```
    ******************************************************
    *  BUA/9340 P/N 16059335 8/1/85 P
    *  SS BY BUA/1728 P/N
    *
    *  ECM P/N 1227165
    *
    *  MY86 YB L98 MD8 NM8 VE1  G44
    *
    *       GM P4 computer system
    *
    *       Calibration Tables
    *
    *       Deduced fm CAMS Disassembly of EPROM Code
    *
    *       From 1986 Y CAR, (BUA, VETTE)
    *
    * L98, 8  85 - 86   160 BAUD ONLY
    * LB9, F  86        160 BAUD ONLY
    *
    * LB9, F  87 - 88   160 & 8192 BAUD
    * L98, 8  87 - 88   160 & 8192 BAUD
    *
    * DATA ON PIN E
    *
    * The ECM is uni-directiona in 160 Baud when the ECM
    * is not in the ALDL mode. When the ECM is in the ALDL
    * Mode, (10k). The ECM will xmit a normal 25 item ALDL
    * list at 160 baud.
    *
    * The ECM will listen for 50 MSEC after completion of
    * the 160 baud ALDL list.  for an inboud Test device
    * originated 8192 (polling) message.
    *
    * If the 8192 polling message is accepted, 8192
    * commications will continue till power down,
    *
    *
    * CALIB = $C000 - $C800
    * IEEE CK SUM =
    *
    ******************************************************

        ORG $0000

LC000:  FDB $25E5   ; EPROM ID code
LC002:  FDB $0A55   ; Date Code
LC004:  FDB $0172   ; Sequence Number
                    ;
LC006:  FDB $9708   ; Ck Sum of Addr's $C008 - $FFFF
LC008:  FCB $32     ; Pgm Match Byte, $32 = 1986 Prod.
                    ;  -Set $AA For bypass of Cksum
                    ;
LC009:  FCB 0       ; Num of Cyl,   8 = 0000 0000, $00
                    ;               6 = 1100 0000, $C0
                    ;               4 = 1000 0000, $80
                    ;               3 = 0110 0000, $60
                    ;
LC00A:  FDB $CA21   ; Cust ID WORD #1
LC00C:  FDB $C1A1   ; Cust ID WORD #2
                    ;
                    ;
LC00E:  FDB 3277    ; 66Hz,  VATS Ck Value, Fail if VATS L.T.
LC010:  FDB 1638    ; 33hZ, VATS Ck Value, Fail if VATS G.T.
                    ;
```

```
LC012:  FDB $0385   ; If Ign off => this, turn off MPU


                    ;---------------------------------------
LC014:  FCB $B4     ; 1011 0100      Air Fuel Opt Word 1, ($B4)
                    ;
                    ; b7 = Use Filter for Air flow
                    ; b6 = Use TCC for Shft Lamp Cnt'l
                    ; b5 = Req Clsed Lp for Can Purge
                    ; b4 = VATS Enable
                    ;
                    ; b3 =
                    ; b2 = Analog MAF Meter in use (vs FM DIGITAL)
                    ; b1 = Single Fire Mode
                    ; b0 = Manual Xmission
                    ;
                    ;---------------------------------------
LC015:  FCB $04     ; 0000 0100     2nd AIr Flow Mode Word, ($04)
                    ;
                    ; b7 =
                    ; b6 =
                    ; b5 =
                    ; b4 =
                    ;
                    ; b3 =
                    ; b2 =
                    ; b1 = 1 = 2 AIR valves, 0 = 1 valve
                    ; b0 =
                    ;
                    ;---------------------------------------
LC016:  FCB $62     ; 3rd AIr Flow Mode Word,  0110 0010
                    ;
                    ; b7 =
                    ; b6 = Calc Base Inj PW, not Tbl
                    ; b5 = Int Reset when B.Lrn cell Chnge
                    ; b4 =
                    ;
                    ; b3 =
                    ; b2 =
                    ; b1 = Reset Corr/init of Auto Enrich
                    ; b0 =
                    ;
                    ;---------------------------------------
LC017:  FCB $00     ; 4th AIr Flow Mode Word, 0000 0000
                    ;
                    ; b7 = Use TCC out to Cnt'l A/C Clutch
                    ; b6 = Use Pwr Steer Pressure Sw
                    ; b5 = N.O. Cooling Fan Req input
                    ; b4 = TCC lk'ed Hwy Mode Spark Ck On.
                    ;
                    ; b3 = If CCP Chg, force Int to 128
                    ; b2 = 4th Gear Hwy Mode Spark Adv on
                    ; b1 =
                    ; b0 = Use Ld Val for BLM not dispflow
                    ;---------------------------------------


    ****************************************************
    *  Spark param'a, (EST)
    * TYPE 32 ECM P/N 122
    ****************************************************
LC018:  FDB     3277            ; Start up RPM
LC01A:  FCB     8               ; 12.5 mS LP'S RPM must be up, (8 Lp's)
LC01B:  FCB     32              ; If Diff Ld Val > Use Max Dwell

LC01C:  FCB     17              ; Advance Ref, (5.9 Deg), (Val/2.844)
```

```
                                ; Initial advance -- 6 deg

LC01D:  FCB     13              ; 198.28 usec Time Corr to S.A.
                                ; - (Val * 15.26)  (spark delay)

LC01E:  FDB     0119            ; 42 DEG Max S.A., (Rel to lead)

LC020:  FDB     65525           ; 3.5 Deg Max S.A. Retard
LC022:  FDB     57              ; Fixed S.A. For Diag, (20 Deg)
LC024:  FCB     23              ; 8 Deg Add S.A. for ALDL

        ;
        ; >> STALL SAVER PARAMS <<
        ; NUM = ARG/12.5 For all RPM args
        ;
LC025:  FCB     32              ; Stall Saver Lo lmt, (400 RPM)
LC026:  FCB     36              ; Stall Saver Lmt, (450 RPM)
LC027:  FCB     44              ; Stall Saver Lmt, (550 RPM)

LC028:  FCB     44              ; If RPM > Disable Stall Saver S.A.

LC029:  FCB     2               ; Add To SABLND ****

        ;
        ; Hot Restart Spark Params
        ;
LC02A:  FCB     113             ; If Cool > 54.7C (129 F) DISABLE HOT RESTART,
                                ; Num = (temp C +40) * (256/192)
                                ;
LC02B:  FCB     28              ; HOT RETARD, (9.8 Deg)
                                ; Num = temp  * (256/192)
                                ;
LC02C   FCB     113             ; DISABLE IF COOL => 54.7c
                                ; Num = (temp C +40) * (256/192)

        ;
        ; Disable cold S.A.
        ;
LC02D:  FCB      27             ; If cool diff fm start > 20c
                                ; Num = temp C * (256/192)


        ;-----------------------------------------------
        ; MAIN SPARK ADV vs LD vs RPM
        ;
        ;  Dissassemby of BUA
        ;  09-03-1994, 13:39:24
        ;
        ;
        ; 12 x 12
        ;
        ; TBL = SPK * (256/90)
        ;-----------------------------------------------
        ORG     $002E

LC02E   FCB  0          ; Min RPM Val
        FCB  32         ; Min LD VALUE Value
        FCB  12         ; COL'S/ROW
        ;-----------------------------------------------
        ; 400 RPM
        ;                   SPK ADV         LD VAL
        ;-----------------------------------------------
        FCB      57    ;  20.0           32.0
        FCB      57    ;  20.0           48.0
        FCB      57    ;  20.0           64.0
        FCB      57    ;  20.0           80.0
```

```
FCB      57    ;  20.0           96.0
FCB      57    ;  20.0          112.0
FCB      57    ;  20.0          128.0
FCB      57    ;  20.0          144.0
FCB      57    ;  20.0          160.0
FCB      57    ;  20.0          176.0
FCB      57    ;  20.0          192.0
FCB      57    ;  20.0          208.0
;-----------------------------------------------
; 600 RPM
;                  SPK ADV         LD VAL
;-----------------------------------------------
FCB      57    ;  20.0           32.0
FCB      57    ;  20.0           48.0
FCB      57    ;  20.0           64.0
FCB      57    ;  20.0           80.0
FCB      57    ;  20.0           96.0
FCB      57    ;  20.0          112.0
FCB      57    ;  20.0          128.0
FCB      57    ;  20.0          144.0
FCB      57    ;  20.0          160.0
FCB      57    ;  20.0          176.0
FCB      57    ;  20.0          192.0
FCB      57    ;  20.0          208.0
;-----------------------------------------------
; 800 RPM
;                  SPK ADV         LD VAL
;-----------------------------------------------
FCB      77    ;  27.1           32.0
FCB      77    ;  27.1           48.0
FCB      77    ;  27.1           64.0
FCB      77    ;  27.1           80.0
FCB      77    ;  27.1           96.0
FCB      70    ;  24.6          112.0
FCB      65    ;  22.9          128.0
FCB      65    ;  22.9          144.0
FCB      63    ;  22.2          160.0
FCB      59    ;  20.7          176.0
FCB      59    ;  20.7          192.0
FCB      59    ;  20.7          208.0
;-----------------------------------------------
; 1000 RPM
;                  SPK ADV         LD VAL
;-----------------------------------------------
FCB      80    ;  28.1           32.0
FCB      80    ;  28.1           48.0
FCB      80    ;  28.1           64.0
FCB      80    ;  28.1           80.0
FCB      80    ;  28.1           96.0
FCB      73    ;  25.7          112.0
FCB      65    ;  22.9          128.0
FCB      65    ;  22.9          144.0
FCB      65    ;  22.9          160.0
FCB      59    ;  20.7          176.0
FCB      59    ;  20.7          192.0
FCB      59    ;  20.7          208.0
;-----------------------------------------------
; 1200 RPM
;
;                  SPK ADV         LD VAL
;-----------------------------------------------
FCB      85    ;  29.9           32.0
FCB      85    ;  29.9           48.0
FCB      85    ;  29.9           64.0
FCB      85    ;  29.9           80.0
FCB      85    ;  29.9           96.0
```

```
FCB      78    ;  27.4          112.0
FCB      70    ;  24.6          128.0
FCB      70    ;  24.6          144.0
FCB      70    ;  24.6          160.0
FCB      60    ;  21.1          176.0
FCB      60    ;  21.1          192.0
FCB      60    ;  21.1          208.0
;-------------------------------------------
; 1400 RPM
;                  SPK ADV         LD VAL
;-------------------------------------------
FCB      88    ;  30.9           32.0
FCB      88    ;  30.9           48.0
FCB      88    ;  30.9           64.0
FCB      88    ;  30.9           80.0
FCB      88    ;  30.9           96.0
FCB      81    ;  28.5          112.0
FCB      73    ;  25.7          128.0
FCB      73    ;  25.7          144.0
FCB      73    ;  25.7          160.0
FCB      65    ;  22.9          176.0
FCB      65    ;  22.9          192.0
FCB      65    ;  22.9          208.0
;-------------------------------------------
; 1600 RPM
;                  SPK ADV         LD VAL
;-------------------------------------------
FCB      102   ;  35.9           32.0
FCB      102   ;  35.9           48.0
FCB      101   ;  35.5           64.0
FCB      98    ;  34.5           80.0
FCB      96    ;  33.8           96.0
FCB      94    ;  33.1          112.0
FCB      91    ;  32.0          128.0
FCB      88    ;  30.9          144.0
FCB      77    ;  27.1          160.0
FCB      70    ;  24.6          176.0
FCB      70    ;  24.6          192.0
FCB      70    ;  24.6          208.0
;-------------------------------------------
; 1800 RPM
;                  SPK ADV         LD VAL
;-------------------------------------------
FCB      106   ;  37.3           32.0
FCB      106   ;  37.3           48.0
FCB      105   ;  36.9           64.0
FCB      102   ;  35.9           80.0
FCB      100   ;  35.2           96.0
FCB      98    ;  34.5          112.0
FCB      93    ;  32.7          128.0
FCB      91    ;  32.0          144.0
FCB      81    ;  28.5          160.0
FCB      73    ;  25.7          176.0
FCB      73    ;  25.7          192.0
FCB      73    ;  25.7          208.0
;-------------------------------------------
; 2000 RPM
;                  SPK ADV         LD VAL
;-------------------------------------------
FCB      109   ;  38.3           32.0
FCB      109   ;  38.3           48.0
FCB      108   ;  38.0           64.0
FCB      104   ;  36.6           80.0
FCB      102   ;  35.9           96.0
FCB      99    ;  34.8          112.0
FCB      95    ;  33.4          128.0
```

```
FCB      93    ;  32.7          144.0
FCB      85    ;  29.9          160.0
FCB      75    ;  26.4          176.0
FCB      75    ;  26.4          192.0
FCB      75    ;  26.4          208.0
;-------------------------------------------
; 2200 RPM
;                  SPK ADV         LD VAL
;-------------------------------------------
FCB      112   ;  39.4           32.0
FCB      112   ;  39.4           48.0
FCB      111   ;  39.0           64.0
FCB      105   ;  36.9           80.0
FCB      102   ;  35.9           96.0
FCB      102   ;  35.9          112.0
FCB      98    ;  34.5          128.0
FCB      94    ;  33.1          144.0
FCB      88    ;  30.9          160.0
FCB      78    ;  27.4          176.0
FCB      78    ;  27.4          192.0
FCB      78    ;  27.4          208.0
;-------------------------------------------
; 2400 RPM
;                  SPK ADV         LD VAL
;-------------------------------------------
FCB      116   ;  40.8           32.0
FCB      116   ;  40.8           48.0
FCB      114   ;  40.1           64.0
FCB      108   ;  38.0           80.0
FCB      105   ;  36.9           96.0
FCB      102   ;  35.9          112.0
FCB      100   ;  35.2          128.0
FCB      97    ;  34.1          144.0
FCB      92    ;  32.3          160.0
FCB      81    ;  28.5          176.0
FCB      81    ;  28.5          192.0
FCB      81    ;  28.5          208.0
;-------------------------------------------
; 2800 RPM
;                  SPK ADV         LD VAL
;-------------------------------------------
FCB      120   ;  42.2           32.0
FCB      120   ;  42.2           48.0
FCB      116   ;  40.8           64.0
FCB      115   ;  40.4           80.0
FCB      108   ;  38.0           96.0
FCB      108   ;  38.0          112.0
FCB      100   ;  35.2          128.0
FCB      97    ;  34.1          144.0
FCB      94    ;  33.1          160.0
FCB      85    ;  29.9          176.0
FCB      85    ;  29.9          192.0
FCB      85    ;  29.9          208.0
;-------------------------------------------
; 3200 RPM
;                  SPK ADV         LD VAL
;-------------------------------------------
FCB      134   ;  47.1           32.0
FCB      134   ;  47.1           48.0
FCB      125   ;  44.0           64.0
FCB      122   ;  42.9           80.0
FCB      108   ;  38.0           96.0
FCB      108   ;  38.0          112.0
FCB      100   ;  35.2          128.0
FCB      97    ;  34.1          144.0
FCB      94    ;  33.1          160.0
```

```
FCB      85    ;  29.9          176.0
FCB      85    ;  29.9          192.0
FCB      85    ;  29.9          208.0
;-----------------------------------------------
; 3600 RPM
;                  SPK ADV         LD VAL
;-----------------------------------------------
FCB      134   ;  47.1           32.0
FCB      134   ;  47.1           48.0
FCB      129   ;  45.4           64.0
FCB      129   ;  45.4           80.0
FCB      114   ;  40.1           96.0
FCB      108   ;  38.0          112.0
FCB      101   ;  35.5          128.0
FCB      97    ;  34.1          144.0
FCB      94    ;  33.1          160.0
FCB      85    ;  29.9          176.0
FCB      85    ;  29.9          192.0
FCB      85    ;  29.9          208.0
;-----------------------------------------------
; 4000 RPM
;                  SPK ADV         LD VAL
;-----------------------------------------------
FCB      134   ;  47.1           32.0
FCB      134   ;  47.1           48.0
FCB      129   ;  45.4           64.0
FCB      129   ;  45.4           80.0
FCB      129   ;  45.4           96.0
FCB      117   ;  41.1          112.0
FCB      106   ;  37.3          128.0
FCB      97    ;  34.1          144.0
FCB      94    ;  33.1          160.0
FCB      85    ;  29.9          176.0
FCB      85    ;  29.9          192.0
FCB      85    ;  29.9          208.0
;-----------------------------------------------
; 4400 RPM
;                  SPK ADV         LD VAL
;-----------------------------------------------
FCB      134   ;  47.1           32.0
FCB      134   ;  47.1           48.0
FCB      129   ;  45.4           64.0
FCB      129   ;  45.4           80.0
FCB      129   ;  45.4           96.0
FCB      117   ;  41.1          112.0
FCB      106   ;  37.3          128.0
FCB      106   ;  37.3          144.0
FCB      94    ;  33.1          160.0
FCB      87    ;  30.6          176.0
FCB      87    ;  30.6          192.0
FCB      87    ;  30.6          208.0
;-----------------------------------------------
; 4800 RPM
;                  SPK ADV         LD VAL
;-----------------------------------------------
FCB      134   ;  47.1           32.0
FCB      134   ;  47.1           48.0
FCB      129   ;  45.4           64.0
FCB      129   ;  45.4           80.0
FCB      129   ;  45.4           96.0
FCB      117   ;  41.1          112.0
FCB      106   ;  37.3          128.0
FCB      106   ;  37.3          144.0
FCB      94    ;  33.1          160.0
FCB      92    ;  32.3          176.0
FCB      92    ;  32.3          192.0
```

```
        FCB      92    ;  32.3          208.0
        ;---------------------------------------------



        ;---------------------------------------------
        ; COOLANT ADVANCE CORRECTION vs LOAD VAL vs COO
        ;
        ;  Dissassemby of BUA, blocks =  12
        ;  02-05-1995, 11:02:07
        ;
        ; TBL = (SPK ADV + BIAS)  * (256/90 )
        ;---------------------------------------------
        ORG  $00FD  ;
                    ;
LC0FD:  FCB  57     ; 20 DEG SA, COOL TBL BIAS
                    ;
LC0FE:  FCB  0      ; Ld selector 0 = LV8
                    ;             4 = LVALT
                    ;
LC0FF:  FCB  32     ; Min COOL Val, (-16 C)
        FCB  32     ; Min LD VAL Value
        FCB  9      ; COL'S/ROW
        ;---------------------------------------------
        ; -16 Deg c COOL
        ;                   spk adv         LV8
        ;---------------------------------------------
        FCB      81    ;     8.5         32.0
        FCB      81    ;     8.5         48.0
        FCB      81    ;     8.5         64.0
        FCB      81    ;     8.5         80.0
        FCB      81    ;     8.5         96.0
        FCB      81    ;     8.5        112.0
        FCB      81    ;     8.5        128.0
        FCB      85    ;     9.9        144.0
        FCB      85    ;     9.9        160.0
        ;---------------------------------------------
        ; -4 Deg c COOL
        ;                   spk adv         LV8
        ;---------------------------------------------
        FCB      81    ;     8.5         32.0
        FCB      81    ;     8.5         48.0
        FCB      81    ;     8.5         64.0
        FCB      81    ;     8.5         80.0
        FCB      81    ;     8.5         96.0
        FCB      81    ;     8.5        112.0
        FCB      81    ;     8.5        128.0
        FCB      85    ;     9.9        144.0
        FCB      85    ;     9.9        160.0
        ;---------------------------------------------
        ; 8 Deg c COOL
        ;                   spk adv         LV8
        ;---------------------------------------------
        FCB      68    ;     3.9         32.0
        FCB      68    ;     3.9         48.0
        FCB      68    ;     3.9         64.0
        FCB      68    ;     3.9         80.0
        FCB      68    ;     3.9         96.0
        FCB      68    ;     3.9        112.0
        FCB      68    ;     3.9        128.0
        FCB      68    ;     3.9        144.0
        FCB      68    ;     3.9        160.0
        ;---------------------------------------------
        ; 20 Deg c COOL
        ;                   spk adv         LV8
        ;---------------------------------------------
```

```
FCB      57    ;     0.0         32.0
FCB      57    ;     0.0         48.0
FCB      57    ;     0.0         64.0
FCB      57    ;     0.0         80.0
FCB      57    ;     0.0         96.0
FCB      57    ;     0.0        112.0
FCB      57    ;     0.0        128.0
FCB      71    ;     5.0        144.0
FCB      71    ;     5.0        160.0
;-----------------------------------------------
; 32 Deg c COOL
;                  spk adv         LV8
;-----------------------------------------------
FCB      57    ;     0.0         32.0
FCB      57    ;     0.0         48.0
FCB      57    ;     0.0         64.0
FCB      57    ;     0.0         80.0
FCB      57    ;     0.0         96.0
FCB      57    ;     0.0        112.0
FCB      57    ;     0.0        128.0
FCB      71    ;     5.0        144.0
FCB      71    ;     5.0        160.0
;-----------------------------------------------
; 44 Deg c COOL
;                  spk adv         LV8
;-----------------------------------------------
FCB      57    ;     0.0         32.0
FCB      57    ;     0.0         48.0
FCB      57    ;     0.0         64.0
FCB      57    ;     0.0         80.0
FCB      57    ;     0.0         96.0
FCB      57    ;     0.0        112.0
FCB      57    ;     0.0        128.0
FCB      71    ;     5.0        144.0
FCB      71    ;     5.0        160.0
;-----------------------------------------------
; 56 Deg c COOL
;                  spk adv         LV8
;-----------------------------------------------
FCB      57    ;     0.0         32.0
FCB      57    ;     0.0         48.0
FCB      57    ;     0.0         64.0
FCB      57    ;     0.0         80.0
FCB      57    ;     0.0         96.0
FCB      57    ;     0.0        112.0
FCB      57    ;     0.0        128.0
FCB      57    ;     0.0        144.0
FCB      57    ;     0.0        160.0
;-----------------------------------------------
; 68 Deg c COOL
;                  spk adv         LV8
;-----------------------------------------------
FCB      57    ;     0.0         32.0
FCB      57    ;     0.0         48.0
FCB      57    ;     0.0         64.0
FCB      57    ;     0.0         80.0
FCB      57    ;     0.0         96.0
FCB      57    ;     0.0        112.0
FCB      57    ;     0.0        128.0
FCB      57    ;     0.0        144.0
FCB      57    ;     0.0        160.0
;-----------------------------------------------
; 80 Deg c COOL
;
;                  spk adv         LV8
;-----------------------------------------------
```

```
        FCB      57    ;     0.0         32.0
        FCB      57    ;     0.0         48.0
        FCB      57    ;     0.0         64.0
        FCB      57    ;     0.0         80.0
        FCB      57    ;     0.0         96.0
        FCB      57    ;     0.0        112.0
        FCB      57    ;     0.0        128.0
        FCB      57    ;     0.0        144.0
        FCB      57    ;     0.0        160.0
        ;-----------------------------------------------
        ; 92 Deg c COOL
        ;                  spk adv         LV8
        ;-----------------------------------------------
        FCB      57    ;     0.0         32.0
        FCB      57    ;     0.0         48.0
        FCB      57    ;     0.0         64.0
        FCB      57    ;     0.0         80.0
        FCB      57    ;     0.0         96.0
        FCB      57    ;     0.0        112.0
        FCB      57    ;     0.0        128.0
        FCB      57    ;     0.0        144.0
        FCB      57    ;     0.0        160.0
        ;-----------------------------------------------
        ; 104 Deg c COOL
        ;                  spk adv         LV8
        ;-----------------------------------------------
        FCB      57    ;     0.0         32.0
        FCB      57    ;     0.0         48.0
        FCB      57    ;     0.0         64.0
        FCB      57    ;     0.0         80.0
        FCB      57    ;     0.0         96.0
        FCB      57    ;     0.0        112.0
        FCB      57    ;     0.0        128.0
        FCB      57    ;     0.0        144.0
        FCB      57    ;     0.0        160.0
        ;-----------------------------------------------
        ; 116 Deg c COOL
        ;                  spk adv         LV8
        ;-----------------------------------------------
        FCB      57    ;     0.0         32.0
        FCB      57    ;     0.0         48.0
        FCB      57    ;     0.0         64.0
        FCB      51    ;    -2.1         80.0
        FCB      46    ;    -3.8         96.0
        FCB      40    ;    -5.9        112.0
        FCB      40    ;    -5.9        128.0
        FCB      40    ;    -5.9        144.0
        FCB      40    ;    -5.9        160.0
        ;-----------------------------------------------



        ;-----------------------------------------------
        ;       HIGHWAY MODE SPARK CONTROL
        ;       ADVANCE vs LD8 LOAD
        ;
        ; TYPE 32, BUA
        ;-----------------------------------------------
        ORG $016E


LC16E:  FCB 133     ; If Coolant <= 60c, (140f), disable
                    ; hi-way mode spark
                    ;
LC16F:  FCB 100     ; If LV8 > 100 disable hi-way mode spark
                    ;
```

```
LC170:  FCB 254     ; If RPM is less than 6350 RPM then
                    ; disable hi-way mode spark
                    ;
LC171:  FCB 10      ; Enable hi-way mode spark if > 10 Sec


        ;-----------------------------------------------------
        ; HIGHWAY MODE SPARK ADVANCE vs LOAD VALUE
        ;
        ;
        ; TBL = SA * (256/90)
        ;-----------------------------------------------
                    ; DEG SA    LD VAL
                    ;-----------------------------------
LC172:  FCB  28     ; 10         32
        FCB  28     ; 10         48
        FCB  28     ; 10         64
        FCB  28     ; 10         80
        FCB  28     ; 10         96
        FCB  23     ; 10        112
        FCB   8     ;  3        128
        FCB   0     ;  0        144
        ;-----------------------------------------------



        ;-----------------------------------------------
        ;  START UP SPARK ADVANCE vs COOLANT TEMP
        ;
        ;
        ;  TBL = SA deg * (256/90)
        ;-----------------------------------------------
        ORG $017A   ; DEG SPK        Deg C COOL
                    ;-----------------------------------
LC17A   FCB  28     ;     10          -40
LC17B   FCB  28     ;     10          -28
LC17C   FCB  28     ;     10          -16
LC17D   FCB  28     ;     10           -4
LC17E   FCB  28     ;     10            8
LC17F   FCB  28     ;     10           20
LC180   FCB  28     ;     10           32
LC181   FCB  28     ;     10           44
LC182   FCB  28     ;     10           56
LC183   FCB  28     ;     10           68
LC184   FCB  28     ;     10           80
LC185   FCB  28     ;     10           92
LC186   FCB  28     ;     10          104
LC187   FCB  28     ;     10          116
        ;-----------------------------------------------



        ;-----------------------------------------------
        ; START UP SPARK ADVANCE DECAY DELAY vs STARTUP COOL
        ;
        ;  Dissassemby of BUA, LINES =  14
        ;  09-14-1994, 10:09:39
        ;
        ;  Table value = INJECTS
        ;
        ;  TBL = VAL/LC188
        ;-----------------------------------------------
        ORG  $0188  ;
                    ;
LC188:  FDB  0256   ; Mult for tbl,
                    ; (NUM = ARG * 256)
```

```
                ;
                ; DECAY DLY   DEG c S/U COOL
                ;---------------------------------
LC18A:  FCB 100     ; 25,600     -40
        FCB 100     ; 25,600     -28
        FCB 100     ; 25,600     -16
        FCB 100     ; 25,600      -4
        FCB 100     ; 25,600       8
        FCB 100     ; 25,600      20
        FCB 100     ; 25,600      32
        FCB 100     ; 25,600      44
        FCB 100     ; 25,600      56
        FCB 80      ; 25,600      68
        FCB 40      ; 25,600      80
        FCB 40      ; 25,600      92
        FCB 40      ; 25,600     104
        FCB 40      ; 25,600     116
        ;---------------------------------------------


        ;---------------------------------------------
        ; START UP SPARK ADVANCE DECAY TIME vs STARTUP COOL
        ;
        ;
        ;  TBL = INJECTS
        ;---------------------------------------------
        ORG  $0198  ;INJ'S          DEG c S/U COOL
                    ;---------------------------------
LC198:  FCB  1      ;                   -40
        FCB  1      ;                   -28
        FCB  1      ;                   -16
        FCB  1      ;                    -4
        FCB  1      ;                     8
        FCB  1      ;                    20
        FCB  1      ;                    32
        FCB  1      ;                    44
        FCB  1      ;                    56
        FCB  1      ;                    68
        FCB  1      ;                    80
        FCB  1      ;                    92
        FCB  1      ;                   104
        FCB  1      ;                   116
        ;---------------------------------------------


        ;---------------------------------------------
        FCB     0
        FCB     0
        FCB     0
        FCB     0
        ;---------------------------------------------


        ***********************************************
        * PROM TEST WORD 1 FOR ERR CODE 51
        *   Set ERR code 51 if N.E. ($55)
        ***********************************************
        ORG  $01AA

LC1AA:  FCB  $55     ; EPROM TEST WD 1



        ;---------------------------------------------
        ; STARTUP SPK ADV DECAY VS STARTUP COOLANT
```

```
        ;
        ; TBL =
        ;---------------------------------------------
        ORG $01AB   ;               Deg c COOL
                    ;---------------------------------
LC1AB:  FCB 128     ; 1.4 Degrees    -40
        FCB 128     ;                -28
        FCB 128     ;                -16
        FCB 128     ;                 -4
        FCB 128     ;                  8
        FCB 128     ;                 20
        FCB 128     ;                 32
        FCB 128     ;                 44
        FCB 128     ;                 56
        FCB 128     ;                 68
        FCB 128     ;                 80
        FCB 128     ;                 92
        FCB 128     ;                104
        FCB 255     ; 2.8            116
        ;---------------------------------------------



LC1B9:  FCB 52      ; If filtered RPM/12.5 = > 65O RPM then KNOCK is on
                    ; Table value = Arg * (256/12.5)

LC1BA:  FCB 2       ; If filtered MPH = > 2 than Then enble KNOCK

LC1BB:  FCB 114     ; 25.3 deg Max allowable KNOCK Retard when not in WOT
                    ; Table value = Arg * (256/45)

LC1BC:  FCB 142     ; If COOLANT < 66.5C THEN DISABLE KNOCK
                    ; Table value = (Arg+40) * (256/192)

LC1BD:  FCB 53      ; If delta COOL since start up G.T. arg ENABLE KNOCK
                    ; Table value = Arg * (256/192)

        ;---------------------------------------------
        ; KNOCK ATACK RATE vs RPM
        ;
        ;
        ; TBL = ATTACK RATE IN (Deg/msec) /0.0225
        ;---------------------------------------------
        ORG $01BE   ; Deg           RPM
                    ;---------------------------------
LC1BE:  FCB   7     ; 0.158          400
        FCB   8     ; 0.180         1200
        FCB  13     ; 0.293         2000
        FCB  16     ; 0.360         3200
        FCB  16     ; 0.360         4800
        ;---------------------------------------------



        ;---------------------------------------------
        ; KNOCK PCT. RECOVERY RATE vs RPM
        ;
        ;  Table values attack rate in PCT.
        ;
        ;   RECOVERY/SEC * 256/500
        ;---------------------------------------------
        ORG $01C3   ; PCT           RPM
                    ;---------------------------------
LC1C3:  FCB 20      ; 39.0           400
        FCB 20      ; 39.0          1200
        FCB 26      ; 50.8          2000
```

```
        FCB 31      ; 60.5         3200
        FCB 31      ; 60.5         4800
        ;---------------------------------------------



        ;---------------------------------------------
        ; MAX KNOCK RETARD WHEN IN WOT vs RPM
        ;
        ;  Dissassemby of BUA, LINES =  8
        ;  09-14-1994, 10:27:25
        ;
        ;  TBL =  5.688  * DEG RETARD
        ;---------------------------------------------
        ORG $01C8   ; DEG RETARD     RPM
                    ;-----------------------------------
LC1C8   FCB  108    ;     19          800
LC1C9   FCB  77     ;     14         1600
LC1CA   FCB  65     ;     11         2400
LC1CB   FCB  77     ;     14         3200
LC1CC   FCB  51     ;      9         4000
LC1CD   FCB  34     ;      6         4800
LC1CE   FCB  34     ;      6         5600
LC1CF   FCB  34     ;      6         6400
        ;---------------------------------------------
        *********************************************
        *   >>> END OF IGNITION TABLES  <<<
        *
        *********************************************



        *********************************************
        *            >>>DIAGNOSTIC PARAMS   <<<
        *
        * BUA, TYPE 32, (MY86)
        *       General Params.
        *********************************************
        ORG $01D0   ;
                    ;-----------------------------------
LC1D0:  FCB $F7     ; 1111 0111, Mask For Mal Funct flg 1
                    ; b 0 Disables ERR Recognition
                    ;
                    ; b 0 = ERR Code 23   MAT Sensor low
                    ; b 1 = ERR Code 22   TPS low
                    ; b 2 = ERR Code 21   TPS High
                    ; b 3 = ERR Code 16   Not used
                    ;
                    ; b 4 = ERR Code 15   Cool Sensor Low Temp
                    ; b 5 = ERR Code 14   Cool Sensor Hi Temp
                    ; b 6 = ERR Code 13   Oxy Sensor
                    ; b 7 = ERR Code 12   No Ref pulse (Dist)
                    ;-----------------------------------
LC1D1:  FCB $CE     ; 1100 1110, Mask for ERR flag 2
                    ;
                    ; b 0 = ERR Code 35   M/A
                    ; b 1 = ERR Code 34   MAF Sensor low
                    ; b 2 = ERR Code 33   MAF Sensor high
                    ; b 3 = ERR Code 32   EGR Diag
                    ;
                    ; b 4 = ERR Code 31
                    ; b 5 = ERR Code 26
                    ; b 6 = ERR Code 25   MAT Sensor High
                    ; b 7 = ERR Code 24   VSS
                    ;-----------------------------------
```

```
LC1D2:  FCB $FF     ; 1111 1111,  Mask For ERR flag 3
                    ;
                    ; b 0 = ERR Code 51   Prom Error
                    ; b 1 = ERR Code 46   VATS Fail
                    ; b 2 = ERR Code 45   o2 Sensor Rich
                    ; b 3 = ERR Code 44   o2 Sensor Lean
                    ;
                    ; b 4 = ERR Code 43   KNOCK Fail
                    ; b 5 = ERR Code 42   SPK Monitor error
                    ; b 6 = ERR Code 41   CYL Select error
                    ; b 7 = ERR Code 36   Burn off Diag.
                    ;-----------------------------------
LC1D3:  FCB $E0     ; 1110 0000, Mask for ERR flg 4
                    ;
                    ; b 0 = ERR Code 63
                    ; b 1 = ERR Code 62
                    ; b 2 = ERR Code 61
                    ; b 3 = ERR Code 56
                    ;
                    ; b 4 = ERR Code 55   ADU Error
                    ; b 5 = ERR Code 54   Fuel pump Voltage
                    ; b 6 = ERR Code 53   Over voltage
                    ; b 7 = ERR Code 52   Missing Cal Pack
                    ;-----------------------------------
LC1D4:    FCB   $00 ; 0000 0000,  Mask for ERR flg 5
                    ;
                    ; b 0 = ERR Code
                    ; b 1 = ERR Code
                    ; b 2 = ERR Code
                    ; b 3 = ERR Code
                    ;
                    ; b 4 = ERR Code
                    ; b 5 = ERR Code
                    ; b 6 = ERR Code
                    ; b 7 = ERR Code
                    ;-------------------------------------


                    ;-----------------------------------
LC1D5:  FCB 50      ; 50, SUCESSIVE PWR UP'S W/O ERROR
                    ;
LC1D6:  FCB 10      ; 1 Sec ERR funct LOGGING FILTER CONSTANT #1
                    ; Num + Arg * 10
                    ;
LC1D7:  FCB 50      ; 5 Sec ERR funct LOGGING FILTER CONSTANT #2
                    ; Num = Arg * 10
                    ;
LC1D8:  FCB 100     ; 10 Sec ERR funct LOGGING FILTER CONSTANT #3
                    ; Num = Arg * 10
                    ;
LC1D9:  FCB 120     ; 12 Sec ERR funct LOGGING FILTER CONSTANT #4
                    ; Num = Arg * 10
                    ;
LC1DA:  FCB 0       ; Ck ENG LAMP BULB TST TIME
                    ;---------------------------------


        ;-------------------------------------------
        ;       ERR # 13 Params
        ;       >> o2 sensor <<
        ;-------------------------------------------
        ORG     $01DB

LC1DB:  FCB     146     ; Coolant lo limit. >= 70C, (157f)
                        ; CALIB = (deg c - 40) * (256/192)
```

```
LC1DC:  FCB     60      ; If eng run time < 30 Sec, disable ERR 13
                        ; CALIB = sec / 2


LC1DD:  FCB     79      ; If o2 volts <=  350 Mvdc, ERR 13
                        ; CALIB = vdc * 226

LC1DE:  FCB     124     ; If o2 volts > 548 Mvdc, ERR 13
                        ; CALIB = vdc * 226

LC1DF:  FCB     13      ; 5% TPS Min for ERR 13
                        ; CALIB = TPS * 2.56

LC1E0:  FCB     30      ; 15 Sec TPS Min time limit for ERR 13
                        ; CALIB = Sec / 2

    ;---------------------------------------------------------
    ;       ERR # 14 Params
    ;       >> Cool sensor Hi <<
    ;---------------------------------------------------------
        ORG     $01E1

LC1E1:  FCB     227     ; If cool 130c, (266f) < then Disable #14
                        ; CALIB = (deg c +40) * 256/192


    ;---------------------------------------------------------
    ;       ERR # 14/15 Params
    ;       >> Cool sensor Hi/Lo <<
    ;---------------------------------------------------------
        ORG     $01E2

LC1E2:  FCB     135     ; 61c, (142f), Cool Temp for default #14/15
                        ; CALIB = (deg c +40) * (256/192)

LC1E3:  FDB     0000    ; If Eng run 0 Sec Disable #15


    ;---------------------------------------------------------
    ;       ERR # 15 Params
    ;       >> Cool sensor Low <<
    ;---------------------------------------------------------
        ORG     $01E5

LC1E5:  FCB     250     ; IF TPS A/D <= disable ERR #15
                        ; TBL4 ADCOOL4K

    ;---------------------------------------------------------
    ;       ERR #21 Params
    ;       >> TPS sensor Hi <<
    ;---------------------------------------------------------
        ORG     $01E6

LC1E6:  FCB     246     ; IF TPS A/D > set ERR #21
LC1E7:  FCB     128     ; If TPS <= 50% disable #21
LC1E8:  FCB     20      ; 20 Sec's Time req for ERR #21
LC1E9:  FCB     12      ; If Air Flow >= 12 gm?sec, disable ERR #21

    ;---------------------------------------------------------
    ;       ERR # 21/22 Params
    ;       >> TPS sensor Hi/Lo <<
    ;---------------------------------------------------------
        ORG     $01EA

LC1EA:  FCB     48      ; Use as  default A/D value for
                        ; TPS if ERR #21
```

```
    ;-------------------------------------------------------
    ;       ERR # 22 Params
    ;       >> TPS sensor Lo <<
    ;-------------------------------------------------------
        ORG     $01EB

LC1EB:  FCB     12      ; If TPS A/D >= 12 then disable ERR #22


    ;-------------------------------------------------------
    ;       ERR # 23 Params
    ;       >> MAT sensor lo <<
    ;-------------------------------------------------------
        ORG     $01EC

LC1EC:  FCB     4       ; If MAT < Enable ERR 23
                        ; TBL3, A/D MAT INV

LC1ED:  FCB     120     : 12 Sec  req for ERR #23

    ;-------------------------------------------------------
    ;       ERR # 23/25 Params
    ;       >> MAT sensor lo/Hi <<
    ;-------------------------------------------------------
        ORG     $01EE

LC1EE:  FDB     0240    : if Eng Run time <= 120 SEC
                        ; disable ERR #23 & ERR #25

LC1F0:  FCB     1       ; 1 MPH MIN TO  ENABLE ERR 23/25
LC1F1:  FCB     29      ; If ERR #25 Use as Default
                        ; for MAT, (Deg C)
                        ;TBL3, ADMATINV

    ;-------------------------------------------------------
    ;       ERR # 24 Params
    ;       >> Vss Sensor  <<
    ;-------------------------------------------------------
        ORG     $01F2

LC1F2:  FCB     3       ; If > 3 MPH then disable ERR 24

LC1F3:  FCB     40      ; If  <= 1000 RPM, Disable ERR #24
                        ; TBL1, NTRPM

LC1F4:  FCB     240     ; If RPM > 6000 then disable ERR 24
                        ; TBL1, NTRPM

LC1F5:  FCB     5       ; If => 2% TPS then Disable ERR 24
                        ; CALIB = Arg * 2.56, (1.93%)

LC1F6:  FCB     26      ; If LV8 >= 26, Disable ERR 24

LC1F7:  FCB     2       ; 2 Sec's TIMER for ERR 24

    ;-------------------------------------------------------
    ;       ERR # 25 Params
    ;       >> MAT sensor Hi <<
    ;-------------------------------------------------------
        ORG     $01F8

LC1F8:  FCB     243     ; If MAT > then Enable ERR 25
                        ; TBL3, ADMATINV

LC1F9:  FCB     120     ; 12 Sec's req for ERR 25
```

```
                        ; CALIB = Sec's * 10

    ;-----------------------------------------------------
    ;       ERR # 32 Params
    ;       >> EGR Diag <<
    ;-----------------------------------------------------
        ORG     $01FA

LC1FA:  FCB     94      ; If COOL >= 30.5c, (87f), Skip
                        ; Strt up ERR #32
                        ; CALIB = (deg c + 40) * (256/19)

LC1FB:  FCB    128      ; If LV8 > 128 then Skip #32

LC1FC:  FCB    173      ; If Cool < 89.8c, (194f),
                        ; Disable ERR #32
                        ; CALIB = (deg c + 40) * (256/192)

LC1FD:  FCB    133      ; If EGR DC < 51.9%, skip ERR #32
                        ; CALIB = EGR DC * 2.56

LC1FE:  FCB     77      ; If TPS > 30%than Skip #32
                        ; CALIB = Arg * 2.56

LC1FF:  FCB     15      ; If TPS < 5.8%, Skip ERR #32
                        ; CALIB = Arg * 2.56

LC200:  FDB   2560      ; Log ERR #32 if tmr > 2560 CNT'S

LC202:  FCB      1      ; Inc ERR #32 tmr this amt
                        ; every 100 Msec.

    ;-----------------------------------------------------
    ;       ERR # 33 Params
    ;       >> MAF Sensor Hi <<
    ;-----------------------------------------------------
        ORG     $0003

LC203:  FCB     38      ; If TPS >= 14.8%, set ERR #34
                        ; CALIB = Arg * 2.56

LC204:  FCB     45      ; If Air Flow <= 45 gms/sec
                        ; disable ERR #33

LC205:  FCB     96      ; If > 0.6 Sec, Set code #33
                        ; CALIB + Arg * 160

LC206:  FCB     8       ; 800 Msec ERR 34 Min time req.
                        ; CALIB = Arg * 10

LC207:  FCB     128     ; If RPM > Disable #33
                        ; RPM/25

LC208:  FCB     100     ; 10.0 VDC PUMP VDC FOR ERR 33 ENABLE

    ;-----------------------------------------------------
    ;       ERR # 34 Params
    ;       >> MAF Sensor Lo <<
    ;-----------------------------------------------------
LC209:  FCB     40      ; 6.4 SEC'S, MIN TIME W/O SIGNAL, (IF FM DIG MAF)
                        ; CALIB = Arg/6.25

LC20A:  FDB     55      ; IF Analog CTS * 7 or PP2DLT < 55
                        ; Set ERR  34.

LC20C:  FCB      2      ; ERR #43, 0.2 Sec Min time req.
```

```
                        ; CALIB + Arg * 10

LC20D:  FCB     24      ; If RPM > 600, Ck ERR #34

LC20E:  FCB     16      ; If TPS > 6.25%, Ck ERR #34
                        ; CALIB = Arg * 2.56,

LC20F:  FCB     0       ; If LV8 >= 0, Ck ERR #34
LC210:  FCB     130     ; If LV8 <= 130, Ck ERR #34

LC211:  FDB     85      ; IF Analog CTS * 7 or
                        ; PP2DLT <, enab ERR #34

    ;---------------------------------------------------------
    ;       ERR # 33/34 Params
    ;       >> MAF Sensor Hi/Lo <<
    ;---------------------------------------------------------
LC213:  FCB     167     ; If TPS > 65.2%, then use for MAF Default
                        ; CALIB = Arg * 2.56

LC214:  FCB     21      ; Gms/sec Scale factor
                        ; gms/sec/IAC Count
                        ; CALIB = Arg * 256

LC215:  FDB     1024    ; 4 Gms/Sec default air flow offset
                        ;CALIB = Arg * 256


    ;-------------------------------------------
    ;  DEFAULT AIR FLOW OFFSET PER PCT TPS VS RPM
    ;  Value = Gms/Sec * 100 pct, (Offset)
    ;
    ;  TBL = Arg * 100
    ;-------------------------------------------
        ORG     $0217

LC217:  FCB      8      ; Table Value
                        ;
                        ; Gms/Sec         RPM
                        ;-----------------------
        FCB      30     ; 0.30             400
        FCB      90     ; 0.90             800
        FCB     110     ; 1.10            1200
        FCB     135     ; 1.35            1600
        FCB     150     ; 1.50            2000
        FCB     175     ; 1.75            2400
        FCB     210     ; 2.10            3200
        FCB     225     ; 2.25            4000
        FCB     230     ; 2.30            4800
    ;-------------------------------------------


    ;---------------------------------------------------------
    ;       ERR # 36 Params
    ;       >> MAF Burn off Diag <<
    ;---------------------------------------------------------
LC221:  FCB      3      ; 0.3 Second Dly prior to Burn off
                        ; CAL = Arg * 10

LC222:  FCB      6      ; 6  fails req for ERR #36 If HLM air meter


LC223:  FCB     95      ; 1.90 VDC, Fail B/O test if HLM A/D GT 1.90 VDC
LC224:  FCB     20      ; Fail B/O test if A/D < 400 mvdc

    ;---------------------------------------------------------
```

```
    ;       ERR # 41 Params
    ;       >> Cyl Sel error <<
    ;-------------------------------------------------------
LC225:  FCB     0       ; Fuel mode
                        ; 24 = TBI
                        ; 16 = 4 Cyl PFI
                        ;  8 = 6 Cyl PFI
                        ;  0 = 8 Cyl PFI


    ;-------------------------------------------------------
    ;       ERR # 42 Params
    ;       >> EST monitor error <<
    ;-------------------------------------------------------
LC226:  FCB     4       ; RPM, tbl1,ntrpm
                        ;TBL1 NTRPM

LC227:  FCB     2       ;If SPK toggled, (PA1 cnt's)
                        ; >= 2 times, prior to eng run set ERR #42

LC228:  FCB     64              ;1048.6 msec ERR 42 treshold,

    ;-------------------------------------------------------
    ;       ERR # 43 Params
    ;       >> KNOCK fail <<
    ;-------------------------------------------------------
LC229:  FCB     235     ; If KNOCK low time > 3.67 Sec,Enab ERR #43
                        ; CALIB = Arg * 64

LC22A:  FCB     45      ; If ERR 43, then KNOCK retard 7.9 Deg
                        ; CALIB = Deg * 256/45

LC22B:  FCB     57      ; Add 10 Deg Sprk Adv for #43 test
                        ; CALIB = Deg * 256/45

LC22C:  FCB     173     ; 90C, (194) MIN COOL TO ENABLE ERR 43
                        ; CALIB = (Deg C + 40) * 256/192

LC22D:  FCB     170     ; If LV < 170, Disable ERR 43


    ;-------------------------------------------------------
    ;       ERR # 44 Params
    ;       >> o2 Sensor lean <<
    ;-------------------------------------------------------
LC22E:  FCB     45      ; If 02 Sensor >= 0.19v, then disable #44
                        ; CALIB = Arg * 226

LC22F:  FCB     20      ; 20 Seconds to set #44

    ;-------------------------------------------------------
    ;       ERR # 45 Params
    ;       >> o2 Sensor rich <<
    ;-------------------------------------------------------
LC230:  FCB     158     ; If o2 Sensor >= 0.699v, disable ERR #45
                        ; CALIB = Arg * 226

LC231:  FCB     50      ; 50 Seconds to set ERR

LC232:  FCB     5       ; If TPS > 1.95%, enab ERR #45
                        ; CALIB = Arg * 2.56

LC233:  FCB     00      ; If TPS < 0%,  enab ERR #45
                        ; CALIB = TPS% * 2.56

    ;-------------------------------------------------------
```

```
    ;       ERR # 54 Params
    ;       >> Fuel Pump voltage <<
    ;       CALIB = Arg * 10
    ;-------------------------------------------------------
LC234:  FCB     15      ; 1.5 SEC'S MIN FOR ERR 54

LC235:  FCB     20      ; 2.0 VDC MIN PUMP VOLTS FOR ERR #54
LC236:  FCB     20      ; 2.O VDC MIN PUMP VOLTS FOR ERR 54

LC237:  FCB     20      ; 2.O VDC MIN IGN VOLTAGE FOR ERR 54
    ;-------------------------------------------------------



    ****************************************************
    *  >>> EGR QUAILIFICATIONS <<<
    *
    * BUA, ECM TYPE $32
    *
    ****************************************************

        ORG     $0238

LC238:  FCB     5       ; Enable EGR if TPS > 1.95%, (If EGR DC <> 0)
                        ; CALIB = Arg * 2.56

LC239:  FCB     8       ; Enable EGR if TPS > 3.13%, (if EGR DC = 0)
                        ; CALIB = Arg * 2.56
                        ;
LC23A:  FCB     30      ;If MAT < then disable EGR
     ;--------------------------------------------------


     ;-------------------------------------------------
     ; EGR Duty CYC vs LV8 & RPM
     ;
     ; Tbl Val(DC) = CALIB * (256/100)
     ;-------------------------------------------------
        ORG     $023B

LC23B:  FCB     32      ; Min Min Val for RPM
        FCB     32      ; LV8 Min
        FCB     9       ; 9 Lines in table
        ;---------------------------------
        ;       800 RPM
        ;---------------------------------
        FCB     255     ; LV 32, DC =99.6%
        FCB     255     ; LV 48
        FCB     255     ; LV 64
        FCB     255     ; LV 80
        FCB     255     ; LV 96
        FCB     255     ; LV 112
        FCB     255     ; LV 128
        FCB     255     ; LV 144
        FCB     255     ; LV 160
        ;--------------------------------
        ;       1200 RPM
        ;--------------------------------
          FCB     255   ;LV 32
          FCB     255   ;LV 48
          FCB     255   ;LV 64
          FCB     255   ;LV 80
          FCB     255   ;LV 96
          FCB     255   ;LV 112
          FCB     255   ;LV 128
          FCB     255   ;LV 144
```

```
          FCB     255   ;LV 160
        ;--------------------------------
        ;       1600 RPM
        ;--------------------------------
          FCB     255   ;LV 32
          FCB     255   ;LV 48
          FCB     255   ;LV 64
          FCB     255   ;LV 80
          FCB     255   ;LV 96
          FCB     255   ;LV 112
          FCB     255   ;LV 128
          FCB     255   ;LV 144
          FCB     255   ;LV 160
        ;--------------------------------
        ;       2000 RPM
        ;--------------------------------
          FCB     255   ;LV 32
          FCB     255   ;LV 48
          FCB     255   ;LV 64
          FCB     255   ;LV 80
          FCB     255   ;LV 96
          FCB     255   ;LV 112
          FCB     255   ;LV 128
          FCB     255   ;LV 144
          FCB     255   ;LV 160
    ;-----------------------------------------------------


    ;-----------------------------------------------------
    ; EGR DUTY CYCLE MULTIPLIER (0-2) vs COOLANT
    ; Gain vs Coolant Temp.
    ;
    ; TABLE VAL = Mult * 128
    ;-----------------------------------------------------

         ORG   $0262

    ;-----------------------------------------------------
    ;
    ;                    MULT       COOL
    ;-----------------------------------------------------
LC262:    FCB     0     ; 0          8
          FCB     0     ; 0         20
          FCB     0     ; 0         32
          FCB     0     ; 0         44
          FCB     128   ; 1         56
          FCB     128   ; 1         68
          FCB     128   ; 1         80
    ;-----------------------------------------------------
    ******************************************************


    ******************************************************
    *       >>>>  Can Purge Param's  <<<<
    *
    ******************************************************
        ORG     $0269

LC269:  FCB     80      ; If Eng time > 80 sec then disable CCP

LC26A:  FCB     147     ; Disable CCP if Cool < 70.3c, (158.4f)
                        ; cal = (Deg c + 40) * 256/192

        ;----------------------
        ; CCP off to on Params
        ;----------------------
```

```
LC26B:  FCB     16      ; Enable CCP if >= 5 MPH
                        ; CALIB = Arg * (16/5)

LC26C:  FCB     10      ; If TPS > = 3.9% then enable CCP
                        ; CALIB = Arg * 2.56

LC26D:  FCB     0       ; If Air flow > 0 then enable CCP

        ;----------------------
        ; CCP on to off params
        ;
        ;----------------------
LC26E:  FCB     10      ; If < 3.12 MPH Disable CCP
                        ; CALIB = Arg * (16/5)

LC26F:  FCB     5       ; If TPS < 1.95% then Disable purge
                        ; CALIB = Arg * 2.56

LC270:  FCB     0       ; If Flow > 0 don't disable CCP
                        ; Gms/Sec

LC271:  FCB     32      ; Filter Coef for CCP D.C.
    ;-------------------------------------------------------

    ;-------------------------------------------------------
    ;  CCP Duty Cycle vs MAF, Gms/Sec
    ;
    ; Table Value = %DC * 2.56
    ;-------------------------------------------------------
        ORG     $0272

LC272:  FCB       8     ; 9 Lines in tbl
    ;-------------------------------------------------------
    ;
    ;                       %DC      AIR FLOW, Gms/Sec
    ;-------------------------------------------------------
        FCB     16      ;   6           0
        FCB     32      ;  13           4
        FCB     48      ;  19           8
        FCB     80      ;  31           12
        FCB     160     ;  63           16
        FCB     208     ;  81           20
        FCB     255     ; 100           24
        FCB     255     ; 100           28
        FCB     255     ; 100           32
    ;-------------------------------------------------------



    ;-------------------------------------------------------
    ; CCP Duty Cycle Gain Vs Load Value
    ;
    ;  Tble Value = Factor * 128
    ;-------------------------------------------------------
        ORG     $027B

LC27B   FCB 8       ; 9 LINE TBL
    ;-------------------------------------------------

    ;-------------------------------------------------------
    ;
    ;                   GAIN        LD VAL
    ;-------------------------------------------------------
LC27C:    FCB     128   ; 1          32
          FCB     128   ; 1          64
          FCB     128   ; 1          96
```

```
          FCB     128   ; 1         128
          FCB     128   ; 1         160
          FCB     128   ; 1         192
          FCB     128   ; 1         224
          FCB     128   ; 1         256
    ;-----------------------------------------------------
    ******************************************************


    ******************************************************
    * TRANSMISSION CONTROL DATA & PARAM's
    * ECM TYPE $32
    * 700R4
    ******************************************************
        ORG     $0284

LC284:  FCB     255     ; SPEED FILTER COEF, (0.996)
                        ; CALIB = ARG * 256
                        ;
LC285:  FCB     120     ; 50C, (122F), COOL TRESH FOR LOCK/UP SHFT ENAB
                        ; CALIB = (ARG+40) * 256/192
                        ;
LC286:  FCB     41      ; 1st GEAR DIRECT N/V RATIO
LC287:  FCB     35      ; 1st GEAR O.D. N/V RATIO
                        ;
LC288:  FCB     30      ; MIN 4th GEAR N/V RATIO
LC289:  FCB     35      ; MAX 4th GEAR N/V RATIO
                        ;
LC28A:  FCB     8       ; 0.8 SEC, 4TH GEAR N/V TIMER
                        ; CALIB = ARG * 10, (8/10 SEC)
                        ;
LC28B:  FCB     255     ; LOOK AHEAD 1ST GEAR TPS, (100%)
                        ;
LC28C:  FCB     0       ; UP SHIFT/LOCK DELAY
                        ; CALIB = ARG * 10, (SEC)
                        ;
LC28D:  FCB     0       ; 1ST GEAR DELAY TIMER
                        ; CALIB = ARG * 10, (SEC)
                        ;
LC28E:  FCB     3       ; HYST FOR %TCC
                        ; CALIB = ARG * 2.56
                        ;
LC28F:  FCB     32      ; RD SPEED COAST, (32 MPH)
                        ;
LC290:  FCB     8       ; LOW MPH COAST TPS = 3.125%
                        ; CALIB = ARG * 2.56, (TPS %)
                        ;
LC291:  FCB     0       ; HI MPH COAST TPS
                        ; CALIB = ARG * 10, (TPS %)
                        ;
LC292:  FCB     255     ; KICK DN PREVENT (SHFTER SW)
                        ; CALIB = ARG / 25, (6375 RPM)
                        ;
LC293:  FCB     128     ; KICK DN/UNLOCK TPS
                        ; CALIB = ARG/25, (3200 RPM)
                        ;
LC294:  FCB     128     ; KICK DN/UNLOCK TPS PREV'NT RPM
                        ; CALIB = ARG/25, (3200 RPM)
                        ;
LC295:  FCB     60      ; MIN VSS, (60 MPH) FOR FORCE UPSHIFT
                        ;
LC296:  FCB     0       ; 0 SEC'S, HI TO LO GEAR LOCK
                        ; CALIB = ARG * 10, (SEC'S)
                        ;
LC297:  FCB     26      ; BIAS TO LOCK ENAB THRESH, (26 MPH)
                        ;
```

```
LC298:  FCB     255     ; NO PASSBY L/U IF TPS < 99.6%
                        ; CALIB = ARG * 2.56
                        ;
LC299:  FCB     28      ; NO PASS BY L/U IF  =< 28 MPH

            ;
            ; PASS BY RPH HYST PAIR
            ;
LC29A:  FCB     32      ; NO PASS BY L/U IF > 800 RPM
LC29B:  FCB     255     ; NO PASS BY L/U IF RPM < 6375
                        ; CAL = ARG/25
                        ;
LC29C:  FDB     65535   ; 819 SEC DLY PRIOR TO PASSBY/LOCKUP
                        ; CALIB = ARG * 80
                        ;
LC29E:  FDB     0240    ; KEEP TCC LK'ED UP FOR PASSBY 30 SEC
                        ; CAL = ARG * 80


    ;-------------------------------------------------------
    ;  MANUAL          - 1ST GEAR DNSHFT
    ;  AUTO TRANS      - NON 4TH GEAR UNLOCK
    ;
    ;  % OF FULL LOAD * 2.56
    ;  12 ENTRIES
    ;-------------------------------------------------------
         ORG     $02A0

LC2A0:  FCB       14    ; 14 MPH, UNLOCK 1ST(MAN), LO GR (AUTO)


    ;-------------------------------------------------------
    ;
    ;                    %FULL LD      MPH
    ;-------------------------------------------------------
LC2A1:    FCB     59    ; 23            12
          FCB     72    ; 28            20
          FCB     92    ; 35            28
          FCB     128   ; 50            36
          FCB     166   ; 65            44
          FCB     218   ; 85            52
          FCB     236   ; 92            60
          FCB     255   ; 100           68
          FCB     255   ; 100           76
          FCB     255   ; 100           84
          FCB     255   ; 100           92
          FCB     255   ; 100          100
    ;-------------------------------------------------------



    ;-------------------------------------------------------
    ;       Manual          - 1st gear Up shift
    ;       Auto Trans      - Non 4th Gear lock
    ;
    ;       % Of Full Load * 2.56
    ;-------------------------------------------------------

        ORG $02AE

LC2AD:  FCB     15      ; UNLOCK AT 15 MPH 1ST MAN & LOW GRS MAN


    ;-------------------------------------------------------
    ;
    ;                    %FULL LD       MPH
```

```
    ;-----------------------------------------------------
LC2AE:    FCB     51    ; 20            12
          FCB     59    ; 23            20
          FCB     67    ; 26            28
          FCB     87    ; 34            36
          FCB     115   ; 45            44
          FCB     166   ; 65            52
          FCB     210   ; 82            60
          FCB     210   ; 82            68
          FCB     210   ; 82            76
          FCB     210   ; 82            84
          FCB     210   ; 82            92
          FCB     210   ; 82           100
        ;-----------------------------------------------------

LC2BA:  FCB       14    ; Unlock 14 MPH Hi gr Auto & Non 1st Man

    ;-----------------------------------------------------
    ; MANUAL          - 1ST GEAR DNSHIFT
    ; AUTO TRANS      - 4TH GEAR UNLOCK
    ;
    ; % OF FULL LOAD * 2.56
    ;-----------------------------------------------------

          ORG   $02BB

    ;-----------------------------------------------------
    ;
    ;                     %FULL LD      MPH
    ;-----------------------------------------------------
LC2BB:    FCB     255   ; 100           12
          FCB     113   ;  44           20
          FCB     141   ;  55           28
          FCB     172   ;  67           36
          FCB     200   ;  78           44
          FCB     225   ;  88           52
          FCB     255   ; 100           60
          FCB     255   ; 100           68
          FCB     255   ; 100           76
          FCB     255   ; 100           84
          FCB     255   ; 100           92
          FCB     255   ; 100           100
    ;-----------------------------------------------------



    ;-----------------------------------------------------
    ; MANUAL          - 4TH GEAR UP SHIFT
    ; AUTO TRANS      - 4TH GEAR LOCK
    ;
    ; TBLE VAL = PCT FULL LD * (256/100)
    ;-----------------------------------------------------
          ORG     $02C7

LC2C7:    FCB     15    ; 15 MPH MIN LK HI GEAR AUTO & NON 1ST MAN


    ;-----------------------------------------------------
    ;
    ;                     %TPS          MPH
    ;-----------------------------------------------------
LC2C8:    FCB     00    ;  0            12
          FCB     77    ; 30            20
          FCB     105   ; 41            28
          FCB     136   ; 53            36
          FCB     174   ; 68            44
```

```
          FCB     215   ; 84            52
          FCB     255   ;100            60
          FCB     255   ;100            68
          FCB     255   ;100            76
          FCB     255   ;100            84
          FCB     255   ;100            92
          FCB     255   ;100           100
     ****************************************************



     ****************************************************
     *  Check CARS LIGHT TABLE & CALIB'S
     *
     ****************************************************
        ORG     $02D4

LC2D4:  FCB    120      ; 50C, (122F) COOL TEMP FOR ENG LITE ENABLE
                        ; CALIB = (TEMP C + 40) * (256/192)

LC2D5:  FCB     40      ; 40 MPH LIMIT FOR LITE ENAB
LC2D6:  FCB     00      ; 0% TPS MIN LIMIT FOR LITE
LC2D7:  FCB     00      ; 0 LV8 MIN  FOR LITE ON

        ;
        ; 2 line tbl
        ;
LC2D8:  FCB     56      ; 1400 RPM/25 Thres for lite
LC2D9:  FCB    208      ; 5200 RPM/25, force lite on


     ;-----------------------------------------------------
     ; SHIFT Lite on Table, TPS VS RPM
     ;
     ;
     ; % TPS * (256/100)
     ;-----------------------------------------------------

          EQU   $02DA
     ;-----------------------------------------------------
     ;
     ;                  %TPS        RPM
     ;-----------------------------------------------------
LC2DA:    FCB     13    ;  5         800
          FCB     46    ; 18        1600
          FCB     118   ; 46        2400
          FCB     192   ; 75        3200
          FCB     192   ; 75        4000
          FCB     255   ;100        4800
          FCB     255   ;100        5600
     ;-----------------------------------------------------

        ;
        ; 2 line tbl
        ;
LC2E1:  FCB       52    ; Lite off, 625 RPM/25
LC2E2:  FCB       204   ; Force lite Off, 5100 RPM/25


     ;-----------------------------------------------------
     ; SHIFT Lite Off Table, %TPS vs RPM
     ;
     ; Table Val = % TPS * (256/100)
     ;-----------------------------------------------------

          EQU   $02E3
```

```
     ;-----------------------------------------------------
     ;
     ;                  %TPS        RPM
     ;-----------------------------------------------------
LC2E3:    FCB     18    ;  7         800
          FCB     51    ; 20        1600
          FCB     123   ; 48        2400
          FCB     197   ; 77        3200
          FCB     197   ; 77        4000
          FCB     255   ;100        4800
          FCB     255   ;100        5600
     ;-----------------------------------------------------



LC2EA:   FCB     2      ; E Lite on delay Mult
                        ; CALIB = Arg
     ;-----------------------------------------------------
     ;  Eng Lite on Modifier Delay vs TPS
     ;
     ;
     ; Tbl Val = Sec * 10/delay mult
     ;-----------------------------------------------------

LC2EA:   FCB     2      ; E Lite on delay Mult
                        ; CALIB = Arg
     ;-----------------------------------------------------
     ;
     ;                SEC'S         %TPS
     ;-----------------------------------------------------
LC2EB:    FCB     150   ; 30            0.0
          FCB     150   ; 30           12.5
          FCB     150   ; 30           25.0
          FCB     150   ; 30           37.5
          FCB     150   ; 30           50.0
    ******************************************************



    ******************************************************
    *   >>> Cooling Fan Tables & Params <<<
    *
    *   TYPE $32 ECM
    ******************************************************
LC2F0:  FCB     35      ; Fan D.C. =  if MPH > 35 & A/C Press Hi

LC2F1:  FCB     11      ; Use A/C If > 11 MPH

LC2F2:  FCB     75      ; 15 Sec, Min Fan On Time
                        ; Cal = Arg * 5
        ;
        ;
        ;
LC2F3:  FCB     255     ; Fan 99.6% D.C. If A/C Pres ^ & MPH <
                        ; Cal = Arg * 2.56



        ;
        ; FAN 1 ON 107c
        ; Cal = (deg c + 40) * (256/192)
        ;
LC2F4:  FCB     197     ; Fan D.C. = tbl if Cool >= 107c, (226f)
                        ; & A/C on & FAN OFF

        ;
```

```
        ; FAN 2 OFF, 105c
        ;
LC2F5:  FCB     193     ; Fan D.C. = tbl  if Cool >= 104.7c, (220.5f)
                        ; & A/C on & FAN on



        ;
        ; FAN 2 ON, 115c
        ; Cal = (deg c + 40) * (256/192)
        ;
LC2F6:  FCB       207   ; Fan D.C. = tbl if Cool >= 115.2c, (239.5f)
                        ; & A/C off & FAN off

        ;
        ; FAN 1 OFF 110c
        ;
LC2F7:  FCB     200     ; Fan D.C. = tbl if Cool >= 110c, (230f)
                        ; A/C off & FAN on
                        ; Cal = (Arg + 40) * 256/192, (Deg C)

        ;-------------------------------------------
        ; Fan Duty Cycle  D.C. vs Coolant Temp
        ;
        ; Tbl Val = %D.C. * (256/100)
        ;-------------------------------------------
LC2F8:    FCB     255   ;100% DC,       80 Deg C
          FCB     255   ;               92
          FCB     255   ;               104
          FCB     255   ;               116
          FCB     255   ;               128
          FCB     255   ;               140
          FCB     255   ;               152 C
        ************************************************


        ************************************************
        * >>> Air Injection Managment Tables & Param's <<<
        *
        ************************************************
LC2FF:  FCB     00      ; Max Air to ports if in Pwr Enrich
                        ; If In WOT >= then divert Air, (Sec)
                        ;
LC300:  FCB     10      ; Divert if If RPM Cont > ____ > 10 SEC
                        ; Cal = Arg * 10, (1 Sec)
                        ;
LC301:  FCB     170     ; If Filtered o2 > 0.752 vdc for ___
                        ; Then divert
                        ; Cal = Arg * 226

LC302:  FCB     56      ; If Filtered o2 0.247 vdc & in closed loop
                        ; >  Then divert
                        ; Cal = Arg * 226
                        ;
LC303:  FDB     200     ; 20 sec Rich or Lean o2 Divert timer
                        ; Cal = Arg * 10
                        ;
LC305:  FCB     160     ; Divert if cont > 4000 RPM & time >
                        ;
LC306:  FCB     10      ; Enable air to conv If > 1 SEC  since
                        ; last neg delta LV8 >  is <
                        ;
LC307:  FCB    25       ; If LV8 < 25 then Divert
LC308:  FCB    100      ; If LV8 > 100 & MPH >  Divert Air
LC309:  FCB    60       ; If > 60 MPH & LV8 >  then divert
                        ;
```

```
LC30A:  FCB    64       ; Enable air to conv if in open lp
                        ; & 100 Msec Drop in LV8 < 64
                        ;
LC30B:  FCB    73       ; If Cool < 14c, (58.5f) then divert
                        ; Cal = (Arg + 40) * 256/192

LC30C:  FCB    254      ; If in Open Lp => 25.4 Sec after
                        ; closed loop  then Divert
                        ; Cal = Arg * 10
        ************************************************


        ;-------------------------------------------------
        ;       >>> Delta TPS Accel Enrichment  <<<
        ;               Tables & params
        ;-------------------------------------------------
LC30D:  FCB     32      ; 0.125, Trans TPS filter coef.
                        ; Cal = Arg * 256
                        ;
LC30E:  FCB     10      ; 3.9% Min Diff TPS for Pwr Enrichment
                        ; Cal = Arg * 2.56
                        ;
LC30F:  FCB     10      ; 0 Async Accel Enrich if Neg Diff TPS > 3.9%
                        ; Cal = msec * 2.56
                        ;
LC310:  FDB     0111    ; 1.69 msec Min Async Pulse Width
                        ; Cal = msec * 65.536
                        ;
LC312:  FDB     0364    ; 5.5 msec Max Async Pulse Width
                        ; Cal = msec * 65.536, (5.55 Msec)

LC314:  FCB     2       ; Cal of Injects in fuel limiting

        ;-------------------------------------------------
        ;  ACCEL ENRICHMENT FACTOR % BPW INJ (0-4)
        ;
        ;
        ; TBL = FACTOR * 64
        ;-------------------------------------------------

LC315:    FCB     32    ; 0.5,      1 A.E. Pulses
          FCB     32    ; 0.5      2
          FCB     32    ; 0.5      3
          FCB     32    ; 0.5      4
          FCB     32    ; 0.5      5
          FCB     32    ; 0.5      6
          FCB     32    ; 0.5      7
          FCB     32    ; 0.5      8
        ;-------------------------------------------------

        ;-------------------------------------
        ;  Number of Pulses Coolant
        ;
        ;
        ;  TBL = Number of Pulses
        ;-------------------------------------
LC31D:    FCB     8     ; Num of Entries in table

        ;-------------------------------------------------
        ;
        ;                 PULSES        Deg c COOL
        ;-------------------------------------------------
          FCB     12    ; 12               -40
          FCB     12    ; 12               -16
          FCB     12    ; 12                 8
          FCB     12    ; 12                32
```

```
          FCB     12    ; 12                56
          FCB     12    ; 12                80
          FCB     12    ; 12               104
          FCB     12    ; 12               128
          FCB     12    ; 12               152
        ;-----------------------------------------------


        ;-------------------------------------
        ; Async Factor vs COOLANT
        ; 8 LINE TBL, BUA TYOE $32 ECM
        ;
        ; TBL = Factor * 128
        ;-------------------------------------
LC327:  FCB       8     ; NUM OF ENTRIES IN TABLE
                        ;
                        ; MULT           Deg C
                        ;-------------------------
        FCB     128     ; 1.00,          -40
        FCB     128     ; 1.00           -16
        FCB     128     ; 1.00             8
        FCB     128     ; 1.00            32
        FCB     128     ; 1.00            56
        FCB      96     ; 0.75            80
        FCB      64     ; 0.50           104
        FCB      64     ; 0.50           128
        FCB      64     ; 0.50           152 C
        ;-----------------------------------------------


        ;-----------------------------------------------
        ;       FUEL Limiting Factor vs Coolant
        ;
        ;       Bits 0 - 3 Are after Next Inject
        ;       Bits 4 - 7 Trigger To Next inject
        ;-----------------------------------------------
LC331:    FCB     217   ; 217           -40 Deg C
          FCB     217   ; 217           -16
          FCB     217   ; 217             8
          FCB     217   ; 217            32
          FCB     217   ; 217            56
          FCB     169   ; 169            80
          FCB     169   ; 169           104
          FCB     169   ; 169           128 C
        ;-----------------------------------------------


        ;-------------------------------------
        ;       Differental Accel Enrichment
        ;       Tables & param's
        ;-------------------------------------
LC339:  FCB     1       ; Loops between Filtering of Ld Vals, (sec)
LC33A:  FCB     32      ; Transient Ld Val Filter coef, (0.125)
LC33B:  FCB     128     ; Init Ld Val Filter constant

LC33C:  FCB     20      ; Min Delta LV8 for Acel enrich

    ;-----------------------------------------------
    ; LV8 AE FACTOR vs DELTA LV8
    ;
    ;  DELTA LV8 ABOVE MINIMUM (LC33C)
    ;
    ;       TBL = Mult * 128
    ;-----------------------------------------------

LC33D:  FCB       4     ; Num of lines in table -1
```

```
    ;-------------------------------------------------------
    ;
    ;                    MULT         Diff ld VAL
    ;-------------------------------------------------------
        FCB     32      ; 0.25            0
        FCB     32      ; 0.25           64
        FCB     40      ; 0.31          128
        FCB     52      ; 0.40          192
        FCB     52      ; 0.40          256
    ;-------------------------------------------------------


    ;-------------------------------------------------------
    ;  Coolant Multilpier vs Coolant Temp.
    ;
    ;
    ;  Tbl Value = Mult * 128
    ;-------------------------------------------------------

LC343:  FCB       8     ; Num of lines in table -1

    ;-------------------------------------------------------
    ;
    ;                    MULT          COOL Deg C
    ;-------------------------------------------------------
        FCB     45      ; 0.35          -40 Deg C
        FCB     45      ; 0.35          -16
        FCB     45      ; 0.35            8
        FCB     45      ; 0.35           32
        FCB     19      ; 0.14           56
        FCB     6       ; 0.04           80
        FCB     0       ; 0,00          104
        FCB     0       ; 0.00          128
        FCB     0       ; 0,00          152
    ;-------------------------------------------------------


    ;-------------------------------------------------------
    ; ACCEL ENRICH DECAY FACTOR VS COOLANT TEMP.
    ;
    ; TABLE VALUE + DIFF LD VAL PCT'AGE PER INJECT
    ;
    ;  TBL VAL = %CHG * (256/100)
    ;-------------------------------------------------------

LC34D:  FCB       8     ; Num of lines in table -1

    ;-------------------------------------------------------
    ;
    ;                    %CHG       COOL Deg C
    ;-------------------------------------------------------
         FCB    64      ; 25          -40 Deg C
         FCB    64      ; 25          -16
         FCB    44      ; 17            8
         FCB    44      ; 17           32
         FCB    64      ; 25           56
         FCB    102     ; 40           80
         FCB    128     ; 50          104
         FCB    153     ; 60          128
         FCB    153     ; 60          152
    ******************************************************



    ******************************************************
```

```
    *         >>> Cranking Tables & Param's <<<
    *
    ******************************************************
LC357:  FDB     $0000   ; DRP VAL If Crank RPM < then use this

LC359:  FCB     128     ; Crank RPM Coef, (0.5)
                        ; CALIB = Arg * 256

LC35A:  FCB     0       ; IF FF CNTR > 0 & enr running then
                        ; skip crank fuel logic

    ;-------------------------------------------------------
    ; CRANK FUEL MULTIPLIER vs RPM
    ;
    ;
    ; TBL = Mult * 256
    ;-------------------------------------------------------

          ORG   $035B

    ;-------------------------------------------------------
    ;
    ;                    MULT       RPM
    ;-------------------------------------------------------
LC35B:    FCB     0     ; 0           0
          FCB     0     ; 0          50
          FCB     0     ; 0         100
          FCB     0     ; 0         150
          FCB     0     ; 0         200
          FCB     0     ; 0         250
          FCB     0     ; 0         300
          FCB     0     ; 0         350
          FCB     0     ; 0         400
          FCB     0     ; 0         450
          FCB     0     ; 0         500
          FCB     0     ; 0         550
          FCB     0     ; 0         600
          FCB     0     ; 0         650
          FCB     0     ; 0         700
          FCB     0     ; 0         750
          FCB     0     ; 0         800
    ;-------------------------------------------------------


    ;-------------------------------------------------------
    ; CRANK FUEL vs COOLANT Temp.
    ;
    ;
    ;  Table = Msec * (65.536 * 256) / LC36C
    ;-------------------------------------------------------
LC36C:  FDB     6554    ; Scale Factor for Max Crk P.W.

    ;-------------------------------------------------------
    ;
    ;                    MSEC PW        COOL Deg c
    ;-------------------------------------------------------
LC36E:  FCB     230     ; 89.8          -40
        FCB     205     ; 80.0          -28
        FCB     77      ; 30.1          -16
        FCB     51      ; 19.9           -4
        FCB     33      ; 12.9            8
        FCB     23      ;  8.9           20
        FCB     20      ;  7.8           32
        FCB     19      ;  7.4           44
        FCB     18      ;  7.0           56
        FCB     17      ;  6.6           68
```

```
        FCB     14      ;  5.5            80
        FCB     12      ;  4.7            92
        FCB     16      ;  6.3           104
        FCB     20      ;  7.8           115
    ;-----------------------------------------------------


LC37C:  FDB     0032    ; 32 Sec Min eng run time to reset

LC37E:  FCB     197     ; Min TPS 76.9% limit to reset pls ctr


    ;-----------------------------------------------------
    ;
    ; CRANK FUEL PW MULT vs  DRP's
    ;
    ;  Tbl = Mult *  256
    ;-----------------------------------------------------
          ORG   $037F

    ;-----------------------------------------------------
    ;
    ;                     MULT      DRP'S
    ;-----------------------------------------------------
LC37F:    FCB     255   ; 1        0
          FCB     255   ; 1        8
          FCB     255   ; 1       16
          FCB     255   ; 1       24
          FCB     255   ; 1       32
          FCB     255   ; 1       40
          FCB     255   ; 1       48
          FCB     255   ; 1       56
          FCB     255   ; 1       64
          FCB     255   ; 1       72
          FCB     255   ; 1       80
          FCB     255   ; 1       88
          FCB     255   ; 1       96
          FCB     255   ; 1      104
          FCB     255   ; 1      112
          FCB     255   ; 1      120
          FCB     255   ; 1      128
    ;-----------------------------------------------------


    ;-----------------------------------------------------
    ;  Crank Fuel PW Mult vs TPS %
    ;
    ;       Table = Mult *  64
    ;-----------------------------------------------------
LC390:  FCB       8     ;Num of lines in table -1

    ;-----------------------------------------------------
    ;
    ;                     MULT          %TPS
    ;-----------------------------------------------------
        FCB     64      ; 1.000           0.0
        FCB     81      ; 1.265          12.5
        FCB     81      ; 1.265          25.0
        FCB     89      ; 1.390          37.5
        FCB     97      ; 1.515          50.0
        FCB     106     ; 1.656          62.5
        FCB     115     ; 1.796          75.0
        FCB     0       ; 0.000          87.5    Un-flood
        FCB     0       ; 0.000         100
```

```
    ;-----------------------------------------------------


    ******************************************************
    *       >>> Fuel/Air Tables & Params <<<
    *
    ******************************************************
LC39A:   FCB    112     ; Throt Hi - Throt Lo

LC39B:  FCB     35      ; 13.7% Min TPS Throttle Posit
                        ; CALIB = Arg * 2.56
LC39C:  FCB     1       ; Filt coef Low TPS, (0.0039)

LC39D:  FCB     16      ; Cool Temp Coef, (0.0625)
                        ; CALIB = Arg * 256

       ********************
        * o2 SENSOR PARAMS
        ********************
LC39E:  FCB     240     ; o2 Sens 12.5 Msec COEF, (0.9375)
                        ; CALIB = Arg * 256
                        ;
LC39F:  FCB     5       ; o2 Sens 100 Msec coef, (0.0195)
                        ; CALIB = Arg * 256
                        ;
LC3A0:  FCB     102     ; 12.5 msec o2 Filter init val
                        ; WHEN ENG NOT RUNNING, (0.398 VDC)
                        ; CALIB = Arg * 256

        ;
        ;       Fuel Output Param's
        ;
LC3A1:  FDB     0111    ; 1.693 msec Min Base PW
                        ; CALIB = Arg * 65.536

LC3A3:  FDB     0111    ; 1.693 msec Default Pulse Width
                        ; CALIB = Arg * 65.536

LC3A5:  FCB     255     ; SHUT OFF ALL FUEL if > 255 MPH
                        ; CALIB = Arg = Table

LC3A6:  FDB     0098    ; SHUT OFF ALL FUEL IF => RPM
                        ; & MPH =>
                        ; CALIB = Arg 65536 * 120/(Arg * Num Cyl)

LC3A8:  FCB     254     ; ENAB FUEL IF < 254 MPH

LC3A9:  FDB     103     ; ENAB FUEL IF RPM <
                        ; CALIB = Arg $FFFF * 120/Arg * Num Cyl

    ;-----------------------------------------------------
    ;       Inj Offset Vs Batt Volts
    ;       Measured At Pump
    ;
    ;   TBL = Msec * 32.768 Msec
    ;-----------------------------------------------------
          ORG   $03AB

    ;-----------------------------------------------------
    ;
    ;                   Msec ADDER      BAT VDC
    ;-----------------------------------------------------
LC3AB:    FCB     21    ; 6.90           0.0
          FCB     21    ; 6.90           1.6
          FCB     21    ; 6.90           3.2
```

```
          FCB     227   ; 2.89           4.8
          FCB     227   ; 2.89           6.4
          FCB     95    ; 1.20           8.0
          FCB     59    ;                9.6
          FCB     41    ;               11.2
          FCB     30    ;               12.8
          FCB     21    ; 0.336         14.4
          FCB     16    ;               16.0
          FCB     11    ;               17.6
          FCB     10    ;               19.2
          FCB     8     ;               20.8
          FCB     7     ; 0.152         22.4
          FCB     6     ;               24.0
          FCB     5     ;               25.5 VDC
    ;-----------------------------------------------------


    ;-----------------------------------------------------
    ; Inj Offset for Small PW's vs Base PW
    ;
    ;  TBL = Msec * 65.536 Msec
    ;-----------------------------------------------------
LC3BC:  FCB     18      ; 0.198 msec     0.488 msec
        FCB     15      ; 0.153          0.732
        FCB     13      ; 0.122          0.976
        FCB     10      ; 0.076          1.220
        FCB     8       ; 0.046          1.460
        FCB     5       ; 0.015          1.780
        FCB     3       ; 0.000          2.197
        FCB     0       ; 0.000          2.440
        FCB     0       ; 0.000          2.685
        FCB     0       ; 0.000          2.929
        FCB     0       ; 0.000          3.170
        FCB     0       ; 0.000          3.410
        FCB     0       ; 0.000          3.660
        FCB     0       ; 0.000          3.900
    ;-----------------------------------------------------


    ******************************************************
    *       >>> Open Loop Fuel Tables & Param's <<<
    *
    *  ORG $S3CB
    ******************************************************
LC3CB:  FDB     0445    ; Stoch Ratio
                        ; CALIB = 6553.6/Arg, (14.727:1)

LC3CD:  FDB     0735    ; Table LU Multiplier
                        ; 65536/(7235) * 5)

    ;-----------------------------------------------------
    ; INJ FLOW RATE
    ; 23#/HR INJECTORS
    ;
    ; Double Fire #/h = 10158.8/cal val
    ; Single Fire #/h = 20317.6/cal val
    ;-----------------------------------------------------
LC3CF:  FDB     0441    ; Double Fire Prod of Inj Flow rate
                        ; cal = Sec/gm * (256 * 5)
                        ;
                        ; 0.344/sec/g,
                        ; (1/0.344/sec/g) = 2.902 g/sec
                        ; 2.902 g/sec * 3.6 = 10.448 kg/hr, (23#)
                        ;
LC3D1:  FDB     0882    ; Single Fire Prod of Inj Flow rate
                        ; cal = Sec/gm * (256 * 10)
```

```
                        ; 0.344/sec/g, 2.902 g/sec * 3.6 = 10.448 kg/hr, (23#)
    ;-----------------------------------------------------


    ;-----------------------------------------------------
    ;  OPEN LOOP A/F Pct Chg vs LD VALUE
    ;  TYPE $32 ECM MY 86
    ;
    ;  Dissassemby of BUA LINES =  17
    ;  09-23-1994, 09:32:07
    ;
    ;  TBL =  2.56  * PCT CHG TO AFR
    ;-----------------------------------------------------
        ORG     $03D3

    ;-----------------------------------------------------
    ;
    ;                 PCT CHG TO AFR    LD VAL
    ;-----------------------------------------------------
LC3D3    FCB  0      ;     0.0           0
LC3D4    FCB  0      ;     0.0          16
LC3D5    FCB  0      ;     0.0          32
LC3D6    FCB  0      ;     0.0          48
LC3D7    FCB  0      ;     0.0          64
LC3D8    FCB  3      ;     1.2          80
LC3D9    FCB  8      ;     3.1          96
LC3DA    FCB  8      ;     3.1         112
LC3DB    FCB  13     ;     5.1         128
LC3DC    FCB  18     ;     7.0         144
LC3DD    FCB  23     ;     9.0         160
LC3DE    FCB  23     ;     9.0         176
LC3DF    FCB  23     ;     9.0         192
LC3E0    FCB  23     ;     9.0         208
LC3E1    FCB  23     ;     9.0         224
LC3E2    FCB  23     ;     9.0         240
LC3E3    FCB  23     ;     9.0         256
    ;-----------------------------------------------------



    ;-----------------------------------------------------
    ;  START UP ENRICH vs COOL
    ;
    ;  Dissassemby of BUA,   LINES =  14
    ;  09-23-1994, 09:26:54
    ;
    ;  TBL =  2.56  * PCT CHG
    ;-----------------------------------------------------
        ORG     $03E4

    ;-----------------------------------------------------
    ;
    ;                 PCT CHG        Deg c COOL
    ;-----------------------------------------------------
LC3E4    FCB  235    ;    91.8         -40.0
LC3E5    FCB  215    ;    84.0         -28.0
LC3E6    FCB  194    ;    75.8         -16.0
LC3E7    FCB  171    ;    66.8          -4.0
LC3E8    FCB  115    ;    44.9           8.0
LC3E9    FCB  36     ;    14.1          20.0
LC3EA    FCB  36     ;    14.1          32.0
LC3EB    FCB  36     ;    14.1          44.0
LC3EC    FCB  36     ;    14.1          56.0
LC3ED    FCB  26     ;    10.2          68.0
LC3EE    FCB  26     ;    10.2          80.0
```

```
LC3EF    FCB  26     ;    10.2          92.0
LC3F0    FCB  26     ;    10.2         104.0
LC3F1    FCB  26     ;    10.2         116.0
    ;-------------------------------------------------------



    ;-------------------------------------------------------
    ; Start up Enrich Decay vs Cool Temp.
    ;
    ; Tbl Val = Num of Injects
    ;-------------------------------------------------------
LC3F2:    FDB     512   ;Scale factor for Table, (2)

LC3F4:    FCB     175   ;       -40,
          FCB     158   ;       -28
          FCB     140   ;       -16
          FCB     140   ;       - 4
          FCB     140   ;         8
          FCB     127   ;        20
          FCB     120   ;        32
          FCB     100   ;        44
          FCB     80    ;        56
          FCB     73    ;        68
          FCB     67    ;        80
          FCB     67    ;        92
          FCB     67    ;       104
          FCB     67    ;       116
    ;-------------------------------------------------------


    ;-------------------------------------------------------
    ; Start up Enrichment Decay Rep Rate Vs Start
    ;    up Coolant Temp
    ;
    ; Tbl Val = Num of Injects
    ;-------------------------------------------------------
LC402:    FCB     23    ;       -40 Deg C
          FCB     23    ;       -28. Injects
          FCB     23    ;       -16
          FCB     23    ;        -4
          FCB     23    ;         8
          FCB     21    ;        20
          FCB     20    ;        32
          FCB     16    ;        44
          FCB     13    ;        56
          FCB     12    ;        68
          FCB     11    ;        80
          FCB     11    ;        92
          FCB     11    ;       104
          FCB     11    ;       116
    ;-------------------------------------------------------


    ;-------------------------------------------------------
    ; Start up Enrich Decay amt Vs Start up Cool Temp
    ;
    ; Tbl Val = Pct Chg * 655.36
    ;-------------------------------------------------------
LC410:    FCB     252   ;  -40
          FCB     252   ;  -28
          FCB     252   ;  -16
          FCB     252   ;   -4
          FCB     252   ;    8
          FCB     252   ;   20
          FCB     252   ;   32
```

```
          FCB     151   ;   44
          FCB     151   ;   56
          FCB     151   ;   68
          FCB     151   ;   80
          FCB     151   ;   92
          FCB     151   ;  104
          FCB     151   ;  116
    ;-------------------------------------------------



    ;-------------------------------------------------
    ; OPEN LOOP A/F % CHANGE VS COOL TEMP
    ;
    ;  Dissassemby of BUA,  LINES =  14
    ;  09-23-1994, 09:36:15
    ;
    ;  TBL =  2.56  * %CHG TO AFR + BIAS
    ;-------------------------------------------------
        ORG     $041E

LC41E:  FCB     221     ; Open Lp AFR Bias to Set up Lean Lmt
                        ;
                        ; AFR = 20:1 EXAMPLE
                        ; 14.7 * 256 = 189

    ;-------------------------------------------------
    ;
    ;                %CHG TO AFR    Deg c COOL
    ;-------------------------------------------------
LC41F    FCB  89     ;    34.8         -40.0
LC420    FCB  68     ;    26.6         -28.0
LC421    FCB  64     ;    25.0         -16.0
LC422    FCB  53     ;    20.7          -4.0
LC423    FCB  49     ;    19.1           8.0
LC424    FCB  35     ;    13.7          20.0
LC425    FCB  25     ;     9.8          32.0
LC426    FCB  25     ;     9.8          44.0
LC427    FCB  25     ;     9.8          56.0
LC428    FCB  25     ;     9.8          68.0
LC429    FCB  25     ;     9.8          80.0
LC42A    FCB  25     ;     9.8          92.0
LC42B    FCB  25     ;     9.8         104.0
LC42C    FCB  25     ;     9.8         116.0
    ;-------------------------------------------------



    ;-------------------------------------------------------
    ;  Dissassemby of BUA.BIN
    ;  Base fuel injection PW's vs LOAD
    ;
    ;       07-22-1989 12:28:30
    ;
    ;  BPINJ/5 = 89 * INJ BC * LV8 / ( 1024 * LV SCALAR)
    ;
    ; TBL = Msec * (65536/5)
    ;  TBL =  13.1072  * PW Msec
    ;-------------------------------------------------------

LC42D:  FCB     0               ; Row min, RPM
        FCB     0               ; Min LV8 Value
        FCB     17              ; Num ROWS/BLK
        ;-----------------------------------------------
        ;        0  RPM          Msec.          LOAD
        ;-----------------------------------------------
```

```
FCB   0                   ; 0.0               LD = 0
FCB   8                   ; 0.6               LD = 16
FCB   15                  ; 1.1               LD = 32
FCB   23                  ; 1.8               LD = 48
FCB   31                  ; 2.4               LD = 64
FCB   38                  ; 2.9               LD = 80
FCB   46                  ; 3.5               LD = 96
FCB   54                  ; 4.1               LD = 112
FCB   61                  ; 4.7               LD = 128
FCB   69                  ; 5.3               LD = 144
FCB   77                  ; 5.9               LD = 160
FCB   84                  ; 6.4               LD = 176
FCB   92                  ; 7.0               LD = 192
FCB   100                 ; 7.6               LD = 208
FCB   107                 ; 8.2               LD = 224
FCB   115                 ; 8.8               LD = 240
FCB   123                 ; 9.4               LD = 256
;-----------------------------------------------------
; 400  RPM          Msec.          LOAD
;-----------------------------------------------------
FCB   0                   ; 0.0               LD = 0
FCB   8                   ; 0.6               LD = 16
FCB   15                  ; 1.1               LD = 32
FCB   23                  ; 1.8               LD = 48
FCB   31                  ; 2.4               LD = 64
FCB   38                  ; 2.9               LD = 80
FCB   46                  ; 3.5               LD = 96
FCB   54                  ; 4.1               LD = 112
FCB   61                  ; 4.7               LD = 128
FCB   69                  ; 5.3               LD = 144
FCB   77                  ; 5.9               LD = 160
FCB   84                  ; 6.4               LD = 176
FCB   92                  ; 7.0               LD = 192
FCB   100                 ; 7.6               LD = 208
FCB   107                 ; 8.2               LD = 224
FCB   115                 ; 8.8               LD = 240
FCB   123                 ; 9.4               LD = 256
;-----------------------------------------------------
; 800  RPM          Msec.          LOAD
;-----------------------------------------------------
FCB   0                   ; 0.0               LD = 0
FCB   8                   ; 0.6               LD = 16
FCB   15                  ; 1.1               LD = 32
FCB   23                  ; 1.8               LD = 48
FCB   31                  ; 2.4               LD = 64
FCB   38                  ; 2.9               LD = 80
FCB   46                  ; 3.5               LD = 96
FCB   54                  ; 4.1               LD = 112
FCB   61                  ; 4.7               LD = 128
FCB   69                  ; 5.3               LD = 144
FCB   77                  ; 5.9               LD = 160
FCB   84                  ; 6.4               LD = 176
FCB   92                  ; 7.0               LD = 192
FCB   100                 ; 7.6               LD = 208
FCB   107                 ; 8.2               LD = 224
FCB   115                 ; 8.8               LD = 240
FCB   123                 ; 9.4               LD = 256
;-----------------------------------------------------
; 1200  RPM          Msec.          LOAD
;-----------------------------------------------------
FCB   0                   ; 0.0               LD = 0
FCB   8                   ; 0.6               LD = 16
FCB   15                  ; 1.1               LD = 32
FCB   23                  ; 1.8               LD = 48
FCB   31                  ; 2.4               LD = 64
FCB   38                  ; 2.9               LD = 80
```

```
FCB   46                ; 3.5               LD = 96
FCB   54                ; 4.1               LD = 112
FCB   61                ; 4.7               LD = 128
FCB   69                ; 5.3               LD = 144
FCB   77                ; 5.9               LD = 160
FCB   84                ; 6.4               LD = 176
FCB   92                ; 7.0               LD = 192
FCB   100               ; 7.6               LD = 208
FCB   107               ; 8.2               LD = 224
FCB   115               ; 8.8               LD = 240
FCB   123               ; 9.4               LD = 256
;-----------------------------------------------------
; 1600  RPM          Msec.          LOAD
;-----------------------------------------------------
FCB   0                 ; 0.0               LD = 0
FCB   8                 ; 0.6               LD = 16
FCB   15                ; 1.1               LD = 32
FCB   23                ; 1.8               LD = 48
FCB   31                ; 2.4               LD = 64
FCB   38                ; 2.9               LD = 80
FCB   46                ; 3.5               LD = 96
FCB   54                ; 4.1               LD = 112
FCB   61                ; 4.7               LD = 128
FCB   69                ; 5.3               LD = 144
FCB   77                ; 5.9               LD = 160
FCB   84                ; 6.4               LD = 176
FCB   92                ; 7.0               LD = 192
FCB   100               ; 7.6               LD = 208
FCB   107               ; 8.2               LD = 224
FCB   115               ; 8.8               LD = 240
FCB   123               ; 9.4               LD = 256
;-----------------------------------------------------
; 2000  RPM          Msec.          LOAD
;-----------------------------------------------------
FCB   0                 ; 0.0               LD = 0
FCB   8                 ; 0.6               LD = 16
FCB   15                ; 1.1               LD = 32
FCB   23                ; 1.8               LD = 48
FCB   31                ; 2.4               LD = 64
FCB   38                ; 2.9               LD = 80
FCB   46                ; 3.5               LD = 96
FCB   54                ; 4.1               LD = 112
FCB   61                ; 4.7               LD = 128
FCB   69                ; 5.3               LD = 144
FCB   77                ; 5.9               LD = 160
FCB   84                ; 6.4               LD = 176
FCB   92                ; 7.0               LD = 192
FCB   100               ; 7.6               LD = 208
FCB   107               ; 8.2               LD = 224
FCB   115               ; 8.8               LD = 240
FCB   123               ; 9.4               LD = 256
;-----------------------------------------------------
; 2400  RPM          Msec.          LOAD
;-----------------------------------------------------
FCB   0                 ; 0.0               LD = 0
FCB   8                 ; 0.6               LD = 16
FCB   15                ; 1.1               LD = 32
FCB   23                ; 1.8               LD = 48
FCB   31                ; 2.4               LD = 64
FCB   38                ; 2.9               LD = 80
FCB   46                ; 3.5               LD = 96
FCB   54                ; 4.1               LD = 112
FCB   61                ; 4.7               LD = 128
FCB   69                ; 5.3               LD = 144
FCB   77                ; 5.9               LD = 160
FCB   84                ; 6.4               LD = 176
```

```
FCB   92                ; 7.0              LD = 192
FCB   100               ; 7.6              LD = 208
FCB   107               ; 8.2              LD = 224
FCB   115               ; 8.8              LD = 240
FCB   123               ; 9.4              LD = 256
;-------------------------------------------------
; 2800  RPM          Msec.          LOAD
;-------------------------------------------------
FCB   0                 ; 0.0              LD = 0
FCB   8                 ; 0.6              LD = 16
FCB   15                ; 1.1              LD = 32
FCB   23                ; 1.8              LD = 48
FCB   31                ; 2.4              LD = 64
FCB   38                ; 2.9              LD = 80
FCB   46                ; 3.5              LD = 96
FCB   54                ; 4.1              LD = 112
FCB   61                ; 4.7              LD = 128
FCB   69                ; 5.3              LD = 144
FCB   77                ; 5.9              LD = 160
FCB   84                ; 6.4              LD = 176
FCB   92                ; 7.0              LD = 192
FCB   100               ; 7.6              LD = 208
FCB   107               ; 8.2              LD = 224
FCB   115               ; 8.8              LD = 240
FCB   123               ; 9.4              LD = 256
;-------------------------------------------------
; 3200  RPM          Msec.          LOAD
;-------------------------------------------------
FCB   0                 ; 0.0              LD = 0
FCB   8                 ; 0.6              LD = 16
FCB   15                ; 1.1              LD = 32
FCB   23                ; 1.8              LD = 48
FCB   31                ; 2.4              LD = 64
FCB   38                ; 2.9              LD = 80
FCB   46                ; 3.5              LD = 96
FCB   54                ; 4.1              LD = 112
FCB   61                ; 4.7              LD = 128
FCB   69                ; 5.3              LD = 144
FCB   77                ; 5.9              LD = 160
FCB   84                ; 6.4              LD = 176
FCB   92                ; 7.0              LD = 192
FCB   100               ; 7.6              LD = 208
FCB   107               ; 8.2              LD = 224
FCB   115               ; 8.8              LD = 240
FCB   123               ; 9.4              LD = 256
;-------------------------------------------------
; 3600  RPM          Msec.          LOAD
;-------------------------------------------------
FCB   0                 ; 0.0              LD = 0
FCB   8                 ; 0.6              LD = 16
FCB   15                ; 1.1              LD = 32
FCB   23                ; 1.8              LD = 48
FCB   31                ; 2.4              LD = 64
FCB   38                ; 2.9              LD = 80
FCB   46                ; 3.5              LD = 96
FCB   54                ; 4.1              LD = 112
FCB   61                ; 4.7              LD = 128
FCB   69                ; 5.3              LD = 144
FCB   77                ; 5.9              LD = 160
FCB   84                ; 6.4              LD = 176
FCB   92                ; 7.0              LD = 192
FCB   100               ; 7.6              LD = 208
FCB   107               ; 8.2              LD = 224
FCB   115               ; 8.8              LD = 240
FCB   123               ; 9.4              LD = 256
;-------------------------------------------------
```

```
; 4000  RPM          Msec.          LOAD
;-----------------------------------------------------
FCB   0                  ; 0.0              LD = 0
FCB   8                  ; 0.6              LD = 16
FCB   15                 ; 1.1              LD = 32
FCB   23                 ; 1.8              LD = 48
FCB   31                 ; 2.4              LD = 64
FCB   38                 ; 2.9              LD = 80
FCB   46                 ; 3.5              LD = 96
FCB   54                 ; 4.1              LD = 112
FCB   61                 ; 4.7              LD = 128
FCB   69                 ; 5.3              LD = 144
FCB   77                 ; 5.9              LD = 160
FCB   84                 ; 6.4              LD = 176
FCB   92                 ; 7.0              LD = 192
FCB   100                ; 7.6              LD = 208
FCB   107                ; 8.2              LD = 224
FCB   115                ; 8.8              LD = 240
FCB   123                ; 9.4              LD = 256
;-----------------------------------------------------
; 4400  RPM          Msec.          LOAD
;-----------------------------------------------------
FCB   0                  ; 0.0              LD = 0
FCB   8                  ; 0.6              LD = 16
FCB   15                 ; 1.1              LD = 32
FCB   23                 ; 1.8              LD = 48
FCB   31                 ; 2.4              LD = 64
FCB   38                 ; 2.9              LD = 80
FCB   46                 ; 3.5              LD = 96
FCB   54                 ; 4.1              LD = 112
FCB   61                 ; 4.7              LD = 128
FCB   69                 ; 5.3              LD = 144
FCB   77                 ; 5.9              LD = 160
FCB   84                 ; 6.4              LD = 176
FCB   92                 ; 7.0              LD = 192
FCB   100                ; 7.6              LD = 208
FCB   107                ; 8.2              LD = 224
FCB   115                ; 8.8              LD = 240
FCB   123                ; 9.4              LD = 256
;-----------------------------------------------------
; 4800  RPM          Msec.          LOAD
;-----------------------------------------------------
FCB   0                  ; 0.0              LD = 0
FCB   8                  ; 0.6              LD = 16
FCB   15                 ; 1.1              LD = 32
FCB   23                 ; 1.8              LD = 48
FCB   31                 ; 2.4              LD = 64
FCB   38                 ; 2.9              LD = 80
FCB   46                 ; 3.5              LD = 96
FCB   54                 ; 4.1              LD = 112
FCB   61                 ; 4.7              LD = 128
FCB   69                 ; 5.3              LD = 144
FCB   77                 ; 5.9              LD = 160
FCB   84                 ; 6.4              LD = 176
FCB   92                 ; 7.0              LD = 192
FCB   100                ; 7.6              LD = 208
FCB   107                ; 8.2              LD = 224
FCB   115                ; 8.8              LD = 240
FCB   123                ; 9.4              LD = 256
;-----------------------------------------------------
; 5200  RPM          Msec.          LOAD
;-----------------------------------------------------
FCB   0                  ; 0.0              LD = 0
FCB   8                  ; 0.6              LD = 16
FCB   15                 ; 1.1              LD = 32
FCB   23                 ; 1.8              LD = 48
```

```
FCB   31                ; 2.4               LD = 64
FCB   38                ; 2.9               LD = 80
FCB   46                ; 3.5               LD = 96
FCB   54                ; 4.1               LD = 112
FCB   61                ; 4.7               LD = 128
FCB   69                ; 5.3               LD = 144
FCB   77                ; 5.9               LD = 160
FCB   84                ; 6.4               LD = 176
FCB   92                ; 7.0               LD = 192
FCB   100               ; 7.6               LD = 208
FCB   107               ; 8.2               LD = 224
FCB   115               ; 8.8               LD = 240
FCB   123               ; 9.4               LD = 256
;-----------------------------------------------------
; 5600  RPM          Msec.          LOAD
;-----------------------------------------------------
FCB   0                 ; 0.0               LD = 0
FCB   8                 ; 0.6               LD = 16
FCB   15                ; 1.1               LD = 32
FCB   23                ; 1.8               LD = 48
FCB   31                ; 2.4               LD = 64
FCB   38                ; 2.9               LD = 80
FCB   46                ; 3.5               LD = 96
FCB   54                ; 4.1               LD = 112
FCB   61                ; 4.7               LD = 128
FCB   69                ; 5.3               LD = 144
FCB   77                ; 5.9               LD = 160
FCB   84                ; 6.4               LD = 176
FCB   92                ; 7.0               LD = 192
FCB   100               ; 7.6               LD = 208
FCB   107               ; 8.2               LD = 224
FCB   115               ; 8.8               LD = 240
FCB   123               ; 9.4               LD = 256
;-----------------------------------------------------
; 6000  RPM          Msec.          LOAD
;-----------------------------------------------------
FCB   0                 ; 0.0               LD = 0
FCB   8                 ; 0.6               LD = 16
FCB   15                ; 1.1               LD = 32
FCB   23                ; 1.8               LD = 48
FCB   31                ; 2.4               LD = 64
FCB   38                ; 2.9               LD = 80
FCB   46                ; 3.5               LD = 96
FCB   54                ; 4.1               LD = 112
FCB   61                ; 4.7               LD = 128
FCB   69                ; 5.3               LD = 144
FCB   77                ; 5.9               LD = 160
FCB   84                ; 6.4               LD = 176
FCB   92                ; 7.0               LD = 192
FCB   100               ; 7.6               LD = 208
FCB   107               ; 8.2               LD = 224
FCB   115               ; 8.8               LD = 240
FCB   123               ; 9.4               LD = 256
;-----------------------------------------------------
; 6400  RPM          Msec.          LOAD
;-----------------------------------------------------
FCB   0                 ; 0.0               LD = 0
FCB   8                 ; 0.6               LD = 16
FCB   15                ; 1.1               LD = 32
FCB   23                ; 1.8               LD = 48
FCB   31                ; 2.4               LD = 64
FCB   38                ; 2.9               LD = 80
FCB   46                ; 3.5               LD = 96
FCB   54                ; 4.1               LD = 112
FCB   61                ; 4.7               LD = 128
FCB   69                ; 5.3               LD = 144
```

```
        FCB   77                ; 5.9               LD = 160
        FCB   84                ; 6.4               LD = 176
        FCB   92                ; 7.0               LD = 192
        FCB   100               ; 7.6               LD = 208
        FCB   107               ; 8.2               LD = 224
        FCB   115               ; 8.8               LD = 240
        FCB   123               ; 9.4               LD = 256
        ;---------------------------------------------------


        ************************************************
        *       Closed Loop QUAL'S
        *
        *
        ************************************************
LC551:  FCB     107     ; 40.7c, (104.4f) Min Temp for Closed Loop
                        ; CALIB = (deg c + 40) * (256/192)
                        ;
LC552:  FCB     147     ; Use Hot C Loop timer If Cool T >= 70.3c, (158.5f)
                        ; CALIB = (deg c + 40) * (256/192)
                        ;
LC553:  FCB     73      ; Use Cold C Loop timer if Cool T <= 14.7c, (58.5f)
                        ; CALIB = (deg c + 40) * (256/192)
                        ;
        FCB       0     ; ? ? ?


LC555:  FCB     $AA     ; Diag Prom test word 2
                        ; Set Error 51 if N.E. $AA

LC556:  FCB     150     ; 75 SEC, Cold Closed Lp Timer
                        ; (SEC * 2 Sec)

LC557:  FCB     103     ; 51.4 SEC, Warm Closed Lp Timer,
                        ; (SEC * 2 Sec)

LC558:  FCB     25      ; 12.5 SEC, Hot Closed Lp Timer
                        ; Arg, (SEC * 2)

        ;
        ; o2 RDY HYST PAIR
        ; (CAL = vdc * 2260
        ;
LC559:  FCB     158     ; If 02 Volts > 0.699 VDC then o2 ready
LC55A:  FCB      45     ; If o2 < 0.199 VDC then o2 is ready
                        ;
LC55B:  FCB     50      ; 10 Sec for o2 Max/Min
                        ; CALIB = (SEC/5 Sec)

    ;-----------------------------------------------------
    ;       Closed Loop Fuel Cnt'l  Param's
    ;
    ;-----------------------------------------------------

        ;
        ; CLOSED Lp INTAGRATOR LIMITS
        ;

LC55C:  FCB     40      ; Closed Lp Corr, Min INT Value
LC55D:  FCB     180     ; Closed Lp Corr, Max INT Value

LC55E:  FCB     3       ; Clsed Lp Idle TPS 1.17% Gain Factor
                        ; CALIB = tps * 2.56

LC55F:  FCB     16      ; 0.2 sec Added Corr To Int Dly At Idle
                        ; CALIB = Arg * 80
```

```
LC560:  FCB     160     ; EECC Clsd Lp Gain factor
                        ; CALIB = Arg * 256, (0.625 Mult)

LC561:  FCB     12      ; Diff Value to Make up Rich/Lean Window
                        ; for Fast o2, CALIB = Arg * 226, (.053 VDC)

LC562:  FCB     23      ; Diff Value to Make up Rich/Lean Window
                        ; When Air div, CALIB = Arg * 226, (.102 VDC)

LC563:  FCB     4       ; Min Error To Implement Int.
                        ; CALIB = Arg * 226, (.017 VDC)

LC564:  FCB     224     ; Positive Error Gain Factor
                        ; CALIB = Arg * 226, (.991 VDC)

LC565:  FCB     154     ; o2 Filter Constant when Coolant Tmp Low

LC566:  FCB     96      ; Cool Int Offset Int Gain
                        ; Cal = (Arg + 40) * 256/196, (42.8 C)

    ;-----------------------------------------------------
    ;       Upper 0 error for Slow 02 Vs Air flow
    ;
    ;       Table value = Volts * 226
    ;-----------------------------------------------------
LC567:    FCB     140   ;               0 Gms/Sec
          FCB     148   ;               8
          FCB     152   ;               16
          FCB     152   ;               24
          FCB     148   ;               32
          FCB     144   ;               40
          FCB     132   ;               48
          FCB     128   ;               56
          FCB     125   ;               64
    ;-----------------------------------------------------


    ;-----------------------------------------------------
    ; Lower 0 error for Slow 02 Vs Air flow
    ;
    ;       Table value = Volts * 226
    ;-----------------------------------------------------
LC570:    FCB     120   ;                0 Gms/Sec
          FCB     128   ;                8
          FCB     132   ;               16
          FCB     132   ;               24
          FCB     128   ;               32
          FCB     124   ;               40
          FCB     112   ;               48
          FCB     109   ;               56
          FCB     106   ;               64
    ;-----------------------------------------------------


    ;-----------------------------------------------------
    ;       Fast o2 Rich/lean Treshold vs Air Flow
    ;
    ;       Table value = Volts * 226
    ;               ORG $C579
    ;-----------------------------------------------------
LC579:    FCB     130   ;                  0 Gms/sec
          FCB     138   ;                  8
          FCB     142   ;                  16
          FCB     142   ;                  24
          FCB     138   ;                  32
```

```
          FCB     134   ;                  40
          FCB     122   ;                  48
          FCB     120   ;                  56
          FCB     118   ;                  64
    ;-----------------------------------------------------


    ;-----------------------------------------------------
    ; Integrator Delay Vs Air flow
    ;
    ; TBL = Sec's * 80
    ;-----------------------------------------------------
LC582:    FCB     32    ;               0 Gms/Sec
          FCB     28    ;               8
          FCB     24    ;               16
          FCB     22    ;               24
          FCB     20    ;               32
          FCB     18    ;               40
          FCB     16    ;               48
          FCB     16    ;               56
          FCB     12    ;               64
    ;-----------------------------------------------------


    ;-----------------------------------------------------
    ; Slow o2 Filter Coef Vs Air flow
    ;
    ;  TBL = Mult  * 256
    ;
    ;-----------------------------------------------------
LC58B:    FCB     16    ;               0 Gms/Sec
          FCB     24    ;               8
          FCB     32    ;               16
          FCB     36    ;               24
          FCB     40    ;               32
          FCB     44    ;               40
          FCB     44    ;               48
          FCB     44    ;               56
          FCB     44    ;               64
    ;-----------------------------------------------------


    ;-----------------------------------------------------
    ; o2 Error Reduction  Vs Air flow
    ;
    ; Table value = Mult (0-1) * 256
    ;-----------------------------------------------------
LC594:    FCB     200   ;               0 Gms/Sec
          FCB     224   ;               8
          FCB     236   ;               16
          FCB     244   ;               24
          FCB     248   ;               32
          FCB     255   ;               40
          FCB     255   ;               48
          FCB     255   ;               56
          FCB     255   ;               64
    ;-----------------------------------------------------


    ;-----------------------------------------------------
    ; Proportional Step Width Offset vs RPM
    ;
    ;       Table value = Sec's * 80
    ;-----------------------------------------------------
LC59D:    FCB     20    ;  400 RPM
          FCB     12    ;  800
```

```
          FCB     8     ; 1200
          FCB     4     ; 1600
          FCB     3     ; 2000
          FCB     2     ; 2400
    ;-----------------------------------------------------


    ;-----------------------------------------------------
    ;  Proportional Step Size Vs Error
    ;
    ; TBL =  BIN STEPS
    ;-----------------------------------------------------
LC5A3:    FCB     3     ; 3          0  Error counts
          FCB     3     ; 3          8
          FCB     3     ; 3         16
          FCB     2     ; 2         24
          FCB     2     ; 2         32
          FCB     2     ; 2         40
          FCB     3     ; 3         48
          FCB     4     ; 4         56
          FCB     7     ; 7         64
          FCB     10    ; 10        72
          FCB     12    ; 12        80
          FCB     16    ; 16        88
    ;-----------------------------------------------------


    ;-----------------------------------------------------
    ; PROPORTIONAL STEP WIDTH Vs Error
    ;
    ;
    ;       Table value = Sec's * 80
    ;-----------------------------------------------------
LC5AF:    FCB     4     ;           0 Error (BIN)
          FCB     4     ;           8
          FCB     4     ;           16
          FCB     4     ;           24
          FCB     4     ;           32
          FCB     8     ;           40
          FCB     12    ;           48
          FCB     24    ;           56
          FCB     32    ;           64
          FCB     64    ;           72
          FCB     128   ;           80
          FCB     240   ;           88
    ;-----------------------------------------------------


    ;-----------------------------------------------------
    ; Rich/Lean Offset Vs Coolant Temp
    ;
    ;
    ; TBL = BIN VAL
    ;-----------------------------------------------------
LF2C6     FCB  0        ;   0        -40 Deg C
          FCB  0        ;   0        -28
          FCB  0        ;   0        -16
          FCB  0        ;   0        -4
          FCB  0        ;   0         8
          FCB  16       ;   16        20
          FCB  16       ;   16        32
          FCB  16       ;   16        44
          FCB  16       ;   16        56
          FCB  16       ;   16        68
          FCB  16       ;   16        80
          FCB  0        ;   0         92
```

```
          FCB  0        ;   0        104
          FCB  0        ;   0        116
    ;-----------------------------------------------------

    ;-----------------------------------------------------
    ; Integrator Delay Vs Error
    ;
    ; TBL = Multiplier (0 - 255)
    ;-----------------------------------------------------
LC5C9:    FCB     255   ;           0 Error
          FCB     255   ;           8
          FCB     255   ;           16
          FCB     255   ;           24
          FCB     128   ;           32
          FCB     68    ;           40
          FCB     64    ;           48
          FCB     64    ;           56
          FCB     64    ;           64
          FCB     64    ;           72
          FCB     64    ;           80
          FCB     64    ;           88
    ;-----------------------------------------------------



    *******************************************************
    *       >>> Block Learn Tables & Param's <<<
    *
    *
    *******************************************************
LC5D5:  FCB     28      ; BLM Cell Boundry, (700 RPM)
LC5D6:  FCB     48      ; BLM Cell Boundry (1200 RPM)
LC5D7:  FCB     80      ; BLM Cell Boundry, (2000 RPM)
                        ;
LC5D8:  FCB     12      ; BLM Flow Cell Boundry, (12 Gms/Sec)
LC5D9:  FCB     22      ; BLM Flow Cell Boundry, (22 Gms/Sec)
LC5DA:  FCB     34      ; BLM Flow Cell Boundry, (34 Gms/Sec)
                        ;
LC5DB:  FCB     4       ; BLM Hysteresis, (100 RPM RPM)
                        ;
LC5DC:  FCB     2       ; BLM Hysteresis
                        ; CALIB = Arg, (2 * 25 Gms/Sec)

LC5DD:  FCB     120     ; If Coolant <= Disable BLM update
                        ; CALIB = (Arg + 40) * 256/192, (50 C)

LC5DE:  FCB     240     ; If Coolant >= Disable BLM update 140c, 284f
                        ; CALIB = (Arg + 40) * 256/192, (140 C)

LC5DF:  FCB     0       ; If Ld Val < Disable BLM Update

LC5E0:  FCB     28      ; BLM Update Rate
                        ; CALIB = Arg * 20 + 1, (450 MSec)
                        ; (50 Msec/bit)


LC5E1:  FCB     2       ; 2, BLM Mult Update Amt

LC5E2:  FCB     160     ; Max Allowable BLM
LC5E3:  FCB     108     ; Min Allowable BLM

LC5E4:  FCB     5       ; If Clsd Lp int > 5, Enab BLM Update

LC5E5:  FCB     5       ; If Clsd Lp int < 5,  Enab BLM Update
```

```
    ****************************************
    * Memory Stay Alive Tables & Param's
    *
    *               $C5E6
    ****************************************
LC5E6:  FCB 118     ; Low  Lmt for SAM Cell 0
LC5E7:  FCB 150     ; High Lmt for SAM Cell 0
                    ;
LC5E8:  FCB 118     ; Low  Lmt for other SAM Cell's
LC5E9:  FCB 150     ; High Lmt for other SAM Cell's
                    ;
LC5EA:  FCB 0       ; Sam Cell A Number, Idle
LC5EB:  FCB 9       ; SAM Cell B Number, Non Idle
                    ;
LC5EC:  FCB 75      ; Stop Cell O update when time up, 15 SEC'D
                    ; CALIB = Arg * 5, (75/5 Sec's)
                    ;
LC5ED:  FCB 171     ; If Temp < 88c Then Skip SAM Update
                    ; CALIB = (Arg + 40) * 256/192, (88.25 C)
                    ;
LC5EE:  FCB 187     ; If Temp >  100c Then Skip SAM Update
                    ; CALIB = (Arg + 40) * 256/192, (100.25 C)
                    ;
LC5EF:  FCB 16      ; SAM A Filter Coef.
                    ; CALIB = Arg * 256
                    ;
LC5F0:  FCB 24      ; SAM B Filter Coef.
                    ; CALIB = Arg * 256

    ****************************************************
    *       Decel Enleanment  Param's
    *
    *               $C5F1
    ****************************************************
LC5F1:  FCB     40      ; Enab Dcel Int Reset If Ld val <=
                        ; CALIB = Arg
                        ;
LC5F2:  FCB     28      ; Enab Dcel Int Reset If RPM >
                        ; CALIB = Arg/25, (700 RPM)
                        ;
LC5F3:  FCB     255     ; TPS Filter Coef
                        ; CALIB = Arg * 255
                        ;
LC5F4:  FCB     240     ; Dif TPS% Threshold for Decle Enlean
                        ; CALIB = Arg * 2.56, (93%)
                        ;
LC5F5:  FCB     245     ; Diff Ld Val Thresh Of Decel Enlean
                        ; CALIB = Arg
                        ;
LC5F6:  FCB     0       ; Decel Enlean Time To maint.
                        ; CALIB = Arg * 80
                        ;
LC5F7:  FCB     0       ; Decel Enlean T/F Default
                        ; CALIB = Arg
                        ;
LC5F8:  FCB   128       ; lmt Fuel factor
                        ; CALIB = Arg * 128, (0.9375)
                        ;
LC5F9:  FCB   128       ; lmt Fuel factor
                        ; CALIB = Arg * 128, (0.9375)


    ****************************************************
    *  Decl Fuel cut off Tables & Param's
    *
    ****************************************************
```

```
LC5FA:  FCB     48      ; Decel Fuel C/O if > 1200 RPM Upper Hyst value
                        ; CALIB = Arg/25
                        ;
LC5FB:  FCB     36      ; Remain In C/O if > 900 RPM
                        ; Lower hyst value
                        ; CALIB = Arg/25
                        ;
LC5FC:  FCB     30      ; Enab C/O if Ld Val < 30
                        ; Lower hyst value
                        ;
LC5FD:  FCB     40      ; Stay in C/O if Ld Val <
                        ; Upper Hyst value
                        ;
LC5FE:  FCB     7       ; Max RPM Decel In 12.5 Msec
                        ; CALIB + Arg/12.5, (87.5 RPM)
                        ;
LC5FF:  FCB     20      ; C/O Cint Min time Lmt
                        ; CALIB = Arg * 80, (0.25 Sec)
                        ;
LC600:  FCB     8       ; If TPS < then Enab C/O
                        ; CALIB = Arg * 2.56, (3.125%)
                        ;
LC601:  FCB     0       ; If Cool Temp < then Disab C/O
                        ; CALIB = (Arg + 40) * 256, (Deg C)
                        ;
LC602:  FCB     15      ; If VSS <= Disable C/O
                        ; CALIB = Arg, (15 MPH)
                        ;
LC603:  FCB     8       ; 3.125% TPS, C/O Stall Saver TPS Default
                        ; CALIB = ARG * 2.56, (3.125%)
                        ;
LC604:  FCB     30      ; 375 msec, C/O Stall Saver T/F TPS Duration
                        ; CALIB = Arg * 80,
                        ;
LC605:  FDB     0256    ; 3.9 Msec, C/O Stall Saver PW
                        ; CALIB = Arg * 65.536
                        ;
LC607:  FCB     1       ; CALIB of C/O Stall Saver Acel Enrich Pulses
                        ;
LC608:  FDB     0511    ; 6.38 Sec, Min Time Between Consec DEFCO'S
                        ; CALIB = Arg * 80,
                        ;
LC60A:  FCB     10      ; 4%TPS, DFCO T/F TPS Default
                        ; CALIB = Arg *2.56


    ******************************************************
    * PWR ENRICHMENT TABLES & PARAM'S
    *
    * MY86 TYPE 32 ECM
    ******************************************************
LC60B:  FCB     50      ; IF Ld VAL > 50 ENAB PWR ENRICH
                        ; CAL = VAL
                        ;
LC60C:  FCB     10      ; Ld VAL HYST FOR PWR ENRICH.
                        ; CAL = VAL
                        ;
LC60D:  FCB     16      ; TPS HYST. DISABLE  PWR ENRICH IF TPS <
                        ; CAL = VAL * 2.56, (6.25%)
                        ;
                        ;
    ;-------------------------------------------------
    ; Pwr Enrichment TPS Treshold vs RPM
    ;
    ; BUA, TYPE $32, ECM P/N 1227165
    ;
```

```
    ; TBL = TPS% * 2.56
    ;-------------------------------------------------

        ORG $060E

    ;-------------------------------------------------
    ;
    ;               %TPS        RPM
    ;-------------------------------------------------
LC60E:    FCB     180   ; 70       400
          FCB     180   ; 70      1200
          FCB     180   ; 70      2000
          FCB     180   ; 70      3200
          FCB     180   ; 70      4800
    ;-------------------------------------------------


    ;-------------------------------------------------
    ; Pwr Enrichment Air/Fuel Pct Change
    ; vs Coolant Temperature
    ;
    ; TBL = Pct Change * 2.56
    ;-------------------------------------------------
LC613:    FCB     8     ; 9 Line table

    ;-------------------------------------------------------
    ;
    ;                    %CHG       Deg c COOL
    ;-------------------------------------------------------
          FCB     140   ; 54.68         -40 C
          FCB     125   ; 48.82         -16
          FCB     112   ; 43.75           8
          FCB     86    ; 33.59           32
          FCB     58    ; 22.66           56    (132.8f)
          FCB     58    ; 22.66           80
          FCB     58    ; 22.66          104
          FCB     58    ; 22.66          128
          FCB     58    ; 22.66          152    (305f)
   ;-------------------------------------------------------


    ;-------------------------------------------------------
    ;  Pwr Enrichment Air/Fuel Pct Change vs RPM
    ;
    ; TBL = (Pct Change * 1.28) + 128
    ;
    ;-------------------------------------------------------
LC61D:    FCB     128   ;O%        O RPM
          FCB     128   ;         400
          FCB     128   ;         800
          FCB     128   ;        1200
          FCB     128   ;        1600
          FCB     128   ;        2000
          FCB     128   ;        2400
          FCB     128   ;        2800
          FCB     128   ;        3200
          FCB     128   ;        3600
          FCB     128   ;        4000
          FCB     128   ;        4400
          FCB     128   ;        4800
          FCB     128   ;        5200
          FCB     128   ;        5600
          FCB     128   ;        6000
          FCB     128   ;        6400 RPM
    ;-------------------------------------------------------
    *******************************************************
```

```
    ******************************************************
    *       >>> IAC Tables & Params <<<
    *
    ******************************************************
LC62E:  FCB     128     ; RPM 12.5 Msec Filter Coef, (0.5)
                        ; CALIB = Arg * 256

LC62F:  FCB     144     ; Idle Spd Start up park posit.
                        ; CALIB = Arg

LC630:  FCB     32      ; Steps Added to Warm Park posit if
                        ; hot restart spark retard is active.

LC631:  FCB     10      ; Steps Added to Warm Park down if
                        ; A/C on during start up.

LC632:  FCB     5       ; Add Steps for Fan Anticipate
                        ; CALIB = Arg/2

LC633:  FCB     5       ;Add Offset for Cold Engine
                        ;when cold spark has expired

        ;
        ; Cmd Speed Definitions
        ;
LC634:    FCB     4     ; IAC offset added for pk/neut
                        ; CALIB = Arg/12.5, (50 RPM)
LC635:    FCB     160   ; Idle Speed Strt up Dly Time
                        ; CALIB = Arg/6.25, (1000 Sec)
LC636:    FCB     0     ; IAC Offset Cmd Spd Added
                        ; CALIB = Num/12.5, (RPM)


    ;-----------------------------------------------------
    ; IAC  TARGET RPM vs coolant Temp.
    ;
    ;  Dissassemby of BUA,  LINES =  17
    ;  09-23-1994, 10:07:16
    ;
    ;  TBL =  .08  * RPM/12.5
    ;-----------------------------------------------------
        ORG     $C637

    ;-----------------------------------------------------
    ;
    ;                 RPM/12.5       Deg c COOL
    ;-----------------------------------------------------
LC637    FCB  84     ;   1050          -40
LC638    FCB  84     ;   1050          -28
LC639    FCB  84     ;   1050          -16
LC63A    FCB  84     ;   1050           -4
LC63B    FCB  84     ;   1050            8
LC63C    FCB  76     ;    950           20
LC63D    FCB  72     ;    900           32
LC63E    FCB  60     ;    750           44
LC63F    FCB  48     ;    600           56
LC640    FCB  48     ;    600           68
LC641    FCB  44     ;    550           80
LC642    FCB  44     ;    550           92
LC643    FCB  44     ;    550          104
LC644    FCB  44     ;    550          116
LC645    FCB  44     ;    550          128
LC646    FCB  44     ;    550          140
LC647    FCB  44     ;    550          152
```

```
    ;-------------------------------------------------


        ;-------------------------
        ; CMD Speed Cnt'l Deadband
        ;-------------------------
LC648:    FCB     6      ; Max RPM Error for deadband in Pk/Neut
                         ; CALIB = Arg/12.5, (75 RPM)

LC649:    FCB     4      ; Max RPM Error for deadband in drive
                         ; CALIB = Arg/12.5, (50 RPM)

LC64A:    FCB     2      ; Max RPM error for A/C & Min Motor Posit.
                         ; Learning Dead Band, CALIB = Arg * 12.5
                         ; (2.5 RPM)

        *********************************
        *       PID ENABLE CONDITIONS
        *********************************

LC64B:  FCB     3        ; Enab T/F if TPS% >
                         ; CALIB = Arg * 2.56, (1.17%)

LC64C:  FCB     0        ; No store of new TPS if Diif
                         ; fm old is <

LC64D:  FCB     8        ; No Decay till TPS >=
                         ; CALIB = Arg * 2.56, (3.125%)

LC64E:  FCB     6        ; Enab C/L PID if MPH <=
                         ; CALIB = Arg * 16/5, (1.8 MPH)

LC64F:  FCB     4        ; 50 RPM, Min under spd error to enab PID
                         ; Durring Xsission dly, CALIB = Arg/12.5
        ;-------------------------
        ; Proportional Gains
        ;
        ;       ORG $C650
        ;-------------------------
LC650:   FCB      32     ; Undr Spd Error Proprt Gain
                         ; CALIB = Arg * 256 * 12.5

LC651:  FCB       32     ; Over spd Error Proport Gain

LC652:  FCB     255      ; Min Under spd err to enab
                         ; High Prop gain addition

LC653:  FCB       0      ; High undr spd error prop gain add.

        ;----------------------
        ; Derivitve Gains
        ;
        ;       ORG $C654
        ;----------------------
LC654:  FCB     16       ; Low gain for deriv term when RPM
                         ; rate inc
                         ; CALIB =(steps/rpm/sec) * 256 * 15.625

LC655:  FCB     64       ; Steps Gain deric term when RPM Rate inc
                         ; CALIB =(steps/rpm/sec) * 256 * 15.625

LC656:  FCB     22       ; 343 RPM/Sec Min dec RPM rate to enable
                         ; hi gain for direv term,
                         ; CALIB = (rpm/sec)/15.625
```

```
LC657:  FCB     255     ; Steps
                        ; CALIB =(steps/rpm/sec) * 256 * 15.625

LC658:  FCB     4       ; 50 RPM min umderspd error to enab hi
                        ; proportional & hi deriv gain additions


        ;------------------------
        ; Integral Gains
        ;
        ;       ORG $C659
        ;------------------------
LC659:    FCB     40    ; PK/NEUT intigrator gain if RPM
                        ; error& rate out of dead bamds
                        ; CALIB =(steps/rpm/sec) * 256 * 15.625

LC65A:    FCB     40    ;
                        ; CALIB =(steps/rpm/sec) * 256 * 15.625

LC65B:    FCB     12    ; Pk/Neut, max RPM rate to intigrate w/KISITGN
                        ; CALIB = (RPM/SEC)/15.625, (187.5 RPM/SEC)

LC65C:    FCB     12    ; Drive, max RPM rate to intigrate w/KISITGD
                        ; CALIB = (RPM/SEC)/15.625, (187.5 RPM/SEC)

        ;------------------------------
        ; Pk/Neut Scalling Gain
        ;
        ;       ORG $C65D
        ;------------------------------

LC65D:  FCB       255   ; Pk/Neut, Mult for prop & deriv terms.
                        ; CALIB = arg * 256

        ;------------------------------
        ; TPS Follower gain's
        ;
        ;       ORG $C65E
        ;------------------------------

LC65E:  FCB     5       ; 31.25 msec between T/F steps in PK/NUET
                        ; CALIB =msec/6.25

LC65F:  FCB     4       ; 25 msec between T/F steps in drive
                        ; CALIB =msec/6.25

LC660:  FCB     10      ; 1.953 msec/RPM addition vs MPH between T/F steps
                        ; in Drive
                        ; CALIB =msec * (32/6.25)

LC661:  FCB     16      ; 100 msec addition to time between T/F steps
                        ; if in open loop IAC.
                        ; CALIB =msec/6.25

LC662:  FCB       192   ; 1.5 steps/% TPS throt follower slope gain

LC663:  FCB       75    ; 75 Steps T.F. max steps in drive.

LC664:  FCB     255     ;Pk/Neut T.F. mult to T.F. steps
                        ; (NEUT STEPS)/(DRIVE STEPS)
        ;----------------------------


        ;----------------------------
        ; A/C Learning Gain
        ;
```

```
        ;-----------------------------
LC665:  FCB     20      ; STEPS, A/C DEFAULT
LC666:  FCB     32      ; STEPS, MAX A/C LEARN STEPS
LC667:  FCB     1       ; STEPS, MIN A/C LEARN STEPS
LC668:  FCB     5       ; STEPS, MAX PLUS A/C LEARN PWER OFF/ON CYCLE

LC669:  FCB     20      ; 400 MSEC MIN RPM ERR DEAD BAND TIME BEFORE
                        ; LEARN ENABLE/DISABLE

LC66A:  FCB     128     ; STEPS, P/N NEUT GAIN FOR A/C LEARNED VAL
                        ; (DRIVE STEPS)/(NEUT STEPS)
        ;-----------------------------

        ;
        ; STEPPER MOTOR PARAMS'S
        ;
LC66B:  FCB     32      ; QUANTIZER GAIN TO CONVERT ALGO OUT FROM LINEAR
                        ; MOTOR GAINS TO STEPS
                        ; CALIB = GAIN * 256
                        ;
LC66C:  FCB      8      ; IDLE SPD INVERSE QUANT GAIN TO MAKE
                        ; FARCTIONAL STPS


        ;-----------------------------------------------
        ;  A/C Clutch Tables & Param's
        ;
        ;
        ;-----------------------------------------------
LC66D:  FCB     255     ; IF TPS GT 99% DISABLE A/C
                        ; (MUST BE 99-16 TO RE-ENABLE)
                        ;
LC66E:  FCB     255     ; IF PLUS DIFF TPS GT 99%DISABLE A/C

LC66F:  FCB     0       ; DISABLE A/C CLUTCH 0 SEC AFTER IF DIFF TPS

LC670:  FCB     1       ; 1 SEC DELAY FOR CLUTCH ENGAGE
LC671:  FCB     1       ; 1 SEC DELAY FOR CLUTCH DIS-ENGAGE

LC672:  FCB     255     ; IF COOL GT 150 Deg c, DIS-ENGAGE CLUTCH

        ;-------------------------------
        ; Transitional Delays
        ;
        ;-------------------------------
LC673:  FCB     40      ; DISABLE CLSD LP PID FOR 800 Msec
                        ; AFTER OPN LP DISABLE
                        ;
LC674:  FCB     30      ; DISABLE CLSD LP PID FOR 600 Msec
                        ; AFTER TPS FOLLOWER DISABLE
                        ;
LC675:  FCB     16      ; DISABLE CLSD LP PID FOR 320 Msec
                        ; AFTER NEUT DRIVE SHIFT
                        ;
LC676:  FCB     20      ; DISABLE CLSD LP PID FOR 400 Msec
                        ; AFTER FAN ON
                        ;
LC677:  FCB     20      ; DISABLE CLSD LP PID FOR 1000 Msec
                        ; AFTER EXPIRATION OF COLD ENGINE SPARK


        ;-----------------------------
        ; Low Integrator Gains
        ;
        ;-----------------------------
LC678:    FCB     40    ; 40 STEPS PK/NEUT LO INT GAIN IF
```

```
                        ; RPM ERR IN DEADBAND
                        ; CALB = (NUM * 128 * 12.5/.05)
                        ;
LC679:    FCB     8     ; 40 STEPS, DRIVE LO INT GAIN IF
                        ; RPM ERR IN DEADBAND
                        ; CALB = (NUM * 128 * 12.5/.05)
                        ;
LC67A:    FCB     0     ; IF RPM ERROR LT 0 DISABLE & CLR INTEGRAL
                        ; CALIB = RPM/12.5
                        ;
        ;--------------------------
        ; Motor Reset Param's
        ;
        ;       ORG $C67B
        ;--------------------------
LC67B:  FCB     145     ; MAX IAC STEPS POSSIBLE


        ;
        ;  RPM Rate Deadband
        ;
LC67C:  FCB       16    ;__ RPM/SEC MIN DIRVITIVE RATE
                        ; CALIB = RPM/SEC/15.625

        ;
        ; Clutch Anticipate
        ;
        ;
        ; SKIP Pwr Steer Press Sw READ
        ; HYST PAIR
        ;
LC67D:  FCB     255     ; SKIP PS SW READ IF 100% TPS, UPPER VAL
LC67E:  FCB     255     ; SKIP PS SW READ IF 100% TPS, LOWER VAL
LC67F:  FCB     8       ; SKIP PWR STEER PRESS SW READ IF => 8 MPH

        ;
        ; Pwr Steering Anticipate
        ;
LC680:  FCB     0       ; PWR STEER ANTIC STEPS
LC681:  FCB     0       ; PWR STEER ANTIC STEPS if A/C on

        ;
        ; MANUAL PARAM'S
        ;
LC682:  FCB     0       ; FLAG, '1' IF MANUAL VECH SELECTED ELSE '0'
LC683:  FCB     5       ; 5 STEPS ADDED TO T/F IN DRIVE &
                        ; VECH IS MOVING (MPH>

        ;
        ; PID HOT SPARK RETARD PARAM'S
        ;
LC684:  FCB     25      ;
LC685:  FCB     24      ; ADD 300 RPM SPEED OFFSET IF HOT SPARK
                        ; RETARD IS ACTIVE

    ;-----------------------------------------------------
    ; IAC Mult (0-1) vs Coolant temp
    ;
    ;
    ; TABLE VALUE = MULT * 256
    ;-----------------------------------------------------

LC686:   FCB      8     ; 9  Lines in Tbl.

    ;-----------------------------------------------------
    ;
```

```
    ;                    MULT          DEG c COOL
    ;-------------------------------------------------------
         FCB     204   ; 0.80            -40
         FCB     204   ; 0.80            -16
         FCB     230   ; 0.90              8
         FCB     255   ; 1.00             32
         FCB     255   ; 1.00             56
         FCB     255   ; 1.00             80
         FCB     255   ; 1.00            104
         FCB     255   ; 1.00            128
         FCB     255   ; 1.00            152
    ;-------------------------------------------------------


    ;-------------------------------------------------------
    ; Warm Park Posit vs Coolant Temp
    ;
    ;       TABLE = STEPS
    ;
    ;
    ;-------------------------------------------------------

        ORG $0690

LC690:    FCB     8     ; 9 Lines in Tbl
    ;-------------------------------------------------------
    ;
    ;                             DEG c COOL
    ;-------------------------------------------------------
         FCB     145   ;        -40
         FCB     145   ;        -16
         FCB     113   ;          8
         FCB     90    ;         32
         FCB     80    ;         56
         FCB     65    ;         80
         FCB     50    ;        104
         FCB     50    ;        128
         FCB     50    ;        152
    ;-------------------------------------------------------
    *******************************************************


    *******************************************************
    *       Mass Air Flow Tables & Param's
    *
    *       DIGITAL MASS FLOW SENSOR
    *
    *               Freq range      34 - 150 hZ
    *               Period          927 - 437 counts
    *               Range           1490 counts
    *
    *       table 1    0 -  511 counts,   0 - 22 gms/sec
    *       table 2  512 -  767 counts,  22 - 48
    *       table 3  768 - 1023 counts,  48 - 82
    *       table 4 1024 - 1279 counts,  82 - 135
    *       table 5 1280 - 1535 counts, 135 - 206
    *       table 6 1536 - 1791 counts, 206 - 255
    *
    *
    *******************************************************

        ORG $069A

LC69A:  FCB 80      ; Ld VAR FOR SCALING LV8 SCALE FACTORS
                    ; CAL = arg + 64, (16)
```

```
LC69B:  FCB 10      ; 1 Sec MAF BURN OFF TIME.
LC69C:  FCB 50      ; 5 SEC MAF BURNOFF DELAY TIME FROM IGN OFF

            ORG     $069D

                  ;---------------------------------------
                  ; Mass Air Flow TABLE 1
                  ;
                  ;  TBL =  gms/Sec *    11.1
                  ;
                  ;---------------------------------------

LC69D:  FCB 23    ; TABLE SCALAR
LC69E:  FCB 8     ; 9 LINE TBL

                  ;---------------------------------------
                  ; gms/SeC    BIN      VDC     #/HR
                  ;---------------------------------------
   FCB          0 ;     0.0        0     0.00        0
   FCB         36 ;     3.2       64     0.18       25
   FCB         50 ;     4.5      128     0.37       35
   FCB         69 ;     6.2      192     0.55       48
   FCB         93 ;     8.4      256     0.73       65
   FCB        121 ;    10.9      320     0.91       84
   FCB        155 ;    14.0      384     1.10      108
   FCB        197 ;    17.7      448     1.28      137
   FCB        248 ;    22.3      512     1.46      172
                  ;---------------------------------------


                  ;---------------------------------------
                  ; Mass Air Flow TABLE 2
                  ;
                  ;  TBL =  gms/Sec *    5.33
                  ;
                  ;---------------------------------------

LC6A8: FCB 48     ; TABLE SCALAR
LC6A9: FCB  8     ; LINE TBL

                  ;---------------------------------------
                  ; gms/SeC    BIN      VDC     #/HR
                  ;---------------------------------------
   FCB        119 ;    22.3      512     1.46      172
   FCB        133 ;    25.0      544     1.55      193
   FCB        147 ;    27.6      576     1.65      213
   FCB        163 ;    30.6      608     1.74      236
   FCB        182 ;    34.1      640     1.83      264
   FCB        198 ;    37.1      672     1.92      287
   FCB        217 ;    40.7      704     2.01      314
   FCB        237 ;    44.5      736     2.10      343
   FCB        254 ;    47.7      768     2.19      368
                  ;---------------------------------------


                  ;---------------------------------------
                  ; Mass Air Flow  TABLE 3
                  ;
                  ;  TBL =  gms/Sec *    3.08
                  ;---------------------------------------

LC6B3:  FCB 83    ; TABLE SCALAR
LC6B4:  FCB 8     ; 9 LINE TBL

                  ;---------------------------------------
                  ; gms/SeC    BIN      VDC     #/HR
```

```
                    ;---------------------------------------
   FCB        147   ;    47.7      768     2.19      368
   FCB        158   ;    51.2      800     2.29      395
   FCB        170   ;    55.1      832     2.38      425
   FCB        182   ;    59.0      864     2.47      455
   FCB        195   ;    63.2      896     2.56      488
   FCB        209   ;    67.8      928     2.65      523
   FCB        223   ;    72.3      960     2.74      558
   FCB        238   ;    77.2      992     2.83      596
   FCB        253   ;    82.0     1024     2.93      633
                    ;---------------------------------------


                    ;---------------------------------------
                    ; Mass Air Flow  TABLE 4
                    ;
                    ;
                    ;   TBL =     1.90  * gms/Sec
                    ;---------------------------------------

LC6BE: FCB 135      ; TABLE SCALAR
LC6BF: FCB 8        ; 9 LINE TBL

                    ;---------------------------------------
                    ; gms/SeC    BIN      VDC     #/HR
                    ;---------------------------------------
   FCB        156   ;    82.3     1024     2.93      635
   FCB        166   ;    87.5     1056     3.02      676
   FCB        176   ;    92.8     1088     3.11      716
   FCB        187   ;    98.6     1120     3.20      761
   FCB        198   ;   104.4     1152     3.29      806
   FCB        210   ;   110.7     1184     3.38      855
   FCB        222   ;   117.1     1216     3.47      903
   FCB        237   ;   125.0     1248     3.57      965
   FCB        255   ;   134.5     1280     3.66     1038
                    ;---------------------------------------


                    ;---------------------------------------
                    ; Mass Air Flow TABLE 5
                    ;
                    ;
                    ;   TBL =     1.24  * gms/Sec
                    ;---------------------------------------

LC6C9:  FCB 207     ; TABLE SCALAR
LC6CA:  FCB 8       ; 9 LINE TBL

                    ;---------------------------------------
                    ; gms/SeC    BIN      VDC     #/HR
                    ;---------------------------------------
   FCB        166   ;   134.2     1280     3.66     1036
   FCB        176   ;   142.3     1312     3.75     1098
   FCB        186   ;   150.4     1344     3.84     1161
   FCB        196   ;   158.5     1376     3.93     1223
   FCB        207   ;   167.4     1408     4.02     1292
   FCB        219   ;   177.1     1440     4.11     1367
   FCB        230   ;   186.0     1472     4.21     1435
   FCB        242   ;   195.7     1504     4.30     1510
   FCB        255   ;   206.2     1536     4.39     1591
                    ;---------------------------------------


                    ;---------------------------------------
                    ; Mass Air Flow TABLE 6
                    ;
```

```
                ;   TBL =     1.00 * gms/SEC
                ;
                ;---------------------------------------

LC6D4:  FCB 255   ; TBL SCALAR
LC6D5:  FCB 16    ; 16 LINE TBL

                ;---------------------------------------
                ; gms/SeC    BIN      VDC     #/HR
                ;---------------------------------------
   FCB        207 ;   206.2     1536     4.39     1591
   FCB        213 ;   212.2     1552     4.43     1637
   FCB        219 ;   218.1     1568     4.48     1684
   FCB        226 ;   225.1     1584     4.53     1737
   FCB        233 ;   232.1     1600     4.57     1791
   FCB        240 ;   239.1     1616     4.62     1845
   FCB        248 ;   247.0     1632     4.66     1906
   FCB        255 ;   254.0     1648     4.71     1960
   FCB        255 ;   254.0     1664     4.75     1960
   FCB        255 ;   254.0     1680     4.80     1960
   FCB        255 ;   254.0     1696     4.85     1960
   FCB        255 ;   254.0     1712     4.89     1960
   FCB        255 ;   254.0     1728     4.94     1960
   FCB        255 ;   254.0     1744     4.98     1960
   FCB        255 ;   254.0     1760     5.03     1960
   FCB        255 ;   254.0     1776     5.07     1960
   FCB        255 ;   254.0     1792     5.12     1960
                ;---------------------------------------



        ;-------------------------------------------------------
        ;       Mass Flow  Filter & Limits
        ;
        ;
        ;-------------------------------------------------------
        ORG $06E7

LC6E7:  FCB     32      ; Mult for sliding filter

LC6E8:  FDB     2048    ; Min Out of MAF, (32 Hz)
                        ; CALIB = 65536/hZ

LC6EA:  FDB     0768    ; Min Allowable Flow, (3 gms/Sec)
                        ; CALIB = (gm/sec) * 256

        ;-------------------------------------------------
        ; Max Air Flow vs RPM
        ;
        ; 17 LINE, 0 -> 6400 RPM
        ;
        ; TBL = Grams/Sec
        ;-------------------------------------------------
            ORG $06EC
                        ; gms/sec       RPM
                        ;--------------------------
LC6EC:    FCB     23    ;  23              0
          FCB     23    ;  23            400
          FCB     30    ;  30            800
          FCB     48    ;  48           1200
          FCB     68    ;  68           1600
          FCB     89    ;  89           2000
          FCB     111   ; 111           2400
          FCB     141   ; 141           2800
          FCB     170   ; 170           3200
```

```
          FCB     200   ; 200           3600
          FCB     220   ; 220           4000
          FCB     236   ; 236           4400
          FCB     245   ; 245           4800
          FCB     247   ; 247           5200
          FCB     247   ; 247           5600
          FCB     247   ; 247           6000
          FCB     255   ; 255           6400
        ;-------------------------------------------------


        ************************************************
        *       >>> Serial Data Tables & Params <<<
        *
        * MY 86     TYPE $32, ECM P/N 1227165
        ************************************************
        ORG     $06FD

LC6FD:  FCB     4       ; Dis String length, (Bytes)

        ;-------------------------------------------------
        ;       DIS Addresses, Xmit
        ;
        ;-------------------------------------------------
LC6FE:    FDB     $C009 ; Num O cyl Addr
          FDB     $011A ; Running total of fuel supplied Addr
          FDB     $011E ; Running total of Dist. Traveled Addr
          FDB     $C70C ; Gal's/Sec Scale Factor Addr
          FDB     $0000 ;
          FDB     $0000 ;
          FDB     $0000 ;
    ;-------------------------------------------------


    ;-------------------------------------------------
    ; DISPLAY Fuel Rate Scale Factors
    ;
    ;-------------------------------------------------

LC70C:    FCB     122   ; Gals/Hr Inj flow rate
                        ; CALIB = Arg * 32, (3.8125 G/Hr)

    ************************************************
    * 160 BAUD DIAGNOSTICS
    * Table Of Addr's vs DATA
    *
    ************************************************

        ORG     $070D

LC70D:  FDB     $C000   ; LOC 2,  PROM ID (16 bits)
        FDB     $C001   ; LOC 3,  MSB
        FDB     $002C   ; LOC 4,  IAC Present Posit.
        FDB     $005D   ; LOC 5,  Coolant temp, (A/D)
        FDB     $0065   ; LOC 6,  Filtered MPH
        FDB     $0112   ; LOC 7,  EGR D/C
        FDB     $0057   ; LOC 8,  RPM
        FDB     $0081   ; LOC 9,  TPS (A/D)
        FDB     $00C6   ; LOC 10, Base FI Pulse Width
        FDB     $006F   ; LOC 11, Filtered o2 Sig
        FDB     $0005   ; LOC 12, Err Flg #1, (Sensors0
                        ;--------------------------------
                        ; Bit 0 = ERR 23 MAT SENSOR LOW
                        ;     1 = ERR 22 TPS LOW
                        ;     2 = ERR 21 TPS HIGH
                        ;     3 = ERR 16 NOT USED
```

```
                    ;
                    ;     4 = ERR 15 COOL SENSOR LOW TEMP.
                    ;     5 = ERR 14 COOL SENSOR HIGH TEMP.
                    ;     6 = ERR 13 O2 SENSOR
                    ;     7 = ERR 12 NO REF PULSES
                    ;--------------------------------
                    ;
    FDB   $0006     ; LOC 13, Err Flg #2
                    ;
                    ; Bit 0 = ERR 35 NOT USED
                    ;     1 = ERR 34 MAF SENSOR LOW
                    ;     2 = ERR 33 MAF SENSOR HIGH
                    ;     3 = ERR 32 EGR DIAG.
                    ;
                    ;     4 = ERR 31 NOT USED
                    ;     5 = ERR 26 NOT USED
                    ;     6 = ERR 25 MAT SENSOR HIGH
                    ;     7 = ERR 24 VSS
                    ;--------------------------------
    FDB   $0007     ; LOC 14, Err Flg #3
                    ;
                    ; Bit 0 = ERR 51 PROM ERROR
                    ;     1 = ERR 46 VATS FAILED
                    ;     2 = ERR 45 O2 SENSOR RICH
                    ;     3 = ERR 44 O2 SENSOR LEAN
                    ;
                    ;     4 = ERR 43 ESC FAILURE
                    ;     5 = ERR 42 EST ERROR
                    ;     6 = ERR 41 CYL SELECT ERROR
                    ;     7 = ERR 36 BURNOFF DIAG.
                    ;--------------------------------
    FDB   $0008     ; L0C 15, Err Flg #4
                    ;
                    ; Bit 0 = ERR 63 NOT USED
                    ;     1 = ERR 62 NOT USED
                    ;     2 = ERR 61 NOT USED
                    ;     3 = ERR 56 NOT USED
                    ;
                    ;     4 = ERR 55 NOT USED
                    ;     5 = ERR 54 FUEL PUMP VOLTAGE
                    ;     6 = ERR 53 OVER VOLTAGE
                    ;     7 = ERR 52 CAL PAC MISSING
                    ;--------------------------------
    FDB     $0044   ;  16, MAF Flow
    FDB     $0060   ;  17, MAT
    FDB     $0037   ;  18, MCU Stat Flf, (Xmission etc)
    FDB     $00A1   ;  19, ECU PA3 Counter
    FDB     $00C0   ;  20, BLM Mult.
    FDB     $00F1   ;  21, Rich/Lean Counter
    FDB     $00EA   ;  22, Decell Fuel Gms/Sec
    FDB     $00EB   ;  23, LSB
    FDB     $00D5   ;  24, Base PW (Last Inj), 16 bits
    FDB     $00D6   ;  25, LSB
*****************************************************



*****************************************************
* MODE 0, REVERT TO NORMAL MODE.
*
* ALDL DEVICE MUST REQUEST MODE 0 BY
* XMITING THE FOLLOWING MSG TO
* THE ECM:
*
*   MSG ID          = $80
*   MSG LEN 1+85    = $56
```

```
    *   MODE            = $00
    *   CKSUM           = $29
    *
    * THE ECM WILL RESPOND WITH:
    *
    *   MSG ID          = $80
    *   MSG LEN 64+85   = $95
    *   MODE            = $00
    *   CKSUM           = $cc
    *
    ******************************************************
          ORG     $073D

LC73D:    FDB     $0000 ; Next Msg entry address
                        ;
          FCB     $80   ; DEVICE ID Code
                        ;
          FCB     $00   ; Option Flag Word
                        ;
          FCB     1     ; Output Msg Length
          FCB     1     ; Input Msg Length
                        ;
          FDB     $016F ; Addr of output cnt'l block, (1 Byte long)
          FDB     $0133 ; Addr of input cnt'l block, (29 bytes long)


    ;------------------------------------------------------
    ;  ADDR'S OF DIFFERENT MODE BLOCKS
    ;
    ;       Table Of Addr's vs DATA
    ;
    ;------------------------------------------------------
          ORG     $0747

LC747:    FDB     $C73D ; MSG CODE $80 Mode 0 Entries
          FDB     $C751 ; MSG CODE $80 Mode 1 Entries
          FDB     $C7D9 ; Msg Code $80 Mode 2 Entries
          FDB     $C7E3 ; Msg Code $80 Mode 3 Entries
          FDB     $C7ED ; Msg Code $80 Mode 4 Entries
    ;------------------------------------------------------


    ******************************************************
    * MODE 1 FIXED DATA DATA STREAM
    * ALDL DEV MUST REQUEST MODE 1 BY
    * XMITING THE FOLLOWING MSG TO
    * THE ECM:
    *
    *   MSG ID          = $80
    *   MSG LEN 1+85    = $56
    *   MODE            = $01
    *   CKSUM           = $29
    *
    * THE ECM WILL RESPOND WITH:
    *
    *   MSG ID          = $80
    *   MSG LEN 64+85   = $95
    *   MODE            = $01
    *   DATA BYTE 1     = $XX
    *       .
    *       .
    *   BATA BYTE 63    = $XX
    *   CKSUM           = $cc
    *
    ******************************************************
LC751:    FDB     $0000 ; Nxt Msg Entry Addr
```

```
                    ;
          FCB     $80   ; DEVICE ID Code
                    ;
          FCB     $80   ; RAM/ROM FLAG
                    ;
          FCB     64    ; Output Msg Lenght
          FCB     1     ; Input Msg Length
                    ;
          FDB     $016F ; Addr of Output Cnt'l Block
          FDB     $0133 ; Addr of Input Cnt'l Block
                    ;
LC75B:    FDB     $C000 ;1,  PROM ID MSB
          FDB     $C001 ;2,  PROM ID LSB
                    ;
          FDB     $0005 ;3,  Err Flg #1
                    ;
                    ; Bit 0 = ERR 23 MAT SENSOR LOW
                    ;     1 = ERR 22 TPS LOW
                    ;     2 = ERR 21 TPS HIGH
                    ;     3 = ERR 16 NOT USED
                    ;
                    ;     4 = ERR 15 COOL SENSOR LOW TEMP.
                    ;     5 = ERR 14 COOL SENSOR HIGH TEMP.
                    ;     6 = ERR 13 O2 SENSOR
                    ;     7 = ERR 12 NO REF PULSES
                    ;--------------------------------
          FDB     $0006 ;4,  Err Flg #2
                    ;
                    ; Bit 0 = ERR 35 NOT USED
                    ;     1 = ERR 34 MAF SENSOR LOW
                    ;     2 = ERR 33 MAF SENSOR HIGH
                    ;     3 = ERR 32 EGR DIAG.
                    ;
                    ;     4 = ERR 31 NOT USED
                    ;     5 = ERR 26 NOT USED
                    ;     6 = ERR 25 MAT SENSOR HIGH
                    ;     7 = ERR 24 VSS
                    ;--------------------------------
          FDB     $0007 ;5,  Err Flg #3
                    ;
                    ; Bit 0 = ERR 51 PROM ERROR
                    ;     1 = ERR 46 VATS FAILED
                    ;     2 = ERR 45 O2 SENSOR RICH
                    ;     3 = ERR 44 O2 SENSOR LEAN
                    ;
                    ;     4 = ERR 43 ESC FAILURE
                    ;     5 = ERR 42 EST ERROR
                    ;     6 = ERR 41 CYL SELECT ERROR
                    ;     7 = ERR 36 BURNOFF DIAG.
                    ;--------------------------------
          FDB     $0008 ;6,  Err Flg #4
                    ;
                    ; Bit 0 = ERR 63 NOT USED
                    ;     1 = ERR 62 NOT USED
                    ;     2 = ERR 61 NOT USED
                    ;     3 = ERR 56 NOT USED
                    ;
                    ;     4 = ERR 55 NOT USED
                    ;     5 = ERR 54 FUEL PUMP VOLTAGE
                    ;     6 = ERR 53 OVER VOLTAGE
                    ;     7 = ERR 52 CAL PAC MISSING
                    ;--------------------------------
          FDB     $0009 ;7,  Err Flg #5
                    ;
                    ; Bit 0 = NOT USED
                    ;     1 = NOT USED
```

```
                ;     2 = NOT USED
                ;     3 = NOT USED
                ;
                ;     4 = NOT USED
                ;     5 = ERR 66 NOT USED
                ;     6 = ERR 65 NOT USED
                ;     7 = ERR 64 NOT USED
                ;---------------------------------
                ;
FDB     $005D ;8,  Coolant, A/D
FDB     $005F ;9,  Strt up Coolant, Deg C
FDB     $0081 ;10, TPS, A/D
FDB     $0057 ;11, RPM, Var
                ;
FDB     $0095 ;12, Ref Period
FDB     $0096 ;13, LSB
                ;
FDB     $0065 ;14, MPH Var for Disp.
FDB     $0066 ;15, LSB
                ;
FDB     $008F ;16, N/V Ratio
FDB     $006F ;17, o2 Filtered
FDB     $00F1 ;18, ALDL Rich/Lean Counter
FDB     $00C6 ;19, Base PW Correction
FDB     $00C0 ;20, Blk Learn, Scaled
FDB     $00BF ;21, Blk Learn
FDB     $00C9 ;22, Clsd/Lp Int.
FDB     $002C ;23, IAC Present Posit.
FDB     $0101 ;24, IAC Step Dir Cmd
FDB     $0102 ;25, Requested Idle Spd.
FDB     $0063 ;26, Filtered Ld Val
FDB     $0064 ;27, LSB
FDB     $0061 ;28, Raw Ld Val
FDB     $0060 ;29, MAT Val
FDB     $012B ;30, MAT Val, A/D
FDB     $0112 ;31, EGR D.C.
FDB     $0113 ;32, Can Prg D.C.
FDB     $00F4 ;33, Fan D.C.
FDB     $007E ;34, Batt Vlts, A/D
FDB     $007F ;35, Pump VDC
                ;
FDB     $00EA ;36, Fuel Gms/Sec, 16 bits
FDB     $00EB ;37, LSB
                ;
FDB     $00B6 ;38,  UNLIMITED AIRFLOW, (MAF Diag)
                ;
FDB     $0115 ;39, Tot Sprk Adv rel to TDC
FDB     $0116 ;40, LSB
                ;
FDB     $009D ;41, Sprk Adv rel to TDC
FDB     $009E ;42, LSB
                ;
FDB     $00A1 ;43, ECU Cnt'r
FDB     $00A5 ;44, Knock Retard
                ;
FDB     $00D5 ;45, Base PW, Last Inject
FDB     $00D6 ;46, LSB
                ;
FDB     $00CE ;47, Total Air/Fuel Val
FDB     $00CF ;48, LSB
                ;
FDB     $011A ;49, Run tot Fuel Consumed
FDB     $011B ;50, LSB
                ;
FDB     $011E ;51, Run tot Dist Run, (.005mi/bit)
                ;
```

```
FDB     $001A ;52, Eng Run Time, Sec
FDB     $001B ;53, LSB
              ;
              ;--------------------------------
FDB     $0035 ;54, Minor Lp mode word #2
              ;
              ; Bit 0 = 1= OVERDRIVE ON
              ;         0= OVERDRIVE OFF
              ;     1 = ERR 14 or 15 THIS STARTUP
              ;     2 = REF PULSES OCCURRED (6.25 MSEC CHECK)
              ;     3 = 1= ALDL MODE, 8192 LOCKED IN, & MODE 4
              ;
              ;     4 = DIAGNOSTIC SWITCH IN DIAGNOSTIC POSITION
              ;     5 = DIAGNOSTIC SWITCH IN ALDL POSITION
              ;     6 = HIGH BAT. VOLT. , DISABLE SOLENOID DISCRETS
              ;     7 = SHIFT LIGHT (1= ON, 0= OFF)
              ;--------------------------------
FDB     $0037 ;55, MPU Status wd, (Fan, P.S. etc)
              ;
              ; Bit 0 = PARK/NEUTRAL MODE
              ;     1 = NOT IN THIRD GEAR
              ;     2 = OVERDRIVE REQUEST
              ;     3 = EXCESSIVE POWER STEER PRES.
              ;       , CLUTCH ANTICIPTE
              ;
              ;     4 = EGR DIAGNOSTIC SWITCH CLOSED
              ;     5 = TCC LOCKED
              ;     6 = FAN REQUEST BIT
              ;     7 = 0 = A/C REQUEST
              ;--------------------------------
FDB     $002E ;56, Mode wd
              ;
              ; Bit 0 = PARK/NEUTRAL (0 = DRIVE)
              ;     1 = 3rd GEAR
              ;     2 = 4th GEAR
              ;     3 = POWER STEERING ( 1 = CRAMP)
              ;
              ;     4 = READ BUT NOT USED
              ;     5 = EGR DIAGNOSTIC
              ;     6 = FAN REQUEST <=> ACHP (A/C HI PRESSURE)
              ;     7 =AIR CONDITIONER ( 0 = A/CREQUESTED)
              ;--------------------------------
FDB     $0034 ;57, Minor Lp wd #1
              ;
              ; Bit 0 = ADVANCE FLAG ( 0= ADV. , 1= RTD)
              ;     1 = CHK ENGINE LIGHT DELAY FLAG
              ;     2 = INTERRUPT SERVICE EXECUTION EXCEED 6.25 MSEC
              ;     3 = FAN ON DISABLED BY PID
              ;
              ;     4 = TCC ROAD SPEED 1st PULSE FLAG
              ;     5 = A/C CLUTCH FLAG ( 0= A/C CLUTCH ON)
              ;     6 = BYPASS CHECK ENABLE
              ;     7 = ENGINE RUNNING FLAG ( 1= RUNNING)
              ;
              ;--------------------------------
FDB     $0001 ;58, Non Vol Mem Mode wd
              ;
              ; Bit 0 = O2 SENSOR READY
              ;     1 = CLOSED LOOP TIMER TIMED OUT
              ;     2 = NOT USED
              ;     3 = IMPROPER SHUTDOWN
              ;
              ;     4 = NOT USED
              ;     5 = IAC KICKDOWN ENABLED
              ;     6 = KWARM KICKDOWN ENABLED
              ;     7 = ERR 42 FAILED
```

```
                ;
                ;--------------------------------
FDB     $0004   ;59,  MANUAL Xmission Mode wd
                ;
                ; Bit 0 = OVERDRIVE ON
                ;     1 = 1st GEAR DIRECT
                ;     2 = 1st GEAR LOOK-AHEAD OK
                ;     3 = 4th GEAR
                ;
                ;     4 = 1st GEAR OVERDRIVE
                ;     5 = DOWNSHIFT/OFF REQUEST
                ;     6 = UPSHIFT/ON REQUEST
                ;     7 = OVERDRIVE ACTIVE
                ;
                ;--------------------------------
FDB     $003C   ;60, ALCL Mode Wd.
                ;
                ; Bit 0 = ALDL RESET
                ;     1 = NOT USED
                ;     2 = FIELD SERVICE MODE
                ;     3 = FIRST C/L PASS THRU FIELD SERVICE MODE DONE
                ;       (1= DONE)
                ;
                ;     4 = FIELD SERVICE. O2 TRANSITION
                ;     5 = ONE SECOND FLAG (SYMMETRICAL)
                ;     6 = 200 MSEC TOGGLE BIT FOR 2.5 HZ FSM FLASH RATE
                ;     7 = PULLUP RESISTOR FOR COOL
                ;--------------------------------
FDB     $003E   ;61, Mjr Lp mode wd
                ;
                ; Bit 0 = 100 MSEC, OLD CCP PURGE ON FLAG (0= OFF)
                ;     1 = AIR CONTROLLED, 0= AIR DIVERTED
                ;     2 = AIR SWITCHED TO PORT
                ;     3 = NOT USED
                ;
                ;     4 = SKIP BURNOFF DUE TO > 17 VOLTS THIS STARTUP
                ;     5 = D.E. QSEC
                ;     6 = BURN OFF AIR METER
                ;     7 = DECEL ENLEANMENT
                ;
                ;--------------------------------
FDB     $0046   ;62, Serial Data Mode Word
                ;
                ; Bit 0 = EXPECTING FIRST 160 BAUD INTERRUPT
                ;     1 = EXPECTING SECOND 160 BAUD INTERRUPT
                ;     2 = IN 8192 MODE
                ;     3 = LOCKED IN 8192 MODE
                ;
                ;     4 = NOT USED
                ;     5 = NOT USED
                ;     6 = NOT USED
                ;     7 = NOT USED
                ;
                ;--------------------------------
FDB     $0044   ;63, Flg Word Fuel/Air Mode word
                ;
                ; Bit 0 = NOT USED
                ;     1 = LEARN CONTROL FLAG
                ;       (1= ENABLE STORE, 0= DISABLE)
                ;     2 = NOT USED
                ;     3 = NOT USED
                ;
                ;     4 = VSS FAILURE
                ;     5 = EECC SLOW O2 RICH/LEAN FLAG
                ;     6 = RICH/LEAN FLAG (1= RICH , 0= LEAN)
                ;     7 = CLOSED LOOP FLAG (1= C/L , 0= O/L)
```

```
                    ;--------------------------------

    ;-------------------------------------------------



    ********************************************************
    * MODE 2 SELECTABLE MEMORY DUMP
    *
    * ALDL DEV MUST REQUEST MODE 2 BY
    * XMITING THE FOLLOWING MSG TO
    * THE ECM:
    *
    *   MSG ID          = $80
    *   MSG LEN 3+85    = $58
    *   MODE            = $02
    *   START ADD MSB   = $aa
    *   START ADD LSB   = $aa
    *   CKSUM           = $cc
    *
    * THE ECM WILL RESPOND WITH:
    *
    *   MSG ID          = $80
    *   MSG LEN 65+85   = $96
    *   MODE            = $03
    *   ADD CONT        = $dd
    *       .
    *       .
    *   ADD (+63) CONT  = $dd
    *   CKSUM           = $cc
    *
    ********************************************************
            ORG $07D9

LC7D9:    FDB     $0000 ; Nxt Msg Entry Addr
          FCB     $80   ; DEVICE Code
          FCB     $40   ; Option Flag Word
          FCB     $40   ; ????
          FCB       3   ; Input Msg Length

          FDB     $0150 ; Addr of Output Cnt'l Block
          FDB     $0133 ; Addr of Input Cnt'l Block
    ;-------------------------------------------------



    ********************************************************
    * MODE 3 RAM DUMP 0 to 8 ADDRESSES
    *
    * ALDL DEV MUST REQUEST MODE 3 BY
    * XMITING THE FOLLOWING MSG TO
    * THE ECM:
    *
    *   MSG ID          = $80
    *   MSG LEN 2n+85   = $58
    *   MODE            = $03
    *   ADD MSB         = $aa
    *   ADD LSB         = $aa
    *       .
    *       .
    *   ADD MSB         = $aa
    *   ADD LSB         = $aa
    *   CKSUM           = $cc
    *
    * THE ECM WILL RESPOND WITH:
```

```
    *
    *   MSG ID          = $80
    *   MSG LEN n+1+85  = $nn
    *   MODE            = $03
    *   ADD CONT        = $dd
    *   ADD CONT        = $dd
    *       .
    *       .
    *   ADD CONT        = $dd
    *   ADD CONT        = $dd
    *   CKSUM           = $cc
    *
    *
    ******************************************************
           ORG     $07E3

LC7E3:     FDB     $0000 ; Nxt Msg Entry Addr
                         ;
           FCB     $80   ; DEVICE ID Code
                         ;
           FCB     $40   ; RAM/ROM Flag Word
                         ;
           FCB     9     ; Output Msg Length
           FCB     17    ; Input Msg Length

           FDB     $0150 ; Addr of Output Cnt'l Bock
           FDB     $0133 ; Addr of Input Cnt'l Block
    ;------------------------------------------------------




    ******************************************************
    * MODE 4 MODIFIER OP'S
    *
    * MODE 4 WILL MODIFY ECM OPERATION
    * & XMIT THE CONTENTS OF RAM,
    *  (0 -> 8 LOC'S) AS REQUESTED
    *
    * ALDL DEV MUST REQUEST MODE 4 BY
    * XMITING THE FOLLOWING MSG TO
    * THE ECM:
    *
    *   MSG ID              = $80
    *   MSG LEN 2n+1+10+85  = $nn
    *   MODE                = $04
    *   CNTL WD 1           = $cc
    *       .
    *       .
    *   CNTL WD 10          = $cc
    *   ADD 1 MSB           = $aa
    *   ADD 1 LSB           = $aa
    *       .
    *       .
    *   ADD N MSB           = $aa
    *   ADD N LSB           = $aa
    *   CKSUM               = $cc
    *
    * THE ECM WILL RESPOND WITH:
    *
    *   MSG ID              = $80
    *   MSG LEN n+1+85      = $nn
    *   MODE                = $04
    *   ADD CONT            = $dd
    *       .
```

```
*       .
*   ADD CONT            = $dd
*   CKSUM               = $cc
*
*
*
*****************************************************
        ORG $07ED

LC7ED:    FDB     $0000 ; Nxt Msg Entry Addr
                        ;
          FCB     $80   ; DEVICE IDCode
                        ;
          FCB     $40   ; RAM/ROM Flag Word
                        ;
          FCB     9     ; Output Msg Length
          FCB     27    ; Input Msg Length
                        ;
          FDB     $0150 ; Addr of Output Cnt'l Bock
          FDB     $0133 ; Addr of Input Cnt'l Block
        ;-----------------------------------------------


        ORG     $07F7

LC7F7:    FCB     30      ; If no Comm >= 30 Sec Force mode 0
                          ; CALIB = SEC'S

L07F8  FCB  $0      ;
L07F9  FCB  $0      ;
L07FA  FCB  $0      ;
L07FB  FCB  $0      ;
L07FC  FCB  $0      ;
L07FD  FCB  $0      ;
L07FE  FCB  $0      ;
L07FF  FCB  $0      ;
    *****************************************************
    *       END OF CALIB TABLES
    *****************************************************


        *************************************************
        *  BUA/9340 P/N 16059335 8/1/85 P
        *  SS BY BUA/1728 P/N 1227165
        *  REV 8/1/95, WS
        *
        *  ECM P/N 1227165
        *
        *  MY86 YB L98 MD8 NM8 VE1  G44
        *
        *       GM P4 computer system
        *
        * RAM Locations     $0000 - $00FF
        * NON VOL RAM Locations
        *
        * MPU Status Reg's      $3FFA
        * MPU Control Reg's     $3FFC
        *
        *************************************************

          ORG     $C800

LC800:    LDS     #$01FF            ; Set Up Stack
          JSR     LF3B5             ; 11 Usec Delay

          LDAA    #$08              ; 0000 1000, Bit 3
```

```
          STAA    L5000             ; Set Log RAM to MPU

          LDX     #$0A              ;
          BRCLR   L0003,$08,LC815   ; Mode Wd3, ERR 51
                                    ; ... else
          LDX     #$02              ; 0000 0010
LC815     STX     L3FFC             ; MCU CSR

        ;
        ; Int RAM 3FC0 - 3FFA, 58 BYTES ?
        ;
          LDX     #$3FC0            ;
          CLRA                      ; Clr D Reg
          CLRB                      ;

LC81D     STD     0,X               ; CLR RAM

          INX                       ;
          INX                       ;
          CPX     #$3FFA            ; Done ?
          BNE     LC81D             ; Loop if not
                                    ; ... else
    ************************************************
    *        Set up MPU Devices
    *
    ************************************************
    ;------------------------------------------------
    ; BIT 0 = SFO
    ; BIT 1 = SF1
    ;           SFO SF1 Frq Hz
    ;           0   0   542,288
    ;           1   0   262,144
    ;           0   1   131,072
    ;           1   1    65,536
    ;
    ; BIT 2 = SPO
    ; BIT 3 = SP1
    ;           SPO SP1 Frq Hz
    ;           0   0     542,288
    ;           1   0   1,048,576
    ;           0   1   1,572,864
    ;           1   1   2,097,152
    ; BIT 4 =
    ; BIT 5 =
    ;
    ; BIT 6 =   0 = SI,
    ;           1 = PRP for Serial Input
    ;
    ; BIT 7 = Ready Bit
    ;           0 = Init TX/Rx Bits
    ;           1 = Xmiter Ready For Next Byte
    ;               Serial Cnt'l set this to 1
    ;
          LDAA    #$8C              ; 1000 1100
          STAA    $4001             ; Set Prescaler Serial Port Val
    ;------------------------------------------------------------


    ;------------------------------------------------------------
    ; DDR REGESTER
    ;
    ; 1 = INPUT
    ; 0 = OUTPUT
    ;
          LDAA    #$8F              ; 1000 1111,
          STAA    L4003             ; Set DDR Direction
```

```
    ;---------------------------------------------------------


    ;---------------------------------------------------------
    ;   BIT 0 = Input is Sync fm RX
    ;   BIT 1 = Output to DO 1 or Tmr Cnt'l PW mod
    ;   BIT 2 = Output to DO 2
    ;   BIT 3 = Output to DO 3
    ;
    ;   BIT 4 = SSO
    ;   BIT 5 = SS1
    ;           SSO SS1 BAUD RATE
    ;           1   0   8192
    ;           0   1   1024
    ;           1   1    256
    ;
    ;   BIT 6 = Match enab Bit
    ;   BIT 7 = Not Used
    ;
          LDAA    #$90              ;1001 0000
          STAA    L4004             ;Set Baud = 8192
    ;---------------------------------------------------------



    ;
    ;   Test A/D Operation
    ;
          LDAA    #$B0              ; A/D Ch TST  Ch.
          JSR     LF1C3             ; To A/D routine

    ;
    ; Clr RAM ?
    ; RAM $01B2 - $002D, 185 BYTES
    ;
          LDX     #$01B2            ; Last Used RAM Loc
LC83D     CLR     0,X               ; Clear RAM
          DEX                       ; Bump Addr Down
          CPX     #$002D            ; Done ?
          BNE     LC83D             ; If Not Loop

    ;
    ;   Enable SXR Chip
    ;   Par I/O
    ;
          LDAA    L4004              ; Get CSR
          ORAA    #$08               ; Set b3
          STAA    L4004              ; Wr Back

    ;
    ;   Serial I/O (SPI) Init
    ;
          LDX     #$4002            ; Output Data Latch
          BSET    0,X,#4            ; SELECT FMD

          LDAA    #$04              ; b2, EST ENABLE

          STAA    L0030             ; Save Status to NON VOL RAM

          JSR     LF1F9             ; Xmit to Serial Data

          BCLR    0,X,#4            ; De-select SPI

          STAA    L0049             ; FACTORY TST FMD BYTE 1
    ;-------------------------------------
```

```
    ;
    ;   Check Socketed device
    ;
          LDX     #$C008            ;
          LDD     #$3FF8            ; B Cnt'r Last H.U      LF32E             ; To Ck SUM

          LDAA    LC008             ; Get Stored CK SUM
          CMPA    #$AA              ; IF its AN $AA Bypass
          BEQ     LC879             ; Xit & Clr ER #51 Flg
                                    ; ... else
          CMPA    #$32              ; Ck for correct EPROM
          BNE     LC87E             ; If Not exit w/error
                                    ; ... else
          CPY     LC006             ; CK CK SUM VAL
          BNE     LC87E             ; Bad Ck Sum, Xit w/Error
                                    ; ... else
LC879:    BCLR    L0047,$10         ; Clr Er #51 Flg

          BRA     LC881             ; Exit Ck Sum test



LC87E:    BSET    L0047,$10         ; Set Err, (#51)

LC881:    LDX     #$FB1A            ; Init MPU

          BRCLR   L0003,$08,LC88B   ; Mode Wd3, ERR 51
                                    ; ... else
          LDX     #$FB12            ; 64,274
LC88B:    STX     L3FFC             ; MCU CSR

        ;
        ; A/D BATTERY VOLTAGE
        ;
          LDAA    #$10              ; Set Up For Batt Volts, A/D CH1
          JSR     LF1BE             ; To A/D
          STAA    L007E             ; Batt Volts, (A/D)

          CMPA    #100              ; 10 VDC
          BCC     LC8E2             ; IF LT 10 VDC,  EXIT via HU CHECK
                                    ; ... else
          BSET    L0040,#$20        ; set B5,   ERR 54A
                                    ;  ... Force Default for Pump Volts

        ;
        ; CK FUEL PUMP VOLTAGE
        ;
          JSR     LE816             ; To Pump Subroutine

          LDAA    L007F             ; Pump VDC, (A/D)
          CMPA    #160              ; 16.0 VDC
          BCS     LC8E2             ; IF GT 16 VDC. EXIT via HU CHECK
                                    ; ... else

        ;
        ; CK DIAG MODE STATUS
        ; (IF DIAG V gt 0.8V & lt 2V, SET FACT TEST)
        ;
          LDAA    #$70              ; A/D Ch 7 DIAG SW STATUS
          JSR     LF1BE             ; To A/D Subroutine

          CMPA    #100              ; 2.0 VDC
          BCC     LC8E2             ; IF GT 2.0 VDC,  EXIT via HU CHECK
                                    ; ... se
          CMPA    #40               ; 800 Mvdc
```

```
          BCS     LC8E2             ; IF LT 800 mvdc,  EXIT via HU CHECK
                                    ; ... else

          BSET    L0047,#$80        ; Set b7, FACTORY Tst MODE. <---***
          BSET    L0031,#$04        ; Enable SPK
        ;-------------------------------------------------


        ;
        ; DO GM IEEE SUM, $C000 --> $FFFF
        ; $4000 IN LENGTH
        ;
          LDX     #$C000            ; START OF EPROM
          LDD     #$4000            ; LENGTH OF EPROM
          JSR     LF32E             ; To Ck Sum Subroutine

          STY     L0173             ; IEEE CK SUM

        ;
        ; INIT IAC & IGN OFF TIMER
        ;
          LDAA    #204              ;
          STAA    L0179             ; IAC MOT
          STAA    L0032             ; IGN TIMER

        ;
        ;
        ;
          LDAA    L0049             ; FACTORY TST FMD BYTE 1
          ANDA    #$03              ; b1 & b0,
          BNE     LC8DF             ; BR IF NOT b0 & b1
                                    ; ... else
          LDX     #$0000            ;
          LDAA    #$AA              ;

LC8D7     STAA    0,X               ;
          INX                       ;
          CPX     #$002E            ;
          BNE     LC8D7             ;
                                    ; ... else
LC8DF     JMP     LC9E3             ;
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; CK IF HEADS UP PRESENT
        ;
        ;-------------------------------------------------
LC8E2     LDX     L5800             ; H.U. ROM Addr
          CPX     #$7E58            ; HU ID CODE
          BNE     LC8ED             ; BR IF NO HEADS UP
                                    ; ... else
          JSR     L5812             ; H.U. ROM Addr
        ;-------------------------------------------------


LC8ED     JSR     LF3A7             ; Call RAM ERR Wd's Ck Sum

          CPD     L0018             ; Ck Sum OF Err Words
          BEQ     LC90E             ; BR IF Z
                                    ; ... else


        ;-------------------------------------------------
        ; Init  RAM (Non Vol)
        ;
```

```
        ;-------------------------------------------------

        ;
        ; CLR RAM, $002D -> $0000
        ;
          LDX     #$002D            ; POINT TO TOP ADDRESS
LC8F8:    CLR     0,X               ; CLEAR MEM LOCATION
          DEX                       ; DECR ADDRESS POINTER
          BNE     LC8F8             ; TILL DONE
                                    ; ... else
        ;
        ; DO ERR WD CKSUM
        ;
          JSR     LF3A7             ; Call NON VOL RAM ERR Wd's Ck Sum
          STD     L0018             ; Save Ck Sum OF Err Words

        ;
        ; INIT BLM CELLS
        ;
          JSR     LF434             ; To INIT BLM Init.

        ;
        ; INIT IAC
        ;
          LDAA    LC62F             ; 144 IAC Idle Spd Start up park posit.
          STAA    L002C             ; Save Strt up IAC Posit


          LDAA    #$40              ; b6
          STAA    L003D             ; Set NV RAM Bad Flg
        ;-------------------------------------------------


        ;-------------------------------------------------
        ;
        ;
        ;-------------------------------------------------
LC90E     LDAA    L0047             ; MD WD
          BITA    #$10              ; b4
          BEQ     LC93B             ; BR IF NOT b4,

          LDAA    L0003             ; Get MD WD3
          ORAA    #$08              ; Set Err b3, ERR 51
          STAA    L0003             ;

          JSR     LF498             ; Else Lite Ck Eng Lamp

          BSET    L0007,#01         ; Err #3 Flg word

          LDAA    L0047             ;
          ORAA    #$10              ; Set b4
          STAA    L0047             ;

          JSR     LF3A7             ; ERR Wd's Ck Sum
          STD     L0018             ; Save Ck Sum OF Err Words


          LDAA    L0047             ;
          BMI     LC93B             ; BR IF


        ;
        ; CK DIAG SW STATUS
        ;
          LDAA    #$70              ; A/D Ch 7 DIAG SW STATUS
          JSR     LF1BE             ; To A/D Subroutine
```

```
          CMPA    #40               ;
          BCS     LC93B             ; BR IF A/D RESULT L.T. 88 MVDC

    ******************************************************
    * WAIT HERE FOR INTERUPT
    *
    ******************************************************
LC938:    SWI                       ;
          BRA     LC938             ;
    ******************************************************


LC93B     BSET    L003C,$80         ; SET b7

          JSR     LF3B6             ; TO SEG 6,  Log RAM to MCU, Cool A/D

          BRSET   L0001,$08,LC96A   ; BR IF b3,
                                    ; ... else

        ;-------------------------------------------------
        ; LK UP Start up Enrich vs Cool Temp
        ;
        ;
        ; Tbl Val = Pct Chg * (256/100)
        ;-------------------------------------------------
          LDAA    L005B             ; COOLANT
          CMPA    #208              ; 115c
          BLS     LC94D             ; BR IF COOL GT 115c
                                    ; ... else
          LDAA    #208              ; USE 115c MAX FOR LK UP
LC94D     PSHA                      ;

          LDX     #$C3E4            ; INDEX START UP ENRICH Tbl
          JSR     LF2C6             ; Call 2d Lk Up, (No Offset)

          CLRB                      ;
          STD     L000E             ; SAVE START UP ENRICH %CHG
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; LK UP Opn Lp AFR % Chg vs Cool Temp.
        ;
        ; Tbl = Pct Chg * 2.56 + AF BIAS
        ;-------------------------------------------------
          PULA                      ; GET COOL VAL FM STX
          PSHA                      ;
          LDX     #$C41F            ; INDEX UP Opn Lp AFR % Chg Tbl

          JSR     LF2C6             ; 2d Lk Up, (No Offset)
          STAA    L00CD             ; Cool Temp, AFR Ratio
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; LK UP Strt Up Spark Adv vs Cool Temp.
        ;
        ; TBL = SA deg * (256/90)
        ;-------------------------------------------------
          PULA                      ; GET COOL VAL FM STX
          LDX     #$C17A            ; Strt Up Spark Adv Tbl

          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          STAA    L0013             ; Spark Adv (START UP)
```

```
        ;-----------------------------------------------


        ;-----------------------------------------------
        ;
        ;
        ;
        ;-----------------------------------------------
LC96A     LDAA    L005D             ; RESTART COOLANT
          BCLR    L003B,$10         ; CLR b4

          CMPA    LC02C             ; Hot Restart Hi Lmt, (54c)
          BCS     LC97A             ; BR IF  RESTART COOL LT 54c
                                    ; ... else
          LDAB    L0001             ;
          ORAB    #$40              ; SET b6
          STAB    L0001             ;

LC97A     CMPA    LC1FA             ; ERR # 32 Params, 31c QUAL
          BCC     LC990             ; BR IF COOL G.T. 31c
                                    ; ... else
          LDX     L001A             ; Eng Run Time (sec)
          BNE     LC990             ; BR IF N/Z
                                    ; ... else
          JSR     LF1E0             ;

          BITA    #$20              ;
          BNE     LC990             ; BR IF b5
                                    ; ... else
          LDAA    L0041             ; DIAGNOSTIC MODE WD 3
          ORAA    #$20              ; SET b5, EGR DIAG SW BAS AT START UP,
                                    ;  ...  ERR 32
          STAA    L0041             ; DIAGNOSTIC MODE WD 3

LC990     LDAA    LC3A0             ; o2 filter init val
          STAA    L006F             ; FILT o2 VDC
          STAA    L0071             ; FILT o2 VDC
          STAA    L0073             ; FILT o2 VDC
    ;-----------------------------------------------

        ;
        ; GET TPS A/D & PROCESS
        ;
          LDAA    #$50              ; A/D Ch 5, (TPS Voltage)
          JSR     LF1BE             ; To A/D Subroutine

          STAA    L0081             ; TPS, (A/D)

          LDAA    LC39B             ; Min TPS Posit
          STAA    L0086             ; Fltered low TPS, (A/D)
          JSR     LF35A             ; To TPS Load Subroutine

          LDAA    L007E             ; Batt Volts Value, (A/D)
          JSR     LDE72             ; TO MAJOR LOOP SUNBOUTINE, Seg E
                                    ; W/BATTERY A/D VALUE

          LDD     L3FC8             ; SPK Period
          STD     L00B2             ; OLD PA2 CNT'R

          LDD     LC3CB             ; 445d, Get Stoch ratio
          STD     L00CE             ; AFR

          LDAA    L0008             ;
          BITA    #$01              ; b0
          BNE     LC9C0             ; BR IF b0
```

```
                                    ; ... else

          DECA                      ;
          STAA    L0004             ; Xmish Mode word

LC9C0     JSR     LFA58             ;

          LDAA    #$04              ;
          JSR     LF4A8             ;

          LDAA    #$0E              ;
          STAA    L0000             ;

          LDAA    #128              ;
          STAA    L00C0             ; Blk Lrn Mult, Scaled 1
          STAA    L00C6             ; Base PW Cls Lp Corr  <----- *****
          STAA    L00C9             ; Cls/Lp Int, Add Fuel if > 128

          LDAA    #$19              ;
          STAA    L018A             ; LOCATION OF NEXT ENTRY IN EPROM TBL

          LDAA    #160              ;
          STAA    L0068             ;

          LDAA    LC62F             ; 144, IDLE SPD START UP PARK POSIT.
          STAA    L010C             ;

        ;
        ;
        ;
LC9E3     LDAA    L4005             ; Free run Up Cnt'r
          ADDA    #$02              ; ADD 2 CNT'S
          STAA    L4006             ; Match Reg

          LDX     #$4007            ; index TX/Rx CSR
          BSET    0,X,$01           ; SET b0

          JMP     LCCC6             ;
    ******************************************************



    ******************************************************
    *   IRQ1 SERVICE ROUTINE, CALLED FROM INT AT LFF2
    *   TYPE $32, ECM P/N
    *
    *   Executed every IRQ1
    *   All Minor Loop done here:
    *
    *       Air/Fuel
    *       SPK
    *       IAC
    *       Etc.
    ******************************************************
LC9F4:    LDX     #$4007            ; index TX/Rx CSR

        ;
        ; CK SCI RX STATUS, (8192 BAUD)
        ;
          BRSET   1,X,#$01,LCA67    ; BR IF b0
                                    ; ... else
          BRCLR   0,X,#$20,LCA0A    ; BR IF b5, If RX Int Not enab
                                    ; ... else
          BRCLR   1,X,#$20,LCA2B    ; BR IF NOT b5, If not RX Int
                                    ; ... else
          BSET    L0046,#$08        ; Set 8192 Baud
```

```
          JSR     LFA91              ; SCI RX SUBROUTINE

          RTI


        ;
        ; CK SCI XMIT STATUS, (8192 BAUD)
        ;
LCA0A:    BRCLR   0,X,#$80,LCA16     ; If Xmit not enab.
                                     ; ... else
          BRCLR   1,X,#$80,LCA2B     ; IF not Xmit Int.
                                     ; ... else
          JSR     LFBBB              ; Xmit Handler

          RTI                        ;


LCA16:    BRCLR   0,X,#$40,LCA2B     ; If SCI Xmit Complete not Enab
                                     ; ... else
          BRCLR   1,X,#$40,LCA2B     ; If SCI Xmit not Complete

        ;
        ; Disable SCI Xmit Via SXR
        ;
          LDAA    L4004              ; Par I/O CSR
          ANDA    #$F7               ; Disable Xmit Via SXR
          STAA    L4004              ; Par I/O CSR

        ;
        ; Enab RX Int's
        ;
          LDAA    #$27               ; Enab RX Int's
          STAA    L4007              ; TX/Rx CSR

LCA2B:    RTI
    ;-------------------------------------------------



    ;-------------------------------------------------
LCA2C:    LDAA    L018C              ; UP CNTS VAL WHEN 6.25 MSEC INT
          ADDA    #143               ;
          STAA    L4006              ;

          BCLR    L0046,$01          ; Clr 1st Int Expected Flg

          JSR     LF880              ; TO 160 BAUD SERIAL

          RTI
    ;-------------------------------------------------


    ;-------------------------------------------------
LCA3B:    LDAA    L018C              ; UP CNTS VAL WHEN 6.25 MSEC INT
          ADDA    #205
          STAA    L4006              ;

          BCLR    L0046,$02          ; Clr 2nd Expected Int Flg

          LDAA    #$04               ; Set Ser Data Line Hi
          JSR     LF4A8              ;

          BRCLR   L0035,$20,LCA66    ; BR IF NOT b5, (SW IN DIAG MODE)
                                     ; ... else
          LDAA    L018A              ; LOCATION OF NEXT ENTRY IN EPROM TBL
          CMPA    #25                ;
```

```
          BNE     LCA66             ;
                                    ; ... else
          LDAA    L0189             ; ALCL NUM OF BITS TO TX
          BNE     LCA66             ; BR IF NZ
                                    ; ... else
          LDAA    #$09              ; 450 Msec
          STAA    L012E             ; 50 Msec TIMER TO LOOK FOR 8192 BAUD
                                    ;
          BSET    L0046,4           ; SET b2

          JSR     LFA7A             ; Init 8192 Baud Ser Reg's

LCA66:    RTI                       ;
        ;-----------------------------------------------


        ;-----------------------------------------
        ;   6.25 Msec Int Logic
        ;
        ;-----------------------------------------
LCA67:    BRSET   L0046,$01,LCA2C   ; BR IF b0, 1st Serial Data Input
                                    ; ... else
          BRSET   L0046,$02,LCA3B   ; BR IF b1, 2nd Serial Data Input
                                    ; ... else
          BRCLR   L0047,$80,LCA76   ; BR IF b3,
                                    ; ... else
          JMP     LFCA2             ; To Factory test routine
        ;-----------------------------------------------


LCA76:    BRSET   L0034,$04,LCA86   ; If tmg error already flaged
                                    ; ... else
          BRCLR   L0036,$04,LCA86   ; IF NOT b2, (TMG ERROR CK FLG)
                                    ; ... else
          LDAA    L0000             ; Fm NON VOL RAM
          STAA    L0119             ; Save Counter
                                    ;
          BSET    L0034,$04         ; SET b2, Tmg error
LCA86:    BSET    L0036,$04         ; SET b2, (FLG FOR TMG ERR CHK)
                                    ;
          LDAB    L4006             ; <----- ????
          STAB    L018C             ; UP CNTS VAL WHEN 6.25 MSEC INT
                                    ;
          BRCLR   L0046,4,LCAA4     ; If Not in 8192 Baud mode
                                    ; ... else
          ADDB    #205              ; Set Up for 6.25 Ms Int.
          BRSET   L0046,8,LCAB3     ; If locked in 8192 Baud Mode
                                    ; ... else
          DEC     L012E             ; 50 Msec TIMER TI LOOK FOR 8192 BAUD
          BNE     LCAB3             ; BR IF Z
                                    ; ... else
          BCLR    L0046,$04         ; Disable 8192 Baud mode

          LDAB    L4006             ; <----- ????
LCAA4:    ADDB    #11               ; Set up for 160 Ms Int, (160 Baud)

          BSET    L0046,$03         ; SET b0 & b1

          LDAA    #$FB              ;
          JSR     LF49A             ; Set Serial line Low

          LDAA    #$01              ;
          STAA    L4007             ; Disable 8192 Baud Int's
LCAB3:    STAB    L4006             ; Save 160 Int time
          CLI                       ; CLR & RESTORE INTERUPTS
```

```
        ;
        ; TEST FOR VALID STX
        ;

          TSX                       ; Save STX pointer

          LDS     #$01FF            ; RE-SET USR STX

          CPX     #$01F7            ; Ck STX ptr VS Home Addr
          BEQ     LCAC3             ; BR IF STX AT $01F7
                                    ; ... else
          BSET    L0033,$01         ; SET b0, STACK FAIL

LCAC3:    JSR     LDEA4             ; Ck Vss Every 6.25 Ms

          LDD     L3FFA             ; Get MCU Status Reg.
          STAA    L00A0             ; Old MPU status reg

        ;
        ; Set Ref Pulse, If it Happened in this Int period
        ;
          LDAB    L0035             ; MNR LOOP MD WD 2
          BITA    #$08              ; b3, (DRP DURRING LAST 6.25 msec)
          BEQ     LCB15             ; BR IF NOT b3
                                    ; ... else
          ORAB    #$04              ; SET b2

          PSHB                      ; SAVE MD WD TO STX
    ;---------------------------------------
    ;   Cold Start Inj Elimination
    ;
    ;---------------------------------------
          LDX     L001A             ; Eng Run Time (sec) Fm NON VOL RAM
          CPX     LC37C             ; 32 Sec Min eng run time to reset
          BHI     LCAEA             ; BR IF GT 32 Sec THRESH
                                    ; ... else
          LDAB    L0082             ; TPS Ld Axis Var
          CMPB    LC37E             ; 77%, TPS Value
          BHI     LCAEA             ; BR IF TPS LT 77%, (If Yes clear)
                                    ; ... else
          LDAB    L0118             ; GET the REF COUNTER
          INCB                      ; INCR REF COUNT
          BPL     LCAEB             ; BR
                                    ; ... else
          BRA     LCAEE             ;



LCAEA:    CLRB                      ; RESET COUNTER
LCAEB:    STAB    L0118             ; SAVE NEW REF COUNTER


LCAEE:    PULB                      ; Restore Mode Word
          BRCLR   L0030,$04,LCB07   ; BR IF NOT b2
                                    ; ...  else
          BRSET   L009D,$80,LCB07   ; BR IF b7
                                    ; ...  else
          LDAA    L012A             ;
          ADDA    LC029             ; 2, SPK BLEND, Add to ????
          BCC     LCB04             ; BR IF NO OVERFLOW
                                    ; ...  else
          LDAA    #255              ; USE MAX LMT

          BCLR    L0036,$20         ; CLR b5, BLEND SPARK

LCB04:    STAA    L012A             ;
```

```
LCB07:    BRSET   L003B,$02,LCB15   ; BR IF b1
                                    ; ...  else
          BRSET   L0034,$80,LCB15   ; BR IF b7, ENG RUNNING
                                    ; ...  else
          BSET    L003B,$02         ; SET b1
          CLR     L0472             ; CLR TMR

LCB15:    LDAA    L0033             ;
          BITA    #$10              ; b4, 1 = IGN OFF
          BEQ     LCB1D             ; BR IF NOT b4, Ign OFF
                                    ; ... else
          ANDB    #$FB              ; CLR b2, (DRP LAST 6.25 Msec)
LCB1D:    STAB    L0035             ; Reset Ref Pulse Indicator


        ;-------------------------------------------------
        ; CHECK VATS
        ;
        ; TYPE #32 ECM P/N 1227165
        ;-------------------------------------------------
          BRSET   L0003,$20,LCB5A   ; BR IF b5, VATS AREADY PASSED
                                    ; ...  else

        ;
        ; CK IF VATS ENABLED
        ;
          LDAA    LC014             ; A/F OPTION WD #1
          BITA    #$10              ; b4, VATS ON
          BEQ     LCB4F             ; BR If NOT VATS ENABLED, (ERR 46)
                                    ; ...  else

          BSET    L0007,$02         ; Set b1, Err 3 Flg word, (VATS Fail)

          JSR     LF3A7             ; UPDATE ERR Wd's Ck Sum
          STD     L0018             ; Save Ck Sum OF Err Words
        ;-------------------------------------------------


        ;
        ; CK VATS FREQ, (PERIOD) WINDOW (33 -> 66Hz)
        ; BUA, (MY 86 TYPE 32 ECM)
        ;
          LDD     L3FF8             ; PA1
          CLV                       ; DELAY, (clr over flow flg)
          SUBD    L0121             ; Old VATS PERIOD
          BEQ     LCB5A             ; If No PULSE
                                    ; ... else

          LDX     L3FF8             ; PA1
          STX     L0121             ; Old VATS

          PSHB                      ;
          PSHA                      ;

        ;
        ; CK VATS FREQUENCY LIMITS
        ;
          SUBD    LC00E             ; 3277d, VATS Max Limit, 66Hz
          PULA                      ;
          PULB                      ;
          BHI     LCB5A             ; BR IF CNT'R LT VATS Max Limit
                                    ; ... else
          SUBD    LC010             ; 1638d, VATS Min Value, 33hz
          BCS     LCB5A             ; BR IF CNT'R GT VATS Max Limit
```

```
                                    ; ... else

LCB4F:    BSET    L0003,$20         ; SET b5, Mode Wd3, VATS OK
          BCLR    L0007,$02         ; CLR b1, Err #3 Flg word< (VATS OK)

          JSR     LF3A7             ; UPDATE ERR Wd's Ck Sum
          STD     L0018             ; Save Ck Sum OF Err Words

    ;-----------------------------------------------------


LCB5A:    LDX     L3FC0             ; Last 2 Ref Periods
          STX     L0095             ; Current Minor LP Ref Period
        ;-------------------------------------------------



        ************************************************
        * CK ALDL
        *
        * BUA, TYPE $32,  ECM P/N 1227165
        ************************************************

          ORG $0B5F

          BRSET   L0046,$08,LCB67   ; BR If 8192 Mode in locked Mode
                                    ; ... else
          BRCLR   L0035,$20,LCBB4   ; BR If Not b5, DIAG SW IN in ALDL Mode
                                    ; ... else

        ;------------------------------
        ; LOOK FOR ALDL MODE 4
        ; (USE SERIAL DATA+1 ICB)
        ;
        ; (BUA TYPE 32)
        ;
        ;------------------------------
LCB67:    LDAA    L0151             ; SERIAL DATA+1 ICB,
          CMPA    #$04              ; CHK FOR Mode 4
          BNE     LCBA4             ; NOT  IN Mode 4
                                    ; ... else
          BRSET   L0035,$08,LCBB4   ; BR IF b3, exit (PRIOR MODE 4)
                                    ; ... else
          BSET    L0035,$08         ; Set Mode 4 Flg <----****

        ;------------------------------
        ; b6, RESET SYSTEM ERRORS
        ; (USE ALDL CWD 1, ICB+4)
        ; WD 3, b6
        ;------------------------------
          LDAA    L0154             ; SERIAL DATA+4 ICB, ND 4 CNT'L WD 3, b6
          BITA    #$40              ; b6
          BEQ     LCB90             ; BR IF NOT b6 (CK IAC)
                                    ; ... else
        ;
        ; Clear Error Flag words
        ;
          CLR     L0005             ; Err #1 Flg word
          CLR     L0006             ; Err #2 Flg word
          CLR     L0007             ; Err #3 Flg word
          CLR     L0008             ; Err #4 Flg word
          CLR     L0009             ; Err #5 Flg Word

          JSR     LF3A7             ; ERR Wd's Ck Sum

          STD     L0018             ; Save Ck Sum OF Err Words
```

```
        ;------------------------------


        ;------------------------------
        ; b5, RESET IAC TO MAX (255)
        ; WD 3, b5
        ;------------------------------
LCB90:    BITA    #$20              ; b5, MD 4 CNT'L WD 3, b5
          BEQ     LCB9B             ; BR IF NOT b5,
                                    ; ... else
          BSET    L00F3,$04         ; SET b2,

          LDAB    #255              ; MAX VALUE
          STAB    L002C             ; IAC Present Posit

        ;------------------------------
        ; b4, RESET BLM'S
        ; WD 3, b4
        ;------------------------------
LCB9B:    BITA    #$10              ; b4,  MD 4 CNT'L WD 3, b4
          BEQ     LCBB4             ; BR IF NOT b3, EXIT
                                    ; ... else
          JSR     LF434             ; Go INIT BLM Init.

          BRA     LCBB4             ; EXIT



        ;------------------------------------------------
        ; CK IF IN ALDL MODE 4
        ; IF NOT IN MODE 4, CLR FLAGS
        ;
        ;
        ;------------------------------------------------
LCBA4:    BRCLR   L0035,$08,LCBB4   ; BR IF NOT b3, ALDL MODE 4, EXIT
                                    ; ... else
          BCLR    L0035,$08         ; CLR b3, (MODE 4 FLG)
          BCLR    L0036,$01         ; CLR b0, (SKP ERR 42 FOR STALL SVR BYPASS)
          BCLR    L003F,$01         ; CLR b0
          CLR     L00B4             ; SPK Fd Bk counter, (Err #42)
        ;------------------------------------------------

LCBB4:    LDAA    L0000             ; Minor Lp Counter
          INCA                      ; Inc Minor Lp Counter
          CMPA    #160              ; If Loop Cnt 160  (16)
          BNE     LCBDA             ; If not 160,  (16)
                                    ; ... else
          LDAB    L003C             ; ALCL MOD WD
          EORB    #$20              ; b5, Toggle 1 Sec Flg
          STAB    L003C             ; ALCL MOD WD

        ;------------------------------------------------
        ;   ENG RUN TIME COUNTER
        ;
        ;   Do not Inc time if eng not running
        ;   Time in Sec's = 80 x .0125
        ;------------------------------------------------
          LDAB    L0034             ; Get Mode wd 1
          BPL     LCBCA             ; BR IF ENG NOT RUNNING
                                    ; ... else
          LDX     L001A             ; Eng Run Time (sec)
          INX                       ; INC RUN TIME
          STX     L001A             ; Save Eng Run Time (sec)
        ;------------------------------------------
```

```
        ;-----------------------------------------
        ; If no Comm >= 30 Sec Force mode 0
        ;  (TM'R VAL AT C7F7)
        ;-----------------------------------------
LCBCA:    LDAA    L0171             ; SERIAL DATA TIME TO FORCE MODE 0
          INCA                      ; Incr Ser Data time out timer
          STAA    L0171             ; NEW Ser DATA TIME VAL
          CMPA    LC7F7             ; 30 SEC,
          BLS     LCBD9             ; BR TIME GT 30 SEC
                                    ; ... else
          CLR     L0151             ; SERIAL DATA+1 ICB, (STATUS)
        ;
        ; FORCE MODE 0
        ;
LCBD9:    CLRA                      ; Clr Minor loop counter
LCBDA:    STAA    L0000             ; Save Minor Lp Count

          SEI                       ; TURN OFF INTERUPTS
          JSR     LF1E0             ; Reset the FMD chip

          STAA    L002E             ; Save Results
          JSR     LF1E5             ; Read other, (Byte 2)
          STAA    L002F             ; Save 2nd FMD Byte

          CLI                       ; CLEAR & RESTORE INTERUPTS
          LDX     #$D000            ; Set PW word to zero D.C.
          LDAA    L002E             ; Get results
          COMA                      ; Comp FMD bytes
          ANDA    #$DF              ; CLR b6

          LDAB    L0037             ; Get prior Value,  MCU INPUT STATUS WD
          ANDB    #$20              ; CLR ALL EXCEPT b5, (TCC LOCKED)
          ABA                       ; Result to A reg

        ;----------------------
        ; CK AFR MODE WD 4
        ;  Norm Open Fan set
        ;----------------------
          LDAB    LC017             ; Get Fuel/Air Mode Wd 4
          BITB    #$20              ; b5, Norm Open Fan Req ?
          BEQ     LCBFE             ; BR IF not b5,
                                    ; ... else
          EORA    #$40              ; If so Invert Bit 6

LCBFE:    ROLB                      ;
          BMI     LCC03             ; If PWR STEER SEL
                                    ; ... else
          ANDA    #$F7              ; CLR b3, EXCESS PWR STEER ACTIVITY
LCC03     STAA    L0037             ; SAVE TO MCU INPUT STATUS WD

        ;
        ; CK A/C QUALS
        ;
          LDAA    L0082             ; TPS Ld Axis Var
          CMPA    LC67D             ; 100% TPS,
          BCS     LCC21             ; BR IF TPS LT THRESH
                                    ; ... else
          CMPA    LC67E             ; 100% TPS
          BCC     LCC21             ; BR IF TPS GT THRESH, (TO IAC LOOP)
                                    ; ... else
          LDAA    L0065             ; Vss
          CMPA    LC67F             ; 8 MPH
          BHI     LCC21             ; SKIP PS SW READ IF > 8 MPH

        ;
        ; PWR STEER SW
```

```
        ;
          LDAA    L002E             ;
          COMA                      ; INVER
          ANDA    #$08              ; MASK, FOR b3, PWR STEER
          ORAA    L0037             ; MCU INPUT STATUS WD
          STAA    L0037             ; MCU INPUT STATUS WD

    ;-----------------------------------------------------
    ;   Status Word L0037, (RAM)
    ;       Bit
    ;       0   1 = in Pk or Nuet
    ;       1   1 = Not in 3rd Gear or O.D.
    ;       3   1 = Pwr Steering Pw Sw, (Hi Load)
    ;
    ;       4   1 = EGR Diag closed
    ;       5   1 = TCC
    ;       6   1 = Cooling Fan Request
    ;       7   1 = A/C Compressor not On
    ;-----------------------------------------------------


LCC21     JSR     LF4DF             ; Do IAC 6.25 Ms Loop


          LDAA    #$50              ; A/D Ch 5, TPS Voltage)
          JSR     LF1BE             ; To A/D subroutine
          STAA    L0081             ; Save TPS, (A/D)
          JSR     LF35A             ; To TPS Load Subroutine

    ;
    ; Transient TPS Filter
    ;
          LDX     L00DD             ; Transient TPS
          LDAA    L0082             ; TPS Ld Axis Var
          LDAB    LC30D             ; 0.125, Trans TPS filter coef.
          JSR     LF250             ; FILTER ROUTINE

          STD     L00DD             ; Transient TPS

    ;
    ; KEEP TRACK of SERIAL DATA & AIRFLOW  HERE
    ;
          LDAB    L00B0             ; MAF Hi TMR (100Ms)
          LDAA    L0034             ; Get mode wd 1
          BMI     LCC65             ; IRQ ?

          BRSET   L0033,$10,LCC62   ; BR IF b4, IGN OFF
                                    ; ... else
          LDAA    L007F             ; Pump Volts, (A/D)
          CMPA    LC208             ; 10 vdc, MIN FOR ERR 34
          BLS     LCC62             ; BR IF VOLTAGE GT 10 V
                                    ; ... else
          CMPB    LC205             ; 600 Msec MIN QUAL TO SET HI MAF ERR 33
          BLS     LCC58             ; BR IF MAF HI TIME G.T. 600 Msec
                                    ; ... else
          LDAA    L003F             ;
          ORAA    #$80              ; SET b7, (MAF HI ERROR)
          STAA    L003F             ;

          BRA     LCC65             ;


LCC58:    LDAA    L00B6             ; Get Air Flow value
          CMPA    LC204             ; If Air Flow <= 45 gms/sec disable ERR 33
          BLS     LCC62             ; BR IF AIR FLOW G.T. 45 gms/S
```

```
                                    ; ... else
          INCB                      ; INCR HI MAF TMR
          BRA     LCC63             ;

LCC62:    CLRB                      ; CLR ERR 33, MAF HI TMR
LCC63:    STAB    L00B0             ; ERR 33, MAP Hi TMR, (100Ms)

        ;
        ; CK EPROM ID BYTE
        ;
LCC65:    LDAB    LC1AA             ; Get EPROM ID
          CMPB    #$55              ; Is it $55
          BNE     LCC95             ; If not do BAD EPROM err

          LDAB    LC555             ;
          CMPB    #$AA              ; Is It $AA ?
          BNE     LCC95             ; If not do BAD EPROM err
                                    ; ... else
    ;-------------------------------------
    ;On Even minor Loops Do:
    ;       1. Spark
    ;       2. O2 Sensor read
    ;       3. Road Speed, Vss
    ;-------------------------------------
          LDAA    L0000             ; Get Minor Lp counter
          RORA                      ;
          BCC     LCC7B             ;
                                    ; ... else
LCC78     JMP     LD6D1             ; Do Air Fuel On Odd Loops



LCC7B     BCLR    L003B,$08          ; CLR b3, MODE 4 BYPASS FUEL


        ;-------------------------------------------------
        ; CK IF IN MODE 4 <----****
        ;
        ;
        ;-------------------------------------------------
          BRCLR   L0035,$08,LCC87   ; BR IF NOT b3, MODE 4
                                    ; ... else
          LDAA    L0154             ; MD 4 CNTL WD 1
          BMI     LCC8C             ;
                                    ; ... else
        ;-------------
        ; TOGGLE COP
        ;-------------


LCC87     JSR     LF21A             ; Toggle COP 2 Each 6.25 Ms
                                    ; SPK Edge Constrant
          BRA     LCC92             ;



        ;-------------------------------------------------
LCC8C     BSET    L003B,$08         ; SET b3
          BSET    L0036,$01         ; SET b0, SKP ERR 42 FPR STALL ..
                                    ;   SVR SPK BYPASS

LCC92     JMP     LCD05             ; Minor Lp

        ;
        ; Bad EPROM Set Error Routine
```

```
        ;
        ;
LCC95     BSET    L004E,1           ; Err #51, NEW ERR 2



          LDAA    L0034             ;
          ANDA    #$7F              ; CLR b7, Eng Run Flg
          STAA    L0034             ;

          LDAA    L003C             ; Get COP 2 Flag
          ORAA    #$80              ; SET b8
          STAA    L003C             ;

    ;-----------------------------------------
    ;If Bad EPROM Disable SPK, (even Loops)
    ;         Don't tog COP 2, (Odd Loops)
    ;-----------------------------------------
          LDAA    L0000             ; Cont if EPROM bad
          RORA                      ;
          BCS     LCC78             ;
                                    ; ... else
          JMP     LD306             ; Go Disable SPK
    ************************************************




    ************************************************
    *   MAJOR LOOP SUBROUTINE
    *
    *   Execute on 100 Msec
    *
    *
    *
    ************************************************
LCCAC:    LDAA    L0000             ; Get Loop Cnt
          RORA                      ;
          BCC     LCCB6             ; EXEC MJR LOOP , SKIP COP
                                    ; ... else
          LDAA    #$FF              ; Set COP hi
          STAA    L400B             ; Arm COP1

LCCB6:    LDAB    L0000             ; Get Loop Cnt
          ANDB    #$0F              ; 0000 1111
          LDX     #$CCE4            ; Point to Seg Addr Table
          ASLB                      ;
          ABX                       ; ADJ ADDRESS POINTER FOR PROPER SUB ADDR
          LDX     0,X               ; Get SEG  ADDR
          JSR     0,X               ; Jump to SEG Addr pointed

          BCLR    L0036,$04         ; CLR b2, TIMIMG ERR CK FLG

    ;-------------------------------------------------
LCCC6:    CLI                       ; CLEAR & RESTORE INTERUPTS
          LDX     $0110             ;

          BRA     LCCCF             ;

    ;--------------------------
    ;   Refill RAM
    ;--------------------------
LCCCC:    LDX     $0110             ; Get RAM Addr.
LCCCF:    SEI                       ; TURN OFF INTERUPTS

          LDD     0,X               ;
```

```
          STD     0,X               ; REFILL HERE

          CLI                       ; CLEAR & RESTORE INTERUPTS
          DEX                       ; DECR ADDR POINTER
          DEX                       ; (TEWICE)
          STX     L0110             ; Save At RAM Addr

          BPL     LCCCC             ; TILL DONE
                                    ; ...
          LDX     #$01FE            ; Top Of RAM ?
          STX     L0110             ; Save RAM Addr here

          BRA     LCCCC             ; Loop till Done

    ;-----------------------------------
    ; MAJOR LOOP SEGMENT TABLE
    ; TYPE $8D, 122
    ;-----------------------------------
LCCE4:  FDB $CD04   ; SEG 0,  Do nothing, exit w/RTS
        FDB $EDA3   ; SEG 1,  Output Bit Sig', (TCC, CCP etc)
        FDB $E07F   ; SEG 2,  Vss Calc
        FDB $EA28   ; SEG 3,  Misc 100 Msec
        FDB $F8F9   ; SEG 4,  Log RAM to H.U.
        FDB $ECEA   ; SEG 5,  A/C, Clsd Lp & Cool FAN
        FDB $F3B6   ; SEG 6,  Log RAM to MCU, Cool A/D
        FDB $EA95   ; SEG 7,  L.U. Coolant var's
        FDB $CD04   ; SEG 8,  Do Nothing, exit w/RTS
        FDB $E34E   ; SEG 9,  Inj Air Managment
        FDB $EB3A   ; SEG A,  Lk UP Man Air temp Var's
        FDB $DEE5   ; SEG B,  EGR
        FDB $E75D   ; SEG C,  Can Purge
        FDB $EF04   ; SEG D,  Diagnostics
        FDB $DE6D   ; SEG E,  TCC (A/D voltage convert)
        FDB $EC23   ; SEG F,  Fuel/Air Major Lp

LCD04:  RTS
    ******************************************************



    ******************************************************
    *   KNOCK (A Minor loop routne)
    *
    *   EXECUTED EVERY OTHER IRQ1
    *
    *   All Ninor Lp functions Related to SPK & Rd Spd
    ******************************************************

LCD05:    LDAA    L0035             ; MD WD 2
          ANDA    $04               ; CLR b2, (DIAG SW IN DIAG MODE)
          ORAA    L0040             ; DIAGNOSTIC MODE WD 2
          STAA    L0040             ; DIAGNOSTIC MODE WD 2

        ;-----------------------------------------
        ; LK UP  Slow o2 Filter Coef Vs Air flow
        ;
        ; TBL = Mult  * 256
        ;-----------------------------------------
          LDAA    L00D2             ; Ld Val Limited AIR FLOW for Lk Up
          LDX     #$C58B            ; TBL
          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          PSHA                      ; FILT COEF TO STX


          LDAA    L005B             ; COOLANT
```

```
          LDAB    LC565             ; Get cold o2 filter coef
          MUL                       ;
          ADDA    L005B             ; COOLANT
          BCC     LCD22             ; IF NO OVERFLOW
                                    ; ... else
          LDAA    #255              ; MAX VAL

LCD22:    PULB                      ; GET SLOW o2 vs FLOW RESULT FM STX
          MUL                       ;
          TAB                       ;

          LDAA    L006F             ; FILT o2 VDC
          LDX     L0071             ; Mnr lp slo flt
          JSR     LF250             ; LAG FILTER ROUTINE

          STD     L0071             ; SAVE FILTERED A/D o2 RESULT

        ;
        ; SPK 12.5 Msec Logic
        ;
          BRCLR   L0035,$04,LCD4B   ; Skp to LCD54 if no ref
                                    ; - in last 12.5 msec

          LDD     L3FC8             ; Get SPK Period
          SUBD    L00B2             ; OLD PA2 CNT'R, Sub Value after
                                    ;  Lst SPK Period
          TSTA                      ;
          BNE     LCD3F             ;
                                    ; ... else
          CMPB    LC228             ;
          BLS     LCD47             ;
                                    ; ... else
LCD3F:    INC     L00B4             ; SPK Fd Bk counter, (Err #42)
          BNE     LCD47             ; BR IF NZ
                                    ; ... else
          DEC     L00B4             ; SPK Fd Bk counter, (Err #42)

LCD47:    ADDD    L00B2             ; OLD PA2 CNT'R, SPK Period
          STD     L00B2             ; OLD PA2 CNT'R, SPK Period



LCD4B:    LDAA    L0035             ; MINOR LP MD WD 2

          LDAB    L0034             ;

          BMI     LCD5F             ;
                                    ; ... else
          LDX     L0095             ; Current Minor LP Ref PERIOD
          CPX     LC018             ; Ck Start up RPM Lmt
          BCS     LCD5F             ;
                                    ; ... else
          ANDA    #$FB              ; CLEAR b2, (DRP LAST 6.25 Msec)
          STAA    L0035             ;

          CLRA                      ;

          BRA     LCD8B             ;



LCD5F:    BITA    $04               ; b2
          BEQ     LCDC1             ; BR IF NOT b2
                                    ; ... else
          ANDA    #$FB              ; CLR b2, (DRP LAST 6.25 Msec)
```

```
          STAA    L0035             ;

                                    ; ... and
        ;-------------------------
        ; CALC DYNAMIC DWELL
        ; = (DYNAMIC DWELL/8) +1
        ;-------------------------
          LDD     L0099             ; DYNAMIC DWELL
          LSRD                      ; Div by 8
          LSRD                      ;
          LSRD                      ;
          COMA                      ;
          COMB                      ;
          ADDD    L0099             ; Dynamic Dwell
          BPL     LCD74             ;
                                    ; .... else
          CLRA                      ; USE ZERO
          CLRB                      ;

LCD74:    STD     L0099             ; Dynamic Dwell
        ;-------------------------


          CLR     L009F             ; Num Of Minor Loops between Ref Pulse

          LDAA    L0034             ;
          BMI     LCDDD             ; BR IF
                                    ; ... else
          LDAB    L0033             ;
          BITB    #$08              ; b3, 2nd DRP (PERIOD VALID)
          BEQ     LCDD0             ; BR IF NOT b3
                                    ; .... else
          LDAA    L0093             ; Cont'r for Eng Strt Up
          CMPA    LC01A             ; Num OF 12.5 Ms lps reguired
                                    ; for RPM to be abover limit
          BCC     LCD8F             ; BR IF
                                    ; else
          INCA                      ;
LCD8B:    STAA    L0093             ; Cntr for Eng Strt Up

          BRA     LCDD4             ;


LCD8F:    LDAA    L0034             ;
          ORAA    #$80              ; SET b7, ENGINE RUNNING FLAG
          STAA    L0034             ;

          BCLR    L003B,$02         ; CLR b1

        ;
        ; CK IF SINGLE FIRE MODE SEL
        ;
          LDAA    LC014             ; AFR MD WD 1,  1011 0100
          BITA    #$02              ; b1, SINGLE FIRE MODE SEL
          BEQ     LCDA5             ; BR IF NOT b1. If MAF in use
                                    ; .... else
          BSET    L0039,$80         ; SET b7, (IN SINGLE FIRE)
          BCLR    L0039,$50         ; CLR b4 & b6, (TGL SF & PW = 0)

        ;--------------------------
        ; MAF, (Hot Wire) Routines
        ;
        ;--------------------------
LCDA5:    CLR     L00B0             ; MAP Hi Cnt'r, (100 Ms)
          BRSET   L0033,$10,LCDB9   ; BR IF b4, (1 = IGN OFF)
                                    ; ... else
```

```
                                    ;
          LDX     L00EF             ; Diff Val to calc Air Flow
          CPX     LC211             ; IF Analog VALS * 7 or
                                    ; PP2DLT < 85, enab ERR #34
          BCC     LCDB9             ;
                                    ; ... else
          LDAA    L003F             ;
          ORAA    #$40              ; SET b6,  ERR #34
          STAA    L003F             ;

LCDB9:    LDAA    L0001             ;
          ORAA    #$08              ; SET b3
          STAA    L0001             ;

          BRA     LCDDD             ;


LCDC1:    LDAA    L009F             ; Num Of Minor Lp's between DRP'S
          CMPA    #23               ; 23 DRP'S ?
          BCS     LCDD7             ; BR IF L.T. 23 DRP'S
                                    ; else
          LDX     #$FFFF            ;
          STX     L3FC0             ; Ref period Cnt'r,

        ;
        ; WAIT FOR INTERUPT
        ;
LCDCD:    SWI                       ; LOOP HERE TILL INTERUPT
          BRA     LCDCD             ;


        ;-------------------------------------------------
        ;
        ;
        ;-------------------------------------------------
LCDD0:    ORAB    #$08              ; SET b3, 2nd DRP, (PERIOD VALID)
          STAB    L0033             ; MINOR LP MD WD 1
                                    ;
LCDD4;    JMP     LD306             ;



LCDD7:    TSTB                      ;
          BPL     LCDD4             ;

          INCA                      ; BUMP UP COUNTER
          STAA    L009F             ; NUM Of MINOR LOOPS BETWEEN DRP'S

LCDDD:    LDAA    #0                ;
          STAA    L400C             ;
          BSR     LCDE6             ;

          BRA     LCDF6             ;


          ;
          ; CALC RPM VAL
          ;
LCDE6:    LDX     #0149             ;
          LDAA    LC009             ; Get Num of Cyl's, (0 = 8 CYL)
          BNE     LCDF2             ; BR IF NZ
                                    ; ... else
          LDD     L0095             ; Current Minor LP Ref Period fm MPU
          BRA     LCDF5             ;
```

```
LCDF2:    JSR     LF266             ; MUL 8 X 16 SUROUTINE

LCDF5:    RTS                       ;
    ;-------------------------------------------------


LCDF6:    STD     L0468         ; IM RAM, NUM OF 65.5Khz cnts between DRPs

                                ; between DRPs
        ;-------------------------------------
        ; RPM, RPM P, RPM/25 & RPM/12.5
        ;
        ;     Q = (153.6/RPM RER) * 2 ^8
        ;
        ; PER = 1/65.5 Khz per bit
        ;-------------------------------------
          PSHB                    ;
          PSHA                    ;

          ASLD                    ; SET DIVIDE OPER  (x2)
          PSHB                    ;
          PSHA
                                  ;
          PULX                    ;
          LDD     #0307           ; 15 * (512/25) or 153.6 * 2
          JSR     LF215           ; TO F DIV SUBTOUTINE

          PSHB                    ;
          PSHA                    ;

          CMPA    #96             ; 2400 RPM
          BLS     LCE14           ;
                                  ; ... else

        ;
        ; ROUND Q & ADJ to HI RANGE (2400-4800)
        ;
          ADDD    #16512          ;
          BCC     LCE1B           ; IF IN HI RANGE RPM/25
                                  ; ... else
          LDAA    #255            ; If > 4800 RPM limit to 4800, (255d)
          BRA     LCE1B           ;


LCE14:    ASLD                    ; x2, (RPM.12.5)
          SUBD    #8064           ;
          BCC     LCE1B           ;
                                  ; ... else
          CLRA                    ; Else clear RPM

            ;--------------------------------
            ; (-400 RPM ($20) + 128 to round)
            ;  0 CTS = 400 RPM
            ;--------------------------------
LCE1B:    STAA    L0056           ; RPM/25

          PULA                    ;
          PULB
                                ;
          PSHB                    ;
          PSHA                    ;
          ADDD    #128            ; Round off
          BCC     LCE28           ; if no overflow
                                  ; ... else

          LDAA    #255            ; limit to 255
```

```
LCE28:    STAA    L0057             ; RPM/25

        ;----------------------
        ; MAKE UN-FILT RPM/12.5
        ;----------------------
          PULA                      ;
          PULB                      ;
          ASLD                      ; x2
          BCS     LCE34             ;IF OVERFLOW LIMIT TO 255, (3187 RPM)
                                    ; ... else
          ADDD    #128              ;
          BCC     LCE36             ;

                                    ; ... else
LCE34:    LDAA    #255              ; USE MAX VAL,  3187 RPM
LCE36:    CLRB                      ;


          LDX     L0058             ; RPM/12.5,  (UN-FILT)
          BEQ     LCE41             ; IF 0, EXIT
                                    ; ... else
          LDAB    LC62E             ; RPM 12.5 Msec IAC Filter Coef, (0.5)
          JSR     LF250             ; FILTER ROUTINE

LCE41:    STD     L0058             ; FILT RPM/12.5
        ;------------------------

                                    ;
          BRCLR   L0001,$80,LCE4C   ; BR IF NOT b7
                                    ; ... else
          BCLR    L0036,$03         ; b0 & b1, SKIP ERR 43.. & IN STALL SVR

          BRA     LCEB3


LCE4C:    CMPA    LC025             ; Stall Svr Lmt, (400 RPM)
          BCS     LCE5D             ;
                                    ; ... else
          CMPA    LC026             ; Stall Svr Lmt, (450 RPM)
          BCC     LCE81             ;
                                    ; ... else
          LDAB    L005A             ;
          CMPB    LC027             ; Stall Svr Lmt, (550 RPM)
          BLS     LCE81             ;
                                    ; ... else
LCE5D:    BRSET   L0036,$02,LCE7E   ; b1, IN STALL SVR BYPASS SPK

          CLR     L00B4             ; SPK Fd Bk counter, (Err #42)

          LDD     L3FFC             ; CPU CR
          ANDB    #$EF              ; CLR b4
          JSR     LF3B5             ; 11 Usec Delay
          STD     L3FFC             ; CPU CR

          BCLR    L0030,$04         ; CLR b2, EST ENABLE BIT, OFF

          SEI                       ; TURN OFF INTERUPTS
          JSR     LF1E5             ; FMD SERIAL BYTE READ
          CLI                       ; CLR & RESTORE INTERUPTS

          LDD     L3FC8             ; Get SPK Period, (PA2 CNT'R)
          STD     L00B2             ; OLD PA2 CNT'R, SPK Period

          LDAA    L0058             ; RPM/12.5
                                    ;
LCE7E:    BSET    L0036,$03         ; SET b1 & b0, STALL SAVER SPK FLAG
```

```
        ;
        ; NO STALL SAVER SA
        ;
LCE81:    BRCLR   L0036,$02,LCEB3   ; BR IF NOT b1, IN STALL SVR SPARK
                                    ; ... else
        ;
        ; Disable Stall SVR Lmt, (550 RPM)
        ;
          CMPA    LC028             ; STALL SVR RPM THRESH
          BLS     LCEB3             ; BR IF RPM GT 550 RPM
                                    ; ... else
          BCLR    L0036,$03         ; Clear Stall SVR SPARK FLAG, b0 & b1
          INC     L00B4             ; EST FB CNT'R, PREVENT ERR 42


        ;
        ; ZERO VAL'S
        ; EST DWELL, EST PULSE WIDTH
        ;
          CLRA                      ;
          CLRB                      ;  ZERO VAL'S
          STD     L3FDC             ; TO SPK Dwell Cnt'r
          JSR     LF3B5             ; 11 Usec Delay

          STD     L3FE6             ; SPK Dwell Cnt'r
          JSR     LF3B5             ; 11 Usec Delay

          STD     L3FE8             ; CURRENT EST FALL - LAST EST FALL
          JSR     LF3B5             ; 11 Usec Delay

          STD     L3FF6             ; EST FALL CNT'R
                                    ; (Time From Ref to Fire IGN Cnt'r)
          JSR     LF3B5             ; 11 Usec Delay

          LDX     L3FEC             ; B Cnt'r last ref
          JSR     LF3B5             ; 11 Usec Delay
          STX     L3FE4             ; B Cnt'r Bgn nxt Dwell


        *****************
        * Compute Dwell
        *****************

        ;
        ; IF LOAD CHANGE DURRING LAST
        ; 25 msec > 10 Kpa SET DWELL
        ; to $FFxx & Br to LCEC8 ...
        ;
LCEB3:    LDAA    #255              ;
          LDAB    L0063             ; FILTERED LD VALUE
          SUBB    L0062             ; NORMILIZED LOAD, 25 Msec OLD
          BCS     LCEC0             ; BR IF OLD G.T. NEW
                                    ; ... else

          CMPB    LC01B             ; Ld Val vs Dwell Limit
          BCC     LCECB             ; br if G.T.
                                    ; ... else
        ;----------------------------------------
        ; IF DELTA RFPER > DYNAMIC DWELL
        ; set  DYNAMIC DWELL = -2 * DELTA REFPER
        ;----------------------------------------
LCEC0:    LDD     L0097             ; OLD REF PER
          SUBD    L0095             ; CURRENT MNR LOOP DRP PERIOD
          ASLD                      ; DIV by 2
```

```
          SUBD    L0099             ; DYNAMIC DWELL
          BMI     LCECD             ;
                                    ; ... else
          ADDD    L0099             ; DYNAMIC DWELL
LCECB:    STD     L0099             ; DYNAMIC DWELL

        ;-----------------------------
        ; Limit  DYNAMIC DWELL to
        ; REF PERIOD/8, (11 DEG FOR V8)
        ;-----------------------------
LCECD:    LDD     L0095             ; Current Minor LP Ref Period Fm MPU
          LSRD                      ; DIV BY 8
          LSRD                      ;
          LSRD                      ;
          SUBD    L0099             ; Dynamic Dwell
          BCC     LCEDA             ; Br if DYNAMIC DWELL > REFPER/8
                                    ; ... else
        ;
        ; IF DYNAMIC DWELL > REFPER/8 set  DYNAMIC DWELL to REFPER/8
        ;
          ADDD    L0099             ; Dynamic Dwell
          STD     L0099             ; SAVE NEW Dynamic Dwell

LCEDA:    LDD     L0095             ; Current Minor LP Ref Period fm MPU
          STD     L0097             ; Last Minor LP Ref Period fm MPU

          LSRD                      ; /2
          SUBD    #229              ; 3.49 Msec, (15.25 Msec/bit)
          BCC     LCEE9             ; BR  IF D G.T. 3.5  Msec,
                                    ; ... else
          ADDD    #0308             ; ADD 4.697 Msec
          BRA     LCEF9             ; EXIT via BATTERY COMP



LCEE9:    LSRD                      ;
          SUBD    #0295             ; 4.5 Msec
          BCS     LCEF4             ; BR IF D L.T. 4.5 Msec
                                    ; ... else
          ADDD    #0382             ; ADD 5.825 Msec
          BRA     LCEF9             ; EXIT via BATTERY COMP


        ;---------------------------
        ; D = 1/4 * (D + 23.3 msec)
        ;---------------------------
LCEF4:    ADDD    #1527             ; 23.3 Msec
          LSRD                      ; /4
          LSRD                      ;

        *******************************
        * BATTERY VOLTAGE COMPENSATION
        *
        *******************************
LCEF9:    PSHB                      ;
          PSHA                      ;

          LDAA    #124              ; 12.4 VDC
          SUBA    L007E             ; Batt Volts Value, (A/D)
          BCC     LCF02             ; BR IF BAT V L.T. 12.4
                                    ; ... else
          CLRA                      ; NEGITIVE RESULT

        ;
        ; LOW BATTERY DWELL
        ; If Batt < 12.4 VDC
```

```
        ;
LCF02:  LDAB    #04             ;
        MUL                     ; 630 usec/Volt
        TSX                     ;
        ADDD    0,X             ;

        PULX                    ;
        ADDD    L0099           ; Dynamic Dwell
        STD     L009B           ; Dwell Cnts to MPU

        LDD     L0095           ; Current Minor LP Ref Period fm MPU
        SUBD    #39             ;
        SUBD    L009B           ; Dwell Cnts to MPU
        BCC     LCF1A           ; BR IF NO UNDERFLOW
                                ; ... else
        ADDD    L009B           ; Dwell Cnts to MPU, (15.25 Msec/BIT)
        STD     L009B           ; Dwell Cnts to MPU, (15.25 Msec/BIT)

        ;
        ; CK PASSBY Lk Up QUALS
        ;
        ; (DISABELD BY QUAL VAL'S)
        ;
LCF1A:  LDX     L0125           ; TCC LK UP PASS BY TMR,  (SEC * 80)
        BNE     LCF5A           ; BR IF NZ
                                ; ... else
        LDAA    L0082           ; TPS Ld Axis Var
        CMPA    LC298           ; No PASSBY Lk Up if TPS < 99.6%
        BCS     LCF44           ; BR IF TPS L.T. 99.6%
                                ; ... else
        LDAA    L0065           ;
        CMPA    LC299           ; No PASS BY Lk Up if RPM < 6375
        BLS     LCF44           ; BR IF RPM G.T. 6375
                                ; ... else

        CMPA    LC29A           ; No PASS BY Lk Up if > 800 RPM
        BHI     LCF44           ; BR IF RPM L.T. 800
                                ; ... else
        LDAA    L0057           ; RPM/25
        CMPA    LC29B           ; NO PASS BY LK UP IF RPM < 6375
        BCS     LCF44           ;
                                ; ... else
        LDX     L0123           ; DLY TMR
        CPX     LC29C           ; 819 Sec DLY prior to PASBY LOCKUP
        BHI     LCF4C           ;
                                ; ... else
        INX                     ; INCR TCC LK UP PASS BY TMR

        BRA     LCF47           ;


LCF44:  LDX     #0              ; CLR DLY TMR
LCF47:  STX     L0123           ; DLY TMR

        BRA     LCF85           ;


LCF4C:  LDX     LC29E           ; KEEP TCC LK'ED UP FOR PASSBY 30 SEC
        STX     L0125           ; TCC LK'ED UP TMR

        LDX     #0              ; CLR DLY TMR
        STX     L0123           ;

        BRA     LCF60           ;
```

```
LCF5A:    DEX                       ; DEC TMR
          STX     L0125             ; TCC LK'ED UP TMR
          BEQ     LCF7F             ;

LCF60:    LDAA    L007E             ; Batt Volts Value, (A/D)
          CMPA    #171              ; 17.1 VDC
          BCC     LCF85             ; BR IF BATT GT 17.1 VDC
                                    ; ... else

        ;
        ; CK AFR  MD WD 1 & 4
        ;
          LDX     #$C014            ; AFR MODE WD POINTER
          BRSET   3,X,$80,LCF85     ; BR IF USE TCC OUT FOR A/C CN'T, (C017)
                                    ; ... else
          BRSET   0,X,$40,LCF85     ; BR IF  USE PWR STEER SW SEL
                                    ; ... else
                                    ;
          LDX     #$DFFF            ; 57,343
          STX     L3FD6             ; TCC PW Cnt'r

          BSET    L0037,$20         ; SET b5, MCU INPUT STATUS WD, TCC
          BSET    L0036,$08         ; SET b3, TCC LOCKED FOR PASS BY NOISE

          BRA     LCF85             ; EXIT TO UP MAIN SPK LK UP


LCF7F:    BSET    L0004,$81         ; SET b7 & b0, Xmission Mode word
                                    ; OD ACTIVE, OD ON
          BCLR    L0036,$08         ; CLR b3, TCC LOCKED FOR PASS BY NOISE


        ************************************************
        * LK UP MAIN SPARK ADV vs LD vs RPM
        *
        * TBL = SPK * (256/90)
        ************************************************
LCF85:    LDX     #$C02E            ; POINT TO MIN SPK TBL

          LDAA    L0001             ;
          ASLA                      ;
          BMI     LCFA7             ; Br IF WARM Kickdown enabled
                                    ; ... else
          LDAB    L005B             ; GET FILT COOLANT
          CMPB    LC02C             ; START UP COOLANT
          BCC     LCF9D             ; BR IF COOLANT GT 26c
                                    ; ... else
          SUBB    L005F             ; START UP COOL
          BCS     LCFA3             ; BR IF COOL LT L005F
                                    ; ... else
          CMPB    LC02D             ; Cool Diff Lmt Fm Tbl, (20c)
          BCS     LCFA3             ;
                                    ; ... else
LCF9D:    LDAA    L003B             ;
          ORAA    #$40              ; SET b6, WARM KICK Dn REQ
          STAA    L003B             ;

LCFA3:    LDAB    #208              ; Max LOAD AXIS ON 1st WARM PASS

          BRA     LCFAF             ;



LCFA7:    LDAB    L0063             ; filtered ld value
          CMPB    #208              ; 208 gms/SEC MAX FOR LK UP
          BLS     LCFAF             ; BR IF LD VAL GT 208
```

```
                                ; ... else
          LDAB    #208          ; USE MAX LD VAL

LCFAF:    LDAA    L0056         ; RPM/25
          JSR     LF27C         ; 3d Lk Up Routine

          STAA    L045D         ; SAVE HU SPK VAL
          PSHA                  ; SAVE MAIN SPK TO STX


        ************************************************
        * LK UP COOL COMP SPK ADV vs LD vs COOL
        *
        ************************************************
          LDAA    L005B         ; COOLANT
          CMPA    #208          ; Limit COOL DEG FL to 115c
          BLS     LCFC0         ; BR IF COOL LT 115c
                                ; ... else
          LDAA    #208          ; USE 115c AS MAX LK UP VAL
LCFC0:    LDX     #$C0FE        ; POINT TO COOL COMP SPK LD SEL BYTE

          LDAB    L0063         ; FILTERED LD VALUE

          TST     0,X           ; CK LD SELECTOR BYTE (0 = LD VAL)
          BNE     LCFD1         ; BR IF NZ
                                ; ... else
          CMPB    #160          ; MAX LD VAL FOR LK UP
          BLS     LCFD4         ; IF LD LT 160
                                ; ... else
          LDAB    #160          ; USE MAX LD VAL FOR LK UP
          BRA     LCFD4         ;


LCFD1:    LSRB                  ; LD VAL/2
          ADDB    #32           ; MIN LD VAL FOR LK UP

LCFD4:    INX                   ; POINT TO TBL
          JSR     LF27C         ; 3d Lk Up Routine

          STAA    L045E         ; SAVE HU COOL COMP SPK RESULT
          PSHA                  ; SAVECOOL COMP SPK TO STX
        ************************************************




        ;
        ; CK
        ;
          LDAB    LC017         ; AFR MD WD 4

          LDAA    L0037         ; MCU INPUT STATUS WD
          BITB    #$10          ; b4, EGR DIAG CLOSED
          BEQ     LCFE9         ; BR IF NOT b4
                                ; ... else

          BITA    #$20          ; b5, N.O. Fan Req
          BEQ     LD017         ; BR IF NOT b5
                                ; ... else

LCFE9:    BITB    #$04          ; b2, 4th gr Hwy Mode Sprk Adv on
          BEQ     LCFF4         ; BR IF NOT b2
                                ; ... else

          LDAA    L008F         ; N/V ratio
          CMPA    LC288         ; Min 4th gr Val
          BHI     LD017         ;
```

```
                                ; ... else

LCFF4:    LDAA    L0063         ; FILTERED LD VALUE
          CMPA    LC16F         ; If LV8 > 100 disable hi-way mode spark
          BHI     LD017         ; BE IF LD VAL LT 100
                                ; ... else

          LDAB    L005B         ; COOLANT
          CMPB    LC16E         ; If Coolant <= 59.8c, (139.5f), disable
          BLS     LD017         ; BR IF COOL GT THRESH
                                ; ... else
          LDAB    L0056         ; RPM/25
          CMPB    LC170         ; If RPM is less than 6350 RPM, disable
          BCS     LD017         ;
                                ; ... else
          LDAB    L00A6         ; Hiway Mode Spk Tmr
          CMPB    LC171         ; Enable hi-way mode spark if > 10 Sec
          BHI     LD01D         ; BR IF TMR LT 10 SEC
                                ; ... else
          LDAA    L0000         ; GET MJR LOOP CNTR
          BNE     LD018         ;
                                ; ... else

          INCB                  ; INCR TMR
          BRA     LD018         ;

LD017:    CLRB                  ; CLR TMR
LD018:    STAB    L00A6         ; Hiway Mode Spk Tmr
          CLRA                  ;

          BRA     LD02B         ;
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; LK UP HIGHWAY MODE SPARK ADVANCE vs LV8 (load)
        ;
        ; TABLE VALUE = SA * (256/90)
        ;-------------------------------------------------
LD01D:    CMPA    #144          ; MAX LD VAL FOR LK UP
          BLS     LD023         ; BR IF LD VAL LT 144
                                ; ... else
          LDAA    #144          ; MAX LD VAL FOR LK UP

LD023:    LDAB    #32           ; MIN LD VAL FOR LK UP
          LDX     #$C172        ; ADDR OF TBL
          JSR     LF2B9         ; 2D Lk Up

LD02B:    LDAB    L003A         ; HU DISPLAY MD WD
          ANDB    #$EF          ; CLR b4
          STAA    L045F         ; SAVE HU HIGHWAY MODE SPARK ADVANCE
          PSHA                  ; SAVE HIGHWAY MODE SPARK ADVANCE TO STX
          BEQ     LD037         ; BR IF Z
                                ; ... else
          ORAB    #$10          ; SET b4
LD037:    STAB    L003A         ; HU DISPLAY MD WD
        ;-------------------------------------------------



        ;-------------------------------------------------
        ; HOT RE-START RETARD
        ;-------------------------------------------------
          LDAA    L0001         ;
          BITA    #$20          ; b5
          BNE     LD04D         ; BR IF b5, (if IAC kick dn enab)
```

```
                                    ; ... else
          LDAB    L005F             ; START UP COOL THRESH
          CMPB    LC02A             ; Low Lmt for Hot Restart, (54c)
          BCS     LD04D             ;
                                    ; ... else
          LDAB    L001B             ;
          SUBB    LC684             ; 25d, Hot Sprk Retard
          BCS     LD054             ;
                                    ; ... else
LD04D:    CLRB                      ;

          ORAA    #$20              ; SET b5, IAC KICK DN ENABLE FLG
          STAA    L0001             ;

          BRA     LD057             ;



LD054:    LDAB    LC02B             ; Hot Restard Lmt fm Tbl, (9.8 Deg)

LD057:    LDAA    L003A             ; HU DISPLAY MD WD
          ANDA    #$DF              ; CLEAR b5
          STAB    L0460             ;

          PSHB                      ;
          BEQ     LD063             ;

          ORAA    #$20              ; SET b5
LD063:    STAA    L003A             ; HU DISPLAY MD WD

          CLRB                      ;

          LDAA    L0035             ; MNR LOOP MD WD 2
          BITA    #$10              ; b4, DIAG SW IN DIAG MODE
          BNE     LD088             ; BR IF b4

          BRCLR   L0030,$04,LD088   ; BR IF NOT b2
                                    ; ... else
          TSX                       ;
          LDAA    0,X
          BNE     LD088             ;

          LDAA    L0002             ; Mode Wd1
          BMI     LD088             ;

          RORA                      ;
          BCC     LD08B             ;

          LDAA    L005B             ; COOLANT
          CMPA    LC22C             ;
          BLS     LD08B             ;

          LDAB    LC22B             ;
          BRA     LD08B             ;


LD088     BCLR    L0002,$01         ; CLR b0, ERR 43B TEST IN WORK
LD08B     PSHB                      ;
          CLRB                      ;

          LDAA    L0035             ; MNR LP MD WD 2
          BITA    #$20              ; b4, DIAG SW IN DIAG MODE
          BEQ     LD096             ; BR IF NOT b5
                                    ; ... else
```

```
        ************************************************
        * SUM THE SPARK ADVANCES
        *
        ************************************************
          LDAB    LC024             ; Added S.A. for ALDL Mode
LD096:    LDX     #0                ; ZERO OUT SPK ADV ACCUM
          ABX                       ;

          PULB                      ; GET ___ SPK
          ABX                       ; + KNOCK TEST SA

          PULA                      ; GET ___ SPK
          PULB                      ;
          ABX                       ;

          PULB                      ; GET ___ SPK
          ABX                       ;

          PULB                      ; GET ___ SPK
          ABX                       ;

          LDAB    L0013             ; START UP SPARK ADVANCE
          ABX                       ;

          PSHA                      ;
          PSHX                      ; SAVE PARTIAL SUMMED SPK ADV TO STX

          PULA                      ;
          PULB                      ;
          TSX                       ;
          SUBB    LC0FD             ; SUB OFF 20 DEG, COOL COMP SPK BIAS
          SBCA    #0                ;
          SUBB    0,X               ;
          SBCA    #$0000            ;

          INS                       ; RESET STX

          STD     L0115             ; FINAL SPK ADV VALUE

    ;-------------------------------------------------
    ; CK IF HEADS UP CONNECTED
    ; MOD SPARK
    ;-------------------------------------------------
          LDX     L0033             ; MINOR LOOP MD WD 1
          BPL     LD0BF             ; BR IF NO HEADS UP ON LINE
                                    ; ... else
          JSR     L5809             ; TO HEADS UP

    ;
    ;
    ;   GET INITAL LEAD FM CAL
    ;
LD0BF:    SUBB    LC01C             ; IGN LEAD Value
          SBCA    #0
          STD     L009D             ; SPK ADV REL TO REF, (Unlim)

          LDD     LC01E             ; MAX S.A. Limit, Aprox 40 Deg

          SUBD    L009D             ; SPK ADV REL TO REF, (Unlim)
          BGT     LD0D1             ; BR IF SPK G.T SPK LMT
                                    ; ... else
          ADDD    L009D             ; SPK ADV REL TO REF, (Unlim)
          STD     L009D             ; SPK ADV REL TO REF, (Unlim)
LD0D1:    JSR     LFA1E             ; TPS ACCEL ENR ??

          LDD     L3FCA             ; Counter #3, 16.5 Khz
```

```
          PSHB                      ;
          PSHA                      ;

          SUBD    L00A1             ;
          TSTA                      ;
          BEQ     LD0E0             ;
                                    ; ... else

          LDAB    #255              ; USE MAX VAL
LD0E0:    PULX                      ;
          PSHB                      ;

          STX     L00A1             ;

          CLRA                      ;
          BRSET   L0003,$80,LD105   ; BR IF b7, KNOCK ENBLED BY DIFF COOL
                                    ; ... else

          LDAB    L005B             ; COOLANT
          SUBB    L005F             ; START UP COOL
          BLS     LD0F9             ; BR IF COOL G.T. START UP COOL
                                    ; ... else
          CMPB    LC1BD             ;
          BLS     LD0F9             ;
          BSET    L0003,$80         ; SET b7, KNOCK ENBLED BY DIFF COOL

          BRA     LD105             ;

        ;
        ; CK KNOCK CONTROL QUAL'S
        ;
LD0F9:    LDAB    L005B             ; COOLANT
          CMPB    LC1BC             ; If COOLANT < 67c, DISABLE KNOCK
          BCC     LD105             ; BR IF COOL GT 67c
                                    ; ... else
          BCLR    L0040,$80         ; CLR b7, KNK ENABLED (BY COOLANT)
          BRA     LD157             ;



LD105:    BSET    L0040,$80         ; SET b7, KNK ENABLED (BY COOLANT)
                                    ;
          LDAB    L0058             ; FILT RPM/12/5
          CMPB    LC1B9             ; If RPM = > 650 RPM KNOCK is ENABLED
          BCC     LD116             ; BR IF RPM G.T. 650
                                    ; ... else
        ;
        ; CK ERR #43 STATUS
        ;
          LDAB    L0065             ;
          CMPB    LC1BA             ; If ERR 43, then KNOCK retard 8 Deg
          BCS     LD157             ;
                                    ; ... else
LD116:    LDAA    LC22A             ; If ERR 43, then KNOCK retard 8 Deg
          LDAB    L0002             ; MD WD 2
          BMI     LD157             ;
                                    ; ... else
        ;
        ; CK BATTERY
        ;
          LDAB    L007E             ; Batt Volts Value, (A/D)
          CMPB    #93               ; 9.3 VDC
          BCS     LD157             ; BR IF BATTERY L.T. 9.3 VDC
                                    ; ... else

          LDAB    L003B             ;
```

```
          BITB    #$20              ; b5
          BNE     LD157             ; BR IF b5
                                    ; ... else

        ;-----------------------------------------------
        ; KNOCK ATACK RATE vs RPM
        ;
        ; TBL = ATTACK RATE IN Deg/MSEC /0.0225,
        ; 400 - 4800 RPM
        ;-----------------------------------------------
          LDAA    L0056             ; RPM/25
          LSRA                      ; RPM/25/4
          LSRA                      ;
          LDX     #$C1BE            ; Tbl Addr,
                                    ; - Diff Cool Temp G.T. Enab KNOCK
          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          PULB                      ; GET KNOCK CNT FM STX
          PSHB                      ;

          MUL                       ; KNOCK CNT * ATACK RATE
          ASLD                      ; MULT * 2
          ADDA    L00A5             ; SUM TO KNOCK RETARD
          BCC     LD13D             ; .... else
                                    ; ... else
          LDAA    #255              ; USE MAX VALUE
LD13D:    PSHA                      ;


          LDAA    LC1BB             ; 25.3 deg Max KNOCK Retard, (not in WOT)

          LDAB    L0043             ; AF MODE WD
          BITB    #$20              ; b5,  PWR ENR IS ACTIVE
          BEQ     LD152             ; BR IF NOT b5
                                    ; .. else

    ;---------------------------------------------
    ; Lk Up  MAX KNOCK RETARD WHEN IN WOT vs RPM
    ;  TBL =  Deg * (256/45)  800 -  6400 RPM
    ;---------------------------------------------
          LDX     #$C1C8            ; Point to tbl
          LDAA    L0057             ; RPM/25
          LSRA                      ; RPM * 2
          LDAB    #16               ; Offset for Lk Up
          JSR     LF2B9             ; 2d Lk Up

LD152:    PULB                      ;
          CBA                       ; COMP LK'ED UP RESULT to B reg
          BCS     LD157             ; BR IF  B G.T. K'ED UP RESULT
                                    ; .. else
          TBA                       ;

        ;
        ; RETARD
        ;
LD157:    STAA    L00A5             ; Retard for knock
          LSRA                      ; RETARD/2
          PSHA                      ;

          LDAB    L0033             ; MINOR LOOP MD WD 1
          BPL     LD164             ;
                                    ; .. else
          LDAB    L004B             ; HU SPK FLAGS

          RORB                      ;
          BCS     LD16D             ;
```

```
                                    ; .. else
LD164:    LDD     L009D             ; SPK ADV Rel to Ref, (Unlim)
          TSX                       ;
          SUBB    0,X               ;
          SBCA    #0                ;
          STD     L009D             ;

LD16D:    PULA                      ;
          LDAA    L0002             ; MB WD 2
          PULB                      ;
          TSTB                      ;
          BEQ     LD180             ;
                                    ; ... else
          BITA    #$01              ;
          BEQ     LD17C             ;
                                    ; ... else
          ANDA    #$FE              ;
          ORAA    #$40              ;

LD17C     ANDA    #$7F              ; CLEAR b7,  ERR 43 TEST FAIL THIS START
          STAA    L0002             ; MD WD 2

        ;---------------------------------
        ; DIAG 20 Deg SPK ADV
        ;---------------------------------
LD180     LDAA    L0041             ; CK IF IN DIAG, DIAGNOSTIC MODE WD 3
          BPL     LD189             ;
                                    ;
          LDD     LC022             ; 20 Deg, Fixed S.A. For diagnostics
          STD     L009D             ; Spk Adv Rel to Ref, (Unlim)


        ;---------------------------------
        ; LIMIT SPARK RETARD
        ;---------------------------------
LD189:    LDX     LC020             ; MAX Spk. RETARD lIMIT FM tBL
          CPX     L009D             ; SPK ADV REL TO Ref, (Unlim)
          BLT     LD192             ;
                                    ; ... else
          STX     L009D             ; USE MAX LMT FOR Spk RTD
     ;-----------------------------------------------



     ;-------------------------------------------------
     ; CK IF IN MODE 4 < ----*****
     ;
     ; CNT'L WD ..,b3 1 = CONTROLING SPK
     ; CNT'L WD ..,b5 1 =
     ;
     ;
     ;-------------------------------------------------
LD192:    BRCLR   L0035,$08,LD1C8   ; BR IF NOT b3, MODE 4
                                    ; ... else
        ;
        ; CK MODE 4 CNT'L CWD 5, b3
        ;
          LDAA    L0158             ; ALDL FUNCT MOD ENABLE WD
          BITA    #$08              ; b3
          BEQ     LD1C8             ; Br IF NOT b3, NOT DOING SPL, (EXIT)
                                    ; ... else
        ;
        ; CK IF ALDL MODIFING SPARK
        ; (MODE 4 CWD 8)
        ;
          LDAB    L015B             ; ALDL SPK ADV, (MODE 4 WD 8, b4)
```

```
          BITA    #$10              ; b4
          BNE     LD1B0             ; Br IF  b4, CONTROLLING Spk
                                    ; ... else
          BITA    #$20              ; b5
          BEQ     LD1AD             ; Br NOT b5, IF ADV SPARK
                                    ; ... else
          LDAA    #128              ;
          NEGB                      ;

          BRA     LD1C4             ; Br IF IN RETARD SA



LD1AD:    CLRA                      ;
          BRA     LD1C4             ; EXIT W/NO SPK MOD

        ;
        ; CK IF ADD or RETARD SPK
        ;
LD1B0:    BITA    #$20              ; b5
          BNE     LD1BD             ; BR IF b5, SUBTRACT SPARK ADVANCE

                                    ; ... else
        ;
        ; ADD SPARK ADVANCE
        ;
          LDD     L009D             ; SPK ADV REL TO REF, (Unlim)
          ADDB    L015B             ; ALDL SPK ADV
          ADCA    #0111             ; 40 deg ???
          BRA     LD1C4             ; GO SAVE SPK ADV

        ;
        ; SUBTRACT SPARK ADVANCE
        ;
LD1BD:    LDD     L009D             ; Spk Adv Rel to Ref, (Unlim)
          SUBB    L015B             ; ALDL SPK ADV
          SBCA    #$0               ;

LD1C4:    STD     L009D             ; Spk Adv Rel to Ref, (Unlim)

          BRA     LD1DB             ;
        ;-------------------------------------------------



        ;-------------------------------------------------
LD1C8:    BRSET   L0041,$80,LD1DB   ; BR IF b7, IN DIAGNOSTICS
                                    ; ... else
          LDX     L009D             ; Spk Adv Rel to Ref, (Unlim)
          BMI     LD1DB             ; BR IF RETARD

          PSHX                      ;
          TSX                       ;
          LDAA    L012A             ; SPK ADV BLEND MULT
          JSR     LF266             ; MUL 8 X 16 SUROUTINE

          PULX                      ;
          STD     L009D             ; Spk Adv Rel to Ref, (Unlim)

LD1DB:    LDD     L009D             ; Spk Adv Rel to Ref, (Unlim)
          BMI     LD1E7             ;

          LDAA    L0034             ;
          ANDA    #$FE              ; CLR b0, IF ADVANCE CLR ADV/RETARD FL
          STAA    L0034             ;
```

```
          BRA     LD1EE             ;


LD1E7:    LDAA    L0034             ;
          ORAA    #$01              ; SET b0, IF RETARD, (ADV/RETARD FLG)
          STAA    L0034             ;

          NEGB                      ;
LD1EE:    PSHB                      ;

        ;-----------------------------------------------
        ; CK HEADS UP
        ; MAKE SPK ADV REL TO TDC
        ;
        ;-----------------------------------------------
          LDAA    L0033             ; CK IF HEADS UP ON LINE
          BPL     LD1F6             ; BR IF NO HEADS UP
                                    ; ... else
          JSR     L580F             ; TO HEADS UP <---------------
    ***************************************************




    ***************************************************
    * SPARK OUT ROUTINE
    *
    *   EXECUTED EVERY OTHER 1RQI
    *   ALL MNR LOOP SPARK FUNCTIONS and Vss
    *
    *
    ***************************************************
LD1F6:    PULA                      ;
          TSX                       ;
          JSR     LF266             ; MUL 8 X 16 SUROUTINE

          PULX                      ;
          PSHB                      ;
          PSHA                      ;
          TSX                       ;
          LDAB    L0034             ; FLAG
          RORB                      ;
          BCS     LD20C             ; TO SPK OUT ROUTINE
                                    ; ... else
          CLRA                      ;
          CLRB                      ;
          SUBD    0,X               ;
          PULX                      ;

          BRA     LD20E             ;


LD20B:    RTS                       ;
        ;-----------------------------------------------


        ;-----------------------------------------------
        ; SPARK OUTPUT ROUTINE
        ;
        ; BUA, TYPE $32 ECM P/N  1227165
        ;-----------------------------------------------
LD20C:    PULB                      ;
          PULB                      ;

LD20E:    SUBB    LC01D             ; Time Corr for Spark, Aprox 200 usec
          SBCA    #0
```

```
          PSHB                    ;
          PSHA                    ;

          TSX                     ;


        ;------------------------
        ; LMT SPK ADV INCREASE TO
        ; DRP PERIOD/16
        ;------------------------
          CLRA                    ;
          CLRB                    ;

          SUBD    L0095           ; Current Minor LP Ref Period fm MPU
          LSRD                    ; TIME/16
          LSRD                    ;
          LSRD                    ;
          LSRD                    ;
          ORAA    #$F0            ; MASK FOR MSB
          ADDD    L3FF6           ; Time Fm Ref to Fire IGN Cnt'r

          SUBD    0,X             ;
          BMI     LD243           ;
                                  ; ... else
          ADDD    0,X             ;
          STD     0,X             ;

          ASLD                    ;

          LDD     L0095           ; Current Minor LP Ref Period
          BCC     LD23B           ;
                                  ; ... else
          COMA                    ;
          COMB                    ;
          ADDD    #1              ;
          SUBD    0,X             ;
          BCC     LD23F           ;
                                  ; ... else
          BRA     LD243           ;


LD23B:    SUBD    0,X             ;
          BCC     LD243           ;

LD23F:    ADDD    0,X             ;
          STD     0,X             ;

LD243:    LDD     0,X             ;
          SUBD    L3FF6           ; TIME Fm Ref to Fire IGN Cnt'r
          BSR     LD20B           ; SHORT DELAY

          STD     L3FE8           ; CURRENT SPK Fall Cnt'r
          BSR     LD20B           ; SHORT DELAY

          ADDD    L3FDC           ; SPK Dwell period cnt'r
          BSR     LD20B           ; SHORT DELAY

          SUBD    L009B           ; Dwell Cnt's to CPU
          STD     L3FE6           ; SPK Dwell Cnt'r

          BSR     LD20B           ; SHORT DELAY


          LDD     L009B           ; Dwell Cnts to MPU
          STD     L3FDC           ; SPK Dwell period cnt'r
          BSR     LD20B           ; SHORT DELAY
```

```
          PULA                      ;
          PULB                      ;
          STD     L3FF6             ; Time Fm Ref to Fire IGN Cnt'r

          LDAA    L0033             ; MINOR LOOP MD WD 1
          BITA    #$08              ; b3, 1st DRP BIT = 1 IF 1ST DRP NOW
          BEQ     LD2A4             ; BR IF NOT b3, 1st DRP

          BITA    #$10              ;
          BNE     LD295             ; BR IF b4
                                    ; ... else
        ;
        ;  CK IF ERR 42
        ;  SPK MON EANBLED
        ;
          LDAB    LC1D2             ; Mask For ERR flag 3
          BITB    #$20              ; b5, SKP Monitor error
          BEQ     LD295             ; BR IF NOT b5
                                    ; ... else
          LDAB    L0034             ;
          ASLB                      ;
          BMI     LD295             ;
                                    ; ... else
          ASLA                      ;
          BMI     LD28A             ;
                                    ; ... else
          LDAB    L00B4             ; SPK Fd Bk counter, (Err #42)
          CLR     L00B4             ; SPK Fd Bk counter, (Err #42)

          CMPB    LC227             ; ERR #42 Param, If SPK toggled,
                                    ; (PA1 cnt's) >= 2 times,
                                    ; prior to eng run set ERR #42
          BLS     LD292             ; BR IF LT 2 CNT'S
                                    ; ... else
LD28A:    BSET    L0033,$40         ; SET b6, LOCK IN ERR 42B


          LDD     L3FFC             ; CPU CR
          BRA     LD2D7             ;



LD292:    BSET    L0034,$40         ; BYPASS CHECK ENABLED

LD295:    LDX     L3FEC             ; B Cnt'r last ref

          LDAB    L0033             ; MINOR LOOP MD WD 1
          ANDB    #$F7              ; CLR b3,  1st DRP BIT, (VALID PERIOD)
          STAB    L0033             ;

          INCB                      ;
          INCB                      ;
          STX     L3FE4             ; B Cnt'r, Bgn nxt Dwell

          INCB                      ;
LD2A4:    MUL                       ;
          LDD     L3FFC             ; CPU CR
          ORAB    #$10              ; SET b4

          BRSET   L0030,$04,LD2B7   ; BR IF b2, EST ENABLED
                                    ; ... else
          CLR     L012A             ; SPK ADV BLEND MULT

          BSET    L0036,$20         ; SET b5, (BLEND SPK)
          BSET    L0030,$04         ; SET b2
```

```
LD2B7:    BRSET   L0036,$02,LD2C0   ; BR IF b1, (IN STALL SVR SPK)
                                    ; ... else
          TST     L0001             ;
          BPL     LD2DA             ; TO CK MODE 4 ROUTINE
                                    ; ... else
LD2C0:    BCLR    L0030,$04         ; CLR b2
          ANDB    #$EF              ;
          BRCLR   L0036,$01,LD2D7   ; BR IF NOT b0, (SKP ERR42 FOR STALL SVR)
                                    ; ... else
          PSHB                      ;

          LDAB    L00B4             ; SPK Fd Bk counter, (Err #42)
          CMPB    LC227             ;
          PULB                      ;
          BLS     LD2DA             ;

          BSET    L0001,$80         ;

          BRA     LD2DA             ;

LD2D7:    BSET    L004E,$20         ; SET b5, NEW ERR 2

    ;-------------------------------------------------
    ; CK IF IN MODE 4 <----*****
    ;  (MODE 4 MD WD 4, b3)
    ;
    ;-------------------------------------------------
LD2DA:    BRCLR   L0035,$08,LD301   ; BR IF NOT b3, MODE 4
                                    ; ... else
          PSHA                      ;
          LDAA    L0154             ; MODE 4 MD WD 4
          BITA    #$08              ; b3
          BEQ     LD300             ; BR IF NOT b3, EXIT
                                    ; ... else
          ANDB    #$EF              ; CLR b4

          BCLR    L0030,$04         ; CLR b2

          PULA                      ;
          PSHA                      ;
          STD     L3FFC             ; CPU CR

          SEI                       ; TURN OFF INTERUPTS

          JSR     LF1E5             ; SPI ROUTINE

          CLI                       ; CLEAR & RESTORE INTERUPTS
          CLR     L00B4             ; SPK Fd Bk counter, (Err #42)

          BSET    L0036,$01         ; SET b0,
                                    ; (SKIP ERR STALL SAVER SPK BYPASS)

          LDX     L3FC8             ; SPK Period
          STX     L00B2             ; OLD PA2 CNT'R

LD300:    PULA                      ;
        ;-------------------------------------------------


LD301:    STD     L3FFC             ; CPU CR

          BRA     LD365             ;
        ************************************************
        * END OF SPK OUT
        ************************************************
```

```
        ************************************************
        * LOW RPM SPARK
        *
        ************************************************
LD306:    LDAA    #00               ;
          STAA    L400C             ; CPU COP

          LDX     #$FFFF            ;
          STX     L0468             ;

          INX                       ;
          STX     L0056             ; RPM/25
          STX     L0058             ; RPM/12.5

          LDAA    L0001             ;
          BITA    #$08              ; b3
          BNE     LD31E             ; BR IF b, BAD SHUTDOWN
                                    ; ... else
          STX     L001A             ; Eng Run Time (sec)

LD31E:    LDAA    LC33B             ; MINOR LOOP MD WD 1

          CLRB                      ;
          STD     L00E5             ; Trans flt'rd Ld Val

          STX     L00D9             ; Accel Enrich, Acum Fuel
          STAB    L00E2             ; Diff Ld Val Accel Enr Factor

          STAB    L0104             ;

          LDAA    L00F3             ;
          BITA    #$04              ; IAC Md Wd #2
          BNE     LD35D             ;
                                    ; ... else
          BSR     LD335             ;
          BRA     LD35D             ;


LD335:    LDAB    L003D             ; AIR MODE WD
          ASLB                      ;
          BPL     LD33F             ;
                                    ; ... else
          LDAB    LC665             ; A/C LRN, .. STEPS
          STAB    L002D             ; Idle Spd A/C Antic

LD33F:    LDAB    LC62F             ; ... STP'S IDLE RPM START UP
          JSR     LD3DE             ;

          LDAA    #255              ; LIMIT
          STAA    L0109             ;
          STAA    L0102             ;
                                    ;
          LDAA    #$80              ; SET BIT 7, AC STATUS OFF
          STAA    L00F2             ; IAC Cnt'l Word
          CLRA                      ;

          LDAB    L0037             ; MCU INPUT STATUS WD
          BITB    #$01              ; b0, IN PK/NEUT
          BEQ     LD35A             ; BR IF NOT b0, IN PK/NEUT
                                    ; ... else
          LDAA    #$90              ;
LD35A:    STAA    L00F3             ; IAC Md Wd #2

          RTS                       ;
```

```
        ;-------------------------------------------------

LD35D:  LDAA    #$EF            ; TIME OUT AF CNT'R
        JSR     LF49A           ;

        BCLR    L0030,$04       ; CLEAR EST ENABLE BIT

LD365:  SEI                     ; TURN OFF INTERUPTS

        JSR     LF1E5           ; FMD serial byte read

        CLI                     ; CLEAR & RESTORE INTERUPTS

        JSR     LF92A           ; TO FUEL OUT
        JSR     LE436           ; TO ASYNC OUT
    ****************************************************




    ****************************************************
    * PID MINOR LOOP
    *
    * 12.5 MSEC CODE
    *
    *
    ****************************************************

        LDAB    L00F3           ; IAC Md Wd #2
        BITB    #$04            ; b2
        BNE     LD393           ; BR IF b2
                                ; ... else
        LDAA    L0035           ; MNR LOOP MD WD2
        BITA    #$20            ; b5, DIAG SW IN ALDL MODE
        BEQ     LD387           ; BR IF NOT b5
                                ; ... else
        LDAA    L003C           ;
        RORA                    ;
        BCS     LD387           ;
                                ; ... else
        LDAA    L0057           ; RPM/25
        CMPA    #80             ; 2000 RPM
        BCC     LD393           ;
                                ; ... else
LD387:  LDAA    L0002           ; Mode Wd2
        BITA    #$10            ; b4, SKP IAC MOROR RESET
        BNE     LD3F0           ; BR IF B4
                                ; ... else
        LDAA    L0033           ;
        BITA    #$10            ; b4, 1 = IGN OFF
        BEQ     LD3F0           ; BR IF NOT b4
                                ; ... else
LD393:  LDAA    L002C           ; IAC Present Posit
        BITB    #$02            ;
        BNE     LD3AC           ;
                                ; ... else
        BITB    #$04            ; b2
        BNE     LD3A7           ; BR IF NOT b2
                                ; ... else
        ORAB    #$04            ; b2
        LDAA    #$FF            ;
        STAA    L002C           ; IAC Present Posit

LD3A3:  LDAA    #$FF            ;
```

```
          BRA     LD3B4             ;


LD3A7:    TSTA                      ;
          BNE     LD3A3             ;
                                    ; ... else
          ORAB    #$02              ; b1
LD3AC:    SUBA    LC62F             ;
          NEGA                      ;
          BPL     LD3B4             ;
                                    ; ... else
          LDAA    #127              ;
LD3B4:    STAA    L0101             ;
          BNE     LD3D0             ; BR IF NZ
                                    ; ... else
          LDAA    L0035             ; MNR LP MD WD 2

          BSET    L0002,$10         ; SET b4, SKIP IAC MOTOR RESET

          BITA    #$20              ; b5,
          BEQ     LD3C5             ; BR IF NOT b5
                                    ; ... else
          BSET    L003C,$01         ;

LD3C5:    LDAA    L0033             ; MINOR LOOP MD WD 1
          BITA    #$10              ; b4, 1 = IGN OFF
          BNE     LD3D0             ; BR IF b4
                                    ; ... else
          JSR     LD335             ;

          BRA     LD3F0             ;



LD3D0:    STAB    L00F3             ; IAC Md Wd #2
LD3D2:    CLR     L0105             ;

          LDAB    L00F2             ; IAC Cnt'l Word
          ANDB    #$EF              ; CLR b4
          STAB    L00F2             ;
                                    ;
          JMP     LD6CA             ;


LD3DE:    LDAA    L002C             ; IAC Present Posit
          SBA                       ;
          BCC     LD3E4             ;
                                    ; ... else
          NEGA                      ;
LD3E4:    BPL     LD3E8             ;
                                    ; ... else
          LDAA    #127              ;
LD3E8:    BCS     LD3EC             ;
                                    ; ... else
          ORAA    #$80              ; b7
LD3EC:    STAA    L0101             ;

          RTS                       ;
        ;-------------------------------------------------

LD3F0:    LDAA    L0034             ; MINOR LP MD WD
          BPL     LD3D2             ;

          LDAA    L0084             ; TPS T/F Ld Axies Var
          STAA    L0085             ; Old Val Fm TPS Tbl
```

```
          LDAA    L0082             ; TPS Ld Axis Var
          TAB                       ;
          SUBB    L0084             ; TPS T/F Ld Axies Var
          BCC     LD400             ;

          NEGB                      ;
LD400:    CMPB    LC64C             ; CMD speed Param
          BLS     LD407             ;

          STAA    L0084             ; TPS T/F Ld Axies Var
LD407:    LDAB    L003F             ;
          ANDB    #$24              ; b2 & b5
          BEQ     LD413             ;

          LDAA    LC64B             ; CMD speed Param
          ASLA                      ;
          STAA    L0084             ; TPS T/F Ld Axies Var

LD413:    JSR     LE87A             ; EXIT TF CODE
    ******************************************************



    ******************************************************
    * PID ENGINE SPEED REGULATOR
    *
    * 50 Msec PID LOGIC
    *
    *
    *
    ******************************************************
          LDAA    L0000             ;
          ANDA    #$07              ; ALL EXCEPT b3
          BEQ     LD41F             ; BR IF b3
                                    ; ... else
          JMP     LD6CE             ;

        ***************************************
        * ESTABLISH IDLE SPEED CMD SPEEDS
        ***************************************

LD41F:    PSHX                      ;
          PSHX                      ;
          PSHX                      ;
          PSHX                      ;
          TSY                       ;

    ;--------------------------------------
    ; LK UP IAC TARGET RPM vs coolant Temp.
    ;
    ;
    ;--------------------------------------
          LDAA    L005B             ; Deg c COOL
          LDX     #$C637            ; INDEX TGT RPM Tbl
                                    ;
          JSR     LF2C6             ; 2d Lk Up, (No Offset)


          LDX     #$C62E            ; INDEX IAC Tables & Params
                                    ;
    ;
    ; CL P/N RPM CMD FLOOR
    ;
          LDAB    L00F3             ; IAC Md Wd #2
          ANDB    #$DF              ; CLR b5
          STAB    L00F3             ; IAC Md Wd #2
```

```
          BPL     LD43A             ;
                                    ; .... else

    ;
    ; ADD IN AN OFFSET FOR P/N
    ;
          ADDA    6,X               ; IAC offset added for pk/neut, (50 RPM)
LD43A:    LDAB    L00F2             ;
          BMI     LD440             ;
                                    ; ... else
          ADDA    8,X               ; IAC Offset Cmd Spd Added, (0 RPM)

LD440:    LDAB    L003A             ; HU DISPLAY MD WD
          ANDB    #$20              ; b5, SET 1K RPM (1000 RPM)
          BEQ     LD448             ; BR IF NOT b5
                                    ; ... else
          ADDA    $57,X             ; Add 300 RPM speed offset if hot spark

LD448:    LDAB    L0035             ; MNR LOOP MD WD 2
          BITB    #$20              ; b5, ALDL SW IN DIAG MODE
          BEQ     LD450             ; BR IF NOT b5
                                    ; ... else
          LDAA    #80               ; 2000/25
LD450:    STAA    L0102             ; MIN RPM IN P/N AS REQ RPM

        ;-------------------------------------------------
        ; CK IF IN MODE 4
        ; MODE 4 CNT'L WD 8, b0 & b1
        ; MODE 4 CNT'L WD .. HAS NEW IAC CMD SPEED
        ;-------------------------------------------------
          BRCLR   L0035,$08,LD468   ; BR IF NOT b3, MODE 4
                                    ; ... else
          LDAA    L0158             ; ALDL FUNCT MOD ENABLE WD
          BITA    #$01              ; b0
          BEQ     LD468             ; BR IF NOT b0, MOD'ING, (EXIT)
                                    ; ... else
          BITA    #$02              ;
          BEQ     LD468             ; BR IF NOT b1,
                                    ; ... else,  MOD'ING, (EXIT)
          LDAA    L0159             ; GET ALDL IAC CMD SPEED
          STAA    L0102             ; IAC CNT'L SPEED

        ;-------------------------------------------------
LD468:    CMPA    L0058             ; RPM/12.5
          BCC     LD472             ;
                                    ; ... else
          LDAA    L00F2             ; IAC Cnt'l Word
          ORAA    #$02              ; SET b1,  SET MOTOR RESET STARTED BIT
          STAA    L00F2             ;

        ;---------------------------------------
        ; CALC 50 Msec RPM RATE
        ;
        ;
        ;---------------------------------------
LD472:    LDD     L00FF             ; 50 Mssec OLD FILT RPM RATE
          SUBD    L0058             ; RPM/12.5
          RORA                      ; SCALE RPM RATE
          RORB                      ;
          ASRA                      ;
          RORB                      ;
          ASRA                      ;
          RORB                      ;
          ASRA                      ;
          RORB                      ;
```

```
          BSR     LD4CD           ;
          STAB    L00FF           ; SAVE 50 Mssec FILT RPM RATE
        ;---------------------------------------

          CLRA                    ;
          CLRB                    ;
          STD     0,Y             ;

          LDAB    L0058           ; RPM/12.5
          STD     4,Y             ;

          LDAB    L0102           ; IAC CNT'L SPEED
          SUBD    4,Y             ;
          BSR     LD4CD           ;


          STAB    4,Y             ;
          TBA                     ;
          BPL     LD49B           ;
                                  ; ... else
          NEGA                    ;
LD49B:    STAA    2,Y             ;
          CMPA    $1C,X           ;
          BLS     LD4A5           ;
                                  ; ... else
          CLRA                    ;
          BRA     LD4AB



LD4A5:    LDAA    L0107           ; DEAD BAND TMR
          INCA                    ; BUMP UP TMR
          BEQ     LD4AE           ; BR IF Z
                                  ; ... else
LD4AB:    STAA    L0107           ; DEAD BAND TMR

LD4AE:    LDAA    L010B           ; SAVE NEW DISABLE CLSD LP PID TMR
          BEQ     LD4B7           ; BR IF Z
                                  ; ... else
          DECA                    ; DECR TMR
          STAA    L010B           ; SAVE NEW DISABLE CLSD LP PID TMR

LD4B7:    LDAA    L0084           ; TPS T/F Ld Axies Var
          CMPA    $1D,X           ;
          BCC     LD4C3           ;
                                  ; ... else
          LDAA    L0067           ; VSS TABLE INPUT, MPH/(16/5)
          CMPA    $20,X           ;
          BLS     LD4DD           ;
                                  ; ... else
LD4C3:    LDAA    L00F2           ; IAC Cnt'l Word
          ANDA    #$FE            ; CLR b0
          STAA    L00F2           ; IAC Cnt'l Word

          TBA                     ;
          JMP     LD550           ;



LD4CD:    ASLD                    ; MILT * 2
          BCC     LD4D6           ; IF NO OVERFLOW
                                  ; ... else
          INCA                    ;
          BEQ     LD4DB           ; BR IF Z
                                  ; ... else
          CLRB                    ;
```

```
          BRA     LD4DB             ;


LD4D6:    TSTA                      ;
          BEQ     LD4DB             ; BR IF Z
                                    ; ... else
          LDAB    #255              ; MAX POS LMY
LD4DB:    RORB                      ;

          RTS                       ;
        ;---------------------------------------


        ;-------------------------------------------------
        ;
        ;
        ;
        ;-------------------------------------------------
LD4DD:    TST     L0067             ; VSS TABLE INPUT, MPH/(16/5)
          BNE     LD53C             ; BR IF MOVING, SOME Vss
                                    ; .... else
          LDAA    L010B             ; DISABLE CLSD LP PID TMR
          BNE     LD54F             ;
                                    ; .... else
          PSHB                      ; SAVE RPM ERR TO STX
          LDAA    L00F3             ; IAC Md Wd #2
          BPL     LD4F5             ;
                                    ; .... else

        ;
        ; NOW IN NEUTRAL
        ;
          BITA    #$10              ; TST OLD PK/NEUT STATUS
          BNE     LD503             ; BR IF IT WAS NEUT
                                    ; .... else
          CLRB                      ;
          ORAA    #$10              ; SET b4, DLY TMR, XISTION DELAY

          BRA     LD4FD             ;


        ;
        ; NOW IN DRIVE
        ;
LD4F5:    BITA    #$10              ; b4, WE WE IN DRIVE, (OLD VAL)
          BEQ     LD503             ; BR IF NOT b4
                                    ; ... else
        ;
        ; OLD STATE WAS NEUT
        ;
          LDAB    $47,X             ; LC675, DELAY TMR, 320 Msec

          ANDA    #$EF              ; CLR b4, OVR SPEED ENABLE

LD4FD:    STAB    L010B             ; DISABLE CLSD LP PID TMR

          CLR     L0107             ;

LD503:    STAA    L00F3             ; IAC Md Wd #2
          BMI     LD53B             ; GOTO TO OPN LOOP TESTS
                                    ; ... else


        ;
        ; OLD STATE WAS IN DRIVE
        ; SINCE IN DRIVE, LEARN MIN POSIT FOR IDLE
```

```
        ;
        ; 400 MSEC MIN RPM ERR DEAD BAND TIME BEFORE
        ; LEARN ENABLE/DISABLE
        ;
          LDAA    L0107             ; RPM ERR TMR
          CMPA    $3B,X             ; 400  Msec MIN RPM ERR TIME
          BLS     LD53B             ; GOTO TO OPN LOOP TESTS
                                    ; ... else
        ;
        ;  LEARN NEW MIN POSIT FOR IDLE
        ;  IF SLEWED ABS, DON'T LEARN
        ;
          LDAA    L00F3             ; IAC Md Wd #2
          ASRA                      ;
          BCS     LD53B             ;
                                    ; ... else

        ;
        ; HOT RESTART ACTIVE ?
        ;
          LDAA    L003A             ; HU DISPLAY MD WD
          BITA    #$20              ; b5
          BNE     LD53B             ;
                                    ; ... else

        ;
        ; LEARN MIN MOTOR AT 100 MSEC LEARN RATE
        ;
          LDAA    L0000             ; NINOR LP CNTR
          CMPA    #$30              ;
          BNE     LD53B             ; BR IF NOT LP # $30
                                    ; ... else

        ;
        ; COMPARE PRESSENT vs MIN MOTOR POSIT'S
        ;
          LDAA    L0109             ;
          LDAB    L010F             ;
          BEQ     LD53B             ;
                                    ; ... else
          BMI     LD534             ;
                                    ; ... else
          INCA                      ;
          CMPA    L010C             ; INIT IAC WARM PARK POSIT
          BLS     LD538             ;
                                    ; ... else
          LDAA    L010C             ; INIT IAC WARM PARK POSIT

          BRA     LD538             ;



LD534:    DECA                      ;
          BNE     LD538             ;
                                    ; .... else
          INCA                      ;
LD538:    STAA    L0109             ;

LD53B:    PULB                      ; GET RPM ERR FM STX
LD53C:    LDAA    L00F2             ; IAC Cnt'l Word
          BITA    #$04              ; B2, MOTOR RESET WORKING
          BEQ     LD553             ;
                                    ; ... else
          BITA    #$18              ; b3 & b4
          BNE     LD54F             ;
                                    ; ... else
```

```
          BRSET   L0037,$08,LD54F   ; BR IF b,3, MCU INPUT STATUS WD PW STEER SW
                                    ; ... else
    ;
    ; BYPASS PID IF A/C ANTICIPATE STEPS
    ; ARE BEING TAKEN
    ;
          LDAA    L0106             ; PID A/C TIMER
          BEQ     LD59A             ;
                                    ; ... else

    ;
    ; DISABLE A/C LEARNING IF TPS OPEN or
    ; Vss GT 0
    ;
    ; UNDER SPEED ENABLE CHECK FOR A PID OVERIDE
    ;
LD54F:    TBA                       ; SAVE ABC VSL OF RPM ERR
LD550:    TSTA                      ; UNDER SPD ERR ?
          BPL     LD588             ; BR IF SO,
                                    ; ... else

LD553:    CLR     L0107             ; CLR DEAD BAND COUNTER
          LDAB    L0084             ; TPS T/F Ld Axies Var
          CMPB    LC64D             ; CMD speed Param
          BCS     LD585             ;
                                    ; ... else
          LDAB    L0067             ; MPH/ (16/5)
          CMPB    $20,X             ; 1.8 MPH,  LC64E, Enab C/L PID if MPH <=
          BLS     LD585             ; BR IF
                                    ; ... else
          LDAB    L010F             ;
          BLE     LD585             ;
                                    ; ... else
          LDAA    L0000             ; NINOR LP CNTR
          ANDA    #$18              ; MASK 0001 1000
          CMPA    #$18              ;
          BNE     LD585             ; BR IF b3 & b4
                                    ; ... else

        ;
        ; WAIT FOR COMP MODE TO BE DONE
        ;
          LDAA    L00F2             ; IAC Cnt'l WorD
          BITA    #$08              ; b3, COMP MODE
          BNE     LD585             ; BR IF b3
                                    ; ... else
          ANDA    #$EF              ; CLR b4, TF ACTIVE
          STAA    L00F2             ; IAC Cnt'l Word

          LDAB    #129              ; 129 STEPS
          STAB    L0101             ; REQUEST MOTOR STEPS

          LDAA    L00F3             ; IAC Md Wd #2
          ORAA    #$20              ; SET b5,
          STAA    L00F3             ; IAC Md Wd #2

LD585:    JMP     LD6C6             ;  EXIT
        ;-------------------------------------------------


        ;
        ; CK IF MANUAL XMISH
        ;
LD588:    LDAB    $54,X             ; FLAG, '1' if manual vech sel
          BEQ     LD590             ; BE IF NOT MANUAL
                                    ; ... else
```

```
          LDAB    L0067           ; MPH/(16/5)
          BNE     LD553           ; BR IF MOVING, (BYPASS UNDER SPD CK)
                                  ; ... else
        ;
        ; CK FOR PID ENABLE
        ;
LD590:    CMPA    $21,X           ; 50 RPM, Min under spd err to enab PID
          BLS     LD553           ; IF ERR LT 50, BP PID REQULATOR
                                  ; ... else

          LDAA    L00F2           ; IAC Cnt'l Word
          ANDA    #$E7            ; CLR b3 & b4, TF & COMP MODE
          STAA    L00F2           ; IAC Cnt'l Word


        **********************
        * PID ENABLED
        *
        **********************
LD59A:    LDAA    L00F3           ; IAC Md Wd #2
          BMI     LD59F           ; CK P/N
                                  ; ... else
          INX                     ; POINT TO 'IN DRIVE' SCALARS
                                  ;
LD59F:    LDAA    $1A,X           ; LC648, Max RPM Err for deadband in P/N
          STAA    $05,Y           ;
                                  ;
          LDAA    $2D,X           ; 187.5 RPM/SEC, LC65B,
                                  ;  NEUT RATE DEAD BAND
          LDAB    $2B,X           ; LC659,  PK/NEUT intigrator gain
          STD     $06,Y           ;
                                  ;
          LDAB    $04,Y           ; RESSTORE RPM  ERR
                                  ;
        ************************************************
          LDX     #$C62E          ; RE-INDEX IAC Tables & Params
                                  ; TABLES FOR PID F.B.
          LDAA    $02,Y           ; ABS VAL OF RP ERR
          CMPA    $05,Y           ;
          BLS     LD5F9           ;
                                  ; ... else
LD5B9:    TSTB                    ;
          BMI     LD5E1           ;
                                  ; ... else
          LDAA    $22,X           ;
          TST     $04,Y           ;
          BMI     LD5EA           ;
                                  ; ... else
          PSHA                    ;
          LDAA    $02,Y           ;
          CMPA    LC658           ; 50 RPM Min UNDER SPD ERROR
                                  ; TO ENABLE HI PROP & DERIV
                                  ; GAIN ADDITIONS, (RPM/12.5)

          PULA                    ;
          BLS     LD5EA           ;
                                  ; ... else
          CMPB    $24,X           ;
          BLS     LD5EA           ;
          ADDA    $25,X           ;
          BCC     LD5EA           ;
                                  ; ... else
          PSHB                    ;
          MUL                     ;
          ADCA    #$00            ;
          PULB                    ;
```

```
          ABA                       ;
          BPL     LD5ED             ;
          LDAA    #$7F              ;
          BRA     LD5ED             ;



LD5E1:    LDAA    $23,X             ;
          NEGB                      ;
          MUL                       ;
          ADCA    #0                ; ROUND OFF
          NEGA                      ;
          BRA     LD5ED             ;


LD5EA:    MUL                       ;
          ADCA    #0                ; ROUND OFF

LD5ED:    TAB                       ;
          CLRA                      ;
          TSTB                      ;
          BPL     LD5F3             ;
                                    ; ... else
          COMA                      ;
LD5F3:    ADDD    0,Y               ;
          STD     0,Y               ;
LD5F9:    CPX     #$C632            ;  STP'S ADDED FOR FAN 2
          BEQ     LD611             ;
                                    ; ... else
          LDX     #$C632            ;  STP'S ADDED FOR FAN 2
          LDAB    L00FF             ; RPM
          TBA                       ;
          BPL     LD607             ;
                                    ; ... else
          NEGA                      ;
LD607:    STAA    $03,Y             ;
          CMPA    $4A,X             ;
          BCC     LD5B9             ;
                                    ; ... else
          LDD     0,Y               ;
;
LD611:    JSR     LD4CD             ;

          STAB    0,Y               ;
          BPL     LD61A             ;
                                    ; ... else
          NEGB                      ;
LD61A:    TBA                       ;
          LDAB    L00F3             ; IAC Md Wd #2
          BPL     LD624             ;
                                    ; ... else
          LDAB    $002B,X           ;
          MUL                       ;
          ADCA    #0                ; ROUND
LD624:    CMPA    $3A,X             ;
          BCS     LD633             ;
                                    ; ... else
          CLR     L0103             ;
          LDAB    0,Y               ;
          STAB    4,Y               ;

          BRA     LD675             ;


LD633:    LDAB    3,Y               ;
          CMPB    6,Y               ;
```

```
          BLS     LD63E             ;
                                    ; ... else
          JMP     LD6C0             ;
        ;-------------------------


LD63E:    LDAB    7,Y               ;
          LDAA    2,Y               ;
          CMPA    5,Y               ;
          BHI     LD656             ;
                                    ; ... else
          CMPA    $48,X             ;
          BLS     LD6C0             ;
                                    ; ... else
          LDAB    $47,X             ;
          TST     L00F3             ;
          BPL     LD656             ;
                                    ; ... else
          LDAB    $46,X             ;
LD656:    MUL                       ;
          ASLD                      ;
          LDAB    4,Y               ;
          BPL     LD65E             ;
                                    ; ... else
          NEGA                      ;
LD65E:    ADDA    L0103             ;
          BVC     LD668             ;
                                    ; ... else
          LDAA    #$007F            ;
          BCC     LD668             ;
                                    ; ... else
          NEGA                      ;
LD668:    STAA    $0004,Y           ;
          STAA    L0103             ;
          BPL     LD671             ;
                                    ; ... else
          NEGA                      ;
LD671:    CMPA    $003A,X           ;
          BCS     LD6C3             ;
                                    ; ... else
LD675     LDAB    $39,X             ;
          MUL                       ;
          ADCA    #0                ;
          STD     6,Y               ;

          LDAA    $3A,X             ;
          MUL                       ;
          ADCA    #0                ;
          BPL     LD686             ;
                                    ; ... else
          LDAA    #$7F              ;
LD686:    STAA    5,Y               ;

        ;-----------------------------------------------
        ; LK UP IAC Mult vs Cool Temp
        ;
        ;
        ;-----------------------------------------------
          LDX     #$C686            ; Tbl Addr,
          LDAA    L005B             ; COOLANT
          JSR     LF2BF             ; 2d Lk Up W/ Interp

          PSHY                      ;
          PULX                      ;
          LDAB    #6                ;
          ABX                       ;
```

```
          JSR     LF266             ; MUL 8 X 16 SUROUTINE

          ASLB                      ;
          ADCA    #0                ;
          TAB                       ;
          LDAA    4,Y               ;
          ROLA                      ;
          LDAA    5,Y               ;
          BCC     LD6AA             ;
                                    ; ... else
          NEGA                      ;
          ORAB    #$80              ;
LD6AA:    STAB    L0101             ; REQUEST MOTOR STEPS
          ASLB                      ;
          BEQ     LD6B6             ;
                                    ; ... else
          LDAB    L00F3             ; IAC Md Wd #2
          ORAB    #$20              ; SET BIT 5
          STAB    L00F3             ; IAC Md Wd #2

LD6B6:    LDAB    L0103             ;
          BEQ     LD6C6             ;
                                    ; ... else
          STAA    L0103             ;

          BRA     LD6C6             ;




LD6C0:    CLR     L0103             ;
LD6C3:    CLR     L0101             ; REQUEST MOTOR STEPS
LD6C6:    PULX                      ;
          PULX                      ;
          PULX                      ;
          PULX                      ;
        ;-----------------------


        ;-----------------------
        ;
        ;
        ;-----------------------

LD6CA:    LDD     L0058             ; RPM/12.5
          STD     L00FF             ; rpm
LD6CE:    JMP     LCCAC             ; TO MJR LP EXEC
    ****************************************************



    ************************************************
    * Air Fuel 12.5 Msec LOOP,
    *
    * BUA, $32 ECM
    *
    *
    *
    ************************************************
LD6D1:    LDX     L008B             ; Ign Off tmr
          BRCLR   L0033,$10,LD721   ; BR IF NOT b4, (1 = IGN ON)

          CPX     #$08              ;
          BCS     LD724             ;
                                    ; ... else
          BCLR    L0001,$FF         ; NON VOL RAM Mode word
```

```
          BCLR    L0002,$EF         ; CLR ALL EST MD BITS
                                    ; EXCEPT FAILED THIS TEST BIT, (b4)
                                    ; b4, SKIP IAC MOTOR RESET
                                    ;
          BCLR    L0003,$BF         ; Mode Wd3, CLR ALL EXCEPT b6

          CPX     LC012             ;   SEC, IF IGN OFF THIS TIME TURN OFF ECM
                                    ;
          BCS     LD6ED             ;

        ;-----------------------------------
        ;
        ; WAIT HERE FOR SOFTWARE INTERUPT
        ; SWI VECTOR TO $????
        ;-----------------------------------
LD6EA:    SWI                       ;

          BRA     LD6EA             ;
        ;-----------------------------------

LD6ED:    INX                       ;
          STX     L008B             ; Ign Off tmr

          CLRA                      ; CLR ENG RUNNING TIMER
          CLRB                      ;
          STD     L001A             ; Eng Run Time (sec)

          LDAA    L0034             ;
          BPL     LD70F             ;
                                    ; ... else
          JSR     LF447             ; Go init ...

          LDAA    L0034             ;

          BRCLR   L0033,$20,LD70F   ; BR IF NOT b5, (1 = IGN OFF)
                                    ; ... else
          LDAB    L0065             ;
          BNE     LD70F             ;
                                    ; ... else
          BRSET   L003E,$10,LD70F   ;
                                    ; ... else
          LDAB    L003E             ;
          ORAB    #$40              ; SET b6
          STAB    L003E             ;

LD70F:    ANDA    #$7F              ; CLR b7, ENG RUNNING FLAG
          STAA    L0034             ;

          CLR     L018D             ;
          CLR     L0093             ; Cntr for Eng Strt Up

          BCLR    L003F,$01         ;
          BCLR    L0039,$80         ; CLE b7, (IN SINGLE FIRE)

          BRA     LD727             ;
        ;---------------------



        ;---------------------
LD721:    LDX     #$FFFF            ;
LD724:    INX                       ;
          STX     L008B             ; Ign Off tmr

LD727:    LDAB    L003F             ;
          ANDB    #$DF              ;1101 1111
```

```
          LDAA    L0034             ;
          BPL     LD744             ;
                                    ; ... else
        ;
        ; CK IF ERR 21 ENABLED
        ;
          LDAA    LC1D0             ; Mask For Mal Funct flg 1
          BITA    #$02              ; b1, ERR Code 22, TPS low
          BEQ     LD74C             ; BE IF NOT b1
                                    ; ... else

          LDAA    L0081             ; TPS, (A/D)
          CMPA    LC1EB             ; If TPS A/D >= 12 then disable ERR #22
          BCC     LD74C             ;
                                    ; ... else
          BSET    L004C,$02         ; set B1, NEW ERR 1

          ORAB    #$20              ; b5
          BRA     LD74C             ;



LD744:    LDAA    LC39B             ; 14% Min TPS Throttle Posit (init val)
          STAA    L0086             ; Fltered low TPS, (A/D)

          CLR     L0087             ;
LD74C:    STAB    L003F             ;

          LDD     L0082             ; TPS Ld Axis Var
          SBA                       ;
          BCS     LD769             ;
                                    ; ... else
          CMPA    LC66E             ; A/C Clutch Value
          BCS     LD769             ;
                                    ; ... else
          LDAA    LC66F             ; A/C Clutch, 0d
          CMPA    L0106             ;
          BCS     LD769             ;
                                    ; ... else
          STAA    L0106             ;

          LDAA    L0034             ;
          ORAA    #$20              ; SET b5
          STAA    L0034             ;

LD769:    LDAA    L0082             ; TPS Ld Axis Var
          STAA    L0083             ; Old ___
          LDX     L0095             ; Current Minor LP Ref Period


          BRSET   L0034,$80,LD77B   ; BR IF b7, ENG RUNNING FLAG
                                    ;
          CPX     LC357             ; Crank RPM lmt
          BCS     LD77B             ;
                                    ; ... else
        ;
        ;   Go do 16 * 16 Mult
        ;
          LDX     LC357             ; Mult'cnd to X, (Crk RPM lmt
LD77B:    LDD     L00EA             ; Gms/Sec Disp Value, (Mult'plr)

          JSR     LF2F0             ; 16 * 16 Mult routine
          PSHB                      ; Save Middle 2 Bytes of Product

          PSHA                      ; Save Middle 2 Bytes of Product
```

```
          LDAA    L0063             ;  FILTERED LD VALUE
          LDAB    L0061             ;
          STD     L0061             ;

          TSX                       ;
          LDAA    LC69A             ; Ld VAR FOR SCALING LV8 Scale factors
                                    ; 80d = 80/64 = 16

          JSR     LF472             ; FACTOR IN 8x16 MULT

          LDD     0,X               ;
          ROLB                      ;
          ROLA                      ;
          BCC     LD798             ;
                                    ; ... else
          LDD     #$FFFF            ;
LD798:    ASLB                      ;
          ADCA    #0                ; ROUND
LD79B:    PULX                      ;
          BCC     LD7A0             ;
                                    ; ... else
          LDAA    #255              ; USE MAX VAL
LD7A0:    STAA    L0063             ; FILTERED LD VALUE

          LDAA    L0129             ; FF CNT'R
          CMPA    LC35A             ; FF CNTR , Crank Param, 0d
          BCS     LD7B1             ; BR F=IF FF CNT LT 0
                                    ; ... else
          BRCLR   L0034,$80,LD7B1   ; BR IF NOT b7, ENG RUNNING FLAG

          JMP     LD86B             ;

        ;-------------------------------------
        ; LK UP Crank Fuel PW Mult vs TPS %
        ;
        ; 9 LINE TBL,    0 - 100% TPS
        ;
        ;  TYPE $32 ECM
        ;
        ; Table = Mult *  64
        ;-------------------------------------
LD7B1:    LDAA    L0082             ; TPS Ld Axis Var for Lk Up
          LDX     #$C390            ; Tbl Addr

          JSR     LF2BF             ; Call 2d Lk Up W/ Interp
          PSHA                      ; Save Lk Up Result

          LDAA    L005B             ; COOLANT
          CMPA    #208              ; 115c
          BLS     LD7C2             ;

        ;-------------------------------------------------
        ; CRANK FUEL vs COOLANT Temp.
        ;   LC36 =  6554 Scale Factor for Max Crk P.W.
        ;
        ;  TYPE $32 ECM
        ;
        ;  Table = Msec * (65.536 * 256) / LC36C
        ;-------------------------------------------------
          LDAA    #$D0              ; Lk Up Var
LD7C2:    LDX     #$C36E            ; Tbl Addr

          JSR     LF2C6             ; Call 2d Lk Up, (No Offset)
          LDX     #$C36C            ;
```

```
          JSR     LF266             ; MUL 8 X 16 SUROUTINE

          STD     L00C2             ;
        ;-------------------------------------------------



        ;-------------------------------------------------
        ; CRANK FUEL PW MULT vs  DRP's
        ;
        ;
        ;  Tbl = Mult *  256
        ;-------------------------------------------------
          LDAA    L0118             ; Get Var for Lk Up
          ASLA                      ;
          LDX     #$C37F            ; Tbl Addr

          JSR     LF2C6             ; Call 2d Lk Up, (No Offset)

          LDX     #$00C2            ;
          JSR     LF266             ; MUL8X16

          STD     L00C2             ;

          LDX     #$00C2            ;
          PULA                      ;
          JSR     LF472             ; FACTOR IN 8x16 MULT

          ROLB                      ;
          ROLA                      ;
          BCC     LD7F0             ;
                                    ; ... else
          LDD     #$FFFF            ;
LD7F0:    LDX     #0                ;
          STD     L00C2             ;

          BEQ     LD863             ;
                                    ; ... else
          JSR     LCDE6             ;

          ASLD                      ;
          BEQ     LD7FF             ; BR IF Z
                                    ; ... else
          BCC     LD802             ; BR IF NO OVERFLOW

LD7FF:    LDD     #$FFFF            ; USE MAX

LD802:    PSHB                      ;
          PSHA                      ;

          PULX                      ;
          LDD     #2457             ;
          JSR     LF215             ; TO F DIV SUBTOUTINE

          LDAB    LC359             ; CRANK RPM Coef, (0.5)
          LDX     L0127             ; OLD CRANK RPM
          JSR     LF250             ; FILTER ROUTINE

        ;---------------------------------
        ; LK UP CRANK FUEL MULT  vs RPM
        ;
        ;  TYPE $32 ECM
        ;
        ; TBL = Mult * 256
        ;---------------------------------
          STD     L0127             ; RRM
```

```
          LDX     #$C35B            ; Tbl Addr,
          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          CMPA    #255              ;
          BNE     LD82B             ;
                                    ; ... else
          INC     L0129             ; FF CNT'R
          BNE     LD82E             ;
                                    ; ... else
          DEC     L0129             ; FF CNT'R
          BRA     LD82E             ;


LD82B:    CLR     L0129             ; FF CNT'R
LD82E:    TSTA                      ;
          BEQ     LD865             ;
                                    ; ... else
          PSHA                      ;
          JSR     LDA2D             ; GO DO BPW'S, (LK UP or CALC)

          JSR     LDD2D             ; GO DO BPW'S, (LK UP or CALC)

          PSHB                      ;
          PSHA                      ;
          TSX                       ;
          LDAA    L000A             ; Sty Alive Mem Cell A
          JSR     LF472             ; FACTOR IN 8x16 MULT

          PULX                      ;
          PSHB                      ;
          PSHA                      ;
          TSX                       ;
          LDD     L00C2             ;
          SUBD    0,X               ;
          PULX                      ;
          PSHB                      ;
          PSHA                      ;
          PULY                      ;
          PULA                      ;
          BCS     LD863             ;
                                    ; ... else
          PSHY                      ;
          TSX                       ;
          JSR     LF266             ; MUL 8 X 16 SUROUTINE

          PULX                      ;
          PSHB                      ;
          PSHA                      ;
          TSX                       ;

          LDD     L00C2             ;
          SUBD    0,X
          STD     L00C2             ;

          PULX                      ;

          BRA     LD865             ;


LD863:    STX     L00C2             ;
LD865:    JSR     LF92A             ;

          JMP     LDDC2             ;
        ;-----------------------------------------------
```

```
LD86B:    BRCLR   L0039,$80,LD872   ; BR IF NOT b7, (IN SINGLE FIRE)
                                    ; ... else
          BSET    L0039,$10         ; SET b4, (TOGGLE S/F F/F)

LD872:    LDAA    L00E5             ; Trans flt'rd Ld Val
          SUBA    L0063             ; filtered ld value
          BCS     LD89E             ;
                                    ; ... else
          BRCLR   L003E,$80,LD886   ; BR IF NOT b7
                                    ; ... else
          TST     L00E8             ; Decel Active Time
          BEQ     LD886             ;
                                    ; ... else
          DEC     L00E8             ; Decel Active Time
          BRA     LD896             ;

LD886:    CMPA    LC5F5             ; Diff Ld Val Tresh For Decel enlean
          BCS     LD89E             ;
                                    ; ... else
          LDAA    L00E9             ; Trans Fltr'ed TPS for
                                    ; -> Decel Enlean
          SUBA    L0082             ; TPS Ld Axis Var
          BCS     LD89E             ;
                                    ; ... else
          CMPA    LC5F4             ; Diff TPS Tresh For Decel enlean
          BCS     LD89E             ;
                                    ; ... else
LD896:    BSET    L003E,$A0         ;
          BCLR    L0038,$10         ;

          BRA     LD8A6             ;



LD89E:    LDAA    LC5F6             ; Dcel Enlean time period
          STAA    L00E8             ; Decel Active Time
          BCLR    L003E,$80         ; CLR b7

LD8A6:    LDAA    L005B             ; COOLANT
          CMPA    LC601             ; Min Cool for Cut Off
          BCS     LD928             ;
                                    ; ... else
          BRSET   L0037,$01,LD928   ; BR IF b0, MCU INPUT STATUS WD (IN PK/NEUT)
                                    ; ... else
          LDAA    L0044             ; AF  MODE WD #2
          BITA    #$10              ; b4, Vss FAILURE
          BNE     LD8BE             ; BR IF b4
                                    ; ... else
          LDAA    L0065             ;
          CMPA    LC602             ; Vss Lmt for Cut Off
          BLS     LD928             ;
                                    ; ... else
LD8BE:    LDAB    L003F             ;
          BITB    #$24              ;
          BNE     LD8D1             ;
                                    ; ... else
          LDAA    L0082             ; TPS Ld Axis Var
          CMPA    LC600             ; Lo TPS Lmt for Cut Off
          BLS     LD8D1             ;
                                    ; ... else
          CLRA                      ;
          CLRB                      ;
          STD     L0088             ; DECEL Fuel C/O Stall svr timer

          BRA     LD928             ;
```

```
LD8D1:    LDAA    L005A             ;
          SUBA    L0058             ; RPM/12.5
          BCS     LD8DC             ;
          CMPA    LC5FE             ; Max RPM Time
          BCC     LD928             ;
                                    ; ... else
        ;
        ; CK IF
        ;   b6  HIGH LIMIT FUEL CUTOFF ENABLED
        ;   b7  not used
        ;
LD8DC:    LDAA    L0043             ; AF  MODE WD
          BITB    #$C0              ; b6 & b7
          BNE     LD8F0             ; BR IF b6 & b7
                                    ; ... else
          LDAB    LC5FC             ; Max Ld val For Cut Off

          BITA    #$02              ; b1,  DECELL FUEL CUT OFF ENABLED
          BEQ     LD8EC             ;br if not b1
                                    ; ... else
          LDAB    LC5FD             ; Stay In Cut off Ld val
LD8EC:    CMPB    L0063             ; FILTERED LD VALUE
          BCS     LD928             ; BR IF LD VAL GT THRESH
                                    ; ... else

        ;
        ; CK RPM WINDOW TO STAY IN DECELL FUEL C/O
        ;
LD8F0:    LDAB    LC5FA             ; 1200 RPM, Cut off Decel Lmt


          BITA    #$02              ; b1, DECELL FUEL CUT OFF ENABLED
          BEQ     LD8FA             ; BR IF NOT b1,
                                    ; ... else
          LDAB    LC5FB             ; Stay In Cut off RPM Lmt
LD8FA:    CMPB    L0057             ; RPM/25
          BCC     LD928             ; BR IF RPM LT  900 RPM
                                    ; ... else

        ;
        ; CK  TIME Req FOR DECEL Fuel C/O
        ;
          LDAB    L00D3             ; TIME Req FOR DECEL Fuel C/O
          BNE     LD925             ; BR IF NZ
                                    ; ... else
          BITA    #$02              ; b1, DECELL FUEL CUT OFF ENABLED
          BNE     LD90A             ; BR IF b1
                                    ; ... else
          LDX     L0088             ; DECEL FUEL C/O STALL SVR TIMER

          BNE     LD928             ;
                                    ; ... else
LD90A:    ORAA    #$02              ; SET DECELL FUEL CUT OFF ENABLED FLG
          STAA    L0043             ; AF MODE WD

        ;
        ; CK SINGLE FIRE MODE SEL
        ;
          LDAB    LC014             ; AFR MD WD 1
          BITB    #$02              ; b1, SINGLE FIRE MODE SEL
          BEQ     LD918             ; BR IF NOT SINGLE FIRE MODE SEL
                                    ; ... else
          BSET    L0039,$A0         ; SET b7 & b5, (IN SF & CLR SF)
```

```
LD918:    LDAB    L003D             ;
          ANDB    #$EF              ; CLR b4
          STAB    L003D             ;

          LDX     LC608             ;6.38 Sec, Min Time Between Consec DEFCO'S
          STX     L0088             ; Decel Fuel C/O Stall svr timer

          BRA     LD97C             ;



LD925:    DECB                      ;
          BRA     LD92D             ;


                                    ;
LD928:    LDAA    L0043             ; AF  MODE WD
                                    ;
          LDAB    LC5FF             ; Cut off Min Time
LD92D:    STAB    L00D3             ; Time Req for Dcel Fuel C/O
                                    ;
          ANDA    #$FD              ; CLR b1, DECELL FUEL CUT OFF ENABLED
          STAA    L0043             ; AF  MODE WD
                                    ;
          BRCLR   L0039,$20,LD93A   ; BR IF NOT b5, (CLR SF FF)
                                    ; ... else
          BCLR    L0039,$60         ; CLR b5 & b6, (CLR SF & 0 PW)
                                    ;
LD93A:    LDAA    L003D             ;
          LDX     L0088             ; Decel Fuel C/O Stall svr timer
                                    ;
          BNE     LD946             ; BR IF
                                    ; ... else
          ANDA    #$EF              ;
          STAA    L003D             ;

          BRA     LD96D             ;


LD946:    DEX                       ;
          STX     L0088             ; Decel Fuel C/O Stall svr timer


          LDAB    LC5FB             ; Cut Off RPM
          CMPB    L0057             ; RPM/25
          BCC     LD95B             ;
                                    ; ... else
          LDAB    L005A             ;
          SUBB    L0058             ; RPM/12.5
          BCS     LD96D             ;
                                    ; ... else
          CMPB    LC5FE             ; Max RPM Decel val
          BCS     LD96D             ;
                                    ; ... else
LD95B:    BITA    #$10              ; 0001 0000
          BNE     LD96D             ;
                                    ; ... else
          ORAA    #$10              ;
          STAA    L003D             ;

          LDAA    LC607             ; Num of Stall Svr Pulses
          STAA    L008A             ; Accel Enrich After Decel C/O

          LDAA    LC604             ; Stall Sve Val
          STAA    L00C5             ; Stall Save IAC Stps, (Sec*80)
```

```
LD96D:    JSR     LFA1E             ; TPS ACCEL ENR ??

          LDAA    L003F             ;
          BITA    #$C0              ;
          BNE     LD97C             ;
                                    ; ... else
          LDAA    L0063             ; FILTERED LD VALUE
          SUBA    L00E5             ; TRANS FLT'RD Ld Val
          BCC     LD97F             ;
                                    ; ... else
LD97C:    CLRA                      ;
          BRA     LD99E             ;


LD97F:    SUBA    LC33C             ;  Min Delta LV8 for Acel ENR
          BCC     LD987             ;
                                    ; ... else
          CLRA                      ;

          BRA     LD998             ;



        ;-------------------------------------------------
        ; LK UP LV8 AE FACTOR vs DELTA LV8
        ;
        ;  DELTA LV8 ABOVE MINIMUM (LC33C)
        ;
        ;  TYPE $32 ECM
        ;
        ;       TBL = Mult * 128
        ;-------------------------------------------------
LD987:    STAA    L00E1             ; Diff Ld Val for Accel Enrich

          BSET    L0038,$08         ; SET b3

          LDX     #$C33D            ; LV8 AE FACTOR Tbl
          JSR     LF2BF             ; 2d Lk Up W/ Interp

          LDAB    L00E7             ; Accel Enr Cool Factor
          MUL                       ;
          ASLD                      ;
          BCS     LD99C             ; BR IF NO OVERFLOW
                                    ; ... else
LD998:    ADDA    L00E2             ; Diff Ld Val Accel Enr Factor
          BCC     LD99E             ; BR IF NO OVERFLOW
                                    ; ... else
LD99C:    LDAA    #255              ; USE MAX VAL
LD99E:    STAA    L00E2             ; Diff Ld Val Accel Enr Factor

          BNE     LD9A9             ; BR IF NZ
                                    ; ... else
          LDX     L00D9             ; Accel Enrich, Acum Fuel
          BNE     LD9A9             ; BR IF NZ
                                    ; ... else

          BCLR    L0038,$0E         ; CLR b0, b1 & b2

        ;
        ; GET o2 VDC & FILTER
        ;
LD9A9:    LDAA    L006F             ; FILT o2 VDC
          STAA    L00C8             ; Filtered o2, (12.5Ms)
```

```
          LDAA    #$20              ; A/D CH 2, (o2 Sense Voltage)

          JSR     LF1BE             ; To A/D subroutine

          LDX     L006F             ; FILT o2 VDC
          LDAB    LC39E             ; o2 Sens Coef, (time)
          JSR     LF250             ; FILTER ROUTINE

          STD     L006F             ; FILT o2 VDC


        ;-------------------------------------------------
        ; CK IF IN MODE 4 <----*****
        ;
        ;   DO AFR MOD VIA ALDL MODE 4
        ;
        ; MODE 4 MODE WD .. b2 HAS AFR STATUS
        ; MODE 4 MODE WD .. HAS NEW AFR VALUE
        ;-------------------------------------------------
          BRCLR   L0035,$08,LD9D7   ; BR IF NOT b3, MODE 4
                                    ; ... else
          LDAA    L0158             ; MODE 4 MODE WD ..
          BITA    #$04              ; b2
          BEQ     LD9D7             ; EXIT
                                    ; ... else
          LDAB    L015A             ; GET ALDL AFR VAL FROM MODE WD ...

        ;
        ; CALC NEW AFR
        ;
          CLRA                      ;
          PSHB                      ;
          PSHA                      ;
          PULX                      ;
          LDD     #$FFFF            ;
          IDIV                      ;
          STX     L00CE             ; Total AFR Value

          JMP     LDA5A             ; EXIT AND BYPASS FOLLOWING AFR
                                    ;   MOD ROUTINES
        ;-------------------------------------------------


        ************************************************
        *  PWR ENRICHMENT TPS TRESHOLD vs RPM
        *  TYPE $32 ECM
        *
        *
        *   400 - 4800 RPM, 5 LINES
        *
        *  TBL = TPS% * 2.56
        ************************************************
LD9D7:    LDX     #$C60E            ; Pwr Enrichment TPS Treshold vs RPM

          LDAA    L0056             ; RPM/25
          LSRA                      ; Div By 4
          LSRA                      ;
          JSR     LF2C6             ; Call 2d Lk Up, (No Offset)

          LDAB    L0043             ; AF  MODE WD
          BITB    #$20              ; b5, PWR ENR IS ACTIVE
          BEQ     LD9ED             ; BR IF NOT b5
                                    ; ... else
          SUBA    LC60D             ; TPS Hyst. Disable P.E. if TPS < 10
          BCC     LD9ED             ;
                                    ; ... else
```

```
          CLRA                    ;

LD9ED:    PSHB                    ;
          ANDB    #$DF            ; CLR b5, PWR ENR IS ACTIVE
          STAB    L0043           ; AF  MODE WD

          CMPA    L82             ; TPS Ld Axis Var

          PULB                    ;

          BHI     LDA28           ;
                                  ; ... else
          LDAA    LC60B           ; If Ld Val > 50, Enab Pwr Enrich

          BITB    #$20            ; b5
          BEQ     LDA01           ; BR IF NOT b5

          SUBA    LC60C           ; 10d, Hyst for Pwr En.
LDA01:    CMPA    L0063           ; Filtered ld value
          BHI     LDA28           ;

          LDAB    L0043           ; AF  MODE WD
          ORAB    #$20            ; SET b5, PWR ENR IS ACTIVE
          STAB    L0043           ; AF  MODE WD

          BCLR    L0039,$80       ; CLR b7, (IN SINGLE FIRE)


        ;-------------------------------------------------
        ;  LK UP Pwr Enrichment Air/Fuel Pct Change vs RPM
        ;  0 -> 6400 RPM, 128 = NO CHG
        ;
        ;  TYPE $32 ECM
        ;
        ;  TBL = (Pct Change * 1.28) + 128
        ;-------------------------------------------------
          LDX     #$C61D          ; Tbl Addr
          LDAA    L0057           ; RPM/25
          JSR     LF2C6           ; 2d Lk Up, (No Offset)
          TAB                     ; RESULT TO B reg

          LDX     #128            ; O% CHG VALUE
          ABX                     ; ADD LK'ED UP VALUE TO NEUTRAL VAL

          LDAB    L00D0           ; CURRENT LK'ED UP AFR % Chg/Cool Temp
          ABX                     ; ADD LK'ED UP VALUE

        ;
        ; MULT PCT CHNG BY CURRENT STOCH VAL
        ; (DIV RESULT /256
        ;
          LDD     LC3CB           ; Get Stoch Ratio
          JSR     LF2F0           ; Go To 16 * 16 Mult routine

          STD     L00CE           ; NEW AFR Value

          BRA     LDA5A           ;

        ************************************************
        * END OF PWR ENRICH
        *
        ************************************************


LDA28:    JSR     LDA2D           ;
```

```
          BRA     LDA5A             ;

        ;-------------------------------------------------
        ;
        ;
        ;
        ;-------------------------------------------------
LDA2D:    LDAB    L000E             ; START UP A/F Ratio

          LDAA    L0044             ; AF  MODE WD #2
          ASLA                      ;
          LDAA    #$01              ;
          BCS     LDA51             ;
                                    ; ... else
        ;
        ; ADD IN Open Lp AFR Bias to Set up Lean Lmt
        ; 221, 20:1 AFR
        ;
          CLRA                      ;
          ADDB    LC41E             ; Open Lp AFR Bias to Set up Lean Lmt
          ADCA    #0                ; ROUND
          ADDB    L00CD             ; AFR Time out Cntr
          ADCA    #0                ; ROUND
          STD     L00CE             ; Total AFR Value

        ;-----------------------------------------
        ; LK UP Opn Lp A/F Pct Chg vs Base Ld Value
        ;
        ;-----------------------------------------
          LDAA    L0063             ; Filtered ld value
          LDX     #$C3D3            ; Tbl Addr,

          JSR     LF2C6             ; Lk Up, (No Offset)
          TAB                       ;
          CLRA                      ;

          STAB    L046A             ;
          ADDD    L00CE             ; Total AFR Value

LDA51:    LDX     LC3CB             ; Get Stoch ratio
          JSR     LF2F0             ; Go to 16 * 16 Mult routine
          STD     L00CE             ; Total AFR Value (middle 2 Of Prod)

          RTS                       ;
        ;-----------------------------------------


        ;-----------------------------------------
        ; JMP HERE IF ALDL IS CONTROLING AFR
        ; W/MODE 4, (BYPASS OTHER AFR MOD ROUTINES
        ;
        ;-----------------------------------------
LDA5A:    TST     L00B0             ; MAF Hi TMR, (100Ms)
          BNE     LDA66             ; BR IF NZ
                                    ; ... else
          LDAA    L0063             ; FILTERED LD VALUE
          CMPA    LC22D             ; If LV < 170 then Disable #43
          BCC     LDA6C             ; BR IF LD VAL GT 170
                                    ; ... else

LDA66:    LDAA    L0002             ;
          ANDA    #$FE              ; CLR b0, ERR 43B TEST IN WORK
          STAA    L0002             ;

        ;-----------------------------------------
        ; CK IF HEADS UP ON LINE
```

```
        ; (MOD AFR)
        ;---------------------------------------------
LDA6C:    LDAA    L0033             ; MINOR LOOP MD WD 1
          BPL     LDA73             ;
                                    ; ... else
          JSR     L5800             ; H.U. ROM Addr
        ;---------------------------------------------

LDA73:    LDY     #$00EA            ; Gms/Sec Disp Value

        ;
        ; CL AFR MD WD FOR
        ;
          LDAA    LC017             ; Get Fuel/Air Mode Wd 4
          RORA                      ;
          BCC     LDA81             ;
                                    ; ... else

        ;---------------------------------------------
        ; BLM UPDATE ROUTINE
        ;
        ;---------------------------------------------
          LDY     #$0063            ; FILTERED LD VALUE

LDA81:    LDAA    L0043             ; AF  MODE WD
          ANDA    #$FB              ; CLR b2, BL CELL CHANGE,
                                    ;   .. (delay BLM update)
          STAA    L0043             ; AF  MODE WD

          LDAB    L00BF             ; BLM CELL NUM, (cells 0-7)
          ANDB    #3                ; 0000 0011,

          LDX     #$C5D4            ; BLM BOUNDS
          ABX                       ; ADD CELL NUM TO ADDRESS POINTER
        ;
        ; CK IF IDLE CELL
        ;
          TSTB                      ; CK FOR CELL 0
          BEQ     LDAA1             ; BR IF CELL 0, (IDLE)
                                    ; ... else

        ;
        ;
        ; CK RPM BOUNDS
        ;
          LDAA    0,X               ; GET CURRENT RPM BOUND
          SUBA    LC5DB             ; BLM Hysteresis, (100 RPM RPM)
          BCS     LDA9D             ; BR IF RPM L.T. BOUND VALUE
                                    ; ... else
          CMPA    L0057             ; RPM/25
          BHI     LDAD9             ; BR IF RPM L.T. BOUND VALUE
                                    ; ... else
LDA9D:    CMPB    #3                ; CELL 3 ?
          BEQ     LDAAC             ;
                                    ; ... else
LDAA1:    LDAA    1,X               ;
          ADDA    LC5DB             ; 100 RPM, BLM Hysterisis
          BCS     LDAAC             ;
                                    ; ... else
          CMPA    L0057             ; RPM/25
          BCS     LDAD9             ;
                                    ; ... else
LDAAC:    LDAB    L00BF             ; BLM CEL NUM, (cells 0-7)
          ANDB    #$0C              ; MASK, 0000 1100
          LSRB                      ; SHFT TO b0 & b1
          LSRB                      ;
```

```
          LDX     #$C5D7          ; Pt to BLM Lmts In CALIB
          ABX                     ; ADD CELL NUM TO ADDRESS POINTER
          TSTB                    ; CK FIR ZERO
          BEQ     LDAC9           ; BR IF Z
                                  ; ... else

          LDAA    0,X             ; GET CELL CONTENTS
          SUBA    LC5DC           ; 2,  BLM Hysteresis
          BCS     LDAC5           ; BR IF CELL VAL LT 2
                                  ; ... else
          CMPA    0,Y             ; AIR FLW to CURRENT CELL BOUND
          BHI     LDAD9           ;
                                  ; ... else
LDAC5:    CMPB    #3              ; CK CELL NUM
          BEQ     LDAD5           ;
                                  ; ... else
LDAC9:    LDAA    1,X             ; GET BLM AIR FLOW BOUND
          ADDA    LC5DC           ; BLM Hysteresis,  (2 gms/sec)
          BCS     LDAD5           ;
                                  ; ... else
          CMPA    0,Y             ;
          BCS     LDAD9           ;
                                  ; ... else
LDAD5:    LDAB    L00BF           ; BLM CELL ADDRESS (cells 0-7)
          BRA     LDB0C           ;

LDAD9:    CLRB                    ; CLR BLM CELL NUMBER CNT'R

        ;
        ; SET  AF  MODE WD
        ;   b2 BL CELL CHANGE, DELAY BLM UPDATE
        ;   b3 DELAY BLM UPDATE, CELL CHANGE
        ;
          LDAA    L0043           ; AF  MODE WD
          ORAA    #0C             ; SET b2 & b3
          STAA    L0043           ; AF  MODE WD

          LDAA    L0057           ; RPM/25
          CMPA    LC5D5           ; Ck Lo BLM RPM LMT, 700 RPM
          BCS     LDAF4           ;
                                  ; ... else

          INCB                    ; INCR CELL POINTER
          CMPA    LC5D6           ; Ck Mid BLM RPM LMT, 1200 RPM
          BCS     LDAF4           ;
                                  ; ... else

          INCB                    ; INCR CELL POINTER
          CMPA    LC5D7           ; Ck Hi BLM RPM LMT, 2000 RPM
          BCS     LDAF4           ;
                                  ; ... else
          INCB                    ; INCR CELL POINTER

LDAF4:    LDAA    0,Y             ; GET FLOW VAL
          CMPA    LC5D8           ; BLM Lo MAF Flow Lmt, 12 gms/S
          BCS     LDB0C           ; BR IF AIR FLOW LT 12 gms/S
                                  ; ... else

          ADDB    #4              ; BUMP CELL NUMBER
          CMPA    LC5D9           ; BLM Mid MAF Flow Lmt, 22 gms/S
          BCS     LDB0C           ; BR IF AIR FLOW LT 22 gms/S
                                  ; ... else

          ADDB    #4              ; BUMP CELL NUMBER
          CMPA    LC5DA           ; BLM Hi MAF FlowBOUND, 34 gms/S
```

```
          BCS     LDB0C             ; BR IF AIR FLOW LT 34 gms/S
                                    ; ... else

          ADDB    #4                ; BUMP CELL NUMBER

        ;
        ; UP DATE CELLS
        ;
LDB0C:    LDX     #$001C            ; POINT TO BLM CELL MATRIX IN MEMORY
          ABX                       ; ADD CELL NUM TO POINTER

          LDAA    0,X               ; GET CURRENT CELL BLM VLUE
          CMPA    LC5E2             ; 160,  Max BLM LMT
          BHI     LDB1C             ; BR IF BLM LT MAX BLM LMT
                                    ; ... else
          CMPA    LC5E3             ; 108, MIN BLM LMT
          BCC     LDB25             ; BR IF BLM GT MIN LMT

LDB1C:    LDAA    L003D             ;
          ORAA    #$40              ; SET b6
          STAA    L003D             ;

          JSR     LF434             ;

LDB25:    STAB    L00BF             ; BLM (cells 0-7)
          STAA    L00C0             ; BLM
          BMI     LDB2D             ;

          LDAA    #128              ;

LDB2D:    LDAB    L0043             ; AF  MODE WD
          BITB    #$20              ; b5, PWR ENR IS ACTIVE
          BEQ     LDB35             ; BR IF NOT b5
                                    ; ... else
          STAA    L00C0             ; BLM

LDB35:    LDD     L00EA             ; Gms/Sec Disp Value
          ASLD                      ; AIR FLOW * 2
          CMPA    #128              ;
          BLS     LDB3E             ;

        ;-----------------------------------------
        ; LK UP Fast o2 R/L Treshold vs Air Flow
        ;
        ;-----------------------------------------
          LDAA    #128              ;Lk Up Var
LDB3E:    STAA    L00D2             ; Ld Val Limited for Lk Up
          LDX     #$C579            ; Tbl Addr,

          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          SUBA    L00D1             ; Lean Offset, (if Cool)
          BRSET   L003E,$02,LDB4F   ;
          SUBA    LC562             ;
LDB4F:    PSHA                      ;

          LDD     LC559             ;
          CMPA    L006F             ; FILT o2 VDC
          BCS     LDB5B             ;
                                    ; ... else
          CMPB    L006F             ;
          BLS     LDB64             ;
LDB5B:    CLR     L00BE             ; Cl/Lp o2 NR timer, (200Ms inc)

          LDAB    L0001             ; NON VOL RAM Mode word
          ORAB    #$0001            ;
```

```
          STAB    L0001           ; NON VOL RAM Mode word

LDB64:    PULA                    ;
          PSHA                    ;

          LDAB    LC561           ;
          ABA                     ;
          CMPA    L006F           ;
          PULA                    ;
          BCS     LDB80           ;
                                  ; ... else
          SBA                     ;
          CMPA    L006F           ;
          BHI     LDB7A           ; GO CLR RICH FLG
                                  ; ... else
          LDAA    L006F           ;
          CMPA    L00C8           ; Filtered o2, (12.5Ms)
          BHI     LDB80           ;
                                  ; ... else
LDB7A:    LDAB    L0044           ; AF  MODE WD #2
          ANDB    #$BF            ; CLR b6,   1 =RICH, 0 = LEAN

          BRA     LDB84           ;


LDB80:    LDAB    L0044           ; AF  MODE WD #2
          ORAB    #$40            ; SET b6   1 = RICH
LDB84:    CMPB    L0044           ; AF  MODE WD #2
          BEQ     LDB94           ; BR IF Z, 0 = LEAN
                                  ; ... else
          INC     L00F1           ; INCR ALDL Rich/Lean Chg Cnt'r

          LDAA    L003C           ;
          ORAA    #$10            ; SET b4
          STAA    L003C           ;

          CLRA                    ;
          BRA     LDB99           ;


LDB94:    LDAA    L00C7           ; Cls Lp Duration Cntr, (Sec*80)
          INCA                    ;
          BEQ     LDB9B           ; BR IF Z
                                  ; ... else
LDB99:    STAA    L00C7           ; Cls Lp Duration Cntr, (Sec*80)

LDB9B:    STAB    L0044           ; AF  MODE WD #2
          LDAB    L0044           ; AF  MODE WD #2
          BPL     LDBFA           ;
                                  ; ... else
        ;
        ; CK AF MODE WD
        ;   b1 DECELL FUEL CUT OFF ENABLED
        ;   b5  PWR ENR IS ACTIVE
        ;
          LDAA    L0043           ; AF  MODE WD
          BITA    #$22            ; b1 & b5
          BNE     LDBF4           ; BR IF b5 & b1
                                  ; ... else
        ;
        ; CK AFR WD 3
        ;
          LDAB    LC016           ; AFR MD WD 3
          BITB    #$20            ; b5, Int Reset ON BLM CELL CHG
          BEQ     LDBB2           ; BR IF NOT b5
                                  ; ... else
```

```
          BITA    #$04              ; b2
          BNE     LDBFA             ; BR IF b2
                                    ; ... else
LDBB2:    LDAA    L0033             ; MINOR LOOP MD 1
          BITA    #2                ; b1, 1 = FORCE LOW PULSE, RESULT OPN LP
          BNE     LDBFA             ; BR IF NOT b1
                                    ; .... else
          LDAA    L003E             ;
          BMI     LDBE8             ;
                                    ; ... else
          BITB    #2                ; b1
          BEQ     LDBC6             ; BR IF NOT b1
                                    ; ... else
          BRCLR   L0038,$88,LDBC6   ; BR IF b7 & b3
                                    ; ... else
          BRA     LDBFA             ;

        ;
        ; CK IF CCP Chg FORCE INT TO 128 ENABLED
        ;
LDBC6:    LDAA    LC017             ; AFR MD WD 4
          BITA    #$08              ; b3, ON CCP Chg FORCE INT TO 128
          BEQ     LDBD4             ; BR IF NOT b3
                                    ; ... else
          LDAA    L003B             ;
          ADDA    L003E             ;
          RORA                      ;
          BCS     LDBFA             ;

LDBD4:    LDAB    L0035             ; MNR LOOP MD WD 2
          BITB    #$20              ; b5, DIAG SW IN ALDL MODE
          BNE     LDC05             ; BR IF b5

          LDAB    L0063             ; Filtered ld value
          CMPB    LC5F1             ; Dcel lean Param
          BHI     LDC05             ;
                                    ; ... else
          LDAB    L0057             ; RPM/25
          CMPB    LC5F2             ; Dcel lean hi lmt param

          BLS     LDC05             ;
                                    ; ... else
LDBE8:    LDAA    L0044             ; AF  MODE WD #2
          BITA    #$40              ; b6, 1 =RICH, 0 = LEAN
          BNE     LDC05             ; BR IF b1
                                    ; ... else
          LDAA    L00C9             ; Cls/Lp Int, Add Fuel if > 128

          CMPA    #1280             ;
          BCS     LDC05             ;
                                    ; ... else
LDBF4:    LDAA    L0041             ; DIAGNOSTIC MODE WD 3
          ORAA    #$04              ; SET b2,  INT FORCED 128. ERR 44/45
          STAA    L0041             ; DIAGNOSTIC MODE WD 3

LDBFA:    LDAA    #128              ;
          STAA    L00C9             ; RESET Cls Lp Int to 128

          CLRA                      ; CLR CLSD LP TMR
          STAA    L00C4             ; Cls Lp Int Tmr (Sec * 40)
          PSHA                      ;
          JMP     LDD21             ;


        ;-----------------------------------------------
```

```
        ; LK UP  Upper 0 error for Slow 02 Vs Air flow
        ;
        ; Table value = Volts * 226
        ;-------------------------------------------------
LDC05:    LDAA    L00D2             ; Ld Val Limited for Clsd Lp L.U.'s

          LDX     #$C567            ; Tbl Addr

          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          SUBA    L00D1             ; Lean Offset, (if Cool)
          BRSET   L003E,$02,LDC16   ; BR IF b1
                                    ; ... else
          SUBA    LC562             ; Diff Value to Make up Rich/Lean Window
                                    ; When Air div
LDC16:    CMPA    L0071             ;
          BCS     LDC38             ;
                                    ; ... else

        ;-------------------------------------------------
        ; LK UP Lower o2 error for Slow 02 Vs Air flow
        ;
        ;       Table value = Volts * 226
        ;-------------------------------------------------
          LDAA    L00D2             ; Ld Val Limited for Clsd Lp LK Up

          LDX     #$C570            ; Tbl Addr,
          JSR     LF2C6             ; 2d Lk Up, (No Offset)
          SUBA    L00D1             ; Lean Offset, (if Cool)
          BRSET   L003E,$02,LDC2B   ; BR IF b1
                                    ; ... else
          SUBA    LC562             ;  Diff Value to Make up Rich/Lean Window
                                    ; When Air div
LDC2B:    SUBA    L0071             ;
          BHI     LDC32             ;
                                    ; ... else
          CLRA                      ;
          BRA     LDC69             ;


LDC32:    LDAB    L0044             ; AF  MODE WD #2
          ANDB    #$DF              ; CLR b5, (RICH FLG)
          BRA     LDC44             ;


LDC38:    TAB                       ;
          LDAA    L0071             ;
          SBA                       ;
          LDAB    LC564             ; o2 Filter Constant when Coolant Tmp Low
          MUL                       ;

          LDAB    L0044             ; AF  MODE WD #2
          ORAB    #$20              ; SET b5, (RICH FLG)
LDC44:    STAB    L0044             ; AF  MODE WD #2

          PSHA                      ;
          STAA    L046B             ;

        ;-------------------------------------------------
        ; LK UP  o2 Error Reduction  Vs Air flow
        ;
        ; Table value = Mult (0-1) * 256
        ;-------------------------------------------------
          LDAA    L00D2             ; Ld Val Limited for Lk Up
          LDX     #$C594            ; Tbl Addr,
```

```
          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          LDAB    L0082             ; TPS Ld Axis Var
          CMPB    LC55E             ; Clsed Lp Idle TPS 1.17% Gain Factor
          BHI     LDC61             ; BR IF TPS L.T. 1.17%
                                    ; ... else
          LDAB    L0067             ; MPH/(16/5)
          BNE     LDC61             ;
                                    ; ... else
          LDAB    LC560             ; EECC Clsd Lp Gain factor
          MUL                       ;
LDC61:    PULB                      ;
          MUL                       ;
          CMPA    #88               ;
          BLS     LDC69             ;
                                    ; ... else
          LDAA    #88               ; USE MAX VALUE

        ;-------------------------------------------
        ; LK UP  PROPORTIONAL STEP WIDTH Vs Error
        ;
        ;-------------------------------------------
LDC69:    PSHA                      ; SAVE  LIMITED o2 ERROR TO STX
          STAA    L046B             ; LIMITED o2 ERROR
          ASLA                      ; x 2 FOR LK UP
          LDX     #$C5AF            ; Tbl Addr

          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          PSHA                      ; Save PORP STEP WIDTH

        ;-------------------------------------------
        ; LK UP Porp Step width offset vs RPM
        ;
        ;
        ;-------------------------------------------
          LDAA    L0056             ; RPM/25
          CMPA    #160              ; 4000 RPM
          BLS     LDC7D             ;
                                    ; ... else
          LDAA    #160              ; 4000 RPM MAX FOR LK UP
LDC7D:    LSRA                      ;
          LDX     #$C59D            ; Tbl Addr,

          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          PULB                      ;
          ABA                       ; ADD IN OFFSET
          BCC     LDC8A             ; BR IF NO OVERFLOW
                                    ; ... else
          LDAA    #255              ; USE MAX VALUE

        ;
        ; b5  EECC SLO o2 R/L FLAG
        ; b6  1 =RICH, 0 = LEAN
        ;
LDC8A:    TAB                       ;
          LDAA    L0044             ; AF  MODE WD #2
          ANDA    #$60              ; CLR ALL EXCEPT b5 & b6
          BEQ     LDC95             ; BR IF NOT  b5 & b6  (RICH & ?)
                                    ; ... else
          CMPA    #$60              ; b5 & b6
          BNE     LDC9C             ; BR IF b5 & b6  (RICH & ?)
                                    ; ... else
LDC95:    PULA                      ;
          PSHA                      ;
```

```
          CMPA    LC563             ; Min Error To Implement Int
          BHI     LDCA6             ;
                                    ; ... else
LDC9C:    CLR     L00C4             ; CLR Cls Lp Int Tmr (Sec * 40)
          LDAA    L00C7             ; Cls Lp Duration Cntr, (Sec * 80)


          CBA                       ;
          BHI     LDD01             ;

          BRA     LDD06             ;

        ;-----------------------------------------
        ; LK UP Integrator Delay Vs Error
        ;
        ;-----------------------------------------
LDCA6:    PULA                      ; Get ERR VAL
          PSHA                      ;
          ASLA                      ; VAL * 2
          LDX     #$C5C9            ; Tlb Addr
          JSR     LF2C6             ; Call 2d Lk Up, (No Offset)

          LDAB    L005B             ; COOLANT
          NEGB                      ;
          SUBB    LC566             ; Cool Int Offset Int Gain
          BCS     LDCBC             ;
                                    ; ... else
          ABA                       ;
          BCC     LDCBC             ; BR IF NO OVERFLOW
                                    ; ... else
          LDAA    #255              ;
LDCBC:    PSHA                      ;

        ;--------------------------------------
        ; LK UP INTEGRATOR DELAY Vs Air flow
        ;
        ;--------------------------------------
          LDAA    L00D2             ; Ld Val Limited for Cls Lp L.U.'s
          LDX     #$C582            ; Tbl Addr,

          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          PULB                      ;
          MUL                       ; DELAY x ____

          LDAB    L0082             ; TPS Ld Axis Var
          CMPB    LC55E             ; Clsed Lp Idle TPS 1.17% Gain Factor
          BHI     LDCD9             ;
                                    ; ... else
          LDAB    L0067             ; MPH/(16/5)
          BNE     LDCD9             ;
                                    ; ... else
          ADDA    LC55F             ; 0.2 sec Added Corr To Int Dly At Idle
          BCC     LDCD9             ; BR IF NO OVERFLOW
                                    ; ... else
          LDAA    #255              ; USE MAX VAL
LDCD9:    CMPA    L00C4             ; Cls Lp Int Tmr (Sec * 40)
          BHI     LDCE0             ;
                                    ; ... else
          CLRA                      ;
          BRA     LDCE3             ;

        ;
        ; CK CLSD LP TMR
        ;
LDCE0:    LDAA    L00C4             ; Clsd Lp Int Tmr (Sec * 40)
```

```
          INCA                      ; INCR TMR
LDCE3:    STAA    L00C4             ; Cls Lp Int Tmr (Sec * 40)
          BNE     LDD06             ; BR IF TMR NZ
                                    ; ... else
        ;
        ; CK MAX/MIN CLSD LP INTAGRATOR VAL'S
        ;
          LDAA    L00C9             ; Clsd Lp Intagrator

          LDAB    L0044             ; AF  MODE WD #2
          BITB    #$20              ; b5,  EECC SLO o2 R/L FLAG
          BNE     LDCF7             ; BR IF b5, RICH
                                    ; ... else
                                    ;
          CMPA    LC55D             ; Clsd Lp, Max INT Value, 180
          BEQ     LDCFD             ; BR IF INT VAL E.Q. 180, (EXIT)
                                    ; ... else
          INCA                      ; INCR INTAGRATOR VAL, (LEAN o2)
          BRA     LDCFD             ; EXIT

LDCF7:    CMPA    LC55C             ; Clsd Lp, Min INT Value, 40
          BEQ     LDCFD             ; BR IF INT VAL E.Q. 40, (EXIT)
                                    ; ... else

          DECA                      ; DECR INTAGRATOR VAL, (RICH o2)
LDCFD:    STAA    L00C9             ; SAVE NEW CLSD LOOP INTAGRATOR

          BRA     LDD06             ;
        ;-------------------------------------------------


LDD01:    PULA                      ;
          CLRA                      ;
          PSHA                      ;
          BRA     LDD12             ;

        ;---------------------------------------
        ; LK UP Proportional Step Size Vs Error
        ;
        ;---------------------------------------
LDD06:    PULA                      ; GET ERRV VALUE
          ASLA                      ; VAL * 2
          LDX     #$C5A3            ; POINT TO Proportional Step Size Vs Err

          JSR     LF2C6             ; 2d Lk Up, (No Offset)
          PSHA                      ; Save Result on stack

          STAA    L046C             ; SAVE Proportional Step Size

LDD12:    LDAB    L0044             ; AF  MODE WD #2
          ASLB                      ;
          BPL     LDD21             ;
                                    ; ... else
          LDAA    L00C9             ; GET Clsd Lp INTAGRATOR
          PULB                      ;
          PSHB                      ;
          SBA                       ;
          BCC     LDD27             ;
                                    ; ... else
          CLRA                      ;

          BRA     LDD27             ; EXIT W/SAVE


LDD21:    ADDA    L00C9             ; Clsd Lp INTAGRATOR
          BCC     LDD27             ; BR IF NO OVERFLOW
```

```
                                ; ... else
          LDAA    #255          ; USE MAX VAL
LDD27:    STAA    L00C6         ; Base PW CLSD Lp Corr
          BSR     LDD2D         ; CALC BPW VAL'S OR LK THEM UP

          BRA     LDD7A         ; APPLY BLM CORR TO BPW CLS LP CORR VALUE

        ;-------------------------------------------------
        ; CALC BPW VAL'S OR LK THEM UP ??
        ;
        ;-------------------------------------------------

        ;
        ; CK AFR MODE
        ; FOR Calc Base Inj PW, not Tbl
        ;
LDD2D:    LDAA    LC016         ; Get Fuel/Air Mode Wd 3 0110 0010,
                                ; b7 =
                                ; b6 = Calc Base Inj PW, not Tbl
                                ; b5 = Int Reset when B.Lrn cell Chnge
                                ; b4 =
                                ;
                                ; b3 =
                                ; b2 =
                                ; b1 = Reset Corr/init of Auto Enrich
                                ; b0 =

          ASLA                  ; SHIFT LEFT
          BPL     LDD60         ; LK UP  Base fuel injection PW's vs LOAD
                                ; ... else


        ;-------------------------------------------------
        ; CALC BPW VAL'S
        ;
        ;-------------------------------------------------
          LDX     L0095         ; Current Minor LP Ref Period
                                ; -> fm MPU
                                ;
          BRSET   L0034,$80,LDD41 ; BR IF b7, ENG RUNNING FLAG
                                ; ... else
                                ;
          CPX     LC357         ; 0000 DRP VAL If Crank RPM <
                                ; then use this
          BCS     LDD41         ;
                                ; .... else
          LDX     LC357         ; 0000, Crank RPM < then use this
LDD41:    LDD     L00EA         ; Gms/Sec Disp Value, (Mult'er)

          JSR     LF2F0         ; Go to 16 * 16 Mult routine
                                ; (Gms/Sec * DRP)

          LSRD                  ; VAL/2

          LDX     L00CE         ; Total AFR Value
          JSR     LF2F0         ; Go to 16 * 16 Mult routine

    ;-------------------------
    ; INJ FLOW RATE, (23#/HR)
    ; (STOCH 14.7 = 445d)
    ;-------------------------
          LDX     LC3CF         ; Double Fire Inj Flow rate, (441)

          BRCLR   L0039,$80,LDD56 ; BR IF NOT b7 (NOT SNGL FIRE)
                                ; ... else
                                ;
```

```
          LDX     LC3D1             ; SINGLE FIRE Inj Flow rate, (882)
LDD56:    JSR     LF2F0             ; Go to 16 * 16 Mult routine
                                    ; (AFR * INJ FLOW RATE)
                                    ;
          ROLB                      ;
          PSHX                      ; SAVE TO STX
          PULA                      ;
          PULB                      ;

          ROLB                      ;
          ROLA                      ;

          RTS                       ;
    ;-------------------------------------------------


    ;-------------------------------------------------
    ; LK UP  Base fuel injection PW's vs LOAD
    ;
    ; BUA TYPE $32 ECM MY(86)
    ;-------------------------------------------------
LDD60     LDX     L00CE             ; Total AFR Value
          LDD     LC3CD             ; Table LU Multiplier, (735d)
          JSR     LF2F0             ; 16 * 16 Mult routine

          PSHB                      ; SAVE TO STX
          PSHA                      ;
          LDAA    L0057             ; RPM/25
          LDAB    L0063             ; Filtered LD VALUE
          LDX     #$C42D            ; POINT TO TBL
          JSR     LF27C             ; 3d Lk Up

          TSX                       ;
          JSR     LF266             ; MUL 8 X 16 SUROUTINE

          PULX                      ;

          RTS                       ;
    ;-------------------------------------------------


    ************************************************
    * APPLY BLM CORR TO BPW CLS LP CORR VALUE
    *
    *
    ************************************************
LDD7A     STD     L00C2             ;

          LDX     #$00C2            ; Base PW Cls Lp Corr value
          LDAA    L00C0             ; Blk Lrn Mult, Scaled 1, rng 0-2
          JSR     LF472             ; FACTOR IN 8x16 MULT


          CLRA                      ;
        ;
        ; CK IF WE ARE TO LEAN or RICHEN FUEL
        ;
          LDAB    L00C6             ; Base PW Cls Lp Corr value
          SUBB    #128              ; CK IF R or LRAN CORR
          BMI     LDD8F             ; BR IF BLM LT 128, (LEAN)
                                    ; ... else
        ;
        ; RICHEN
        ;
          ADDD    L00C2             ; SUM IN  Base PW Cls Lp Corr Value
```

```
          BRA     LDD9C             ; EXIT W/NEW Base PW Cls Lp Corr Value


        ;
        ;
        ; LEAN OUT
        ;
LDD8F:    NEGB                      ; INVERT  Base PW Cls Lp Corr Value
          PSHB                      ;
          PSHA                      ;
          TSX                       ;

          LDD     L00C2             ; SUB Base PW Cls Lp Corr value
          SUBD    0,X               ;

          PULX                      ;
          BCC     LDD9C             ; BR IF NO UNDERFLOW
                                    ; ... else
          CLRA                      ;
          CLRB                      ;

LDD9C:    STD     L00C2             ; SAVE NEW Base PW Cls Lp Corr Value

          PULB                      ;
          LSRB                      ;
          BCC     LDDA7             ;
                                    ; ... else
          LDAA    L003D             ;
          RORA                      ;
          ADCB    #0                ; ROUND
LDDA7:    CLRA                      ;
          PSHB                      ;
          PSHA                      ;
          TSX                       ;

          LDAA    L0044             ;  AF  MODE WD #2
          ASLA                      ;
          ASLA                      ;

          LDD     L00C2             ;
          BCS     LDDB7             ;
                                    ; ... else
          SUBD    0,X               ;
          BRA     LDDB9             ;


LDDB7:    ADDD    0,X               ;
LDDB9:    STD     L00C2             ;

          PULX                      ;
          JSR     LF901             ;
          JSR     LE436             ;
        ************************************************


        ************************************************
        * AIR FUEL MINOR LOOP
        * 50 Msec
        *
        *
        ************************************************
LDDC2:    LDAA    L0000             ;
          ANDA    #$06              ; b1 & b2
          BEQ     LDDCB             ; BR IF NOT b1 & b2
                                    ; ... else
          JMP     LDE6A             ;
```

```
LDDCB:    LDD     L0043           ; AF  MODE WD
          BITB    #$02            ; b1, DECELL FUEL CUT OFF ENABLED
          BEQ     LDE30           ; BR IF NOT b1
                                  ; ... else_
          BITA    #$08            ; b3
          BNE     LDE30           ;
                                  ; ... else_
        ;
        ; CK CLSD LP INT FOR STOCH
        ;
          LDAA    L00C9           ; Clsd Lp Int

          CMPA    #128            ;
          BEQ     LDE30           ; BR IF INT = 128
                                  ; ... else_
        ;
        ; CK BLM UP DATE TIMER
        ;
          LDAB    L00CA           ; Blk Lrn Up Date TMR, (50Ms Inc)

          INCB                    ; INCR TMR
          BNE     LDDE1           ;
                                  ; ... else
          DECB                    ; DECR TMR
LDDE1:    STAB    L00CA           ; SAVE NEW Blk Lrn Up Date TMR VAL

          CMPB    LC5E0           ; BLM Update Rate, 450 Msec
          BCS     LDE33           ; BR IF TMR L.T. 450 Msec
                                  ; ... else
          SUBA    #128            ; CK CLSD LP INT VAL
          BCS     LDDF8           ; BR IF INT L.T 128,
                                  ; ... else
          CMPA    LC5E4           ; CK If Clsd Lp INT > 5, Enab BLM Update
          BLS     LDE33           ; BR IF INT VAL GT 5
                                  ; ... else
          LDAA    L0044           ;  AF  MODE WD #2
          ASLA                    ;
          BMI     LDE33           ;
                                  ; ... else
          BRA     LDE03           ;


LDDF8:    NEGA                    ; INVERT CLSD LP INT VALUE
          CMPA    LC5E5           ; CK  If Clsd Lp INT < 5,  Enab BLM Update
          BLS     LDE33           ; BR IF INT VAL GT 5
                                  ; ... else
          LDAA    L0044           ;  AF  MODE WD #2
          ASLA                    ;
          BPL     LDE33           ;
                                  ; ... else
        ;
        ;
        ;
LDE03:    LDX     #$001C          ; POINT TO BLM CELL MATRIX IN RAM
          LDAB    L00BF           ; BLM  CELL NUMBER
          ABX                     ; ADJ CELL POINTER ADDRESS
          LDAA    0,X             ; GET SELECTED BLM CELL VALUE

          LDAB    L0044           ; AF  MODE WD #2
          ASLB                    ;
          BPL     LDE1F           ;
                                  ; ... else
          SUBA    LC5E1           ; SUB OFF 2, BLM Update Amt
          BCS     LDE1A           ; BR IF UNDERFLOW
```

```
                                    ; ... else
          CMPA    LC5E3             ; 108,  Min Allowable BLM
          BCC     LDE2C             ; BR IF BLM G.T. MIN BLM VALUE
                                    ; ... else
LDE1A:    LDAA    LC5E3             ; 108,  Min Allowable BLM
          BRA     LDE2C             ;


LDE1F:    ADDA    LC5E1             ; ADD 2, BLM Mult Update Amt
          BCS     LDE29             ; BR IF BLM OVERFLOW
                                    ; ... else
          CMPA    LC5E2             ; 160,  Max Allowable BLM
          BLS     LDE2C             ; BR IF BLM G.T. MAX VALUE
                                    ; ... else
LDE29:    LDAA    LC5E2             ; USE 160,  Max Allowable BLM
LDE2C:    STAA    0,X               ; SAVE NEW BLM VAL TO CELL ADDR
          STAA    L00C0             ; SAVE NEW BLM

LDE30:    CLRB                      ; CLR BLM UP DATE TIMER
          STAB    L00CA             ; Blk Lrn U/D Cntr, (50Ms Inc)

        ***********************************
        *
        * UPDATE BLM CELLS
        *
        ***********************************
LDE33:    LDAB    L00BF             ; Blk Lrn Mumt (cells 0-7)
          CMPB    LC5EA             ; SAM Cell A NUMBER, IDLE CELL NUM
          BEQ     LDE3D             ; BR IF IDLE CELL
                                    ; ... else
          CLRB                      ;
          STAB    L00C1             ; Base PW

LDE3D:    LDAA    L0043             ; AF  MODE WD;
          ANDA    #$F7              ; CLR b3,  DELAY BLM UPDATE, CELL CHANGE
          STAA    L0043             ; AF  MODE WD

          LDAA    L0058             ; RPM/12.5
          STAA    L005A             ;

        ;
        ; CK  TRANS FLTR Lp TMR FOR LD VAL & TPS
        ;
          DEC     L00E4             ; TRANS FLTR Lp TMR
          BPL     LDE6A             ; BR IF TIMED OUT (EXIT)
                                    ; ... else
          LDD     LC339             ; Loops between Filtering
                                    ; of Ld Vals, (1 sec)
          STAA    L00E4             ; Trans Fltr Lp TMR

        ;
        ; FILTER TRANSIENT LD VAL
        ;
          LDX     L00E5             ; TRANSIENT FLT'RD Ld Val
          LDAA    L0063             ; Filtered ld value
          JSR     LF250             ; FILTER ROUTINE
          STD     L00E5             ; NEW TRANSIENT FLT'RD Ld Val

        ;
        ; FILTER TRANSIENT TPS VAL
        ;
          LDAA    L00E9             ; Trans Fltr'ed TPS for Decel Enlean
          CLRB                      ;
          PSHB                      ;
          PSHA                      ;
```

```
          PULX                    ; GET OLD TPS Ld Axis Var
          LDAB    LC5F3           ; TPS Flt Coef (Enlean)
          LDAA    L0082           ; TPS Ld Axis Var
          JSR     LF250           ; FILTER ROUTINE

          STAA    L00E9           ; Trans Fltr'ed TPS for Decel Enlean

LDE6A:    JMP     LCCAC           ; TO MJR LP EXEC
        ************************************************



        ************************************************
        * MAJOR LOOP SUBROUTINE  SEG E
        *
        *  TCC (A/D voltage convert)
        *
        ************************************************

        ;
        ;   Test Batt Voltage
        ;
LDE6D:    LDAA    #$10            ; A/D Ch 1, (Battery Voltage)
          JSR     LF1BE           ; To A/D subroutine

LDE72:    STAA    L007E           ; Batt Volts Value, (A/D)
          CMPA    #90             ; 9.0 VDC
          BCC     LDE7E           ;
          CMPA    #40             ; 4 VDC
          BCS     LDEA0           ;
                                  ; ... else
          BRA     LDEA3           ;


LDE7E:    BCLR    L003E,$40       ; CLR b6
                                  ;
          BRCLR   L0033,$10,LDE8D ; BR IF NOT b4, (1 = IGN OFF)
                                  ; ... else
          LDX     L3FC8           ; SPK Period
          STX     L00B2           ;
          CLR     L00B4           ; SPK Fd Bk counter, (Err #42)


LDE8D:    LDD     LC69B           ;
          STD     L00B7           ;

          CLR     L011F           ;
          CLR     L0120           ;
          BCLR    L0033,$10       ; CLR b4, (1 = IGN OFF)
          JSR     LE0D7           ; SHIFTER SWITCH READ SUBROUTINE

          BRA     LDEA3           ;


LDEA0:    BSET    L0033,$10       ; SET b4, (1 = IGN OFF)

LDEA3:    RTS                     ;
        ;-----------------------------------

LDEA4:    LDD     L3FC2           ; Timer #1
          SUBD    L006D           ;
          BEQ     LDED3           ;
          INC     L011E           ;
;
          LDAB    L0034           ;
          BITB    #$10            ; b4
```

```
          BNE     LDEC1             ; BR IF b4
                                    ; ... else
          ORAB    #$10              ; SET b4
          STAB    L0034             ;
;
          LDX     L3FC2             ; Timer #1
          INX                       ;
          STX     L006D             ;
          INX                       ;
          STX     L006B             ;
;
LDEC1:    CLR     L0068             ;
          LDX     L006B             ;
          STX     L0069             ;
          LDX     L006D             ;
          STX     L006B             ;
;
          LDX     L3FC2             ; Timer #1
          STX     L006D             ;
          BRA     LDEE4             ;
;
LDED3:    LDAB    L0068             ;
          INCB                      ;
          CMPB    #$9F              ;
          BLS     LDEE2             ;
                                    ; ... else
          LDAB    L0034             ; CLR b4
          ANDB    #$EF              ;
          STAB    L0034             ;

          LDAB    #$A0              ;
LDEE2:    STAB    L0068             ;

LDEE4:    RTS                       ;
        ************************************************



        ************************************************
        * MAJOR LOOP SUBROUTINE  SEG B
        *
        *  EGR
        *
        ************************************************
LDEE5:    LDAB    L0037             ; MCU INPUT STATUS WD
          RORB                      ;
          BCC     LDEF0             ;
                                    ; ... else
          LDAB    L0035             ; MNR LOOP MD WD 2
          BITB    #$20              ; b5, DIAG SW IN ALDL MODE
          BEQ     LDF45             ; BR IF NOT b5,
                                    ; ... else
LDEF0:    LDAA    L0060             ;
          CMPA    LC23A             ; If MAT < 30d then disable EGR
          BCS     LDF45             ;
                                    ; ... else
          LDD     LC238             ; Enable EGR if TPS > 1.95%,
          TST     L0112             ; ERG PW
          BNE     LDF00             ; BR IF NZ
                                    ; ... else
          TBA                       ;
LDF00:    CMPA    L0082             ; TPS Ld Axis Var
          BHI     LDF45             ;
                                    ; ... else
          LDAA    L0043             ; AF  MODE WD
          BITA    #$20              ; b5, PWR ENR IS ACTIVE
```

```
          BNE     LDF45             ; BR IF NOT b5
                                    ; ... else

    ;-------------------------------------------------
    ; Lk up EGR Duty CYC vs LV8 vs RPM
    ;
    ; Tbl Val(DC) = CALIB * (256/100)
    ;
    ; BUA TYPE $32 ECM MY(86)
    ;-------------------------------------------------
          LDX     #$C23B            ; EGR Duty CYC vs LV8 & RPM
          LDAB    L0063             ; filt ld value
          CMPB    #160              ; 160 Gms/Sec
          BCS     LDF15             ; BR IF LD VAL LT 160 Gms/Sec
                                    ; ... else
          LDAB    #160              ; USE  160 Gms/Sec  MAX FOR LK UP

LDF15:    LDAA    L0057             ; RPM/25

LDD60     LDX     L00CE             ; Total AFR Value
          LDD     LC3CD             ; Table LU Multiplier, (735d)
          JSR     LF2F0             ; 16 * 16 Mult routine

          PSHB                      ; SAVE TO STX
          PSHA

    ;-------------------------------------------------
    ; LK UP  Base fuel injection PW's vs LOAD VAL vs RPM
    ;
    ; BUA TYPE $32 ECM MY(86)
    ;
    ; TBL = Msec * (65536/5)
    ;-------------------------------------------------
          LDAA    L0057             ; RPM/25
          LDAB    L0063             ; Filtered LD VALUE

          LDX     #$C42D            ; Base fuel injection PW TBL
          JSR     LF27C             ; 3d Lk Up

          TSX                       ;
          JSR     LF266             ; MUL 8 X 16 SUROUTINE

          PULX                      ;

          RTS                       ;

          CMPA    #80               ;
          BLS     LDF1D             ; TO 3d Lk UP
                                    ; ... else
          LDAA    #$50              ;
LDF1D:    JSR     LF27C             ; 3d Lk Up Routine

          STAA    L0112             ; EGR PW
        ;-----------------------------------------


        ;-----------------------------------------
        ; EGR DUTY CYCLE MULTIPLIER (0-2) vs COOLANT
        ; Gain vs Coolant Temp.
        ;
        ; TABLE VAL = Mult * 128
        ;-----------------------------------------
          LDAA    L005B             ; COOLANT
          CMPA    #160              ; 80c MAX FOR LK UP
          BLS     LDF2B             ; BR IF COOL LT 80c
                                    ; ... else
```

```
          LDAA    #160              ; USE 80c AS MAX VAL FOR LK UP
LDF2B:    LDAB    #64               ; MIN COOL VAL, 8c
          LDX     #$C262            ; EGR DUTY CYCLE MULTIPLIER Tbl
          JSR     LF2B9             ; 2d Lk Up

          LDAB    L0112             ; ERG PW
          MUL                       ; x LK UP RESULT
          ASLD                      ; x2
          BCC     LDF3C             ; BR IF NO OVERFLOW
                                    ; ... else
          LDAA    #255              ; USE MAX VAL

        ;-------------------------------------------
        ;  CK IF IN HEADS UP
        ;
        ;
        ;-------------------------------------------
LDF3C:    LDAB    L0033             ; MINOR LOOP MD WD 1
          BPL     LDF46             ;
                                    ; ... else
          JSR     L581B             ; TO HEADS UO <---------

          BRA     LDF46             ; EXIT


LDF45:    CLRA                      ; DISABLE EGR
        ;-------------------------------------------

LDF46:    STAA    L0112             ; ERG PW

          RTS                       ;
        ;-------------------------------------------------



        ;-------------------------------------------------
LDF4A:    BRCLR   L0035,$02,LDF52   ; BR IF NOT b1, (ERR14/15 THIS START UP)
                                    ; ... else
          LDAA    #$00FF            ;
          BRA     LDF89             ;

LDF52:    LDAA    L0065             ; Vss
          BRSET   L0037,$40,LDF64   ; BR IF b6, MCU INPUT STATUS WD
                                    ;  COOL FAN REQUEST
                                    ; ... else
          CMPA    LC2F0             ; 35 MPH
          BCC     LDF64             ; BR IF Vss G.T 35 MPH
                                    ; ... else
          LDAA    LC2F3             ; 99.6%, Fan Duty Cyc (FAN FULL ON)
          BEQ     LDF90             ;
                                    ; ... else
          BRA     LDF89             ;

LDF64:    LDX     #$C2F6            ; POINT TO FAN 2

          BRCLR   L0037,$80,LDF70   ; BR IF NOT b7,  MCU INPUT STATUS WD
                                    ; A/C COMP NOT ON
                                    ; ... else
          CMPA    LC2F1             ; 11 MPH
          BHI     LDF73             ; BR IF GT 11 MPH
                    ; ... else

LDF70:    LDX     #$C2F4            ; FAN 1 HYST PARAM'S

LDF73:    BRCLR   L00F4,$FF,LDF78   ; BE IF NOT $FF
                    ; ... else
```

```
          INX                       ; OFF VAL
;
; Call 2D Lk Up
;
LDF78:    LDAA    L005B             ; CURRENT COOLANT
          CMPA    0,X               ; ON or OFF THRESH
          BCS     LDF90             ; BE IF COOL L.T. THRSH
                    ; ... else
          LDAB    #160              ; 80c MIN VAL FOR LK UP

          LDX     #$C2F8            ; Fan Duty Cycle Tabl Addr
          JSR     LF2B9             ; 2d Lk Up

          TSTA                      ; CK FOR Z
          BEQ     LDF90             ;
                    ; ... else
LDF89:    LDAB    LC2F2             ; 15 Sec, Min Fan On Time
          STAB    L00F5             ; SAVE MIN FAN TIME

          BRA     LDF9A             ;


LDF90:    BRCLR   L00F5,$FF,LDF99   ; Br IF  MIN FAN TIME EXPIRED
                    ; ... else
          DEC     L00F5             ; DEC MIN FAN TIME
          BRA     LDF9C             ; EXIT via RTS

LDF99:    CLRA                      ; CLR  MIN FAN TIME
LDF9A:    STAA    L00F4             ; NEW MIN FAN TIME

LDF9C:    RTS                       ;
    ;------------------------------

LDF9D:    LDX     #$C62E            ; INDEX IAC Tables & Params
          LDAA    #$80              ;
          PSHA                      ;
          LDAB    L0034             ;

          LDAA    L00F3             ; IAC Md Wd #2
          BITA    #4                ;
          BNE     LDFFF             ;

          BITA    #8                ;
          BEQ     LDFFF             ;
          LDAA    L010B             ; DISABLE CLSD LP PID TMR
          BEQ     LDFBB             ;
          LDAA    L00F2             ; IAC Cnt'l Word
          ANDA    #$FE
          JMP     LE07B             ;
LDFBB:    LDAA    $3F,X             ;
          BITB    #$0020            ;
          BEQ     LDFC3             ;
          SUBA    #$10              ;
LDFC3:    CMPA    L0084             ;TPS T/F Ld Axies Var
          BCS     LDFFF             ;
          LDAA    #$F9              ;
          BITB    #$20
          BNE     LDFCE             ;
          CLRA                      ;
LDFCE:    ADDA    $44,X             ;
          CMPA    L005B             ; COOLANT
          BCS     LDFFF             ;
                                    ; ... else
          LDAA    L0037             ;
          ANDA    #$80              ; b7, MCU INPUT STATUS WD
                                    ;    A/C COMP NOT ON
```

```
          BNE     LDFDC           ; BR IF NOT b7
                                  ; ... else
          INS                     ;
          PSHA                    ;
LDFDC:    ADDA    L00F2           ; IAC Cnt'l Word
          BPL     LDFF0           ;
                                  ; ... else
          LDAA    $42,X           ;
          TST     L0037           ; STATUS WD
          BPL     LDFE9           ;
                                  ; ... else
          LDAA    $43,X           ;
LDFE9:    CMPA    L0106           ;
          BCS     LE005           ;
          BRA     LE002           ;


LDFF0:    LDAA    L0106           ;
          BEQ     LE005           ;
                                  ; ... else
          DECA                    ;
          BNE     LE002           ;
                                  ; ... else
          ANDB    #$DF            ; 1101 11111
          TST     L0037           ; MCU INPUT STATUS WD
          BPL     LE002           ;
                                  ; ... else
LDFFF:    CLRA                    ;
          ORAB    #$20            ; SET b5
LE002:    STAA    L0106           ;

LE005:    STAB    L0034           ;
          LDAA    L00F2           ; IAC Cnt'l Word
          PULB                    ;
          PSHB                    ;
          TSTB                    ;
          BPL     LE016           ;
                                  ; ... else
          ANDA    #$00FE          ;
          BMI     LE076           ;
                                  ; ... else
          ORAA    #$0020          ;
          BRA     LE02E           ;
LE016:    ANDA    #$DF            ;
          ORAA    #$40            ;
          BITA    #$81            ;
          BEQ     LE07B           ;
                                  ; ... else
          LDAB    L0107           ;
          CMPB    $3B,X           ;
          BCS     LE076           ;
                                  ; ... else
          EORA    #$01            ;
          BPL     LE033           ;
                                  ; ... else
          LDAB    L002C           ; IAC Present Posit
          STAB    L0108           ;
LE02E:    CLR     L0107           ;
          BRA     LE076           ;


LE033:    PSHA                    ;
          LDAA    L002C           ; IAC Present Posit
          SUBA    L0108           ;
          BCC     LE03C           ;
          CLRA                    ;
```

```
LE03C:    LDAB    L00F3             ;
          BPL     LE044             ;
                                    ; ... else
          LDAB    $3C,X             ;
          MUL                       ;
          ASLD                      ;
LE044:    LDAB    $38,X             ;
          CBA                       ;
          BLS     LE04A             ;
                                    ; ... else
          TBA                       ;
LE04A:    LDAB    $39,X             ;
          CBA                       ;
          BHI     LE050             ;
                                    ; ... else
          TBA                       ;
LE050:    TAB                       ;
          SUBA    L002D             ; Idle Spd A/C Antic
          BCS     LE05E             ;
                                    ; ... else
          CMPA    $3A,X             ;
          BLS     LE05E             ;
                                    ; ... else
          LDAB    $3A,X             ;
          TBA                       ;
          ADDB    L002D             ; Idle Spd A/C Antic
LE05E:    STAB    L002D             ; Idle Spd A/C Antic
          LDAB    L00F3             ;
          BPL     LE06F             ;
                                    ; ... else
          LDAB    $36,X             ;
          TSTA                      ;
          BPL     LE06E             ;
          NEGA                      ;
          MUL                       ;
          NEGA                      ;
          BRA     LE06F             ;



LE06E:    MUL                       ;
LE06F:    ADDA    L0105             ;
          STAA    L0105             ;

          PULA                      ;
LE076:    ANDA    #$7F              ; CLEAR b7
          TSX                       ;
          ORAA    0,X               ;
LE07B:    STAA    L00F2             ; IAC Cnt'l Word
          PULA                      ;

          RTS                       ;
        ************************************************



        ************************************************
        * MAJOR LOOP SUBROUTINE  SEG 2,  Vss Calc
        *
        *
        * CALCULATE ROAD SPEED IN MPH
        ************************************************
LE07F:    LDAA    L0033             ; MINOR LP MOD WD 1
          BITA    #$10              ; b4, (1 = IGN OFF)
          BNE     LE0D6             ;
                                    ; ... else
```

```
          LDAA    #160              ;
          CMPA    L0068             ;
          BHI     LE091             ;
          CLRA                      ;
          CLRB                      ;
          STD     L0065             ;

          BRA     LE0C9             ;



LE091:    LDD     L006B             ;
          SUBD    L0069             ;
          PSHB                      ;
          PSHA                      ;
          TSX                       ;
          LDD     L006D             ;
          SUBD    L006B             ;
          ADDD    $0000,X           ;
          PULX                      ;
          RORA                      ;
          RORB                      ;
          PSHB                      ;
          PSHA                      ;
          PULX                      ;
          LDD     #$01CC            ;
          JSR     LF215             ; TO F DIV SUBTOUTINE

          LDX     L0065             ;
          LDAB    LC284             ; Vss Filter coef
          JSR     LF250             ; FILTER ROUTINE
;
          STD     L0065             ;
          ADDD    #$80              ;
          BCC     LE0BA             ;
          DECA                      ;
LE0BA:    LDAB    #$CD              ;
          MUL                       ;
          ADDD    #$20              ;
          CMPA    #$2F              ;
          BLS     LE0C7             ;
          LDD     #$3000            ;
LE0C7:    ASLD                      ;
          ASLD                      ;
LE0C9:    LDAB    L00AB             ; VSS Err cnt'r
          CMPB    LC1F7             ;
          BLS     LE0D4             ;
                                    ; ... else
          LDAA    LC64E             ; CMD speed Param
          INCA                      ;
LE0D4:    STAA    L0067             ; MPH/(16/5)

LE0D6:    RTS                       ;
    ******************************************************



    ******************************************************
    * PRNDL SWITCH READ
    *
    * REQUEST VALID FOR 100 Msec
    *
    ******************************************************
LE0D7:    LDAA    L0037             ; MCU INPUT STATUS WD
          LDAB    L0045             ; SHFT MW
          RORA                      ;
```

```
          RORA                      ;
          RORA                      ;
          RORA                      ;
          BMI     LE0E7             ;
                                    ; ... else
          ANDB    #$F7              ; 1111 0111
          STAB    L0045             ;

          BRA     LE102             ;



LE0E7:    BITB    #$08              ; b3
          BEQ     LE0ED             ; BR IF NOT b3
                                    ; ... else
          ANDA    #$7F              ; CLR b7

LE0ED:    ORAB    #$08              ; b3
          STAB    L0045             ;

          BITA    #$02              ; b1
          BNE     LE101             ; BR IF b1
                                    ; ... else
          LDAB    L0004             ; Xmission Mode word
          ASRB                      ;
          BCC     LE102             ;
                                    ; ... else
          LDAB    L0065             ; Vss (MPH/1)
          CMPB    LC2AD             ; Unlock at 15 MPH 1st Man & Low grs Man
          BHI     LE102             ; BR IF Vss LT 15 MPH
                                    ; ... else
LE101:    LSRA                      ;
LE102:    LSRA                      ;
          ANDA    #$60              ; 0110 0000, b5 & b6
          BITA    #$40              ; b5
          BEQ     LE10A             ; BR IF NOT b5
                                    ; ... else
          INCA                      ;
LE10A:    ORAA    L0004             ; Xmission Mode word
          STAA    L0004             ; Xmission Mode word
          NOP                       ;
        ************************************************



        ************************************************
        * RPM/Vss RATIO CODE
        *
        *
        *
        *
        ************************************************
          LDX     L0065             ;
          LDAA    L0057             ;
          LDAB    #25               ;
          MUL                       ;
          JSR     LF215             ; TO F DIV SUBTOUTINE
          STAA    L008F             ; N/V ratio

          BRCLR   L0036,$08,LE122   ; BR IF NOT b3, (TCC LOCKED FOR PASSBY)
                                    ; ... else
          JMP     LE2D1             ;


LE122:    LDAB    L0004             ; Xmission Mode word
          ANDB    #$E5              ; 1110 0101
```

```
          BITB    #$80            ; b7, OD ACTIVE
          BEQ     LE151           ; BR IF NOT b7
                                  ; ... else
          CMPA    LC287           ; 35, 1st Gear val
          BCS     LE143           ;
                                  ; ... else
          LDAA    L012C           ;
          BNE     LE14B           ;
                                  ; ... else
          ORAB    #$10            ; SET b4

          LDAA    L0004           ; Xmission Mode word
          BITA    #$12            ; b1 & b4, 1st gr dir & 1st gr OD
          BNE     LE16A           ; BR IF b4 & b1
                                  ; ... else
          LDAA    LC296           ; 0 SEC'S, Hi to Lo Gear lock
          STAA    L0090           ; 4 -> 3 Dnw Shft Lk Interupt tmr

          BRA     LE16A           ;



LE143:    LDAA    LC28D           ; 0 SEC'S, 1st gear dly
          STAA    L012C           ;
          BRA     LE16A           ;



LE14B:    DECA                    ;
          STAA    L012C           ;
          BRA     LE16A           ;


LE151:    LDAA    LC28D           ; 0 SEC'S, 1st Gear dly
          STAA    L012C           ;

          LDAA    L008F           ;
          CMPA    LC286           ; 41 1st gear direct RATIO
          BCS     LE160           ;
                                  ; ... else
          ORAB    #$02            ; b1,

LE160:    CMPA    LC288           ; 30d, Min 4th grar
          BCS     LE16A           ;
                                  ; ... else

          CMPA    LC289           ; 35d, Max 4th gear
          BLS     LE16F           ;
                                  ; ... else

LE16A:    LDAA    LC28A           ; 4th gear tmr

          BRA     LE178           ;



LE16F:    LDAA    L008E           ; 4th Gr N/V tmr
          BNE     LE177           ;
                                  ; ... else
          ORAB    #$08            ; b3, 4TH GEAR

          BRA     LE17A           ;



LE177:    DECA                    ;
```

```
LE178:    STAA    L008E             ; 4th Gr N/V tmr

LE17A:    STAB    L0004             ; Xmission Mode word
          NOP                       ;

          LDAA    L005B             ; COOLANT
          CMPA    LC285             ; 50c, Cool thres for TCC
          BCC     LE193             ;
                                    ; ... else
        ;
        ; CK AFR MD WD 1 FOR AUTO/MAN XMISH
        ;
          LDAA    LC014             ; Get Fuel/Air Mode Wd 1
          BITA    #01               ; b0, MAN XMISH
          BNE     LE18D             ; BR IF MAN XMISH
                                    ; ... else

          ANDB    #$DF              ; CLR b5
LE18D:    TSTB                      ;
          BPL     LE1D4             ;
                                    ; ... else
          JMP     LE262             ;
        ;------------------------------

LE193:    LDAA    L0065             ;
          PSHA                      ;

        ;
        ; CK AFR MD 1 FOR XMISH PARAMS
        ;
          LDAA    LC014             ; Get Fuel/Air Mode Wd 1
          ASRA                      ;
          PULA                      ;
          BCS     LE1A9             ;
                                    ; ... else
          BITB    #$20              ; b5
          BEQ     LE1A9             ;
                                    ; ... else

          ANDB    #$DF              ; CLR b5
          SUBA    LC297             ; Bias to Lock Enab Thresh, (26 MPH)
          BCC     LE1A9             ;
                                    ; ... else

          CLRA
    ;-------------------------------------------------------
    ;  MANUAL          - 1ST GEAR DNSHFT
    ;  AUTO TRANS      - NON 4TH GEAR UNLOCK
    ;
    ;  % OF FULL LOAD * 2.56
    ;  12 ENTRIES
    ;-------------------------------------------------------
LE1A9:    LDX     #$C2A0            ; 14 MPH, Unlock 1st(man), Lo Gr (Auto)

          BITB    #$12              ; b4 & b1
          BNE     LE1B3             ; BR IF  b4 & b1
                                    ; ... else
          LDX     #$C2BA            ; Unlock 14 MPH Hi gr Auto & Non 1st Man
LE1B3:    BITB    #$C0              ; b7 & b6
          BNE     LE1C1             ; BR IF b7 & b6

                                    ; ... else
    ;-------------------------------------------------------
    ;       Manual          - 1st gear Up shift
    ;       Auto Trans      - Non 4th Gear lock
    ;
```

```
    ;       % Of Full Load * 2.56
    ;-----------------------------------------------------

        ;
        ; Unlock at 15 MPH 1st Man & Low grs Man
        ;
          LDX     #$C2AD            ; 15 MPH Unlock, 1st Man & Low grs Man
          BITB    #$08              ; b3
          BEQ     LE1C1             ; BR IF NOT b3
                                    ; ... else

    ;-----------------------------------------------------
    ;       Manual          - 4TH gear Up shift
    ;       Auto Trans      - 4th Gear lock
    ;
    ;       Tble Val = Pct full ld * (256/100)
    ;-----------------------------------------------------
        ;
        ; 15 MPH Min lk hi gear Auto & Non 1st Man
        ;
          LDX     #$C2C7            ; 15 MPH Min lk hi gear Auto &
                                    ; Non 1st Man


LE1C1:    TST     L0090             ; 4-3 Dnw Shft Lk Interupt tmr
          BEQ     LE1C9             ;
                                    ; ... else
          JMP     LE28F             ;




LE1C9:    BITB    #$01              ; b0
          BEQ     LE1D4             ; BR IF NOT b0
                                    ; ... else
          CMPA    0,X               ;
          INX                       ; INCR INDEX
          BCC     LE1D7             ; BR IF
                                    ; ... else
          ORAB    #$06              ;

LE1D4:    JMP     LE27E             ;
        ;-----------------------------------------------------


LE1D7:    BITB    #$02              ; b1,
          BEQ     LE1F0             ; BR IF NOT b1
                                    ; ... else
          ORAB    #4                ; b2,
          BITB    #$C0              ; b7 & b6
          BNE     LE1F0             ; BR IF b7 & b6
                                    ; ... else
          BITB    #$04              ;
          BEQ     LE1FB             ; BR IF NOT b2
                                    ; ... else
          LDAA    LC28B             ; 100% TPS, Lk Ahead 1st GR
          CMPA    L0082             ; TPS Ld Axis Var
          BCC     LE1FB             ;
                                    ; ... else
          ANDB    #$FB              ; 1111 1011

          BRA     LE241             ;



LE1F0:    BITB    #$04              ; b2
```

```
          BEQ     LE1FB           ; BR IF NOT b2
                                  ; ... else
          ORAB    #$80            ; b7, OD ACTIVE
          ANDB    #$FB            ; CLR b2

          LDX     #$C2BB          ;
LE1FB:    STAB    L0004           ; Xmission Mode word

          LDAB    LC28F           ; Rd Spd Coast, 32 MPH

          LDAA    L0045           ;
          BITA    #$10            ; b4
          BNE     LE20A           ; BR IF b4
                                  ; ... else
          ADDB    #5              ; 5 MPH HYST
          BCS     LE20E           ; BR IF OVERFLOW
                                  ; ... else
LE20A:    CMPB    L0065           ; CK Vss
          BLS     LE215           ; BR IF Vss LT 32+5 MPH (COAST)
                                  ; ... else
LE20E:    ANDA    #$EF            ; CLR b4
          LDAB    LC290           ;

          BRA     LE21A           ;



LE215:    ORAA    #$10            ; b4
          LDAB    LC291           ; Hi MPH Coast TPS

LE21A:    STAA    L0045           ;
          LDAA    L0004           ; Xmission Mode word
          PSHA                    ;
          BPL     LE227           ;
                                  ; ... else
          SUBB    LC28E           ; Hyst for TCC
          BCC     LE227           ;
                                  ; .... else
          CLRB                    ;
LE227:    LDAA    L0082           ; TPS Ld Axis Var
          CBA                     ;
          PULB                    ;
          BCS     LE25E           ;
                                  ; ... else
          BITB    #$C0            ; b7 & b6
          BEQ     LE245           ; BR IF NOT b7 & b6
                                  ; ... else
          JSR     LE2BE           ;
          BCS     LE25E           ;
                                  ; ... else
          BITB    #$20            ; b5
          BEQ     LE25A           ; BR IF NOT b5
                                  ; ... else
          LDAA    L0057           ;
          CMPA    LC292           ; kick Dn Prevent (Shifter Sw)
          BHI     LE285           ;
                                  ; ... else
LE241:    ANDB    #$FE            ; CLR b0
          BRA     LE272           ;


        ;
        ;
        ;
LE245:    LDAA    LC014           ; Get Fuel/Air Mode Wd 1
          ASRA                    ; SHIFT RIGHT
```

```
          BCC     LE256           ;
                                  ; ... else
          TBA                     ;
          BITB    #$08            ; b3
          BNE     LE256           ;
                                  ; ... else
          ANDA    #$06            ; CLR ALL EXCEPT b1 & b2
                                  ; ... else
          CMPA    #$06            ;
          BNE     LE272           ;
                                  ; ... else
LE256:    BSR     LE2BE           ;

          BLS     LE272           ;
                                  ; ... else
LE25A:    ORAB    #$81            ; SET b7 & b0

          BRA     LE285           ;



LE25E:    BITB    #$80            ; b7
          BEQ     LE272           ; BR IF NOT b7
                                  ; ... else
LE262:    LDAA    L0057           ;
          BITB    #$12            ; b4 & b1
          BEQ     LE26D           ; BE IF
                                  ; ... else
          CMPA    LC294           ; Kick Dn/Unlock TPS Prev'nt RPM,
                                  ; (3200 RPM)
          BRA     LE270           ;



LE26D:    CMPA    LC293           ; Kick Dn/Unlock TPS RPM, (3200 RPM)
LE270:    BHI     LE279           ; BR IF RPM LT THRESH'S
                                  ; ... else
LE272:    LDAA    L0065           ; CURRENT Vss
          CMPA    LC295           ; Min VSS, (60 MPH) for Force Upshift
          BLS     LE27E           ; BR IF Vss GT 60 MPH
                                  ; ... else
LE279:    CLR     L008D           ; CLR TCC LK Dly tmr

          BRA     LE25A           ; EXIT



LE27E:    ANDB    #$7F            ; CLR b7
          LDAA    LC28C           ; 0 sec's, Up Shft lk delay
          STAA    L008D           ; TCC LK Dly tmr, (.1sec)

LE285:    BITB    #$20            ; b5
          BEQ     LE28F           ;
                                  ; ... else
          BITB    #$80            ; b7
          BNE     LE28F           ; BR IF NOT b7
                                  ; ... else
          ANDB    #$FE            ; CLR b0
LE28F:    ANDB    #$9F            ; CLR b5 & b6

          LDAA    L0037           ; MCU INPUT STATUS WD
          ANDA    #$DF            ; CLR b5, (TCC)
          PSHA                    ;
          LDAA    L008D           ; TCC LK Dly tmr, (.1sec)
```

```
          BEQ     LE29B             ;
                                    ; ... else
          DECA                      ;
LE29B:    STAA    L008D             ; TCC LK Dly tmr, (.1sec)
          LDAA    L0090             ; 4-3 Dnw Shft Lk -> Interupt tmr
          BEQ     LE2A7             ;
                                    ; ... else
          DECA                      ;
          STAA    L0090             ; 4-3 Dnw Shft Lk -> Interupt tmr
          PULA                      ;

          BRA     LE2B1             ;


LE2A7:    LDAA    L008D             ; TCC LK Dly tmr, (.1sec)
          PULA                      ;
          BNE     LE2B1             ;
                                    ; ... else
          TSTB                      ;
          BPL     LE2B1             ;
                                    ; ... else
          ORAA    #$20              ; SET b5, TCC LOCKED
LE2B1:    STAA    L0037             ; MCU INPUT STATUS WD

          STAB    L0004             ; Xmission Mode word
          ROR     L0035             ; MNR LOOP MD WD 2
          RORB                      ;
          ROL     L0035             ;

          BRA     LE2D1             ;



LE2BE:    PSHB                      ;
          LDAA    L0065             ;
          CMPA    #$64              ; 0110 0100
          BLS     LE2C7             ;
                                    ; ... else

        ;
        ; Call 2D Lk Up
        ;
          LDAA    #$64              ; Get Var for Lk Up
LE2C7:    ASLA                      ;
          LDAB    #$18              ; Off set for Lk Up
          JSR     LF2B9             ; Call 2D Lk Up

          PULB                      ;
          CMPA    L0082             ; TPS Ld Axis Var

          RTS                       ;
    ******************************************************



    ******************************************************
    *  CARS SHIFT LIGHT CODE
    *
    * This code to provide a shift schedule for best
    * fuel economy.
    *
    ******************************************************

     ;
     ; QUALS FOR CHECK ENG LIGHT
     ;
```

```
LE2D1:    LDAA    L005B             ; COOLANT
          CMPA    LC2D4             ; 50c, Cool Temp for shift lite
          BLS     LE347             ;
                                    ; ... else
          LDAA    L0065             ;
          CMPA    LC2D5             ; 40 MPH, Lmt for Ck  Shift lamp
          BLS     LE347             ;
                                    ; ... else
          LDAA    L0082             ; 0%, TPS Ld Axis Var
          CMPA    LC2D6             ; TPS min Val for lite
          BCS     LE347             ;
                                    ; ... else
          LDAA    L0063             ; Filtered ld value
          CMPA    LC2D7             ; 0, Ld Val for Shift lite on
          BLS     LE347             ;
                                    ; ... else
          LDAA    L008F             ;
          CMPA    LC288             ; 30d, Min 4th gr param
          BLS     LE347             ;
                                    ; ... else

        ;
        ; CK SHIFT LIGHT hi/lo RPM QUALS
        ;
         LDAA    L0057             ;
         LDX     #$C2D8            ; INDEX 2 line HIGH RPM HYST TBL
                                   ;
          BRCLR   L0035,$80,LE300   ; BR IF NOT b7, (OVERDRIVE ON)
                                    ; ... else
          LDX     #$C2E1            ; INDEX 2 LINE LOW RPM HYST TBL
LE300:    CMPA    0,X               ; Lite off, 625 RPM
          BLS     LE347             ;
                                    ; ... else
          CMPA    1,X               ; lite Off, 5100 RPM
          BLS     LE315             ;
                                    ; ... else
          LDX     #0                ;
          STX     L0091             ; Err Lmp On Dly

          BSET    L0035,$80         ; SET b7, (OVERDRIVE ON)
          BSET    L0036,$10         ; SET b4, (SHIFT LIGHT DELAY STARTED)

          BRA     LE34D             ;

        ;
        ;Call 2D Lk Up
        ;
LE315:    LDAB    #$10              ; Offset Value for Lk Up
          LSRA                      ; n/2
          INX                       ; INDEX L___/L___ Table Addr
          INX                       ;
          JSR     LF2B9             ; Call 2D Lk Up
          CMPA    L0082             ; TPS Ld Axis Var w/table value
          BCS     LE347             ;
                                    ; .... else
          BRSET   L0036,$10,LE33B   ; BR IF b4, (SHFT LITE DLY STARTED)
                                    ; .... else
          BSET    L0036,$10         ; SET b4, (SHFT LITE DLY STARTED)

        ;-------------------------------------------
        ; LK UP Eng Lite on Modifier Dly vs % TPS
        ;
        ;  Tbl Val = Sec * 10/delay mult
        ;-------------------------------------------
          LDAA    L0082             ; TPS Ld Axis Var For Lk Up
          BPL     LE32E             ;
```

```
                                    ; ... else
          LDAA    #$80              ;
LE32E:    LSRA                      ;
          LDX     #$C2EB            ; Tbl Addr

          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          LDAB    LC2EA             ;
          MUL                       ;
          STD     L0091             ; Err Lmp On Dly


LE33B:    BSET    L0035,$80         ; SET b7, (OVERDRIVE ON)
          LDX     L0091             ; Err Lmp On Dly
          BEQ     LE34D             ; BR IF Z
                                    ; .... else

          DEX                       ; DECR  ERR Lmp On Dly
          STX     L0091             ; ERR Lmp On Dly

          BRA     LE34A             ;


LE347:    BCLR    L0036,$10         ; CLR b4 (SHFT LITE DLY STARTED)
LE34A:    BCLR    L0035,$80         ; CLR b7, (OVERDRIVE ON)

LE34D:    RTS                       ;
     ****************************************************




    ****************************************************
    * MAJOR LOOP SUNBROUTINE  SEG 9
    *
    * Inj Air Managment
    *
    ****************************************************
LE34E:    LDX     #$C2FF            ; POINT TO AIR INJ PARAM'S

          LDAB    L0044             ; AF  MODE WD #2
          ANDB    #$80              ; b7, MASK FOR b7, 1 = CLS LOOP
          ORAB    L003D             ;
          STAB    L003D             ;

          LDAA    L005B             ; COOLANT
          CMPA    $0C,X             ; L820B, If Cool < 14c, divert
          BCS     LE365             ;
                                    ; ... else
          LDAA    L003B             ;
          BITA    #$04              ; b2
          BEQ     LE368             ; BR IF NOT b2
                                    ; ... else
LE365:    JMP     LE42B             ;



LE368:    LDAA    L0044             ; AF  MODE WD #2
          BPL     LE375             ;
                                    ; ... else
          CLR     L00FC             ;
          LDAA    $0D,X             ; LC3C,  If in Open Lp => 25.4 Sec after
                                    ; closed loop, Divert
          STAA    L00FD             ;
```

```
          BRA     LE39A             ;


LE375:    TSTB                      ;
          BPL     LE37F             ;
                                    ; ... else
          LDAA    L00FD             ;
          BEQ     LE365             ;
                                    ; ... else
          DECA                      ;
          STAA    L00FD             ;

LE37F     BRCLR   L0034,$80,LE39A   ; BR IF NOT b7, ENG RUNNING FLAG
                                    ; ... else
          LDAB    L00FC             ;

          LDAA    L00FB             ;
          SUBA    L0063             ; FILTERED LD VALUE
          BLS     LE391             ;
                                    ; ... else
          CMPA    $0B,X             ; LC30A, Enable air to conv if in open lp
                                    ; & 100 Msec Drop in D VAL L.T. 64 gms/S
          BLS     LE391             ;
          LDAB    7,X               ; LC306,  Enable air to conv If > 1 SEC
                                    ; since last neg delta LV8 >  is <
LE391     TSTB                      ;
          BEQ     LE39A             ;
                                    ; ... else
          DECB                      ;
          STAB    L00FC             ;
          JMP     LE41E             ;



LE39A:    LDAB    L0056             ; RPM/25
          CMPB    6,X               ; Divert if cont > 4000 RPM & time >
          BLS     LE3AB             ;
                                    ; ... else
          LDAB    L00F6             ;
          CMPB    1,X               ;
          BHI     LE3E0             ;
                                    ; ... else
          INCB                      ;
          BNE     LE3AC             ;
                                    ; ... else
          BRA     LE3AE             ;


LE3AB:    CLRB                      ;
LE3AC:    STAB    L00F6             ;

LE3AE:    LDAA    L0043             ; AF  MODE WD
          BITA    #$20              ; b5, PWR ENR IS ACTIVE
          BEQ     LE3BF             ; BR IF NOT b5
                                    ; ... else
          LDAB    L00FE             ;
          CMPB    0,X               ;
          BEQ     LE3E0             ;
                                    ; ... else
          INCB                      ;
          STAB    L00FE             ;
          BRA     LE418             ;



LE3BF:    CLR     L00FE             ;
```

```
          LDX     L00F7           ;
          LDAB    L0073           ;
          CMPB    LC301           ; If Filtered o2 > 752 MVDC for ___
                                  ; Then divert
          BLS     LE3D3           ;
                                  ; ... else
          CPX     LC303           ;
          BCC     LE3DC           ;
                                  ; ... else
          INX                     ;
          BRA     LE3D8           ;



LE3D3:    LDX     L00F7           ;
          BEQ     LE3E2           ;
          DEX                     ;
LE3D8:    STX     L00F7           ;

          BRA     LE3E6           ;



LE3DC:    ORAA    #$01            ; SET b0, AIR INJ DIVERT
          STAA    L0043           ; AF  MODE WD
LE3E0:    BRA     LE42B           ;



LE3E2:    ANDA    #$FE            ; CLR b0,  AIR INJ DIVERT
          STAA    L0043           ; AF  MODE WD

LE3E6:    RORA                    ;
          BCS     LE42B           ;
                                  ; ... else
          CMPB    LC302           ; If Filtered o2 > 247 MVDC & IN CLS LP
                                  ; Then divert
          BCC     LE3F2           ;
                                  ; ... else
          LDAA    L0044           ;  AF  MODE WD #2
          BMI     LE3F7           ;
                                  ; ... else
LE3F2:    LDX     #$0000          ;
          BRA     LE3FF           ;



LE3F7:    LDX     L00F9           ; RICH OR LEAN o2 DIV TIMER
          CPX     LC303           ; 200, 20 sec Rich or Lean o2 Div timer
          BHI     LE42B           ; BR IF TIME LT 20 Sec
                                  ; ... else
          INX                     ; INCR TMR
LE3FF:    STX     L00F9           ; RICH OR LEAN o2 DIV TIMER

          LDAA    L0063           ; Filtered ld value
          CMPA    LC307           ; If LV8 < 25 then Divert
          BCS     LE42B           ;
                                  ; ... else
          CMPA    LC308           ; If LV8 > 100 & MPH >  Divert Air
          BLS     LE414           ;
                                  ; ... else

          LDAA    L0065           ; CURRENT Vss
          CMPA    LC309           ; If > 60 MPH & LV8 >  then divert AIR
          BHI     LE42B           ;
                                  ; ... else
```

```
LE414:    LDAB    L003D             ;
          BMI     LE41E             ;
                                    ; ... else
LE418:    LDAB    L003E             ;
          ORAB    #$06              ; b1 & b2
          BRA     LE42F             ;


LE41E:    LDAB    L003E             ;

        ;
        ; CK AFR MD WD  FOR NUM OF AIR VALVES
        ;
          LDAA    LC015             ; $04, AFR Mode Wd 2
          BEQ     LE42B             ; BR If zero, 1 AIR VALVE
                                    ; ... else
          ANDB    #$FB              ; CLR b2,
          ORAB    #$02              ; SET b1, 1 = 2 AIR VALVES IN USE
          BRA     LE42F             ;



LE42B:    LDAB    L003E             ;
          ANDB    #$F9              ; CLR b1 & b2
LE42F:    STAB    L003E             ;

          LDAA    L0063             ; FILT LD VALUE
          STAA    L00FB             ;

          RTS                       ;
        ;-----------------------------------


LE436:    BRCLR   L0034,$80,LE44E   ; BR IF NOT b7
                                    ; ... else
          BRCLR   L0038,$80,LE44E   ; BR IF NOT b7
                                    ; ... else
          LDAB    L00DF             ; Num of Async Pulses since Accel Enr
          CMPB    L00D7             ; Num of Async Pulses to do
          BCS     LE451             ; BR IF TO DO G.T. DONE VAL (AS FUEL)
                                    ; ... else
          BRSET   L0038,$40,LE44E   ; BR IF b6,
          CLR     L00DF             ; Num of Async Pulses since Accel Enr

          BCLR    L0038,$80         ; CLR b7

LE44E:    JMP     LE4AD             ;
        ************************************************



        ************************************************
        *  Accel Enrichment Factor % BPW INJ (0-4)
        *  (ASYNC FUEL CODE FOR DISFF TPS & STALL SVR)
        *
        *
        * INDEXED LK UP, 8 LINES
        *
        * TBL = FACTOR * 64
        ************************************************
LE451:    INC     L00DF             ; Num of Async Pulses since Accel Enr
          CMPB    #7                ; MAX OF 8 PULSES
          BLS     LE45A             ; BR IF COUNT GT 7
                                    ; ... else
          LDAB    #7                ; USE MAX FOR LK UP
LE45A:    LDX     #$C315            ; TBL ADDRESS
```

```
          ABX                       ; ADJ TBL POINTER
          LDAA    0,X               ; GET VAL FM TBL
          PSHA                      ; SAVE TO STX

          LDD     L00C2             ;

          BRCLR   L0039,$80,LE468   ; BR IF NOT b7, (IN SINGLE FIRE)
                                    ; ... else
          LSRD                      ;
LE468:    PSHB                      ;
          PSHA                      ;
          TSX                       ;
          LDAA    2,X               ;
          JSR     LF266             ; MUL 8 X 16 SUROUTINE

          PULX                      ;
          INS                       ;
          ASLD                      ;
          BCS     LE478             ;
          ASLD                      ;
          BCC     LE47B             ; BR IF NO OVER FLOW
                                    ; ... else
LE478:    LDD     #$FFFF            ; USE MAX VAL
LE47B:    STD     L00DB             ; New Accel Enrich PW
          LDAA    L00D8             ; Cool Fact for Async Pulses

          LDX     #L00DB            ;
          JSR     LF472             ; FACTOR IN 8x16 MULT


          LDX     LC312             ; 0364d, 5.5 msec Max Async Pulse Width
          CPX     L00DB             ; New Accel Enrich PW
          BHI     LE48E             ; BR IF GT 5.5 Msec THRESH
                                    ; ... else
          STX     L00DB             ; New Accel Enrich PW

LE48E:    BRCLR   L0038,$40,LE4A1   ; BR IF NOT b6
                                    ; ... else
          JSR     LF9E5             ;


          PSHX                      ;
          TSX                       ;
          SUBD    0,X               ;
          PULX                      ;
          BLS     LE4AD             ;
                                    ; ... else
          CPD     L00DB             ; New Accel Enrich PW
          BCS     LE4A3             ;
                                    ; ... else
LE4A1:    LDD     L00DB             ; New Accel Enrich PW
LE4A3:    CPD     LC310             ; 1.69 msec Min Async Pulse Width
          BCS     LE4AD             ;
                                    ; ... else
          STD     L00DB             ; New Accel Enrich PW

          BRA     LE4B1             ;



LE4AD:    CLRB                      ;
          CLRA                      ;
          STD     L00DB             ; New Accel Enrich PW

LE4B1:    BRCLR   L003D,$10,LE4CA   ; BR IF NOT b4
                                    ; ... else
```

```
          BRCLR   L008A,$FF,LE4CA   ; BR IF NOT $FF
                                    ; ... else
          DEC     L008A             ; Accel Enrich After Decel C/O

          LDD     LC605             ; Cut off Stall Save PW
          ADDD    L00DB             ; New Accel Enrich PW
          STD     L00DB             ; New Accel Enrich PW

          ADDD    L00D9             ; Accel Enrich, Acum Fuel
          BCC     LE4CA             ;
                                    ; ... else
          LDD     #$FFFF            ;
LE4CA:    STD     L00D9             ; Accel Enrich, Acum Fuel

          LDX     L00DB             ; New Accel Enrich PW
          BEQ     LE4E7             ;
          LDAB    L00CB             ; Inj Offset Corr, Ms*65.636

          ABX                       ;
          ABX                       ;
          STX     L3FF2             ; Async PW Cnt'r
          JSR     LF3B5             ; 11 Usec Delay

          LDAA    #$04              ;
          JSR     LF4C3             ;

          LDAA    #$FB              ;
          JSR     LF3B5             ; 11 Usec Delay

          JSR     LF4CE             ;

        ;-------------------------------------------
        ; CK IF HEADS UP CONNECTED
        ;  Accel Enrich
        ;
        ;-------------------------------------------
LE4E7:    BRCLR   L0033,$80,LE4EE   ; BR IF NOT b7, (HEADS UP ON LINE)
                                    ; ... else
          JSR     L5818             ; <---- TO HEADS UP
        ;-----------------------------------------------

LE4EE:    LDD     L011A             ; ACCEL ENR PW
          ADDD    L00DB             ; New Accel Enrich PW
          STD     L011A             ; ACCEL ENR PW

          RTS                       ;
    ***************************************************




    ***************************************************
    *  DIAGNOSTIC QUALIFICATION CODE
    *
    *
    *
    ***************************************************
        ;
        ; ERR 13 o2 SENSOR
        ;
        ;
LE4F7:    LDAB    L003F             ;
          BITB    #$24              ;
          BNE     LE546             ;
                                    ; ... else
          LDAA    L0041             ; DIAGNOSTIC MODE WD 3
```

```
          ASLA                    ;
          BMI     LE510           ;
                                  ; ... else
          LDD     L001A           ; Eng Run Time (sec)
          LSRD                    ; DIV BY 2
          CMPB    LC1DC           ; ERR 13,If eng run time < 30 Sec,
                                  ; disable ERR
          BCS     LE546           ;
                                  ; ... else
          LDAA    L0041           ; DIAGNOSTIC MODE WD 3
          ORAA    #$40            ; SET b6
          STAA    L0041           ; DIAGNOSTIC MODE WD 3

        ;
        ; CK ERR 13 o2 LIMITS
        ;
LE510:    LDAB    L006F           ; o2 A/D VALUE
          CMPB    LC1DE           ; ERR 13, 548 Mvdc
          BHI     LE546           ; BR IF o2 VDC LT  548 Mvdc
                                  ; ... else
          CMPB    LC1DD           ; ERR 13, 350 Mvdc
          BLS     LE546           ; BR IF o2 VDC GT 350 Mvdc
                                  ; ... else
          LDAB    L00AA           ; o2 Sensor Hvy Ld Cnt'r -> (2 Sec)
          CMPB    LC1E0           ;
          BHI     LE54B           ; ERR 13, 15 Sec TPS Min time limit
                                  ; ... else
          LDAA    L003F           ;
          BITA    #$10            ; b4
          BEQ     LE551           ; BR IF NOT b4
                                  ; ... else
          LDAB    L005B           ; COOLANT
          CMPB    LC1DB           ; ERR 13, COOL LOW LMT 70c
          BLS     LE551           ; BR IF COOL GT 70c
                                  ; ... else
          LDAA    L0082           ; TPS Ld Axis Var
          CMPA    LC1DF           ; ERR 13, 5% TPS Min
          BHI     LE541           ; BR IF TPS LT 5%
                                  ; ... else
          TST     L00AA           ; o2 Sensor Hvy Ld Cnt'r, (2 Sec)
          BEQ     LE551           ; BR IF
          DEC     L00AA           ; o2 Sensor Hvy Ld Cnt'r, (2 Sec)

          BRA     LE551           ;



LE541:    INC     L00AA           ; o2 Sensor Hvy Ld Cnt'r, (2 Sec)

          BRA     LE551           ;



LE546:    CLR     L00AA           ; o2 Sensor Hvy Ld Cnt'r, (2 Sec)

          BRA     LE551           ;
        ;-------------------------------------------------



        ;-------------------------------------------------
        ; ERR 21 HIGH TPS SENSOR ERROR
        ;
        ;-------------------------------------------------
LE54B:    BSET    L004C,$40       ; SET b6, NEW ERR 1
          BSET    L0041,$10       ; SET b4, ERR 13 DETECTED
```

```
LE551:    LDAB    L003F           ;
          BITB    #$C0            ; b6 & b7
          BNE     LE57D           ; BR IF b6 & b7
                                  ; ... else
          LDAA    L0081           ; TPS, (A/D)
          CMPA    LC1E7           ; If TPS <= disable ERR 21
          BLS     LE571           ; BR IF TPS GT 50%
                                  ; ... else
          LDAA    L00A7           ; TPS Err cnt'r,(100Ms)
          CMPA    LC1E8           ; 20 Sec's Time req for ERR 21
          BHI     LE578           ; BR IF TIME LT 20 SEC
                                  ; ... else
          LDAA    L00B6           ;
          CMPA    LC1E9           ; If Air Flow >= 12 gm?sec,
                                  ; disable ERR 21
          BCC     LE573           ;
                                  ; ... else
          INC     L00A7           ; TPS Err cnt'r,(100Ms)
          BRA     LE57D           ;



LE571:    ANDB    #$FB            ; 1111 1011

LE573:    CLR     L00A7           ; TPS Err cnt'r,(100Ms)

          BRA     LE57D           ;




LE578:    BSET    L004C,$04       ; NEW ERR 1
          ORAB    #$04            ; SET b2

LE57D:    STAB    L003F           ;
        ;-------------------------------------------------



        ;-------------------------------------------------
        ; ERR 24 VSS SENSOR ERROR
        ;
        ;-------------------------------------------------
          BITB    #$E4            ; 1110 0100
          BNE     LE5B0           ;
                                  ; ... else
          LDAA    L0065           ;
          CMPA    LC1F2           ; If > 3 MPH then disable ERR 24
          BHI     LE5B0           ;
                                  ; ... else
          LDAA    L00AB           ; VSS Err TIMER
          CMPA    LC1F7           ; 2 Sec's for ERR 24
          BHI     LE5BE           ; BR IF TIME LT 2 Sec
                                  ; ... else
          LDAA    L0063           ; Filtered LD VALUE
          CMPA    LC1F6           ; If LV8 >= 26 LV8, Disable ERR 24
          BCC     LE5B0           ; BR IF LD VAL  GT 26
                                  ; ... else
          LDAA    L0082           ; TPS Ld Axis Var
          CMPA    LC1F5           ; If => 2% TPS then Disable ERR 24
          BCC     LE5B0           ; BR IF TPS GT 2%
                                  ; ... else
          LDAA    L0037           ; MCU INPUT STATUS WD
          RORA                    ;
          BCS     LE5B0           ;
```

```
                                    ; ... else
          LDAA    L0056             ; RPM/25
          CMPA    LC1F3             ; If  <= 1000 RPM, Disable ERR 24
          BLS     LE5B0             ; BR IF RPM GT 1000 RPM
                                    ; ... else
          CMPA    LC1F4             ; If RPM > 6000 then disable ERR 24
          BLS     LE5B5             ; BR IF RPM GT
                                    ; ... else
LE5B0:    CLR     L00AB             ; VSS Err cnt'r

          BRA     LE5C7             ;



LE5B5:    BITB    #$08              ; b3
          BEQ     LE5C7             ; BR IF NOT b3
                                    ; ... else
          INC     L00AB             ; VSS Err cnt'r

          BRA     LE5C7             ;



LE5BE:    BSET    L004D,$80         ; SET b7

          LDAA    L0044             ; AF  MODE WD #2
          ORAA    #$10              ; b4,  Vss FAILURE
          STAA    L0044             ; AF  MODE WD #2
        ;-------------------------------------------------



        ;-------------------------------------------------
        ; ERR 32 EGR DIAGNOSTIC ERROR
        ;
        ;-------------------------------------------------
LE5C7:    LDAB    L0041             ; DIAGNOSTIC MODE WD 3

          BRSET   L002E,$20,LE5D3   ; BR IF b5

          ANDB    #$20              ; CLR
          BNE     LE5E6             ; ALL EXCEPT b5,  EGR DIAG SW
                                    ;   BAD  AT START UP, ERR 32
                                    ; ... else
          BRA     LE612             ;



LE5D3:    ANDB    #$DF              ; CLR b5
          STAB    L0041             ; DIAGNOSTIC MODE WD 3

          LDX     #$C1FB            ;
          LDAA    L003F             ;
          BITA    #$00E4            ;
          BNE     LE612             ;
                                    ; ... else
          LDD     L00AE             ; EGR Diag Cnt'tr
          SUBD    $0005,X           ;
          BLS     LE5EB             ;
                                    ; ... else
LE5E6:    BSET    L004D,$08         ;
          BRA     LE61F             ;


LE5EB:    LDAA    L0063             ; Filtered ld value
          CMPA    0,X               ;
```

```
          BCC     LE608             ;
                                    ; ... else
          LDAA    L005B             ; COOLANT
          CMPA    1,X               ;
          BCS     LE612             ;
                                    ; ... else
          LDAA    L0112             ;
          CMPA    2,X               ;
          BLS     LE608             ;
                                    ; ... else
          LDAA    L0082             ; TPS Ld Axis Var
          CMPA    0,X               ;
          BHI     LE608             ;
                                    ; ... else
          CMPA    4,X               ;
          BHI     LE617             ;
LE608:    LDX     L00AE             ; EGR Diag Cnt'tr
          BEQ     LE61D             ;
                                    ; ... else
          DEX                       ;
          BEQ     LE61D             ;
                                    ; ... else
          DEX                       ;
          BRA     LE61D             ;


LE612:    LDX     #0                ;
          BRA     LE61D             ;


LE617:    LDX     L00AE             ; EGR Diag Cnt'tr
          LDAB    LC202             ;
          ABX                       ;
LE61D:    STX     L00AE             ; EGR Diag Cnt'tr
        ;-------------------------------------------------



        ;-------------------------------------------------
        ; ERR 33 MASS FLOW HIGH ERROR
        ;
        ;-------------------------------------------------
LE61F:    LDAB    L003F             ;
          BMI     LE658             ;
                                    ; ... else
          BITB    #$24              ; ERR 33
          BNE     LE653             ; BR IF ERR 33
                                    ; ... else
          LDAA    L007F             ; Pump Volts, (A/D)
          CMPA    LC208             ; 10.0 VDC MIN PUMP V FOR ERR 33 ENABLE
          BLS     LE653             ; BR IF PUMP V GT 10 VDC
                                    ; ... else
          BRSET   L0040,$20,LE65F   ; BR IF b5, ERR 54A
                                    ; ... else
          LDAA    L00B6             ; AIR FLOW
          CMPA    LC204             ; 45 gms/sec AIR MIN FOR ERR 33 ENABLE
          BLS     LE653             ; BR IF AIR FLOW GT 45 gms/sec
                                    ; ... else
          LDAA    L00B0             ; MAF Hi Cnt'r, (100Ms)
          CMPA    LC206             ; 800 Msec MIN TIME QUAL FOR ERR 33
          BHI     LE658             ; BR IF TIME LT 800 Msec
                                    ; ... else
          LDAA    L0082             ; TPS Ld Axis Var
          SUBA    LC203             ; 15% TPS MIN FOR ENABLE ERR 34
          BCC     LE653             ; BR IF TPS GT 15%
                                    ; ... else
```

```
          LDAA    L0056             ; RPM/25
          CMPA    LC207             ; 3200 RPM
          BHI     LE653             ; BR IF RPM LT 3200 RPM
                                    ; ... else
          INC     L00B0             ; MAF Hi Cnt'r, (100Ms)

          BRA     LE65D             ;


LE653:    CLR     L00B0             ; CLR MAF Hi Cnt'r, (100Ms)
          BRA     LE65D             ;


LE658:    BSET    L004D,$04         ; SET ERR 33
          ORAB    #$80              ; b7
LE65D:    STAB    L003F             ;
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; ERR 34B MAF SENSOR
        ;
        ;-------------------------------------------------
LE65F:    BRSET   L003F,$40,LE696   ; BR IF b6,
                                    ; ... else
          LDX     L00EF             ; Diff Val to calc Air Flow
          CPX     LC20A             ; IF Analog CTS * 7 or PP2DLT < 55
          BHI     LE69E             ; BR IF ....  ,(EXIT & CLR TMR)
                                    ; ... else
          LDAA    L00B5             ; ERR 34 TMR
          CMPA    LC20C             ; ERR #34, 200 MSEC Min time req.
          BCC     LE696             ; BR IF TMR GT 200 MSEC
                                    ; ... else
          BRCLR   L003F,$A4,LE677   ;

          BRA     LE6A1             ;

        ;
        ; ERR 34 CRITERIA
        ;
LE677:    LDAB    L0056             ; RPM/25
          CMPB    LC20D             ; If RPM > 600, Ck ERR #34
          BCS     LE6A1             ; BR IF RPM LT 600 RPM, (EXIT)
                                    ; ... else
          LDAB    L0082             ; TPS Ld Axis Var
          CMPB    LC20E             ; If TPS > 6.25%, Ck ERR #34
          BCS     LE6A1             ; BR IF TPS LT 6.25%, (EXIT)
                                    ; ... else
          LDAB    L0063             ; Filtered ld value
          CMPB    LC20F             ; If LV8 >= 0, Ck ERR #34
          BCS     LE6A1             ; BR IF LV8 LT 0 gms/sec, (EXIT)
                                    ; ... else
          CMPB    LC210             ; If LV8 <= 130, Ck ERR #34
          BHI     LE6A1             ; BR IF LV8 LT 130 gms/sec, (EXIT)
                                    ; ... else
          INCA                      ; INCR ERR 34 TIMER
          STAA    L00B5             ; ERR 34 TMR
          BRA     LE6A1             ; EXIT
        ;-------------------------------------------


LE696:    BSET    L004D,$02         ; SET
          BSET    L003F,$40         ; SET ERR 34

          BRA     LE6A1             ;   69E
```

```
        ;
        ; CLER ERROR TMR
        ;
LE69E:    CLR     L00B5             ; ERR 34 TMR
        ************************************************


        ************************************************
        * ERR 41 CYL SELECT
        *
        ************************************************
LE6A1:    LDAA    L0040             ; DIAGNOSTIC MODE WD 2
          LSRA                      ;
          BCC     LE6A9             ; BR IF
                                    ; ... else
          BSET    L004E,$40         ; b6, ERR 41
LE6A9:    ASLA                      ;
          STAA    L0040             ; CLR ERR LAST 100 Msec FLAG
        ************************************************


        ************************************************
        * ERR 42B SPK MONITORING
        *
        * 2 SPK MPN NOT TOGGLING WHEN SPK ENABLED
        ************************************************
          LDAB    L003F             ;
          BRSET   L0036,$01,LE6DF   ; BR IF b0, (SKP ERR42 FOR STALL SVR)
                                    ; ... else
          LDAA    L0000             ;
          BITA    #$10              ; b4
          BNE     LE6DF             ; BR IF b4
                                    ; ... else
          LDAA    L0034             ;
          ASLA                      ;
          BPL     LE6DF             ;
                                    ; ... else
          LDAA    L0056             ; RPM/25
          CMPA    LC226             ; RPM, tbl1,ntrpm
          BLS     LE6D8             ; BR IF RPM GT THRESH
                                    ; ... else
          LDAA    L00B4             ; SPK Fd Bk counter, (Err #42)
          BNE     LE6D8             ; BR IF NZ
                                    ; ... else
          BITB    #$01              ;
          BNE     LE6D0             ; NR IF b0
                                    ; ... else
          ORAB    #$01              ; SET b0

          BRA     LE6DA             ;



LE6D0:    LDAA    L0001             ;
          ORAA    #$80              ; SET b7
          STAA    L0001             ;

          BRA     LE6DC             ;



LE6D8:    ANDB    #$FE              ;
LE6DA:    STAB    L003F             ;
LE6DC:    CLR     L00B4             ; SPK Fd Bk counter, (Err #42)
        ************************************************
```

```
        ************************************************
        * ERR 43  KNOCK FAIL
        *
        *
        ************************************************
LE6DF:    LDAA    L003B             ;
          BITA    #$20              ; b5, ERR 43A
          BNE     LE6E9             ; BR IF ERR 43A
                                    ; ... else
          LDAA    L0002             ; MD WD 2
          BPL     LE6EC             ;
                                    ; ... else
LE6E9:    BSET    L004E,$10         ; SET b4, ERR43

LE6EC:    LDAB    L0041             ; DIAGNOSTIC MODE WD 3
          ANDB    #$FD              ; CLR b1, ERR 44/45 FLG
        ************************************************


        ************************************************
        * ERR 44  LEAN o2 SENSOR
        *
        *
        ************************************************
          LDAA    L003F             ;
          BITA    #$00C0            ;
          BNE     LE758             ;
                                    ; ... else
          LDAA    LC22E             ;
          CMPA    L0073             ;
          BLS     LE717             ;
                                    ; ... else
          LDAA    L00A8             ; o2 Lan Cnt'r (2 Sec)
          CMPA    LC22F             ;
          BHI     LE71C             ;
                                    ; ... else
          LDAA    L0044             ; AF  MODE WD #2
          BPL     LE717             ;
                                    ; ... else
          BITB    #$0004            ;
          BNE     LE717             ;
                                    ; ... else
          LDAA    L003F             ;
          BITA    #$08              ;
          BEQ     LE721             ;
                                    ; ... else
          INC     L00A8             ; o2 Lan Cnt'r (2 Sec)
          BRA     LE721             ;


LE717:    CLR     L00A8             ;o2 Lan Cnt'r (2 Sec)

          BRA     LE721             ;



LE71C:    BSET    L004E,$08         ; b3, NEW ERR 2

          ORAB    #$02              ;
        ************************************************


        ************************************************
        * ERR 45  RICH o2 SENSOR
```

```
        *
        *
        ****************************************************
LE721:    LDAA    L0073             ; o2 VDC
          CMPA    LC230             ;
          BLS     LE74E             ;
                                    ; ... else
          LDAA    L00A9             ; o2 Sensor Rich tmr,
                                    ; -> (2 Sec)
          CMPA    LC231             ;
          BHI     LE753             ;
                                    ; ... else
          LDAA    L0044             ; AF  MODE WD #2
          BPL     LE74E             ;

          BITB    #4                ; 0000 0100
          BNE     LE74E             ;
                                    ; ... else
          LDAA    L0082             ; TPS Ld Axis Var
          CMPA    LC232             ;
          BHI     LE743             ;
                                    ; ... else
          CMPA    LC233             ;
          BCC     LE74E             ;
LE743:    LDAA    L003F             ;
          BITA    #8                ; 0000 1000
          BEQ     LE758             ;
          INC     L00A9             ; o2 Sensor Rich tmr,
                                    ; -> (2 Sec)
          BRA     LE758             ;
                                    ;
LE74E:    CLR     L00A9             ; o2 Sensor Rich tmr,
                                    ;  -> (2 Sec)
          BRA     LE758             ;

LE753:    BSET    L004E,$04         ; b2, NEW ERR 2

          ORAB    #$02              ; SET b1 ERR 44/55 HAS BEEN CAUGHT
LE758:    ANDB    #$FB              ; CLR b2 INT FORCED 128. ERR 44/45
          STAB    L0041             ; DIAGNOSTIC MODE WD 3

          RTS                       ;
    ****************************************************



    ****************************************************
    * MAJOR LOOP SUBROUTINE,  SEG C
    *
    *  Can Purge
    *
    ****************************************************
LE75D:    LDAA    L003B             ;  OLD CCP STATUS BYTE
          LSRD                      ;
          LDAA    L003E             ;
          RORA                      ;
          ASLD                      ;
          STAA    L003E             ;

          ;
          ; CCP SOLENOID SHALL NOT BE ON UNLESS
          ;  RUNTIME  GT CAL PARAM
          ;
          ;
          BRSET   L0001,$10,LE774   ;
          LDAA    L001B             ;
```

```
          CMPA    LC269             ;
          BLS     LE787             ;
                                    ; .... else
          BSET    L0001,$10         ; b4

        ;
        ; CK IF IN ALDL
        ;
LE774:    LDAA    L0035             ;
          BITA    #$20              ; b5, DIAG SW IN ALDL MODE
          BNE     LE787             ;
                                    ; .... else
          LDAA    L005B             ; COOLANT
          CMPA    LC26A             ;
          BCS     LE787             ;
                                    ; .... else
          LDD     L0043             ; AF  MODE WD
          BITA    #$02              ; b1, DECELL FUEL CUT OFF ENABLED
          BEQ     LE789             ; BE IF NOT b1
                                    ; ... else
LE787:    BRA     LE808             ;

        ;
        ; CK AFR MD WD 1 FOR CCP CLSD LOOP OPTION ....
        ;
LE789:    LDAA    LC014             ; Get Fuel/Air Mode Wd 1
          BITA    #$20              ; Bit Cl'sed Lp for CCP ?
          BEQ     LE797             ; BR IF NOT b5
                                    ; .... else
          TSTB                      ;
          BMI     LE797             ; BR IF
                                    ;.... else

        ;
        ; b1 ERR 44/55 HAS BEEN CAUGHT
        ; b4 ERR 13 DETECTED
        ;
          BRCLR   L0041,$12,LE808   ; BR IF NOT b1 & b4
                                    ; ... else
LE797:    LDX     #$C26B            ; INDEX Enable CCP
          LDAB    L003B             ;
          RORB                      ;
          BCC     LE7A2             ;
                                    ; ... else
        ;----------------------
        ; CCP on to off params
        ;
        ;----------------------
          LDX     #$C26E            ; INDEX CCP on to off params
LE7A2:    LDAA    L0067             ; Vss, (MPH/(16/5))
          CMPA    0,X               ; If Vss < 3.12 MPH Disable CCP
          BLS     LE808             ; BR
                                    ; ... else
          LDAA    L0082             ; TPS Ld Axis Var
          CMPA    1,X               ; IF TPS < 1.95% then Disable purge
          BLS     LE808             ; BR IF
                                    ; ... else
          LDD     L00EA             ; Gms/Sec Disp Value
          CMPA    2,X               ; If Flow > 0 gms/sec don't disable CCP
          BLS     LE808             ; BR
                                    ; ... else
          CMPA    #$20              ;
          BCS     LE7BB             ; BR IF
                                    ; ... else
          LDD     #$FFFF            ;
LE7BB:    ASLD                      ;
```

```
          ASLD                    ;
          ASLD                    ;

        ;-------------------------------------------------
        ;  CCP Duty Cycle vs MAF, Gms/Sec
        ;
        ; Table Value = %DC * 2.56
        ;-------------------------------------------------
          LDX     #$C272          ; Tbl Addr
                                  ; - CCP vs MAF, (%DC)
          JSR     LF2BF           ; Call 2d Lk Up W/ Interp

          PSHA                    ;


        ;-----------------------------------------------------
        ; CCP Duty Cycle Gain VS Load Value
        ;
        ;  Tle Value = Factor * 128
        ;-----------------------------------------------------
          LDX     #$C27C          ; CCP Duty Cycle Gain Table
          LDAB    #16             ; Offset Val for Lk Up
          LDAA    L0063           ; Filtered ld value
          LSRA                    ; SAVE, DIV by 2
          JSR     LF2B9           ; Call 2D Lk Up

          PULB                    ;
          MUL                     ;
          ROLB                    ;
          ROLA                    ;
          BCC     LE7D8           ; BR IF NO OVERFLOW
                                  ; ... else
          LDAA    #255            ; USE MAX VALUE

LE7D8:    LDAB    L0113           ; CCP PW
          BEQ     LE7E5           ;
                                  ; ... else
          LDAB    L0114           ;
          BEQ     LE7FF           ;
                                  ; ... else
          CBA                     ;
          BCC     LE7E8           ;
                                  ; ... else
LE7E5:    STAA    L0114           ;
LE7E8:    PSHA                    ;

          LDAA    L0113           ; CCP PW

          CLRB                    ;
          PSHB                    ;
          PSHA                    ;
          PULX                    ;

          LDAB    LC271           ;

          PULA                    ;
          JSR     LF250           ;

          CMPA    L0114           ;
          BCS     LE7FF           ;
                                  ; ... else

          CLR     L0114           ;

        ;-----------------------------------------------
        ; CK IF HEADS UP CONNECTED
```

```
        ; CCP
        ;---------------------------------------------
LE7FF:    LDX     L0033             ; MINOR LOOP MD WD 1
          BPL     LE809             ;
                                    ; ... else
          JSR     L581E             ; H.U. ROM Addr

          BRA     LE809


LE808:    CLRA                      ; CLEAR CCP PW
        ;---------------------------------------------

        ;--------------------------------
        ; ERR # 54 Params
        ; >> Fuel Pump voltage <<
        ;--------------------------------
LE809:    LDAB    L003B             ;
          ANDB    #$FE              ; 1111 1110

          STAA    L0113             ; CCP PW
          BEQ     LE814             ; BR IF ZERO PW
                                    ; ... else
          ORAB    #$01              ; SET b0
LE814:    STAB    L003B             ;

LE816:    LDAA    #$60              ; A/D Ch 6, (Pump Voltage)
          JSR     LF1BE             ; To A/D subroutine
          STAA    L007F             ; PUMP VOLTS, (A/D)


          LDAA    L0040             ; DIAGNOSTIC MODE WD 2
          BITA    #$10              ; b4, SET ERR 54 (SET NOT RUNNING)
          BNE     LE85A             ; BR IF b4
                                    ; ... else
          BITA    #$08              ; b3
          BEQ     LE85F             ; BR IF NOT b3, (BYPASS ERR 54)
                                    ; ... else

          LDAB    L007E             ; 2.0 VDC Batt Volts Value
          CMPB    LC237             ; 2.O VDC MIN IGN VOLTAGE FOR ERR 54
          BCS     LE85F             ; BR IF IGN VDC LT 2 VDC, (bypass ERR #54)
                                    ; ... else
          BITA    #$40              ; b6
          BEQ     LE83F             ; BR IF NOT b6,
                                    ; ... else
          LDX     L0034             ;
          BPL     LE85F             ; (bypass ERR #54)
                                    ; ... else
          LDAB    L007F             ; PUMP VOLTS, (a/d)
          CMPB    LC236             ; 2.O VDC MIN PUMP VOLTS FOR ERR 54
          BCC     LE854             ; IF PUMP VOLTS < 2V, (bypass ERR #54)
                                    ; ... else
          BRA     LE85A             ;


        ;--------------------------------
        ; ERR # 54 Params
        ; >> Fuel Pump voltage <<
        ;--------------------------------
LE83F:    LDAB    L0080             ; ERR 54 TIMER
          INCB                      ; INCR ERR 54 TME
          BEQ     LE846             ; BR IF TMR = 0
                                    ; ... else
          STAB    L0080             ; ERR 54 TIMER
LE846:    CMPB    LC234             ; 1.5 SEC'S MIN FOR ERR 54
```

```
          BCC     LE858             ; BR IF TMR GT 1.5 SEC
                                    ; ... else
          LDAB    L007F             ; PUMP VOLTS, (A/D)
          CMPB    LC235             ; 2 VDC, MIN Pump Volts
          BCS     LE85F             ; BR IF PUMP VDC LT 2 VDC, (SET ERR #54)
                                    ; ... else
          ORAA    #$40              ; b6

LE854:    ANDA    #$DF              ; 1101 1111

          BRA     LE85F             ;



LE858:    ORAA    #$10              ; b4

LE85A:    BSET    L004F,$20         ; SET b5

          ORAA    #$20              ; b5

        ;
        ; BYPASS ERR 54 TESTS
        ;
LE85F:    TAB                       ;
          ANDB    #04               ; 0000 0100

          ANDA    #$F3              ; 1111 0011
          ASLB                      ;
          ABA                       ;
          STAA    L0040             ;

          TAB                       ;
          LDAA    L007F             ; Pump Volts, (A/D)
          BITB    #$20              ; b5
          BEQ     LE871             ;
                                    ; ....else
        ;-----------------------------
        ; Get Batt V & CALL L.U.
        ;
        ;-----------------------------
          LDAA    L007E             ; Batt Volts Value, (A/D), For Lk Up
LE871:    LDX     #$C3AB            ; Point to Inj Offset vs Batt Tbl
          JSR     LF2C6             ;Call 2d Lk Up, (No Offset)
          STAA    L00CB             ;Inj Offset Corr, Ms*65.636 fm tbl

          RTS                       ;
    ******************************************************



    ******************************************************
    *       >>> IAC Tables & Params <<<
    *
    *
    ******************************************************
LE87A:    LDX     #$C62E            ; INDEX IAC Tables & Params

          LDAA    L00F3             ;
          BITA    #$08              ; b3
          BEQ     LE8E2             ; BR IF NOT b3
                                    ; ... else
          LDAB    L00F2             ; IAC Cnt'l Word

          LDAA    L0034             ;
          BITA    #$08              ; b3
          BNE     LE88F             ; BR IF b3
```

```
                                    ; ... else
          LDAA    L00F4             ;
          BNE     LE8B7             ; BR IF NZ
                                    ; ... else
LE88F:    LDAA    L0001             ;
          ASLA                      ;
          BMI     LE8D7             ;
                                    ; ... else
          LDAA    L003B             ;
          ASLA                      ;
          BPL     LE8D7             ;
                                    ; ... else
          LDAA    LC633             ;
          ASLA                      ;
          SUBA    L010E             ;
          BHI     LE8B3             ;
                                    ; ... else
          LDAA    L0001             ;
          ORAA    #$40              ; SET b6
          STAA    L0001             ;

          LDAA    L003B             ;
          ANDA    #$00BF            ;

          STAA    L003B             ;
          LDAA    LC677             ;

          BRA     LE8D4             ;



LE8B3:    LDAA    #$0082            ;

          BRA     LE8C2             ;


LE8B7:    LDAA    LC632             ;
          ASLA                      ;
          SUBA    L010E             ;
          BLS     LE8CB             ;
                                    ; ... else
          LDAA    #$02              ;
LE8C2:    STAA    L0101             ;

          ORAB    #$08              ; b3
          ANDB    #$EF              ; 1110 1111

          BRA     LE8E0             ;



LE8CB:    LDAA    L0034             ;
          ORAA    #$08              ; SET b3
          STAA    L0034             ;

          LDAA    LC676             ;
LE8D4:    STAA    L010B             ; DISABLE PID CLD LP TIMER

LE8D7:    ANDB    #$F7              ; 1111 0111
          STAB    L00F2             ; IAC Cnt'l Word

          CLR     L010E             ;

          BRA     LE8E3             ;
```

```
LE8E0:    STAB    L00F2             ; IAC Cnt'l Word

LE8E2:    RTS                       ;
        ;-------------------------------------------------



        ;-------------------------------------------------
        ;
        ;
        ;
        ;-------------------------------------------------
LE8E3:    LDAA    L00F3             ;
          BITA    #$20              ;
          BNE     LE8E2             ;
                                    ; ... else
          LDAA    L0084             ; TPS T/F Ld Axies Var

          LDAB    L003D             ;
          BITB    #$10              ; b4
          BEQ     LE8FD             ; BR IF NOT b4,
                                    ; ... else
          LDAB    L00C5             ; Stall Save IAC Stps, (Sec*80)
          BEQ     LE8FD             ;
                                    ; ... else
          DECB                      ;
          STAB    L00C5             ; Stall Save IAC Stps, (Sec*80)

          ADDA    LC603             ; 3.125% TPS Cut off STALL SAVER
                                    ; TPS DEFAULT
          BCS     LE911             ;
                                    ; ... else
LE8FD:    LDAB    L0043             ;
          BITB    #$02              ; b1
          BEQ     LE908             ; BR IF NOT b1
                                    ; ... else
          ADDA    LC60A             ; 4% TPS, DFCO T/F TPS Default

          BRA     LE90F             ;



LE908:    LDAB    L003E             ;
          BPL     LE913             ;
                                    ; ... else
          ADDA    LC5F7             ; 0d, Decel Enlean T/F Default
LE90F:    BCC     LE913             ;
                                    ; ... else
LE911:    LDAA    #$FF              ;
LE913:    LDAB    L00F2             ; IAC Cnt'l Word
          CMPA    $1D,X             ;
          BHI     LE936             ;
                                    ; ... else
          LDAA    L0085             ; Old Val Fm TPS Tbl
          CMPA    $1D,X             ;
          BLS     LE924             ;
                                    ; ... else
          LDAA    $46,X             ;
          STAA    L010B             ; DISABLE PID CLD LP TIMER

LE924:    CLRA                      ;
          BITB    #$50              ; b4 & b6
          BNE     LE944             ; BR IF NOT b4 & b6
                                    ; ... else

        ;
```

```
        ; CK PWR STEERING
        ;
          PSHB                      ;

          LDAB    L0037             ; MCU INPUT STATUS WD
          BITB    #$08              ; b3, PWR STEER SW BY HI PRESSURE
          PULB                      ;
          BNE     LE944             ; BR IF b3, PWR STEER SW

        ;
        ; TPS NOISE ELEM, (DON'T MOD A/C COMPENSATION
        ;

                                    ; ... else
          TST     L0105             ; CK IF TF IS DONE
          BEQ     LE995             ; BR IF NOT DONE
                                    ; ... else
LE936:    LDAB    $34,X             ; TF GAIN TO B Reg
          MUL                       ; STEP CMD = TPS * TF GAIN
          ASLD                      ; x2
          BCC     LE93E             ; BR IF NO OVERFLOW
                                    ; ... else
          LDAA    #255              ; USE MAX VAL

        ;
        ; CK IF STEP CMG GT TF MAX
LE93E:    LDAB    $35,X             ;
          CBA                       ;
          BLS     LE944             ; BR IF SEEP CMD IS OK
                                    ; ... else
          TBA                       ;

        ;
        ; CK IF PWR STEER PRESS HI
        ;
LE944:    LDAB    L0037             ; MCU INPUT STATUS WD
          BITB    #$08              ; b3, PWR STEER SW
          BEQ     LE961             ; BR IF NOT b3,
                                    ; ... else
          ADDA    $52,X             ; ADD PWR STEER ANTICIPATE
          BCC     LE950             ; BR IF NO OVERFLOW
                                    ; ... else
          LDAA    #255              ; USE MAX VAL

LE950:    LDAB    L00F2             ; IAC Cnt'l Word
          BMI     LE95B             ; BR IF
                                    ; ... else
          ADDA    LC681             ; 0 IAC STPS, Pwr Steer Anticipate STEPS
          BCC     LE95B             ; BR IF NO OVERFLOW
                                    ; ... else
          LDAA    #255              ; USE MAX VALUE

LE95B:    ORAB    #$40              ; SET b6, LD IS BEING CONTROLED
          ANDB    #$FE              ; 1111 1110

          BRA     LE98A             ;



LE961:    LDAB    L00F2             ; IAC Cnt'l Word, A/C REQUEST
          BMI     LE984             ;
                                    ; ... else
          LDAB    L002D             ; Idle Spd A/C Antic
          CMPB    $38,X             ;
          BHI     LE96F             ;
```

```
                                    ; ... else
          CMPB    $39,X             ;
          BCC     LE97A             ;
                                    ; ... else
LE96F:    LDAB    LC665             ;
          STAB    L002D             ; Idle Spd A/C Antic

          LDAB    L003D             ;
          ORAB    #$40              ; SET b6
          STAB    L003D             ;

LE97A:    LDAB    L00F2             ; IAC Cnt'l Word
          ADDA    L002D             ;
          BCC     LE98A             ; BR IF NO OVERFLOW
                                    ; ... else
          LDAA    #$255             ; USE MAX VAL

          BRA     LE98A             ;



LE984:    BITB    #$40              ; b6, LOAD IS BEING CNT'ED
          BEQ     LE98A             ; BR IF NOT b6
                                    ; ... else
          ORAB    #$20              ; SET b5, LOAD IS BEING REMOVED
LE98A:    STAB    L00F2             ; IAC Cnt'l Word 1

          LDAB    L00F3             ; IAC Cnt'l Word 2, PK/NEUT
          BPL     LE997             ; BR IF IN DRIVE
                                    ; ... else
          LDAB    $36,X             ; PK/NEUT MULT
          MUL                       ;

          BRA     LE9A4             ;

LE995:    BRA     LE9E3             ;


LE997:    LDAB    L0067             ; MPH/(16/5)
          CMPB    $20,X             ;
          BLS     LE9A4             ;
                                    ; ... else
          ADDA    LC683             ; 5 Steps added to T.F. in drive & MOVING
          BCC     LE9A4             ; BR IF NO OVERFLOW
                                    ; ... else

          LDAA    #255              ; USE MAX VALUE

LE9A4:    LDAB    L00F2             ; AC Cnt'l Word
          ORAB    #$10              ; b4

          SUBA    L0105             ;
          BCS     LE9B3             ;
                                    ; ... else
          BPL     LE9C5             ;
                                    ; ... else

          LDAA    #127              ;
          BRA     LE9C5             ;

LE9B3:    BMI     LE9B7             ;
                                    ; ... else
          LDAA    #$0081            ;
LE9B7:    NEGA                      ;
          PSHB                      ;
          CMPA    #$03              ;
```

```
          BCC     LE9C2             ;
                                    ; ... else
          LDAB    $46,X             ;
          STAB    L010B             ; DISABLE PID CLD LP TIMER

LE9C2:    ORAA    #$80              ; b6

          PULB                      ;

LE9C5:    STAA    L0101             ;
          ASLA                      ;
          BEQ     LE9D7             ;
                                    ; ... else
          BCS     LEA25             ; EXIT
                                    ; ... else
          LDAA    L002C             ; IAC Present Posit
          CMPA    $4D,X             ;
          BCS     LEA25             ;
                                    ; ... else
          ANDB    #$EF              ; 1110 1111
          BRA     LE9E3             ;


LE9D7:    ANDB    #$CF              ; 1100 1111
                                    ; ... else
          BPL     LE9E3             ;
                                    ; ... else
          LDAA    L0037             ;
          BITA    #$08              ;
          BNE     LE9E3             ;
                                    ; ... else
          ANDB    #$BE              ;
                                    ;

        ;-------------------------------------------------
        ; CK IF IN MODE 4 <---- *****
        ; SET IAC MODE
        ;
        ; ECM TYPE $E6
        ;
        ; MODE 4 CNT'L WD ... HAS FLAGS
        ;-------------------------------------------------
LE9E3:    BRCLR   L0035,$08,LE9F9   ; BR IF NOT b3, MODE 4
                                    ; ... else
          LDAA    L0154             ;
          BITA    #$02              ; b1
          BEQ     LE9F9             ; BR IF NOT b1
                                    ; ... else
          LDAA    L0155             ; GET ALDL
          ANDB    #$FB              ; CLR b2
          BITA    #$02              ; b1
          BNE     LEA25             ; BR IF b1 GO SAVE IAC CNT'L WD
                                    ;   AND EXIT via RTS
                                    ; ... else
          ORAB    #$04              ; SET b2
        ;-------------------------------------------------


        ;-------------------------------------------------
LE9F9:    BITB    #$04              ; b2
          BNE     LEA25             ; B IF NOT b2
                                    ; ... else
          LDAA    L0067             ; MPH/(16/5)
          BNE     LEA21             ; BR IF NZ, MOVING
                                    ; ... else
```

```
          LDAA    L0084             ; TPS T/F Ld Axies Var
          CMPA    $1D,X             ;
          BCC     LEA21             ;
                                    ; ... else
          LDAA    L0058             ; RPM/12.5
          CMPA    L0102             ;
          BLS     LEA14             ;
                                    ; ... else
          LDAA    #$0082            ;
          ORAB    #$0002            ;

          BRA     LEA22             ;


LEA14:    LDAA    #$02              ;
          BITB    #$02              ;
          BEQ     LEA22             ;
                                    ; ... else
          ORAB    #$04              ;
          LDAA    $45,X             ;
          STAA    L010B             ; DISABLE PID CLD LP TIMER

LEA21:    CLRA                      ;
LEA22:    STAA    L0101             ;

        ;-------------------------------------------------
LEA25:    STAB    L00F2             ; IAC Cnt'l Word

          RTS                       ;
    ****************************************************




    ****************************************************
    * MAJOR LOOP SUBROUTINE  SEG 3,  Misc 100 Msec
    *
    *
    ****************************************************
LEA28:    LDAB    L0035           ;
          ANDB    #$CF            ; Clr b4 & b5 (DAIG MD & ALDL MODE)

        ;
        ; READ A/D AND CK DIAGNOSTIC PIN B VOLTAGE....
        ;
          LDAA    #$70            ; A/D Ch 7, (Start/Run Pwr)
          JSR     LF1BE           ; To A/D subroutine


          CMPA    #40             ; 800 Mv
          BCS     LEA45           ; BR IF A/D LT 800 Mv, (GROUND'ED TST)
                                  ; ... else
          CMPA    #100            ; 2.00 VDV
          BCS     LEA47           ; BR IF A/D LT 2.00 VDC
                                  ; ... else
          CMPA    #152            ; 3.04 VDV
          BCC     LEA47           ; BR IF A/D GT 3.05 VDC, (ROAD TST MODE)
                                  ; ... else
          BRSET   L0046,$08,LEA47 ; BR If 8192 Mode in locked Mode
                                  ; ... else
          ORAB    #$20            ; SET b5

          BRA     LEA47           ;

LEA45:    ORAB    #$10            ; SET b4, (DIAG SW IN DIAG MODE)
                                  ;   (GROUND'ED DIAG PIN)
```

```
LEA47:    STAB    L0035             ;
         ;-------------------------------------------------


         ;-------------------------------------------------
           LDAA    L01B2             ;
           BEQ     LEA54             ;
                                     ; ... else
           LDAA    L0033             ; MINOR LOOP MD WD 1
           ORAA    #$04              ; SET b2, STACK OVER WRITE
           STAA    L0033             ;

LEA54:     CLRA                      ;
           CLRB                      ;
           STD     L3FCE             ; ??? DELAY



           LDAA    L0034             ;
           BMI     LEA80             ;
                                     ; ... else
           LDAA    L0043             ;
           ANDA    #$D5              ; CLEAR b1 b3 & b5
           STAA    L0043             ;


         ;-------------------------------------------------
           LDAA    L005B             ; COOLANT
           STAA    L005F             ; STARTUP COOLANT

           BRSET   L0001,$40,LEA76   ; BR IF b6
                                     ; ... else
           CMPA    LC02C             ; Hot Restart Limit, (129F)
           BCS     LEA76             ;
                                     ; ... else
           LDAA    L0001             ; .
           ORAA    #$40              ; SET b6
           STAA    L0001             ;


         ;-------------------------------------------------
LEA76:     CLRB                      ;
           LDAA    LC3A0             ; o2 filter init val fm ROM
           STD     L006F             ;

           STAA    L0073             ;

           BRA     LEA8F             ;



         ;-------------------------------------------------
LEA80:     BCLR    L0002,$10         ; CLR b4, SKIP IAC MOTOR RESET


         ;-------------------------------------------------
           LDX     L0073             ;
           LDAA    L006F             ;
           LDAB    LC39F             ; 100 Msec o2 Coef
           JSR     LF250             ;

           STD     L0073             ;


LEA8F:     LDAA    #$8F              ; 1000 11111
           STAA    L4003             ;
```

```
      RTS
*****************************************************


*****************************************************
* MAJOR LOOP SUBROUTINE, SEG 7
*
*  LK UP Coolant var's
*
* BUA TYPE 32 ECM
*****************************************************

      ;
      ; LK UP Rich/Lean Offset Vs Coolant Temp
      ;
      ; TBL = BIN VAL
      ;
LEA95:  LDAA    L005B           ; COOLANT
        CMPA    #208            ; 115c
        BLS     LEA9D           ; BR IF LT 115c
                                ; ... else
        LDAA    #$208           ; USE 115c MAX FOR LK UP
LEA9D:  STAA    L005E           ; LMT'ED COOLANT

        LDX     #$C5BB          ; Rich/Lean Offset Tbl

        JSR     LF2C6           ; 2d Lk Up, (No Offset)
        STAA    L00D1           ; Lean Offset, (if Cool) fm Tbl
      ;--------------------------------------


      ;----------------------------------------
      ; LK UP Number of ASYNC Pulses vs Coolant
      ;
      ;
      ;----------------------------------------
        LDAA    L005B           ; COOLANT
        LDX     #$C31D          ; Number of ASYNC Pulses Tbl

        JSR     LF2BF           ; 2d Lk Up W/ Interp
        STAA    L00D7           ; Num of Async Pulses to do
      ;-------------------------------------------------


      ;-------------------------------------------------
      ; Async Factor vs COOLANT
      ;
      ; TBL = Factor * 128
      ;-------------------------------------------------
        LDAA    L005B           ; COOLANT
        LDX     #$C327          ; Async Factor Tbl

        JSR     LF2BF           ; 2d Lk Up W/ Interp
        STAA    L00D8           ; Cool Fact for Async Pulses
      ;-------------------------------------------------



      ;
      ; ANALOG MAF BURN OFF ROUTINE
      ;
        LDAA    L005B           ; COOLANT
        LDX     #$C613          ; Pwr Enrichment Air/Fuel Tbl
```

```
          JSR     LF2BF             ; 2d Lk Up W/ Interp
          STAA    L00D0             ; LU AFR % Chg vs Cool Temp
        ;---------------------------------------


        ;
        ; ANALOG MAF BURN OFF ROUTINE
        ;

          BRCLR   L003B,$02,LEAD5   ; BR IF NOT b1, BR IF START NOT ENAB'LED
                                    ; ... else
          BRSET   L0033,$32,LEAD5   ; BR IF b1 & b4 & b5, (1 = IGN OFF, ENAB
                                    ; MAF B/O)
                                    ; ... else,
          INC     L0472             ; START TIME
          BNE     LEAD5             ; BR IF NZ,
                                    ; ... else
          DEC     L0472             ;

LEAD5:    BRCLR   L0033,$10,LEB2C   ; BR IF NOT b4, (1 = IGN NOT ON)
                                    ; ... else
          BRCLR   L003E,$40,LEB2C   ; BR IF NOT b6, IF NO ENABLED
                                    ; ... else
          BRCLR   L00B8,$FF,LEAE6   ; BR IF NOT $FF, BR IG DELAY = 0
                                    ; ... else
          DEC     L00B8             ; DECR CNT'R

          BRA     LEB2C             ; EXIT B/O



LEAE6:    BRCLR   L00B7,$FF,LEB2C   ; BR IF NOT $FF, BR IF B/O TOME = 0
                                    ; ... else
          DEC     L00B7             ; DECR CNT'R

          LDX     #$DFFF            ; 57,343
          STX     L3FDA             ; Mass Air B.U. PW TMR

        ;
        ; ANALOG MAF BURN OFF ERR 36
        ;
          BRSET   L003F,$40,LEB39   ; BR IF b6
                                    ; ... else

          LDAA    L011F             ; MAF Burn off delay tmr
          CMPA    LC221             ; 300 msec  Dly prior to Burn off
          BCC     LEB05             ; BR IF TIME LT 300 msec
                                    ; ... else
          INCA                      ; INCR MAF Burn off delay tmr
          STAA    L011F             ; SAVE NEW MAF Burn off delay tmr

          BRA     LEB39             ;



        ;---------------------------
        ;   CK  ERR 36 Params
        ;    MAF Burn off Diag
        ;---------------------------
LEB05:    LDAA    #$A0              ; A/D Ch A, (Mass Air Sensor Ch)
          JSR     LF1BE             ; To A/D subroutine

          CMPA    LC223             ; Fail B/O test if HLM A/D >  1.90 VDC
          BHI     LEB19             ; BR IF MAF A/D VAL LT 1.90 VDC
                                    ; ... else
          CMPA    LC224             ; Fail B/O test if A/D LT 400 mvdc
```

```
          BCS     LEB19             ; BR IF MAF VAL L.T. 20
                                    ; ... else
          BCLR    L0003,$40         ; CLR b6, ERR 36, BO FAILED

          BRA     LEB39             ; EXIT via RTS


LEB19:    LDAA    L0120             ; ERR 36 COUNTER
          CMPA    LC222             ; 6  fails req for ERR 36
          BCC     LEB27             ; BR IF ERR EVENTS L.T. 6
                                    ; ... else
          INCA                      ; INCR ERR 36 COUNT
          STAA    L0120             ; SAVE NEW ERR 36 COUNTER

          BRA     LEB39             ;


LEB27:    BSET    L0003,$40         ; SET b6, ERR 36, MAF BURN OFF FAIL

          BRA     LEB39             ; EXIT via RTS


LEB2C:    LDX     #$D000            ; 53,248
          STX     L3FDA             ; Mass Air B.U. PW TMR

          BRCLR   L0003,$40,LEB39   ; BR IF b6, ERR 36, MAF BURN OFF FAIL
                                    ; ... else
          BSET    L004E,$80         ; SET b7,  NEW ERR 2

LEB39:    RTS                       ;
    ******************************************************



    ******************************************************
    * MAJOR LOOP SUBROUTINE
    *
    * SEG A,  Lk UP Man Air temp Var's
    *
    ******************************************************
LEB3A:    LDAB    L0000             ; MJR LOOP CNTR
          BITB    #$10              ; b4
          BNE     LEB5B             ; BR IF b4
                                    ; ... else

        ;---------------------------------------
        ; LK UP KNOCK % Recovery rate vs RPM
        ;
        ;  RECOVERY/SEC * 256/500
        ;---------------------------------------
          LDAA    L0056             ; RPM/25
          LSRA                      ; DIV BY 4
          LSRA                      ;
          LDX     #$C1C3            ; KNOCK PCT. RECOVERY RATE Tbl

          JSR     LF2C6             ; 2d Lk Up, (No Offset)

        ;
        ; CALC KNOCK RETARD AS PROD OF
        ; RATE AND KNOCK RETARD WITH MIN
        ; VAL HELD TO ONE
        ;
          LDAB    L00A5             ; Retard for knock
          MUL                       ; RETARD * LK UP RESULT
          ADCA    #0                ; ROUND
          NEGA                      ;
```

```
          BNE     LEB54             ; BR IF NZ
                                    ; .. else
          LDAA    #255              ; USE MAX VAL
LEB54:    ADDA    L00A5             ; Retard for knock
          BCS     LEB59             ;
                                    ; ... else
          CLRA                      ; CLR RETARD VALUE
LEB59:    STAA    L00A5             ; Retard for knock

        ;
        ; CK IF ERR #43 ENABLED
        ;  (KNOCK FAIL)
        ;
LEB5B:    LDAA    LC1D2             ; Mask For ERR flag 3
          BITA    #$10              ; b4 ERR #42 KNOCK FAIL
          BEQ     LEBB3             ; BE IF NOT b4
                                    ; ... else

          LDAB    L0000             ; MJR LOOP COUNTER
          CMPB    #26               ; CK IF TIME FOR 1 SEC LOGIC
          BNE     LEB8F             ;
                                    ; ... else
          LDAA    L0002             ; MDWD1
          BITA    #$40              ; b6, ERR 43 TEST OVER THIS STARTUP
          BNE     LEB8F             ; BR IF b6
                                    ; ... else
          BITA    #$01              ; b0, ERR 43 TEST IN WORK
          BNE     LEB82             ; BR IF b0
                                    ; ... else
          TST     L00B0             ; MAP Hi Cnt'r, (100Ms)
          BNE     LEB8F             ;
                                    ; ... else
          LDAB    L0063             ; Filtered ld value
          CMPB    LC22D             ; LV 170
          BCS     LEB8F             ; BR IF LD VAL LT 170, (DISABLE ERR 43)
                                    ; ... else
          ORAA    #$01              ; b0

          BRA     LEB8D             ;



LEB82:    ANDA    #$FE              ; 1111 1110

          LDAB    L005B             ; COOLANT
          CMPB    LC22C             ; 90c MIN FOR ERR 43 ENABLE
          BLS     LEB8D             ; BR IF COOL LT 90c, (DISABLE ERR 43)
                                    ; ... else
          ORAA    #$C0              ; SET b6 & b7, ERR 34 OVER & FAILED
LEB8D:    STAA    L0002             ;

LEB8F:    LDAA    L00A4             ;
          INCA                      ; INCR
          CMPA    #39               ;
          BEQ     LEB9A             ; BR IF
                                    ; ... else
          STAA    L00A4             ; SAVE NEW

          BRA     LEBB3             ;



LEB9A:    CLR     L00A4             ;
          LDD     L3FCA             ; Counter #3, 16.5Khz
          PSHA                      ;
```

```
          LDAB    L003B             ;
          ANDB    #$DF              ; 1101 1111

          SUBA    L00A3             ;
          CMPA    LC229             ; If KNOCK low time > 3.67 Sec,Enab
                                    ; ERR #43
          BCS     LEBAE             ; BR IF
                                    ; ... else
          ORAB    #$20              ; b5
LEBAE:    STAB    L003B             ;

          PULA                      ;
          STAA    L00A3             ;
        ;-------------------------------------------------



        ;-----------------------------------------
        ; READ MAN AIR TEMP AND CK ERROR 23/25
        ;
        ;-----------------------------------------
LEBB3:    LDAA    #$80              ; A/D Ch 8, MAT
          JSR     LF1BE             ; To A/D subroutine

          COMA                      ; INVERT TEMPERATURE
          STAA    L012B             ; A/D MAT VALUE
          STAA    L0060             ; MAT


        ;
        ; ERR 23 MAT LOW
        ;
          LDX     L001A             ; ENG RUN TIME (Sec)
          CPX     LC1EE             ; 120 SEC'S MIN RUN TIME FOR ERR 23/25
          BLS     LEC22             ; BR IF RUN TIME GT 120 SEC'S (EXIT)
                                    ; ... else
          LDAB    L0065             ; MPH/1

          LDAA    L0060             ; MAT
          CMPA    LC1EC             ; 4d MAX MAT TO  ENABLE ERR 23
          BCC     LEBDF             ; BR IF MAT GT 4d (CLR ERR 23 THIS PASS)
                                    ; ... else
          LDAA    L00AC             ; Lo MAT Err #23 TIMER
          CMPA    LC1ED             ; 12 Sec  req for ERR 23
          BHI     LEBE7             ; BR IF TIMER LT 12 Sec
                                    ; ... else
          CMPB    LC1F0             ; 1 MPH MIN TO  ENABLE ERR 23/25
          BHI     LEBE2             ; BR IF Vss LT 1 MPH, (CLR ERR 23)
                                    ; ... else
          INC     L00AC             ; INCR Lo MAT Err 23 TMR

          BRA     LEBEA             ; TO HI MAT ROUTINE



LEBDF:    BCLR    L0043,$10         ; CLR ERR 23 THIS PASS FLAG
LEBE2:    CLR     L00AC             ; CLR Lo MAT Err 23

          BRA     LEBEA             ; TO HI MAT ROUTINE



LEBE7:    BSET    L0043,$10         ; SET ERR 23 THIS PASS FLAG
        ;-------------------------------------------------
```

```
            ;
            ; ERR 25, HIGH MAT
            ;
LEBEA:    LDAA    L0060           ; MAT
          CMPA    LC1F8           ; If MAT > 243 then Enable ERR 25
          BCS     LEC02           ; BR IF MAT LT 243d
                                  ; ... else
          LDAA    L00AD           ; Hi MAT TIMER, Err 25
          CMPA    LC1F9           ; 12 Sec's req for ERR 25
          BHI     LEC0A           ;
                                  ; ... else
          CMPB    LC1F0           ; 1 MPH MIN TO  ENABLE ERR 23/25
          BLS     LEC05           ; BR IF Vss GT 1 MPH
                                  ; ... else
          INC     L00AD           ; BUMP UP Hi MAT TIMER, Err 25

          BRA     LEC0D           ; EXIT ERR 25 ROUTINE



LEC02:    BCLR    L0040,$02       ; CLR b1,

LEC05:    CLR     L00AD           ; CLEAR Hi MAT TIMER, Err 25
          BRA     LEC0D           ; EXIT ERR 25 ROUTINE



LEC0A:    BSET    L0040,$02       ; SET ERR 25 THIS PASS


LEC0D:    BRSET   L0043,$10,LEC1A ; BR IF B4, ERR 23 THIS PASS
                                  ; ... else
          BRCLR   L0040,$02,LEC22 ; BR IF NOT b1, NO ERR 24, EXIT via RTS
                                  ; ... else
          BSET    L004D,$40       ; SET b6, ERR 25 FLAG

          BRA     LEC1D           ; BR TO SET DEFULT MAT VALUE



LEC1A:    BSET    L004C,$01       ; SET b0, ERR 23 FLAG
LEC1D:    LDAA    LC1F1           ; 29d, If ERR Use as Default MAT
          STAA    L0060           ; MAT

LEC22:    RTS                     ;
    ******************************************************



    ******************************************************
    * MAJOR LOOP SUBROUTINE  SEG F
    *
    *   Fuel/Air Major Lp
    *
    ******************************************************
LEC23:    LDAA    L0000           ; MJR LOOP CNTR
          BITA    #$10            ;
          BNE     LEC72           ; BYPASS 200 MSEC STUFF ...


        ;
        ; 200 MESC ROUTINE
        ;
          LDX     #$001C          ; POINT TO BLM CELLS
          LDAA    L00C1           ; CELL ZERO TMER
          INCA                    ; INCR TMR
```

```
          BEQ     LEC33             ; BR IF Z
                                    ; ... else
          STAA    L00C1             ; NEW CELL ZERO TMER VALUE

        ;
        ; CK IF BL ENABLED ??
        ; (L0044 b1)
        ;
LEC33:    LDAB    L0044             ;
          BITB    #$02              ; b1
          BEQ     LEC71             ; BR IF BL NOT ENABLED
                                    ; ... else

        ;
        ; CK COOLANT FOR SAM ENABLE
        ; (88 - 100 C)
        ;
          LDAB    L005B             ; COOLANT
          CMPB    LC5ED             ; If Temp < 88c Then Skip SAM Update
          BCS     LEC71             ; BR IF COOL LT 88c
                                    ; ... else
          CMPB    LC5EE             ; If Temp >  100c Then Skip SAM Update
          BCC     LEC71             ; BR IF COOL LT 100c
                                    ; ... else
        ;
        ; CK FOR IDLE/NON IDLE CELLS
        ;
          LDAB    L00BF             ; BLM (cells 0-7)
          ABX                       ; ADD CELL NUMBER TO ADDRESS POINTER
          LDAA    0,X               ; GET CELL VALUE
          CMPB    LC5EA             ; 0,  Sam Cell A Number, Idle
          BEQ     LEC60             ; BR IF CELL 0
                                    ; ... else
          CMPB    LC5EB             ; 9, SAM Cell B Number, Non Idle
          BNE     LEC71             ; BR IF NOT CELL 9
                                    ; ... else
          LDX     L000C             ; SAM Cell B
          LDAB    LC5F0             ; 24d, SAM B Filter Coef.
          JSR     LF250             ; DO LAG FILTER

          STD     L000C             ; SAM Cell B
          BRA     LEC71             ; EXIT VIA RTS


LEC60:    LDAB    L00C1             ; CELL ZERO TMR
          CMPB    LC5EC             ; Stop Cell O update when time up
                                    ; 15 SEC'S
          BCC     LEC71             ; BR IF TIME LT 15 SEC'S
                                    ; ... else
          LDX     L000A             ; Err #5 Flg Word
          LDAB    LC5EF             ; SAM A Filter Coef.
          JSR     LF250             ; DO LAG FILTER

          STD     L000A             ;Err #5 Flg Word

LEC71:    RTS                       ;
        ;-----------------------------------------------


        ;-----------------------------------------------
        ; VOLTAGE COMP, COOL or MAT
        ; LK UP  DECELL & ACCEL Enr Cool Factor vs COOL
        ;
        ;-----------------------------------------------
LEC72:    LDAA    L005B             ; COOLANT
          LDX     #$C343            ; COOL MULT Tbl,
```

```
          JSR     LF2BF             ; 2d Lk Up W/ Interp
          STAA    L00E7             ; Accel Enr Cool Factor

          LDAB    L0034             ;
          BMI     LECC2             ;
                                    ; ... else
          LDAB    L0001             ; NON VOL RAM Mode word
          BITB    #$08              ; b3
          BNE     LECC2             ;

        ****************************************
        * AFR MAJOR LOOP ROUTINE
        *
        ****************************************

        ;-------------------------------------------------
        ; LK UP  START UP ENRICH vs COOL
        ;
        ;
        ;  TBL =  2.56  * PCT CHG
        ;-------------------------------------------------
          LDAA    L005E             ; FILT COOL TEMP
          LDX     #$C3E4            ; START UP ENRICH

          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          CLRB                      ;
          STD     L000E             ; A/F Ratio time out
        ;-------------------------------------------------


        ;-------------------------------------------------
        ;  START UP SPARK ADVANCE vs START UP COOLANT TEMP
        ;
        ;  TBL = SA deg * (256/90)
        ;-------------------------------------------------
          LDX     #$C17A            ; START UP SPARK TBL

          LDAA    L005F             ; START UP COOL
          CMPA    #208              ; CK MAX LK UP VAL, 115c
          BCS     LEC9C             ;

          LDAA    #208              ; USE 115c MAX FOR LK UP
LEC9C:    PSHA                      ;
          JSR     LF2C6             ; Call 2d Lk Up, (No Offset)

          CLRB                      ;
          STD     L0013             ; Spark Adv Time out
        ;-------------------------------------------------


        ;-----------------------------------------
        ; LK UP  START UP SPK ADV DECAY vs COOLANT
        ; Table value = INJECTS
        ;
        ;  TBL =  2.844  * DEG SPK
        ;-----------------------------------------
          PULA                      ; Lk Up Var
          LDX     #$C18A            ; Tbl Addr,
          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          LDX     #$C188            ; Mult for Start Up Spark adv

          JSR     LF266             ; MUL 8 X 16 SUROUTINE
          STD     L0015             ; Spark Decay Delay
```

```
        ;-------------------------------------------------


        ;----------------------------------------
        ; LK UP  START UP ENR DELAY DECAY vs COOLANT
        ;  Tbl Val = Num of Injects
        ;----------------------------------------
          LDX     #$C3F4            ; START UP ENR DELAY DECAY TBL
          LDAA    L005E             ; COOL 116
          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          LDX     #$C3F2            ; Scale factor for Table, (2)
          JSR     LF266             ; MUL 8 X 16 SUROUTINE
          STD     L0010             ;
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; LK UP,  Open Loop A/F % Change vs Cool Temp
        ;  TBL =  2.56  * %CHG TO AFR
        ;-------------------------------------------------
LECC2:    LDX     #$C41F            ; Opn Lp A/F TBL

          LDAA    L005E             ; COOL 116
          JSR     LF2C6             ; 2d Lk Up, (No Offset)
          STAA    L00CD             ;
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; LK UP Accel Enrich Decay Factor vs Coolant Temp.
        ;
        ; Table Value + Diff Ld Val Pct'age Per Inject
        ;
        ;  Tbl Val = %Chg * (256/100)
        ;-------------------------------------------------
          LDX     #$C34D            ; Accel Enrich Decay Factor TBL

          LDAA    L005B             ; COOLANT
          JSR     LF2BF             ; 2d Lk Up W/ Interp
          STAA    L00E3             ;
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; LK UP WARM PARK IAC POSIT vs COOLANT
        ;
        ;-------------------------------------------------
          LDX     #$C690            ; Tbl Addr,

          LDAA    L005B             ; COOLANT
          JSR     LF2BF             ; Call 2d Lk Up W/ Interp
          STAA    L010C             ; SAVE PARK POSIT

          CMPA    L0109             ;
          BCC     LECE9             ; BR IF TBL VAL LT CURRENT POSIT
                                    ; ... else
          STAA    L0109             ;

LECE9:    RTS                       ;
    ************************************************


    ************************************************
    * MJR LOOP SUBROUTINE  SEG 5
```

```
    *
    * Clsd Lp QUAL'S, JP TO A/C & Cool FAN
    *
    ******************************************************

        ;
        ; CK CLOSED LOOP QUAL'S
        ;
LECEA:    LDAA    L0000             ; MJR LP CNTR
          BITA    #$10              ; b4
          BNE     LECF6             ; BR IF b4
                                    ; ... else
          JSR     LDF4A             ; GO DO FAN & A/C
          JMP     LDF9D             ; A/C CLUTCH

        ;
        ; CK IF ENG RUNNING
        ;
LECF6:    LDAA    L0034             ;
          BMI     LECFE             ; BR IF RUNNING
                                    ; ... else
          BRCLR   L0001,$08,LED77   ; BR IF NOT b3, NOT RUNNING,
                                    ;    PROPER SHUT DN
                                    ; ... else
        ;
        ; CK IF ERR 44/45
        ;
LECFE:    LDAA    L0041             ;
          BITA    #$02              ; b1, ERR 44/45
          BEQ     LED09             ; BR IF NOT b1
                                    ; ... else
          CLR     L00BE             ; CLR Clsd Lp o2 Not Rdy timer,
                                    ; (200Ms inc) & FORCE OPEN LOOP
          BRA     LED77             ;

        ;
        ; CK IF ALDL or DIAG MODE
        ;
LED09:    LDAA    L0035             ;
          ANDA    #$30              ; MASK FOR b4 & b5, (ALDL/DIAG MODE)
          BNE     LED48             ; BR IF b4 & b5
                                    ; ... else

        ;-----------------------------------------------------
        ; CK IF IN ALDL MODE 4 <----*****
        ; MODE WD ... and MD WD ...
        ;
        ;-----------------------------------------------------
          BRCLR   L0035,$08,LED24   ; BR IF NOT b3, (NOT IN 8192 MODE 4)
                                    ; .... else
          LDX     #$0154            ; INDEX ALDL MD WD ..
          BRCLR   0,X,$01,LED20     ; BR IF NOT b0, IF COMMANDING FUEL <***
                                    ; ... else
          BRCLR   1,X,$01,LED77     ; BR IF NOT b0, IF COMMANDING OPEN LOOP <*
                                    ; ... else
          BRA     LED48             ; BR TO CLOSED LOOP


LED20:    BRSET   4,X,$04,LED77     ; BR IF b2, IF CONTROLLING AFR <*****
                                    ; .... else
        ;-----------------------------------------------------

        ;
        ; CK IF CLSD LOOP TIMER IS TIMED OUT ??
        ;
LED24:    LDAB    L0001             ;
```

```
          BITB    #$02              ;
          BNE     LED48             ;
                                    ; ... else

          LDD     L001A             ; Eng Run Time (sec)
          LSRD                      ; SACE BY 2 FOR TMR CK
          LDX     #$C556            ; 75 SEC, Cold Closed Lp Timer
          LDAA    L005F             ; COOL
          CMPA    LC553             ; Use Cold C Loop timer if Cool <= 15c
          BLS     LED3E             ; BR IF COOL GT 16c
                                    ; ... else
          INX                       ; LC557, Warm Closed Lp Timer
          CMPA    LC552             ; Use Hot C Loop timer If Cool T >= 70c
          BLS     LED3E             ; BR IF COOL GT 70c
                                    ; ... else
          INX                       ; LC558,  Hot Closed Lp Timer
LED3E:    CMPB    0,X               ;
          BCS     LED77             ;
                                    ; ... else
          LDAA    L0001             ;
          ORAA    #$02              ; SET b1,
          STAA    L0001             ;



LED48:    LDAA    L005B             ; COOLANT
          CMPA    LC551             ; 41c, Min Temp for Closed Loop
          BLS     LED77             ; BR IF COOL GT 41c
                                    ; ... else
          LDAA    L0033             ; MINOR LOOP MD WD 1
          BPL     LED59             ;
                                    ; ... else
          LDAA    L004B             ; HU SPK FLAGS
          ANDA    #$30              ; 0011 0000
          BNE     LED77             ;
                                    ; ... else
LED59:    BSET    L0033,$20         ; SET b5, (ENABLE MAF B/O)
          LDAB    L0001             ;
        ;
        ; CK  Cl/Lp o2 Not Ready timer
        ;
          LDAA    L00BE             ; Cl/Lp o2 NR timer, (200Ms inc)
          CMPA    LC55B             ; 10 Sec for o2 Max/Min
          BCC     LED6A             ; BR IF TIME GT 10 SEC'S
                                    ; ... else
          INCA                      ; INCR TMR
          STAA    L00BE             ; Cl/Lp o2 NR timer, (200Ms inc)

          BRA     LED6E             ;



LED6A:    ANDB    #$FE              ; CLR b0
          STAB    L0001             ;

LED6E:    RORB                      ;
          BCC     LED77             ;
                                    ; ... else
          LDAB    L0044             ;
          ORAB    #$80              ; SET b7
          BRA     LED7B             ;


LED77:    LDAB    L0044             ;
          ANDB    #$7F              ; CLR b7
LED7B:    STAB    L0044             ;
```

```
          BPL     LED9B             ;
                                    ; ... else

        ***********************************
        * BL STORE QUAL'S
        *
        ***********************************

          LDAA    L005B             ; GET CURRENT COOLANT
          CMPA    LC5DD             ; If Coolant 50c <= Disable BLM update
          BLS     LED9B             ; BR IF COOL GT 50c
                                    ; ... else
          CMPA    LC5DE             ; If Coolant >= 140c Disable BLM update
          BHI     LED9B             ; BR IF COOL LT 140c
                                    ; ... else

          LDX     L00CE             ; Total AFR Value
          CPX     LC3CB             ; STOCH RATIO
          BNE     LED9B             ; BR IF AFR IS NOT AT STOCH
                                    ; ... else
        ;
        ; QUAL'S MET, ENABLE BL STORE
        ;
          ORAB    #$02              ; SET b1

          LDAA    L0063             ;
          CMPA    LC5DF             ; 0, Min ld val for BLM
          BCC     LED9D             ;
                                    ; ... else

        ;
        ; QUAL'S NOT MET, DISABLE BL STORE
        ;
LED9B:    ANDB    #$FD              ; CLR b1
LED9D:    STAB    L0044             ;

          JSR     LDF9D             ; TO A/C ROUTINE

          RTS
    ****************************************************


    ****************************************************
    * MJR LOOP SEG 1,  Output Bit Sig', (TCC, CCP etc)
    *
    *
    *
    ****************************************************
LEDA3:    LDAA    L007E             ; Batt Volts Value, (A/D)
          CMPA    #171              ; 17.1 VDC
          BCS     LEDBA             ; BR IF BATT V LT 17.1 VDC
                                    ; ... else
          BSET    L003E,$10         ; Set Flg to Disable Burn off

          BRCLR   L0035,$40,LEDB5   ; BR IF NOT b6,  (HI V BATTERY)
                                    ; ... else
          BSET    L004F,$40         ; if yes set flg (b6)

          BRA     LEDC5             ;


LEDB5:    BSET    L0035,$40         ; SET b6, (HI V BATTERY)
          BRA     LEDBD             ;
```

```
LEDBA:    BCLR    L0035,$40         ; CLR b6, (HI V BATTERY)

LEDBD:    LDX     L0034             ; Ck Eng Run & Diag Modes
          BMI     LEDFD             ; Go if Eng Running
                                    ; ... else
          LDX     L0041             ; Get #rd Diag word
          BMI     LEDCA             ; Go if In diag
                                    ; ... else

        ;----------------------------------
        ;   Not in Diag & Eng not running
        ;----------------------------------
LEDC5:    LDX     #$D000            ;
          BRA     LEDCD             ;

        ;----------------------------------
        ;   In Diag & Eng not running
        ;----------------------------------
LEDCA:    LDX     #$DFFF            ;
LEDC5:    LDX     #$D000            ;
          BRA     LEDCD             ;

LEDCD:    STX     L3FD2             ; EGR PW Out Cnt'r
          JSR     LF3B5             ; 11 Usec Delay

          STX     L3FD6             ; TCC PW Out Cnt'r
          JSR     LF3B5             ; 11 Usec Delay

          STX     L3FD8             ; CCP PW Out Cnt'r
          JSR     LF3B5             ; 11 Usec Delay

          STX     L3FCC             ; PW Mod cnt'r, (P8) ARC
          JSR     LF3B5             ; 11 Usec Delay

          STX     L3FD4             ;PW Mod Cnt'r, Acell Enrich
          CPX     #$D000            ;
          BNE     LEDF4             ;
                                    ; ... else
          LDAA    L4004             ;Par I/O CSR
          ANDA    #$FD
          BRA     LEDF9             ;

LEDF4:    LDAA    L4004             ;Par I/O CSR
          ORAA    #2                ;0000 0010
LEDF9:    STAA    L4004             ;Par I/O CSR

          RTS

        ;--------------------
        ;   Air Inj Cnt'l
        ;--------------------
LEDFD:    LDX     #$DFFF            ;


        ;-------------------------------------------------
        ; CK IF IN ALDL MODE 4 <----****    LEE2A
        ;  Air Inj Cnt'l
        ;
        ; CNT'L WD 5, b5, ENABLE AIR MOD
        ; CNT'L WD 6, AIR INJ PWM VAL
        ;-------------------------------------------------
          BRCLR   L0035,$08,LEE1B   ; BR IF NOT b3, MODE 4

          LDAB    L0156             ; CNT'L WD, b5
          BITB    #$20              ; b5, ENABLE AIR MOD
```

```
          BEQ     LEE1B             ; BR IF NOT 1, (ENABLED)
                                    ; ... else
          LDAB    L0157             ; CNT'L WD 6, AIR INJ PWM VAL
          LDAA    #$34              ;
          ASLD                      ;
          ASLD                      ;
          ORAB    #03               ; b0 & b1

          PSHB                      ;
          PSHA                      ;
          PULX                      ;
          LDAA    L003E             ; Get Air Mode Wd.

          BRA     LEE24             ;
        ;-------------------------------------------------



LEE1B:    LDAA    L003E             ; GET AIR MODE Wd.
          BITA    #2                ; AIR INJ REQUESTED
          BNE     LEE24             ; iF YES Go TURN ON
                                    ; ... else
          LDX     #$D000            ; IF NO...
LEE24:    STX     L3FCC             ; (MPU CSR), TURN OFF
          LDX     #$DFFF            ; Load 100% D.C.


        ;-------------------------------------------------
        ; CK IF IN ALDL MODE 4 <----****        EE2A:
        ;
        ; CNT'L WD 5, b6,
        ; CNT'L WD 6, PWM VAL
        ;-------------------------------------------------
          BRCLR   L0035,$08,LEE43   ; BR IF NOT b3, MODE 4
                                    ; ... else
          LDAB    L0156             ; CNT'L WD 5, b6
          BITB    #$40              ; b6
          BEQ     LEE43             ; BR IF NOT b6
                                    ; ... esle
          LDAB    L0157             ; CNT'L WD 6, PWM D.C.
          LDAA    #$34              ;
          ASLD                      ;
          ASLD                      ;
          ORAB    #$03              ;
          PSHB                      ;
          PSHA                      ;
          PULX                      ;

          BRA     LEE4F             ;
        ;-------------------------------------------------



LEE43:    LDAB    LC015             ; Get Fuel/Air Mode Wd 2
          BEQ     LEE4C             ; BR IF Z
                                    ; ... else
          BITA    #$04              ; b2 = NUM OF AIR VALVES
          BNE     LEE4F             ; Go If Yes
                                    ; ... else
LEE4C:    LDX     #$D000            ; CLR ENAB Bit
LEE4F:    STX     L3FD4             ; ENRICH PW CNT'R
                                    ; - > Cont with A/C En/Dis

        ;---------------------------
        ;   TCC and or A/C Clutch
        ;---------------------------
```

```
          LDX     #$DFFF            ;

        ;
        ; CK IF Ck IF A/C if not do TCC
        ;
          LDAB    LC017             ; AFR MD WD 4
                                    ;  b7 = Use TCC out to Cnt'l A/C Clutch
          BPL     LEE6D             ;
                                    ; ... else


        ;-------------------------------------------------
        ; CK IF IN ALDL MODE 4 <----****
        ;  MODE 4 MD WD .., b1
        ; A/C ??
        ;-------------------------------------------------
          BRCLR   L0035,$08,LEE65   ; BR IF NOT b3, MODE 4
                                    ; ... else
          LDAA    L0156             ; MODE 4 MD WD ..
          BITA    #$02              ; b1
          BNE     LEE84             ; BR IF b1
                                    ; ... else
        ;-------------------------------------------------


        ;-------------------------------------------------
        ;   If A/C Then Set Up A/C Bit Invert
        ;
        ;-------------------------------------------------
LEE65:    LDAB    L0034             ; Get Mode Wd #1
          ANDB    #$20              ; 0010 0000
          EORB    #$20              ; Invert
          BRA     LEE96             ; To output Tst

LEE6D:    LDAB    LC014             ; Get Fuel/Air Mode Wd 1
          ASLB                      ; Is TCC sig used as Shft Lamp


          BPL     LEE79             ; Go If not

          BRCLR   L0035,$80,LEE98   ; BR IF NOT b7, OVERDRIVE ON
                                    ; Turn off If Lamp out

          BRA     LEE9B             ;
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; CK IF IN ALDL MODE 4 <----****
        ;  MODE 4 MD WD .., b2
        ;
        ;  TCC ??
        ;-------------------------------------------------
LEE79:    BRCLR   L0035,$08,LEE92   ; BR IG NOT b3, MODE 4
                                    ; ... else
          LDAA    L0156             ; MODE 4 MD WD ..
          BITA    #$04              ; b2
          BEQ     LEE92             ; BR IF NOT b2
                                    ; ... else
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; BR HERE FROM ALDL MODE 4 ROUTINE
        ;
        ;
```

```
        ;-------------------------------------------------
LEE84:    LDAA    #$34              ;
          LDAB    L0157             ; ALDL MD WD ...
          ASLD                      ;
          ASLD                      ;
          ORAB    #3                ;
          PSHB                      ;
          PSHA                      ;
          PULX                      ;

          BRA     LEE9B             ;
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; BR HERE FROM ALDL MODE 4 ROUTINE
        ; TCC CNT'L
        ;
        ;-------------------------------------------------
LEE92:    LDAB    L0037             ; Tst If TCC S/B locked
          BITB    #$20              ; b5
LEE96:    BNE     LEE9B             ; BR IF b5, TCC LOCKEDs
                                    ;  ... else
LEE98:    LDX     #$D000            ; If Not, Clr Lock Bit
LEE9B:    STX     L3FD6             ; TCC PW Cnt'r
        ;-------------------------------------------------



        ;-------------------------------------------------
        ;   CCP Cnt'l
        ;
        ;
        ;-------------------------------------------------



        ;-------------------------------------------------
        ; CK IF IN ALDL MODE 4 <----****
        ;  MODE 4 MD WD .., b3
        ;
        ; CCP DC
        ;-------------------------------------------------
          BRCLR   L0035,$08,LEEAE   ; BR IF NOT b3, MODE 4
                                    ; ... else
          LDAA    L0156             ; MODE 4 MD WD .., b3
          BITA    #8                ; b3
          BEQ     LEEAE             ;
                                    ; ... else
          LDAB    L0157             ; Get Purge Dty Cyc

          BRA     LEEB1             ;
        ;-------------------------------------------------



LEEAE:    LDAB    L0113             ; CCP PW

LEEB1:    LDAA    #$34              ; $D0 when shfted 2 times
          COMB                      ;
          ASLD                      ; Mult Dty Cycl By 4 (32Hz)
          ASLD                      ;
          ORAB    #3                ; 0000 0011
          STD     L3FD8             ; CCP PW Cnt'r

        ;----------------------
```

```
        ;   Cool Fan Cnt'l
        ;----------------------


        ;-------------------------------------------------
        ; CK IF IN ALDL MODE 4 <----****
        ;  MODE 4 MD WD .., b3
        ;
        ;  COOL FAN
        ;-------------------------------------------------
          BRCLR   L0035,$08,LEED3   ; BR IF NOT b3, MODE 4
                                    ; ... else
          LDAA    L0152             ; MODE 4 MD WD .., b3
          BITA    #2                ; 0000 0010 , Bit 1
          BEQ     LEED3             ; If Set
                                    ; ... else
          LDAA    L4004             ; Par I/O CSR
          LDAB    L0153             ;
          ANDB    #$02              ; 0000 0010, Bit 1
          ANDA    #$FD              ; 1111 1101, Mask off bit 2
          ABA                       ;

          BRA     LEEE3             ;
        ;-------------------------------------------------

LEED3:    LDAA    L4004             ; Par I/O CSR
          ANDA    #FD               ; 1111 1101
          TST     L00F4             ; Ck Fan Dty Cyc
          BEQ     LEEE3             ;
                                    ; ... else
          BRCLR   L0034,8,LEEE3     ; Go if Fan Disable not set
                                    ; ... else
          ORAA    #$02              ; SET b1
LEEE3:    STAA    L4004             ; Par I/O CSR

        ;------------------------
        ;   EGR & Air Switch
        ;------------------------

        ;-------------------------------------------------
        ; CK IF IN ALDL MODE 4
        ; EGR PW
        ; ALDL MODE 4,  MD WD ... b0
        ;-------------------------------------------------
          BRCLR   L0035,$08,LEEF6   ; BR IF NOT b3, MODE 4
                                    ; ... else
          LDAA    L0156             ; MD WD ... b0
          BITA    #$01              ; b0
          BEQ     LEEF6             ; BR IF NOT b0
                                    ; ... else
          LDAB    L0157             ; GET MODE 4 MD WD ..

          BRA     LEEFA             ;
        ;-------------------------------------------------

LEEF6:    LDAB    L0112             ; Out Fm EGR PW Mod
          COMB                      ;


        ;-------------------------------------------------
LEEFA:    LDAA    #34               ;
          ASLD                      ; Mult x 4 for 32 Hz op's
          ASLD                      ;
          ORAB    #$03              ; SET b0 & b1
          STD     L3FD2             ; Wr to EGR PW Cnt'r
```

```
        RTS                         ;
    ****************************************************


    ****************************************************
    * MAJOR LOOP SUBROUTINE SEG D,
    *
    *   Diagnostics
    *
    ****************************************************

        ;
        ;   DIAGNOSTICS
        ;
        ;   Eexcuted on 100 Ms Clk
        ;   Do Loging, and blinking of Err lamp
        ;
LEF04:  LDAB    L0000           ; Get Minor Lp counter
        LDAA    L003F           ; Get Diag mode wd #1
        ANDB    #$F0            ; 1111 0000, Mask ?
        BNE     LEF15           ;
                                ; ... else
        ORAA    #8              ; 0000 1000, Bit 3
        LDAB    L001B           ;
        RORB                    ;
        BCC     LEF15           ;
                                ; ... else
        ORAA    #$10            ; 0001 0000, Bit 4
LEF15:  STAA    L003F           ; Save Diag wd #1

        LDAB    L0041           ;

        LDAA    L0035           ; MNR LOOP MD WD 2
        BITA    #$10            ; b4, DIAG SW IN DIAG MODE
        BNE     LEF2C           ; BR IF b4,
                                ; ... else
        ANDB    #$7F            ;
        STAB    L0041           ;
                                ;
        LDAA    L003C           ;
        ANDA    #$E3            ;
        STAA    L003C           ;
                                ;
        JMP     LEF92           ;


LEF2C:  ORAB    #$80            ;
        STAB    L0041           ;
        CLR     L00B1           ; Err Lamp Tmr, (100Ms)
        LDAA    L0034           ;
        BMI     LEF40           ;
                                ; ... else
        LDAA    L003C           ;
        ANDA    #$E3            ;
        STAA    L003C           ;
        JMP     LEFFE           ;


LEF40:  LDAB    L0044           ;
        BMI     LEF51           ;
                                ; ... else
LEF44:  LDAA    L003C           ;
        ANDA    #$F7            ;
        EORA    #$40            ;
        STAA    L003C           ;
```

```
          ASLA                      ;
          BMI     LEF87             ;
                                    ; ... else
          BRA     LEF78             ;


LEF51:    LDAA    L003C             ;
          BITA    #$0008            ;
          BNE     LEF68             ;
                                    ; ... else
          LDAB    L003F             ;
          BITB    #8                ;
          BEQ     LEF44             ;
                                    ; ... else
          ORAA    #8                ;
          STAA    L003C             ;
LEF61:    LDAB    L0044             ;
          ASLB                      ;
          BMI     LEF7F             ;
                                    ; ... else
          BRA     LEF84             ;


LEF68:    LDAA    L003F             ;
          BITA    #8                ;
          BEQ     LEF87             ;
                                    ; ... else
          LDAA    L003C             ;
          BITA    #$10              ; b4
          BEQ     LEF61             ; BR IF NOT b4
                                    ; ... else
          ANDA    #$EF              ; 1110 1111
          STAA    L003C             ;

LEF78:    LDD     L3FFC             ; MCU CSR
          BITB    #$08              ; b3
          BEQ     LEF84             ; BR IF NOT b3
                                    ; ... else
LEF7F:    JSR     LF498             ;


          BRA     LEF87             ;
LEF84:    JSR     LF4A6             ;


LEF87:    CLRB                      ;
          STAB    L0042             ; DIAG CNT'L WD

          LDAA    L003C             ;
          ORAA    #$04              ;
          STAA    L003C             ;

          BRA     LEFCC             ;

    ;----------------------------
    ;   End of Field Sev Mode
    ;----------------------------
LEF92:    CLRB                      ; Reset Flash Cnt'l Wd
          STAB    L0042             ; DIAG CNT'L WD

          LDAA    L004E             ; NEW ERR 2
          ANDA    L0053             ;
          ANDA    #$01              ;
          BEQ     LEFA9             ;
                                    ; ... else
          ORAA    L0007             ; Err #3 Flg word
```

```
          STAA    L0007             ; Err #3 Flg word

          JSR     LF3A7             ; NV MEM Wd's Ck Sum

          STD     L0018             ; Save Ck Sum OF Err Words

          JMP     LF0FC             ;



LEFA9:    LDAA    L0034             ; Ck If ENG Running
          BMI     LEFCC             ; BR IF YES, GOT DO DIAG
                                    ; ... else
          STAB    L00A7             ; TPS Err cnt'r,(100Ms)
          STAB    L00AB             ; VSS Err cnt'r
          STAB    L00A8             ; o2 Lan Cnt'r (2 Sec)
          STAB    L00A9             ; o2 Sensor Rich tmr, (2 Sec)

          STAB    L00AA             ; o2 Sensor Hvy Ld Cnt'r, (2 Sec)
          STAB    L00B5             ; ERR 34 TMR
          STAB    L00AC             ; Lo MAT Err #23
          STAB    L00AD             ; Hi MAT cnt'r, Err#25
          STAB    L00AE             ; EGR Diag Cnt'tr
          STAB    L00AF             ;

          LDAA    L0033             ; MINOR LOOP MD WD 1
          BITA    #$10              ; B4, (1 = IGN ON)
          BEQ     LEFC9             ; GO if Yes
                                    ; ... else
          STAB    L00B0             ; Clr Err #3 Timer

LEFC9:    JMP     LEFFE             ; Goto to Err log filter
    ****************************************************



    ****************************************************
    * MAIN BACKGROUND DIAGNOSTICS
    *
    *
    ****************************************************
LEFCC:    LDAA    L003F             ; Get Diag Mode Wd #1
          BITA    #$02              ; b1
          BNE     LEFFB             ; Go do Err Checks
                                    ; ... else
        ;
        ;   Clr bulb Tst After Dly time
        ;       & eng Running
        ;
          LDAB    L001B             ;
          CMPB    LC1DA             ; 0,  Ck Eng Lmp Bulb tst time
          BCS     LEFFB             ;
                                    ; ... else
          ORAA    #$02              ; b1
          STAA    L003F             ;
          INC     L0017             ; Inc No Err Counter
          LDAA    L0017             ; No Err Counter

          CMPA    LC1D5             ;
          BLS     LEFFB             ; Begin Err Chk's
                                    ; ... else

        ;--------------------
        ; CLR ALL ERRORS
        ;------------------
          CLRA                      ; If Yes, Clr All Errs & ck sum
```

```
          STAA    L0005           ; Err #1 Flag word
          STAA    L0006           ; Err #2 Flg word
          STAA    L0007           ; Err #3 Flg word
          STAA    L0008           ; Err #4 Flaf word
          STAA    L0009           ; Err #5 Flg Word
          STAA    L0017           ; No Err Counter
          STAA    L0042           ; DIAG CNT'L WD

          JSR     LF3A7           ; Call EEPROM ERR Wd's Ck Sum

          STD     L0018           ; Ck Sum OF Err Words

LEFFB:    JSR     LE4F7           ;


        ;
        ;   Err Loggong Filter
        ;   Turn Sys Err If Time constraints meet
        ;
        ;
LEFFE:    LDAA    L003C           ; ALCL MOD WD
          BITA    #$04            ; b2, FIEL SERVICE MODE
          BEQ     LF007           ; BR IF NOT b2
                                  ; ... else
          JMP     LF0FF           ; EXIT THIS ROUTINE


LF007:    LDAA    L0041           ; DIAG MODE WD
          BPL     LF00E           ; BR IF IN
                                  ; ... else

          JMP     LF10E           ;



LF00E:    LDAA    L0033           ; MINOR LOOP MD WD 1
          BITA    #$10            ; b4, (1 = IGN ON)
          BEQ     LF017           ; BR IF NOT b4
                                  ; ... else
          JMP     LF0FF           ;


LF017:    LDAA    L0051           ;
          ORAA    L0052           ;
          ORAA    L0053           ;
          ORAA    L0054           ;
          ORAA    L0055           ;
          BNE     LF058           ; BR IF NZ
                                  ; ... else
          LDD     L004C           ; NEW ERR 1             ;
          ANDA    LC1D0           ; 1111 0111, Mask For Mal Funct flg 1
          ANDB    LC1D1           ; 1100 1110, Mask For Mal Funct flg 2
          STD     L0051           ;

          LDD     LC1D2           ; Mask For ERR flag 3
          ORAA    #$01            ; ERR Code 51   Prom Error
          ANDA    L004E           ;    NEW ERR 2
          ANDB    L004F           ;
          STD     L0053           ;

          LDAA    L0050           ; NEW ERR 3
          ANDA    LC1D4           ; Mask For ERR flag 5
          STAA    L0055           ;

          LDAA    L00B1           ; Err Lamp Tmr, (100Ms)
```

```
          BEQ     LF049             ;
                                    ; ... else
          DEC     L00B1             ; Err Lamp Tmr, (100Ms)

          JMP     LF0C8             ;


LF049:    LDAA    L0041             ;
          ANDA    #$00FE            ;
          STAA    L0041             ;

          LDAA    L003B             ;
          ANDA    #$00FB            ;
          STAA    L003B             ;

          JMP     LF0C8             ;


LF058:    CLRA                      ;
          LDY     #$C1D4            ;
          LDX     #$0050            ;
LF060:    LDAB    0,Y               ;
          ANDB    0,X               ;
          ANDB    5,X               ;
          STAB    5,X               ;
          BEQ     LF06C             ;
                                    ; ... else
          INCA                      ;
LF06C:    DEY                       ;
          DEX                       ;
          CPX     #$004B            ;
          BNE     LF060             ;
                                    ; ... else
          INC     L00B1             ; Err Lamp Tmr, (100Ms)
          LDAB    L0041             ;
          TSTA                      ;
          BNE     LF090             ;
                                    ; ... else
          LDAA    L00B1             ; Err Lamp Tmr, (100Ms)
          RORB                      ;
          BCS     LF086             ;
                                    ; ... else
          LDAB    LC1D6             ;

          BRA     LF089             ;


LF086:    LDAB    LC1D8             ;
LF089:    CBA                       ;
          BCS     LF0C8             ;
                                    ; ... else
          STAB    L00B1             ;Err Lamp Tmr, (100Ms)
          BRA     LF0C8             ;


LF090:    LDAA    L00B1             ;Err Lamp Tmr, (100Ms)
          RORB                      ;
          BCS     LF09A             ;
                                    ; ... else
          LDAB    LC1D7             ;
          BRA     LF09D             ;


LF09A:    LDAB    LC1D9             ;
LF09D:    CBA                       ;
          BCS     LF0C8             ;
```

```
                                    ; ... else
          LDAA    LC1D8             ;
          STAA    L00B1             ; Err Lamp Tmr, (100Ms)

          LDAA    L0041             ;
          ORAA    #$0001            ;
          STAA    L0041             ;

          CLRB                      ;

          LDX     #$0005            ;
LF0AF:    LDAA    4,X               ;
          ORAA    $50,X             ;
          STAA    4,X               ;
          STAB    $50,X             ;
          DEX                       ;
          BNE     LF0AF             ;
                                    ; ... else
          CLR     L0017             ; No Err Counter
                                    ;
          JSR     LF3A7             ; Call EEPROM ERR Wd's Ck Sum

          STD     L0018             ; Ck Sum OF Err Words

          LDAA    L003B             ;
          ORAA    4                 ;
          STAA    L003B             ;
LF0C8:    LDAA    L0034             ;
          BMI     LF0D4             ;
                                    ; ... else
          BITA    #2                ;
          BNE     LF0FC             ;
                                    ; ... else
          ORAA    #2                ;
          BRA     LF0D6             ;


LF0D4:    ANDA    #$FD              ;
LF0D6:    STAA    L0034             ;


        ;-------------------------------------------------
        ; CK IF IN ALDL MODE 4
        ;
        ;
        ; ALDL MODE 4,  MD WD ... b0
        ;
        ;-------------------------------------------------
          BRCLR   L0035,$08,LF0EC   ;
                                    ; ... else
          LDAA    L0152             ; MD WD .. b0
          BITA    #$01              ;
          BEQ     LF0EC             ;
                                    ; ... else
          LDAA    L0153             ; MD WD .. b0
          BITA    #$01              ;
          BEQ     LF0F7             ;
                                    ; ... else
          BRA     LF0FC             ;
        ;-------------------------------------------------


LF0EC:    LDAA    L0041             ;
          RORA                      ;
          BCS     LF0FC             ;
                                    ; ... else
```

```
          LDAA    L003F             ;
          BITA    #2                ;
          BEQ     LF0FC             ;
                                    ; ... else
LF0F7:    JSR     LF4A6             ;

          BRA     LF0FF             ;



LF0FC:    JSR     LF498             ;

        ;
        ; EXIT HERE ...
        ;
LF0FF:    LDAA    L003F             ;  ERR MD WD
          ANDA    #$E7              ;  CLE 1 & 2 SEC FLAGS
          STAA    L003F             ;

        ;
        ;CLEAR ALL NEW ERR'S
        ;
          CLRA                      ;
          CLRB                      ;
          STD     L004C             ; NEW ERR 1
          STD     L004E             ; NEW ERR 2
          STAA    L0050             ; NEW ERR 3

          RTS                       ;
    ******************************************************




    ******************************************************
    * FLASH ERROR CODES FOR EACH ERR IN MEM
    *
    ******************************************************
LF10E:    LDAA    L0042             ;
          BITA    #$40              ; b6,
          BEQ     LF166             ;
                                    ; ... else
          DEC     L00BD             ;
          LDAB    L00BD             ;
          BEQ     LF11D             ;
                                    ; ... else
          BRA     LF0FF             ;


LF11D:    BITA    #$10              ; b4, LIGHT ON
          BEQ     LF12B             ; BR IF NOT
                                    ; ... else
          ANDA    #$EF              ; CLR b4, TURN OFF LIGHT
          LDAB    #$04              ; b2,
LF125:    STAA    L0042             ;
LF127:    STAB    L00BD             ;

          BRA     LF0F7             ;

        ;
        ; READY FOR 2ND BYTE ?
        ;
LF12B:    BITA    #$20              ; b5,
          BNE     LF139             ;
                                    ; ... else
          LDAB    L00B9             ;CNTR for blk 1st ERR Code DIgit
```

```
          BNE     LF142           ;
          LDAB    #8              ;
          ORAA    #$20            ;

          BRA     LF125           ;


        ;
        ; 2ND BYTE DONE ?
        ;
LF139:    LDAB    L00BA           ;CNTR for blk 2nd ERR Code digit
          BEQ     LF14F           ;
                                  ; ... else
          DECB                    ;
          STAB    L00BA           ; CNTR for blk 2nd ERR Code digit
          BRA     LF145           ;


LF142:    DECB                    ;
          STAB    L00B9           ; CNTR for blk 1st ERR Code digit

LF145:    ORAA    #$0010          ; TURN LIGHT ON
          STAA    L0042           ;

          LDAA    #$04            ;
          STAA    L00BD           ;

          BRA     LF0FC           ;

        ;
        ;
        ;
LF14F:    LDAB    L00BB           ; Cnt for Current Err in Blink out
          ANDA    #$03            ;
          BEQ     LF15C           ;
                                  ; ... else
          LDAA    L0042           ;
          DECA                    ;
          ANDA    #$00DF          ;
          BRA     LF1AB           ;


LF15C:    LDAA    L00BC           ; Cntr for Rotaint Err In Blnk Disp
LF15E:    INCB                    ;
          CMPB    #$25            ;
          BCS     LF168           ;
                                  ; ... else
          CLRA                    ;
          BRA     LF125           ;


LF166:    LDAB    #2              ;
LF168:    CMPB    #2              ;
          BNE     LF174           ;
                                  ; ... else
          LDAA    L0005           ; Err #1 Flag word
          ANDA    LC1D0           ;
          ROLA                    ;
          BRA     LF1A5           ;



LF174:    CMPB    #10             ;
          BNE     LF17F           ;
                                  ; ... else
```

```
          LDAA    L0006             ; Err #2 Flg word
          ANDA    LC1D1             ; Mask for ERR flag 2

          BRA     LF1A2             ;

LF17F:    CMPB    #$12              ;
          BNE     LF18C             ;
                                    ; ... else

          LDAA    LC1D2             ; Mask For ERR flag 3
          ORAA    #1                ; SET b0
          ANDA    L0007             ; Err #3 Flg word

          BRA     LF1A2             ;


LF18C:    CMPB    #$1A              ;
          BNE     LF197             ;
                                    ; ... else
          LDAA    LC1D3             ; Mask for ERR flg 4
          ANDA    L0008             ; Err #4 Flag word

          BRA     LF1A2             ;


LF197:    CMPB    #$22              ;
          BNE     LF1A2             ;
                                    ; ... else
          LDAA    L0009             ; Err #5 Flg Word
          ANDA    #$E0              ;
          ANDA    LC1D4             ; Mask for ERR flg 5

LF1A2:    ROLA                      ;
          BCC     LF15E             ;
                                    ; ... else
LF1A5:    STAA    L00BC             ; Cntr for Rotatate Err In Blnk Disp
          STAB    L00BB             ; Cnt for Current Err in Blink out

          LDAA    #$42              ;
LF1AB:    STAA    L0042             ;

          CLRA                      ;
LF1AE:    INCA                      ;
          SUBB    #6                ;
          BHI     LF1AE             ;
                                    ; ... else
          ADDB    #$0006            ;
          STAA    L00B9             ; CNTR for blk 1st ERR Code digit
          STAB    L00BA             ; CNTR for blk 2nd ERR Code digit

          LDAB    #$1C              ;

          JMP     LF127             ;
    ******************************************************


    ******************************************************
    *       SUBROUTINES
    *
    *   PUBLIC Enties for:
    *           LF1BE   A/D Read
    *           LF1C3   READ A/D PORT & MONITOR BUSS FOR FAIL
    *           LF1E0   ACCESS FMD LINE STATUS
    *           LF1F9   XMIT DATA ON S3 SERIAL BUSS
    *           LF215   FRACTIONAL DIVIDE
```

```
*           LF21A   TOGGLE FMD COP
*           LF231   GET IDLE AIR CONDITION
*           LF242   TURN ON/OFF IAC COILS
*           LF250   LAG FILTER242
*           LF266   8 x 16 MULT (RE-ENTRANT)
*           LF27C   3d TABLE LK UP
*           LF2B9   2d TABLE LK UP
*           LF2F0   16 x 16 MULTIPLY
*           LF32E   CALCULATE A STD GM CHECKSUM
*           LF3A7   CALCULATE A ERR WD CHECKSUM
*           LF      NORMALAZED TPS
*           LF3B5   11 usec DELAY
*           LF465   LIMIT A REG VAL'S
*           LF472   Factor in a 8 x 16 Multiply
*           LF498   Set Up MCU CSR
*           LF49A   Turn off a CSR bit
*           LF4A6   TURN OFF ERR LAMP
*           LF4A8   Turn On a CSR bit
    ****************************************************


    ****************************************************
    *   A/D sub Routine
    *
    *   Enter With  A/D Ch 0 - B in A Reg.
    *   Return w/Resultds in A Reg.
    *
    *
    ****************************************************
LF1BE:    SEI                       ; Set Int Mask
          BSR     LF1C3             ; To A/D routine
          CLI                       ; Clr int mask, Int's Enabled


          RTS                       ;

        ;----------------------------------
        ;   A/D Subroutine
        ;----------------------------------
LF1C3:    PSHB                      ; Save Reg,s
          PSHX                      ;
          LDX     #$4002            ; Point to Serial Data Latch
          BCLR    0,X,8             ; Clr Bit 8
          JSR     LF1F9             ; Xmit to Serial Data

          STAA    L0064             ; Save to RAM Buffer

          LDAA    #7                ; DELAY VALUE
LF1D2:    DECA                      ;
          BNE     LF1D2             ; Loop till 0
                                    ; ... else
          LDAA    #$B0              ; 176d
          JSR     LF1F9             ; Xmit to Serial Data

          BSET    0,X,$08           ; Set b3, DISABLE SAD

          PULX                      ; Restore Reg's
          PULB                      ;

                RTS                           ;
    ****************************************************


    ****************************************************
    * P4 MODE'ING DEVICE, SPI READ
    *
```

```
    * 1. LF1E0, SEL FMD ON SPI & READ BYTE 1, WHICH HAS FMD
    *    DESCRETES
    *
    * 2. LF1E5, SEL FMD ON SPI & READ BYTE 2
    *
    *
    * RETURNS WITH:
    *        BYTE IN A Reg
    *        CY CLR IF NO FAILURE
    ****************************************************

        ;
        ; READ BYTE 1
        ;
LF1E0:    BCLR    L0030,$80         ; CLR b7, SEL FMD b1 READ
          BRA     LF1E8             ;

        ;
        ; READ BYTE 2
        ;
LF1E5:    BSET    L0030,$80         ; SET b7, SEL FMD b2 READ

LF1E8:    PSHX                      ;
          LDX     #$4002            ; ENABLE CS FOR FMD
          BSET    0,X,$04           ; Set b2

          LDAA    L0030             ; SET UP FMD SPI INPUT
          JSR     LF1F9             ; READ SEL FMD BYTES

          BCLR    0,X,$04           ; CLR b2, DISABLE FMD
          PULX                      ;

          RTS                       ;
        ***************************************************



        ***************************************************
        * Xmit to SPI Data
        *
        *  DATA FROM A Reg LOAD SPI SR AND TRANSMITS
        *  TO SELECED DEVICE VIA SPI
        *
        *  CALL:
        *       A = DATA TO BE XMITED VIA SPI
        *
        *   RETURNING:
        *       A = RX'ED SPI DATA (O IF SPI FAIL)
        *
        ***************************************************
LF1F9:    PSHX                      ; Save X reg

          STAA    L4000             ; To SPI S/Reg.

          LDX     #$4001            ;
          BCLR    0,X,$80           ; Clr b7, TO START SPI XMIT

        ;
        ; WAIT FOR SPI TO FINISH, 256 CYC MIN
        ;
          LDAA    #22               ; TIME DELAY VAL
          CLC                       ; CLR CY, SPI I/O ERR FLG

LF206:    BRSET   0,X,$80,LF210     ; BR IF b7, SPI DONE
                                    ; ... else
          DECA                      ; DEC DELAY VALUE
```

```
          BNE     LF206             ; BR IF DELAY NOT DONE
                                    ; ... else
          SEC                       ;
          BRA     LF213             ;

          ;
          ; GET RETURNED DATA FROM SPI
          ;
LF210:    LDAA    L4000             ; Fm SPI S/Reg

LF213:    PULX                      ;

          RTS                       ;
         ***************************************************



     ***************************************************
     * FRACTIONAL DIVIDE
     *
     *
     ***************************************************
LF215:    FDIV                      ; DIVIDE
          PSHX                      ; SAVE QOUTIENT

          PULA                      ;
          PULB                      ;

          RTS                       ;
     ***************************************************


     ***************************************************
     * TOGGLE FMD COP
     *    LD FMD SPI IMAGE
     *    TOGGLE COP2 in BYTE
     *    OUTPUT via SPI
     *
     ***************************************************
LF21A:    PSHX                      ;
          LDAA    L0030             ; ACCESS SPI BYTE
          EORA    #$02              ; COP2
          STAA    L0030             ;

          SEI                       ;

          LDX     #$4002            ; Pt to SPI Data Latch
          BSET    0,X,4             ; SEL FMD CHIP
          JSR     LF1F9             ; Xmit via SPI

          BCLR    0,X,4             ; UN-SEL FMD CHIP
          CLI                       ;
          PULX                      ;

          RTS
    ***************************************************

    ***************************************************
    * GET IDLE AIR CONDITIONS
    *
    * RETURNS WITH:
    *           STATUS OF IAC  A,B & C
    ***************************************************
LF231:    PSHX                      ;
          LDAA    L4002             ; Get SPI Data Latch
          ANDA    #$03              ; MASK OFF IAC BITS
```

```
          LDX     #$4004            ; IO CNT'L REG PORT ADDRESS
          BRCLR   0,X,4,LF240       ; IAC C ON
                                    ; ... else
          ORAA    #$04              ; TURN ON BIT
LF240:    PULX                      ;

          RTS                       ;
    ******************************************************


    ******************************************************
    * OUTPUT THE IAC SOLENOIDS
    *   TOGGLES OF IAC SOLENOIDS
    *
    *
    ******************************************************
LF242:    PSHB                      ;
          ANDA    #$03              ; MASK b0 & b1
          LDAB    L4002             ; Get SPI Data Latch
          ANDB    #$FC              ; MASK OFF LOW ORDER
          ABA                       ; NEW STATE
          STAA    L4002             ; To SPI Data Latch
          PULB                      ;

          RTS                       ;
    ******************************************************


    ******************************************************
    *   FIRST ORDER LAG FILTER
    *
    * CALLING:
    *       X = OLD FILT VALUE
    *       A = NEW VALUE TO BE FILTERED
    *       B = FILT CONSTANT
    *
    * RETURNING:
    *       D = NEW FILT VALUE
    *
    ******************************************************
F250:    PSHX                      ;
          PSHB                      ;

          MUL                       ;
          PSHB                      ;
          PSHA                      ;

          TSX                       ;
          LDAA    $2,X              ;
          INX                       ;
          INX                       ;
          INX                       ;
          NEGA                      ;

          JSR     LF266             ; MUL8X16

          TSX                       ;
          ADDD    0,X               ;
          PULX                      ;
          INS                       ;
          PULX                      ;

          RTS
    ******************************************************
```

```
    ******************************************************
    * MUL8X16
    * 8 X 16 Multiply with 16 bit result.
    *
    * output is rounded for 16 bit result.
    *
    *   Calling Arg:
    *           A ACC = 8 BIT Multiplier
    *           X REG = Address of 16 Bit Multiplicand
    *
    *   Returns with:
    *           A ACC = MSB of result
    *           B ACC = LSB 0f result
    *   Regesters affected:
    *           A, B & Conditions Regester
    *   Execution time:
    *           68 CPU Cycles
    *   Stack Used:
    *           4 bytes
    *   Subs Called:
    *           None
    ******************************************************
    ORG $F266

LF266:
    PSHX            ; Save mutiplcand on stx
    PSHA            ; save Mult'er on stx

    LDAB    1,X
    MUL             ; Get 1st partial prod
    ADCA    #0
    PSHA            ; Save partial prod.

    LDAA    0,X
    TSX
    LDAB    1,X
    MUL             ; Get 2nd Partial prod.
    ADDB    0,X     ; Add 1st part prod to 2nd.
    ADCA    #0

    PULX            ; Restore STX
    PULX            ; Get Mutl'cnd to X Reg.

    RTS             ; & Return


    ;-------------------------------------------------
    ;   Throw out Extranious Interupts
    ;-------------------------------------------------
LXXX:
          RTI
    ******************************************************

    ******************************************************
    ; LKUP3D.src        FROM BUA.BIN, 86 VETTE
    ;   Main Look Up Subroutine, (3 Dem)
    ;
    ;   Enter with:
    ;       R = number of rows in table
    ;       Q = minimum value of columns
    ;       RNUM =  Number of Q values, (NUM OF BK POINTS)
    ;
    ;   Max Value Diff between talbe entries = 255
    ;   Call With:
    ;       A = Row Arg
```

```
;       B = Col Arg
;       X = Tbl Addr
;
;   Returns with:
;           ACCA = Result, (Y = F(Q,R)
;
;   Regesters affected:
;           A ACC & Conditions Regester
;
;   Execution time:
;           155 CPU Cycles + (2 * p4lkupq+p4lkupr)
;
;   Stack Used:
;           11 bytes
;
;   Subs Called:
;           p4lkupq
;           p4lkupr
;
;
;   $F27C - $F2EF, ($79, 121d BYTES)
;
;*****************************************************
    ORG $F27C

LF27C:    SUBA    0,X           ; Calc Row Arg offset, (Lmt to 0)
          PSHB                  ; Save Col Arg to stack
          PSHX                  ; Save Tbl offset to stack
          BCC     LF283         ; BR IF NO UNDERFLOW
                                ; ... else
          CLRA                  ;

LF283:    SUBB    1,X           ; Calc  Col Arg offset, (Lmt to 0)
          BCC     LF288         ; BR IF NO UNDERFLOW
                                ; ... else
          CLRB                  ;

LF288:    PSHB                  ; Save Col Arg to stack
          LDAB    #16           ; Make In Arg Into Interp Inc's

          MUL                   ; Calc Col Arg offset, (Lmt to 0)
          PSHB                  ; Save Interp Inc's tp stack

          LDAB    2,X           ; Set Addr of tbl
          PSHB                  ;
          MUL                   ;
          ABX                   ;
          INX                   ;
          INX                   ;
          INX                   ;
          PSHX                  ; Save Tbl Addr on stack

          TSX                   ;
    ;
    ;Call 2d Lk Up, (No Offset)
    ;
          LDAA    4,X               ;Get Col Arg for Lk Up
          LDX     0,X               ;Tbl Addr
          JSR     LF2C6             ;Call 2d Lk Up, (No Offset)

          PSHA                      ;Save result Of Lk Up to stack

          TSX                       ;
          LDAA    5,X               ; Get Col Arg
          LDAB    4,X               ;
          STAB    5,X               ; Put R(low) in highest STX
```

```
      LDAB    3,X               ; RNUM

      LDX     1,X               ; Addr of Table
      ABX                       ; R1 + RNUM
      JSR     LF2C6             ; Call 2d Lk Up, (No Offset)

      TAB                       ;
      PULA                      ;
      PULX                      ;
      PULX                      ;
      JSR     LF2D6             ; Call Interpolate routine

      INS                       ; Restore Stack
      PULX                      ; Restore X
      PULB                      ; Restore B

      RTS
*****************************************************
;-----------------------------------------------

*****************************************************
;   Look Up Routine 2 dimentional
;
;   Use for tables with 1 byte Unsigned values and
;   fixed spacing and a 1 byte unsigned Variable
;
;   Four entries are provides, see each for enty & exit
;   conditions.
;   Enter with:
;       FOUR ENTRY POINTS:
;
;   1. LKUP2D:  A ACC = Independent Var Value
;           B ACC = Offset to be subtracted fm A ACC
;                       prior to table look up
;
;   2. LKUPQ:   A ACC = Independent Var Value, offset=0)
;           X REG = Address of table
;
;   3. LKUPR:   A ACC = 1st value for interpelation
;           B ACC = 2nd value for interpelation
;
;   4. LKUP2C:  A ACC = Independent Var Value, offset=0)
;           X REG = Address of table
;
;   Returns with:
;           ACC A = Result, (Single byte Un-signed table value)
;
;   Regesters affected:
;           A ACC & Conditions Regester
;
;   Execution time:
;           LKUP2D:  128 CPU cycles
;           LKUPQ:   118
;           LKUPR:    62
;           LKUP2C:  126
;
;   Stack Used:
;           LKUP2D: 10 bytes
;           LKUPQ:  10 bytes
;           LKUPR:   4 bytes
;           LKUP2C  10 bytes
;
;   Subs Called:
;           None
*****************************************************
```

```
    ******************************************************
    ;p4lkup2d Entry Point
    ;
    ;   Use When an Offset of the Independent Var is in B
    ;
    ;   Enter with:
    ;       X = Addr of table
    ;       A = Independent Var
    ;       B = Offset to be sub'ed fm A
    ;
    ;   Return with:
    ;       A = Results
    ;
    ;   128 Cycles
    ******************************************************
LF2B9:    SBA                       ;Sub Off set
          BCC     LF2C6             ;if not L.T. Zero,
                                    ; - Call 2d Lk Up, (No Offset)
                                    ; ... else
          CLRA                      ;Set To Zero if L.T.
          BRA     LF2C6             ;& go to Lk Up
                                    ; - Call 2d Lk Up, (No Offset)

    ;-----------------------------------------------
    ;
    ;   Use to interpolate fn table with fixed spacing which
    ;   is specified in 1st byte of table, No B offset is
    ;   allowed.
    ;
    ;   Enter with:
    ;       X = Addr of table
    ;       A = Independent Variable
    ;
    ;   Return with:
    ;       A = Results
    ;
    ;   126 Cycles
    ;-----------------------------------------------
LF2BF:    PSHB                      ; Save B
          PSHX                      ; Save Table Addr
          LDAB    0,X               ; Get Spacing value
          INX                       ;

          BRA     LF2CA             ; Goto to Lk Up

    ;-------------------------------------------------------
    ; 2d LK UP, Use When no Offset of the Independent Var.
    ;
    ;   Enter with:
    ;       X = Addr of table
    ;       A = Independent Var, (offset = 0)
    ;
    ;   Return with:
    ;       A = Results
    ;
    ;   118 Cycles
    ;-----------------------------------------------
LF2C6:    PSHB                      ; Save Col Input Arg
          PSHX                      ; Save Tabl Addr

          LDAB    #16               ; Set Spacing
LF2CA:    MUL                       ; Calc Increment
          PSHB                      ; Save Increment on Stack
          TAB                       ;
          ABX                       ;
          LDD     0,X               ;
```

```
          BSR     LF2D6             ; Call Interpolate routine

          PULB                      ; Restore Stack
          PULX                      ;
          PULB                      ;

          RTS                       ; Return to Caller
    ******************************************************


    ******************************************************
    ;   Interpolation Subroutine
    ;
    ;   Use to interplate two 8 bit Values
    ;
    ;   Enter with:
    ;       A = 1st Vaulue for interpolation
    ;       B = 2nd Value for interpolation
    ;
    ;   Return with:
    ;       Stack = Results
    ;
    ;   62 Cycles
    ******************************************************
LF2D6:    PSHX                      ;Save X
          PSHB                      ;Save B
          PSHA                      ;Vave A

          SBA                       ;Less than 0 ?
          TSX                       ;

          LDAB    6,X               ;Get Increment Multiplier
          BCS     LF2E8             ;If Cy Set go
                                    ; ... else
    ;-----------------------------
    ; Interp & rnd Dwn if required
    ;-----------------------------
          MUL                       ;
          NEGA                      ;
          ADDA    0,X
          ASLB                      ;
          SBCA    #0                ;
          BRA     LF2EC             ;

    ;--------------------
    ; Interp & round UP
    ;--------------------
LF2E8:    NEGA

          MUL                       ;
          ADCA    0,X               ;
LF2EC:    INS                       ;Restore Stack
          PULB                      ;
          PULX                      ;

          RTS                       ;
    ******************************************************


    ******************************************************
    ; MUL16X16
    ;   16 * 16 Mult Fixed Point Routine
    ;
    ;   Call with:
    ;       X = Multiplicand
```

```
;       A = MSB of Multiplier
;       B = LSB of Multiplier
;
;   Returns with:
;       A ACC = Middle 2 bytes of 32 bit product
;       B ACC = Middle 2 bytes of 32 bit product
;       X REG = upper  2 bytes of 32 bit result.
;
;   Regesters affected:
;           A, B, X & Conditions Regester
;   Execution time = 182 CVycles max
;
;   Middle (A & B) will be set to $FFFF if MSB oof the
;    result is N.Z.
*****************************************************
    ORG $F2F0

LF2F0:
          PSHA                      ; Reserve for MSB of Result
          PSHX                      ; Reserve for Part Result
          PSHX                      ; Save Mutlpcand to Stack
          PSHB                      ; Save LSB of Mult to Stack
          PSHA                      ; Save MSB of Mult to Stack

          TSX                       ;
          LDAA    3,X               ;
          MUL                       ; LSB of Mult'cnd * LSM of Mult

          ADCA    #0                ;
          STAA    5,X               ;

          LDD     1,X               ;
          MUL                       ; LSB of Mult * MSB of Mult'cnd

          ADDB    5,X               ;
          ADCA    #0                ;
          STD     4,X               ;

          LDAA    0,X               ; MSB mult'plr X LSB -
                                    ; Mult'cand
          LDAB    3,X               ;
          CLR     6,X               ; Clr MSB Of Result
          MUL                       ; MSB Mult * LSB of Mult'cnd
          ADDD    4,X               ;
          ROL     6,X               ;
          STD     4,X               ;

          LDAA    0,X
          LDAB    2,X               ;
          MUL                       ; MSB Mult * MSB Mult'cnd
          ADDB    4,X               ; MSB Result In A&B
          ADCA    6,X               ;
          STAB    4,X               ;
          STD     2,X               ; 2 High Bytes to X

          TSTA                      ; Hi Byte N.Z. ?
          BEQ     LF328             ; If No go
                                    ; ... else
          LDD     #$FFFF            ; Else Set To $FFFF
          STD     4,X               ;

LF328:    PULX                      ; Higher Bytes to X
          PULX                      ;
          PULA                      ; Middle bytes Results to A & B
          PULB                      ;
          INS                       ; Restore Stack
```

```
      RTS
    ****************************************************


    ****************************************************
    ;CKSUM:
    ;   CALCULATE A STD GM CHECKSUM
    ;
    ;   Output is A 16 bit result.
    :
    ;   Calling Arg:
    ;           B  = Number of bytes to cksum
    ;           X  = Starting address
    ;   Returns with:
    ;           Y  = Checksum
    ;
    ;   Execution time:
    ;           855,726 CPU Cycles, (FFFF bytes)
    ****************************************************
        ORG $F32E

    EQU COP $400B                   ; Watch dog timer


LF32E:
        PSHX                        ; Save start addr of SUM
        PSHB
        PSHA                        ; Save num of bytes to sum

        LSRD                        ; count in 2's
        PSHA                        ; save hi byte (/2) on stx

        LDY #0                      ; clear Y Reg.
        TBA                         ; Ck for ACCB = 0 after shift
        BEQ LF348
                                    ;...else
LF33A:  LDAB    0,X                 ;Get byte
        ABY                         ;Add to CHECKSUM
        LDAB    1,X                 ;Next byte
        ABY                         ;Add to CHECKSUM
        LDAB    #2
        ABX                         ;Point to next pair of bytes
        DECA                        ;Dec counter
        BNE LF33A
                                    ; ... else

LF348:
        PSHX                        ; Save current Address

        LDX #$FF00                  ; COP Time Value
        STX COP                     ; Toggle COP (every 512 bytes)
        TSX
        DEC 2,X                     ; Dec hi order byte of count
        PULX                        ; Continue till all bytes done
        BPL LF33A
                                    ;...else

        INS                         ; Dump hi order counter
        PULA                        ; Restore regesters
        PULB
        PULX

        RTS                         ;& Return
    ****************************************************
```

```
    ******************************************************
    ;
    ;
    ;
    ******************************************************
LF35A:    LDAB    L003F             ;

        ;
        ; CK ID ERR 21 ENABLED
        ;
          LDAA    LC1D0             ; Mask For Mal Funct flg 1
          BITA    #$04              ; b2, ERR Code 21   TPS High
          BEQ     LF36F             ; BR IF NOT b2
                                    ; ...else

          LDAA    L0081             ; TPS, (A/D)
          CMPA    LC1E6             ; IF TPS A/D > set ERR #21
          BLS     LF36F             ;
                                    ; ...else
          ORAB    #$04              ; SET b2
          BSET    L004C,$04         ; SET b2

LF36F:    STAB    L003F             ;

          LDAA    L0081             ; TPS, (A/D)
          BITB    #$24              ; b5 & b2
          BEQ     LF37A             ; BR IF NOT b5 & b2
                                    ; ...else
          LDAA    LC1EA             ;
LF37A:    PSHA                      ;
          LDAB    L0086             ;F ltered low TPS, (A/D)
          CBA                       ;
          BHI     LF38A             ;
                                    ; ...else
          LDX     L0086             ; Fltered low TPS, (A/D)
          LDAB    LC39C             ; Lo TPS filter coef
          JSR     LF250             ;

          STD     L0086             ; Fltered low TPS, (A/D)
LF38A:    LDD     L0086             ; Fltered low TPS, (A/D)
          ADDD    #$0080            ;
          TAB                       ;
          PULA                      ;
          SBA                       ;
          BCC     LF395             ;
                                    ; ...else
          CLRA                      ;
LF395:    LDAB    LC39A             ; Hi/Lo TPS%
          MUL                       ;
          ADDD    #32               ;
          ASLD                      ;
                                    ; ...else
          BCS     LF3A2             ;
                                    ; ...else
          ASLD                      ;
          BCC     LF3A4             ;
                                    ; ...else
LF3A2:    LDAA    #255              ; MAX VALUE
LF3A4:    STAA    L0082             ; TPS Ld Axis Var

          RTS                       ;
    ******************************************************


    ******************************************************
```

```
    *   Do Check sum of NON VOL MEMORY  Err Flg Word's
    *
    *   Return with:
    *       A = MSB of Ck Sum
    *       B = LSB of Ck Sum
    ****************************************************
    ORG $F3A7

LF3A7:    LDX      #5          ; Set For 5 EEPROM Flg,s
          LDD      #1          ; Inc for non zero sum
LF3AD:    ADDB     4,X         ; Sum Flg Words
          ADCA     #0          ;
          DEX                  ; Dec till done
          BNE      LF3AD       ; Loop Till done
                               ;...else

    ;
    ; ECU DELAY HERE
    ; 11 uswc
    ;
LF3B5:    RTS              ;Return to caller
    ****************************************************



    ****************************************************
    * MAJOR LOOP SUBROUTINE SEG 6,
    *
    * Log RAM to MCU, Cool A/D
    *
    *
    ****************************************************

        ;
        ;   Read coolant temp & correct
        ;   reading if failure occurs
        ;
LF3B6:  JSR     LF8F9               ; TO  SEG 4,  Log RAM to H.U.

        LDAA    #$40                ; A/D Ch 4, (Coolant Temp)
        JSR     LF1BE               ; Go to to A/D

        PSHA                        ; Save A/D Coolant Value
     ;------------------------------------------
     ; LK UP COOL VALUE FM 2D TBL
     ;   3840 Ohm COOL Table
     ;
     ;
     ;------------------------------------------
        LDX     #$FEA7              ; INDEX 3840 ohm COLLANT Table

        BRSET   L003C,$80,LF3CF     ; BR IF b7, COP 2 not toggled
                                    ; ... else
        BRCLR   L0030,$01,LF3CF     ; BR IF NOT b0, If 4K Res value in use
                                    ; ... else
     ;------------------------------------------
     ; LK UP COOL VALUE FM 2D TBL
     ;   348 Ohm Table
     ;
     ;
     ;------------------------------------------
        LDX     #$FEB8              ; INDEX 348 OHM Cool sensor Table
        BRA     LF3D5               ; Lk Up Val
                                    ;
LF3CF:  ADDA    #10                 ; Wrap ?
        BCC     LF3D5               ; BR IF NO OVER FLOW
```

```
                                        ; ... else
        LDAA    #255                    ; limit A/D VAL, (lk Up Var)

LF3D5:  JSR     LF2C6                   ; Call 2d Lk Up, (No Offset)
        STAA    L005D                   ; Save For ALDL

        CMPA    #120                    ; 50 Deg C
        BHI     LF3E7                   ; If > 50 C Assume 348 Ohms
                                        ; ... else
        CMPA    #106                    ; 39.5 C
        BHI     LF3EA                   ; If 39.5 to 50 C assume  No Change
                                        ; ... else
        BCLR    L0030,$01               ; Use 4 K Ohms
        BRA     LF3EA                   ;


LF3E7:  BSET    L0030,$01               ; Use 348 Ohms
LF3EA:  BCLR    L003C,$80               ; Reset COP2 Cool Flag

    ;
    ;   Error #14 Hi Temp Failure
    ;
    PULA
        BRSET   L003B,$08,LF42A
        PSHA
        LDAA    L005D                   ;
        LDAB    #$20                    ;Do Error #14
        CMPA    LC1E1                   ;If Cool < Calib ck Timmer 1st.
        PULA
        BCC     LF404

    ;
    ;   Error #15 Low Temp Failure
    ;
        LDAB    #$10                    ; Do Err #15
        CMPA    LC1E5
        BLS     LF41A                   ; If Cool > Calib, Filter
                                        ; ... else
LF404:  LDX     L001A                   ;
        CPX     LC1E3                   ; Ck Eng Run time
        BLS     LF412
                                        ; ... else
        BSET    L0035,$02               ; SET b1, ERR 14/15 THIS START UP
        ORAB    L004C
        STAB    L004C

LF412:  LDAA    LC1E2                   ; Use Default Cool Fm Equate
        CLRB
        STD     L005B                   ; COOLANT

        BRA     COOLS8


LF41A:  LDAA    L005D
        BRCLR   L003B,$10,LF42B
                                        ; ... else
        LDAB    LC39D                   ;Cool Temp Coef fm ROM
        LDX     L005B                   ; COOLANT
        JSR     LF250

        STD     L005B                   ; COOLANT

LF42B:  CLRB
        STD     L005B                   ; COOLANT

        STAA    L005F
```

```
        BSET    L003B,$10       ;Set Cool Flg

        RTS

    ;
    ;   Intilize BLM Table
    ;
LF434:    CLRB                  ;
          LDAA    #120          ; Get Default Val
          STD     L000A         ; Err #5 Flg Word
          STD     L000C         ; Sty Alive Mem Cell B

LF43B:    LDX     #16           ; Init BLM Cells
LF43E:    DEX                   ;
          STAA    $1C,X
          CPX     #0
          BNE     LF43E         ;
                                ; ... else
          RTS                   ;


    ;
    ; CK LOW LMT FOR SAM CELL'S 0 & B
    ;
LF447:    LDAA    L000C         ; Sty Alive Mem Cell B
          LDX     #$C5E8        ; 118, Low Lmt for other SAM Cell's
          BSR     LF465         ;

          STAA    L000C         ; Sty Alive Mem Cell B
          BSR     LF43B         ;

          LDAA    L000A         ;
          LDX     #$C5E6        ; 118, Low Lmt for SAM Cell 0
          BSR     LF465         ;

          STAA    L000A         ;


          LDX     #$001C        ; POINT TO BLM CELLS
          LDAB    LC5EA         ; 0, SAM Cell A Number, Idle
          ABX                   ; ADD TO BLM POINTER
          STAA    0,X           ;

          RTS                   ;
    ******************************************************



    ******************************************************
    * LIMIT
    *
    *   Limit Bounds on 8 Bit Interger
    *       (Upper & Lower)
    *
    *   Call with:
    *           A = Input Arg
    *           X = Bound
    *   Return:
    *           A
    ******************************************************
LF465:
          CMPA    0,X           ; Is A reg > Low limit ?
          BHI     LF46B         ; If yes
                                ; ... else
          LDAA    0,X           ; If no Ld Low Limit
LF46B:    CMPA    1,X           ; Hi Limit ?
```

```
          BLS     LF471             ; If Yes, then return

          LDAA    1,X               ; If no Ld High Limit

LF471:    RTS                       ;
    ******************************************************


    ******************************************************
    * FACTIN
    *   Factor in a 8 x 16 Multiply
    *
    ******************************************************
LF472:
        PSHA                        ;Save Input Arg.
        LDAB    1,X                 ;
        MUL                         ;Mult LSB of 16 Bit Num
        PSHB                        ;
        PSHA                        ;
        TSY                         ;
        LDAA    2,Y                 ; Set For 2nd Byte
        LDAB    0,X                 ;
        MUL                         ; Mult MSB of 16 bit Num
        ADDB    0,Y                 ; Add LSB result to MSB result

        ADCA    0                   ;
        ROL     1,Y                 ; Shft MSB for X 2 Mult
        ROLB                        ; Prior result LSB
        ROLA                        ;
        BCC     LF48F               ;
                                    ; ... else
        LDD     #$FFFF              ; Max Limmit of Exit Val
LF48F:
        STD     0,X                 ;
        ROL     1,Y                 ;Clr Cy
        PULY                        ;
        INS                         ;

        RTS
    ******************************************************


    ******************************************************
    * Set Up MCU CSR
    * Enter as required to operate LSB of CSR
    *
    *   Entry:
    *       LF4A8   To turn ON  a bit
    *       LF49A   To turn OFF a bit
    ******************************************************

        ;
        ; To turn ON  a BIT
        ;
LF498:    LDAA    #F7               ; 1111 1000, Sw on Err Lamp


        ;
        ; To turn OFF a BIT
        ;
LF49A:    PSHX                      ;
          LDX     L3FFC             ; MCU CSR, (Turn off a CSR bit)

          PSHX                      ;
          TSY                       ;
          ANDA    1,Y
```

```
          BRA     LF4B2             ;

        ;
        ; TURN OFF ERR LAMP
        ;
LF4A6:    LDAA    $08               ; b3, Turn off err lamp


        ;
        ; Turn On a CSR bit
        ;
LF4A8:    PSHX                      ;
          LDX     L3FFC             ; MCU CSR (Turn On a CSR bit)

          PSHX                      ;
          TSY                       ;
          ORAA    1,Y               ;
LF4B2:    ANDA    #$FE              ; MCU test normal
          ORAA    #2                ;
          STAA    1,Y               ;
          PULA                      ;
          ORAA    #$FB              ; All Bits, (0-7) Enable
          PSHA                      ;
          PULX                      ;
          STX     L3FFC             ; MCU CSR
          PULX                      ; Restore X

          RTS

    ;
    ;   Toggle ECU byte 1
    ;
LF4C3:
          LDX     L3FFC             ; MCU CSR
          PSHX                      ;
          TSY                       ;
          ORAA    0,Y
          BRA     LF4D7             ;

LF4CE:
          LDX     L3FFC             ; MCU CSR
          PSHX                      ;
          TSY                       ;
          ANDA    0,Y               ; Reset bit
LF4D7:
          STAA    0,Y               ;
          PULX                      ;
          STX     L3FFC             ; MCU CSR

          RTS                       ;
    ******************************************************


    ******************************************************
    * IAC
    *
    *   PID IDLE CONTROL
    *
    ******************************************************
LF4DF:  LDX       #$C62E            ; INDEX IAC Tables & Params
        LDY       #$4004            ; Use Y as Port Addr for IAC
        JSR       LF231             ; Get IAC motor State

        ASL       L00F3
        LDAB      L0037             ; P/N status in Bit 0
        RORB                        ; Xfer P/N status to Bit 7
```

```
        ROR     L00F3
        BRSET   L004E,$01,LF502    ; Br if M51
        LDAB    L0033              ; MINOR LOOP MD WD 1
        BITB    #$10               ; b4, (1 = IGN ON)
        BNE     LF511              ; If not B/P open loop & T/F
                                   ; ... else
        LDAB    L00F3              ;
        BITB    #4                 ; Is motor reset done ?
        BNE     LF511              ; If not B/P open loop & T/F
                                   ; ... else

LF502:
        LDAB    L0034              ; Get Eng Status fn minor LP MW
        BMI     LF514              ; If running, GT open loop & T/F
                                   ; ... else

        LDAB    L0035              ; MNR LOOP MD WD 2
        BITB    #$10               ; b4, DIAG SW IN DIAG MODE
        BEQ     LF511              ; BR IF NOT b4
                                   ; ... else
        LDAB    #$81               ; If in Diag, Extend motor
        STAB    L0101              ; Save Val as cmd'ed steps

LF511:  JMP     LF5B0              ; & Step the motor

    ;
    ;  IDLE SPEED OPEN LOOP
    ;
LF514:
        LDAB    L007E              ; Get Present battery volts
        CMPB    #$AB               ; Is it >17.5 V ?
        BHI     LF51E              ; If so shut off Motor
        CMPB    #$5A               ; Is battery low ?
        BHI     LF521              ; If not, go check engine

    ;
    ;  DO START UP ROUTINE
    ;
LF51E:    JMP     LF640            ;

LF521:    LDAB    L00F3            ; Is startup delay over ?
          BITB    #$0008           ; If so then B/P Delay
          BNE     LF550            ;

          LDAB    LC630            ;
          ADDB    L010C            ;
          BCS     LF538            ; Ck for overflow

          BRSET   L0037,#$80,LF53A ; If A/C requested
          ADDB    LC631            ; Startup offset
          BCC     LF53A            ; BR if no overflow on add

LF538:    LDAB    #$00FF           ; Limit to 255
LF53A:    JSR     LD3DE            ; Jmp to Cmd down Steps

          LDAA    L0104            ; Get the delay counter
          INCA                     ; Update the delay
          CMPA    7,X              ; Comp dlt to max desired
          BLS     LF5AD            ; If dly to short,B/P open loop

          LDAB    L00F3            ;
          ORAB    #8               ; Set dly over
          STAB    L00F3            ; save mode word

          CLR     L0104            ; R/S dly counter after startup
          BRA     LF573            ;
```

```
    ;-------------------------------------------------

LF550:    BITB    #$0020          ; PID commanding
          BNE     LF5B0           ;

          LDAB    L00F2           ; IAC Cnt'l Word
          BITB    #$10            ; In the T/F mode ?
          BNE     LF562           ; If so issue a step

          BITB    #08             ;
          BNE     LF5B0           ;

          BITB    #$4             ; Open loop step needed ?
          BNE     LF573           ; If not, B/P step issue

LF562:    LDAA    L0101           ; Steps being requested ?
          BPL     LF573           ; If so,goto Trajectory Decay

    ;
    ;  TRAJECTORY DECAY ROUTINE
    ;
          BITB    #$20            ; A/C Steps being removed ?
          BNE     LF573           ; If so, B/P decay

          DEC     L0104           ; Dec decay step timer
          BEQ     LF573           ; & if ready step motor

          JMP     LF67B           ; Else return with no step
    ;-------------------------------------------------

LF573:    LDAA    $30,X           ; Get neutral delay
          LDAB    L00F3           ; R/S decay timer
          BMI     LF58B           ; BR if not in drive

          LDAA    L0065           ; Mul MPH * 8, limit to 32
          CMPA    #$20            ;
          BCS     LF581           ;

          LDAA    #$FF           ;
LF581:    ASLA                    ;
          ASLA                    ;
          ASLA                    ;
          LDAB    $32,X           ; Mul by drive delay Mult.
          MUL                     ;
          ADDA    $31,X           ; Add to the drive delay
          BCS     LF5A8           ;

LF58B:    LDAB    L00F2           ; IAC Cnt'l Word
          BITB    #4              ; Ck if sys in open loop ?
          BNE     LF5AD           ; If no,BR arround O/L Calc's

          ASLA                    ;
          BCS     LF5A8           ;

          PSHA                    ;

    ;---------------
    ; Form RPM Error
    ;---------------
          LDAB    L0058           ; RPM/12.5
          SUBB    L0102           ;  & sub desired speed
          CLRA                    ;
          ASLD                    ;
          ASLD                    ; Divide by Max Error of 800 RPM
          TSTA                    ;
          BNE     LF5AC           ; B/P > of decay Count for -
```

```
    ;----------------------
    ; Increase Decay Counter
    ;----------------------
         COMB                    ; B = 1 - pct RPM error
         LDAA    $33,X           ; Max delta count's
         MUL                     ;
         PULB                    ; Get base count
         ABA                     ; Add delta to base
         BCC     LF5AD           ; Limit to max Num of minor loops
                   ;-- per step

LF5A8:   LDAA    #$00FF          ;
         BRA     LF5AD           ; Store Delta

LF5AC:   PULA                    ; Resore base decay
LF5AD:   STAA    L0104           ; Save base decay


    ****************************************************
    *  MOVE IAC MOTOR
    *
    *       Accumulator A will contain MCU1io, and must not
    *       be changed.
    *
    *       Accumulator B is used as GP scratch Pad.
    ****************************************************

        ;
        ;  NORMAL MOVE IAC MOTOR
        ;
LF5B0:    BCLR    L00F3,#$01      ;

        ;
        ; CK IF HEADS UP CONNECTED
        ; U/D Motor posit fm HUD
        ;
          LDAA    L0033           ; MINOR LOOP MD WD 1
          BPL     LF5BA           ; If no, B/P 12U update
                                  ; ... else
          JSR     L5803           ; TO HEADS UP <---------


        ;
        ; CK IF IN ALDL MODE 4 <----*****
        ; MODE WD ... and MD WD ...
        ; ECM TYPE $32
        ; IAC
        ;
LF5BA:    BRCLR   L0035,#$08,LF5DF  ; BR IF NOT IN ALDL MODE 4
                                  ; ... else
          LDAA    L0158           ;
          BITA    #$01            ; b0,
          BEQ     LF5DF           ; BR IF NOT b0
                                  ; ... else
          BITA    #$02            ; b1,
          BNE     LF5DF           ; BR IF NOT b1
                                  ; ... else
          LDAA    L002C           ; IAC Present Posit
          SUBA    L0159           ;
          BCC     LF5D1           ;
                                  ; ... else
          NEGA                    ;
LF5D1:    BPL     LF5D5           ;
                                  ; ... else
          LDAA    #$7F            ; 0111 1111
```

```
LF5D5:    BCS     LF5D9             ;
                                    ; ... else
          ORAA    #$80              ; SET b7
LF5D9:    STAA    L0101             ;

          BSET    L00F3,$01         ; SET b0

LF5DF:    JSR     LF231             ; Get Motor status

          LDAB    L0101             ; Get num of CMD steps
          ASLB                      ; Any to do ?, -->
                                    ; - put sel bits in Carry
          BEQ     LF619             ; If no, put PWM the motor coils
                                    ;  (12U mod FAN ?)

          BITA    #$0004            ; Is step motor on ?
          BEQ     LF63A             ; If no, toggle on & -->
                                    ;  - wait 6.25 MS

          DEC     L0101             ; If yes, cnt this CMD step
          LDAB    L002C             ; IAC Present Posit
          BCC     LF5FB             ; If C=0, then Retract Pintel

    ;
    ; EXTEND PINTEL CODE
    ;
          BEQ     LF5F6             ; If Zero, stay in loop

          DECB                      ; Adj pressent motor posit.
LF5F6:    DEC     L010A             ; Dec running counter
          BRA     LF604             ; Update A/C & T/F flags


    ;
    ; RETRACT PINTEL CODE
    ;
LF5FB:    CMPB    $4D,X             ; Limit motor posit.
          BCC     LF619             ; Inc running counter

          INCB                      ; If < max Update posit.
          INC     L010A             ;
          CLC

    ;
    ; UPDATE A/C LEARING & THROTTLE FOLLOWER REG'S
    ;
    ;
LF604:    STAB    L002C             ; IAC Present Posit
          LDAB    L00F2             ; IAC Cnt'l Word
          BITB    #$0010            ; Is Throt follower active
          BEQ     LF619             ; If no T/F, Ck Kwarm or Fan

          LDAB    L0105             ; Get the T/F Learn ARG.
          INCB                      ; Assume step taken is retract
          BCC     LF616             ; If step is retract, B/P DEC


          DECB                      ; Get bk orig Val of T/F Delta
          BEQ     LF616             ; if orig = 0, then B/P DEC.

          DECB                      ; DEC, actual value of delta
LF616:    STAB    L0105             ;

LF619:    LDAB    L00F2             ; IAC Cnt'l Word
          BITB    #$08              ; b3
          BEQ     LF622             ; BR IF NOT b3,
```

```
          INC     L010E             ;
LF622:    LDAB    L002C             ; IAC Present Posit
          CMPB    $4D,X             ;
          BLS     LF62D             ;

          LDAB    L0101             ;
          BPL     LF63A             ;

    ;
    ;MOVE MOTOR 1 STEP
    ;
LF62D:    LDAB    L010A             ; RUNING COUNTER

          LDX     #$FEC9            ; STEP TABLE
          ANDB    #$03              ; MASK FOR 2 LOWEST BITS
          ANDA    #$FC              ; MASK OUT A & B BITS
          ABX                       ; ADD TO BASE ADDRES
          ORAA    0,X               ; INSET NEW BITS



    ;
    ; PW MODULATE MOTOR (100pct. D.C.)
    ;

        ;
        ; IF YES TURN STEPPER ON
        ;
LF63A:    BSET    0,Y,4             ;
          BRA     LF644             ;

        ;
        ;    IF NO TURN STEPPER OFF
        ;
LF640:    BCLR    0,Y,4             ;
LF644:    JSR     LF242             ; UP DATE THE PORTS

    ;------------------------
    ; BASE BIAS DETERMINATION
    ;-----------------------
          LDAB    L0109             ;
          ADDB    L0105             ;
          BCC     LF651             ;

          LDAB    #$00FF            ;
LF651:    PSHB                      ;
          LDAB    L010E             ;
          LDAA    L003B             ;
          ASLA                      ;
          PULA                      ;
          BPL     LF65C             ;

          NEGB                      ;
LF65C:    ABA                       ;
          TAB                       ;
          LDAA    L002C             ;IAC Present Posit
          SBA                       ;
          STAA    L010F             ;
          LDAB    L002C             ;IAC Present Posit
          SUBB    L010F             ;
          LDAB    #$0080            ;
          BCC     LF673             ;
                                    ; ... else
          CBA                       ;
          BHI     LF678             ;
```

```
                                    ; ... else
          INCB                      ;
          BRA     LF677             ;

LF673:    CBA                       ;
          BCS     LF678             ;
                                    ; ... else
          DECB                      ;
LF677:    TBA                       ;
LF678:    STAA    L010F             ;


    ;-------------------------------------------------
    ;   MAIN INJECTION ROUTINE
    ;
    ;   1. Cks cyl Select, Set Err If mismach
    ;   2.
    ;   3.
    ;   4.
    ;   5.
    ;   6.
    ;
    ;-------------------------------------------------
LF67B:    BRSET   L00A0,$40,LF682   ;
          JMP     LF76A             ; Exit if no inject


LF682:    LDAB    L002F             ;
          ANDB    #$18              ; 0001 1000
          CMPB    LC225             ; 0d, Fuel mode FLAG,  0 = 8 Cyl PFI
          BEQ     LF68E             ; BR IF Z,  (0 = 8 Cyl PFI)
                                    ; ... else
          BSET    L0040,$01         ; SET b0

LF68E:    BRSET   L0034,$80,LF695   ; BR IF b7 (ENG RUNNING)
                                    ; ... else
          JMP     LF71C             ; If Eng Not running



LF695:    BRCLR   L000E,$FF,LF6D5   ; A/F Ratio time out
                                    ; ... else
          LDD     L0010             ; Blk Lrn Mult Values
          BEQ     LF6A4             ;
                                    ; ... else
          SUBD    #$01              ;
          STD     L0010             ; BLM Values

          BRA     LF6D5             ;



LF6A4:    LDAA    L00CC             ; AFR Time out Cntr
          BEQ     LF6AD             ; Skip if <> 0
                                    ; ... else
          DECA                      ;
          STAA    L00CC             ; AFR Time out Cntr

          BRA     LF6D5             ;




        ;-------------------------------------------------
        ; LK UP Start up Enrichment Decay Rep Rate Vs Start
        ;    up Coolant Temp
```

```
        ;
        ; Tbl Val = Num of Injects
        ;-------------------------------------------------
LF6AD:    LDAA    L005F             ;
          CMPA    #208              ; CK FOR UPPER TEMP LK UP
          BLS     LF6B5             ; BR IF COOL LT 116c
                                    ; ... else
          LDAA    #208              ; LMT TO 116c  FOR LK UP

LF6B5:    PSHA                      ;

          LDX     #$C402            ; Start up Enrichment Decay tbl
          JSR     LF2C6             ; 2d Lk Up
          STAA    L00CC             ; AFR Time out Cntr, Fm Tbl

        ;-------------------------------------------------
        ; Start up Enrich Decay amt Vs Start up Cool Temp
        ;
        ; Tbl Val = Pct Chg * 655.36
        ;-------------------------------------------------
          PULA                      ; Get Lk Up Var
          LDX     #$C410            ; Start up Enrich Decay amt Tbl
          JSR     LF2C6             ; 2d Lk Up, (No Offset)
          PSHA                      ; Save result to stk


          LDD     L000E             ; A/F Ratio time out TIMER
          TSX                       ;
          SUBB    0,X               ;
          SBCA    #0                ;
          BCC     LF6D2             ; SAVE TIMER
                                    ; ... else
          LDD     #0                ; ZERO OUT AFR TIMER
LF6D2:    STD     L000E             ; A/F Ratio time out

          PULA                      ;
LF6D5:    BRSET   L0036,$20,LF71C   ; BR IF b5, (BLEND SPK)
                                    ; ... else
          LDD     L0015             ; Spark Decay Delay
          BEQ     LF6E4             ;
                                    ; ... else
          SUBD    #$01              ;
          STD     L0015             ; Spark Decay Delay
          BRA     LF71C             ;

LF6E4:    BRCLR   L003B,$80,LF6F1   ;
          LDAA    L0012             ; Sprk Adv Fm Blend Finished

          BEQ     LF6F1             ;
                                    ; ... else
          DECA                      ;
          STAA    L0012             ; Sprk Adv Fm Blend Finished

          BRA     LF71C             ;
        ;-------------------------------------------------


        ;-----------------------------------------
        ; LK UP  START UP SPARK ADVANCE DECAY TIME
        ;
        ; TBL = INJECTS
        ;-----------------------------------------
LF6F1:    BSET    L003B,$80         ; SET b7

          LDAA    L005F             ; GET CURRENT COOLANT
          CMPA    #208              ; 115c COOL
```

```
          BCS     LF6FC             ; BR IF COOL LT 115c
                                    ; ... else
          LDAA    #208              ; USE MAA COOL, 115c
LF6FC:    PSHA                      ; Save LMT'ED COOL TO STX
          LDX     #$C198            ; START UP SPARK ADVANCE DECAY Tbl
          JSR     LF2C6             ; 2d Lk Up, (No Offset)

          STAA    L0012             ; START UP Sprk Adv DECAY TIME
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; LK UP  Startup Spk Adv Decay vs Startup Coolant
        ;
        ; TBL = Deg * 256 * 256 / 90
        ;-------------------------------------------------
          PULA                      ; GET LMT'ED COOLANT FM STX
          LDX     #$C1AB            ; Startup Spk Adv Decay Tbl
          JSR     LF2C6             ; 2d Lk Up, (No Offset)
          PSHA                      ; Save result TO STX

          TSX                       ; STX TO X
          LDD     L0013             ; Spark Adv, (STARTUP)
          SUBB    0,X               ;
          SBCA    #0                ;
          BCC     LF719             ;
                                    ; ... else
          LDD     #0                ; ZERO SPK
LF719:    STD     L0013             ; SPARK Adv, (STARTUP)

          PULA                      ;

LF71C:    BRCLR   L0039,$10,LF726   ; BR IF NOT b4, (TOGGLE SF F/F)
                                    ; ... else
          LDAA    L0039             ; SINGLE FIRE MD WD
          EORA    #$40              ; TOGGLE b6, (O PW)
          STAA    L0039             ;

LF726:    LDAA    L003D             ;
          EORA    #$01              ; TOGGLE b0
          STAA    L003D             ;

          BSET    L0038,$14         ; SET b4 & b2

          LDX     L00C2             ;
          STX     L00D5             ; Base PW, Last Inj

          LDD     L011A             ; ACCEL ENR PW
          ADDD    L011C             ;
          STD     L011A             ; ACCEL ENR PW

          BRCLR   L0034,$80,LF748   ; BR IF NOT b7
                                    ; ... else
          INC     L018D             ;
          BNE     LF748             ;

          DEC     L018D             ;

LF748:    BRSET   L003E,$20,LF750   ; BR IF b5
                                    ; ... else
          BRCLR   L0038,$40,LF758   ; BR IF NOT b6
                                    ; ... else
LF750:    LDAB    L00E0             ; Num of Inj,s simce Start Of Acel Enr
          INCB                      ; INC NUM INJ'S
          CMPB    LC314             ; Injects in fuel limiting
          BCS     LF768             ; BR IF NUM INJ'S LT LMT THRESH (2)
```

```
                                    ; ... else

LF758:    BRSET   L003E,$80,LF76A   ; BR IF b7
                                    ; ... else

          BCLR    L0038,$40         ; CLR b6
          BCLR    L003E,$20         ; CLR b5

          CLRB                      ; ZERO OUT NUM ASYN PULSES
          STAB    L00DF             ; NUM OF ASYNC PULSES SINCE ACEL ENR

          CLRA                      ;
          STD     L00D9             ; ACCEL ENRICH, ACUM FUEL
LF768:    STAB    L00E0             ; NUM OF INJ,S SINCE START of ACCEL ENR


    ****************************************************
    *   Calc Air flow Fm MAF Air meter
    *
    * ESTABLISH 1 of 2 TYPES OF MAF, ANALOG (0 5 VDC)
    * OR DIFITAL ) 32 Hz to ___ Hz)
    ****************************************************

        ;
        ; CK AFR MD WD1 FOR ANALOG MAF
        ;
LF76A:    LDAA    LC014             ; Fuel/Air Mode Wd 1
          BITA    #$04              ; b2, ANALOG MAF
          BNE     LF7AC             ; BR IF b2, (ANALOG MAF )
                                    ; ... else

        ;
        ; DIGITAL (FM) MAF
        ; (OLD BOSCH TYPE)
        ;
          LDD     L00ED             ; 8 cntr Lps MAS
          SUBD    L3FF8             ; CNT'r
          BNE     LF790             ; BR IF NZ
                                    ; ... else
          LDAB    L0033             ; MINOR LOOP MD WD 1
          BITB    #$10              ; b4, (1 = IGN OFF) Skip Err 34 Ck
          BNE     LF790             ;
                                    ; ... else
          LDAA    L00EC             ; Num Lps w/o MAF input
          CMPA    LC209             ; 6.4 SEC'S, MIN TIME W/O SIGNAL
          BHI     LF788             ; Set ERR Flg
                                    ; ... else
          INCA                      ; BUMP UP TIMER

          BRA     LF7B9             ;



LF788:    LDAB    L003F             ;
          ORAB    #$40              ; Set b6, Err Flg #34, LO MAF VALUE
          STAB    L003F

          BRA     LF7C1             ;

        ;
        ; UPDATE COUNTER VALUES AFTER MAF PULSE OCOURRANCE
        ;
        ;
LF790:    LDD     L00ED             ; 8 cntr Lps MAS
          PSHB                      ;
          PSHA                      ;
```

```
          TSX                       ;

          LDD     L3FF8             ; CNT'R
          STD     L00ED             ; 8 cntr Lps MAF

          SUBD    0,X               ; Calc Diff in  period
          PULX                      ;
          STD     L00EF             ; Diff Val to calc Air Flow


          LDD     LC6E8             ; 2048d, Min Out Val for MAF, (32 Hz)
                                    ; CALIB = 65536/hZ
          SUBD    L00EF             ; Diff Val to calc Air Flow

          BCC     LF7A8             ; BR IF NO UNDEFLOW
                                    ; ... else
          CLRA                      ; ZERO CNT'R VALUE
          CLRB                      ;
LF7A8:    STD     L00EF             ; USE DIFF CNT'R VAL TO CALC air FLOW

          BRA     LF7B8             ; CLR NO PULSE CNTR & CALC AIR FLOW
        ************************************************


        ************************************************
        * ANALOG MAF
        *
        * MULT ANALOG VAL x 7 TO LOOK
        * LIKE FM MAF AND USE FM TABLES
        ************************************************
LF7AC:    LDAA    #$A0              ; A/D Ch A, Mass Air Sensor
          JSR     LF1BE             ; To A/D subroutine

          STAA    L00ED             ; MAF A/F VALUE
          LDAB    #7                ;
          MUL                       ; 7 * MAF A/D VALUE
          STD     L00EF             ; Val to calc Air Flow
        ************************************************


LF7B8:    CLRA                      ;
LF7B9:    STAA    L00EC             ; Num Loops w/o MAF input

        ;
        ; Calulate Air Flow
        ;
          LDAB    L003F             ;
          ANDB    #$C0              ; b7 & b6
          BEQ     LF7EE             ; BR IF NOT b7 & b6
                                    ; ... else
        ;
        ; Make Default Airflow
        ;

        ;-------------------------------------------------
        ; LK UP  Default air flow offset per pct TPS vs RPM
        ; P/O ERR 33/34
        ;
        ; Value = Gms/Sec * 100 pct, (Offset)
        ;
        ; TBL = Arg * 100
        ;-------------------------------------------------
LF7C1:    LDAA    L0056             ; RPM/25
          LDX     #$C217            ; Default air flow offset TBL
          JSR     LF2BF             ; 2d Lk Up Routine
```

```
          LDAB    LC213             ; If TPS > 65.2%, use for MAF Default
          CMPB    L0082             ; TPS Ld Axis Var
          BCS     LF7D2             ; BR IF TPS LT THRESH
                                    ; ... else
          LDAB    L0082             ;

LF7D2:    MUL                       ;
          STD     L00EA             ; Gms/Sec Disp Value
        ;-------------------------------------------------


          LDAA    L002C             ; IAC Present Posit
          LDAB    LC214             ; Gms/sec Scale factor
          MUL                       ;
          ADDD    L00EA             ; Gms/Sec Disp Value
          BCS     LF7E4             ;
                                    ; ... else
          ADDD    LC215             ; 4 Gms/Sec default air flow offset
          BCC     LF7E7             ;

LF7E4:    LDD     #$FFFF            ; Max Val if Overflow

LF7E7:    JMP     LF86E             ;
        ;-------------------------------------------------

        ;
        ; Table For ADD overflows
        ;
        ;
LF7EA:  FCB $00
        FCB $40
        FCB $80
        FCB $C0

        ;-------------------------
        ;   Scale Raw MAF VAL'S
        ;
        ;-------------------------
LF7EE:    TSTA                      ;
          BEQ     LF7F4             ;
                                    ; ... else
          JMP     LF87F             ;


LF7F4:    LDD     L00EF             ; Diff Val to calc Air Flow
          CMPA    #6                ;
          BLS     LF7FD             ;
                                    ; ... else

        ;---------------------------------------
        ; Mass Air Flow TABLE 1
        ;
        ;  TBL =  gms/Sec *    11.1
        ;
        ;---------------------------------------
          LDD     #$06FF            ;

LF7FD:    LDX     #$C69D            ; TABLE SCALAR Mass Air Flow TABLE 1
                                    ; Table SCALER Multiplier
          CMPA    #$02              ;
          BCC     LF807             ;
                                    ; ... else
          LSRD                      ; Div by 2
          LDAA    #1                ;
LF807:    PSHB                      ;
```

```
      LDAB    #11               ;
      DECA                      ;
      MUL                       ;
      ABX                       ;

      PULA                      ; Val for Lk Up
      LDAB    0,X               ;
      PSHB                      ;
      INX                       ; ADJ Tbl Addr
      JSR     LF2BF             ; Call 2d Lk Up W/ Interp

      PULB                      ;

;
;   Mass Air FLow Limit Ck's
;
      MUL                       ; To Make Gms/Sec Disp value
      PSHB                      ;
      PSHA                      ;
      STAA    L00B6             ;

      LDX     LC014             ; AFR MD WD  1
      PULX                      ;

      BPL     LF862             ;
      PSHX                      ;

;
;   Up Date Air Filter tbl
;
      LDX     #$0075            ; OLD AIR FLOW

      LDAB    L007D             ; Current Air flow
      INCB                      ;
      STAB    L007D             ; Current Air flow

      ASLB                      ; Mult by 2
      ANDB    #$07              ; Lmt to 7 bytes
      ABX                       ; Point X to Value to Replace

      PULA                      ; Get NewSPK Unlimited Value

      PULB                      ;
      STD     0,X               ; Save In Avg Buffer

;-------------------------------
;   CALC MASS AIR FLOW TERM
;
;-------------------------------
      LDX     #$00EA            ; Gms/Sec Disp Value
      LDAA    LC6E7             ; Mult for sliding filter
      NEGA                      ;
      JSR     LF266             ;

      STD     L00EA             ; Gms/Sec Disp Value

    ;
    ; SUM UNLIMITED READS FOR NEW VALUE
    ;
      LDX     #$F7EA            ;
      LDD     L0075             ; OLD AIR FLOW
      ADDD    L0077             ;
      BCC     LF848             ;
                                ; ... else
      INX                       ;
```

```
LF848:    ADDD    L0079           ;
          BCC     LF84D           ;
                                  ; ... else
          INX                     ;

LF84D:    ADDD    L007B           ;
          BCC     LF852           ;
                                  ; ... else
          INX                     ;

LF852:    LSRD                    ; Avg By dividing by 4
          LSRD                    ;
          ORAA    0,X             ; Add in Overflow
          PSHB                    ;
          PSHA                    ;
          TSX                     ;

          LDAA    LC6E7           ; Mult for sliding filter
          JSR     LF266           ; To 8 x 16 Mult routine

          PULX                    ;
          ADDD    L00EA           ; Gms/Sec Disp Value
LF862:    STD     L00EA           ; Gms/Sec Disp Value

        ;
        ; Max Flow Vs RPM
        ;
          LDX     L00EA           ; Gms/Sec Disp Value
          CPX     LC6EA           ; Min Allowable Flow, (3 gms/Sec)
          BCC     LF870           ; GO CK AGANST MAX FLOW vs RPM
                                  ; ... else
          LDD     LC6EA           ; USE Min Allowable Flow, (3 gms/Sec)


LF86E:    STD     L00EA           ; gms/Sec Disp Value

        ;-------------------------------------------------
        ; LK UP  Max Air Flow vs RPM
        ;
        ; 17 LINE, 0 -> 6400 RPM
        ;
        ; TBL = Grams/Sec
        ;-------------------------------------------------
LF870:    LDX     #$C6EC          ; Max Air Flow Tbl
          LDAA    L0057           ; RPM/25
          JSR     LF2C6           ; 2d Lk Up, (No Offset)
                                  ;
          CMPA    L00EA           ; Gms/Sec Disp Value
          BHI     LF87F           ; BR IF MAX fm tbl LT ACTUAL Gms/Sec
                                  ; ... else
          CLRB                    ;
          STD     L00EA            ; Gms/Sec AIR FLOW

LF87F:    RTS
        ************************************************



        ************************************************
        * (SCI) Serial Data Status
        *
        * 160 BAUD ???
        *
        ************************************************
LF880:    LDAA    L0189           ; ALCL NUM BITS TO TX
          BNE     LF8D9           ; BR IF NON Z
```

```
                                    ; ... else
          LDAA    #$08              ;
          STAA    L0189             ; ALCL NUM BITS TO TX
                                    ;
          LDAA    L0047             ;
          BPL     LF8B6             ; TO 160 BAUD TBL MANAGER
                                    ; ... else
          LDAA    L0048             ;
          BNE     LF895             ; NR IF NZ
                                    ; ... else
          JMP     LF8F8             ; EXIT via RTS
    ;-------------------------------------------------

LF895:    LDX     #$FC62            ;
          LDAB    #16               ;
          MUL                       ;
          ABX                       ;
          LDAB    L018A             ; LOCATION OF NEXT ENTRY IN EPROM TBL
          CMPB    #16               ;
          BCC     LF8CF             ;
                                    ; ... else
          LSRB                      ;
          BCC     LF8AB             ;
                                    ; ... else
          LDAA    L017A             ;

          BRA     LF8ED             ;
    ;-------------------------------------------------

LF8AB:    ASLB                      ;
          ABX                       ;
          LDX     0,X               ;
          LDD     0,X               ;
          STAB    L017A             ;

          BRA     LF8ED             ;
    ;-------------------------------------------------

    ;-------------------------------------------------
    ; 160 BAUD DIAGNOSTICS
    ;
    ; MINOR LP MD WD 2
    ;   b4 = DIAG SW IN DIAG MODE
    ;   b5 = DIAG SW IN ALDL MODE
    ;-------------------------------------------------
LF8B6:    LDAA    L0035             ; MINOR LP MD WD 2

          LDAB    L018A             ; LOCATION OF NEXT ENTRY IN EPROM TBL
          BEQ     LF8ED             ; BR IF Z
                                    ; ... else
          ANDA    #$30              ; MASK FOR  b4 & b5
          BNE     LF8CB             ; BR IF b4 & b5
                                    ; ... else

    ;-------------------------------------------------
    ; DIS ADDRESSES TABLE, Xmit
    ; (7 ADDRESS'S)
    ;
    ;-------------------------------------------------
          CMPB    LC6FD             ; 4d, DISP STRG LENGTH
          BHI     LF8CF             ;
                                    ; ... else

          LDX     #$C6FE            ; DIS ADDRESSES TABLE

          BRA     LF8E6             ;
```

```
    ;-----------------------------------------------

    ;-----------------------------------------------
    ; 160 BAUD DIAGNOSTICS
    ;
    ;
    ;-----------------------------------------------
LF8CB:    CMPB    #25               ;
          BNE     LF8E3             ; TO 160 BAUD DIAGNOSTICS
                                    ; ... else
LF8CF:    CLRA                      ;
          STAA    L018A             ; LOCATION OF NEXT ENTRY IN EPROM TBL
          DECA                      ;
          STAA    L018B             ; ALCL XMIT BYTE

          BRA     LF8F8             ;  EXIT via RTS


LF8D9:    DEC     L0189             ; ALCL NUM BITS TO TX
          ASL     L018B             ; ALCL XMIT BYTE
          BCC     LF8F3             ; Output Nxt byte
                                    ; ... else
          BRA     LF8F8             ; EXIT via RTS
    ;-----------------------------------------------


     ************************************************
     * ALCL Xmit Table
     * (160 BAUD DIAGNOSTICS)
     * Table Of Addr's vs DATA
     * (23 ADDRESS'S)
     *
     * TYPE $32 ECM P/N 1227165
     ************************************************
LF8E3:    LDX     #$C70D            ; INDEX ADDRESS TABLE

LF8E6:    DECB                      ;
          ASLB                      ;
          ABX                       ; ADJ INDEX
          LDX     0,X               ; GET DATA RAM ADDRESS
          LDAA    0,X               ; GET DATA

LF8ED:    STAA    L018B             ; SAVE DATA TO ALCL XMIT BYTE
          INC     L018A             ; LOCATION OF NEXT ENTRY IN EPROM TBL

LF8F3:    LDAA    #04               ; Ld Ser Data w/0, 350 usec

          JSR     LF4A8             ; To turn ON a bit

LF8F8:    RTS
    ************************************************


    ************************************************
    * MJR LOOP SUBROUTINE  SEG 4,
    *
    * LOG RAM ASSIGNMENT
    *
    ************************************************

    ;
    ; CK IF HEADS UP CONNECTED
    ;
LF8F9:    LDAA    L0033             ; MINOR LOOP MD WD 1
          BPL     LF900             ; Exit if not H.U.
                                    ; ... else
```

```
          JSR     L5806             ; TO HEADS UP <------
    ;-----------------------------------------------

LF900:    RTS                       ;


    ;-----------------------------------------------
    ;   Fuel Out Subroutine
    ;
    ;-----------------------------------------------
LF901:    LDAA    L00E2             ; DIFF Ld Val ACCEL ENR FACTOR
          BRCLR   L0038,$02,LF915   ; If ACCEL ENR FLG CLR
          BRCLR   L0038,$04,LF915   ; IF NO KiNJ SINCE LAST PULSE
          SUBA    L00E3             ; DIFF LlD VvAL FOR ACCCEL ENRICH
          BCC     LF913             ; if > = 0

          CLRA                      ; LIMIT TO ZERO
          BCLR    L0038,$08         ; CLR ACEL ENR FLAG

LF913:    STAA    L00E2             ; Diff Ld Val Acel Enr Factor
LF915:    BCLR    L0038,$04         ; Reset Inj Flg
          BSET    L0038,$02         ; Set 1st time Acel enr flg
          LDX     #$C2              ; Get data
          JSR     LF266             ; Scale w/8 X 16 Mult

          ADDD    L00C2             ; Add to data
          BCC     LF928             ;
          LDD     #$FFFF            ; Set Max limit

LF928:    STD     L00C2             ;

    ;---------------------------
    ;   Fuel Output Cnt'l
    ;---------------------------
LF92A:    BRCLR   L0003,$20,LF957   ; Mode Wd3, VATS OK
                                    ; ... else
          BRSET   L0033,$10,LF957   ; BR IF b4, (1= IGN OFF)
                                    ; ... else
          BRSET   L0043,$02,LF957   ; 0 if in Decel C/O
                                    ; ... else
          BRCLR   L0034,$80,LF95E   ; B/P hi RPM & MPH C/O tst if
                                    ; -> not running
                                    ; ... else

          LDX     #$C3A5            ; Hi fuel C/O limit
          LDAA    L0065             ;
          BRCLR   L0043,$40,LF946   ; If fuel not C/O
          LDX     #$C3A8            ; Hi fuel C/O limit

LF946:    BCLR    L0043,$40         ;
          CMPA    0,X               ; Is MPH > than lmt
          BHI     LF954             ; If Yes

          LDD     L0095             ; Current Minor LP Ref Period fm MPU
          CPD     1,X               ; Is RPM > than limit
          BCC     LF95E             ; If not

LF954:    BSET    L0043,$40         ; Set Fuel cutoff flg

LF957:    LDX     #0                ; Set Acel Enr to 0
          STX     L00D9             ; Acel Enrich, Acum Fuel
          STX     L00C2             ;

LF95E:    BRCLR   L003E,$A0,LF964   ;
          BRA     LF96D             ;
```

```
LF964:    BRCLR   L0038,$C0,LF999   ;
          LDX     #$F9E5            ;
          BRA     LF973             ;

LF96D:    LDD     LC5F8             ; Lmt Fuel Factor fm ROM
          LDX     #$F9FC            ;
LF973:    JSR     0,X               ;

          PSHX                      ;
          PSHB                      ;
          PSHA                      ;
          PULX                      ;
          PULA                      ;
          PULB                      ;
          PSHX                      ;
          TSX                       ;
          SUBD    0,X               ; Fuel Supplied - lmt < 0 ?

          PULX                      ;
          BCS     LF999             ;If so

          PSHB                      ;
          PSHA                      ;
          TSX                       ;
          LDD     L00C2             ;
          SUBD    0,X               ;
          PULX                      ;
          BCS     LF992             ;

          CPD     LC3A1             ;Min Base PW fm ROM
          BCC     LF994             ;if so do 0 fuel

LF992:    CLRA                      ;
          CLRB                      ;
LF994:    PSHB                      ;
          PSHA                      ;
          PULX                      ;

          BRA     LF99B             ;
        ;-------------------------------------------------


LF999:    LDX     L00C2             ;
LF99B:    BRCLR   L0039,$80,LF9A6   ; BR IF NOT b7, (IN SNGL FIRE MODE)
                                    ; ... else
          BRCLR   L0039,$40,LF9A6   ; BR IF NOT b6, (0 PW)
          LDX     #0                ;
LF9A6:    STX     L011C             ; Save Pending fuel for
                                    ; -> acum fuel
          BEQ     LF9D2             ; If 0 JMP AROUND OFFSET
                                    ; ... else
          CPX     #0256             ; 3900 usec
          BCC     LF9C0             ; BR IF PW'S GT 3900 usec
                                    ; ... else
          PSHX                      ; TEMP SAVE PW TO STX
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; Inj Offset for Small PW's vs Base PW
        ;
        ; FOR PW'S LT 3.9 Msec
        ;
        ;  TBL = Msec * 65.536 Msec
        ;-------------------------------------------------
          PULA                      ;
```

```
          PULA                      ; GET LSB OF PW FM STX
          LDAB    #32               ; Offset for Lk Up, (Min Lk up val)
          LDX     #$C3BC            ; Table Addr
          JSR     LF2B9             ; Call 2D Lk Up, (Low PW)

          TAB                       ; COPY  RESULTS TO B Reg
          LDX     L011C             ; GET BPW
          ABX                       ; ADD IN PW OFFSET
LF9C0:    LDAB    L00CB             ; INJ OFFSET CORR, Msec * 65.636
          ABX                       ; ADD IN PW OFFSET, (twice)
          ABX                       ;

        ;------------------------
        ;   Min Base PW check
        ;------------------------
          BCLR    L0033,$02         ; b1, FORCE LOP PW, RESULT OPN LP

          CPX     LC3A1             ; base PW
          BHI     LF9D2             ;

          BSET    L0033,$02         ; Set LOW PW RESULT OPN LP

          LDX     LC3A3             ; Default Base PW fm ROM

        ;
        ;   Simu Fuel
        ;
LF9D2:    CPX     #$7FFF            ;
          BCS     LF9DA             ;

          LDX     #$7FFF            ;
LF9DA:    STX     L3FD0             ; To MCU

          BRSET   L0039,$C0,LF9E4   ; BR IF b7 & b6, (IN SF & 0 PW)
                                    ; ... else
          STX     L0466             ; To Base PW

LF9E4:    RTS                       ;
        ;-------------------------------------------------

        ;-------------------------------------------------
        ;   Accel enrich Fuel Subroutine
        ;   INDEXED LK UP
        ;
        ;
        ;       Bits 0 - 3 Are after Next Inject
        ;       Bits 4 - 7 Trigger To Next inject
        ;-------------------------------------------------
LF9E5:    LDX     #$C331            ; Fuel Lmt vs COOL
          LDAB    L005B             ; COOLANT

          LSRB                      ; Scale Coolant
          LSRB                      ; COOL/32
LF9EC:    LSRB                      ;
          LSRB                      ;
          LSRB                      ;

        ;
        ; AFTER NEXT INJECT
        ;
          ABX                       ; ADJ TBL POINTER (0 - 9)
          LDAB    0,X               ; Get fuel lmt factor
          ASLD                      ; Get 4 bits TO MSB
          ASLD                      ;
          ASLD                      ;
          ASLD                      ;
```

```
          ANDB    #$F0              ; 1111 0000, Mask, after Next Inject


        ;
        ; TRIGGER To NEXT INJECT
        ;
          LDAA    0,X               ; Get fuel lmt factor FM TBL
          ANDA    #$F0              ; 1111 0000, Mask, Trig To Next inject

          BRCLR   L0038,$10,LFA01   ; BR IF NOT b4
                                    ; ... else
          TBA                       ;
LFA01:    LDX     #$00C2            ;
          JSR     LF266             ; Fuel Lmt x ?? (8 x 16 mult)

          ASLD                      ;
          BCC     LFA0D             ; BR IF NO OVERFLOW
                                    ; ... else
          LDD     #$FFFF            ; USE MAX LMT
LFA0D:    PSHB                      ; SAVE TO STX
          PSHA                      ;
                                    ;
          LDD     L00D5             ; Base PW, Last Inj
          ADDD    L00D9             ; Acel Enrich, Acum Fuel
          BCC     LFA18             ; BR IF NO OVERFLOW
                                    ; ... else
          LDD     #$FFFF            ; USE MAX LMT
LFA18:    PSHB                      ; SAVE TO STX
          PSHA                      ;

          PULX                      ;
          PULA                      ;
          PULB                      ;

          RTS                       ;
        ;-------------------------------------------------


        ;-------------------------------------------------
        ; TPS ACCEL ENR ROUTINE
        ;
        ;-------------------------------------------------
LFA1E:    LDAA    L003F             ;
          ANDA    #$24              ; b5 & b 2
          BNE     LFA51             ; BR IF NZ

          LDAA    L0082             ; TPS Ld Axis Var
          SUBA    L00DD             ; Transient TPS
          BCC     LFA32             ; BR IF TPS GT TRANSIENT TPS
                                    ; ... else
        ;
        ; NEG TPS DIFF
        ;
          COMA                      ;
          CMPA    LC30F             ; 0 Async Accel Enrich if Neg
                                    ; Diff TPS > 3.9%
          BHI     LFA51             ;
                                    ; ... else
          BRA     LFA57             ;


        ;
        ; POS TPS DIFF
        ;
LFA32:    CMPA    LC30E             ; 3.9% Min Diff TPS for Pwr Enrichment
```

```
          BCS     LFA51             ; BR IF TPS L.T. 3.9% Min Diff

          BRSET   L0038,$80,LFA4C   ; BR IF b7
                                    ; ... else
          BCLR    L0038,$10         ; CLR b4

          LDX     #$018E            ;
LFA41:    CLR     0,X               ;
          INX                       ;
          INX                       ;
          CPX     #$01AE            ;
          BNE     LFA41             ;
                                    ; ... else
          STAA    L00D4             ; DIFF TPS for ACEL ENRICH

LFA4C:    BSET    L0038,$E0         ; SET b&, 6 & 5

          BRA     LFA57             ;
        ;-----------------------------------------


LFA51:    CLR     L00DF             ; CLR Num of Async Pulses Since Accel Enr

          BCLR    L0038,$80         ; CLR b7, (IN TPS ACELL ENRICH)

LFA57:    RTS                       ;
        ************************************************



        ************************************************
        * SERIAL DATA INIT SUBROUTINE  (SCI)
        *
        *
        ************************************************
LFA58:    CLRA                      ; CLEAR SCI RAM STUFF
          CLRB                      ;
          STAA    L012D             ; CLEAR STATUS FLAGS
          STD     L0131             ; CLEAR DEVICE TBL POINTER (2 BYTES)

          STAA    L012F             ; CLRAR GET BYTE COUNTER
          STAA    L0130             ; CLEAR CK SUM

          LDX     #$C73D            ; Get 1st ROM Tbl device

LFA69:    PSHX                      ; TEMP SAVE TBL DEV ADDRESS

          LDX     8,X               ; INDEX INPUT CNT'L BLOCK, (ICB)
          STAA    0,X               ; CLEAR DCB ....

          PULX                      ; RESTORE  ROM Tbl device
          PSHX                      ; TEMP SAVE  ROM Tbl device

          LDX     6,X               ; INDEX OUTPUT CNT'L BLOCK, (OCB)
          STAA    0,X               ; CLEAR DCB FLAGS

          PULX                      ; RETREIVE TBL DEV ADDRESS

          LDX     0,X               ; INDEX NXT MSG ENTRY ADDRESS
          BNE     LFA69             ; IF NOT LAST LINE
                                    ; ... else
          RTS                       ;
    ;-------------------------------------------------

LFA7A:    LDAA    L4008             ; CLR  TX/RX STATUS REG
```

```
          LDAA    #$27              ; 0010 0111
                                    ; Tx off, Rx on, RX Int on Wake up enable
          STAA    L4007             ; SET SCI Cntl, (CSR)
          LDAA    L4009             ; SERIAL DATA REG

        ;
        ; SET MPU CSR ....
        ;
          LDD     L3FFC             ; MPU CSR
          ORAB    #04               ; SET b2
          JSR     LF3B5             ; 11 usec DELAY
          STD     L3FFC             ; MPU CSR

          RTS
        ************************************************



        ************************************************
        *   SERIAL DATA RECIEVE SUBROUTINE
        *
        *   CALLED BY SCI INTERUPT
        *
        * CK'S FOR ERR'S, FRAME, OVER RUN ETC, IF ERR THEN
        * FLAG ERR, SET SCI WAKE UP AND EXIT.
        *
        * IF NO SCI ERR, UP DATE RX CK SUM, CK RX BYTE CNT'R,
        *
        * IF 1st BYTE:
        *   CK vs ROM TBLS FOR A MATCH TO QUAL.
        *
        *   SAVE INDEX ADDRESS IF A MATCH & INCR RX BNYTE CNT'R
        *   ELSE .... PUT SCI BACK TO SLEEP IF NO MATCH.
        *
        * IF 2nd BYTE:
        *    SUB OFF $55 TO GET BYTE COUNT.
        *
        * IF LAST BYTE:
        *   CK THE RX CK SUM, SW SCI TO TX AND RDY TO TX DATA
        *   IF BAD CK SUM (NZ), FLAG ERR & PUT SCI BACK TO SLEEP
        ************************************************
LFA91:    LDAB    L4008             ; TX/RX STATUS REG
          LDAA    L4009             ; SERIAL DATA REG

          LDX     L0131             ; INDEX CURRENT I/O BUFFER

        ;
        ; CK FRAMING & OVERRUN ERRORS
        ;
          BITB    #$0E              ; Ck for OR or FRAME ERROR
          BNE     LFB0E             ; BR IF ERROR
                                    ; ... else
        ;
        ; UPDATE CKSUM
        ;
          TAB                       ; DATA TO B reg
          ADDB    L0130             ; ADD DATA TO CK SUM
          STAB    L0130             ; SAVE NEW CK SUM

        ;
        ; CK SCI BYTE CNT'R TO SEE WHICH BYTE IS EXPECTED
        ;
          LDAB    L012F             ; GET BYTE COUNTER
          BNE     LFADD             ; BR IF NZ
                                    ; ... else
```

```
        ;
        ; IF BYTE CNT = 0, THE INCOMMING BYTE S/B A DEVICE CODE
        ;
          LDX     #$C73D            ; INDEX  EPROM TBL

LFAAD:    CMPA    2,X               ; DEVICE CODE
          BEQ     LFABE             ; IF CODE (Z)
                                    ; ... else
          LDX     0,X               ; NXT ROM ADDR
          BNE     LFAAD             ; LAST ADDR ?

        ;
        ; DEVICE CODE NOT FOUND
        ;
          LDAA    #$27              ; 0010 0111,
          STAA    L4007             ; SLEEP CMD,  TX/Rx CSR
          CLRB                      ;

          JMP     LFBA2             ; EXIT

        ;
        ; DEVICE CODE FOUND
        ;

LFABE:    STAA    L016D             ; SAVE DEVICE CODE
          STX     L0131             ; SAVE TBL POINTER

          LDAA    L012D             ; GET STATUS FLGS
          ORAA    #$40              ; SET b6, (Input in work)
          STAA    L012D             ; RESTORE FLGS

          LDX     8,X               ; POINT TO INPUT CNT'L BLOCK (ICB)
          LDAA    0,X               ; GET ICB STATUS FLGS
          ANDA    #$BF              ; INPUT NOT COMPLTETE
          ORAA    #$80              ; b7, INPUT IN WORK
          STAA    0,X               ; RESTORE ICB FLAGS

          LDAA    #$25              ; 0010 0101,
          STAA    L4007             ; SET SCI CNTL, (CSR)

          BRA     LFB08             ; GO INCR BYTE CNT & EXIT via RTS


LFADD:    CMPB    #01               ; IS SERIAL DATA 2nd DATA BYTE ?
          BNE     LFAE8             ; BR IF NOT
                                    ; ... else
        ;
        ; IF BYTE CNT = 1, INCOMING BYTE S/B
        ; MSG LENGTH + $55
        ;
          SUBA    #$55              ; SUB DATA BIAS, (85d)
          STAA    L0170             ; SAVE MSG LENGTH

          BRA     LFB08             ; GO INCR BYTE CNT & EXIT via RTS


LFAE8:    SUBB    #02               ; SER BYTE CNT => DATA BYTE CNT
          CMPB    L0170             ; IS SERIAL BYTE DATA  (MSG LEN)
          BCC     LFB10             ; BR IF NOT A DATA BYTE


        ;
        ; IF ( 0 <= L012F - BYTE CNT < NIN) THEN THE SERIAL BYTE
        ; IS A SCI DATA BYTE, IS DROPED IN TO DATA BUFFER, BYTE CNT,
        ; IN THIS CASE A 2: INI & DEVICE CODE.
        ;
```

```
        ; L012F IS THE SERIAL BYTE CNTR
        ;
          TSTB                      ;
          BNE     LFB03             ;
                                    ; ... else
          PSHB                      ;
          TAB                       ;
          CMPB    #04               ;
          BHI     LFAFA             ;
                                    ; ... else
          ASLB                      ;
          ABX                       ;
LFAFA:    LDAB    #10               ;
          ABX                       ;
          LDX     0,X               ;
          STX     L0131             ; SCI TBL POINTER

          PULB                      ;

LFB03     LDX     8,X               ; INDEX ICB
          ABX                       ; ADJ POINTER
          STAA    1,X               ; SAVE SCI DATA BYTE

LFB08     INC     L012F             ; INCR BYTE COUNTER

          JMP     LFBA5             ; EXIT VIA RTS
    ;-----------------------------------------------



LFB0E     BRA     LFB6D             ; TO BRIDGE

        ;
        ; IF ( L012F - BYTE CNT >= NIN) THEN THE SERIAL BYTE
        ; IS ASSUMED TO BE THE LAST BYTE, (CHKSUM).
        ; CKSUM S/B ZERO, IF NO A CKSUM ERROR EXISTS
        ;
LFB10:    LDAB    L0130             ; CKSUM
          BEQ     LFB19             ; BR IF Z (OK CKCUM)

        ;
        ; BAD CKSUM, SET CK SUM ERROR
        ;
          LDAA    #03               ; CK SUM ERR FLAGS
          BRA     LFB7A             ;


LFB19:    LDAA    L012D             ; SCI STATUS FLAGS
          ORAA    #$10              ; DEV HAD ERR FREE XMISSION
          ANDA    #$BF              ; INPUT NO LONGER IN WORK
          STAA    L012D             ; SCI STATUS FLAGS

          PSHX                      ; TEMP INDEX SAVE

          LDX     8,X               ; INDEX ICB
          LDAA    0,X               ; GET ICB STATUS FLAGS
          ANDA    #$7F              ; INPUT NO LONGER IN WORK
          ORAA    #$40              ; SET b5, INPUT COMPLETE
          STAA    0,X               ; RESTOR ICB STATUS FLAGS

          PULX                      ;

        ;
        ; IF REPLY EXPECETED (NOUT >= 0) THEN XMIT INTERUPT
        ; IS ENABLED AND FUTUTRE SCI INTERUPTS WILL CALL
```

```
        ; SDI INTL, XMIT MODE ROUTINE.  IF NOUT < 0 GOTO TO
        ; SLEEP
        ;
          CLRA                      ;
          LDAB    4,X               ; GOING TO REPLY
          BMI     LFB7A             ; BR IF NOT
                                    ; .. else

        ;
        ; GOING TO RESPOND
        ;
          LDAA    L012D             ; SCI STATUS FLAGS
          ORAA    #$80              ; SET b7, OUTPUT IN WORK
          STAA    L012D             ; SCI STATUS FLAGS

          LDX     6,X               ; INDEX OUTPUT CNT'L BLOCK (OCB)

          LDAA    0,X               ; GET OCB STATUS FLAGS
          ORAA    #$80              ; SET OUTPUT IN WORK
          STAA    0,X               ;

          LDX     L0131             ; TBL POINTER  FOR OCB
          LDAA    2,X               ; GET MSG ID

          LDAB    L4008             ; SCI  TX/RC STATUS REG

        ;
        ; TX MSG ID
        ;
          STAA    L400A             ; TX Data Reg, (SCI)
          STAA    L0130             ; SCI CKSUM

          LDAB    #01               ; INIT BYTE CNT
          STAB    L012F             ; SAVE BYTE COUNTER

          LDAA    L4004             ; Par I/O CSR
          ORAA    #08               ; ENABLE TX VIA SXR IC
          STAA    L4004             ; Par I/O CSR

          LDAA    #$81              ; 1000 0001, CLT TE TO FORCE IDLE
          STAA    L4007             ; SET SCI Cntl, (CSR)

          LDAA    #$89              ; 1000 1001, RE-ENABLE TX
          STAA    L4007             ; SET SCI Cntl, (CSR)

          JSR     LFBA6             ; XFER ICB --> ICB

          RTS                       ;

        ;
        ; HANDLE OVER RUN/FRAMING ERROR
        ;
LFB6D:    LDAA    #04               ; SET FRAME ERR
          BITB    #$02              ; b1, FRAME ERR
          BNE     LFB75             ; BR IF FRAME ERROR
                                    ; ... else
          LDAA    #05               ; SET OVER RUN ERR

LFB75:    LDAB    L0131             ; TBL POINTER, DEV CODE DEFINED ?
          BEQ     LFB87             ; BR IF NOT
                                    ; ... else
LFB7A:    LDX     8,X               ; INDEX ICB
          LDAB    0,X               ; GET ICB STATUS FLAGS
          ANDB    #$70              ; CLR ERR'S & NO INPUT IN WK
          STAB    0,X               ; RESTORE ICB STATUS FLAGS
```

```
          TAB                       ; ERR FLAGS TO B Reg
          ORAB    0,X               ; SET NEW ERROR
          STAB    0,X               ; SAVE ERR  IN STATUS Reg


LFB87:    LDAB    L012D             ; SCI STATUS FLAGS
          ANDB    #$B0              ; SET INPUT NO LONGER IN WORK
                                    ; & CLR PRIOR ERORS
          STAB    L012D             ; SCI STATUS FLAGS
          ORAA    L012D             ; SCI STATUS FLAGS
          STAA    L012D             ; SCI STATUS FLAGS

        ;
        ; CLR CURRENT TBL POINTER
        ;
          CLRA
          CLRB
          STD     L0131             ; CURRENT TBL POINTER

        ;
        ; SET SLEEP MODE
        ;
          LDAA    #$27              ; 0010 0111,
          STAA    L4007             ; SET SCI Cntl, (CSR)

          STAB    L012F             ; CLR BYTE COUNTER
LFBA2:    STAB    L0130             ; CLR CKSUM

LFBA5:    RTS                       ;




        ;
        ; XFER DATA FROM ICB TO MODE 2,3 & 4 OCB
        ; [BUA TYPE $32]
        ;
LFBA6:    PSHA                      ;
          PSHB                      ;

          LDAA    5,X               ; GET INPUT MSG LENGTH, {$0131+5}
          LDX     #$0134            ; INPUT BUFFER (ICB) ADDRESS+1

LFBAD:    LDAB    0,X               ; GET
          STAB    $1D,X             ; XFER BYTE ICB TO ICB ?? ($0151)
                                    ; START AT $0151, MODE 2,3 & 4 OCB
          INX                       ; NEXT ADDRESS
          DECA                      ; DEC BYTE CNT
          BNE     LFBAD             ; TILL DONE
                                    ; ... else
          CLR     L0171             ; SERIAL TIMER
          PULB                      ;
          PULA                      ;

          RTS                       ;
    ******************************************************



    ******************************************************
    * SERIAL MODE XMIT SUBROUTINE
    *
    * PROCESS SERIAL DATA via SCI PORT OF HC6801
    *   READ BYTE COUNTER, L012F.
    *   FROM THE BYTE COUNT THE BYTE TO BE OUTPUTED IS
    *   DETERMINED TO BE:
```

```
*       1. A DEVICE CODE
*       2. NUMBER OF DATA BYTES
*       3. DATA, FROM ROM DATA TBL or RAM DATA TBL
*       4. 2 COMP CHECKSUM
*           NOTE: (If last byte sent was cksum,
*                   the SCI is switched to wakeup mode)
*
*
* SEND DATA TO SCI PORT
*****************************************************

        ;
        ; THE 1st BYTE WAS SENT IN RX ROUTINE WHEN
        ; XMIT WAS STARTED
        ;

LFBBB:    LDX     L0131             ; INDEX CURRENT DEVICE TBL
          LDAB    L012F             ; GET BYTE COUNTER
          CMPB    #01               ; 2nd BYTE TO BE SENT
          BNE     LFBE2             ;
                                    ; ... else
        ;
        ; IF L012F = 1 THEN DATA = NOUT + NUM OF DATA BYTES
        ;
          LDAA    4,X               ; DATA = NOUT +  NUM OF DATA BYTES
          LDAB    L0151             ; INPUT CONTROL BLOCK (ICB+1)
          CMPB    #02               ;
          BLS     LFBDB             ;
                                    ; ... else
          LDAA    L0170             ; TX MSG LEN
          SUBA    #01               ;
          CMPB    #03               ;
          BEQ     LFBD9             ;
                                    ; ... else
          SUBA    #10               ;

LFBD9:    ASRA                      ;
          INCA                      ; INR MSG LENGTH

LFBDB:    STAA    L0170             ; TX MSG LEN
          ADDA    #$55              ; ADD ON TO MSG LENGTH, (85d)
          BRA     LFC33             ; GO TX SCI DATA

LFBE2:    CMPB    #2                ;
          BNE     LFBEB             ;


        ;
        ; IF ... = 2 THEN DATA IS MODE (SAME AS MODE IN RX'ED MSG)
        ;                           ; ... else
          LDAA    L0151             ; INPUT CONTROL BLOCK (ICB+1)
          BRA     LFC33             ; GO TX SCI DATA


LFBEB:    SUBB    #02               ; SER BYTE CNT TO DATA BYTE CNT
          CMPB    L0170             ; DATA BYTE TO BE SENT,  (TX MSG LEN)
          BCC     LFC2D             ; BR IF NOT
                                    ; ... else
        ;
        ; IF (0 <= L012F- .... < NOUT) THEN SER DATA
        ; IS REGULAR DATA BYTE. .... IS NUM OF SERIAL
        ; SENT PRIOR TO SENDING REGULAR DATA, IN THIS
        ; CASE IT IS 2: THE DEVICE CODE & NUMBER OF DATA BYTES
        ;
          DECB                      ;
          LDAA    3,X               ; GET EPROM TBL OPT fLG'S
```

```
          BITA    #$80              ; b7, EPROM TBL INPUT
          BNE     LFC04             ; BR IF EPROM TBL
                                    ; ... else
          BITA    #$40              ; b6, RAM TBL
          BNE     LFC0C             ; BR IF RAM TBL
                                    ; ... else
        ;
        ;   DATA IS FM OUTPUT BUFFER
        ;
          LDX     6,X               ; Point to Output DCB
          ABX                       ; ADD BYTE CNT TO INDEX

          LDAA    1,X               ; Get Data fm Output buff

          BRA     LFC33             ; GO TX DATA ...


        ;
        ;   DATA IS EPROM TABLE DRIVEN
        ;
LFC04:    ASLB                      ; GET DATA FROM EPROM TBL
          ABX                       ; ADJUST INDEX
          LDX     $0A,X             ; POINT to ERPOM Tbl
          LDAA    0,X               ; GET DATA FROM TBL

          BRA     LFC33             ; GO TX DATA ...

        ;
        ;   DATA IS FM RAM TBL
        ;
LFC0C:    LDX     6,X               ; RAM Tbl Addr
          LDAA    L0151             ; INPUT CONTROL BLOCK (ICB+1)
          CMPA    02                ; Mode 2 ?
          BEQ     LFC25             ; BR IF MODE 2
                                    ; ... else
          CMPA    #04               ; Mode 4 ?
          BNE     LFC1E             ; BR IF MODE 4
                                    ; ... else
          PSHB                      ;
          LDAB    #10               ;
          ABX                       ;
          PULB                      ;

        ;
        ; MODE 4 <-----*****
        ;
LFC1E:    INX                       ; NEXT ADDRESS FROM RAM
          ASLB                      ;
          ABX                       ; ADJ POINTER
          LDX     1,X               ; GET NEW ADDRESS

          BRA     LFC29             ; GET DATA & XMIT

        ;
        ; MODE 2 <-----*****
        ;
LFC25:    INX                       ; MODE 2 CALC NEXT ADDRESS
          LDX     1,X               ;
          ABX                       ;



        ;
        ; GET 8 DATA FROM INDEXED VAL & GO TX DATA
        ;
LFC29:    LDAA    0,X               ; GET DATA
```

```
          BRA     LFC33             ; GO XMIT DATA

LFC2D:    BNE     LFC41             ; BR IF NZ
                                    ; ... else
        ;
        ; IF ( ) THEN THE DATA TO BE SENT
        ; IS THE CK SUM (2'S COMPLEMENT)
        ;
          LDAA    L0130             ; CKSUM
          NEGA                      ; NEGATE CKSUM FOR 2'S COMP

        ;
        ; XMIT DATA, UP DATE CKSUM & INCREMENT BYTE CNTR
        ;
LFC33:    STAA    L400A             ; SCI TX Data       <-----***
          ADDA    L0130             ; UPDATE CKSUM
          STAA    L0130             ; NEW CKSUM
          INC     L012F             ; INCR BYTE COUNTER

          BRA     LFC71             ; EXIT via RTS

        ;-------------------------------------------
        ; ALL BYTES HAVE BEEN SENT, SCI CLEARED &
        ; SWITCHED TO WAKE  MODE
        ;-------------------------------------------
LFC41:    CLRA                      ;
          CLRB                      ;
          STAA    L0130             ; CLR CKSUM
          STD     L0131             ; CLEAR DEVICE TBL POINTER

          STAA    L012F             ; CLR BYTE COUNTER


          LDAA    L012D             ; STATUS FLAGS
          ANDA    #$70              ; b4,5 & 6, OUTPUT NOT IN WORK/CLR ERROR
          STAA    L012D             ; RESTORE STATUS FLAGS

          PSHX                      ; TEMP SAVE INDEX

          LDX     8,X               ; INDEX INPUT CNT'L BLOCK (ICB)
          LDAA    0,X               ;
          ANDA    #$F0              ; ERR CODE, NO ERRORS
          STAA    0,X               ; RESTORE ICB STATUS FLAGS
          PULX                      ; RESTORE INDEX

          LDX     6,X               ; INDEX OUTPUT CNT'L BLOCK

          LDAA    0,X               ; GET OCB STATUS FLAGS REG
          ANDA    #$7F              ; OUTPUT NO LONGER IN WORK
          STAA    0,X               ; RESTORE OCB STATUS FLAGS

        ;
        ; CLR REG'S
        ;
          LDAA    L4008             ; tx/rx status reg
          LDAA    L4009             ; SERIAL DATA REG, (CLR FRAME ERR)

        ;
        ; SWITCH FROM XMIT TO WAKE UP MODE
        ;
          LDAA    #$41              ; b6 & b0
          STAA    L4007             ; SET SCI Cntl, (CSR)

LFC71:    RTS
        ************************************************
```

```
        ************************************************
        *
        *   TEST TABLE
        ************************************************
        ************************************************
        * FACTST.SRC, BUA CHIP, 86 Y CAR
        *
        *   Factory System test  (ECM test)
        *
        *
        *   CALLS:  P4 XMIT S3
        *           A/D READ BATTTERY
        *           P4 CHECK SUM
        *           P4 A/D READ
        *
        *
        *   TABLE:          HARDWARE I/F:   BOFFECU
        *                       PRP
        *
        *
        *   $FC72 - $FEA6
        ************************************************

        ORG $FC72

LFC72:  FDB L017B       ; A/D, Ch 0/1, PRESSURE
        FDB L017C       ; A/D, Ch 1/2,
        FDB L017D       ; A/D, Ch 2/3, o2
        FDB L017E       ; A/D, Ch 3/4,
        FDB L017F       ; A/D, Ch 4/5, Coolant, 4K
        FDB L0180       ; A/D, Ch 5/6
        FDB L0181       ; A/D, Ch 6/7, PUMP V
        FDB L0182       ; A.D, CH 7/8
        FDB L0183       ; A/D, Ch 8/9, MAT Temp
        FDB L0184       ; A/D, Ch 9/10
        FDB L0185       ; A/D, Ch 10/11,  MAN A
        FDB L0186       ; A/D, Ch 11/12

        FDB L0187       ; 384 OHM  Coolant temp
        FDB L0188       ; 4K Coolant temp

        FDB L0049       ; FMD BYTE 1 & 2

LFC82:  FDB LC000       ; EPROM ID
        FDB LC002       ; Date Code
        FDB LC004       ; Seq Num

        FDB L0173       ; IEEE EPROM Ck Sum
        FDB L0175       ; EEPROM Ck Sum

        FDB L4002       ; Serial Data Latch
        FDB L0047       ; MODE WD
        FDB L0000       ; MINOR LOOP COUNTER

LFC92:  FDB L3FC0       ; Ref Period Timer
        FDB L3FC2       ; Timer #1 (Input 5)
        FDB L3FC4       ; Timer #2 (Input 6)
        FDB L3FC6       ; Cntr #1 (Cum Pulses)
        FDB L3FC8       ; Cntr #2 SPK PERIOD, (SPK Feed Bk, in 3)
        FDB L3FCA       ; Cntr #3 (16.5 Khz cntr if In 4 is hi)
        FDB L3FE0       ; Cntr #4 (Cum pulses on in 5)
        FDB L3FF8       ; Timer #1A (B Cnt'r Last H.U Pulse)
    ************************************************
```

```
    ;-------------------------------------------------
    ;   FACTORY TEST ROUTINE
    ;
    ;
    ;   Read FDM byte 1 & 2
    ;   (Fuel Modeling Device)
    ;-------------------------------------------------

        ;
        ; READ FMD BYTE 1 & 2
        ;
LFCA2:    TAP                       ;
          LDS     #$01FF            ; Set up STX

          STAA    L018C             ; UP CNTS VAL WHEN 6.25 Msec Ins.

          BRCLR   L0048,#3,LFCBE    ; set b0 & b1
                                    ; Mode = 4, (OD on, & in Drive)

          ADDA    #11               ;
          STAA    L4006             ; Match register

          BSET    L0046,#3          ; 0000 0011, Ser data out Wd
                                    ; set b0 & b1. 8192 mode
          LDAA    #$FB              ; CLR b2
          JSR     LF49A             ; Set Bit's, (CPU)

          BRA     LFCC6             ;


LFCBE:    ADDA    #205              ;
          STAA    L4006             ; Match register

          BCLR    L0046,3           ; clr  b0 & b1,Ser data mode wd
                                    ; 11 = 1 & 2nd 160 baud interupt

LFCC6:    JSR     LFDA7             ; Tst for Factory mode

        ;
        ; SEL FMD CHIP
        ;
          LDX     #$4002            ; FMD Data Latch
          BSET    0,X,#4            ; b2

          LDAA    L0031             ; FACT TST, FMD SERIAL INPUT
          ORAA    #$80              ; Set b7
          PSHA                      ; Save on STX
          JSR     LF1F9             ; Call Xmit to Serial Data

          TAB                       ; Byte 2 to B reg

          PULA                      ;
          ANDA    #$7F              ; CLR b7

        ;
        ; Toggle FMD CS To do Read
        ; ($4002 FMD Data Latch)
        ;
          BCLR    0,X,#4            ; CLR b2
          BSET    0,X,#4            ; SET b2

          JSR     LF1F9             ; Call Xmit to Serial Data

          STD     L0049             ; FACTORY TST FMD BYTE 1 M& 2
```

```
          BCLR    0,X,4             ; De-select FMD Chip

          CLI                       ; CLR & RESTIORE INTERUPTS


        ;
        ; FACT TST MINOR LP Cnt'r
        ; Roll over at 96 counts
        ;
          LDAA    L0172             ; FACT TST MINOR LP Cnt'r
          INCA                      ; INCR LP CNT'R
          CMPA    #96               ; Roll over at 96 counts
          BCS     LFCF3             ; BR IF LP CNT'R GT 96
                                    ; ... else
          CLRA                      ;

LFCF3:    STAA    L0172             ; FACT TST MINOR LP Cnt'r

        ;
        ; BATTERY/IGNITION ROUTINE
        ;
        ;
          JSR     LFDA1             ; Get Battery voltage

          LDAB    L0032             ; Ign Tmr

          CMPA    #40               ; Tst for Batt < 4 VDV
          BHI     LFD04             ; BR IF BATT LT 4.0 VDC

          CMPB    #160              ; Has Ign Been off for 1 sec ?
          BCS     LFD20             ;

          SWI                       ; Reset MPU for Pwr Down

LFD04:    TSTB                      ;
          BEQ     LFD21             ;
                                    ; ... else
          CMPA    #90               ; Tst for Ign on, (Batt V > 9 VDC)
          BCS     LFD21             ;

          CLRB                      ;

          LDAA    L0049             ; FACTORY TST FMD BYTE 1
          ANDA    #$03              ; b0 & b1
          CMPA    L0048             ; Ck For Mode Changed ?
          BEQ     LFD21             ; Yes It Has Changed
                                    ; ... else
          STAA    L0048             ;
          STAB    L0189             ; ALCL NUM BITS TO TX
          STAB    L0172             ; FACT TST MINOR LP Cnt'r
          DECB                      ;
          STAB    L018A             ; LOCATION OF NEXT ENTRY IN EPROM TBL

LFD20:    INCB                      ; Bump up ign timer
LFD21:    STAB    L0032             ; IGN OFF TIMER

          LDD     #$FF00            ; Restart COP
          STD     L400B             ; COP ARM/CLR

    ;
    ;  Using FTMW 1
    ;
          LDD     L3FFC             ; MCU CSR

          PSHA                      ;
```

```
          LDAA    L0031             ; FACT TST, FMD SERIAL INPUT
          EORA    #$02              ; Toggle bit 1
          TST     L0048             ; Mode 1 ?
          BNE     LFD51             ;

          ORAB    #4                ; SET b2, Rase ALDL Line
          BRSET   L0049,$04,LFD3E   ; BR IF b2, Fact tst wd #1.
                                    ; ... else
          ANDB    #$FB              ; CLR b2
LFD3E:    TST     L0032             ; IGN OFF TIMER, Is Ign off ?
          BNE     LFD47             ; BR IF TMR NZ
                                    ; ... else
          BRCLR   L0049,$03,LFD49   ;BR IF NOT b0 & b1,  Fact tst wd #1
                                    ; ... else
        ;
        ; Start toggeling COP 2
        ;
LFD47:    STAA    L0031             ; FACT TST, FMD SERIAL INPUT


LFD49:    PULA                      ;
          STD     L3FFC             ; MCU CSR

          BSR     LFDA6             ; Exit w/RTS
          BRA     LFD7B             ; Toggel COP 2


        ;
        ; Toggle COP 2
        ;
LFD51:    STAA    L0031             ; FACT TST, FMD SERIAL INPUT

          PULA                      ;
          STD     L3FFC             ; MCU CSR
          STD     L3FFC             ; MCU CSR
          LDAA    L0048             ; Test mode
          LSRA                      ;
          BCS     LFDB5             ;

    ;
    ; MISC TEST MODE (3)
    ;
          CLRA                      ;
          LDAB    #$C5              ; Set 3 msec Async PW
          STD     L3FF2             ; Async PW Cnt'r
          BSR     LFDA6             ; Exit w/rts

          LDD     L3FFC             ; MCU CSR
          ORAA    #4                ; SET b2
          BSR     LFDA6             ; Exit w/RTS

          STD     L3FFC             ; MCU CSR

          LDX     #0                ; Zero NV Mem Ck sum
          LDD     #$002E            ;
          JSR     LF32E             ; Ck Sum Subroutine

          STY     L0175             ; Save NV RAM Ck sum

      ;
      ; All Off Mode
      ;
LFD7B:    LDD     L3FFC             ; MCU CSR, Get Flags
          ANDA    #$FB              ; CLR b2, Reset Async
          ANDB    #$EF              ; CLR b0, Disable SPK
          ORAB    #8                ; SET b3, Turn Off Err lamp
```

```
          BSR     LFDA6             ; Exit w/RTS, (Wait)

          STD     L3FFC             ; MCU CSR, Save new Arg
          CLRA                      ; Clr D reg.
          CLRB                      ;
          BSR     LFDA6             ; Exit W/RTS

          STD     L3FD0             ; Sync Fuel = 0
          LDAA    L4004             ; Par I/O CSR, EFI PW
          ANDA    #$F9              ; 1111 1001, Trn off FAN & IAC

          STAA    L4004             ; Par I/O CSR
          LDY     #$7000            ;
          BSR     LFDED             ;

          JMP     LFEA3             ; Exit FDM

        ;
        ;   Get Battery voltage
        ;
LFDA1     LDAA    #$10              ; A/D CH 1, (Battery Volts)
LFDA3     JSR     LF1C3             ; To A/D routine

LFDA6     RTS

    ;----------------------------------------
    ; Test ALDL Mode for an A/D Value
    ;   between 40 to 100
    ;
    ;   Branch to Appropriate mode on exit
    ;----------------------------------------
LFDA7:    LDAA    #$70              ;A/D Ch 7, (Start/Run Pwr)
          BSR     LFDA3             ; If not Reset & return

          CMPA    #40               ; 40 ?
          BCS     LFDB3             ; If not Reset & return

          CMPA    #$64              ; 100
          BCS     LFDB4             ; if >= 40 or <= 100, RTS
                                    ; ... else
LFDB3:    SWI                       ; SOFTWARE INTERUPT

LFDB4:    RTS
    ;-------------------------------------------------

    ;------------------------------
    ; I/O Check modes (2 & 4)
    ; Modes 2 & 4 xmit different
    ; serial data
    ;------------------------------

    ;------------------------------
    ; Read all (12), A/D's
    ; & save results to table FDMPRES
    ;------------------------------
LFDB5:    LDX     #$017B            ; Set up A/D storage in RAM

          CLRA                      ; Set A/D Ch 0, (Rd Cal Pack)
          CLRB                      ;

LFDBA:    JSR     LF1BE             ; Call To A/D READ subroutine
          STAA    0,X               ; Save Results

          INX                       ; Bump up A/D storage pointer
          ADDB    #$10              ; Next A/D chan
```

```
          TBA                       ; COPY B to A reg
          CMPB    #$C0              ; Stop if CH C, ($C0)
          BCS     LFDBA             ; Loop if < ch C, (#12)
                                    ; ... else

        ;
        ; Sw coolant P.U's every
        ; 25 MSEC, (bits 0 & 1)
        ;
          LDAB    L0172             ; FACT TST MINOR LP Cnt'r
          BITB    #03               ; b0 & b1
          BNE     LFDE3             ; BR IF b0 & b1
                                    ; ... else
          LDAA    L017F             ; Get coolant results

        ;
        ; Br if 4K PU
        ;
          BRCLR   L0031,01,LFDDA    ; BR IF NOT b0, (FACT TST, FMD SERIAL IN)

          STAA    L0187             ; Save 348 Coolant results
          BRA     LFDDD             ; EXIT COOL FOR NEXT ROUTINE

LFDDA:    STAA    L0188             ; Save 4K Coolant temp

        ;
        ; Toggle COP 2
        ;
LFDDD:    LDAB    L0031
          EORB    #$01              ; TOGGLE b0
          STAB    L0031             ; FACT TST, FMD SERIAL INPUT

LFDE3:    LDAB    L0172             ; FACT TST MINOR LP Cnt'r
          BITB    #$0F              ;
          BEQ     LFDFF             ; BR IF NOT $0F
                                    ; ... else
          JMP     LFE4F             ;


    ;-------------------------------------------------
    ;   >>> 100 MSEC logic <<<
    ;
    ; Subroutine for writing s DC to all 6
    ; PWM's, required DC must be in Y reg
    ;-------------------------------------------------
LFDED:    LDX     #$3FD2            ; EGR PW Cnt'r
LFDF0:    STY     0,X               ;
          INX                       ;
          INX                       ;
          CPX     #$3FDC            ; SPK Dwell period cnt'r
          BNE     LFDF0             ;

          STY     L3FCC             ;

          RTS                       ;

    ;-------------------------------
    ;   Exrcise PWM outputs
    ;
    ;-------------------------------
LFDFF:    CMPB    #$20              ;0010 0000, (seg xo in B reg)
          BLS     LFE05             ;

          SUBB    #$30              ;
LFE05:    LDY     #$D39A            ;
          CMPB    #$10              ;
```

```
          BHI     LFE17             ;

          LDY     #$D200            ;
          BCS     LFE17             ;

          LDY     #$D066            ;


    ;-----------------------------
    ;   Tgggle MALF & Fan
    ;-----------------------------
LFE17:    BSR     LFDED             ;

          BSR     LFDA6             ;

          LDD     L3FFC             ; MCU CSR
          LDX     #$4004            ;
          PSHA                      ;
                                    ;
          ORAB    #$10              ; b4
          LDAA    L0172             ; FACT TST MINOR LP Cnt'r
          BITA    #$10              ; Test Bit 4
          BEQ     LFE32             ;
                                    ; ... else
          ORAB    #$08              ; Make sure SPK is enabled (Bit 3)
          BSET    0,X,6

          BRA     LFE37             ;



LFE32:    ANDB    #$F7              ; CLR b3,
                                    ; MALF lite on, Fan off
          BCLR    0,X,2
LFE37:    PULA                      ;
          STD     L3FFC             ; MCU CSR

    ;---------------------
    ; Exercise IAC Motor
    ;---------------------
          LDAA    L0179             ; IAC motor
          ASLA                      ;
          ADCA    #0                ;
          STAA    L0179             ; Out 1 step to IAC motor
          ANDA    #3                ; 0000 0011, save IAC A&B states

          LDAB    L4002             ; Get Serial Data Latch
          ANDB    #$FC              ; 1111 1100, Mask for old IAC A & B &
          ABA                       ; Add in new IAC a & B
          STAA    L4002             ; Get Serial Data Latch
    ;-----------------------------
    ;   End of 100 Ms Routine
    ;-----------------------------

    ;-----------------------------
    ;   DO SPARK & FUEL
    ;   based on RPM
    ;-----------------------------
LFE4F:    LDX     L3FC0             ; Ld Last 2 Ref Periods
          PSHX                      ; Save ref (RPM)
          PULA                      ;
          PULB                      ;
          LSRD                      ; Divide Ref Per/4
          LSRD                      ;
          LDY     #0                ;
          STD     L0177             ; Save Ref Period for later
```

```
          LDD     #655              ; 10 Ms Period
          CPX     #655              ; < 100 hZ ?
          BHI     LFE77             ; If Yes
                                    ; ... else
          CPX     #328              ; > 200 Hz ?
          BCS     LFE82             ; If yes

    ;-----------------
    ; Base P.W. = 5Ms
    ; Dwell = 4 Ms
    ;-----------------
          LSRD                      ;
          STD     L3FD0             ; BPW = 5 msec
          LDAB    #6                ; Set dwell = 4 msec
          PSHB                      ;
          PSHA                      ;
          CLRA                      ;
          CLRB                      ;
          BRA     LFE94             ;

    ;-----------------
    ; Base P.W. = 10 Ms
    ; Dwell = 5 Ms
    ;-----------------
LFE77:    STD     L3FD0             ; Sync fuel cnt'r
          LSRD                      ; Div by 2
          PSHB                      ; 5 msec Dwell
          PSHA                      ;
          LDD     L0177             ; SPK Fall= REFPER/4(45 Deg retard)

          BRA     LFE94             ; Ref period

    ;-----------------
    ; Base P.W. = 1 Ms
    ; Dwell = 3 Ms
    ;-----------------
LFE82:    LDY     #0066             ; 1 Ms Fuel dly

          LDD     #0066             ; Set BPW = 1 msec
          STD     L3FD0             ; Sync fuel cnt'r

          LDAB    #197              ; Set 3 msec Dwell
          PSHB                      ;
          PSHA                      ;
          CLRB                      ;
          SUBD    L0177             ;
    ;-------------------------------------------------

LFE94:    PULX                      ;
          STX     L3FDC             ; SPK Dwell period cnt'r
          BSR     LFEA6             ;

          STD     L3FF6             ; Tm Fm Ref to Fire IGN Cnt'r
          BSR     LFEA6             ; Short delay

          STY     L3FCE             ; EFI DLY

LFEA3:    JMP     LCCC6             ; WAITLOOP

LFEA6:    RTS                       ;
        ;-------------------------------------------------
```

```
        ;-------------------------------------------------
        ;   Cool Temp L.U. Table;
        ;
        ; System uses 2 different Series resistors with
        ; the Coolant thermistor to make the range greater
        ;
        ;   Table Arg = (Deg C + 40) * (256/192)
        ;
        ;        4k Ohm Table is LFEA7
        ;       348 Ohm Table is LFEB8
        ;-------------------------------------------------

        ;-----------------------------------------
        ;    3840 ohm Table
        ;-----------------------------------------
LFEA7:  FCB 255     ;Hot    0 A/D
        FCB 215     ;121 C, 6
        FCB 155     ;76     22
        FCB 132     ;59     38
        FCB 117     ;48     54
        FCB 106     ;39     70
        FCB 97      ;32     86
        FCB 88      ;26     102
        FCB 81      ;21     118
        FCB 74      ;15     134
        FCB 67      ;10     150
        FCB 60      ;5      166
        FCB 52      ;-1     182
        FCB 44      ;-7     198
        FCB 34      ;-14    214
        FCB 22      ;-24    246
        FCB 00      ;-40    246
        ;-----------------------------------------


        ;-----------------------------------------
        ;   348 Ohm Table
        ;-----------------------------------------
LFEB8:  FCB 255     ;Hot    0 A/D
        FCB 255     ;Hot    16
        FCB 250     ;147 C  32
        FCB 223     ;128    48
        FCB 205     ;114    64
        FCB 191     ;103    80
        FCB 179     ;94     96
        FCB 168     ;86     112
        FCB 157     ;78     128
        FCB 147     ;71     144
        FCB 138     ;63     160
        FCB 128     ;56     176
        FCB 117     ;48     192
        FCB 105     ;38     208
        FCB 90      ;27     224
        FCB 67      ;10     240
        FCB 00      ;Cold   256
        ;-----------------------------------------


        ;-----------------------------------------
        ;   Stepper Motor State Table
        ;-----------------------------------------
LFEC9:  FCB 0
        FCB 1
        FCB 3
LFECC:  FCB 2
        ***************************************************
```

```
        ************************************************
        * VECTOR
        *
        * C800 IS ALGO BEGINING
        ************************************************

        ORG $3FF0

LFFF0  FDB  $0000   ; SWI  ???
LFFF2  FDB  $C9F4   ; IRQ1
LFFF4  FDB  $F27B   ; IRQ, NOT USED
LFFF6  FDB  $6000   ; ILLEGAL OP CODE

LFFF8  FDB  $C800   ; ILLEAGLE ADDRESS
LFFFA  FDB  $C800   ; COP TIMED OUT
LFFFC  FDB  $C800   ; CLOCK FAILED
LFFFE  FDB  $C800   ; HOT RESTART
        ************************************************
```