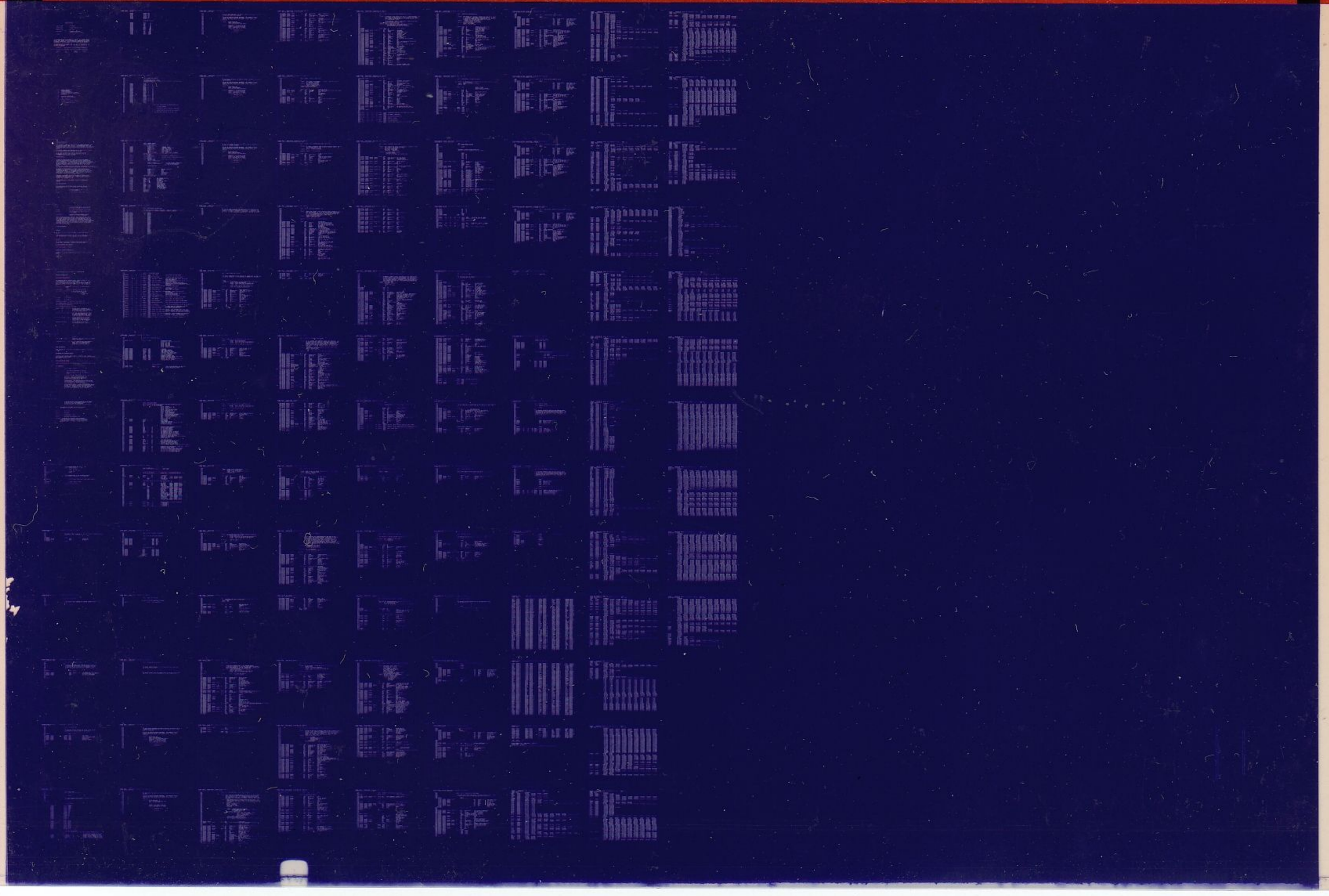
TU58

PERF EXER
CNTUUA0

AH-T476A-MC
FICHE 1 OF 1



.REM &

IDENTIFICATION

PRODUCT CODE:	AC-T475A-MC
PRODUCT NAME:	CNTUUA0 TU58 PERF EXER
PRODUCT DATE:	DEC, 1982
MAINTAINER:	DIAGNOSTIC SERVICES/ INTERNAL SPECIAL SYSTEMS
AUTHOR:	R. J. ROSS

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1.0 GENERAL INFORMATION

THIS DIAGNOSTIC EXERCISES FROM 1 TO 8 TU58 CONTROLLER BOARDS, EACH OF WHICH MAY SUPPORT 1 OR 2 DRIVES. THE PROGRAM IMPLIMENTS THE "MAINTENANCE MODE" SWITCH WITHIN ALL PACKET COMMANDS, THUS RETRIEVING MAXIMUM INFORMATION FROM THE DEVICE UPON CERTAIN DEVICE RECOGNIZED ERRORS.

STATISTICAL SUMMARIES ARE PROVIDED FOR ALL UNITS TESTED. RETRIES ARE PERFORMED ON DATA-RELATED ERROR CONDITIONS.

USE OF LOOP ON ERROR FLAG (:LOE) IS IMPLEMENTED BUT NOT RECOMMENDED FOR USE, SINCE THE LOOPS ARE QUITE LENGTHLY DUE TO COMMUNICATIONS PROTOCOL OVERHEAD.

1.1 PROGRAM ABSTRACT

IN ORDER TO EXERCISE MULTIPLE UNITS IN AN EFFICIENT MANNER, A SCHEDULING ALGORITHM BUILDS, THEN SENDS THE NEXT COMMUNICATION PACKET (COMMAND OR DATA) FORMULATED BY EXECUTING MACRO CODE WITHIN THE TEST ALGORITHMS. THE USE OF MACROS TO IMPLIMENT THE COMMUNICATIONS PROTOCOL SIMPLIFIES CONTEXT SWITCHING FROM UNIT TO UNIT BY NOT REQUIRING 8 SEPARATE DEVICE STACKS IN ADDITION TO THE SYSTEM STACK.
THE TESTS ARE PERFORMED USING THE SPECIFIED ALGORITHM ON ALL DRIVE 0'S, THEN REPEAT THE TEST AFTER SWITCHING DRIVES, IF ANY DRIVE "1'S" WERE SELECTED.

FOLLOWING THE TRANSMISSION OF 1 PACKET TO EACH DEVICE (WITH XOFF PRECEEDING) THE UNITS ARE POLLED, AND THEIR ENTIRE RESPONSES EVALUATED ROUND ROBIN. IF ANY ERROR INITIATES A RETRY, THE SCHEDULING PROCESS IS MODIFIED TO COMMUNICATE WITH ONLY 1 UNIT UNTIL COMPLETION OF THE RETRY PROCEDURE. THEN, A RETRY BY ANOTHER UNIT MAY PROCEED, OR THE SYSTEM CONTINUES NORMALLY.

THROUGHOUT THE PROGRAM, R5 POINTS TO ONE OF 8 POSSIBLE DATA STRUCTURES CONTAINING STATUS, TEST PARAMETERS, AND STATISTICAL INFORMATION FOR THE CURRENT UNIT. "START" CLEARS STATISTICS. "RESTART" AND "CONTINUE" DO NOT.

UPON OCCURANCE OF A FATAL ERROR, THAT UNIT IS DESCHEDULED (ABORTED) ALLOWING THE REMAINING (IF ANY) TO PROCEED WITH TESTING.

ERROR DESCRIPTIONS:

AN EXPLANATION OF THE EXTENDED ERROR INFORMATION FOLLOWS. SEE ALSO THE SECTION IN THIS LISTING SUBTITLED "ERROR MESSAGE DESCRIPTIONS".

BLOCK #:	THE RECORD NUMBER (1 PER 512. BYTES) IN LAST COMMAND PACK.
COMMAND:	THE MOST RECENT COMMAND PACKET OP CODE.

EXPCTD: THE DATA PATTERN USED ON WRITE COMMAND AND FOR DATA COMPARE AFTER READ OP.

SUCCESS: THE SUCCESS CODE RECEIVED IN END PACKET.

PAK SENT: TYPE OF PACKET JUST SENT (0 FOR DATA; 1 FOR COMMAND)

FLAG RCVD: FLAG BYTE OF PACKET CURRENTLY BEING CHECKED, OR 1ST BYTE OF RESPONSE.

SINCE IN MAINTENANCE MODE TU58 WILL SEND A BAD DATA PACK WITH A "DATA CHECK" SUCCESS STATUS IN THE FOLLOWING END PACK, THE HOST WILL, UPON CHECKING THOSE DATA PACK(S), DETERMINE "BAD DATA" IN PACKET ERROR FIRST, THEN INTERPRET THE SUCCESS CODE TO DIFFERENTIATE A COMMUNICATIONS GLITCH (GOOD SUCCESS) VS. TU 'DATA-CHECK' ERROR CODE. THIS WOULD SEEM TO RESULT IN TWO "ERROR" MESSAGES FOR ONE ERROR CONDITION, BUT ONLY THE SECOND ERROR MESSAGE WILL CONTAIN PERTINENT (NOT ZERO) ERROR NUMBER.

1.2 SYSTEM REQUIREMENTS

1.2.1 HARDWARE

SBC 11/21 CPU WITH AT LEAST 16K WORDS OF MEMORY AND CONSOLE DEVICE.

TU58 CONTROLLER AND DRIVE(S). DL, DLV, OR PDT COMPATABLE INTERFACE; AND REVISION "I" TU58 MICROCODE (OR LATER) ASSUMED.

1.2.2 SOFTWARE

THE PROGRAM IS REVISION C DIAGNOSTIC SUPERVISOR COMPATIBLE.
CONSULT XXDP+ USERS MANUAL FOR OPERATING INSTRUCTIONS.

1.3 RELATED DOCUMENTS AND STANDARDS

XXDP+ USERS MANUAL CHQUS

1.4 DIAGNOSTIC HIERARCY PREREQUISITES

APPROPRIATE INTERFACE DIAGNOSTICS MAY BE RUN TO ISOLATE INTERFACE ERRORS.

1.5 ASSUMPTIONS

SYSTEM HARDWARE OTHER THAN TU58(S) IS OPERATIONAL.

2.0 OPERATING INSTRUCTIONS

2.1 HOW TO RUN THIS DIAGNOSTIC

THE DIAGNOSTIC MAY BE INVOLKED WITH A 'START' RESPONSE TO THE SUPERVISOR PROMPT. 'STA'(CR) IS SUFFICIENT.
IF THE DEVICE IS NOT AT THE STANDARD ADDRESS AND VECTOR (176500, 300), THEN ANSWER "CHANGE HW?" WITH 'YES' INITIALLY TO SET UP HARDWARE CONFIGURATION TABLES FOR EACH UNIT. THAT INFORMATION IS:

TU58 CSR - ADDRESS OF RCSR OF DLV-11 OR OTHER INTERFACE BOARD.

VECTOR ADDR. - ADDRESS OF INTERRUPT VECTOR LOCATION.

PDT (PARALLEL) INTERFACE -- IS THE TU58 IN A PDT 11/130, OR SYSTEM WHOSE BUFFERS ARE:
RCSR
RCDB (AND XMDB)
XMSR

TEST DR0 - YES OR NO

TEST DR1 - YES OR NO

SUBSEQUENT RESPONSES TO "CHANGE HW?" MAY THEN BE "NO".

THE STANDARD ADDRESS AND VECTOR LOCATIONS FOR THE PDT 11/130

ARE 177170 AND 260 RESPECTIVELY.

THE SOFTWARE QUESTIONS ARE AS FOLLOWS:

NUMBER OF BLOCKS: TEST 4-7 -- ONE MAY SELECT A MINIMUM OF 8, TO A MAXIMUM OF 512 BLOCKS TO WRITE, READ; WRITE VERIFY; AND READ REDUCED, AS EXPLAINED IN SECTION 6.0.

ADD DR # TO DATA PATTERN -- FOR THOSE SAME READ AND WRITE TESTS 4-7, THE DRIVE NUMBER (0 OR 1) MAY BE ADDED TO DATA WRITTEN ON TAPE TO INSURE DRIVE SELECT BIT OPERATION.

STATISTICS PRINTED AT EOP -- SELECTS WHETHER OR NOT TO PRINT INFORMATION AT END OF PASS OR ^C. THESE STATISTICS MAY ALSO BE RE-TRIEVED WITH THE "PRI" COMMAND.

COMPARE DATA ON READ -- SELECTS WHETHER OR NOT TO DO A DATA COMPARE ON DATA PACKETS RE-

CEIVED.

PRINT PACKET ON ERROR -- PRINTS 132. BYTE DATA PACKET ON A COMPARE ERROR,IF SELECTED.

ERRORS=DVC FATAL IF 'EVL' SET -- IF USER SETS EVL FLAG (EVALUATE) MODE), HRD OR SFT ERROR MESSAGES BECOME DVC FTL ERRORS AFTER THE NUMBER SPECIFIED IS EXCEEDED.

3.0 ERROR INFORMATION

ERROR INFORMATION IS PROVIDED ON OCCURRANCE OF ERRORS AS OUTLINED IN SECTION 1.1.

4.0 PERFORMANCE AND PROGRESS REPORTS

STATISTICS ARE AVAILABLE PER SECTION 1.1 AT END OF PASS, CONTROL-C, OR UPON ENTERING A "PRI" COMMAND. THEY CONSIST OF # BLOCKS WRITTEN AND READ, # OF DATA ERRORS, HARD OR SOFT.

5.0 DEVICE INFORMATION TABLES

CONSULT SECTION SUBTITLED "DATA BLOCK FORMAT" FURTHER ON IN THIS LISTING.

6.0 TEST SUMMARIES

INIT: INIT IS SENT TO DEVICE IF:

1. INIT CODE IN SUPERVISOR IS EXECUTED

OR

2. INIT IS REQUESTED BY DEVICE AS A RESULT OF ERROR.

TEST 1: INITIATES FIRMWARE DIAGNOSTICS AT DEVICE LEVEL (SELF TEST)

TEST 2: SEEK TEST. SEEKS BOT ON BOTH TRACKS,THEN VERIFIES 60 IPS OPERATION TO SEEK EOT ON: ON BOTH TRACKS,ENDING THEN AT BOT.

TEST 3: PERFORMS WRITE, THEN READ OF ADJACENT BLOCKS AT BOT WITH VARYING DATA, THEN SEEKS HALF WAY INTO REMAINING TAPE AND REPEATS THE ABOVE UNTIL EOT.

TESTS 4-7: READS OR WRITES BLOCK # AS DATA INTO SUCCESSIVE BLOCKS ON TAPE, THE LENGTH OF WHICH IS DETERMINED BY SOFTWARE QUESTION #1: DEFAULT IS SHORT TAPE (8.).MINIMUM, (8.) RESULTS IN TRANSFER OF 8. (OR 4 PER TRACK) 512. BYTE BLOCKS OF DATA PER READ (OR WRITE) OPERATION. THE

ALGORITHM SWITCHES TRACKS REGARDLESS OF THE NUMBER
BLOCKS SELECTED. DRIVE NUMBER IS ADDED TO RECORD
AS DEFAULT,SO FOR TAPE INTERCHANGE
TESTING, ANSWER (N) TO SOFTWARE (SW) QUESTION #2.

NOTE: THE AMOUNT OF TIME SPENT IN TESTS 4-7 IS QUITE
LONG IF THE FULL TAPE (512.) IS SELECTED.

TEST 4: WRITE TAPE

TEST 5: READ TAPE

TEST 6: 'WRITE VERIFY' TAPE

TEST 7: READ MODIFIED THRESHOLD TAPE

7.0 REVISION: CZTUUB.MAC WAS EDITED BY SING LAKSHMANAN
TO INCLUDE DEFAULT ADDRESS AND VECTOR IN HARDWARE
P-TABLE AND PRIO6 INSTEAD OF PRIO7 IN SETVEC MACROS
AND CHANGE NAME I.E. CNTUUAO . CHANGES MARKED AS
VER:1

&

```
                                .TITLE PROGRAM HEADER AND TABLES
                                .SBTTL  PROGRAM HEADER

                                        .ENABL  ABS,AMA
        002000                  .       =       2000
                                        .NLIST  BEX
002000                          BGNMOD

                                ;++
                                ; THE PROGRAM HEADER IS THE INTERFACE BETWEEN
                                ; THE DIAGNOSTIC PROGRAM AND THE SUPERVISOR.
                                ;--

002000                                  POINTER BGNRPT,BGNSW,BGNSFT,BGNAU,BGNDU,BGNSETUP

002000                                  HEADER  CNTUU,A,0,3600.,1

002122                          DESCRIP <TU58 PERF EXER>
```

PROGRAM HEADER

```
                                ;++
                                ;THE PROTECT TABLE IS USED BY THE MONITOR TO WARN THE OPERATOR WHEN HE
                                ;TRIES TO TEST THE LOAD DEVICE.
                                ;--

002142                          BGNPROT
002142  000000                          .WORD   0               ;DEVICE CSR
002144  177777                          .WORD   -1              ;NO MASS BUS
002146  177777                          .WORD   -1              ;NO DRIVE
002150                          ENDPROT
```

PROGRAM HEADER

```
                                .SBTTL  DISPATCH TABLE

                                ;++
                                ; THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
                                ; IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
                                ;--

002150                                  DISPATCH 7
```

```
                                .SBTTL  DEFAULT HARDWARE P-TABLE

                                ;++
                                ; THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
                                ; THE TEST-DEVICE PARAMETERS.  THE STRUCTURE OF THIS TABLE
                                ; IS IDENTICAL TO THE STRUCTURE OF THE HARDWARE P-TABLES.
                                ; DEFAULT CSR ADDRESS AND VECTOR WERE CHANGED IN VER:1
                                ;--

002170                                  BGNHW   DFPTBL

002172  176540                         .WORD   176540          ;CSR ADDRESS;SBC 11/21 SPECIFIC
002174  000120                         .WORD   120             ;VECTOR ADDR.;SBC 11/21 SPECIFIC
002176  000003                         .WORD   3               ;TEST DRIVE ZERO AND ONE
002200  000000                         .WORD   0               ;NOT PDT TYPE INTERFACE

002202                                  ENDHW
```

```
PROGRAM HEADER AND TABLES       MACRO M1200  15-DEC-82 12:54  PAGE 13
SOFTWARE P-TABLE


                                .SBTTL  SOFTWARE P-TABLE

                                ;++
                                ; THE SOFTWARE P-TABLE CONTAINS THE VALUES OF THE PROGRAM
                                ; PARAMETERS THAT CAN BE CHANGED BY THE OPERATOR.
                                ;--

002202                                  BGNSW   SFPTBL

002204  000010                 LENGTH: .WORD   8.              ;TAPE LENGTH
002206  000001                 STAEOP: .WORD   1               ;PRINT STATISTICS AT EOP
002210  000001                 PRBUF:  .WORD   1               ;PRINT DATA BUF ON COMP. ERROR
002212  000001                 CMPDAT: .WORD   1               ;COMPARE DATA
002214  000001                 DRVCHK: .WORD   1               ;ADD DR # TO DATA
002216  000001                 EVLTHR: .WORD   1               ;THRESHOLD FOR EVL TEST

002220                                  ENDSW

002220                                  ENDMOD
```

```
                                .TITLE GLOBAL AREAS
                                .SBTTL  GLOBAL EQUATES SECTION


002220                                  BGNMOD

                                ;++
                                ; THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
                                ; ARE USED IN MORE THAN ONE TEST.
                                ;--

002220                                  EQUALS
                                ;
                                ; BIT DIFINITIONS
                                ;
100000                          BIT15== 100000
040000                          BIT14== 40000
020000                          BIT13== 20000
010000                          BIT12== 10000
004000                          BIT11== 4000
002000                          BIT10== 2000
001000                          BIT09== 1000
000400                          BIT08== 400
000200                          BIT07== 200
000100                          BIT06== 100
000040                          BIT05== 40
000020                          BIT04== 20
000010                          BIT03== 10
000004                          BIT02== 4
000002                          BIT01== 2
000001                          BIT00== 1
                                ;
001000                          BIT9==  BIT09
000400                          BIT8==  BIT08
000200                          BIT7==  BIT07
000100                          BIT6==  BIT06
000040                          BIT5==  BIT05
000020                          BIT4==  BIT04
000010                          BIT3==  BIT03
000004                          BIT2==  BIT02
000002                          BIT1==  BIT01
000001                          BIT0==  BIT00
                                ;
                                ; EVENT FLAG DEFINITIONS
                                ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
                                ;
                                                                ;  BIT POSITION IN SECOND STATUS WORD
000040                          EF.START==      32.             ; (100000) START COMMAND WAS ISSUED
000037                          EF.RESTART==    31.             ; (040000) RESTART COMMAND WAS ISSUED
000036                          EF.CONTINUE==   30.             ; (020000) CONTINUE COMMAND WAS ISSUED
000035                          EF.NEW==        29.             ; (010000) A NEW PASS HAS BEEN STARTED
000034                          EF.PWR==        28.             ; (004000) A POWER-FAIL/POWER-UP OCCURRED
                                ;
                                ;
                                ; PRIORITY LEVEL DEFINITIONS
                                ;
000340                          PRI07== 340
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 14-1
GLOBAL EQUATES SECTION

                000300                  PRI06== 300
                000240                  PRI05== 240
                000200                  PRI04== 200
                000140                  PRI03== 140
                000100                  PRI02== 100
                000040                  PRI01== 40
                000000                  PRI00== 0
                                        ;
                                        ;OPERATOR FLAG BITS
                                        ;
                000004                  EVL==        4
                000010                  LOT==       10
                000020                  ADR==       20
                000040                  IDU==       40
                000100                  ISR==      100
                000200                  UAM==      200
                000400                  BOE==      400
                001000                  PNT==     1000
                002000                  PRI==     2000
                004000                  IXE==     4000
                010000                  IBE==    10000
                020000                  IER==    20000
                040000                  LOE==    40000
                100000                  HOE==   100000
    574
```

```
                                .SBTTL  ERROR CODE EQUATES

                                ;THE ERROR CODE OFFSET VALUES :
                                ;USED BY ROUTINE 'LOG' TO INDEX (BY R5) INTO DEVICE'S DATA BLOCK AND
                                ;INCREMENT STATISTICS.

000002                          SFTRD   ==      2
000004                          SFTWR   ==      4
000006                          RCINIT  ==      6
000012                          OVRN    ==      10.
000014                          BDCOM   ==      12.
000016                          HRDRD   ==      14.
000020                          HRDWR   ==      16.
000022                          BDCHK   ==      18.
000024                          SKERR   ==      20.
000026                          WRLOCK  ==      22.
000030                          NOMOT   ==      24.
000032                          CNINIT  ==      26.
000034                          PARTL   ==      28.
000036                          NOUNIT  ==      30.
000040                          CMNDER  ==      32.
000042                          RECERR  ==      34.
000044                          SLFER   ==      36.
000046                          SUCOTL  ==      38.
000050                          TORCVB  ==      40.
000052                          OTL     ==      42.
000054                          NCART   ==      44.
000056                          TOSNDB  ==      46.

                                ;               IN ADDITION, SYSTEM SETUP OR RUNTIME ERRORS ARE:

                                ;       100.    -       ALL UNITS ABORTED

                                ;       101.    -       MORE THAN 8. UNITS (16 DRIVES) REQUESTED

                                ;       102.    -       NEITHER DRIVE SELECTED FOR THIS CONTROLLER

                                ;               ALL THE ABOVE ARE CLASSIFIED AS SYSTEM FATAL
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 18
GENERAL EQUATES


                                .SBTTL  GENERAL EQUATES
                                ;RADIAL SERIAL CODES:
                                ;-----------------------------------------------------------------------
                                ;THE FLAG BYTE CODES ARE:
000002                                  RSCMND == 2             ;"COMMAND" PACKET
000020                                  RSCONT == 20            ;"CONTINUE" SINGLE BYTE
000020                                  RSXON  == 20            ;"XON" SINGLE BYTE
000023                                  RSXOFF == 23            ;"XOFF" SINGLE BYTE
000004                                  RSINIT == 4             ;"INIT" SINGLE BYTE
000001                                  RSDATA == 1             ;"DATA" PACKET
000002                                  RSEND  == RSCMND        ;"END" PACKET FLAG IS "COMMAND"
                                ;-----------------------------------------------------------------------
                                ;END PACK SIZE:
000016                                  RSNDSZ == 14.           ;TOTAL BYTES IN COMMAND PACKET
                                ;MESSAGE PACK SIZE:
000012                                  RSMSIZ == 12            ;10. BYTES FOR BYTE COUNT INSIDE CMND PACK
                                ;DATA PACK SIZE:
000204                                  RSDASZ == 132.          ;TOTAL BYTES IN DATA PACKET
                                ;DATA + END PACK SIZE:
000222                                  RSDNSZ == RSDASZ+RSNDSZ

000016                                  RSSNSZ == RSMSIZ + 4            ;SIZE FOR SENDING COMMAND PACK
001036                                  RCBFSZ== 4*RSDASZ+RSNDSZ        ;4 DATA PAKS AND END PACK
                                                                        ;IS SIZE OF RCV BUFFERS
                                ;-----------------------------------------------------------------------
                                ;       THE OP CODES ARE:


000100                                  RSSEND == 100           ;END PACK DESCRIPTOR
000003                                  RSSWR  == 3             ;WRITE
000002                                  RSSRD == 2              ;READ
000005                                  RSSSEK == 5             ;SEEK
000000                                  RSSNOP == 0             ;NO-OPERATION
000001                                  RSSNIT == 1             ;INITIALIZE
000007                                  RSSSLF == 7             ;SELF TEST
                                ;-----------------------------------------------------------------------
                                ;THE SUCCESS CODES ARE:

177720                          ESABO   ==-48.          ;BAD COMMAND FROM HOST
177767                          ESNCRT  ==-9.           ;NO CARTRIDGE
177770                          ESNONX  ==-8.           ;NO DRIVE
000000                          ESOK    ==0             ;OP COMPLETE SUCCESS
177776                          ESPART  ==-2            ;PARTIAL OP
177740                          ESSK    ==-32.          ;SEEK ERROR
000001                          ESTRY   ==1             ;RETRYS OCCURRED
177765                          ESWLOC  ==-11.          ;WRITE PROTECTED
177737                          ESNOMO  ==-33.          ;MOTOR STOPPED
177720                          ESCMD   ==-48.          ;COMMAND ERROR
177711                          ESREC   ==-55.          ;BAD RECORD NUMBER.
177757                          ESCKS   ==-17.          ;TU CHKSUM ERROR
177777                          ESSLF   ==-1.           ;SELF TEST ERROR
177757                          ESCKSM=ESCKS
177757                          ESWR=ESCKS
177757                          ESRD=ESCKS
                                ;-----------------------------------------------------------------------
```

GLOBAL AREAS MACRO M1200 15-DEC-82 12:54 PAGE 20
ERROR MESSAGE DESCRIPTIONS

```
                                .SBTTL  ERROR MESSAGE DESCRIPTIONS

                                ;THE TABLE OF ERROR MESSAGES (ADDRESSES).  ABNDX(R5) CONTAINS THE OFFSET
                                ;OF THE REASON.  IT'S ABSOLUTE ADDRESS IS RSNTAB + ABNDX(R5).

002220  002314                  RSNTAB: MSNLOG
002222  003046                          MSSFRD
002224  003106                          MSSFWR
002226  002530                          MSRNIT
002230  002314                          MSNLOG
002232  003252                          MSOVRN
002234  002376                          MSCOM
002236  003146                          MSHDRD
002240  003210                          MSHDWR
002242  002550                          MSHCHK
002244  002300                          MSSKER
002246  002506                          MSWPRO
002250  002440                          MSNOMO
002252  002612                          MSNIT
002254  002626                          MSPART
002256  002650                          MSUNIT
002260  002676                          MSCMD
002262  002712                          MSREC
002264  002356                          MSSELF
002266  002732                          MSWRSP
002270  002756                          MSNRSP
002272  002772                          MSQRSP
002274  002456                          MSNOTP
002276  003024                          MSTOSN
```

```
                                ;HERE ARE THE MESSAGES PROPER:

002300  123  105  105  MSSKER:: .ASCIZ /SEEK ERROR/              ;DEVICE COULD NOT READ HEADER
                              .EVEN
002314  123  131  123  MSNLOG:: .ASCIZ /SYSTEM ERROR/            ;DIAGNOSTIC HUNG. BETTER RE-BOOT
                              .EVEN
002332  102  101  104  MSBDA:: .ASCIZ  /BAD DATA IN PACKET/     ;HOST DATA CHECK FOUND ERROR, DEVICE MAY
                              .EVEN                              ;HAVE READ CORRECTLY.
002356  123  105  114  MSSELF:: .ASCIZ /SELF TEST ERROR/        ;MICRO DIAGNOSTIC FAILED, BUT DEVICE COULD STILL
                              .EVEN                              ;SEND AN END PACKET.
002376  102  101  104  MSCOM:: .ASCIZ  /BAD DATA W-O DATA CHECK ERR AT TU/  ;PREVIOUS DATA CHECK
                              .EVEN                              ;ERROR NOT DUE TO DEVICE READ OPERATION
002440  115  117  124  MSNOMO:: .ASCIZ /MOTOR STOPPED/           ;DEVICE COULD NOT GET ANY MEANINGFUL SIGNAL
                              .EVEN                              ;FROM TAPE.
002456  103  101  122  MSNOTP:: .ASCIZ /CARTRIDGE NOT IN PLACE/ ;NO MEDIA OR BAD SWITCH
                              .EVEN
002506  127  122  111  MSWPRO:: .ASCIZ /WRITE PROTECTION/       ;CARTRIDGE WRITE PROTECT TAB MISSING OR
                              .EVEN                              ;SWITCH BAD
002530  122  105  103  MSRNIT:: .ASCIZ /RECIEVING INIT/         ;DEVICE SENT INIT REQUEST
                              .EVEN
002550  110  117  123  MSHCHK:: .ASCIZ /HOST FOUND PACKET CHECKSUM ERROR/  ;DEVICE SENT PACK WITH
                              .EVEN                              ;BAD CHECKSUM
002612  103  101  116  MSNIT:: .ASCIZ  /CAN'T INIT/             ;DEVICE SENT BYTE OTHER THAN "CONTINUE"
                              .EVEN                              ;DURING INITIALIZATION
002626  120  101  122  MSPART:: .ASCIZ /PARTIAL OPERATION/      ;END OF MEDIUM ENCOUNTERED
                              .EVEN
002650  042  116  117  MSUNIT:: .ASCIZ /"NON-EXISTENT" DRIVE/   ;DEVICE RECV'D TOO LARGE DRIVE NUMBER
                              .EVEN
002676  102  101  104  MSCMD:: .ASCIZ  /BAD COMMAND/            ;DEVICE COULD NOT UNDERSTAND HOST
                              .EVEN
002712  102  101  104  MSREC:: .ASCIZ  /BAD RECORD NO./         ;DEVICE RECV'D TOO LARGE A RECORD NUMBER
                              .EVEN
002732  127  122  117  MSWRSP:: .ASCIZ /WRONG SUCCESS CODE/     ;HOST COULD NOT DECIPHER CODE IN END PACK
                              .EVEN
002756  116  117  040  MSNRSP:: .ASCIZ /NO RESPONSE/            ;TIME OUT WAITING FOR BYTE IN RCV BUF ON INTERFACE.
                              .EVEN
002772  111  116  104  MSQRSP:: .ASCIZ \INDECIPHERABLE FLAG BYTE\  ;HOST COULD NOT UNDERSTAND 1ST BYTE OF
                              .EVEN                              ;RESPONSE FROM TU AS PROPER PROTOCOL
003024  124  111  115  MSTOSN:: .ASCIZ /TIME OUT ON SEND/       ;DLV 'READY' NEVER WENT HIGH
                              .EVEN
003046  122  105  103  MSSFRD:: .ASCIZ /RECOV. DATA CHECK ERR ON RD OP/  ;TU58 RESPONDED WITH "DATA-CHECK"
                              .EVEN                              ;ERROR ON READ OP. ;HOST RETRY(S) SUCCESSFUL
003106  122  105  103  MSSFWR:: .ASCIZ /RECOV. DATA CHECK ERR ON WR OP/  ;SAME BUT WR OR WR VERIFY OPERATION
                              .EVEN
003146  125  116  122  MSHDRD:: .ASCIZ /UNRECOV. DATA CHECK ERR ON RD OP/  ;TU58 RESPONDED WITH "DATA-CHECK"
                              .EVEN                              ;ERROR ON READ OP.  ;RETRIES UNSUCCESSFUL
003210  125  116  122  MSHDWR:: .ASCIZ /UNRECOV. DATA CHECK ERR ON WR OP/  ;SAME BUT WR OPERATION
                              .EVEN
003252  104  114  126  MSOVRN:: .ASCIZ /DLV ERROR IN RECEIVE/  ;DLV ERROR (THE CONTENTS PRINTED OUT)
                              .EVEN
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 24
MISC STORAGE AND EQUATES

                                .SBTTL  MISC STORAGE AND EQUATES

003300  000000                SYSTAT:: .WORD                  ;SYSTEM STATUS WORD
                                                            ;BIT7-BIT15 = 1ST BYTE OF PACK RCVD
                                                            ;BIT05 = NOT USED
                                                            ;BIT04 = NOT USED
                                                            ;BIT03 = NOT USED
                                                            ;BIT02 = NOT USED
                                                            ;BIT01 = RETRY OCCURRING
                                                            ;BIT00 = CHKSUM IS ODD (TEMP STORAGE)

003302  000000                TAPLEN:: .WORD                  ;# RECORDS
003304  000000                DEVPTR:: .WORD                  ;->NEXT UNIT ADDRESS
003306  000000                RCFLG::  .WORD                  ;TEMP STORE FOR GTBYTE
003310  000000                RCBCNT:  .WORD                  ;TEMP STORAGE FOR GTBYTE
003312  000004                FTLNM:   .WORD 4                ;NUMBER OF TRIES BEFORE ABORT
003314  000000                DONE::   .WORD                  ;1 IF TEST ALGORITHM COMPLETE
003316  000000                IDPTR::  .WORD                  ;PTR IN TESTID MACRO
003320  000000                TSTTOP:  .WORD                  ;POINTER TO CURRENT TEST
003322  000010                MXRTRY:: .WORD  8.              ;NUMBER OF RETRIES, BEFORE "HARD" ERROR
003324  000000                BLKER::  .WORD                  ;RECORD # FOR ERROR REPORT
003326  000000                SECREC:: .WORD                  ;RECORD # TO START AFTER SWITCHING TRACKS
003330  000000                PRNSIZ:: .WORD                  ;SIZE OF PACK FOR "PRNPAK"
003332  000000                ALLGON:: .WORD                  ;SECONDARY DON'T PRINT STATISTICS FLAG.


                        ;               TIME OUT CONSTANTS:

003334  177777                CSNRDY::  -1                    ;TIME OUT ON SEND DELAY (DLV NOT READY)
003336  000226                CSRCVB::  150.                  ;45 SEC. MULTIPLIER  REWIND TIME
                                                            ;CAN BE OPTIMISED PER CPU
```

```
                        .SBTTL  DATA BLOCK FORMAT
                        ;-------------------------------------------------------------------------
                        ;R5 --> TOP OF 1 OF THE 8 DATA BLOCKS (1 PER UNIT) DURING EXECUTION
                        ;@R5 IS THE STATUS WORD CONTAINING:
                                                        ;BIT15 = ABORTED
                                                        ;BIT14 = SEND "BREAK"
                                                        ;BIT13 = HALTED
                                                        ;BIT12 = TEMP STOR WRITE MACRO
                                                        ;BIT11 = UNIT NOT BEING TESTED
                                                        ;BIT10 = RETRYING
                                                        ;BIT9  = TU58 CHKSUM ERROR
                                                        ;BIT8  = RD/WR OPERATION
                                                        ;BIT7  = NORMAL/REDUCED THRESHOLD (MACROS)
                                                        ;BIT6  = HOST DATA COMPARE ERROR
                                                        ;BIT5  = WR VERIFY OPERATION
                                                        ;BIT4  = TYPE OF PAK SENT ODATA 1CMD
                                                        ;BIT3  =  NOT USED
                                                        ;BIT0,1,2=UNIT NO.
000000                  STATUS  ==      0.              ;DEVICE STATE
000002                  RETRY   ==      2.              ;# OF RETRIES
000004                  ABNDX   ==      4.              ;ERROR NUMBER FOR LOG
                        ;R0                             ;STORAGE FOR REGISTERS USED IN TEST BODY
                        ;R1                             ;STORED WITH SWAPOW
                        ;R2                             ;RETRIEVED WITH SWAPIN
                        ;R3                             ;
                        ;R4                             ;
000020                  TSTPC   ==      16.             ;POINTER TO NEXT EXECUTABLE TEST INST.
000022                  RCSR    ==      18.             ;DLV RCV STATUS ADDRESS
000024                  RCDB    ==      20.             ;DLV RCV DATA ADDRESS
000026                  XMSR    ==      22.             ;DLV SND STATUS ADDRESS
000030                  XMDB    ==      24.             ;DLV SND DATA ADDRESS
000032                  XSPKNM  ==      26.             ;THE NUMBER OF PACKETS TO RECEIVE
000034                  XSFLG   ==      28.             ;THE EXPECTED FLAG OF 1ST PACKET
000036                  XSCNT   ==      30.             ;THE EXPECTED COUNT OF 1ST PACKET
                                                        ;FOR MULTIPLE PACKET RECIEVES (MAX.4)
                        ;       BLKW    8.              ;CONSECUTIVE XSFLGS AND XSCNTS
000060                  DR      ==      48.             ;DR==0 OR 1; BIT8,9 DRIVE SELECTED BY OPERATOR
000062                  TRK     ==      50.             ;COUNTER FOR TRACK NUMBER
000064                  REC     ==      52.             ;RECORD (BLOCK #)

000066                  TMP     ==      54.             ;TEST MACRO REGISTER
000070                  SNDCNT  ==      56.             ;THE # OF BYTES FOR SENDING PACKET
000072                  PATTEN  ==      58.             ;DATA PATTERN-LOWER BYTE USED
000074                  DLV     ==      60.             ;CONTENTS OF RCDB ON DLV ERROR
000076                  SUCCS   ==      62.             ;SUCCESS CODE OF LAST END PACKET
000100                  CMDSNT  ==      64.             ;TYPE OF COMMAND CURRENT IN EVEN BYTE; BIT15==VERIFY OP.

000102                  RCVBUF  ==      66.             ;POINTER TO 542. BYTE BUFFER (4 DATA PAKS + END PACK)
000104                  PKPTR   ==      68.             ;POINTER TO TOP OF PACKET
000106                  XSPTR   ==      70.             ;POINTER TO CURRENTLY USED XSFLG OR XSCNT
000110                  WRTN0   ==      72.             ;THE # OF 512. BYTE BLOCKS WRITTEN DR0
000112                  WRTN1   ==      74.             ;THE # OF 512. BYTE BLOCKS WRITTEN DR1
000114                  RDN0    ==      76.             ;THE # OF 512. BYTE BLOCKS READ DR0
000116                  RDN1    ==      78.             ;THE # OF 512. BYTE BLOCKS READ DR1
```

```
                                ;AND THE ERROR LOG...                +-----------+
                                ;SPLIT INTO A BYTE PER DRIVE:        ! DR1 ! DR0 !
                                ;                                    +-----------+

                                ;-------------------------------------------------------------------
                                ;OFFSET IN DATA BLOCK           ;ERROR TYPE     ;ERRCODE;MSG CODE;SUC. CODE
                                ;-------------------------------------------------------------------

000120                          LGOFST  ==      80.             ;**RESERVED**
000122                          SOFTR   ==      82.             ;SOFT READ      ;SFTRD  ;MSSFRD ;ESCKSM
000124                          SOFTW   ==      84.             ;SOFT WRITE     ;SFTWR  ;MSSFWR ;ESSKSM
                                ;       WORD                    ;RECIEVED INIT  ;RCINIT ;MSRNIT ;******
                                ;       WORD                    ;**RESERVED**

                                ;THEN THOSE CODES WHICH HAVE N TRIES BEFORE ABORT

000132                          T4TRY   ==      90.             ;DLV ERROR      ;OVRN   ;MSOVRN ;******
000134                          BDATA   ==      92.             ;BAD DATA       ;BDCOM  ;MSDATA ;******
000136                          HARDR   ==      94.             ;HARD READ      ;HRDRD  ;MSHDRD ;ESCKSM
000140                          HARDW   ==      96.             ;HARD WRITE     ;HRDWR  ;MSHDWR ;ESCKSM
                                ;       WORD                    ; CHKSM AT HOST ;BDCHK  ;MSHCHK ;******
                                ;       WORD                    ;SEEK ERROR TOTAL;SKERR ;MSSKER ;******
000146                          T1TRY   ==      102.            ;WRITE PROTECT  ;WRLOCK ;MSWPRO ;ESWLOC
                                ;       WORD                    ;NO MOTOR       ;NOMOT  ;MSNOMO ;ESNOMO
                                ;       WORD                    ;CANT INIT      ;CNINIT ;MSNIT  ;******
                                ;       WORD                    ;PARTIAL OP     ;PARTL  ;MSPART ;ESPART
                                ;       WORD                    ;NO UNIT        ;NOUNIT ;MSUNIT ;ESNONX
                                ;       WORD                    ;COMMAND ERROR  ;CMNDER ;MSCMD  ;ESCMD
                                ;       WORD                    ;BAD RECORD NO.;RECERR  ;MSREC  ;ESREC
                                ;       WORD                    ;SELF TEST ERROR;SLFER  ;MSSELF ;******
                                ;       WORD                    ;WRONG SUC.CODE ;SUCOTL ;MSWRSP ;******
                                ;       WORD                    ;NO RESPONSE    ;TORCVB ;MSNRSP ;******
                                ;       WORD                    ;WEIRD FLAG     ; OTL   ;MSQRSP ;******
                                ;       WORD                    ;NO CARTRIDGE   ;NOCART ;MSNOTP ;ESNCRT
                                ;       WORD                    ;TIME OUT  SEND;TOSNDB  ;MSTOSN ;******

000202                          BLKEND  ==      130.            ;OFFSET OF END OF STATISTICS (RESERVED)
                                ;       WORD                    ;** RESERVED **
000204                          TUVECT  ==      132.            ;VECTOR ADDRESS
                                ;       WORD                    ;** RESERVED **
000210                          BLKSIZ  ==      136.            ;** RESERVED **
                                ;-------------------------------------------------------------------
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 30
DEVICE DATA BLOCK ALLOCATION


                                .SBTTL  DEVICE DATA BLOCK ALLOCATION

                                ;TABLE OF DEVICE DATA BLOCK ADDRESSES

003340  003360                  BLKTBL::        .WORD   DEV0
003342  003570                                  .WORD   DEV1
003344  004000                                  .WORD   DEV2
003346  004210                                  .WORD   DEV3
003350  004420                                  .WORD   DEV4
003352  004630                                  .WORD   DEV5
003354  005040                                  .WORD   DEV6
003356  005250                  LSTDEV::        .WORD   DEV7

                                ;AND STORAGE FOR EACH:

003360                          DEV0:           .BLKB   BLKSIZ
003570                          DEV1:           .BLKB   BLKSIZ
004000                          DEV2:           .BLKB   BLKSIZ
004210                          DEV3:           .BLKB   BLKSIZ
004420                          DEV4:           .BLKB   BLKSIZ
004630                          DEV5:           .BLKB   BLKSIZ
005040                          DEV6:           .BLKB   BLKSIZ
005250                          DEV7:           .BLKB   BLKSIZ
```

```
    947                             .SBTTL  GLOBAL TEXT SECTION
    948
    949                             ;
    950                             ; NAMES OF DEVICES SUPPORTED BY PROGRAM
    951                             ;
    952 005460                              DEVTYP  <TU58 CONTROLLER>
    953
    965
    966
    984
```

```
                                .SBTTL  SYSTEM MACRO DEFINITIONS


                                ;++
                                ;THE MACRO 'SWAPIN' RETRIEVES THE TEST REGISTERS WHICH WERE SAVED
                                ;IN THE DEVICE DATA BLOCK.
                                ;--


                                ;++
                                ;THE MACRO 'SWAPOW' SAVES THE CURRENT STATE OF THE UNIT IN THE DRIVE
                                ;DATA BLOCK IN SO THAT THE SCHEDULER MAY 'SWAPIN' ANOTHER UNIT.
                                ;--
```

```
1030                                    ;++
1031                                    ;THE WRITE MACRO IMPLEMENTS THE COMPLETE PROTOCOL NECESSARY TO BUILD
1032                                    ;A COMMAND PACKET AND SUBSEQUENT DATA PACKETS (UNTIL THE BYTE COUNT
1033                                    ;(BCNT) IS SATISFIED).
1034                                    ;
1035                                    ;SETS UP THE EXPECTED PROTOCOL RESPONSES:  THE NUMBER OF PACKETS
1036                                    ;(XSPKNM) AND THEIR FLAG BYTES AND COUNTS (XSFLG, XSCNT).  CALLS
1037                                    ;'RSVP' TO SEND EACH PACKET, AND 'CHKSUM' TO CALC. THE PACKET
1038                                    ;CHECKSUM.
1039                                    ;
1040                                    ; INPUTS  - DEVICE BLOCK @R5
1041                                    ;           TRBUF - BUFFER ADDRESS
1042                                    ;           UNIT'S TEST REGISTERS FROM 'SWAPIN'
1043                                    ; OUTPUTS - SNDCNT(R5) = # OF BYTES TO SEND
1044                                    ;           XSPKNM = # OF PACKETS EXPECTED
1045                                    ;           XSFLG = FLAG BYTE OF 1ST PACKET
1046                                    ;           XSCNT = BYTE COUNT OF 1ST PACKET
1047                                    ;              . ***
1048                                    ;              .   *  SUBSEQUENT XSFLGS
1049                                    ;              .    >
1050                                    ;              .   *  AND XSCNTS
1051                                    ;              . ***
1052                                    ;--
1053
```

```
1124                            ;++
1125                            ;THE SEEK MACRO IMPLIMENTS THE COMPLETE PROTOCOL TO INITIATE A SEEK
1126                            ;SEQUENCE.
1127                            ;
1128                            ;SETS UP THE EXPECTED PROTOCOL RESPONSES:  THE NUMBER OF PACKETS
1129                            ;(XSPKNM) AND THEIR FLAG BYTES AND COUNTS (XSFLG, XSCNT).  CALLS
1130                            ;'RSVP' TO SEND EACH PACKET, AND 'CHKSUM' TO CALC. THE PACKET
1131                            ;CHECKSUM.
1132                            ;
1133                            ; INPUTS  - DEVICE BLOCK @R5
1134                            ;           UNITS TEST REGISTERS FROM SWAPIN
1135                            ;           TRBUF - BUFFER ADDRESS
1136                            ;
1137                            ; OUTPUTS -
1138                            ;           XSPKNM = # OF PACKETS EXPECTED
1139                            ;           XSFLG = FLAG BYTE OF 1ST PACKET
1140                            ;           XSCNT = BYTE COUNT OF 1ST PACKET
1141                            ;             . ***
1142                            ;             .   *  SUBSEQUENT XSFLGS
1143                            ;             .    >
1144                            ;             .   *  AND XSCNTS
1145                            ;             . ***
1146                            ;
1147                            ;--
1148
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 40
SYSTEM MACRO DEFINITIONS

                                ;++
                                ;THE RETRY MACRO IMPLIMENTS THE COMPLETE PROTOCOL NECESSARY TO INITIATE
                                ;A RETRY (READ OPERATION) SEQUENCE.
                                ;
                                ;SETS UP THE EXPECTED PROTOCOL RESPONSES:  THE NUMBER OF PACKETS
                                ;(XSPKNM) AND THEIR FLAG BYTES AND COUNTS (XSFLG, XSCNT).  CALLS
                                ;'RSVP' TO SEND EACH PACKET, AND 'CHKSUM' TO CALC. THE PACKET
                                ;CHECKSUM.
                                ;
                                ; INPUTS  - DEVICE BLOCK @R5
                                ;          TRBUF - BUFFER ADDRESS
                                ;          UNITS TEST REGISTERS FROM SWAPIN
                                ;
                                ; OUTPUTS - SNDCNT(R5) = # OF BYTES TO SEND
                                ;          XSPKNM = # OF PACKETS EXPECTED
                                ;          XSFLG = FLAG BYTE OF 1ST PACKET
                                ;          XSCNT = BYTE COUNT OF 1ST PACKET
                                ;            . ***
                                ;            .   *  SUBSEQUENT XSFLGS
                                ;            .    >
                                ;            .   *  AND XSCNTS
                                ;            . ***
                                ;--
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 42
SYSTEM MACRO DEFINITIONS


                        ;++
                        ;THE READ MACRO IMPLIMENTS THE COMPLETE PROTOCOL NECESSARY TO INITIATE
                        ;A READ SEQUENCE.
                        ;
                        ;SETS UP THE EXPECTED PROTOCOL RESPONSES:  THE NUMBER OF PACKETS
                        ;(XSPKNM) AND THEIR FLAG BYTES AND COUNTS (XSFLG, XSCNT).  CALLS
                        ;'RSVP' TO SEND EACH PACKET, AND 'CHKSUM' TO CALC. THE PACKET
                        ;CHECKSUM.
                        ;
                        ; INPUTS  - DEVICE BLOCK @R5
                        ;          TRBUF - BUFFER ADDRESS
                        ;          UNITS TEST REGISTERS FROM SWAPIN
                        ;
                        ; OUTPUTS - SNDCNT(R5) = # OF BYTES TO SEND
                        ;          XSPKNM = # OF PACKETS EXPECTED
                        ;          XSFLG = FLAG BYTE OF 1ST PACKET
                        ;          XSCNT = BYTE COUNT OF 1ST PACKET
                        ;            . ***
                        ;            .   *  SUBSEQUENT XSFLGS
                        ;            .    >
                        ;            .   *  AND XSCNTS
                        ;            . ***
                        ;--
```

```
1313                            ;++
1314                            ;THE SELF TEST MACRO IMPLIMENTS THE COMPLETE PROTOCOL NECESSARY TO
1315                            ;INITIATE A 'DIAGNOSE' SEQUENCE.
1316                            ;
1317                            ;SETS UP THE EXPECTED PROTOCOL RESPONSES:  THE NUMBER OF PACKETS
1318                            ;(XSPKNM) AND THEIR FLAG BYTES AND COUNTS (XSFLG, XSCNT).  CALLS
1319                            ;'RSVP' TO SEND EACH PACKET, AND 'CHKSUM' TO CALC. THE PACKET
1320                            ;CHECKSUM.
1321                            ;
1322                            ; INPUTS  - DEVICE BLOCK @R5
1323                            ;           TRBUF - BUFFER ADDRESS
1324                            ;           UNITS REGISTERS TEST FROM SWAPIN
1325                            ;
1326                            ; OUTPUTS - SNDCNT(R5) = # OF BYTES TO SEND
1327                            ;           XSPKNM = # OF PACKETS EXPECTED
1328                            ;           XSFLG = FLAG BYTE OF 1ST PACKET
1329                            ;           XSCNT = BYTE COUNT OF 1ST PACKET
1330                            ;             . ***
1331                            ;             .   *  SUBSEQUENT XSFLGS
1332                            ;             .    >
1333                            ;             .   *  AND XSCNTS
1334                            ;             . ***
1335                            ;--
1336
```

```
1363                                    ;++
1364                                    ;THE TEST ID MACRO INTERFACES THE SUPERVISOR'S TEST DISPATCH TO THE
1365                                    ;DIAGNOSTIC'S FORMAT BY IMPLEMENTING CALLS THAT:  1) INITIALIZE THE
1366                                    ;PC OF THE TEST CODE (TSTPC(R5)),  2) ASSIGN THE 1ST DRIVES,  3) RUN
1367                                    ;THE TEST,  4) SWITCH DRIVES AND REINITIALIZE, 5) RUN THE TEST AGAIN.
1368                                    ;--
1369
1388                                    ;-----------------------------------------------------------------------
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 48
GLOBAL SUBROUTINES SECTION


                                        .SBTTL  GLOBAL SUBROUTINES SECTION

                                        ;++
                                        ; THE GLOBAL SUBROUTINES SECTION CONTAINS THE SUBROUTINES THAT ARE USED
                                        ; TO LINK THE DIAGNOSTIC TO THE SUPERVISOR (THROUGH THE TSTID MACRO).
                                        ;--

                                        ;++
                                        ; SWAPDR
                                        ;    SUBROUTINE TO DETERMINE IF TO TEST OTHER DRIVE (FOR ALL UNITS)
                                        ; INPUTS:       DR(R5) - DRIVE CONFIGURATION
                                        ;               BLKTBL - TOP OF DATA BLOCK ALLOCATION TABLE
                                        ;               LSTDEV - ADDR. OF LAST UNIT'S DATA BLOCK
                                        ;
                                        ; OUTPUTS:      DR(R5) UPDATED TO TEST SAME OR OTHER DRIVE
                                        ;               CARRY SET IF SECOND PASS NECESSARY
                                        ;--

                        SWAPDR:: CLR    R2              ;FOR # OF DRIVE 1'S.
005502  012737  003340  005600          MOV     #BLKTBL,SWPTR   ;TABLE ADDR. OF 1ST UNIT
005510  017705  000064          1$:     MOV     @SWPTR,R5       ;GET DATA BLOCK ADDR.
005514  032715  100000                  BIT     #BIT15,@R5      ;ABORTED?
005520  001013                          BNE     3$              ;YES
005522  032765  000001  000060          BIT     #BIT0,DR(R5)    ;DID DR. 0?
005530  001007                          BNE     3$              ;NO, DID DR.1 1ST PASS
005532  032765  001000  000060          BIT     #BIT9,DR(R5)    ;YES; 1 SELECTED?
005540  001403                          BEQ     3$              ;NO, ALL DONE
005542  105265  000060                  INCB    DR(R5)          ;YES, SWAP
005546  005202                          INC     R2              ;ONE MORE TO TEST
005550  027727  005600  003356  3$:     CMP     SWPTR,#LSTDEV   ;LAST DEVICE?
005556  103004                          BHIS    4$              ;YES
005560  062737  000002  005600          ADD     #2,SWPTR        ;NO-POINT NEXT
005566  000750                          BR      1$              ;DO

005570  005702                  4$:     TST     R2              ;(CLEAR CARRY),MORE TO DO?
005572  001401                          BEQ     5$              ;NO
005574  000261                          SEC                     ;YES
005576  000207                  5$:     RETURN                  ;RETURN

005600  000000                  SWPTR:  .WORD
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 50
GLOBAL SUBROUTINES SECTION

                                        ;++
                                        ; SETDR - SUBROUTINE TO GET DRIVE FOR 1ST PASS FOR EACH TEST
                                        ;
                                        ; INPUTS:       DR(R5) - DRIVE CONFIGURATION
                                        ;               BLKTBL - TOP OF DATA BLOCK ALLOCATION TABLE
                                        ;               LSTDEV - ADDR. OF LAST UNIT'S DATA BLOCK
                                        ;
                                        ; OUTPUTS:      DR(R5) IS SET TO TEST DRIVE 0 OR DRIVE 1
                                        ;--

005602  012737  003340  005656  SETDR:: MOV     #BLKTBL,SETPTR  ;TABLE OF ADDR. 1ST UNIT
005610  017705  000042          1$:     MOV     @SETPTR,R5      ;GET DATA BLOCK ADDR.
005614  105065  000060                  CLRB    DR(R5)          ;PRESET AS DR0
005620  032765  000400  000060          BIT     #BIT8,DR(R5)    ;DO DR0?
005626  001002                          BNE     2$              ;YES
005630  105265  000060                  INCB    DR(R5)          ;NO-USE DRIVE 1
005634  023727  005656  003356  2$:     CMP     SETPTR,#LSTDEV  ;MORE UNITS
005642  103004                          BHIS    3$              ;NO-EXIT
005644  062737  000002  005656          ADD     #2,SETPTR       ;YES-GET TABLE ENTRY
005652  000756                          BR      1$              ;CONFIGURE THAT UNIT
005654  000207                  3$:     RETURN
005656  000000                  SETPTR: .WORD
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 52
GLOBAL SUBROUTINES SECTION

   1517                                 ;++
   1518                                 ; CLRALL - CLEARS INPUT BUFFER FOR RESPONSE FROM UNIT.
   1519                                 ;
   1520                                 ; INPUTS:       BLKTBL - TOP OF DATA BLOCK ALLOCATION TABLE
   1521                                 ;               LSTDEV - ADDR. OF LAST UNIT'S DATA BLOCK
   1522                                 ;
   1523                                 ; OUTPUTS:      ALL UNITS BUFFERS CLEARED.
   1524                                 ;
   1525                                 ; CALLS:        CLRBUF
   1526                                 ;--
   1527
   1528 005660  012737  003340  005752  CLRALL:: MOV    #BLKTBL,CLRPTR  ;TOP OF TABLE OF ADDRESSES
   1529 005666  017705  000060          1$:     MOV    @CLRPTR,R5      ;GET DATA BLOCK
   1530 005672  004737  005720                  CALL   CLRBUF          ;CLEAR IT'S RECEIVE BUFFER
   1531 005676  023727  005752  003356          CMP    CLRPTR,#LSTDEV  ;LAST DEV?
   1532 005704  103004                          BHIS   2$              ;YES
   1533 005706  062737  000002  005752          ADD    #2,CLRPTR       ;-->NEXT
   1534 005714  000764                          BR     1$              ;CONTINUE
   1535 005716  000207                  2$:     RETURN
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 54
GLOBAL SUBROUTINES SECTION

   1538                                 ;++
   1539                                 ; CLRBUF - CLEARS 1 UNIT'S INPUT BUFFER.
   1540                                 ; INPUTS:  RCVBUF(R5) IS BUFFER START
   1541                                 ;          RCBFSZ - SIZE OF RECEIVE BUFFER IN BYTES
   1542                                 ;          RCBFSZ IS SIZE OF BUFFER
   1543                                 ; OUTPUTS:  CLEARED AREA.
   1544                                 ;--
   1545
   1546 005720                         CLRBUF:: PUSH   R0              ;SAVE R0
   1547 005722                                  PUSH   R4              ;SAVE R4
   1548 005724  016500  000102                 MOV    RCVBUF(R5),R0   ;GET ADDRESS OF BUFFER
   1549 005730  012704  001036                 MOV    #RCBFSZ,R4      ;SIZE IN BYTES
   1550 005734  005020                 1$:     CLR    (R0)+           ;CLEAR IT
   1551 005736  162704  000002                 SUB    #2,R4           ;2 BYTES LESS
   1552 005742  001374                         BNE    1$              ;MORE
   1553 005744                                 POP    R4              ;RESTORE
   1554 005746                                 POP    R0              ;
   1555 005750  000207                         RETURN                 ;EXIT
   1556 005752  000000                 CLRPTR: .WORD
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 56
GLOBAL SUBROUTINES SECTION

                                        ;++
                                        ; SETUP - CALLED WITHIN EACH TEST TO INSERT BEGINNING ADDRESS OF THE
                                        ;         TEST INTO ALL UNITS TEST PC'S.
                                        ; INPUTS:       TSTTOP LOADED WITH TEST ALGORITHMS STARTING ADDR.
                                        ;               BLKTBL - TOP OF DATA BLOCK ALLOCATION TABLE
                                        ;               LSTDEV - ADDR. OF LAST UNIT'S DATA BLOCK
                                        ;
                                        ; OUTPUTS:      TSTPC(R5) FOR ALL UNITS
                                        ;               DONE - CLEARED
                                        ;--

005754  005037  003314          SETUP:: CLR     DONE            ;NOT DONE YET
005760  012737  003340  003316          MOV     #BLKTBL,IDPTR   ;TABLE TOP ADDR
005766  017705  175324          1$:     MOV     @IDPTR,R5       ;DEVICE'S DATA BLOCK
005772  013765  003320  000020          MOV     TSTTOP,TSTPC(R5);INSERT PC FOR TOP OF TEST
006000  023727  003316  003356          CMP     IDPTR,#LSTDEV   ;ALL UNITS SET?
006006  103004                          BHIS    2$              ;YES
006010  062737  000002  003316          ADD     #2,IDPTR        ;NO,GET NEXT POINTER
006016  000763                          BR      1$              ;SET HIM UP
006020  000207                  2$:     RETURN                  ;DONE
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 58
GLOBAL SUBROUTINES SECTION

                                        ;++
                                        ; RUN - IMPLEMENTS THE CALLS TO SEND PACKETS, RECEIVE PACKETS, THEN
                                        ;       CHECK ANSWERS DURING TEST RUN TIME.
                                        ; INPUTS:  DONE
                                        ; OUTPUTS: NONE
                                        ;--

006022  004737  006052          RUN::   CALL    NXTST           ;MAKE AND SEND NEXT PACK TO ALL
                                                                ;UNABORTED UNITS
006026  005737  003314                  TST     DONE            ;COMPLETE?
006032  001006                          BNE     2$              ;YES
006034  004737  006736                  CALL    GETANS          ;NO,GET ALL RESPONSES

006040                                  BREAK                   ;SUPERVISOR CHECK

006042  004737  010112                  CALL    CHKANS          ;CHECK ALL RESPONSES
006046  000765                          BR      RUN             ;CONTINUE TILL DONE
006050  000207          2$:             RETURN
```

```
                                .SBTTL  NXTST / THE SCHEDULER

                                ;++
                                ; NXTST - USING EACH UN-ABORTED UNIT'S TEST PROGRAM COUNTER
                                ;         (TSTPC(R5)), EXECUTES THE TEST CODE THAT COMPRISES MAKING A
                                ;         PACKET AND SENDING IT.  ACTION IS ROUND ROBIN.  CHECKS FIRST
                                ;         FOR ANY UNIT RETRYING AND IF SO SERVICES ONLY THAT UNIT THIS
                                ;         PASS.  INITS NON-RETRYING UNITS IF NECESSARY.
                                ; INPUTS:       (IMPLIED) DATA BLOCKS.
                                ;               BLKTBL - TOP OF DATA BLOCK ALLOCATION TABLE
                                ;               LSTDEV - ADDR. OF LAST UNIT'S DATA BLOCK
                                ;
                                ; OUTPUTS:      ERRSF IF ALL UNITS ARE ABORTED.
                                ;                     SYSTAT IS UPDATED
                                ;--

006052  012737  003340  003304  NXTST:: MOV     #BLKTBL,DEVPTR  ;UNIT 0 TO START
006060  017705  175220          1$:     MOV     @DEVPTR,R5      ;GET DATA BLOCK
006064  032715  002000                  BIT     #BIT10,@R5      ;RETRYING?
006070  001422                          BEQ     2$              ;NOT THIS GUY
006072  005715                          TST     @R5             ;YES, ABORTED THO?
006074  100420                          BMI     2$              ;YES ON TO NEXT UNIT
006076  052737  000002  003300          BIS     #BIT1,SYSTAT    ;NOT ABORTED-SET RETRY STATUS
006104                                  SWAPIN                  ;GET DEVICE REGISTERS
006130  004775  000020                  JSR     PC,@TSTPC(R5)   ;DO TEST FOR
006134  000477                          BR      NXTRET          ;THIS UNIT ONLY-EXIT
006136  023727  003304  003356  2$:     CMP     DEVPTR,#LSTDEV  ;TRY NEXT UNIT?
006144  103004                          BHIS    NXTST2          ;NO
006146  062737  000002  003304          ADD     #2.,DEVPTR      ;YES,->NEXT
006154  000741                          BR      1$              ;GET BLOCK

006156  005037  006336          NXTST2: CLR     ABONM           ;HERE=NO RETRIES TO DO, NO UNIT ABORTED YET
006162  012737  003340  003304          MOV     #BLKTBL,DEVPTR  ;-->UNIT 0 STORAGE BLOCK
006170  017705  175110          PERDEV: MOV     @DEVPTR,R5      ;R5-->NEXT DEVICE STORAGE BLOCK

006174  005715                  3$:     TST     @R5             ;ABORTED?
006176  100426                          BMI     4$              ;YES
006200  032715  040000                  BIT     #BIT14,@R5      ;SEND BREAK?
006204  001407                          BEQ     6$              ;NO
006206  004737  013222                  CALL    DOBRK           ;YES
006212  032715  040000                  BIT     #BIT14,@R5      ;SUCCESSFUL INIT?
006216  001016                          BNE     4$              ;NO ON TO NEXT UNIT
006220  005715                          TST     @R5             ;ABORTED?
006222  100414                          BMI     4$              ;YES-ON TO NEXT UNIT
006224                          6$:     SWAPIN                  ;NO,GET DEVICE REGISTERS R0-R4 CONTAINING TEST PARAMETERS
006250  004775  000020                  JSR     PC,@TSTPC(R5)   ;INITIATE 1 PACKET TRANSMISSION AND RETURN
006254  005715                  4$:     TST     @R5             ;ABORTED?
006256  100002                          BPL     8$              ;NO-ON TO NEXT UNIT
006260  005237  006336                  INC     ABONM           ;YES...ONE MORE TALLIED
006264  023727  003304  003356  8$:     CMP     DEVPTR,#LSTDEV  ;ALL TU'S TRIED?
006272  103004                          BHIS    5$              ;YES
006274  062737  000002  003304          ADD     #2.,DEVPTR      ;NO THE ADDRESS+2=NEXT ADDRESS
006302  000732                          BR      PERDEV          ;DO NEXT UNIT
006304  022737  000010  006336  5$:     CMP     #8.,ABONM       ;ALL ABORTED?
006312  001010                          BNE     NXTRET          ;NO
006314                                  ERRSF   100.,NOMOR      ;YES!
006324                          11$:    BREAK                   ;SUPERVISOR BREAK
```

```
 1658 006326  005237  003332                    INC     ALLGON          ;SET DON'T-PRINT STATISTICS FLAG
 1659 006332                                    DOCLN                   ;EXIT
 1660 006334  000207                NXTRET:     RETURN
 1661
 1662 006336  000000                ABONM:      .WORD                   ;THE NUMBER OF ABORTED UNITS
 1663 006340     101     114     114 NOMOR:      .ASCIZ  /ALL UNITS ABORTED!/
 1664                                            .EVEN
```

```
                                .SBTTL  RSVP / XOFF AND SEND A PACKET TO ALL DEVICES

                                ;++
                                ; RSVP - SAVES TEST CODE PROGRAM COUNTER IN TSTPC(R5) AND UNIT'S REGIS-
                                ;        TERS.  POINTS TO "XOFF" THAT PRECEEDS PACKET IN XMIT BUFFER
                                ;        AND SENDS PACKET WITH XOFF.  RETURNS TO SCHEDULER (NXTST) SO
                                ;        THAT OTHER UNITS PACKETS MAY BE FORMED, TO GET ALL UNITS WORKING
                                ;        AT ONCE.
                                ; INPUTS:  (SP) CONTAINS UNITS PC TO SAVE SINCE RSVP WAS CALLED.  THE
                                ;         NUMBER PACKETS EXPECTED (XSPKNM), AND THE EXPECTED FLAGS AND
                                ;         BYTE COUNTS OF EACH (XSFLG, XSCNT...) ARE LOADED BY TEST CODE
                                ;         (MACROS).
                                ;         SNDCNT - # BYTES TO SEND
                                ;         REC(R5) - RECORD #
                                ;         TRBUF - BUFFER ADDR.
                                ;         XSPKNM(R5) - # EXPECTED
                                ;         RCVBUF(R5)
                                ;
                                ; OUTPUTS:  CMDSNT - UPDATED WITH PACKET OP CODE
                                ;         BLKER  - RECORD NUMBER STATISTICS UPDATED IF NOT RETRYING
                                ;                  AND COMMAND PACKET SENT.
                                ;         SUCCS(R5) - PRESET CLEAR
                                ;         STATUS WORD @R5 - BIT9 - DATA CHECK ERROR - CLEARED
                                ;                          BIT5 - "VERIFY" OPERATION
                                ;                          BIT4 - 0 = DATA PACK 1 = CMND
                                ;                          BIT8 - RD/WR OPERATION
                                ;         XSPTR - POINTS TO EXPECTED FLAG
                                ;         UPPER BYTE OF XSPKNM IS REPLICATED.
                                ;         PACKET POINTER (PKPTR(R5)) POINTS TO TOP OF UNITS RECEIVE BUFFER
                                ;         AREA (RCVBUF(R5)) FOR CURRENT UNIT.
                                ;--

006364  000240                 RSVP::  NOP                             ;FINISH TEST
006366  012665  000020                 MOV     (SP)+,TSTPC(R5) ;SAVE WHERE YOU WERE IN TEST BODY AND
006372                                 SWAPOW                          ;SAVE TEST REGISTERS

                                                                       ;CORRECT FOR RETURN TO SCHEDULER
006416  012700  024367         XFNSND: MOV     #TRBUF-1,R0             ;POINT TO XOFF
006422  005265  000070                 INC     SNDCNT(R5)              ;ONE MORE TO SEND, TOO.
006426  000402                         BR      SND                     ;SEND XOFF+PACKET
006430  012700  024370         NOXOFF: MOV     #TRBUF,R0               ;FOR NORMAL PACKET SEND
006434  004737  006666         SND:    CALL    SNDBYT                  ;SEND BYTE
006440  005715                         TST     @R5                     ;R5--> TO STATUS BLK
006442  100510                         BMI     6$                      ;ABORTED? YES...QUIT
006444  005365  000070                 DEC     SNDCNT(R5)              ;NO, SEND MORE
006450  001371                         BNE     SND                     ;IF MORE TO SEND
006452  012700  024370                 MOV     #TRBUF,R0               ;-->BUFFER
006456  016537  000064  003324         MOV     REC(R5),BLKER   ;PREPARE FOR RECEIVE
006464  156565  000032  000033         BISB    XSPKNM(R5),XSPKNM+1(R5)  ;REPLICATE LO. BYTE TO HI FOR GTPAKS, CHKANS
006472  005065  000076                 CLR     SUCCS(R5)               ;NO SUCCESS YET
006476  042715  001000                 BIC     #BIT9,@R5               ;NO DATA CHK ERROR YET
006502  016565  000102  000104         MOV     RCVBUF(R5),PKPTR(R5)  ;TOP OF RCV BUFFER GOES THE 1ST PACKET
006510  012704  000034                 MOV     #XSFLG,R4               ;FORM
006514  060504                         ADD     R5,R4                   ;ADDRESS
006516  010465  000106                 MOV     R4,XSPTR(R5)    ;OF 1ST XSFLG

006522  042715  000020                 BIC     #BIT4,@R5               ;PRESET AS DATA PAK
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 62-1
RSVP / XOFF AND SEND A PACKET TO ALL DEVICES

 1724 006526  121027  000002                    CMPB    @R0,#RSCMND      ;WAS IT COMMAND PAK?
 1725 006532  001054                            BNE     6$               ;NO...
 1726 006534  116065  000002  000100            MOVB    2(R0),CMDSNT(R5)  ;YES-SAVE COMMAND
 1727 006542  052715  000020                    BIS     #BIT4,@R5        ;ITS CMND PAK
 1728
 1729 006546  032715  002000                    BIT     #BIT10,@R5       ;RETRYING?
 1730 006552  001044                            BNE     6$               ;YES-DON'T UPDATE ANY STATS OR CONDITION
 1731 006554  126027  000002  000002            CMPB    2(R0),#RSSRD     ;NO,A READ?
 1732 006562  001012                            BNE     4$               ;NO
 1733 006564  042715  000400                    BIC     #BIT8,@R5        ;(FOR HARD/SOFT LOGGING) RD/WR FLAG=0
 1734 006570  004737  013052                    CALL    WHCHDR           ;GET DRIVE
 1735 006574  103403                            BCS     8$               ;
 1736 006576  005265  000114                    INC     RDN0(R5)         ;DRIVE 0
 1737 006602  000402                            BR      4$               ;
 1738 006604  005265  000116            8$:     INC     RDN1(R5)         ;DRIVE 1
 1739
 1740 006610  126027  000002  000003  4$:       CMPB    2(R0),#RSSWR     ;A WRITE?
 1741 006616  001022                            BNE     6$               ;NO
 1742 006620  052715  000400                    BIS     #BIT8,@R5        ;YES, RD/WR FLAG=1
 1743 006624  105760  000003                    TSTB    3(R0)            ;VERIFY TOO?
 1744 006630  001403                            BEQ     21$              ;NO
 1745 006632  052715  000040                    BIS     #BIT5,@R5        ;YES-SET VERIFY FLAG
 1746 006636  000402                            BR      22$
 1747 006640  042715  000040            21$:    BIC     #BIT5,@R5        ;(NO)-RESET VERIFY FLAG
 1748 006644  004737  013052            22$:    CALL    WHCHDR           ;GET DRIVE NO
 1749 006650  103403                            BCS     5$               ;CARRY=DR1
 1750 006652  005265  000110                    INC     WRTN0(R5)        ;# BLKS WRITTEN DR0
 1751 006656  000402                            BR      6$               ;EXIT
 1752
 1753 006660  005265  000112            5$:     INC     WRTN1(R5)        ;# BLKS WRITTEN DRV1
 1754 006664  000207            6$:     RETURN                           ;RETURN
```

```
                                .SBTTL  SNDBYT / OUTPUT A BYTE TO UNIT

                                ;++
                                ; SNDBYT - TEST 'READY' ON INTERFACE.  IF 'READY', SEND BYTE AND EXIT.
                                ;          IF TIMED OUT, LOG ERROR.
                                ; INPUTS - R0 = POINTER TO BUFFER
                                ;        - IMPLIED UNIT DATA BLOCK
                                ;        - CSNRDY - TIMEOUT CONSTANT
                                ; OUTPUTS - R0 IS INCREMENTED.
                                ; ERROR - NOT-READY-TO-SEND TIME OUT
                                ;--

006666                          SNDBYT:: PUSH   R1              ;ENTER R0-->BYTE
006670  013701  003334          4$:      MOV    CSNRDY,R1       ;GET TIMEOUT CONSTANT FOR NOT READY ERROR
006674  105775  000026          1$:      TSTB   @XMSR(R5)       ;READY TO SEND?
006700  100412                           BMI    2$              ;YES
006702                                   PUSH   R0              ;NO, SAVE R0
006704                                   BREAK                  ;MONITOR BREAK
006706                                   POP    R0              ;RESTORE

006710  005301                           DEC    R1              ;ABORTED?
006712  001370                           BNE    1$              ;NO
006714  012704  000056                   MOV    #TOSNDB,R4      ;YES,SET CODE FOR TIMEOUT ERROR
006720  004737  012046                   CALL   LOG             ;LOG IT
006724  000402                           BR     3$              ;QUIT
006726  112075  000030          2$:      MOVB   (R0)+,@XMDB(R5) ;SEND IT
006732                          3$:      POP    R1              ;RESTORE
006734  000207                           RETURN                 ;DONE
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 66
GETANS / GETS RESPONSES ROUND ROBIN USING "XON"

                                        .SBTTL  GETANS / GETS RESPONSES ROUND ROBIN USING "XON"

                                        ;++
                                        ; GETANS - IF A UNIT IS RETRYING CLEAR HIS RECEIVE BUFFER (CLRBUF) AND GET
                                        ;          HIS RESPONSE (GTPKS1), ELSE, CLEAR ALL BUFFERS (CLRALL) AND
                                        ;          GET ALL RESPONSES (GTPKS8).
                                        ; INPUTS:  SYSTAT - SYSTEM STATUS WORD.
                                        ;
                                        ; OUTPUTS: SERVST = -1 IF NO RETRIES.
                                        ;--

006736  000240                  GETANS:: NOP                     ;1 UNIT IF RETRY;  ELSE ALL
006740  032737  000002  003300          BIT     #BIT1,SYSTAT    ;RETRY?
006746  001010                          BNE     1$              ;YES
006750  012737  177777  007656          MOV     #-1,SERVST      ;PRESET NO UNITS SERVICED
006756  004737  005660                  CALL    CLRALL          ;CLEAR ALL INPUT BUFFERS
006762  004737  007214                  CALL    GTPKS8          ;GET ALL REPLYS
006766  000404                          BR      2$              ;EXIT
006770  004737  005720          1$:     CALL    CLRBUF          ;RETRY-CLEAR 1 UNIT ONLY
                                                                ;R5->UNIT BY NXTST
006774  004737  007004                  CALL    GTPKS1          ;GET 1 REPLY
007000  000207                  2$:     RETURN                  ;DONE

007002  000000                  GETPTR: .WORD
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 68
GTPKS1 / GET RETRY RESPONSE-1 UNIT


                                .SBTTL  GTPKS1 / GET RETRY RESPONSE-1 UNIT

                                ;++
                                ; GTPKS1 - SENDS 'XON' TO UNIT, GETS FLAG BYTE (IF ANY), CHECKS IF IT IS
                                ;          WHAT WAS EXPECTED.  IF IT IS, USE EXPECTED BYTE COUNT(XSCNT).  IF
                                ;          NOT, CHECK IF PREMATURE-END PACK OR (SINCE MAINTENANCE MODE)
                                ;          IF IT'S A PREMATURE DATA PACK.  ADJUST COUNT, GET REST OF
                                ;          PACKET, AND REPEAT ABOVE UNTIL NO MORE PACKETS.
                                ; INPUTS:  (IMPLIED) UNITS DATA BLOCK
                                ;          RSNDSZ - END PACKET SIZE
                                ;
                                ; OUTPUTS: SYSTAT UPPER BYTE = FLAG BYTE RECEIVED
                                ;--

007004  000240                  GTPKS1:: NOP                    ;R5->THE UNIT
007006  012703  000034                   MOV     #XSFLG,R3      ;THE OFFSET VALUE OF FLAG
007012  060503                           ADD     R5,R3          ;FORM THE ABSOLUTE ADDRESS
007014  010301                           MOV     R3,R1          ;R3-->ADDR. OF EXPECTED FLAG
007016  062701  000002                   ADD     #2.,R1         ;R1-->ADDR. OF EXPECTED COUNT
007022  012700  007212                   MOV     #EXON,R0       ;R0=ADDRESS
007026  004737  006666                   CALL    SNDBYT         ;XON THE DEVICE
                                                                ;*** TIME CRITICAL
007032  016500  000102                   MOV     RCVBUF(R5),R0  ;***--> TO THE BUFFER
007036  116502  000033                   MOVB    XSPKNM+1(R5),R2 ;***GET THE # OF PACKETS TO RECEIVE
007042  032702  177400                   BIT     #177400,R2     ;***SIGN UN-EXTEND
007046  011137  003310          1$:      MOV     @R1,RCBCNT     ;***HOW MANY BYTES IT SHOULD BE
007052  011337  003306                   MOV     @R3,RCFLG      ;***WHAT THE FIRST BYTE SHOULD BE
007056  004737  007662                   CALL    GTBYTE         ;***GET THE ALL IMPORTANT FLAG
007062  032715  100000                   BIT     #BIT15,@R5     ;TIMEOUT?
007066  001050                           BNE     4$             ;YES
007070  005300                           DEC     R0             ;-> BYTE RECIEVED
007072  111037  003301                   MOVB    @R0,SYSTAT+1   ;SAVE IT AS FLAG BYTE
007076  121037  003306                   CMPB    @R0,RCFLG      ;1ST BYTE WHAT WAS EXPECTED?
007102  001420                           BEQ     2$             ;YES
007104  121027  000002                   CMPB    @R0,#RSEND     ;NO, WAS IT END PAK?
007110  001006                           BNE     14$            ;NO
007112  012737  000016  003310           MOV     #RSNDSZ,RCBCNT ;YES, USE END SIZE FOR COUNT
007120  012702  000001                   MOV     #1,R2          ;AND ASSUME IT'S LAST PACKET!
007124  000407                           BR      2$             ;CONTINUE RECEIVE
007126  121027  000001          14$:     CMPB    @R0,#RSDATA    ;WAS IT DATA?
007132  001026                           BNE     4$             ;NO,CHKANS MAY FIND INIT...
007134  012737  000204  003310           MOV     #RSDASZ,RCBCNT ;YES, SET FOR DATA PAK SIZE
007142  005202                           INC     R2             ;ONE MORE PACK THAN EXPECTED (END PACK)

007144  005200                  2$:      INC     R0             ;RESTORE TO -> NEXT BYTE
007146  005337  003310          5$:      DEC     RCBCNT         ;THAT'S ONE LESS BYTE TO GO
007152  001411                           BEQ     3$             ;DONE
007154  004737  007662                   CALL    GTBYTE         ;GET REST OF PACKET
007160  005765  000074                   TST     DLV(R5)        ;ERROR
007164  001011                           BNE     4$             ;YES-ALL OVER
007166  032715  100000                   BIT     #BIT15,@R5     ;OR IF ABORTED
007172  001006                           BNE     4$             ;THEN QUIT
007174  000764                           BR      5$             ;CONTINUE RECEIVE

007176  005302                  3$:      DEC     R2             ;ONE LESS PACKET TO GO
007200  001403                           BEQ     4$             ;MORE PACKETS IN TRANSACTION?
                                                                ;YES
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 68-1
GTPKS1 / GET RETRY RESPONSE-1 UNIT

 1870 007202  022121                      CMP     (R1)+,(R1)+     ;POINT TO NEW EXPECTED COUNT
 1871 007204  022323                      CMP     (R3)+,(R3)+     ;AND FLAG,
 1872 007206  000717                      BR      1$              ;AND RECEIVE,
 1873 007210  000207              4$:     RETURN                  ;RETURN
 1874
 1875 007212     020              EXON:   .BYTE   RSXON
 1876 007213     023              EXOFF:  .BYTE   RSXOFF
```

```
                                .SBTTL  GTPKS8 / GET RESPONSES (NO RETRIES)

                                ;++
                                ; GTPKS8 - SET ALL ABORTED UNITS SERVICED (SERVST: BIT POSITION).  UNTIL
                                ;          ALL UNITS SERVICED (SERVST=0), IF NO MORE PACKETS, SET UNIT
                                ;          SERVICED, ELSE, GET A FLAG BYTE FROM UNIT, DECREMENTING THE
                                ;          NUMBER OF PACKETS LEFT.  CHECK TO SEE IF EXPECTED FLAG,
                                ;          ADJUST COUNT IF NOT, GET REST OF PACKET.  IF WAS DATA PACK,
                                ;          SEND "XOFF" TO ENHANCE THROUGHPUT AND GO ON TO NEXT UNIT
                                ;          (IF ANY).
                                ; INPUTS:  (IMPLIED)UNITS DATA BLOCK POINTED TO BY R5.  NONE PASSED.
                                ;          RSNDSZ - END PACK SIZE
                                ;          RSDNSZ - DATA + END SIZE
                                ;
                                ; OUTPUTS: SYSTAT - UPPER BYTE=1ST BYTE RECEIVED, CURRENT UNIT
                                ;--

007214  000240                  GTPKS8:: NOP                    ;GET ALL UNITS RESPONSES XOFF IF DATA PAK (THROUGHPUT)
007216  012737  003340  007660          MOV     #BLKTBL,GTPTR   ;->1ST
007224  017705  000430          GTAGIN: MOV     @GTPTR,R5       ;GET DATA BLOCK
007230  032715  100000                  BIT     #BIT15,@R5      ;ABORTED?
007234  001403                          BEQ     2$              ;NO
007236  004737  007572                  CALL    SETSRV          ;YES-SET' SERVICED' AND
007242  000534                          BR      GTDOWN          ;ON TO NEXT UNIT
007244  105765  000033          2$:     TSTB    XSPKNM+1(R5)    ;NO, ANY PACKETS LEFT?
007250  001003                          BNE     3$              ;YES
007252  004737  007572                  CALL    SETSRV          ;NO-HE'S DONE
007256  000526                          BR      GTDOWN          ;SO ON TO NEXT UNIT
007260  105365  000033          3$:     DECB    XSPKNM+1(R5)    ;NOW ITS ONE LESS PACKET
007264  017537  000106  003306          MOV     @XSPTR(R5),RCFLG  ;GET EXPECTED FLAG
007272  062765  000002  000106          ADD     #2,XSPTR(R5)    ;--> COUNT
007300  017537  000106  003310          MOV     @XSPTR(R5),RCBCNT  ;AND EXPECTED COUNT
007306  012700  007212                  MOV     #EXON,R0        ;-> XON
                                                                ;***TIME CRITICAL
007312  004737  006666                  CALL    SNDBYT          ;***SEND IT
007316  016500  000104                  MOV     PKPTR(R5),R0    ;***->WHERE 1ST BYTE GOES
007322  004737  007662                  CALL    GTBYTE          ;***GET IT
007326  032715  100000                  BIT     #BIT15,@R5      ;ABORTED?
007332  001403                          BEQ     4$              ;NO-CONTINUE
007334  105065  000033                  CLRB    XSPKNM+1(R5)    ;YES-NO MORE PACKETS EXPECTED
007340  000475                          BR      GTDOWN          ;ON TO NEXT
007342  005300                  4$:     DEC     R0              ;-->BYTE JUST RECEIVED
007344  111037  003301                  MOVB    @R0,SYSTAT+1    ;SAVE IT
007350  121037  003306                  CMPB    @R0,RCFLG       ;IS IT WHAT EXPECTED?
007354  001436                          BEQ     GTOK            ;YES
007356  105065  000033          UNXPCT: CLRB    XSPKNM+1(R5)    ;NO, MUST BE LAST REPLY
007362  121027  000002                  CMPB    @R0,#RSEND      ;MAYBE AN END PAK?
007366  001004                          BNE     4$              ;NO
007370  012737  000016  003310          MOV     #RSNDSZ,RCBCNT  ;YES, USE PROPER COUNT
007376  000406                          BR      GTUM            ;AND GET IT
007400  121027  000001          4$:     CMPB    @R0,#RSDATA     ;IS IT DATA?
007404  001053                          BNE     GTDOWN          ;NO, ALL OVER, CHKANS WILL INIT UNIT
007406  012737  000222  003310          MOV     #RSDNSZ,RCBCNT  ;YES, USE COUNT OF DATA + END PAK SURE TO FOLLOW
007414  005200                  GTUM:   INC     R0              ;WHERE TO STUFF THE REST
007416  005337  003310          5$:     DEC     RCBCNT          ;ONE DOWN
007422  001444                          BEQ     GTDOWN          ;NONE TO GO
007424  004737  007662                  CALL    GTBYTE          ;MORE TO GO
```

```
1936 007430  032715  100000                    BIT     #BIT15,@R5      ;TIMEOUT?
1937 007434  001037                            BNE     GTDOWN          ;YES
1938 007436  005765  000074                    TST     DLV(R5)         ;BUT DLV ERROR?
1939 007442  001765                            BEQ     5$              ;NO
1940 007444  105065  000033                    CLRB    XSPKNM+1(R5)    ;YES-LAST TIME
1941 007450  000431                            BR      GTDOWN          ;ON TO NEXT
1942
1943 007452  005200                    GTOK:   INC     R0              ;NEXT PLACE IN BUFFER
1944 007454  005337  003310              1$:   DEC     RCBCNT          ;MORE BYTES?
1945 007460  001413                            BEQ     2$              ;NO-ALL DONE
1946 007462  004737  007662                    CALL    GTBYTE          ;YES-GET IT
1947 007466  032715  100000                    BIT     #BIT15,@R5      ;TIMEOUT?
1948 007472  001020                            BNE     GTDOWN          ;YES
1949 007474  005765  000074                    TST     DLV(R5)         ;ERROR?
1950 007500  001765                            BEQ     1$              ;NO
1951 007502  105065  000033                    CLRB    XSPKNM+1(R5)    ;LAST TIME
1952 007506  000412                            BR      GTDOWN          ;EXIT
1953 007510  122775  000001  000104    2$:     CMPB    #RSDATA,@PKPTR(R5)  ;WAS DATA?
1954 007516  001006                            BNE     GTDOWN          ;NO, ALL DONE
1955 007520  010065  000104                    MOV     R0,PKPTR(R5)    ;START OF NEXT PACK NEXT TIME
1956 007524  012700  007213                    MOV     #EXOFF,R0       ;XOFF AND SEND TO
1957 007530  004737  006666                    CALL    SNDBYT          ;ENHANCE THROUGHPUT
1958 007534  062765  000002  000106  GTDOWN:  ADD     #2.,XSPTR(R5)   ;NEXT XSFLG FOR NEXT TRY
1959 007542  023727  007660  003356            CMP     GTPTR,#LSTDEV   ;DONE ONE CYCLE ALL UNITS?
1960 007550  103004                            BHIS    1$              ;YES
1961 007552  062737  000002  007660            ADD     #2,GTPTR        ;NEXT UNIT
1962 007560  000621                            BR      GTAGIN          ;CONTINUE RECEIVE
1963 007562  105737  007656              1$:   TSTB    SERVST          ;DONE SERVICING ALL PAKS
1964                                                                    ;FROM ALL UNITS?
1965 007566  001212                            BNE     GTPKS8          ;NO, KEEP TRYING
1966 007570  000207                            RETURN                  ;YES.
```

```
                                .SBTTL  SETSRV / SET UNIT SERVICED

                                ;++
                                ; SETSRV - RESET THE BIT IN 'SERVST' CORRESPONDING TO THE UNIT NUMBER.
                                ; INPUTS - SERVST - 'SERVICED' WORD
                                ;        - @R5 = UNIT # (BITS 0, 1, 2)
                                ; OUTPUTS - SERVST MODIFIED
                                ;--

007572                          SETSRV: PUSH    R5              ;SET UNIT SERVICED
007574                                  PUSH    R0
007576  011505                          MOV     @R5,R5          ;GET STAT WD
007600  042705  177770                  BIC     #177770,R5      ;MASK UNIT #
007604  012700  007636                  MOV     #SRVTBL,R0      ;->TOP OF BIT TABLE
007610  005705                  1$:     TST     R5              ;RIGHT ONE?
007612  001404                          BEQ     2$              ;YES
007614  062700  000002                  ADD     #2,R0           ;NO, ->NEXT
007620  005305                          DEC     R5              ;1 LESS
007622  000772                          BR      1$              ;CONTINUE
007624  041037  007656          2$:     BIC     @R0,SERVST      ;MOW IT DOWN
007630                                  POP     R0
007632                                  POP     R5
007634  000207                          RETURN                  ;RETURN

007636  000001                  SRVTBL: .WORD   BIT0            ;BIT POSITION LOOKUP TABLE
007640  000002                          .WORD   BIT1
007642  000004                          .WORD   BIT2
007644  000010                          .WORD   BIT3
007646  000020                          .WORD   BIT4
007650  000040                          .WORD   BIT5
007652  000100                          .WORD   BIT6
007654  000200                          .WORD   BIT7

007656  000000                  SERVST: .WORD
007660  000000                  GTPTR:  .WORD
```

```
                                .SBTTL  GTBYTE / GET A BYTE FROM UNIT

                                ;++
                                ; GTBYTE - TEST INTERFACE FOR 'READY-TO-RECEIVE' AND INPUT A BYTE, IF
                                ;          SO.  IF NOT, THE FOLLOWING OCCURS:  SEND 'XOFF' TO UNIT IN
                                ;          PREPARATION FOR ^C CHECK ('BREAK' TO SUPERVISOR).  WAIT
                                ;          TO SEE IF A CHARACTER SLOPS OVER DUE TO UART LATENCY. IF
                                ;          ONE DOES THEN MIGHT AS WELL GET IT AND SEND 'XON' TO GET
                                ;          THE REST OF THE MESSAGE, OTHERWISE, 'BREAK'.  THEN SEND
                                ;          'XON', AND TEST FOR LONG TIMEOUT (A 30 SECOND REWIND).  IF SO,
                                ;          LOG ERROR, OTHERWISE REPEAT THE ABOVE UNTIL READY OR TIME OUT.
                                ;          REMEMBER TO PRESERVE R0 SINCE THE 'BREAK' TRAP CLOBBERS IT.
                                ;
                                ; INPUTS  - R0 POINTS TO INPUT BUFFER
                                ;         - IMPLIED UNITS DATA BLOCK
                                ;         - CSRCVB TIME OUT MULTIPLIER
                                ;
                                ; OUTPUTS - R0 IS INCREMENTED
                                ;         - DLV (R5) NON-ZERO ON INTERFACE ERROR.
                                ;
                                ; ERROR   - TIME OUT ON RECEIVE
                                ;--

007662  005037  010106          GTBYTE:: CLR    GBTMP           ;TIMEOUT REGISTER
007666  013704  003336                   MOV    CSRCVB,R4       ;TIMEOUT ERROR CONSTANT (MULTIPLIER)
007672  105775  000022          1$:      TSTB   @RCSR(R5)       ;READY?
007676  100013                           BPL    3$              ;NO
007700  017565  000024  000074           MOV    @RCDB(R5),DLV(R5)  ;GET ERROR + BYTE
007706  116520  000074                   MOVB   DLV(R5),(R0)+   ;COPY BYTE TO BUFFER
007712  005765  000074                   TST    DLV(R5)         ;ERROR?
007716  100472                           BMI    4$              ;YES-EXIT
007720  005065  000074                   CLR    DLV(R5)         ;NO-RESET
007724  000467                           BR     4$              ;AND EXIT
007726  005337  010106          3$:      DEC    GBTMP           ;DEC T.O. CONSTANT
007732  001357                           BNE    1$              ;STILL VALID

                                ;CODE TO SEE ^C DURING LONG SEEK OR REWIND
                                                                ;HERE GBTMP=0
007734  010037  010110                   MOV    R0,GBTMP2       ;R0 MUST BE PRESERVED!
007740  012700  007213                   MOV    #EXOFF,R0       ;QUIET THE DEVICE
007744  004737  006666                   CALL   SNDBYT          ;BY SENDING XOFF
007750  105775  000022          6$:      TSTB   @RCSR(R5)       ;CHARACTER SLOP OVER?
007754  100415                           BMI    5$              ;YES
007756  005337  010106                   DEC    GBTMP           ;NO-WAIT A WHILE
007762  105737  010106                   TSTB   GBTMP           ;DONE WAITING?
007766  001370                           BNE    6$              ;NO
007770                                   BREAK                  ;YES-NO SLOP OVER
007772  012700  007212                   MOV    #EXON,R0        ;START DEVICE TALKING
007776  004737  006666                   CALL   SNDBYT          ;AGAIN
010002  013700  010110                   MOV    GBTMP2,R0       ;RESTORE R0
010006  000426                           BR     7$              ;END KLUGE
010010  013700  010110          5$:      MOV    GBTMP2,R0       ;RESTORE R0
010014  017565  000024  000074           MOV    @RCDB(R5),DLV(R5)  ;GET ERROR + BYTE
010022  116520  000074                   MOVB   DLV(R5),(R0)+   ;COPY BYTE TO BUFFER
010026  005765  000074                   TST    DLV(R5)         ;ERROR?
010032  100403                           BMI    17$             ;YES-EXIT
010034  005065  000074                   CLR    DLV(R5)         ;NO-CLEAR
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 74-1
GTBYTE / GET A BYTE FROM UNIT

 2063 010040  000400                        BR      17$             ;EXIT
 2064 010042  010037  010110        17$:    MOV     R0,GBTMP2       ;AGAIN SAVE R0
 2065 010046  012700  007212                MOV     #EXON,R0        ;RESTORE TO TALKING STATE
 2066 010052  004737  006666                CALL    SNDBYT          ;BY SENDING 'XON'
 2067 010056  013700  010110                MOV     GBTMP2,R0       ;RESTORE R0
 2068 010062  000410                        BR      4$              ;DONE
 2069 010064  005037  010106        7$:     CLR      GBTMP
 2070 010070  005304                        DEC     R4              ;TIMEOUT?
 2071 010072  001277                        BNE     1$              ;NO
 2072 010074  012704  000050                MOV     #TORCVB,R4      ;YES
 2073 010100  004737  012046                CALL    LOG             ;LOG ERROR.
 2074 010104  000207                4$:     RETURN                  ;RETURN
 2075 010106  000000                GBTMP:  .WORD   0
 2076 010110  000000                GBTMP2: .WORD   0
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 76
CHKANS / CHECK DEVICE(S) RESPONSE

                                .SBTTL  CHKANS / CHECK DEVICE(S) RESPONSE

                                ;++
                                ; CHKANS - AS IN "GETANS", IF RETRYING DO ONLY 1 UNIT ELSE DO ALL NON-
                                ;          ABORTED UNITS.
                                ; INPUTS:  IMPLIED SYSTAT BIT1 (RETRYING)
                                ;          BLKTBL - TOP OF DATA BLOCK ALLOCATION TABLE
                                ;          LSTDEV - ADDR. OF LAST UNIT'S DATA BLOCK
                                ;
                                ; OUTPUTS: NONE PASSED.
                                ;--

010112  000240                  CHKANS:: NOP                    ;IF RETRY THEN CHECK ONE
                                                                ;ELSE CHECK ALL
010114  032737  000002  003300          BIT     #BIT1,SYSTAT    ;RETRYING?
010122  001403                  BEQ     CHK8                    ;NO DO NORMAL
010124  004737  010202          CALL    CHKPKS                  ;YES DO BAZARRE WITH
                                                                ;R5 -> UNIT
010130  000422                  BR      CHKANR                  ;ALL DONE

010132  012737  003340  010200  CHK8:   MOV     #BLKTBL,CHKPTR  ;YOU KNOW ... TOP OF TABLE
010140  017705  000034          2$:     MOV     @CHKPTR,R5      ;GET UNIT'S BLOCK ADDRESS
010144  032715  100000                  BIT     #BIT15,@R5      ;ABORTED?
010150  001002                  BNE     3$                      ;YES
010152  004737  010202          CALL    CHKPKS                  ;NO, DO THIS GUY
010156  023727  010200  003356  3$:     CMP     CHKPTR,#LSTDEV  ;ALL DONE?
010164  103004                  BHIS    CHKANR                  ;YES
010166  062737  000002  010200          ADD     #2,CHKPTR       ;NO,-->NEXT DEVICE
010174  000761                  BR      2$                      ;DO DA

010176  000207                  CHKANR: RETURN

010200  000000                  CHKPTR: .WORD
```

```
                                .SBTTL  CHKPKS / DECIPHERS RESPONSE OF UNIT POINTED TO BY R5 /

                                ;++
                                ; CHKPKS - FOR UNIT R5 AND FOR ALL PACKETS, CHECK TO SEE IF PACKET IS DATA OR
                                ;          END PACK, CHECK CHECKSUMS, COMPARE DATA IF DATA PACK, CHECK
                                ;          SUCCESS CODE IF END.  IF UNKNOWN PACKET TYPE, CHECK FOR INTERFACE
                                ;          ERROR.  IF "CONTINUE" FALL THROUGH.  IF "INIT" SET "SEND
                                ;          BREAK" FLAG.  CALL "LOG"  WITH R4=ERROR NUMBER IF ERROR.
                                ; INPUTS:  (IMPLIED) UNITS DATA BLOCKS
                                ;
                                ; OUTPUTS: ERRORS - DLV ERROR
                                ;                - UNKNOWN FLAG BYTE ERROR
                                ;                - CHECKSUM ERROR
                                ;                - DATA COMPARE ERROR
                                ;          R4 = ERROR NUMBER
                                ;          SYSTAT UPPER BYTE = 1ST BYTE OF RESPONSE
                                ;--

010202  000240                  CHKPKS:: NOP                    ;CHECK WHAT WAS RECIEVED
010204  016500  000102                   MOV     RCVBUF(R5),R0  ;GET BUFFER ADDR.
010210  016502  000032                   MOV     XSPKNM(R5),R2  ;AND # OF PACKETS EXPECTED
010214  012703  000034                   MOV     #XSFLG,R3      ;THE OFFSET VALUE
010220  060503                           ADD     R5,R3          ;R3-->THIS UNIT XSFLG AGAIN
010222  010301                           MOV     R3,R1          ;COPY TO R1
010224  062701  000002                   ADD     #2,R1          ;R1-->XSBCNT FOR 1ST PACKET
010230  010065  000104           1$:     MOV     R0,PKPTR(R5)   ;POINT TO PACKET
010234  111037  003301                   MOVB    @R0,SYSTAT+1   ;SAVE RCV'D BYTE
010240  011137  003310                   MOV     @R1,RCBCNT     ;GET COUNT
010244  011337  003306                   MOV     @R3,RCFLG      ;AND FLAG
010250  121013                           CMPB    @R0,@R3        ;1ST BYTE=EXPECTED?
010252  001050                           BNE     5$             ;UH OH...
010254  121027  000020                   CMPB    @R0,#RSCONT    ;OK, IS IT 1 BYTE?
010260  001516                           BEQ     7$             ;YES...ONTO NEXT PACK
                                                                ;NO, SO > 1 BYTE (NEVER EXPECT INIT!)
010262  013704  003310                   MOV     RCBCNT,R4      ;EXPECTED, SO COUNT MUST BE RIGHT
010266  005744                           TST     -(R4)          ;ADJUST FROM RECEIVE COUNT TO COUNT FOR CHECKSUM
010270  004737  013162                   CALL    CKCKSM         ;CHECK CHECKSUM
010274  103005                           BCC     2$             ;NO CARRY...NO INCORRECT
010276  012704  000022                   MOV     #BDCHK,R4      ;ERROR
010302  004737  012046                   CALL    LOG            ;LOG IT
010306  000503                           BR      7$             ;ON TO NEXT PACK
010310  122710  000002           2$:     CMPB    #RSEND,(R0)    ;END PAK?
010314  001005                           BNE     3$             ;NO
010316  004737  010536                   CALL    CHKEND         ;YES-CHECK
010322  012702  000001                   MOV     #1,R2          ;LAST PACKET
010326  000473                           BR      7$             ;AND FALL THROUGH
010330  122710  000001           3$:     CMPB    #RSDATA,@R0    ;DATA PAK?
010334  001003                           BNE     4$             ;NO
010336  004737  013762                   CALL    COMPAR         ;YES-CHECK DATA
010342  000465                           BR      7$             ;ALL DONE?

010344  052715  040000           4$:     BIS     #BIT14,@R5     ;SET 'DOBREAK' FLAG
010350  012704  000052                   MOV     #OTL,R4        ;OUT TO LUNCH
010354  005765  000074                   TST     DLV(R5)        ;AH,BUT DLV ERROR?
010360  001402                           BEQ     20$            ;NO
010362  012704  000012                   MOV     #OVRN,R4       ;YES-USE CORRECT ERROR #
010366  004737  012046           20$:    CALL    LOG            ;TALLY
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 78-1
CHKPKS / DECIPHERS RESPONSE OF UNIT POINTED TO BY R5 /

 2171 010372  000460                       BR      8$              ;DONE
 2172
 2173                                ;HERE CHECKS UNEXPECTED RESPONSE
 2174
 2175 010374  122710  000004        5$:    CMPB    #RSINIT,@R0     ;INIT?
 2176 010400  001007                       BNE     6$              ;NO
 2177 010402  052715  040000               BIS     #BIT14,@R5      ;YES-SET 'DOBREAK' FLAG
 2178 010406  012704  000006               MOV     #RCINIT,R4      ; WE GOT AN INIT
 2179 010412  004737  012046               CALL    LOG             ;TALLY IT
 2180 010416  000446                       BR      8$              ;DONE
 2181 010420  122710  000001        6$:    CMPB    #RSDATA,@R0     ;DATA PAK?
 2182 010424  001013                       BNE     9$              ;NO
 2183 010426  012704  000204               MOV     #RSDASZ,R4      ;YES, USE DATA SIZE
 2184 010432  005744                       TST     -(R4)           ;ADJUST FOR CHKSUM
 2185 010434  004737  013162               CALL    CKCKSM          ;AND CHECK
 2186 010440  103421                       BCS     10$             ;GOOF
 2187 010442  004737  013762               CALL    COMPAR          ;OK, HOW'S THE DATA?
 2188                                                             ;EXPECTED END, GOT
 2189                                                             ;DATA + END.
 2190 010446  062700  000204               ADD     #RSDASZ,R0      ;POINT TO END PACK
 2191 010452  000666                       BR      1$              ;CHECK IT, USE SAME XSFLG
 2192
 2193 010454  122710  000002        9$:    CMPB    #RSEND,(R0)     ;END?
 2194 010460  001331                       BNE     4$              ;NO-OUT TO LUNCH
 2195
 2196 010462  012704  000016               MOV     #RSSNSZ,R4      ;YES, TOTAL SIZE MINUS
 2197 010466  005744                       TST     -(R4)           ;TWO (THE CHKSUM)
 2198 010470  004737  013162               CALL    CKCKSM          ;CHECK IT
 2199 010474  103403                       BCS     10$             ;OOPS
 2200 010476  004737  010536               CALL    CHKEND          ;OK,NOW TEST SUC. CODE
 2201
 2202 010502  000414                       BR      8$              ;ALL DONE
 2203
 2204 010504  012704  000022        10$:   MOV     #BDCHK,R4       ;CHECKSUM ERROR
 2205 010510  004737  012046               CALL    LOG
 2206 010514  000407                       BR      8$              ;EXIT
 2207
 2208 010516  005302                7$:    DEC     R2              ;ANY PACKETS LEFT TO CHECK?
 2209 010520  001405                       BEQ     8$              ;NO, ALL DONE
 2210 010522  063700  003310               ADD     RCBCNT,R0       ;YES, POINT TO NEXT PACKET
 2211 010526  022121                       CMP     (R1)+,(R1)+     ;POINT TO NEXT EXPECTED COUNT
 2212 010530  022323                       CMP     (R3)+,(R3)+     ;AND EXPECTED FLAG
 2213 010532  000636                       BR      1$              ;TRY ANOTHER,THEY'RE SMALL
 2214
 2215 010534  000207                8$:    RETURN                  ;RETURN
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 80
CHKEND / CHECK SUCCESS AND DETERMINE RETRY STATUS /


                                        .SBTTL  CHKEND / CHECK SUCCESS AND DETERMINE RETRY STATUS /

                                        ;++
                                        ; CHKEND - IF RETRYING; CHECK SUCCESS CODE AND IF 0, PRINT RECOVERED, LOG
                                        ;          SOFT ERROR, END RETRY STATUS.  IF NOT 0 AND WAS STILL "DATA
                                        ;          CHECK" ERROR - DETERMINE WHETHER TO CONTINUE ANOTHER RETRY OR
                                        ;          LOG "UNRECOVERABLE" ERROR.
                                        ;
                                        ;          IF NOT RETRYING;  CHECK IF 'DATA CHECK' ERROR SUCCESS CODE,
                                        ;          AND IF SO,START RETRY, ELSE EXIT.
                                        ; INPUTS:  IMPLIED  UNITS DATA BLOCK
                                        ; OUTPUTS: RETRY (SYSTAT BIT 1), (BIT10 @R5) SET IF RETRYING.
                                        ;          -  DATA COMARE ERROR (BIT6 @R5) CLEARED.
                                        ;          -   REDUCED/NORMAL GAIN (BIT7 @R5) ADJUSTED
                                        ;--

010536                                  CHKEND:: PUSH   R0              ;R0 --> END PAK
010540                                           PUSH   R4
010542  032737  000002  003300          1$:      BIT    #BIT1,SYSTAT    ;RETRYING?
010550  001052                                   BNE    CHKREE          ;YES-BRANCH
010552  004737  011536                           CALL   CHKSUC          ;NO,GET SUCCESS CODE
                                                                        ;LOG ERROR...
010556  032715  100000                           BIT    #BIT15,@R5      ;ABORTED?
010562  001402                                   BEQ    3$              ;NO,CONTINUE
010564  000137  011242                           JMP    CHKRET          ;YES,EXIT
010570  105765  000077                  3$:      TSTB   SUCCS+1(R5)     ;NO; HOW'D WE DO?
010574  001013                                   BNE    CHKERR          ;NOT SO GOOD.
010576  032715  000100                           BIT    #BIT6,@R5       ;OK, HOST FIND DATA PAK ERROR?
010602  001002                                   BNE    2$              ;YES
010604  000137  011242                           JMP    CHKRET          ;NO
010610  012704  000014                  2$:      MOV    #BDCOM,R4       ;YES;  JUST BAD DATA-NO DATACHK ERR
010614  004737  012046                           CALL   LOG             ;BAD DATA IN PACKET
010620  000137  011242                           JMP    CHKRET          ;QUIT
010624  032715  001000                  CHKERR:  BIT    #BIT9,@R5       ;BAD SUCCESS; TU DATA CHK ERROR?
010630  001002                                   BNE    1$              ;YES
010632  000137  011242                           JMP    CHKRET          ;NO. ALL DONE.
010636  052715  002000                  1$:      BIS    #BIT10,@R5      ;YES-START RETRY
010642  012765  000001  000002                   MOV    #1,RETRY(R5)    ;CALL IT 1ST
010650                                           PRINTX #RTRYN,RETRY(R5)  ;** PRINT **
010674  000562                                   BR     CHKRET          ;ALL DONE
010676  004737  011536                  CHKREE:  CALL   CHKSUC  ;RETRYING,GET SUCCESS
010702  105765  000077                           TSTB   SUCCS+1(R5)     ; SUCCESSFUL YET?
010706  001054                                   BNE    UNSUC           ;NO, CHECK COUNT
010710                                           PRINTX #RECOV,RETRY(R5)
010734  105715                                   TSTB   (R5)            ;DETERMINE THRESHOLD
010736  100411                                   BMI    2$              ;IT'S MODIFIED
010740                                           PRINTX #THRSLO         ;NORMAL
010760  000410                                   BR     3$
010762                                  2$:      PRINTX #THRSHI         ;ENHANCED
011002  032715  000400                  3$:      BIT    #BIT8,@R5       ;WRITE OR READ OPERATION?
011006  001003                                   BNE    4$              ;WRITE
011010  012704  000002                           MOV    #SFTRD,R4       ;READ
011014  000402                                   BR     5$
011016  012704  000004                  4$:      MOV    #SFTWR,R4       ;WRITE
011022  004737  012046                  5$:      CALL   LOG
011026  005065  000002                           CLR    RETRY(R5)       ;RESTORE TO NORMAL STATE
011032  042715  002200                           BIC    #BIT10!BIT7,@R5 ;NO RETRY, NORM THRESHOLD
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 80-1
CHKEND / CHECK SUCCESS AND DETERMINE RETRY STATUS /

   2275 011036  000501                          BR      CHKRET          ;QUIT
   2276
   2277 011040  000240                  UNSUC:  NOP                     ;RETRYING;  SEE IF HARD YET
   2278 011042  032715  001000                  BIT     #BIT9,@R5       ;TU DATA CHECK ERROR?
   2279 011046  001015                          BNE     2$              ;YES
   2280 011050                                  PRINTB  #RETERR         ;NO-''OTHER-ERROR'' ERROR
   2281 011070  005065  000002                  CLR     RETRY(R5)       ;NO RETRIES
   2282 011074  042715  002200                  BIC     #BIT10!BIT7,@R5 ;NO RETRY, NORM THRESHOLD
   2283 011100  000460                          BR      CHKRET          ;EXIT
   2284 011102  023765  003322  000002  2$:     CMP     MXRTRY,RETRY(R5)  ;YES. DID WE GRADUATE TO HARD?
   2285 011110  001425                          BEQ     HRD1            ;YES
   2286 011112  005265  000002                  INC     RETRY(R5)       ;NO.  JUST ANOTHER
   2287 011116                                  PRINTX  #RTRYN,RETRY(R5)  ;PRINT OUT
   2288 011142  032715  000200                  BIT     #BIT7,@R5       ;WAS NORMAL THRESHOLD?
   2289 011146  001403                          BEQ     1$              ;YES-REDUCE GAIN
   2290 011150  042715  000200                  BIC     #BIT7,@R5       ;NO-NORM
   2291 011154  000432                          BR      CHKRET
   2292 011156  052715  000200          1$:     BIS     #BIT7,@R5       ;REDUCED
   2293 011162  000427                          BR      CHKRET          ;DONE
   2294 011164  000240                  HRD1:   NOP                     ;HERE IS HARD ERROR!
   2295 011166                                  PRINTX  #UNREC
   2296 011206  032715  000400                  BIT     #BIT8,@R5       ;RD OR WR?
   2297 011212  001003                          BNE     4$              ;WRITE
   2298 011214  012704  000016                  MOV     #HRDRD,R4       ;READ
   2299 011220  000402                          BR      5$              ;LOG IT
   2300 011222  012704  000020          4$:     MOV     #HRDWR,R4       ;WRITE
   2301 011226  004737  012046          5$:     CALL    LOG             ;LOG IT
   2302 011232  005065  000002                  CLR     RETRY(R5)       ;BACK TO NORMAL
   2303 011236  042715  002200                  BIC     #BIT10!BIT7,@R5 ;NO RETRY, NOT REDUCED
   2304
   2305 011242  042737  000002  003300  CHKRET: BIC     #BIT1,SYSTAT    ;NO SYSTEM RETRY NEXT PASS
   2306 011250  042715  000100                  BIC     #BIT6,@R5       ;NO MORE HOST DATA CHECK ERROR
   2307 011254                                  POP     R4
   2308 011256                                  POP     R0
   2309 011260  000207                          RETURN
   2310
   2311
   2312 011262      045      101      122  RECOV:  .ASCIZ  /%ARECOVERED FROM DATA CHECK ERROR RETRY # %D1%N/
   2313                                          .EVEN
   2314 011342      045      101      040  THRSLO: .ASCIZ  /%A NORMAL THRESHOLD%N/
   2315                                          .EVEN
   2316 011370      045      101      040  THRSHI: .ASCIZ  /%A MODIFIED THRESHOLD %N/
   2317                                          .EVEN
   2318 011422      045      101      122  RTRYN:  .ASCIZ  /%ARETRY # %D1%N/
   2319                                          .EVEN
   2320 011442      045      101      125  UNREC:  .ASCIZ  /%AUNRECOVERABLE%N/
   2321                                          .EVEN
   2322 011464      045      101      117  RETERR: .ASCIZ  /%AOTHER ERROR DURING RETRY : EXIT RETRY%N/
   2323                                          .EVEN
```

```
                                .SBTTL  CHKSUC / INTERPRET SUCCESS CODE /
                                ;++
                                ; CHKSUC - COPY SUCCESS CODE (BYTE) TO SUCCS+1(R5).  INTERPRET SUCCESS
                                ;          AND IF NOT 0, LOG APPROPRIATE ERROR.
                                ; INPUTS:  R0 POINTS TO END PACKET.
                                ;          @R5 - UNIT STATUS WORD
                                ;          CMDSNT(R5) - COMMAND BYTE
                                ;
                                ; OUTPUTS: R4 IS ERROR NUMBER IF ERROR.
                                ;            SUCCS(R5) UPDATED.
                                ;            BIT9 @R5 SET ON DATA CHECK SUCCESS CODE
                                ;--

011536  000240                  CHKSUC:: NOP
011540  016065  000002  000076          MOV     2(R0),SUCCS(R5) ;R0-->END PACKET
011546  122760  000000  000003          CMPB    #ESOK,3(R0)     ;GET SUCCESS BYTE
011554  001533                  BEQ     12$             ;COMPLETE SUCCESS-EXIT

011556  122760  000001  000003          CMPB    #ESTRY,3(R0)    ;OK BUT RETRIES?
011564  001012                  BNE     20$             ;NO
011566  126527  000100  000002          CMPB    CMDSNT(R5),#RSSRD;A READ?
011574  001001                  BNE     22$             ;NO

011576  000516                  BR      10$             ;NO RETRIES IN MAINTENANCE!
011600  126527  000100  000003  22$:    CMPB    CMDSNT(R5),#RSSWR       ;A WRITE?
011606  001001                  BNE     20$             ;NO
011610  000511                  BR      10$             ;LOG IT
011612  122760  177737  000003  20$:    CMPB    #ESNOMO,3(R0)   ;NO MOTOR?
011620  001003                  BNE     1$              ;NO
011622  012704  000030                  MOV     #NOMOT,R4       ;YES-
011626  000504                  BR      11$             ;LOG

011630  122760  177757  000003  1$:     CMPB    #ESCKS,3(R0)    ;"DATA CHECK" ERROR?
011636  001003                  BNE     2$              ;NO
011640  052715  001000                  BIS     #BIT9,@R5       ;SET DATA-CHK-ERROR FLAG
011644  000477                  BR      12$             ;DONT LOG

011646  126527  000100  000007  2$:     CMPB    CMDSNT(R5),#RSSSLF  ;SELF TEST?
011654  001006                  BNE     3$              ;NOPE
011656  105760  000003                  TSTB    3(R0)           ;YES, NEG. IF ERROR
011662  100070                  BPL     12$             ;OK

011664  012704  000044                  MOV     #SLFER,R4       ;YES-ERROR
011670  000463                  BR      11$             ;LOG IT

011672  122760  177740  000003  3$:     CMPB    #ESSK,3(R0)     ;SEEK ERROR?
011700  001003                  BNE     4$              ;NO
011702  012704  000024                  MOV     #SKERR,R4       ;YES-
011706  000454                  BR      11$             ;LOG

011710  122760  177767  000003  4$:     CMPB    #ESNCRT,3(R0)   ;NO CART?
011716  001003                  BNE     5$              ;NO
011720  012704  000054                  MOV     #NCART,R4       ;YES-
011724  000445                  BR      11$             ;LOG

011726  122760  177720  000003  5$:     CMPB    #ESCMD,3(R0)    ;NO UNDERSTAND HOST?
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 82-1
CHKSUC / INTERPRET SUCCESS CODE /

   2383 011734  001003                          BNE     6$              ;NO
   2384 011736  012704  000040                  MOV     #CMNDER,R4      ;YES-
   2385 011742  000436                          BR      11$             ;LOG
   2386
   2387 011744  122760  177770  000003  6$:     CMPB    #ESNONX,3(R0)   ;NON EXISTENT UNIT?
   2388 011752  001003                          BNE     7$              ;NO
   2389 011754  012704  000036                  MOV     #NOUNIT,R4      ;YES-
   2390 011760  000427                          BR      11$             ;LOG
   2391
   2392 011762  122760  177765  000003  7$:     CMPB    #ESWLOC,3(R0)   ;WRITE LOCKED?
   2393 011770  001003                          BNE     8$              ;NO
   2394 011772  012704  000026                  MOV     #WRLOCK,R4      ;YES-
   2395 011776  000420                          BR      11$             ;LOG
   2396
   2397 012000  122760  177776  000003  8$:     CMPB    #ESPART,3(R0)   ;PARTIAL OP?
   2398 012006  001003                          BNE     9$              ;NO
   2399 012010  012704  000034                  MOV     #PARTL,R4       ;YES-
   2400 012014  000411                          BR      11$             ;LOG
   2401
   2402 012016  122760  177711  000003  9$:     CMPB    #ESREC,3(R0)    ;WRONG RECORD?
   2403 012024  001003                          BNE     10$             ;NO
   2404 012026  012704  000042                  MOV     #RECERR,R4      ;YES-
   2405 012032  000402                          BR      11$             ;LOG
   2406
   2407 012034  012704  000046          10$:    MOV     #SUCOTL,R4      ;UNDEFINED
   2408 012040  004737  012046          11$:    CALL    LOG             ;LOG ERROR
   2409 012044  000207                  12$:    RETURN                  ;RETURN
```

```
                                .SBTTL  LOG / TO LOG ERROR IN CORRECT PLACE

                                ;++
                                ; LOG - DETERMINE IF ERROR IS FATAL, NON-FATAL OR FATAL AFTER N TRIES
                                ;       BY INDEX (ERROR #) INTO DEVICE DATA BLOCK.  ADD THE DRIVE # TO
                                ;       INDICATE UPPER OR LOWER BYTE AND INCREMENT THAT ERROR UNLESS
                                ;       THAT BYTE WOULD OVERFLOW.  DETERMINE IF EVL FLAG SET,AND IF SO,
                                ;       CHECK THRESHOLD (EVLTHR) AND  PRINT APPROPRIATE ERROR MESSAGE
                                ;       DESCRIPTION.  ABORT THE UNIT IF INDICATED THROUGH DODROP CODE.
                                ; INPUTS:  R4 = ERROR CODE
                                ; OUTPUTS: ABNDX(R5) = ERROR CODE.
                                ;           DLV(R5) = 0
                                ;          L$LUN = UNIT NUMBER
                                ;--

012046                          LOG::   PUSH    R0
012050                                  PUSH    R1
012052                                  PUSH    R3
012054                                  PUSH    R4

012056  011537  002074                  MOV     @R5,L$LUN       ;GET UNIT NUMBER
012062  042737  177770  002074          BIC     #177770,L$LUN   ;MASK IT OFF
012070  010465  000004                  MOV     R4,ABNDX(R5)    ;SAVE INDEX IN CASE OF ABORT MESSAGE
012074  012703  000120                  MOV     #LGOFST,R3      ;OFFSET TO LOW ORDER BYTE (DRIVE0)
012100  060403                          ADD     R4,R3           ;FORM INDEX OF PARAM. TO UPDATE
012102  060503                          ADD     R5,R3           ;FORM ABSOLUTE ADDR. THIS UNIT
012104  004737  013052                  CALL    WHCHDR          ;SEE WHICH DRIVE T'WAS
012110  103001                          BCC     2$              ;WAS DRIVE 0
012112  005203                          INC     R3              ;DRIVE 1; POINT TO UPPER BYTE
012114  122713  000377          2$:     CMPB    #255.,@R3       ;POTENTIAL OVERFLOW POSSIBLE?
012120  001005                          BNE     LOGOK           ;NO
012122                          LOG0:   ERRDF   0.,OVRFLO,ERRDES  ;YES
012132  000512                          BR      ABO             ;ABORT UNIT
012134  105213                  LOGOK:  INCB    @R3             ;INCREMENT THE ERROR
012136  111304                          MOVB    @R3,R4          ;TEMP'LY SAVE IT
012140  016503  000004                  MOV     ABNDX(R5),R3    ;GET INDEX AGAIN
012144  012701  002220                  MOV     #RSNTAB,R1      ;FORM ADRS OF MSG
012150  066501  000004                  ADD     ABNDX(R5),R1    ;LIKE THIS
012154  042701  000001                  BIC     #BIT0,R1        ;INSURE WORD BOUNDARY
012160  032737  000004  016154          BIT     #EVL,FLGLOC     ;EVL SELECTED?
012166  001414                          BEQ     LOGOK2          ;NO-CONT
012170  123704  002216                  CMPB    EVLTHR,R4       ;YES,OVER THRESHOLD?
012174  101011                          BHI     LOGOK2          ;NO
012176  010337  012210                  MOV     R3,DFTL1+2      ;YES,LOAD ERROR #
012202  011137  012212                  MOV     @R1,DFTL1+4     ;AND MESSAGE ADDR
012206                          DFTL1:  ERRDF   0,DFTL1,ERRDES  ;ERROR
012216  000460                          BR      ABO             ;DROP IT
012220  120327  000014          LOGOK2: CMPB    R3,#BDCOM       ;'NEVER FATAL' TYPE?
012224  103011                          BHIS    NTSFT           ;NO
012226  010337  012240                  MOV     R3,LOG1+2       ;YES, ERROR CODE
012232  011137  012242                  MOV     @R1,LOG1+4      ;DESCRIPTION
012236                          LOG1:   ERRSOFT 0.,LOG1,ERRDES
012246  000450                          BR      LOGO            ;EXIT

012250  120327  000026          NTSFT:  CMPB    R3,#WRLOCK      ;ONE TRY?
012254  103411                          BLO     MABEE           ;NO, MAYBE A MULTIPLE
012256  010337  012270                  MOV     R3,LOG2+2.      ;YES
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 84-1
LOG / TO LOG ERROR IN CORRECT PLACE

   2469 012262  011137  012272                    MOV     @R1,LOG2+4
   2470 012266                             LOG2:  ERRHRD  0,LOG2,ERRDES   ;PRINT HARD MESSAGE
   2471 012276  000430                            BR      ABO             ;DROP UNIT
   2472
   2473 012300  042704  177400             MABEE: BIC     #177400,R4      ;NEGATE SIGN EXTEND
   2474 012304  163704  003312             1$:    SUB     FTLNM,R4        ;SEE IF MULTIPLE OF
   2475 012310  001413                            BEQ     HRD             ;FTLNM-YES!
   2476 012312  103401                            BLO     SFT             ;NO
   2477 012314  000773                            BR      1$              ;NOT THERE YET
   2478
   2479 012316  010337  012330             SFT:   MOV     R3,LOG3+2       ;ERROR CODE
   2480 012322  011137  012332                    MOV     @R1,LOG3+4      ;DESCRIPTION
   2481 012326                             LOG3:  ERRSOFT 0,LOG3,ERRDES
   2482 012336  000414                            BR      LOGO            ;EXIT
   2483 012340  010337  012352             HRD:   MOV     R3,LOG3B+2      ;HARD ERROR CODE
   2484 012344  011137  012354                    MOV     @R1,LOG3B+4     ;DESCRIPTION
   2485 012350                             LOG3B: ERRHRD  0,LOG3B,ERRDES
   2486
   2487 012360  011500                     ABO:   MOV     @R5,R0          ;GET UNIT NUMBER
   2488 012362  042700  177770                    BIC     #177770,R0      ;UN-SIGN EXTEND
   2489 012366                                    DODU    R0              ;USE LOGICAL # TO DROP
   2490 012370                             LOGO:  POP     R4              ;RESTORE
   2491 012372                                    POP     R3
   2492 012374                                    POP     R1
   2493 012376                                    POP     R0
   2494 012400  000207                            RETURN                  ;RETURN
```

```
2497                                    ;++
2498                                    ; ERRDES - CONTAINS CODE FOR EXTENDED ERROR INFORMATION:  DRIVE #,
2499                                    ;          BLOCK #, ETC.
2500                                    ;--
2501
2502 012402                                    B(NMSG  ERRDES          ;ERROR DESCRIPTION
2503 012402                                    PUSH    R0
2504 012404                                    PUSH    R2
2505 012406  005002                            CLR     R2              ;PRESET TO DATA TYPE
2506 012410  032715  000020                    BIT     #BIT4,@R5       ;WHAT PACK TYPE?
2507 012414  001401                            BEQ     2$              ;DATA
2508 012416  005202                            INC     R2              ;COMMAND
2509 012420                             2$:    PRINTB  #UNIT,<B,DR(R5)>,R2,<B,SYSTAT+1>
2510 012456  016500  000064                    MOV     REC(R5),R0      ;RECORD NUMBER
2511 012462  016502  000072                    MOV     PATTEN(R5),R2   ;DATA EXPECTED
2512 012466                                    PRINTB  #RECID,R0,<B,CMDSNT(R5)>,<B,R2>,<B,SUCCS+1(R5)>
2513 012530  005765  000074                    TST     DLV(R5)         ;DLV ERROR?
2514 012534  001414                            BEQ     3$              ;NO
2515 012536                                    PRINTB  #RECID2,DLV(R5) ;YES-PRINT
2516 012562  005065  000074                    CLR     DLV(R5)         ;RESET
2517 012566                             3$:    POP     R2              ;RESTORE
2518 012570                                    POP     R0
2519 012572                                    ENDMSG                  ;EXIT
2520 012574      045     101     104  UNIT::   .ASCIZ  /%ADRIVE#  %01%A  PAK SENT %01%A FLAG RCVD %03%N/
2521                                           .EVEN
2522 012654      045     101     102  RECID::  .ASCIZ  /%ABLOCK#  %04%A COMMAND %02%A EXPCTD %03%A SUCCESS %03%N/
2523                                           .EVEN
2524 012746      103     101     116  OVRFLO:  .ASCIZ  /CAN'T UPDATE ERROR OR STATISTIC:OVERFLOW PENDING/
2525                                           .EVEN
2526 013030      045     101     040  RECID2:  .ASCIZ  /%A RCDB WAS %06%N/
2527                                           .EVEN
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 88
WHCHDR / SEE WHICH DRIVE IS ACTIVE

                                .SBTTL  WHCHDR / SEE WHICH DRIVE IS ACTIVE
                                ;++
                                ; INPUTS:  DR(R5)
                                ; OUTPUTS:  CARRY=DRIVE (1 OR 0)
                                ;--

013052  000241                  WHCHDR:: CLC                    ;CLEAR CARRY

013054  105765  000060                  TSTB    DR(R5)         ;DR 0?
013060  001401                          BEQ     2$             ;YES
013062  000261                          SEC                    ;NO

013064  000207                  2$:     RETURN                 ;RETURN
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 90
CHKSUM / FORM THE PACKET CHECKSUM

                                        .SBTTL  CHKSUM / FORM THE PACKET CHECKSUM
                                        ;++
                                        ; THE CHECKSUM IS A 16 BIT CHECKSUM WITH END-AROUND CARRY.
                                        ;
                                        ; INPUTS:  R0 -> (POINTS TO) TOP OF PACKET
                                        ;          R1 = # OF BYTES
                                        ; OUTPUTS:  R0 -> WHERE TO PUT CHECKSUM
                                        ;           R1 = CHECKSUM
                                        ;--

013066                                  CHKSUM:: PUSH   R3
013070                                           PUSH   R2
013072  042737  000001  003300                   BIC    #BIT0,SYSTAT    ;"CHECKSUM IS ODD" BIT
013100  032701  000001                   BIT    #BIT0,R1        ;AN ODD # OF BYTES?
013104  001403                           BEQ    1$              ;NO
013106  052737  000001  003300           BIS    #BIT0,SYSTAT    ;YES

013114  006001                           1$:    ROR    R1              ;/2 FOR WORDS

013116  005003                           2$:    CLR    R3              ;PREP CHECKSUM WORD

013120  062003                           3$:    ADD    (R0)+,R3        ;FORM SUM
013122  005503                                  ADC    R3              ;WITH CARRY
013124  005301                                  DEC    R1              ;MORE WORDS?
013126  001374                                  BNE    3$              ;YES

013130  032737  000001  003300                   BIT    #BIT0,SYSTAT    ;WAS IT ODD
013136  001405                                  BEQ    4$              ;NO
013140  112002                                  MOVB   (R0)+,R2        ;YES GET NEXT BYTE
013142  042702  177400                          BIC    #177400,R2      ;UN-SIGN EXTEND
013146  060203                                  ADD    R2,R3           ;ADD IT IN
013150  005503                                  ADC    R3              ;AND CARRY JUST IN CASE

013152  010301                           4$:    MOV    R3,R1           ;RETURN IT IN CORRECT PLACE
013154                                          POP    R2              ;RESTORE
013156                                          POP    R3
013160  000207                                  RETURN                 ;RETURN
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 92
CKCKSM / MODULE TO CHECK THE CHKSUMS

                                .SBTTL  CKCKSM / MODULE TO CHECK THE CHKSUMS

                                ;++
                                ; MAKE SURE THE CHECKSUM RECEIVED = THE CHECKSUM CALCULATED.
                                ; INPUTS:  R4 = THE PACKET BYTE COUNT
                                ;          R0 -> THE PACKET TOP
                                ; OUTPUTS:  CARRY SET IF CHECKSUM CALC'D DOES NOT EQUAL CHECKSUM SENT
                                ;           R0 -> THE PACKET TOP
                                ;--

013162                          CKCKSM:: PUSH   R1
013164                                   PUSH   R0              ;SAVE
013166  010401                          MOV    R4,R1           ;COPY BYTE COUNT TO CORRECT
013170  004737  013066                   CALL   CHKSUM          ;REGISTER FOR CHKSUM AND
                                                                ;FORM CHECKSUM

                                ;HERE R0 --> XMITTED CHKSUM, R1=CHKSUM CALC'D

013174  122001                           CMPB   (R0)+,R1        ;LOWER ORDER CHECK
013176  001005                           BNE    2$              ;WRONG

013200  000301                           SWAB   R1              ;OK-PREP FOR

013202  122001                           CMPB   (R0)+,R1        ;HIGH ORDER CHECK
013204  001002                           BNE    2$              ;WRONG
013206  000241                           CLC                    ;OK-CLEAR SAILING

013210  000401                           BR     3$              ;EXIT

013212  000261                  2$:      SEC                    ;LET ERROR BE KNOWN

013214                          3$:      POP    R0
013216                                   POP    R1
013220  000207                           RETURN                 ;RETURN
```

```
                                        .SBTTL  DOBRK / MODULE TO INIT TU58 AND TEST INTERRUPTS

                                        ;++
                                        ; DOBRK - SEND RADIAL SERIAL "BREAK" TO DEVICE:
                                        ;       - SET "BREAK" ON INTERFACE.
                                        ;       - SEND 8. NULLS
                                        ;       - CLEAR "BREAK" ON INTERFACE
                                        ;       - SET VECTORS FOR RCV AND XMIT
                                        ;       - SEND 2 BYTES OF "INIT"
                                        ;       - RECEIVE "CONTINUE"
                                        ;       - IF RECEIVE GARBAGE OR TIMEOUT - ERROR
                                        ;       - CLEAR INTERRUPTS AND VECTORS
                                        ; INPUTS:  @R5 BIT14 WAS SET - (SEND BREAK)
                                        ; OUTPUTS: @R5 BIT14 CLEAR IF SUCCESSFUL INIT.
                                        ;          SYSTAT+1 = RECEIVED BYTE
                                        ;          ERRORS R4 = ERROR CODE:
                                        ;                - SEND NOT READY TIMEOUT (TOSNDB)
                                        ;                - NO RESPONSE
                                        ;                - DLV ERROR
                                        ;                - CAN'T INIT
                                        ;--

013222  105037  013755          DOBRK:: CLRB    INITWD+1        ;CLEAR BYTE RECEIVE ADDR
013226  005037  013756                  CLR     BRKTO           ;CLEAR TIME OUT CONSTANT
013232  052775  000001  000026        BIS     #BIT0,@XMSR(R5) ;SET 'BREAK'
013240  012765  000001  000100        MOV     #RSSNIT,CMDSNT(R5)  ;SAY WE SENT 'INIT'
013246  052715  000020                BIS     #BIT4,@R5       ;PAK SENT TYPE =COMMAND, SORT OF
013252  012704  000010                MOV     #8.,R4          ;BREAK-IT'S-BACK COUNT=8
013256                          1$:     BREAK                   ;SUPERVISOR TAKE FIVE
                                                                ;FOR ^C CHECK, ETC.
013260  105775  000026                TSTB    @XMSR(R5)       ;READY?
013264  100410                        BMI     4$              ;YES
013266  005337  013756                DEC     BRKTO           ;NO,TIME OUT?
013272  001371                        BNE     1$              ;NO
013274  012704  000056                MOV     #TOSNDB,R4      ;YES, SET ERROR CODE
013300  004737  012046                CALL    LOG             ;LOG IT
013304  000535                        BR      3$              ;EXIT
013306  113775  013752  000030  4$:   MOVB    BRKWD,@XMDB(R5) ;SEND NULL
013314  005037  013756                CLR     BRKTO           ;RESET TIME OUT
013320  005304                        DEC     R4              ;MORE NULLS TO SEND?
013322  001355                        BNE     1$              ;YES
                                ;VER:1  CLR     @XMSR(R5)       ;NO, CLEAR 'BREAK'
013324  005375  000026                DEC     @XMSR(R5)       ;NO, CLEAR 'BREAK' ;;VER:1
013330  017500  000024                MOV     @RCDB(R5),R0    ;HEAVE 'GARBAGE' 1ST BYTE
013334                                SETPRI  #PRI00          ;SET TO INTERRUPT FO SURE
013342                                SETVEC  TUVECT(R5),#RCVINT,#PRI06;SET VECTO INFO ;VER:1
013370  062765  000004  000204        ADD     #4,TUVECT(R5)   ;AND INC TO SND VECTOR
013376                                SETVEC  TUVECT(R5),#SNDINT,#PRI06;AND SET IT;VER:1
013424  162765  000004  000204        SUB     #4,TUVECT(R5)   ;RESET VECTOR ADDR.
013432  005037  013756                CLR     BRKTO           ;RESET TIME OUT
013436  012704  013754                MOV     #INITWD,R4      ;USE ADDR. FOR SNDBYT
013442  010437  013760                MOV     R4,BRKPTR       ;AND SAVE FOR "WAIT"
013446  052775  000100  000026        BIS     #BIT6,@XMSR(R5) ;ENABLE INTER.
013454  004737  013716                CALL    WAIT            ;AND ENTER LOOP
013460  005715                        TST     @R5             ;ABORTED FROM TIME OUT?
013462  100446                        BMI     3$              ;YES-EXIT
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 94-1
DOBRK / MODULE TO INIT TU58 AND TEST INTERRUPTS

 2683 013464  005037  013756                    CLR     BRKTO              ;RESET TIME OUT
 2684 013470  012704  013754                    MOV     #INITWD,R4         ;SEND SECOND INIT
 2685 013474  010437  013760                    MOV     R4,BRKPTR          ;SAVE POINTER AGAIN
 2686 013500  052775  000100  000026            BIS     #BIT6,@XMSR(R5) ;AND THEN ENABLE INT
 2687 013506  004737  013716                    CALL    WAIT               ;AND WAIT
 2688 013512  005715                            TST     @R5                ;IF ABORTED
 2689 013514  100431                            BMI     3$                 ;THEN EXIT
 2690
 2691 013516  012704  013755                    MOV     #INITWD+1,R4       ;WHERE RESPONSE WILL GO (ADDRESS)
 2692 013522  010437  013760                    MOV     R4,BRKPTR          ;AND FOR 'WAIT'
 2693 013526  052775  000100  000022            BIS     #BIT6,@RCSR(R5) ;ENABLE RECIEVE INT.
 2694 013534  004737  013716                    CALL    WAIT               ;GET ANSWER
 2695 013540  005715                            TST     @R5                ;ABORTED?
 2696 013542  100416                            BMI     3$                 ;YES.
 2697
 2698 013544  123727  013755  000020            CMPB    INITWD+1,#RSCONT   ;NO, IS IT 'CONTINUE'?
 2699 013552  001003                            BNE     2$                 ;NOPE-ERROR
 2700
 2701 013554  042715  040000                    BIC     #BIT14,@R5         ;SUCCESSFUL, CLEAR DOBREAK FLAG
 2702 013560  000407                            BR      3$                 ;EXIT
 2703
 2704 013562  113737  013755  003301  2$:       MOVB    INITWD+1,SYSTAT+1       ;SAVE BUM RESPONSE
 2705 013570  012704  000032                    MOV     #CNINIT,R4              ;CAN'T INIT CODE
 2706 013574  004737  012046                    CALL    LOG                ;LOG IT
 2707                                                                      ;SCHEDULER WILL TRY AGAIN IF NOT ABORTED
 2708
 2709 013600  042775  000100  000026  3$:       BIC     #BIT6,@XMSR(R5) ;CLEAR INTERRUPTS
 2710 013606  042775  000100  000022            BIC     #BIT6,@RCSR(R5) ; AND FOR RECIEVE
 2711 013614                                    CLRVEC  TUVECT(R5)         ;RELEASE RECIEVE VECT.
 2712 013622  062765  000004  000204            ADD     #4,TUVECT(R5)      ;AND GET SEND ADDR.
 2713 013630                                    CLRVEC  TUVECT(R5)         ;AND RELEASE IT
 2714 013636  162765  000004  000204            SUB     #4,TUVECT(R5)      ;RESTORE POINTER
 2715 013644  000207                            RETURN                     ;RETURN
```

```
                                        .SBTTL  INTERRUPT SERVICE ROUTINES AND TIMER
                                
013646                          BGNSRV  SNDINT                  ;"SEND" INTERRUPT SERVICE:
                                
013646  042775  000100  000026  SNDHND: BIC     #BIT6,@XMSR(R5) ;DISABLE INTERRUPT
013654  112475  000030                 MOVB    (R4)+,@XMDB(R5);OUTPUT BYTE
013660                          ENDSRV
                                
                                
                                
013662                          BGNSRV  RCVINT                  ;"RCV" INTERRUPT SERVICE:
                                
013662  042775  000100  000022  RCVHND: BIC     #BIT6,@RCSR(R5) ;DISABLE INTS
013670  017565  000024  000074         MOV     @RCDB(R5),DLV(R5)       ;SAVE BYTE
013676  116524  000074                 MOVB    DLV(R5),(R4)+   ;BYTE TO BUFFER
013702  005765  000074                 TST     DLV(R5)         ;ERROR?
013706  100402                         BMI     10$             ;YES
013710  005065  000074                 CLR     DLV(R5)         ;NO CLEAR ERROR
013714                          10$:
013714                          ENDSRV
                                
                                
                                
013716  000240                  WAIT:   NOP                     ;WAIT  LOOP FOR
                                                                ;INTERRUPT SERVICING
013720  020437  013760                 CMP     R4,BRKPTR       ;IF=,THEN NO INTERRUPT
013724  001011                         BNE     1$              ;GOT ONE!
013726                                 BREAK                   ;SUPERVISOR BREAK
013730                                 BREAK                   ;KILL SOME TIME
013732  005337  013756                 DEC     BRKTO           ;TIME OUT?
013736  001367                         BNE     WAIT            ;NO...CONT.
013740  012704  000050                 MOV     #TORCVB,R4      ;YES LOAD ERROR #
013744  004737  012046                 CALL    LOG             ;LOG IT
013750  000207                  1$:    RETURN                  ;RETURN
                                
013752  000000                  BRKWD:  .WORD   0               ;NULL
013754     004                  INITWD: .BYTE   RSINIT          ;INIT COMMAND
013755     000                          .BYTE   0               ;RSCONT IS EXPECTED HERE
013756  000000                  BRKTO:  .WORD   0               ;TIME OUT
013760  000000                  BRKPTR: .WORD   0               ;POINTER TO INITWD
```

```
GLOBAL AREAS    MACRO M1200  15-DEC-82 12:54  PAGE 98
COMPAR/DATA COMPARISON MODULE

                                .SBTTL  COMPAR/DATA COMPARISON MODULE
                                ;++
                                ; COMPAR - IF "COMPARE DATA" SELECTED, COMPARE EACH DATA BYTE OF PACKET
                                ;          TO PATTEN(R5).  SAVE NUMBER OF BYTES NOT CORRECT.  IF NOT
                                ;          0, PRINT SOFT ERROR AND TOTAL # WRONG BYTES.  SET 'BAD_DATA_
                                ;          IN_PACKET" BIT (BIT6 @R5) FOR HIGHER LEVEL MODULES.
                                ; INPUTS:  - (CMPDAT) FLAG TO NOT COMPARE (=1)
                                ;          - PKPTR(R5) POINTS TO DATA PACK.
                                ; OUTPUTS: BIT6 @R5 (BAD DATA FLAG) ADJUSTED.
                                ;          L$LUN - UNIT NUMBER
                                ;          PRNSIZ - SIZE OF PACKET
                                ;--

013762                          COMPAR:: PUSH   R0              ;COMPARE DATA IS DATA PACKET
013764                                   PUSH   R4              ;TO PATTERN WRITTEN
013766                                   PUSH   R1              ;USING BYTE COUNT IN PACKET
013770  005037  014140                   CLR    BDBYTS          ;CLEAR TOTAL WRONG
013774  016504  000104                   MOV    PKPTR(R5),R4    ;GET TOP OF PACKET
014000  005737  002212                   TST    CMPDAT          ;COMPARE SELECTED?
014004  001451                           BEQ    4$              ;NO-EXIT
014006  005204                           INC    R4              ;YES, LOCATE COUNT
014010  111401                           MOVB   @R4,R1          ;GET IT
014012  042701  177400                   BIC    #177400,R1      ;SIGN-UNEXTEND
                                                                ;MUST TEST BYTE-WISE...
014016  005204                           INC    R4              ;-->FIRST DATA  BYTE
014020  126524  000072          1$:      CMPB   PATTEN(R5),(R4)+  ;DATA-WHAT WAS EXPECTED?
014024  001402                           BEQ    2$              ;YES
014026  005237  014140                   INC    BDBYTS          ;NO, INCREMENT TOTAL WRONG
014032  005301                  2$:      DEC    R1              ;MORE LEFT?
014034  001371                           BNE    1$              ;YES
014036  005737  014140                   TST    BDBYTS          ;ANY WRONG?
014042  001432                           BEQ    4$              ;NO
014044  011537  002074                   MOV    @R5,L$LUN       ;GET UNIT NUMBER
014050  042737  177770  002074           BIC    #177770,L$LUN   ;MASK IT OFF
014056                                   ERRSOFT 0.,MSBDA,ERRDES  ;YES-PRINT 'BAD DATA IN PACKET' ERROR
014066                                   PRINTB  #DESC,BDBYTS
014112  052715  000100                   BIS    #BIT6,@R5       ;LET 'EM KNOW UPSTAIRS-BAD DATA FLAG
014116  012737  000204  003330           MOV    #132.,PRNSIZ    ;SIZE IS ONE DATA PACK
014124  004737  014176                   CALL   PRNPAK          ;AND PRINT THE PACKET
014130                          4$:      POP    R1              ;RESTORE
014132                                   POP    R4
014134                                   POP    R0

014136  000207                           RETURN

014140  000000                  BDBYTS:  .WORD
014142     045     101     124  DESC:    .ASCIZ  /%ATOTAL BAD BYTES= %D3%A.%N/
                                .EVEN
```

```
                                .SBTTL  PRNPAK/MODULE TO PRINT DATA PACKET

                                ;++
                                ; PRNPAK - IF PRINT_DATA_PACK_ON_ERROR SELECTED: PRINT EACH BYTE OF PACKET
                                ;          TO BY PKPTR(R5).
                                ; INPUTS:  PRNSIZ - # OF BYTES IN PACKET.
                                ; OUTPUTS: NONE
                                ;--

014176  000240                  PRNPAK:: NOP                    ;PRINTS 1 PACKET
                                                                ;PKPTR(R5)->TOP OF PACKET
                                                                ;PRNSIZ (PASSED)=BYTE COUNT
014200                                   PUSH    R0
014202                                   PUSH    R4
014204  105737  002210                 TSTB    PRBUF           ;PRINT PACKET SELECTED?
014210  001451                         BEQ     4$              ;NO
014212  016504  000104                 MOV     PKPTR(R5),R4    ;YES-GET TOP OF PACK
014216  012737  000020  014342  1$:    MOV     #16.,LNCNT      ;16 BYTES PER LINE
014224  112437  014344          2$:    MOVB    (R4)+,PRDAT     ;AVOID SIGN EXTEND
014230                                   PRINTF  #PRFORM,<B,PRDAT>  ;PRINT BYTE
014256  005337  003330                 DEC     PRNSIZ          ;ONE LESS
014262  001414                         BEQ     3$              ;NO MORE
014264  005337  014342                 DEC     LNCNT           ;NEW LINE?
014270  001355                         BNE     2$              ;NOT YET
014272                                   PRINTF  #CARLF          ;YES
014312  000741                         BR      1$              ;NEXT LINE
014314                          3$:    PRINTF  #CARLF          ;FINISH UP
014334                          4$:    POP     R4
014336                                 POP     R0
014340  000207                         RETURN                  ;RETURN

014342  000000                 LNCNT:  .WORD
014344  000000                 PRDAT:  .WORD
014346     045     117     063 PRFORM: .ASCIZ   /%03%A /
                                   .EVEN
014356     045     116     000 CARLF:  .ASCIZ   /%N/
                                   .EVEN

014362                                 ENDMOD
```

```
MISCELLANEOUS SECTIONS  MACRO M1200  15-DEC-82 12:54  PAGE 101
PRNPAK/MODULE TO PRINT DATA PACKET

                                .TITLE MISCELLANEOUS SECTIONS
                                .SBTTL  REPORT CODING SECTION

014362                                  BGNMOD

                                ;++
                                ; THE REPORT CODING SECTION CONTAINS THE
                                ; "PRINTS" CALLS THAT GENERATE STATISTICAL REPORTS.
                                ;--

014362                                  BGNRPT
014362                                  PUSH    R0
014364                                  PUSH    R1
014366                                  PUSH    R2
014370                                  PUSH    R3
014372                                  PUSH    R4
014374                                  PUSH    R5

014376                                  BREAK
014400  012737  003340  015010          MOV     #BLKTBL,RPTR    ;GET 1ST DEVICE BLOCK
014406                                  PRINTS  #STATHD         ;HEADER
014426                                  BREAK                   ;^C CHECK
014430                                  PRINTS  #STHD2          ;2ND HEADER
014450                          1$:     BREAK                   ;^C CHECK
014452  017705  000332                  MOV     @RPTR,R5        ;GET DEVICE BLOCK
014456  032715  004000                  BIT     #BIT11,@R5      ;UNIT NOT TESTED?
014462  001131                          BNE     2$              ;TRUE, DON'T PRINT STATISTICS
                                                                ;OK TO PRINT
014464  011537  015006                  MOV     @R5,RLUN        ;SAVE STATUS WORD
014470  042737  177770  015006          BIC     #177770,RLUN    ;MASK UNIT NUM.
014476  116501  000122                  MOVB    SOFTR(R5),R1    ;SOFTREAD
014502  042701  177400                  BIC     #177400,R1      ;SIGN-UNEXTEND
014506  116502  000124                  MOVB    SOFTW(R5),R2    ;SOFT WRITE
014512  042702  177400                  BIC     #177400,R2      ;
014516  116503  000136                  MOVB    HARDR(R5),R3    ;HARD READ
014522  042703  177400                  BIC     #177400,R3      ;
014526  116504  000140                  MOVB    HARDW(R5),R4    ;HARD WRITE
014532  042704  177400                  BIC     #177400,R4      ;
014536                                  PRINTS  #FM0,RLUN       ;SUMMARY/UNIT #
014562                                  PRINTS  #FM,#0,WRTN0(R5),RDN0(R5),<B,BDATA(R5)>,R1,R2,R3,R4
014634  116501  000123                  MOVB    SOFTR+1(R5),R1  ;SAME
014640  042701  177400                  BIC     #177400,R1      ;AS
014644  116502  000125                  MOVB    SOFTW+1(R5),R2  ;ABOVE
014650  042702  177400                  BIC     #177400,R2      ;THIS
014654  116503  000137                  MOVB    HARDR+1(R5),R3  ;TIME
014660  042703  177400                  BIC     #177400,R3      ;FOR
014664  116504  000141                  MOVB    HARDW+1(R5),R4  ;DRIVE
014670  042704  177400                  BIC     #177400,R4      ;ONE

014674                                  PRINTS  #FM,#i,WRTN1(R5),RDN1(R5),<B,BDATA+1(R5)>,R1,R2,R3,R4
014746  023727  015010  003356  2$:     CMP     RPTR,#LS^DEV    ;ALL UNITS DONE?
014754  103005                          BHIS    3$              ;YES
014756  062737  000002  015010          ADD     #2,RPTR         ;NO-DO

014764  000137  014450                  JMP     1$              ;MORE UNITS

014770                          3$:     POP     R5
```

```
MISCELLANEOUS SECTIONS  MACRO M1200  15-DEC-82 12:54  PAGE 101-1
REPORT CODING SECTION

   2947 014772                                      POP     R4
   2948 014774                                      POP     R3
   2949 014776                                      POP     R2
   2950 015000                                      POP     R1
   2951 015002                                      POP     R0
   2952 015004                                      ENDRPT
   2953 015006  000000                      RLUN:   .WORD
   2954 015010  000000                      RPTR:   .WORD
   2955
   2956 015012     045     116     045      STATHD: .ASCII  /%N%A      DR BLKS WR  BLKS RD  BDPAK  /
   2957 015060     104     103     110              .ASCIZ  @DCHK/RD DCHK/WR  DCHK/RD DCHK/WR%N@
   2958                                              .EVEN
   2959 015124     045     101     125      FM0:    .ASCIZ  /%AUNIT %D1%N/
   2960                                              .EVEN
   2961
   2962 015142     045     101     040      FM:     .ASCII  /%A       %D1%A %D5%A.    %D5%A.     %D3%A.    /
   2963 015216     045     104     063              .ASCIZ  /%D3%A.   %D3%A.      %D3%A.     %D3%A.%N/
   2964                                              .EVEN
   2965 015266     045     101     040      STHD2:  .ASCII  /%A                                          /
   2966 015333     122     105     103              .ASCIZ  /RECOV   RECOV   UNRECOV UNRECOV%N/
   2967                                              .EVEN
   2968 015376                                      ENDMOD
```

```
                                .SBTTL  INITIALIZE SECTION

                                ;++
                                ; THE INITIALIZE SECTION CONTAINS THE CODING THAT IS PERFORMED
                                ; AT THE BEGINNING OF EACH PASS.
                                ;--

015376                                  BGNINIT

015376  000240                 INIT:   NOP                             ;
015400  105037  016150                  CLRB    STRT                    ;FOR STATS CLEAR
015404                                  READEF  #EF.START               ;START COMMAND?
015412                                  BNCOMPLETE INIT2                ;NO
015414  005237  016150                  INC     STRT                    ;YES, SET START FLAG
015420  012737  003340  003304  INIT2:  MOV     #BLKTBL,DEVPTR          ;SET ALL UNITS ABORTED:
015426  005004                          CLR     R4                      ;UNIT NUMBER
015430  017705  165650          1$:     MOV     @DEVPTR,R5              ;GET POINTER
015434  010415                          MOV     R4,@R5                  ;INSERT UNIT #
015436  052715  120000                  BIS     #BIT15!BIT13,@R5  ;SET ABORTED, HALTED
015442  052715  004000                  BIS     #BIT11,@R5              ;SET UNIT NOT TESTED
015446  006304                          ASL     R4                      ;*2 FOR LOOK-UP
015450  016465  024346  000102          MOV     BUFTBL(R4),RCVBUF(R5)   ;SETUP POINTER TO UNIT'S BUFFER
015456  006204                          ASR     R4                      ;CORRECT BACK TO UNIT #
015460  023727  003304  003356          CMP     DEVPTR,#LSTDEV          ;LAST DEVICE DONE?
015466  103005                          BHIS    CHECK                   ;YES
015470  062737  000002  003304          ADD     #2,DEVPTR               ;NO-GET
015476  005204                          INC     R4                      ;NEXT DEVICE AND
015500  000753                          BR      1$                      ;SERVICE

015502  022737  000010  002012  CHECK:  CMP     #8.,L$UNIT              ;MAKE SURE NOT
015510  103005                          BHIS    GETHRD                  ;TOO MANY UNITS
015512                                  ERRSF   101.,TOMANY                     ;TOMANY-REQUEST ^C
015522                                  DOCLN                           ;EXIT

015524  012737  003340  003304  GETHRD: MOV     #BLKTBL,DEVPTR          ;INIT TABLE POINTER
015532  005004                          CLR     R4                      ;CLEAR DEVICE COUNTER
015534  017705  165544          1$:     MOV     @DEVPTR,R5              ;GET STATUS WORD
015540  010437  002074                  MOV     R4,L$LUN                ;UNIT NUM. IN CASE ERROR
015544                                  GPHARD  R4,R2                   ;GET HARD INFO
015552                                  BNCOMPLETE 3$
015554  042715  004000                  BIC     #BIT11,@R5              ;UNIT IS TESTED!
015560  012203                          MOV     (R2)+,R3                ;R3=CSR
015562  012265  000204                  MOV     (R2)+,TUVECT(R5)  ;GET VECTOR ADDRESS
015566  112265  000061                  MOVB    (R2)+,DR+1(R5)          ;SAVE UNIT SUMMARY
015572  005202                          INC     R2                      ;GET TO WORD BOUND
015574  012237  016152                  MOV     (R2)+,PDTFLG            ;AND GET PDT FLAG
015600  052715  040000                  BIS     #BIT14,@R5              ;SET SEND BREAK FLAG
015604  032765  000400  000060          BIT     #BIT8,DR(R5)            ;DRIVE 0?
015612  001011                          BNE     13$                     ;YES
015614  032765  001000  000060          BIT     #BIT9,DR(R5)            ;DRIVE 1?
015622  001005                          BNE     13$                     ;OK
015624                                  ERRSF   102.,NODRVS                     ;NEITHER?!
015634                                  DOCLN                           ;EXIT

015636  105737  016150          13$:    TSTB    STRT                    ;START COMMAND?
015642  001412                          BEQ     14$                     ;NO, DONT CLEAR
                                                                        ;YES-CLEAR STATS
```

```
MISCELLANEOUS SECTIONS  MACRO M1200  15-DEC-82 12:54  PAGE 103-1
INITIALIZE SECTION

 3028 015644  012702  000202                MOV     #BLKEND,R2      ;R2-->END OF STATS
 3029 015650  012701  000110                MOV     #WRTNO,R1       ;FORM ADDRESS OF START:
 3030 015654  060501                        ADD     R5,R1           ;R1-->START OF STATS.
 3031 015656  162702  000110                SUB     #WRTNO,R2       ;FORM # TO CLEAR
 3032
 3033 015662  105021                2$:     CLRB    (R1)+           ;CLEAR 'EM
 3034 015664  005302                        DEC     R2              ;MORE?
 3035 015666  001375                        BNE     2$              ;YES
 3036 015670  042715  120000        14$:    BIC     #BIT15!BIT13,@R5  ;SET NOT ABORTED NOT HALTED
 3037 015674  010365  000022                MOV     R3,RCSR(R5)     ;GET DEVICE REGISTERS:
 3038 015700  062703  000002                ADD     #2,R3
 3039 015704  010365  000024                MOV     R3,RCDB(R5)
 3040 015710  062703  000002                ADD     #2,R3
 3041 015714  010365  000026                MOV     R3,XMSR(R5)
 3042 015720  062703  000002                ADD     #2,R3
 3043 015724  105737  016152                TSTB    PDTFLG          ;UNIT A PDT?
 3044 015730  001402                        BEQ     4$              ;NO
 3045 015732  162703  000004                SUB     #4,R3           ;YES...RCDB=XMDB
 3046 015736  010365  000030        4$:     MOV     R3,XMDB(R5)
 3047 015742  005065  000072                CLR     PATTEN(R5)      ;ZERO DATA PATTERN
 3048 015746  005065  000002                CLR     RETRY(R5)       ;NO RETRIES
 3049 015752  005065  000064                CLR     REC(R5)         ;NO RECORD
 3050 015756  005065  000076                CLR     SUCCS(R5)       ;NO SUCCESS
 3051 015762  005065  000074                CLR     DLV(R5)         ;NO DLV ERROR
 3052 015766  005037  003332                CLR     ALLGON          ;OK TO PRINT STATISTICS
 3053 015772  062737  000002  003304  3$:   ADD     #2,DEVPTR       ;-->NEXT DEVICE
 3054 016000  005204                        INC     R4              ;INCREMENT UNIT NUMBER
 3055 016002  020437  002012                CMP     R4,L$UNIT       ;MORE UNITS?
 3056 016006  001252                        BNE     1$              ;YES, GP HARD THE NEXT
 3057
 3058 016010  005037  003300                CLR     SYSTAT          ;SYSTEM STATUS WORD
 3059 016014                                RFLAGS  FLGLOC          ;GET USER FLAGS
 3060 016022  005037  003324        5$:     CLR     BLKER           ;NO ERROR
 3061 016026  013737  002204  003302  SETLEN: MOV     LENGTH,TAPLEN   ;GET # OF RECORDS
 3062 016034  006237  003302                ASR     TAPLEN          ;GET # BLOCKS PER TRACK
 3063 016040  012737  000200  003326        MOV     #200,SECREC     ;PRESET SECOND START AT 200
 3064 016046  022737  000200  003302        CMP     #200,TAPLEN     ;# BLKS > 128.?
 3065 016054  101003                        BHI     3$              ;NO-SWITCH TRACKS 2ND PASS
 3066 016056  012737  000400  003326        MOV     #400,SECREC     ;YES-START AT 400
 3076
 3088
 3089 016064                        3$:     ENDINIT
 3090
 3091
 3092 016066      124      117      117  TOMANY: .ASCIZ  /TOO MANY UNITS MAX.=8 /
 3093                                            .EVEN
 3094 016116      123      105      114  NODRVS: .ASCIZ  /SELECT AT LEAST 1 DRIVE /
 3095                                            .EVEN
 3096 016150  000000                    STRT::  .WORD
 3097 016152  000000                    PDTFLG::.WORD           ;TU58 IS IN PDT
 3098 016154  000000                    FLGLOC::.WORD           ;USER FLAGS
```

```
MISCELLANEOUS SECTIONS  MACRO M1200  15-DEC-82 12:54  PAGE 105
INITIALIZE SECTION

                                        ;++
                                        ; THE AUTO DROP CODE IS INVOKED WHEN THE ADR FLAG IS SET AND CHECKS FOR
                                        ; A VALID INTERFACE LOCATION.  DROPS UNIT IF INTERFACE IS NOT THERE.
                                        ;--

016156                                  BGNAUTO
016156  000240                                NOP             ;AUTO DROP ROUTINE
016160                                      SETVEC  #4,#TRPHND,#PRI06;VER:1 ;GET BUS TRAP VEC.
016206  012737  003340  016264              MOV     #BLKTBL,TRPPTR  ;GET TOP OF DATA BLOCK TABLE
016214  017705  000044              1$:     MOV     @TRPPTR,R5      ;GET DATA BLOCK
016220  032715  104000                      BIT     #BIT15!BIT11,@R5  ;NOT TESTED OR ABORTED?
016224  100403                              BMI     2$              ;YES
016226  005775  000022                      TST     @RCSR(R5)       ;NO-VALID ADDRESS?
016232  000240                              NOP                     ;YES...(TRAP IF NOT)
016234  023727  016264  003356      2$:     CMP     TRPPTR,#LSTDEV ;MORE TO TRY?
016242  103004                              BHIS    3$              ;NO
016244  062737  000002  016264              ADD     #2,TRPPTR       ;ON TO NEXT
016252  000760                              BR      1$              ;GET IT
016254                                  3$:     CLRVEC  #4              ;RESTORE
016262                                  ENDAUTO
016264  000000                          TRPPTR: .WORD

                                        ;ILLEGAL ADDRESS TRAP HANDLER:

016266                                  TRPHND: PRINTF  #MSAUTO         ;SAY "AUTO DROPPED"
016306  011500                              MOV     @R5,R0          ;GET UNIT #
016310  042700  177770                      BIC     #177770,R0      ;MASK IT OFF
016314                                      DODU    R0              ;DROP HIM
016316  000002                              RTI
016320      045     101     101     MSAUTO: .ASCIZ  /%AAUTO DROP: %N/
```

```
MISCELLANEOUS SECTIONS  MACRO M1200  15-DEC-82 12:54  PAGE 107
CLEANUP CODING SECTION


   3136                                 .SBTTL  CLEANUP CODING SECTION
   3137
   3138                                 ;++
   3139                                 ; THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
   3140                                 ; AFTER THE HARDWARE TESTS HAVE BEEN PERFORMED.
   3141                                 ;--
   3142
   3143 016340                                  BGNCLN
   3144 016340  005737  003332                  TST     ALLGON          ;ENTRANCE FROM ALL-UNITS-ABORTED?
   3145 016344  001004                          BNE     1$              ;YES-EXIT
   3146 016346  005737  002206                  TST     STAEOP          ;NO-STATS AT EOP?
   3147 016352  001401                          BEQ     1$              ;NO
   3148 016354                                  DORPT                   ;YES
   3149
   3156
   3168
   3169 016356                          1$:     ENDCLN
```

```
                                .SBTTL  DROP UNIT SECTION

                                ;++
                                ; THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
                                ; TO NO LONGER BE TESTED.
                                ;--

016360                                  BGNDU
                                                                ;R0=UNIT NUMBER
016360                                  PUSH    R0              ;SAVE IT
016362                                  PUSH     R5             ;SAVE PRESENT UNIT POINTER
016364  004737  016424                  CALL     GETR5          ;GET POINTER TO UNIT
016370  052715  120000                  BIS     #BIT15!BIT13,@R5  ;SET ABORTED, HALTED
016374                                  POP     R5              ;RESTORE PRESENT UNIT POINTER
016376                                  POP     R0              ;RETRIEVE UNIT NUMBER
016400                                  PRINTF  #ABOMSG,R0

016422                                  ENDDU
016424  012737  003340  016454  GETR5: MOV     #BLKTBL,PTR     ;-->UNIT 0
016432  017705  000016          1$:     MOV     @PTR,R5         ;GET STATUS WORD
016436  005300                          DEC     R0              ;CORRECT UNIT?
016440  100404                          BMI     2$              ;YES
016442  062737  000002  016454          ADD     #2,PTR          ;NO,-->NEXT
016450  000770                          BR      1$              ;CONTINUE
016452  000207                  2$:     RETURN
016454  000000                  PTR:    .WORD

016456      045     101     104 ABOMSG: .ASCIZ  /%ADROPPED UNIT %D1%N/
                                        .EVEN
```

```
MISCELLANEOUS SECTIONS  MACRO M1200  15-DEC-82 12:54  PAGE 111
ADD UNIT SECTION

                                .SBTTL  ADD UNIT SECTION
                                ;++
                                ; THE ADD-UNIT SECTION CONTAINS ANY CODE THE PROGRAMMER WISHES
                                ;  TO BE EXECUTED IN CONJUNCTION WITH THE ADDING OF A UNIT BACK
                                ;  TO THE TEST CYCLE.
                                ;--
016504                                  BGNAU

                                ;THE INIT CODE CONTAINS ALL CODE NECESSARY TO ADD A UNIT.

016504                                  ENDAU
```

```
MISCELLANEOUS SECTIONS  MACRO M1200  15-DEC-82 12:54  PAGE 114
TEST 1 / DEVICE SELF-DIAGNOSTIC EXECUTION

                                .SBTTL  TEST 1 / DEVICE SELF-DIAGNOSTIC EXECUTION
                                
016506                          BGNMOL
                                .NLIST  ME,BEX
                                
016506                          BGNTST
016506                          TSTID   #TST1
016506  012737  016552  003320                        MOV     #TST1,TSTTOP    ;SAVE ADDR OF TEST
016514  004737  005754                                CALL    SETUP           ;INIT UNITS TSTPC
016520  004737  005602                                CALL    SETDR           ;GET 1ST DRVS.
016524  004737  006022                                CALL    RUN             ;DO TEST
016530  004737  005500                                CALL    SWAPDR          ;GET NEXT DRVS.
016534  103004                                        BCC     64$             ;BR NO 2ND DRVS
016536  004737  005754                                CALL    SETUP           ;REINIT UNITS TSTPC
016542  004737  006022                                CALL    RUN             ;REPEAT TEST
016546                                          64$:                    ;DONE
016546                          EXIT TST
                                
016552                  TST1:   TUSELF
016672  005237  003314                INC     DONE
016676  000207                  RETURN
                                
                                
016700                          ENDTST
```

```
MISCELLANEOUS SECTIONS  MACRO M1200  15-DEC-82 12:54  PAGE 116
TEST 2 / SEEK EOT,BOT

                                        .SBTTL  TEST 2 / SEEK EOT,BOT
                                        BGNTST
                                        TSTID   #TST2
                                                        MOV     #TST2,TSTTOP    ;SAVE ADDR OF TEST
                                                        CALL    SETUP           ;INIT UNITS TSTPC
                                                        CALL    SETDR           ;GET 1ST DRVS.
                                                        CALL    RUN             ;DO TEST
                                                        CALL    SWAPDR          ;GET NEXT DRVS.
                                                        BCC     64$             ;BR NO 2ND DRVS
                                                        CALL    SETUP           ;REINIT UNITS TSTPC
                                                        CALL    RUN             ;REPEAT TEST
                                                64$:                            ;DONE
                                        EXIT TST

                                TST2:   CLR     R4                      ;R4=INDEX INTO RECORD TABLE
                                1$:     MOV     RECDAT(R4),REC(R5)      ;GET THE RECORD

                                        TUSEEK  REC(R5),DR(R5)          ;SEEK IT

                                        ADD     #2,R4                   ;POINT TO NEXT RECORD
                                        CMP     RECDAT(R4),#-1.         ;LAST ONE DONE?
                                        BNE     1$                      ;NO-LOOP
                                        INC     DONE                    ;YES-SET DONE FLAG
                                        RETURN

                                RECDAT: 0.              ;BOT
                                        200             ;BOT OTHER TRACK
                                        177             ;EOT
                                        377             ;EOT OTHER TRACK
                                        400             ;BOT AGAIN
                                        -1.
                                        ENDTST
```

```
MISCELLANEOUS SECTIONS  MACRO M1200  15-DEC-82 12:54  PAGE 118
TEST 3 / HIGH ACTIVITY WRITE/READ

                                        .SBTTL  TEST 3 / HIGH ACTIVITY WRITE/READ
                                        ;
                                        ; WRITE THEN READ VARYING DATA FOR ALL PHYSICALLY ADJACENT BLOCKS AROUND
                                        ; A RECORD, GO HALF-WAY INTO REMAINING TAPE REPEAT UNTIL EOT.
                                        ;
017146                                          BGNTST
017146                                          TSTID   #TST3
017146  012737  017212  003320                          MOV     #TST3,TSTTOP    ;SAVE ADDR OF TEST
017154  004737  005754                          CALL    SETUP           ;INIT UNITS TSTPC
017160  004737  005602                          CALL    SETDR           ;GET 1ST DRVS.
017164  004737  006022                          CALL    RUN             ;DO TEST
017170  004737  005500                          CALL    SWAPDR          ;GET NEXT DRVS.
017174  103004                                  BCC     64$             ;BR NO 2ND DRVS
017176  004737  005754                          CALL    SETUP           ;REINIT UNITS TSTPC
017202  004737  006022                          CALL    RUN             ;REPEAT TEST
017206                                  64$:                            ;DONE
017206                                          EXIT TST
                                        ;
                                        ;
017212  012765  000100  000066  TST3:   MOV     #100,TMP(R5)    ;INIT TO HALF OF REMAINING
017220  005004                          CLR     R4              ;FOR INDEX INTO DATA TABLE
017222  005065  000064                  CLR     REC(R5)         ;START AT RECORD 0
017226  016465  020522  000072  1$:     MOV     TST3PT(R4),PATTEN(R5)   ;GET DATA
017234                                  TUWRIT  PATTEN(R5),REC(R5),#512.,DR(R5),#0
020024                                  TUREAD  REC(R5),#512.,DR(R5),#0
020424  062704  000002                  ADD     #2,R4           ;POINT TO NEXT DATA
020430  005764  020522                  TST     TST3PT(R4)      ;END?
020434  001402                          BEQ     2$              ;YES
020436  000137  017226                  JMP     1$              ;NO-WRITE, READ NEW DATA
020442  005004                  2$:     CLR     R4              ;POINT TO FIRST DATA
020444  062765  000200  000064          ADD     #200,REC(R5)    ;BUT NOW USE ADJACENT RECORD
020452  032765  001000  000064          BIT     #1000,REC(R5)   ;ALL ADJACENT RECORDS DONE?
020460  001002                          BNE     3$              ;YES
020462  000137  017226                  JMP     1$              ;NO-WRITE, READ AT NEW RECORD
020466  162765  001000  000064  3$:     SUB     #1000,REC(R5)   ;RESTORE TO NEXT RECORD
020474  066565  000066  000064          ADD     TMP(R5),REC(R5) ;HALF INTO REST OF TAPE
020502  006265  000066                  ASR     TMP(R5)         ;HALF OF HALF FOR NEXT TIME
020506  103402                          BCS     4$              ;DONE?
020510  000137  017226                  JMP     1$              ;NO
020514  005237  003314          4$:     INC     DONE            ;YES-SET FLAG
020520  000207                          RETURN
020522  000000                  TST3PT: .WORD   000000
020524  125252                          .WORD   125252
020526  177777                          .WORD   177777
020530  052525                          .WORD   052525
020532  000000                          .WORD   000000
                                        ;
                                        ;
020534                                  ENDTST
```

```
MISCELLANEOUS SECTIONS  MACRO M1200  15-DEC-82 12:54  PAGE 120
TEST 3 / HIGH ACTIVITY WRITE/READ


                                .SBTTL  TEST 4 / WRITE SELECTED NUMBER OF BLOCKS

                                        BGNTST
                                        TSTID   #TST4
020536  012737  020602  003320                        MOV     #TST4,TSTTOP    ;SAVE ADDR OF TEST
020544  004737  005754                                CALL    SETUP           ;INIT UNITS TSTPC
020550  004737  005602                                CALL    SETDR           ;GET 1ST DRVS.
020554  004737  006022                                CALL    RUN             ;DO TEST
020560  004737  005500                                CALL    SWAPDR          ;GET NEXT DRVS.
020564  103004                                        BCC     64$             ;BR NO 2ND DRVS
020566  004737  005754                                CALL    SETUP           ;REINIT UNITS TSTPC
020572  004737  006022                                CALL    RUN             ;REPEAT TEST
020576                                          64$:                          ;DONE
020576                                  EXIT TST
020602  005065  000064          TST4:   CLR     REC(R5)         ;START AT REC 0
020606  013765  003302  000066        MOV     TAPLEN,TMP(R5)  ;GET THE # OF BLOCKS PER TRACK
020614  005065  000062                CLR     TRK(R5)         ;TRK(R5)=1ST OR 2ND PASS COUNTER
020620  016565  000064  000072  1$:    MOV     REC(R5),PATTEN(R5)  ;USE RECORD NO. FOR DATA
020626  005737  002214                TST     DRVCHK                  ;ADD DR #?
020632  001403                        BEQ     10$                     ;NO
020634  066565  000060  000072        ADD     DR(R5),PATTEN(R5)       ;YES, ADD DRIVE ID
020642                          10$:    TUWRIT  PATTEN(R5),REC(R5),#512.,DR(R5),#0
021432  005365  000066                DEC     TMP(R5)         ;DO ALL RECORDS FOR THIS TRACK?
021436  001404                        BEQ     2$              ;YES-GET OTHER TRACK
021440  005265  000064                INC     REC(R5)         ;NO-ONTO NEXT RECORD
021444  000137  020620                JMP     1$              ;EXECUTE THE WRITE
021450  005765  000062          2$:   TST     TRK(R5)         ;DONE 2 TRACKS?
021454  001012                        BNE     TST4EX          ;YES-EXIT
021456  005265  000062                INC     TRK(R5)         ;NO-SET FLAG FOR NEXT PASS
021462  013765  003326  000064        MOV     SECREC,REC(R5)  ;GET NEW STARTING BLOCK #
021470  013765  003302  000066        MOV     TAPLEN,TMP(R5)  ;RESET # OF BLOCKS
021476  000137  020620                JMP     1$              ;AND EXECUTE
021502  005237  003314        TST4EX: INC     DONE            ;DONE
021506  000207                        RETURN                  ;RETURN

021510                                  ENDTST
```

```
                                        .SBTTL  TEST 5 / READ SELECTED NUMBER OF BLOCKS

                                                BGNTST
                                                TSTID   #TST5
021512  012737  021556  003320                                MOV     #TST5,TSTTOP    ;SAVE ADDR OF TEST
021520  004737  005754                                        CALL    SETUP           ;INIT UNITS TSTPC
021524  004737  005602                                        CALL    SETDR           ;GET 1ST DRVS.
021530  004737  006022                                        CALL    RUN             ;DO TEST
021534  004737  005500                                        CALL    SWAPDR          ;GET NEXT DRVS.
021540  103004                                                BCC     64$             ;BR NO 2ND DRVS
021542  004737  005754                                        CALL    SETUP           ;REINIT UNITS TSTPC
021546  004737  006022                                        CALL    RUN             ;REPEAT TEST
021552                                                  64$:                          ;DONE
                                                EXIT TST

                                        TST5:   CLR     REC(R5)             ;START AT REC 0
021562  013765  003302  000066                MOV     TAPLEN,TMP(R5)      ;GET THE # OF BLOCKS PER TRACK
021570  005065  000062                        CLR     TRK(R5)             ;TRK(R5)=1ST OR 2ND PASS
021574  016565  000064  000072        1$:     MOV     REC(R5),PATTEN(R5)  ;USE RECORD NO. AS DATA
021602  005737  002214                        TST     DRVCHK              ;ADD DR #?
021606  001403                                BEQ     10$                 ;NO
021610  066565  000060  000072                ADD     DR(R5),PATTEN(R5)   ;ADD IN DRIVE ID
021616                                  10$:    TUREAD  REC(R5),#512.,DR(R5),#0
022216  005365  000066                        DEC     TMP(R5)             ;DO ALL RECORDS THIS TRACK?
022222  001404                                BEQ     2$                  ;YES-GET OTHER TRACK
022224  005265  000064                        INC     REC(R5)             ;NO-NEXT RECORD
022230  000137  021574                        JMP     1$                  ;EXECUTE THE READ
022234  005765  000062                2$:     TST     TRK(R5)             ;DONE 2 TRACKS?
022240  001012                                BNE     TST5EX              ;YES-EXIT
022242  005265  000062                        INC     TRK(R5)             ;NO-SET FLAG FOR NEXT PASS
022246  013765  003326  000064                MOV     SECREC,REC(R5)      ;GET NEW STARTING BLOCK #
022254  013765  003302  000066                MOV     TAPLEN,TMP(R5)      ;RESET # OF BLOCKS
022262  000137  021574                        JMP     1$                  ;AND EXECUTE
022266  005237  003314              TST5EX:   INC     DONE                ;DONE
022272  000207                                RETURN                      ;RETURN

022274                                          ENDTST
```

```
MISCELLANEOUS SECTIONS  MACRO M1200  15-DEC-82 12:54  PAGE 124
TEST 6 / WRITE-VERIFY SELECTED NUMBER OF BLOCKS

                                .SBTTL  TEST 6 / WRITE-VERIFY SELECTED NUMBER OF BLOCKS

022276                                  BGNTST
022276                                  TSTID   #TST6
022276  012737  022342  003320                                  MOV     #TST6,TSTTOP    ;SAVE ADDR OF TEST
022304  004737  005754                                          CALL    SETUP           ;INIT UNITS TSTPC
022310  004737  005602                                          CALL    SETDR           ;GET 1ST DRVS.
022314  004737  006022                                          CALL    RUN             ;DO TEST
022320  004737  005500                                          CALL    SWAPDR          ;GET NEXT DRVS.
022324  103004                                                  BCC     64$             ;BR NO 2ND DRVS
022326  004737  005754                                          CALL    SETUP           ;REINIT UNITS TSTPC
022332  004737  006022                                          CALL    RUN             ;REPEAT TEST
022336                                                  64$:                            ;DONE
022336                                  EXIT TST

022342  005065  000064          TST6:   CLR     REC(R5)         ;START AT REC 0
022346  013765  003302  000066          MOV     TAPLEN,TMP(R5)  ;GET THE # OF BLOCKS PER TRACK
022354  005065  000062                  CLR     TRK(R5)         ;TRK(R5)=1ST OR 2ND PASS
022360  016565  000064  000072  1$:     MOV     REC(R5),PATTEN(R5)  ;USE RECORD NO. FOR DATA
022366  005737  002214                  TST     DRVCHK          ;ADD DR #?
022372  001403                          BEQ     10$             ;NO
022374  066565  000060  000072          ADD     DR(R5),PATTEN(R5)       ;ADD DRIVE ID
022402                          10$:    TUWRIT  PATTEN(R5),REC(R5),#512.,DR(R5),#1
023172  005365  000066                  DEC     TMP(R5)         ;DO ALL RECORDS FOR THIS TRACK?
023176  001404                          BEQ     2$              ;YES-GET OTHER TRACK
023200  005265  000064                  INC     REC(R5)         ;NO-NEXT RECORD
023204  000137  022360                  JMP     1$              ;EXECUTE THE WRITE
023210  005765  000062          2$:     TST     TRK(R5)         ;DONE 2 TRACKS?
023214  001012                          BNE     TST6EX          ;YES-EXIT
023216  005265  000062                  INC     TRK(R5)         ;NO-SET FLAG FOR NEXT PASS
023222  013765  003326  000064          MOV     SECREC,REC(R5)  ;GET NEW STARTING BLOCK #
023230  013765  003302  000066          MOV     TAPLEN,TMP(R5)  ;RESET # OF BLOCKS
023236  000137  022360                  JMP     1$              ;AND EXECUTE
023242  005237  003314          TST6EX: INC     DONE            ;DONE
023246  000207                          RETURN                  ;RETURN

023250                                  ENDTST
```

```
MISCELLANEOUS SECTIONS  MACRO M1200  15-DEC-82 12:54  PAGE 126
TEST 7 / READ-REDUCED THRESHOLD SELECTED NUMBER OF BLOCKS

                                        .SBTTL  TEST 7 / READ-REDUCED THRESHOLD SELECTED NUMBER OF BLOCKS

                                                BGNTST
                                                TSTID   #TST7
023252  012737  023316  003320                                 MOV     #TST7,TSTTOP    ;SAVE ADDR OF TEST
023260  004737  005754                                         CALL    SETUP           ;INIT UNITS TSTPC
023264  004737  005602                                         CALL    SETDR           ;GET 1ST DRVS.
023270  004737  006022                                         CALL    RUN             ;DO TEST
023274  004737  005500                                         CALL    SWAPDR          ;GET NEXT DRVS.
023300  103004                                                 BCC     64$             ;BR NO 2ND DRVS
023302  004737  005754                                         CALL    SETUP           ;REINIT UNITS TSTPC
023306  004737  006022                                         CALL    RUN             ;REPEAT TEST
023312                                                  64$:                           ;DONE
023312                                                  EXIT TST

023316  005065  000064          TST7:   CLR     REC(R5)         ;START AT REC 0
023322  013765  003302  000066          MOV     TAPLEN,TMP(R5)  ;GET THE # OF BLOCKS PER TRACK
023330  005065  000062                  CLR     TRK(R5)         ;TRK(R5)=1ST OR 2ND PASS
023334  016565  000064  000072  1$:     MOV     REC(R5),PATTEN(R5)  ;USE RECORD NO. FOR DATA
023342  005737  002214                  TST     DRVCHK          ;ADD DR #?
023346  001403                          BEQ      10$            ;NO
023350  066565  000060  000072          ADD     DR(R5),PATTEN(R5)       ;ADD DRIVE ID
023356                          10$:    TUREAD  REC(R5),#512.,DR(R5),#1
023756  005365  000066                  DEC     TMP(R5)         ;DO ALL RECORDS THIS TRACK?
023762  001404                          BEQ     2$              ;YES-GET OTHER TRACK
023764  005265  000064                  INC     REC(R5)         ;NO-NEXT RECORD
023770  000137  023334                  JMP     1$              ;EXECUTE THE READ
023774  005765  000062          2$:     TST     TRK(R5)         ;DONE 2 TRACKS?
024000  001012                          BNE     TST7EX          ;YES-EXIT
024002  005265  000062                  INC     TRK(R5)         ;NO-SET FLAG FOR NEXT PASS
024006  013765  003326  000064          MOV     SECREC,REC(R5)  ;GET NEW STARTING BLOCK #
024014  013765  003302  000066          MOV     TAPLEN,TMP(R5)  ;RESET # OF BLOCKS
024022  000137  023334                  JMP     1$              ;AND EXECUTE
024026  005237  003314          TST7EX: INC     DONE            ;DONE
024032  000207                          RETURN                  ;RETURN

024034                                  ENDTST
```

MISCELLANEOUS SECTIONS MACRO M1200 15-DEC-82 12:54 PAGE 128
PATCH AREA

```
3523                                .SBTTL  PATCH AREA
3524    000144                              .REPT   100.
```

```
MISCELLANEOUS SECTIONS  MACRO M1200  15-DEC-82 12:54  PAGE 130
I/O BUFFER AREAS:

                                .SBTTL  I/O BUFFER AREAS:

                                ;WHO-GETS-WHAT-SPACE TABLE

024346  025426                BUFTBL: .WORD   BUF0
024350  026464                        .WORD   BUF1
024352  027522                        .WORD   BUF2
024354  030560                        .WORD   BUF3
024356  031616                        .WORD   BUF4
024360  032654                        .WORD   BUF5
024362  033712                        .WORD   BUF6
024364  034750                        .WORD   BUF7


                                ;-----------------------------------------------------------------
                                ;ONLY 1 TRANSMIT BUFFER NECESSARY:

024366      023                         .BYTE RSXOFF
024367      023                         .BYTE RSXOFF    ;SEND XOFF BEFORE EVERY PACKET

024370                                  TRBUF:  .BLKB RCBFSZ
                                ;-----------------------------------------------------------------


025426                          BUF0:   .BLKB   RCBFSZ
026464                          BUF1:   .BLKB   RCBFSZ
027522                          BUF2:   .BLKB   RCBFSZ
030560                          BUF3:   .BLKB   RCBFSZ
031616                          BUF4:   .BLKB   RCBFSZ
032654                          BUF5:   .BLKB   RCBFSZ
033712                          BUF6:   .BLKB   RCBFSZ
034750                          BUF7:   .BLKB   RCBFSZ

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

036006                                  ENDMOD
```

```
PARAMETER CODING        MACRO M1200  15-DEC-82 12:54  PAGE 132
I/O BUFFER AREAS:

                                .TITLE PARAMETER CODING

                                .SBTTL  HARDWARE PARAMETER CODING SECTION

036006                                  BGNMOD

                                ;++
                                ; THE HARDWARE PARAMETER CODING SECTION CONTAINS MACROS
                                ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                ; WITH THE OPERATOR.
                                ;--

036006                                  BGNHRD

036010                                  GPRMA   MSG1,0,0,160000,177777,YES
036020                                  GPRMA   MSG1B,2,0,0,776,YES
036030                                  GPRML   MSG1C,6,1,YES
036036                                  GPRML   MSG2,4,1,YES
036044                                  GPRML   MSG3,4,2,YES

036052                                  ENDHRD

036052      124     125     065 MSG1:   .ASCIZ  /TU58 CSR/
036063      126     105     103 MSG1B:  .ASCIZ  /VECTOR ADDR./
036100      120     104     124 MSG1C:  .ASCIZ  /PDT (PARALLEL) INTERFACE/
036131      124     105     123 MSG2:   .ASCIZ  /TEST DRIVE 0/
036146      124     105     123 MSG3:   .ASCIZ  /TEST DRIVE 1/
                                .EVEN
```

```
PARAMETER CODING        MACRO M1200  15-DEC-82 12:54  PAGE 134
SOFTWARE PARAMETER CODING SECTION


                                        .SBTTL  SOFTWARE PARAMETER CODING SECTION

                                        ;++
                                        ; THE SOFTWARE PARAMETER CODING SECTION CONTAINS MACROS
                                        ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                        ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                        ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                        ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                        ; WITH THE OPERATOR.
                                        ;--

036164                                          BGNSFT

036166                                          GPRMD   MSG4,0,D,1777,8.,512.,YES
036200                                          GPRML   MSG4B,10,1,YES
036206                                          GPRML   MSG5,2,1,YES
036214                                          GPRML   MSG6,6,1,YES
036222                                          GPRML   MSG7,4,1,YES

036230                                          GPRMD   MSG8,10.,D,377,1,254.,YES

036242                                  SFTOUT: ENDSFT

036242  116     125     115     MSG4:   .ASCIZ  'NUMBER OF BLOCKS:TEST 4-7 (8 TO 512)'
036307  101     104     104     MSG4B:  .ASCIZ  /ADD DX # TO DATA PATTERN:TEST 4-7/
036351  123     124     101     MSG5:   .ASCIZ  /STATISTICS PRINTED AT EOP/
036403  103     117     115     MSG6:   .ASCIZ  /COMPARE DATA ON READ/
036430  120     122     111     MSG7:   .ASCIZ  /PRINT PACKET ON ERROR/
036456  043     040     105     MSG8:   .ASCIZ  /# ERRORS = DVC FATAL IF 'EVL'SET/
                                        .EVEN
```

```
PARAMETER CODING        MACRO M1200  15-DEC-82 12:54  PAGE 136
SOFTWARE PARAMETER CODING SECTION

 3711            000016                          .REPT   14.             ;LASTAD CORRECTION
 3720 036554                                     LASTAD
      036560                             L$LAST::
 3721 036560                                     ENDMOD
 3722
 3723 036560                                     BGNSETUP        1
 3724 036560                                     BGNPTAB
 3725 036564  176540                             176540
 3726 036566  000120                             120
 3727 036570  000003                             3
 3728 036572  000000                             0
 3729 036574                                     ENDPTAB
 3730 036574                                     ENDSETUP
 3731            000001                          .END
```

```
PARAMETER CODING        MACRO M1200  15-DEC-82 12:54  PAGE 136-1
SYMBOL TABLE

ABNDX = 000004 G      CHKANS  010112 G      C$MSG = 000023        EVL    = 000004 G      G$RADA= 000140
ABO     012360        CHKEND  010536 G      C$OPEN= 000034        EVLTHR  002216         G$RADB= 000000
ABOMSG  016456        CHKERR  010624        C$PNTB= 000014        EXOFF   007213         G$RADD= 000040
ABONM   006336        CHKPKS  010202 G      C$PNTF= 000017        EXON    007212         G$RADL= 000120
ADR   = 000020 G      CHKPTR  010200        C$PNTS= 000016        E$END  = 002100         G$RADO= 000020
ALLGON  003332 G      CHKREE  010676        C$PNTX= 000015        E$LOAD= 000035          G$XFER= 000004
ASSEMB= 000010        CHKRET  011242        C$QIO  = 000377       FLGLOC  016154 G        G$YES  = 000010
BDATA = 000134 G      CHKSUC  011536 G      C$RDBU= 000007        FM      015142          HARDR  = 000136 G
BDBYTS  014140        CHKSUM  013066 G      C$REFG= 000047        FMO     015124          HARDW  = 000140 G
BDCHK = 000022 G      CHK8    010132        C$RESE= 000033        FTLNM   003312          HELP   = 000000
BDCOM = 000014 G      CKCKSM  013162 G      C$REVI= 000003        F$AU   = 000015         HOE    = 100000 G
BIT0  = 000001 G      CLRALL  005660 G      C$RFLA= 000021        F$AUTO= 000020          HRD      012340
BIT00 = 000001 G      CLRBUF  005720 G      C$RPT  = 000025       F$BGN  = 000040         HRDRD  = 000016 G
BIT01 = 000002 G      CLRPTR  005752        C$SEFG= 000046        F$CLEA= 000007          HRDWR  = 000020 G
BIT02 = 000004 G      CMDSNT= 000100 G      C$SPRI= 000041        F$DU   = 000016         HRD1     011164
BIT03 = 000010 G      CMNDER= 000040 G      C$SVEC= 000037        F$END  = 000041         IBE    = 010000 G
BIT04 = 000020 G      CMPDAT  002212        C$TPRI= 000013        F$HARD= 000004          IDPTR    003316 G
BIT05 = 000040 G      CNINIT= 000032 G      DESC    014142        F$HW   = 000013         IDU    = 000040 G
BIT06 = 000100 G      COMPAR  013762 G      DEVPTR  003304 G      F$INIT= 000006          IER    = 020000 G
BIT07 = 000200 G      CSNRDY  003334 G      DEV0    003360        F$JMP  = 000050         INIT     015376
BIT08 = 000400 G      CSRCVB  003336 G      DEV1    003570        F$MOD  = 000000         INITWD   013754
BIT09 = 001000 G      C$AU   = 000052       DEV2    004000        F$MSG  = 000011         INIT2    015420
BIT1  = 000002 G      C$AUTO= 000061        DEV3    004210        F$PROT= 000021          ISR    = 000100 G
BIT10 = 002000 G      C$BRK  = 000022       DEV4    004420        F$PWR  = 000017         IXE    = 004000 G
BIT11 = 004000 G      C$BSEG= 000004        DEV5    004630        F$RPT  = 000012         I$AU   = 000041
BIT12 = 010000 G      C$BSUB= 000002        DEV6    005040        F$SEG  = 000003         I$AUTO= 000041
BIT13 = 020000 G      C$CEFG= 000045        DEV7    005250        F$SOFT= 000005          I$CLN  = 000041
BIT14 = 040000 G      C$CLCK= 000062        DFPTBL  002172 G      F$SRV  = 000010         I$DU   = 000041
BIT15 = 100000 G      C$CLEA= 000012        DFTL1   012206        F$SUB  = 000002         I$HRD  = 000041
BIT2  = 000004 G      C$CLOS= 000035        DIAGMC= 000000        F$SW   = 000014         I$INIT= 000041
BIT3  = 000010 G      C$CLP1= 000006        DLV    = 000074 G     F$TEST= 000001          I$MOD  = 000041
BIT4  = 000020 G      C$CVEC= 000036        DOBRK   013222 G      GBTMP   010106          I$MSG  = 000041
BIT5  = 000040 G      C$DCLN= 000044        DONE    003314 G      GBTMP2  010110          I$PROT= 000040
BIT6  = 000100 G      C$DODU= 000051        DR     = 000060 G     GETANS  006736 G        I$PTAB= 000041
BIT7  = 000200 G      C$DRPT= 000024        DRVCHK  002214        GETHRD  015524          I$PWR  = 000041
BIT8  = 000400 G      C$DU   = 000053       EF.CON= 000036 G      GETPTR  007002          I$RPT  = 000041
BIT9  = 001000 G      C$EDIT= 000003        EF.NEW= 000035 G      GETR5   016424          I$SEG  = 000041
BLKEND= 000202 G      C$ERDF= 000055        EF.PWR= 000034 G      GTAGIN  007224          I$SETU= 000041
BLKER   003324 G      C$ERHR= 000056        EF.RES= 000037 G      GTBYTE  007662 G        I$SFT  = 000041
BLKSIZ= 000210 G      C$ERRO= 000060        EF.STA= 000040 G      GTDOWN  007534          I$SRV  = 000041
BLKTBL  003340 G      C$ERSF= 000054        ERRDES  012402 G      GTOK    007452          I$SUB  = 000041
BOE   = 000400 G      C$ERSO= 000057        ESABO = 177720 G      GTPKS1  007004 G        I$TST  = 000041
BRKPTR  013760        C$ESCA= 000010        ESCKS = 177757 G      GTPKS8  007214 G        J$JMP  = 000167
BRKTO   013756        C$ESEG= 000005        ESCKSM= 177757        GTPTR   007660          LENGTH   002204
BRKWD   013752        C$ESUB= 000003        ESCMD  = 177720 G     GTUM    007414          LGOFST= 000120 G
BUFTBL  024346        C$ETST= 000001        ESNCRT= 177767 G      G$CNTO= 000200          LNCNT    014342
BUF0    025426        C$EXIT= 000032        ESNOMO= 177737 G      G$DELM= 000372          LOE    = 040000 G
BUF1    026464        C$GETB= 000026        ESNONX= 177770 G      G$DISP= 000003          LOG      012046 G
BUF2    027522        C$GETW= 000027        ESOK   = 000000 G     G$EXCP= 000400          LOGO     012370
BUF3    030560        C$GMAN= 000043        ESPART= 177776 G      G$HILI= 000002          LOGOK    012134
BUF4    031616        C$GPHR= 000042        ESRD   = 177757       G$LOLI= 000001          LOGOK2   012220
BUF5    032654        C$GPLO= 000030        ESREC  = 177711 G     G$NO   = 000000         LOGO     012122
BUF6    033712        C$GPRI= 000040        ESSK   = 177740 G     G$OFFS= 000400          LOG1     012236
BUF7    034750        C$INIT= 000011        ESSLF  = 177777 G     G$OFSI= 000376          LOG2     012266
CARLF   014356        C$INLP= 000020        ESTRY  = 000001 G     G$PRMA= 000001          LOG3     012326
CHECK   015502        C$MANI= 000050        ESWLOC= 177765 G      G$PRMD= 000002          LOG3B    012350
CHKANR  010176        C$MEM  = 000031       ESWR   = 177757       G$PRML= 000000          LOT    = 000010 G
```

PARAMETER CODING MACRO M1200 15-DEC-82 12:54 PAGE 136-2
SYMBOL TABLE

```
LSTDEV  003356 G    L10004  013660      NCART = 000054 G    RECERR= 000042 G    STRT    016150 G
L$ACP   002110 G    L10005  013714      NODRVS  016116     RECID   012654 G    SUCCS = 000076 G
L$APT   002036 G    L10006  015004      NOMOR   006340     RECID2  013030      SUCOTL= 000046 G
L$AU    016504 G    L10007  016064      NOMOT = 000030 G    RECOV   011262      SVCGBL= 000000
L$AUT   002070 G    L10010  016262      NOUNIT= 000036 G    RETERR  011464      SVCINS= 177777
L$AUTO  016156 G    L10011  016356      NOXOFF  006430     RETRY = 000002 G    SVCSUB= 177777
L$CCP   002106 G    L10012  016422      NTSFT   012250     RLUN    015006      SVCTAG= 177777
L$CLEA  016340 G    L10013  016504      NXTRET  006334     RPTR    015010      SVCTST= 177777
L$CO    002032 G    L10014  016700      NXTST   006052 G   RSCMND= 000002 G    SWAPDR  005500 G
L$DEPO  002011 G    L10015  017144      NXTST2  006156     RSCONT= 000020 G    SWPTR   005600
L$DESC  002122 G    L10016  020534      ONEFIL= 000001      RSDASZ= 000204 G    SYSTAT  003300 G
L$DESP  002076 G    L10017  021510      OTL   = 000052 G    RSDATA= 000001 G    S$LSYM= 010000
L$DEVP  002060 G    L10020  022274      OVRFLO  012746     RSDNSZ= 000222 G    TAPLEN  003302 G
L$DISP  002152 G    L10021  023250      OVRN  = 000012 G    RSEND = 000002 G    THRSHI  011370
L$DLY   002116 G    L10022  024034      O$APTS= 000000      RSINIT= 000004 G    THRSLO  011342
L$DTP   002040 G    L10023  036052      O$AU  = 000001      RSMSIZ= 000012 G    TMP   = 000066 G
L$DTYP  002034 G    L10024  036242      O$BGNR= 000001      RSNDSZ= 000016 G    TOMANY  016066
L$DU    016360 G    L10025  036564      O$BGNS= 000001      RSNTAB  002220      TORCVB= 000050 G
L$DUT   002072 G    L10027  036574      O$DU  = 000001      RSSEND= 000100 G    TOSNDB= 000056 G
L$DVTY  005460 G    MABEE   012300      O$ERRT= 000000      RSSNIT= 000001 G    TRBUF   024370
L$EF    002052 G    MSAUTO  016320      O$GNSW= 000001      RSSNOP= 000000 G    TRK   = 000062 G
L$ENVI  002044 G    MSBDA   002332 G    O$POIN= 000001      RSSNSZ= 000016 G    TRPHND  016266
L$ETP   002102 G    MSCMD   002676 G    O$SETU= 000001      RSSRD = 000002 G    TRPPTR  016264
L$EXP1  002046 G    MSCOM   002376 G    PARTL = 000034 G    RSSSEK= 000005 G    TSTPC = 000020 G
L$EXP4  002064 G    MSG1    036052      PATTEN= 000072 G    RSSSLF= 000007 G    TSTTOP  003320
L$EXP5  002066 G    MSG1B   036063      PDTFLG  016152 G   RSSWR = 000003 G    TST1    016552
L$HARD  036010 G    MSG1C   036100      PERDEV  006170     RSVP    006364 G    TST2    016746
L$HIME  002120 G    MSG2    036131      PKPTR = 000104 G    RSXOFF= 000023 G    TST3    017212
L$HPCP  002016 G    MSG3    036146      PNT   = 001000 G    RSXON = 000020 G    TST3PT  020522
L$HPTP  002022 G    MSG4    036242      PRBUF   002210     RTRYN   011422      TST4    020602
L$HW    002172 G    MSG4B   036307      PRDAT   014344     RUN     006022 G    TST4EX  021502
L$ICP   002104 G    MSG5    036351      PRFORM  014346     SECREC  003326 G    TST5    021556
L$INIT  015376 G    MSG6    036403      PRI   = 002000 G    SERVST  007656      TST5EX  022266
L$LADP  002026 G    MSG7    036430      PRI00 = 000000 G    SETDR   005602 G    TST6    022342
L$LAST  036560 G    MSG8    036456      PRI01 = 000040 G    SETLEN  016026      TST6EX  023242
L$LOAD  002100 G    MSHCHK  002550 G    PRI02 = 000100 G    SETPTR  005656      TST7    023316
L$LUN   002074 G    MSHDRD  003146 G    PRI03 = 000140 G    SETSRV  007572      TST7EX  024026
L$MREV  002050 G    MSHDWR  003210 G    PRI04 = 000200 G    SETUP   005754 G    TUVECT= 000204 G
L$NAME  002000 G    MSNIT   002612 G    PRI05 = 000240 G    SFPTBL  002204 G    T$ARGC= 000002
L$PRIO  002042 G    MSNLOG  002314 G    PRI06 = 000300 G    SFT     012316      T$CODE= 005052
L$PROT  002142 G    MSNOMO  002440 G    PRI07 = 000340 G    SFTOUT  036242      T$ERRN= 000146
L$PRT   002112 G    MSNOTP  002456 G    PRNPAK  014176 G   SFTRD = 000002 G    T$EXCP= 000000
L$REPP  002062 G    MSNRSP  002756 G    PRNSIZ  003330 G   SFTWR = 000004 G    T$FLAG= 000040
L$REV   002010 G    MSOVRN  003252 G    PTR     016454     SKERR = 000024 G    T$FREE= 036574
L$RPT   014362 G    MSPART  002626 G    RCBCNT  003310     SLFER = 000044 G    T$GMAN= 000000
L$SOFT  036166 G    MSQRSP  002772 G    RCBFSZ= 001036 G   SND     006434      T$HILI= 000376
L$SPC   002056 G    MSREC   002712 G    RCDB  = 000024 G    SNDBYT  006666 G    T$LAST= 000001
L$SPCP  002020 G    MSRNIT  002530 G    RCFLG   003306 G   SNDCNT= 000070 G    T$LOLI= 000001
L$SPTP  002024 G    MSSELF  002356 G    RCINIT= 000006 G    SNDHND  013646      T$LSYM= 010000
L$STA   002030 G    MSSFRD  003046 G    RCSR  = 000022 G    SNDINT  013646 G    T$LTNO= 000007
L$SW    002204 G    MSSFWR  003106 G    RCVBUF= 000102 G    SOFTR = 000122 G    T$NEST= 177777
L$TEST  002114 G    MSSKER  002300 G    RCVHND  013662      SOFTW = 000124 G    T$NS0 = 000000
L$TIML  002014 G    MSTOSN  003024 G    RCVINT  013662 G    SRVTBL  007636      T$NS1 = 000005
L$UNIT  002012 G    MSUNIT  002650 G    RDN0  = 000114 G    STAEOP  002206      T$PCNT= 000000
L10001  002202      MSWPRO  002506 G    RDN1  = 000116 G    STATHD  015012      T$PTAB= 010026
L10002  002220      MSWRSP  002732 G    REC   = 000064 G    STATUS= 000000 G    T$PTHV= 000001
L10003  012572      MXRTRY  003322 G    RECDAT  017130      STHD2   015266      T$PTNU= 000001
```

```
PARAMETER CODING        MACRO M1200  15-DEC-82 12:54  PAGE 136-3
SYMBOL TABLE

T$SAVL= 177777          T$$CLE= 010011          T$$SRV= 010005          T7      023252 G        XFNSND  006416
T$SEGL= 177777          T$$DAT= 010027          T$$SW = 010002          UAM   = 000200 G        XMDB  = 000030 G
T$SIZE= 000006          T$$DU = 010012          T$$TES= 010022          UNIT    012574 G        XMSR  = 000026 G
T$SUBN= 000000          T$$HAR= 010023          T1      016506 G        UNREC   011442          XSCNT = 000036 G
T$TAGL= 177777          T$$HW = 010001          T1TRY = 000146 G        UNSUC   011040          XSFLG = 000034 G
T$TAGN= 010030          T$$INI= 010007          T2      016702 G        UNXPCT  007356          XSPKNM= 000032 G
T$TEMP= 000000          T$$MSG= 010003          T3      017146 G        WAIT    013716          XSPTR = 000106 G
T$TEST= 000007          T$$PC = 000001          T4      020536 G        WHCHDR  013052 G        X$ALWA= 000000
T$TSTM= 177777          T$$PRO= 010000          T4TRY = 000132 G        WRLOCK= 000026 G        X$FALS= 000040
T$TSTS= 000001          T$$PTA= 010026          T5      021512 G        WRTN0 = 000110 G        X$OFFS= 000400
T$$AU = 010013          T$$RPT= 010006          T6      022276 G        WRTN1 = 000112 G        X$TRUE= 000020
T$$AUT= 010010          T$$SOF= 010024

. ABS.  036574     000
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  32856 WORDS  ( 129 PAGES)
DYNAMIC MEMORY:  19748 WORDS  ( 75 PAGES)
ELAPSED TIME:  00:02:42
CNTUUA.BIN/DS:GBL/EN:AMA:ABS,CNTUUA.LST/CR/-SP/NL:CND:MD:BEX=SVC34/MLB,CNTUUA.MAC
```

CNTUUA CREATED BY MACRO ON 15-DEC-82 AT 12:55 PAGE 1
SYMBOL CROSS REFERENCE CREF V01

SYMBOL	VALUE		REFERENCES								
ABNDX	= 000004	G	#26-825	*84-2434	84-2447	84-2449					
ABO	012360		84-2444	84-2458	84-2471	#84-2487					
ABOMSG	016456		109-3187	#109-3217							
ABONM	006336		*60-1632	*60-1649	60-1654	#60-1662					
ADR	= 000020	G	#14-573								
ALLGON	003332	G	#24-793	*60-1658	*103-3052	107-3144					
ASSEMB	= 000010		5-380	5-380							
BDATA	= 000134	G	#28-878	101-2929	101-2939						
BDBYTS	014140		*98-2777	*98-2788	98-2791	98-2796	98-2806				
BDCHK	= 000022	G	#16-601	78-2152	78-2204						
BDCOM	= 000014	G	#16-598	80-2248	84-2459						
BIT0	= 000001	G	#14-573	48-1473	72-1993	84-2450	90-2561	90-2562	90-2564	90-2575	94-2650
BIT00	= 000001	G	#14-573	14-573							
BIT01	= 000002	G	#14-573	14-573							
BIT02	= 000004	G	#14-573	14-573							
BIT03	= 000010	G	#14-573	14-573							
BIT04	= 000020	G	#14-573	14-573							
BIT05	= 000040	G	#14-573	14-573							
BIT06	= 000100	G	#14-573	14-573							
BIT07	= 000200	G	#14-573	14-573							
BIT08	= 000400	G	#14-573	14-573							
BIT09	= 001000	G	#14-573	14-573							
BIT1	= 000002	G	#14-573	60-1623	66-1799	72-1994	76-2093	80-2236	80-2305		
BIT10	= 002000	G	#14-573	60-1619	62-1729	80-2254	80-2274	80-2282	80-2303	118-3370	118-3370
			118-3371	120-3413	120-3413	122-3444	124-3475	124-3475	126-3506		
BIT11	= 004000	G	#14-573	101-2915	103-2990	103-3011	105-3111				
BIT12	= 010000	G	#14-573	118-3370	118-3370	118-3370	120-3413	120-3413	120-3413	124-3475	124-3475
			124-3475								
BIT13	= 020000	G	#14-573	103-2989	103-3036	109-3184					
BIT14	= 040000	G	#14-573	60-1638	60-1641	78-2165	78-2177	94-2701	103-3017		
BIT15	= 100000	G	#14-573	48-1471	68-1841	68-1863	70-1899	70-1916	70-1936	70-1947	76-2101
			80-2240	103-2989	103-3036	105-3111	109-3184				
BIT2	= 000004	G	#14-573	72-1995							
BIT3	= 000010	G	#14-573	72-1996							
BIT4	= 000020	G	#14-573	62-1723	62-1727	72-1997	86-2506	94-2652			
BIT5	= 000040	G	#14-573	62-1745	62-1747	72-1998					
BIT6	= 000100	G	#14-573	72-1999	80-2245	80-2306	94-2678	94-2686	94-2693	94-2709	94-2710
			96-2722	96-2730	98-2797						
BIT7	= 000200	G	#14-573	72-2000	80-2274	80-2282	80-2288	80-2290	80-2292	80-2303	
BIT8	= 000400	G	#14-573	50-1506	62-1733	62-1742	80-2267	80-2296	103-3018		
BIT9	= 001000	G	#14-573	48-1475	62-1717	80-2251	80-2278	82-2361	103-3020		
BLKEND	= 000202	G	#28-898	103-3028							
BLKER	003324	G	#24-790	*62-1714	*103-3060						
BLKSIZ	= 000210	G	#28-902	30-924	30-925	30-926	30-927	30-928	30-929	30-930	30-931
BLKTBL	003340	G	#30-912	48-1469	50-1503	52-1528	56-1571	60-1617	60-1633	70-1897	76-2099
			101-2909	103-2985	103-3005	105-3109	109-3208				
BOE	= 000400	G	#14-573								
BRKPTR	013760		*94-2677	*94-2685	*94-2692	96-2743	#96-2757				
BRKTO	013756		*94-2649	*94-2658	*94-2664	*94-2675	*94-2683	*96-2747	#96-2756		
BRKWD	013752		94-2663	#96-2753							
BUFTBL	024346		103-2992	#130-3533							
BUF0	025426		130-3533	#130-3553							

CNTUUA CREATED BY MACRO ON 15-DEC-82 AT 12:55 PAGE 2
SYMBOL CROSS REFERENCE CREF V01

SYMBOL	VALUE		REFERENCES								
BUF1	026464		130-3534	#130-3554							
BUF2	027522		130-3535	#130-3555							
BUF3	030560		130-3536	#130-3556							
BUF4	031616		130-3537	#130-3557							
BUF5	032654		130-3538	#130-3558							
BUF6	033712		130-3539	#130-3559							
BUF7	034750		130-3540	#130-3560							
CARLF	014356		100-2835	100-2837	#100-2846						
CHECK	015502		103-2995	#103-3000							
CHKANR	010176		76-2097	76-2105	#76-2109						
CHKANS	010112	G	58-1596	#76-2091							
CHKEND	010536	G	78-2157	78-2200	#80-2234						
CHKERR	010624		80-2244	#80-2251							
CHKPKS	010202	G	76-2095	76-2103	#78-2132						
CHKPTR	010200		*76-2099	76-2100	76-2104	*76-2106	#76-2111				
CHKREE	010676		80-2237	#80-2258							
CHKRET	011242		80-2242	80-2247	80-2250	80-2253	80-2257	80-2275	80-2283	80-2291	80-2293
			#80-2305								
CHKSUC	011536	G	80-2238	80-2258	#82-2340						
CHKSUM	013066	G	#90-2559	92-2602	114-3321	116-3339	118-3370	118-3370	i18-3370	118-3371	118-3371
			120-3413	120-3413	120-3413	122-3444	122-3444	124-3475	124-3475	124-3475	126-3506
			126-3506								
CHK8	010132		76-2094	#76-2099							
CKCKSM	013162	G	78-2150	78-2185	78-2198	#92-2599					
CLRALL	005660	G	#52-1528	66-1802							
CLRBUF	005720	G	52-1530	#54-1546	66-1805						
CLRPTR	005752		*52-1528	52-1529	52-1531	*52-1533	#54-1556				
CMDSNT	= 000100	G	#26-850	*62-1726	82-2347	82-2351	82-2364	86-2512	*94-2651		
CMNDER	= 000040	G	#16-608	82-2384							
CMPDAT	002212		#13-500	98-2779							
CNINIT	= 000032	G	#16-605	94-2705							
COMPAR	013762	G	78-2162	78-2187	#98-2774						
CSNRDY	003334	G	#24-800	64-1770							
CSRCVB	003336	G	#24-801	74-2030							
C$AU	= 000052		#5-380	111-3252							
C$AUTO	= 000061		#5-380	105-3120							
C$BRK	= 000022		#5-380	58-1594	60-1657	64-1774	74-2052	94-2654	96-2745	96-2746	101-2908
			101-2911	101-2913							
C$BSEG	= 000004		#5-380								
C$BSUB	= 000002		#5-380								
C$CEFG	= 000045		#5-380								
C$CLCK	= 000062		#5-380								
C$CLEA	= 000012		#5-380	107-3169							
C$CLOS	= 000035		#5-380								
C$CLP1	= 000006		#5-380								
C$CVEC	= 000036		#5-380	94-2711	94-2713	105-3119					
C$DCLN	= 000044		#5-380	60-1659	103-3003	103-3023					
C$DODU	= 000051		#5-380	84-2489	105-3131						
C$DRPT	= 000024		#5-380	107-3148							
C$DU	= 000053		#5-380	109-3207							
C$EDIT	= 000003		#5-380	5-423							
C$ERDF	= 000055		#5-380	84-2443	84-2457						

CNTUUA CREATED BY MACRO ON 15-DEC-82 AT 12:55 PAGE 3
SYMBOL CROSS REFERENCE CREF V01

SYMBOL	VALUE		REFERENCES							
C$ERHR	= 000056		#5-380	84-2470	84-2485					
C$ERRO	= 000060		#5-380							
C$ERSF	= 000054		#5-380	60-1656	103-3002	103-3022				
C$ERSO	= 000057		#5-380	84-2463	84-2481	98-2795				
C$ESCA	= 000010		#5-380							
C$ESEG	= 000005		#5-380							
C$ESUB	= 000003		#5-380							
C$ETST	= 000001		#5-380	114-3326	116-3353	118-3395	120-3427	122-3458	124-3489	126-3520
C$EXIT	= 000032		#5-380	114-3319	116-3333	118-3363	120-3403	122-3434	124-3465	126-3496
C$GETB	= 000026		#5-380							
C$GETW	= 000027		#5-380							
C$GMAN	= 000043		#5-380							
C$GPHR	= 000042		#5-380	103-3009						
C$GPLO	= 000030		#5-380							
C$GPRI	= 000040		#5-380							
C$INIT	= 000011		#5-380	103-3089						
C$INLP	= 000020		#5-380							
C$MANI	= 000050		#5-380							
C$MEM	= 000031		#5-380							
C$MSG	= 000023		#5-380	86-2519						
C$OPEN	= 000034		#5-380							
C$PNTB	= 000014		#5-380	80-2280	86-2509	86-2512	86-2515	98-2796		
C$PNTF	= 000017		#5-380	100-2830	100-2835	100-2837	105-3128	109-3187		
C$PNTS	= 000016		#5-380	101-2910	101-2912	101-2928	101-2929	101-2939		
C$PNTX	= 000015		#5-380	80-2256	80-2261	80-2264	80-2266	80-2287	80-2295	
C$QIO	= 000377		#5-380							
C$RDBU	= 000007		#5-380							
C$REFG	= 000047		#5-380	103-2982						
C$RESE	= 000033		#5-380	#5-380						
C$REVI	= 000003		#5-380	5-423						
C$RFLA	= 000021		#5-380	103-3059						
C$RPT	= 000025		#5-380	101-2952						
C$SEFG	= 000046		#5-380							
C$SPRI	= 000041		#5-380	94-2670						
C$SVEC	= 000037		#5-380	94-2671	94-2673	105-3108				
C$TPRI	= 000013		#5-380							
DESC	014142		98-2796	#98-2807						
DEVPTR	003304	G	#24-782	*60-1617	60-1618	60-1627	*60-1629	*60-1633	60-1634	60-1650	*60-1652
			*103-2985	103-2987	103-2994	*103-2996	*103-3005	103-3007	*103-3053		
DEV0	003360		30-912	#30-924						
DEV1	003570		30-913	#30-925						
DEV2	004000		30-914	#30-926						
DEV3	004210		30-915	#30-927						
DEV4	004420		30-916	#30-928						
DEV5	004630		30-917	#30-929						
DEV6	005040		30-918	#30-930						
DEV7	005250		30-919	#30-931						
DFPTBL	002172	G	#11-472							
DFTL1	012206		*84-2455	*84-2456	#84-2457	84-2457				
DIAGMC	= 000000		5-380	5-380						
DLV	= 000074	G	#26-848	68-1861	70-1938	70-1949	*74-2033	74-2034	74-2035	*74-2037	*74-2058
			74-2059	74-2060	*74-2062	78-2167	86-2513	86-2515	*86-2516	*96-2731	96-2732

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CNTUUA     CREATED BY  MACRO  ON 15-DEC-82 AT 12:55     PAGE 4
SYMBOL CROSS REFERENCE                                  CREF   V01

SYMBOL  VALUE                 REFERENCES
                               96-2733    *96-2735    *103-3051
DOBRK      013222  G           60-1640    #94-2648
DONE       003314  G          #24-786     *56-1570     58-1590    *114-3322   *116-3344   *118-3386   *120-3424   *122-3455   *124-3486
                              *126-3517
DR       = 000060  G          #26-841      48-1473     48-1475    *48-1477    *50-1505     50-1506    *50-1508     86-2509     88-2540
                              *103-3014    103-3018    103-3020    116-3339    118-3370    118-3370    118-3371    118-3371    120-3412
                               120-3413    120-3413    122-3443    122-3444    122-3444    124-3474    124-3475    124-3475    126-3505
                               126-3506    126-3506
DRVCHK     002214             #13-501      120-3410    122-3441    124-3472    126-3503
EF.CON   = 000036  G          #14-573
EF.NEW   = 000035  G          #14-573
EF.PWR   = 000034  G          #14-573
EF.RES   = 000037  G          #14-573
EF.STA   = 000040  G          #14-573      103-2982
ERRDES     012402  G           84-2443     84-2457     84-2463     84-2470     84-2481     84-2485    #86-2502     98-2795
ESABO    = 177720  G          #18-667
ESCKS    = 177757  G          #18-678      18-680      18-681      18-682      82-2359
ESCKSM   = 177757             #18-680
ESCMD    = 177720  G          #18-676      82-2382
ESNCRT   = 177767  G          #18-668      82-2377
ESNOMO   = 177737  G          #18-675      82-2354
ESNONX   = 177770  G          #18-669      82-2387
ESOK     = 000000  G          #18-670      82-2342
ESPART   = 177776  G          #18-671      82-2397
ESRD     = 177757             #18-682
ESREC    = 177711  G          #18-677      82-2402
ESSK     = 177740  G          #18-672      82-2372
ESSLF    = 177777  G          #18-679
ESTRY    = 000001  G          #18-673      82-2345
ESWLOC   = 177765  G          #18-674      82-2392
ESWR     = 177757             #18-681
EVL      = 000004  G          #14-573      84-2451
EVLTHR     002216             #13-502      84-2453
EXOFF      007213             #68-1876     70-1956     74-2045
EXON       007212              68-1832    #68-1875     70-1911     74-2053     74-2065
E$END    = 002100             #5-380
E$LOAD   = 000035             #5-380        5-423
FLGLOC     016154  G           84-2451    *103-3059   #103-3098
FM         015142              101-2929    101-2939   #101-2962
FMO        015124              101-2928   #101-2959
FTLNM      003312             #24-785      84-2474
F$AU     = 000015             #5-380       111-3229    111-3252
F$AUTO   = 000020             #5-380       105-3106    105-3120
F$BGN    = 000040             #5-380        5-406       7-433      13-513      14-566      86-2502     96-2720     96-2728     100-2849
                               101-2893    101-2900    101-2968    103-2978    105-3106    107-3143    109-3179    111-3229    114-3314
                               114-3317    114-3319    114-3326    116-3331    116-3333    116-3353    118-3361    118-3363    118-3395
                               120-3401    120-3403    120-3427    122-3432    122-3434    122-3458    124-3463    124-3465    124-3489
                               126-3494    126-3496    126-3520    130-3564    132-3629    132-3640    134-3684    136-3721    136-3723
                               136-3724    136-3724    136-3729    136-3730
F$CLEA   = 000007             #5-380       107-3143    107-3169
F$DU     = 000016             #5-380       109-3179    109-3207
F$END    = 000041             #5-380        5-380       5-380      5-380       5-380       5-380       5-380       5-380       5-380
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SYMBOL CROSS REFERENCE CREF V01

SYMBOL	VALUE		REFERENCES								
			5-380	5-380	5-380	5-380	5-380	5-380	5-380	5-380	5-406
			13-513	14-566	86-2519	96-2724	96-2737	100-2849	101-2893	101-2952	101-2968
			103-3089	105-3120	107-3169	109-3207	111-3252	114-3314	114-3317	114-3317	114-3317
			114-3319	114-3326	114-3326	116-3331	116-3331	116-3331	116-3333	116-3353	116-3353
			118-3361	118-3361	118-3361	118-3363	118-3395	118-3395	120-3401	120-3401	120-3401
			120-3403	120-3427	120-3427	122-3432	122-3432	122-3432	122-3434	122-3458	122-3458
			124-3463	124-3463	124-3463	124-3465	124-3489	124-3489	126-3494	126-3494	126-3494
			126-3496	126-3520	126-3520	130-3564	132-3629	132-3655	134-3700	136-3721	136-3723
			136-3724	136-3729	136-3730						
F$HARD	= 000004		#5-380	132-3640	132-3655						
F$HW	= 000013		#5-380	11-472	11-485						
F$INIT	= 000006		#5-380	103-2978	103-3089						
F$JMP	= 000050		#5-380	114-3319	116-3333	118-3363	120-3403	122-3434	124-3465	126-3496	
F$MOD	= 000000		#5-380	5-406	13-513	14-566	100-2849	101-2893	101-2968	114-3314	130-3564
			132-3629	136-3721							
F$MSG	= 000011		#5-380	86-2502	86-2519						
F$PROT	= 000021		#5-380	7-433	7-437						
F$PWR	= 000017		#5-380								
F$RPT	= 000012		#5-380	101-2900	101-2952						
F$SEG	= 000003		#5-380								
F$SOFT	= 000005		#5-380	134-3684	134-3700						
F$SRV	= 000010		#5-380	96-2720	96-2724	96-2728	96-2737				
F$SUB	= 000002		#5-380								
F$SW	= 000014		#5-380	13-495	13-511						
F$TEST	= 000001		#5-380	114-3317	114-3326	116-3331	116-3353	118-3361	118-3395	120-3401	120-3427
			122-3432	122-3458	124-3463	124-3489	126-3494	126-3520			
GBTMP	010106		*74-2029	*74-2039	*74-2049	74-2050	*74-2069	#74-2075			
GBTMP2	010110		*74-2044	74-2055	74-2057	*74-2064	74-2067	#74-2076			
GETANS	006736	G	58-1592	#66-1798							
GETHRD	015524		103-3001	#103-3005							
GETPTR	007002		#66-1810								
GETR5	016424		109-3183	#109-3208							
GTAGIN	007224		#70-1898	70-1962							
GTBYTE	007662	G	68-1840	68-1860	70-1915	70-1935	70-1946	#74-2029			
GTDOWN	007534		70-1902	70-1906	70-1919	70-1930	70-1934	70-1937	70-1941	70-1948	70-1952
			70-1954	#70-1958							
GTOK	007452		70-1923	#70-1943							
GTPKS1	007004	G	66-1807	#68-1827							
GTPKS8	007214	G	66-1803	#70-1896	70-1965						
GTPTR	007660		*70-1897	70-1898	70-1959	*70-1961	#72-2003				
GTUM	007414		70-1928	#70-1932							
G$CNTO	= 000200		#5-380								
G$DELM	= 000372		#5-380								
G$DISP	= 000003		#5-380								
G$EXCP	= 000400		#5-380								
G$HILI	= 000002		#5-380								
G$LOLI	= 000001		#5-380								
G$NO	= 000000		#5-380								
G$OFFS	= 000400		#5-380	132-3643	132-3644	132-3645	132-3646	132-3647	134-3686	134-3687	134-3688
			134-3689	134-3690	134-3692						
G$OFSI	= 000376		#5-380	132-3643	132-3644	132-3645	132-3646	132-3647	134-3686	134-3687	134-3688
			134-3689	134-3690	134-3692						

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SYMBOL CROSS REFERENCE CREF V01

```
SYMBOL  VALUE              REFERENCES
G$PRMA  = 000001           #5-380      132-3643    132-3644
G$PRMD  = 000002           #5-380      134-3686    134-3692
G$PRML  = 000000           #5-380      132-3645    132-3646    132-3647    134-3687    134-3688    134-3689    134-3690
G$RADA  = 000140           #5-380
G$RADB  = 000000           #5-380
G$RADD  = 000040           #5-380      134-3686    134-3692
G$RADL  = 000120           #5-380      132-3645    132-3646    132-3647    134-3687    134-3688    134-3689    134-3690
G$RADO  = 000020           #5-380      132-3643    132-3644
G$XFER  = 000004           #5-380
G$YES   = 000010           #5-380      132-3643    132-3644    132-3645    132-3646    132-3647    134-3686    134-3687    134-3688
                            134-3689   134-3690    134-3692
HARDR   = 000136  G        #28-879     101-2924    101-2934
HARDW   = 000140  G        #28-880     101-2926    101-2936
HELP    = 000000           #5-365      5-375       5-397       5-415       9-440       9-455       11-479      13-504      #14-518
                            14-556     14-575      30-932      30-938      32-954      32-959      32-967      32-974       32-979
                            32-985     48-1401     48-1413     48-1418     48-1424     48-1429     48-1435     48-1443      48-1450
                            48-1456    48-1462    #101-2855    103-3067    103-3077    107-3150    107-3157    109-3189     109-3195
                            111-3232   111-3238   #112-3258    112-3299    112-3305    130-3565    130-3570    130-3580    #132-3591
                            132-3649   132-3665    134-3693    136-3714
HOE     = 100000  G        #14-573
HRD       012340            84-2475   #84-2483
HRDRD   = 000016  G        #16-599      80-2298
HRDWR   = 000020  G        #16-600      80-2300
HRD1      011164            80-2285   #80-2294
IBE     = 010000  G        #14-573
IDPTR     003316  G        #24-787     *56-1571     56-1572     56-1574    *56-1576
IDU     = 000040  G        #14-573
IER     = 020000  G        #14-573
INIT      015376           #103-2980
INITWD    013754           *94-2648     94-2676     94-2684     94-2691     94-2698     94-2704    #96-2754
INIT2     015420            103-2983  #103-2985
ISR     = 000100  G        #14-573
IXE     = 004000  G        #14-573
I$AU    = 000041           #5-380      #111-3229   #111-3252
I$AUTO  = 000041           #5-380      #105-3106   #105-3120
I$CLN   = 000041           #5-380      #107-3143   #107-3169
I$DU    = 000041           #5-380      #109-3179   #109-3207
I$HRD   = 000041           #132-3640   #132-3655
I$INIT  = 000041           #5-380      #103-2978   #103-3089
I$MOD   = 000041           #5-380       5-406      #5-406       13-513     #13-513      14-566     #14-566      100-2849   #100-2849
                            101-2893  #101-2893     101-2968   #101-2968     114-3314   #114-3314     130-3564   #130-3564     132-3629
                           #132-3629     136-3721  #136-3721
I$MSG   = 000041           #5-380      #86-2502    #86-2519
I$PROT  = 000040           #5-380      #7-433
I$PTAB  = 000041           #5-380       136-3724   #136-3724    136-3729   #136-3729
I$PWR   = 000041           #5-380
I$RPT   = 000041           #5-380      #101-2900   #101-2952
I$SEG   = 000041           #5-380       114-3317    116-3331    118-3361    120-3401    122-3432    124-3463    126-3494
I$SETU  = 000041           #5-380       136-3723   #136-3723    136-3724    136-3730   #136-3730
I$SFT   = 000041           #134-3684   #134-3700
I$SRV   = 000041           #5-380      #96-2720    #96-2724    #96-2728    #96-2737
I$SUB   = 000041           #5-380       114-3317    116-3331    118-3361    120-3401    122-3432    124-3463    126-3494
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SYMBOL CROSS REFERENCE CREF V01

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SYMBOL  VALUE              REFERENCES
I$TST   = 000041           #5-380      114-3317    #114-3317    114-3319    114-3326    #114-3326   #114-3326   116-3331   #116-3331
                            116-3333   116-3353    #116-3353   #116-3353   118-3361    #118-3361    118-3363   118-3395   #118-3395
                           #118-3395   120-3401    #120-3401    120-3403   120-3427    #120-3427   #120-3427   122-3432   #122-3432
                            122-3434   122-3458    #122-3458   #122-3458   124-3463    #124-3463    124-3465   124-3489   #124-3489
                           #124-3489   126-3494    #126-3494    126-3496   126-3520    #126-3520   #126-3520
J$JMP   = 000167           #5-380
LENGTH    002204           #13-497     103-3061
LGOFST  = 000120  G        #28-869      84-2435
LNCNT     014342           *100-2828   *100-2833   #100-2842
LOE     = 040000  G        #14-573
LOG       012046  G         64-1780     74-2073     78-2153     78-2170     78-2179     78-2205     80-2249     80-2272     80-2301
                            82-2408    #84-2427     94-2661     94-2706     96-2750
LOGO      012370            84-2464     84-2482    #84-2490
LOGOK     012134            84-2442    #84-2445
LOGOK2    012220            84-2452     84-2454    #84-2459
LOGO      012122           #84-2443
LOG1      012236           *84-2461    *84-2462    #84-2463    84-2463
LOG2      012266           *84-2468    *84-2469    #84-2470    84-2470
LOG3      012326           *84-2479    *84-2480    #84-2481    84-2481
LOG3B     012350           *84-2483    *84-2484    #84-2485    84-2485
LOT     = 000010  G        #14-573
LSTDEV    003356  G        #30-919      48-1479     50-1509     52-1531     56-1574     60-1627     60-1650     70-1959     76-2104
                            101-2940   103-2994    105-3115
L$ACP     002110  G        #5-423
L$APT     002036  G        #5-423
L$AU      016504  G         5-423      #111-3229
L$AUT     002070  G        #5-423
L$AUTO    016156  G         5-423      #105-3106
L$CCP     002106  G        #5-423
L$CLEA    016340  G         5-423      #107-3143
L$CO      002032  G        #5-423
L$DEPO    002011  G        #5-423
L$DESC    002122  G         5-423      #5-425
L$DESP    002076  G        #5-423
L$DEVP    002060  G        #5-423
L$DISP    002152  G         5-423      #9-453
L$DLY     002116  G        #5-423
L$DTP     002040  G        #5-423
L$DTYP    002034  G        #5-423
L$DU      016360  G         5-423      #109-3179
L$DUT     002072  G        #5-423
L$DVTY    005460  G         5-423      #32-952
L$EF      002052  G        #5-423
L$ENVI    002044  G        #5-423
L$ETP     002102  G        #5-423
L$EXP1    002046  G        #5-423
L$EXP4    002064  G        #5-423
L$EXP5    002066  G        #5-423
L$HARD    036010  G         5-423       132-3640   #132-3640
L$HIME    002120  G        #5-423
L$HPCP    002016  G        #5-423
L$HPTP    002022  G        #5-423
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CNTUUA      CREATED BY  MACRO  ON 15-DEC-82 AT 12:55      PAGE 8
SYMBOL CROSS REFERENCE                                    CREF   V01
SYMBOL  VALUE              REFERENCES
L$HW       002172  G        5-423      11-472     #11-472
L$ICP      002104  G       #5-423
L$INIT     015376  G        5-423    #103-2978
L$LADP     002026  G       #5-423
L$LAST     036560  G        5-423    #136-3720   136-3730
L$LOAD     002100  G       #5-423
L$LUN      002074  G       #5-423    *84-2432   *84-2433   *98-2793   *98-2794   *103-3008
L$MREV     002050  G       #5-423
L$NAME     002000  G       #5-423
L$PRIO     002042  G       #5-423
L$PROT     002142  G        5-423    #7-433
L$PRT      002112  G       #5-423
L$REPP     002062  G       #5-423
L$REV      002010  G       #5-423
L$RPT      014362  G        5-423    #101-2900
L$SOFT     036166  G        5-423     134-3684  #134-3684
L$SPC      002056  G       #5-423
L$SPCP     002020  G       #5-423
L$SPTP     002024  G       #5-423
L$STA      002030  G       #5-423
L$SW       002204  G        5-423      13-495     #13-495
L$TEST     002114  G       #5-423
L$TIML     002014  G       #5-423
L$UNIT     002012  G       #5-423     103-3000   103-3055
L10001     002202            11-472   #11-485
L10002     002220            13-495   #13-511
L10003     012572          #86-2519
L10004     013660          #96-2724
L10005     013714          #96-2737
L10006     015004          #101-2952
L10007     016064          #103-3089
L10010     016262          #105-3120
L10011     016356          #107-3169
L10012     016422          #109-3207
L10013     016504          #111-3252
L10014     016700           114-3319  #114-3326
L10015     017144           116-3333  #116-3353
L10016     020534           118-3363  #118-3395
L10017     021510           120-3403  #120-3427
L10020     022274           122-3434  #122-3458
L10021     023250           124-3465  #124-3489
L10022     024034           126-3496  #126-3520
L10023     036052           132-3640  #132-3655
L10024     036242           134-3684  #134-3700
L10025     036564          #136-3724
L10027     036574           136-3724  #136-3729
MABEE      012300            84-2467  #84-2473
MSAUTO     016320           105-3128  #105-3133
MSBDA      002332  G       #22-723     98-2795
MSCMD      002676  G        20-707    #22-745
MSCOM      002376  G        20-697    #22-727
MSG1       036052           132-3643  #132-3657
```

SYMBOL	VALUE		REFERENCES								
MSG1B	036063		132-3644	#132-3658							
MSG1C	036100		132-3645	#132-3659							
MSG2	036131		132-3646	#132-3660							
MSG3	036146		132-3647	#132-3661							
MSG4	036242		134-3686	#134-3702							
MSG4B	036307		134-3687	#134-3703							
MSG5	036351		134-3688	#134-3704							
MSG6	036403		134-3689	#134-3705							
MSG7	036430		134-3690	#134-3706							
MSG8	036456		134-3692	#134-3707							
MSHCHK	002550	G	20-700	#22-737							
MSHDRD	003146	G	20-698	#22-761							
MSHDWR	003210	G	20-699	#22-763							
MSNIT	002612	G	20-704	#22-739							
MSNLOG	002314	G	20-691	20-695	#22-721						
MSNOMO	002440	G	20-703	#22-729							
MSNOTP	002456	G	20-713	#22-731							
MSNRSP	002756	G	20-711	#22-751							
MSOVRN	003252	G	20-696	#22-765							
MSPART	002626	G	20-705	#22-741							
MSQRSP	002772	G	20-712	#22-753							
MSREC	002712	G	20-708	#22-747							
MSRNIT	002530	G	20-694	#22-735							
MSSELF	002356	G	20-709	#22-725							
MSSFRD	003046	G	20-692	#22-757							
MSSFWR	003106	G	20-693	#22-759							
MSSKER	002300	G	20-701	#22-719							
MSTOSN	003024	G	20-714	#22-755							
MSUNIT	002650	G	20-706	#22-743							
MSWPRO	002506	G	20-702	#22-733							
MSWRSP	002732	G	20-710	#22-749							
MXRTRY	003322	G	#24-789	80-2284							
NCART =	000054	G	#16-614	82-2379							
NODRVS	016116		103-3022	#103-3094							
NOMOR	006340		60-1656	#60-1663							
NOMOT =	000030	G	#16-604	82-2356							
NOUNIT =	000036	G	#16-607	82-2389							
NOXOFF	006430		#62-1707								
NTSFT	012250		84-2460	#84-2466							
NXTRET	006334		60-1626	60-1655	#60-1660						
NXTST	006052	G	58-1588	#60-1617							
NXTST2	006156		60-1628	#60-1632							
ONEFIL =	000001		#2-4	2-8	4-361	5-362	5-401	13-514	14-515	14-528	100-2851
			101-2852	101-2865	111-3254	112-3255	112-3266	131-3586	132-3587	132-3601	
OTL =	000052	G	#16-613	78-2166							
OVRFLO	012746		84-2443	#86-2524							
OVRN =	000012	G	#16-597	78-2169							
O$APTS =	000000		#5-380	5-423							
O$AU =	000001		#5-380	#5-413	5-423						
O$BGNR =	000001		#5-380	#5-413	5-423						
O$BGNS =	000001		#5-380	#5-413	5-423						
O$DU =	000001		#5-380	#5-413	5-423						

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SYMBOL CROSS REFERENCE CREF V01

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SYMBOL  VALUE          REFERENCES
O$ERRT  = 000000       #5-380    5-423
O$GNSW  = 000001       #5-380    #5-413    5-423
O$POIN  = 000001       #5-380    #5-413    #5-413    #5-413    #5-413    #5-413    #5-413    5-413     5-423
O$SETU  = 000001       #5-380    #5-413    5-423     136-3720
PARTL   = 000034  G    #16-606   82-2399
PATTEN  = 000072  G    #26-847   86-2511   98-2786   *103-3047 *118-3369  118-3370  *120-3409 *120-3412 120-3413
                       *122-3440 *122-3443 *124-3471 *124-3474  124-3475  *126-3502 *126-3505
PDTFLG    016152  G    *103-3016 103-3043  #103-3097
PERDEV    006170       #60-1634  60-1653
PKPTR   = 000104  G    #26-853   *62-1718   70-1914   70-1953   *70-1955  *78-2139   98-2778   100-2827
PNT     = 001000  G    #14-573
PRBUF     002210       #13-499   100-2825
PRDAT     014344       *100-2829 100-2830  #100-2843
PRFORM    014346       100-2830  #100-2844
PRI     = 002000  G    #14-573
PRI00   = 000000  G    #14-573   94-2670
PRI01   = 000040  G    #14-573
PRI02   = 000100  G    #14-573
PRI03   = 000140  G    #14-573
PRI04   = 000200  G    #14-573
PRI05   = 000240  G    #14-573
PRI06   = 000300  G    #14-573   94-2671   94-2673   105-3108
PRI07   = 000340  G    #14-573
PRNPAK    014176  G    98-2799   #100-2820
PRNSIZ    003330  G    #24-792   *98-2798  *100-2831
PTR       016454       *109-3208 109-3209  *109-3212 #109-3215
RCBCNT    003310       #24-784   *68-1838  *68-1849  *68-1854  *68-1858  *70-1910  *70-1927  *70-1931  *70-1933
                       *70-1944  *78-2141  78-2148   78-2210
RCBFSZ  = 001036  G    #18-651   54-1549   130-3549  130-3553  130-3554  130-3555  130-3556  130-3557  130-3558
                       130-3559  130-3560
RCDB    = 000024  G    #26-833   74-2033   74-2058   94-2669   96-2731   *103-3039
RCFLG     003306  G    #24-783   *68-1839  68-1845   *70-1908  70-1922   *78-2142
RCINIT  = 000006  G    #16-596   78-2178
RCSR    = 000022  G    #26-832   74-2031   74-2047   94-2693   94-2710   96-2730   *103-3037 105-3113
RCVBUF  = 000102  G    #26-852   54-1548   62-1718   68-1835   78-2133   *103-2992
RCVHND    013662       #96-2730
RCVINT    013662  G    94-2671   #96-2728
RDN0    = 000114  G    #26-857   *62-1736  101-2929
RDN1    = 000116  G    #26-858   *62-1738  101-2939
REC     = 000064  G    #26-843   62-1714   86-2510   *103-3049 *116-3337  116-3339  *118-3368 118-3370  118-3370
                       118-3371  118-3371  *118-3377 118-3378  *118-3381 *118-3382 *120-3406 120-3409  120-3413
                       120-3413  *120-3416 *120-3421 *122-3437  122-3440  122-3444  122-3444  *122-3447 *122-3452
                       *124-3468 124-3471  124-3475  124-3475  *124-3478 *124-3483 *126-3499  126-3502  126-3506
                       126-3506  *126-3509 *126-3514
RECDAT    017130       116-3337  116-3342  #116-3347
RECERR  = 000042  G    #16-609   82-2404
RECID     012654  G    86-2512   #86-2522
RECID2    013030       86-2515   #86-2526
RECOV     011262       80-2261   #80-2312
RETERR    011464       80-2280   #80-2322
RETRY   = 000002  G    #26-824   *80-2255  80-2256   80-2261   *80-2273  *80-2281  80-2284   *80-2286  80-2287
                       *80-2302  *103-3048
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SYMBOL CROSS REFERENCE CREF V01

SYMBOL	VALUE		REFERENCES								
RLUN	015006		*101-2918	*101-2919	101-2928	#101-2953					
RPTR	015010		*101-2909	101-2914	101-2940	*101-2942	#101-2954				
RSCMND	= 000002	G	#18-633	18-639	62-1724	114-3321	116-3339	116-3339	118-3370	118-3370	118-3371
			118-3371	120-3413	120-3413	122-3444	122-3444	124-3475	124-3475	126-3506	126-3506
RSCONT	= 000020	G	#18-634	78-2145	94-2698	118-3370	118-3370	120-3413	120-3413	124-3475	124-3475
RSDASZ	= 000204	G	#18-646	18-648	18-651	68-1854	78-2183	78-2190			
RSDATA	= 000001	G	#18-638	68-1852	70-1929	70-1953	78-2160	78-2181	118-3370	118-3370	118-3371
			118-3371	120-3413	120-3413	122-3444	122-3444	124-3475	124-3475	126-3506	126-3506
RSDNSZ	= 000222	G	#18-648	70-1931							
RSEND	= 000002	G	#18-639	68-1847	70-1925	78-2155	78-2193	114-3321	118-3370	118-3370	118-3371
			118-3371	120-3413	120-3413	122-3444	122-3444	124-3475	124-3475	126-3506	126-3506
RSINIT	= 000004	G	#18-637	78-2175	96-2754						
RSMSIZ	= 000012	G	#18-644	18-650	114-3321	114-3321	116-3339	116-3339	118-3370	118-3370	118-3370
			118-3370	118-3371	118-3371	118-3371	118-3371	120-3413	120-3413	120-3413	120-3413
			122-3444	122-3444	122-3444	122-3444	124-3475	124-3475	124-3475	124-3475	126-3506
			126-3506	126-3506	126-3506						
RSNDSZ	= 000016	G	#18-642	18-648	18-651	68-1849	70-1927	114-3321	116-3339	118-3370	118-3370
			118-3371	118-3371	120-3413	120-3413	122-3444	122-3444	124-3475	124-3475	126-3506
			126-3506								
RSNTAB	002220		#20-691	84-2448							
RSSEND	= 000100	G	#18-657								
RSSNIT	= 000001	G	#18-662	94-2651							
RSSNOP	= 000000	G	#18-661								
RSSNSZ	= 000016	G	#18-650	78-2196	114-3321	116-3339	118-3370	118-3370	118-3371	118-3371	120-3413
			120-3413	122-3444	122-3444	124-3475	124-3475	126-3506	126-3506		
RSSRD	= 000002	G	#18-659	62-1731	82-2347	118-3370	118-3371	118-3371	120-3413	122-3444	122-3444
			124-3475	126-3506	126-3506						
RSSSEK	= 000005	G	#18-660	116-3339							
RSSSLF	= 000007	G	#18-663	82-2364	114-3321						
RSSWR	= 000003	G	#18-658	62-1740	82-2351	118-3370	120-3413	124-3475			
RSVP	006364	G	#62-1699	114-3321	116-3339	118-3370	118-3370	118-3370	118-3371	118-3371	120-3413
			120-3413	120-3413	122-3444	122-3444	124-3475	124-3475	124-3475	126-3506	126-3506
RSXOFF	= 000023	G	#18-636	68-1876	130-3546	130-3547					
RSXON	= 000020	G	#18-635	68-1875							
RTRYN	011422		80-2256	80-2287	#80-2318						
RUN	006022	G	#58-1588	58-1597	114-3318	114-3318	116-3332	116-3332	118-3362	118-3362	120-3402
			120-3402	122-3433	122-3433	124-3464	124-3464	126-3495	126-3495		
SECREC	003326	G	#24-791	*103-3063	*103-3066	120-3421	122-3452	124-3483	126-3514		
SERVST	007656		*66-1801	70-1963	*72-1988	#72-2002					
SETDR	005602	G	#50-1503	114-3318	116-3332	118-3362	120-3402	122-3433	124-3464	126-3495	
SETLEN	016026		#103-3061								
SETPTR	005656		*50-1503	50-1504	50-1509	*50-1511	#50-1514				
SETSRV	007572		70-1901	70-1905	#72-1978						
SETUP	005754	G	#56-1570	114-3318	114-3318	116-3332	116-3332	118-3362	118-3362	120-3402	120-3402
			122-3433	122-3433	124-3464	124-3464	126-3495	126-3495			
SFPTBL	002204	G	#13-495								
SFT	012316		84-2476	#84-2479							
SFTOUT	036242		#134-3700								
SFTRD	= 000002	G	#16-594	80-2269							
SFTWR	= 000004	G	#16-595	80-2271							
SKERR	= 000024	G	#16-602	82-2374							
SLFER	= 000044	G	#16-610	82-2369							

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CNTUUA      CREATED BY  MACRO  ON 15-DEC-82 AT 12:55        PAGE 12
SYMBOL CROSS REFERENCE                                      CREF   V01
SYMBOL  VALUE             REFERENCES
SND        006434           62-1706    #62-1708     62-1712
SNDBYT     006666   G       62-1708    #64-1769     68-1833     70-1913     70-1957     74-2046     74-2054     74-2066
SNDCNT   = 000070   G      #26-846     *62-1705    *62-1711    *114-3321   *116-3339   *118-3370   *118-3370   *118-3370   *118-3370
                           *118-3371   *118-3371   *120-3413   *120-3413   *120-3413   *120-3413   *122-3444   *122-3444   *124-3475
                           *124-3475   *124-3475   *124-3475   *126-3506   *126-3506
SNDHND     013646          #96-2722
SNDINT     013646   G       94-2673    #96-2720
SOFTR    = 000122   G      #28-870      101-2920    101-2930
SOFTW    = 000124   G      #28-871      101-2922    101-2932
SRVTBL     007636           72-1982    #72-1993
STAEOP     002206          #13-498      107-3146
STATHD     015012           101-2910   #101-2956
STATUS   = 000000   G      #26-823
STHD2      015266           101-2912   #101-2965
STRT       016150   G      *103-2981   *103-2984    103-3025   #103-3096
SUCCS    = 000076   G      #26-849     *62-1716     80-2243     80-2259    *82-2341     86-2512    *103-3050
SUCOTL   = 000046   G      #16-611      82-2407
SVCGBL   = 000000          #5-380      #5-389       5-423       5-423       5-423       5-423       5-423       5-423       5-423
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                            5-423       5-423       5-423       5-423       5-423       5-423       5-423       5-423       5-425
                            5-425       5-425       7-433       7-433       7-433       9-453       9-453       9-453       11-472
                            11-472      11-472      11-472      11-472      11-472      13-495      13-495      13-495      13-495
                            13-495      13-495      32-952      32-952      32-952      86-2502     86-2502     86-2502     96-2720
                            96-2720     96-2720     96-2728     96-2728     96-2728     101-2900    101-2900    101-2900    103-2978
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                            109-3179    109-3179    111-3229    111-3229    111-3229    132-3640    132-3640    132-3640    134-3684
                            134-3684    134-3684   #136-3720    136-3720    136-3720    136-3720
SVCINS   = 177777          #5-380      #5-386       5-423       5-423       5-423       5-423       5-423       5-423       5-423
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                            58-1594     60-1656     60-1656     60-1656     60-1656     60-1657     60-1659     64-1774     74-2052
                            80-2256     80-2256     80-2256     80-2256     80-2256     80-2256     80-2261     80-2261     80-2261
                            80-2261     80-2261     80-2261     80-2264     80-2264     80-2264     80-2264     80-2264     80-2266
                            80-2266     80-2266     80-2266     80-2266     80-2280     80-2280     80-2280     80-2280     80-2280
                            80-2287     80-2287     80-2287     80-2287     80-2287     80-2287     80-2295     80-2295     80-2295
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SYMBOL CROSS REFERENCE CREF V01

SYMBOL VALUE REFERENCES

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                    86-2509   86-2509   86-2509   86-2509   86-2509   86-2509   86-2509   86-2509   86-2509
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                    94-2711   94-2713   94-2713   96-2724   96-2737   96-2745   96-2746   98-2795   98-2795
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SVCSUB  = 177777    #5-380    #5-388
SVCTAG  = 177777    #5-380    #5-390    11-485    11-485    11-485    13-511    13-511    13-511    86-2519
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SVCTST  = 177777    #5-380    #5-387    114-3317  114-3317  114-3317  116-3331  116-3331  116-3331  118-3361
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                    124-3463  124-3463  126-3494  126-3494  126-3494
SWAPDR    005500 G  #48-1468  114-3318  116-3332  118-3362  120-3402  122-3433  124-3464  126-3495
SWPTR     005600    *48-1469  48-1470   48-1479   *48-1481  #48-1489
SYSTAT    003300 G  #24-772   *60-1623  66-1799   *68-1844  *70-1921  76-2093   *78-2140  80-2236   *80-2305
                    86-2509   *90-2561  *90-2564  90-2575   *94-2704  *103-3058
S$LSYM  = 010000    #5-380    #11-485   #13-511   #86-2519  #96-2724  #96-2737  #101-2952 #103-3089 #105-3120
                    #107-3169 #109-3207 #111-3252 #114-3326 #116-3353 #118-3395 #120-3427 #122-3458 #124-3489
                    #126-3520 #132-3655 #134-3700
TAPLEN    003302 G  #24-781   *103-3061 *103-3062 103-3064  120-3407  120-3422  122-3438  122-3453  124-3469
                    124-3484  126-3500  126-3515
THRSHI    011370    80-2266   #80-2316
THRSLO    011342    80-2264   #80-2314
TMP     = 000066 G  #26-845   *118-3366 118-3382  *118-3383 *120-3407 *120-3414 *120-3422 *122-3438 *122-3445
                    *122-3453 *124-3469 *124-3476 *124-3484 *126-3500 *126-3507 *126-3515
```

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SYMBOL CROSS REFERENCE CREF V01

SYMBOL VALUE REFERENCES

TOMANY 016066 103-3002 #103-3092
TORCVB = 000050 G #16-612 74-2072 96-2749
TOSNDB = 000056 G #16-615 64-1779 94-2660
TRBUF 024370 62-1704 62-1707 62-1713 114-3321 116-3339 118-3370 118-3370 118-3370 118-3370
118-3371 118-3371 120-3413 120-3413 120-3413 120-3413 122-3444 122-3444 124-3475
124-3475 124-3475 124-3475 126-3506 126-3506 #130-3549
TRK = 000062 G #26-842 *120-3408 120-3418 *120-3420 *122-3439 122-3449 *122-3451 *124-3470 124-3480
*124-3482 *126-3501 126-3511 *126-3513
TRPHND 016266 105-3108 #105-3128
TRPPTR 016264 *105-3109 105-3110 105-3115 *105-3117 #105-3121
TSTPC = 000020 G #26-831 *56-1573 60-1625 60-1646 *62-1700
TSTTOP 003320 #24-788 56-1573 *114-3318 *116-3332 *118-3362 *120-3402 *122-3433 *124-3464 *126-3495
TST1 016552 114-3318 #114-3321
TST2 016746 116-3332 #116-3336
TST3 017212 118-3362 #118-3366
TST3PT 020522 118-3369 118-3373 #118-3388
TST4 020602 120-3402 #120-3406
TST4EX 021502 120-3419 #120-3424
TST5 021556 122-3433 #122-3437
TST5EX 022266 122-3450 #122-3455
TST6 022342 124-3464 #124-3468
TST6EX 023242 124-3481 #124-3486
TST7 023316 126-3495 #126-3499
TST7EX 024026 126-3512 #126-3517
TUVECT = 000204 G #28-900 94-2671 *94-2672 94-2673 *94-2674 94-2711 *94-2712 94-2713 *94-2714
*103-3013
T$ARGC = 000002 #5-423 5-423 #5-423 5-423 5-423 #5-423 5-423 5-423 #5-423
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#80-2264 80-2264 80-2264 #80-2266 80-2266 80-2266 #80-2280 80-2280 80-2280
#80-2287 80-2287 #80-2287 80-2287 80-2287 #80-2295 80-2295 80-2295 #86-2509
86-2509 #86-2509 86-2509 #86-2509 86-2509 #86-2509 86-2509 86-2509 #86-2512
86-2512 #86-2512 86-2512 #86-2512 86-2512 #86-2512 86-2512 #86-2512 86-2512
86-2512 #86-2515 86-2515 #86-2515 86-2515 86-2515 #98-2796 98-2796 #98-2796
98-2796 98-2796 #100-2830 100-2830 #100-2830 100-2830 100-2830 #100-2835 100-2835
100-2835 #100-2837 100-2837 100-2837 #101-2910 101-2910 101-2910 #101-2912 101-2912
101-2912 #101-2928 101-2928 #101-2928 101-2928 101-2928 #101-2929 101-2929 #101-2929
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105-3128 105-3128 #109-3187 109-3187 #109-3187 109-3187 109-3187
T$CODE = 005052 #132-3643 132-3643 #132-3643 132-3643 #132-3643 132-3643 #132-3644 132-3644 #132-3644
132-3644 #132-3644 132-3644 #132-3645 132-3645 #132-3645 132-3645 #132-3645 132-3645
#132-3646 132-3646 #132-3646 132-3646 #132-3646 132-3646 #132-3647 132-3647 #132-3647
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#134-3687 134-3687 #134-3687 134-3687 #134-3687 134-3687 #134-3688 134-3688 #134-3688
134-3688 #134-3688 134-3688 #134-3689 134-3689 #134-3689 134-3689 #134-3689 134-3689
#134-3690 134-3690 #134-3690 134-3690 #134-3690 134-3690 #134-3692 134-3692 #134-3692
134-3692 #134-3692 134-3692
T$ERRN = 000146 #5-380 #60-1656 60-1656 #84-2443 84-2443 #84-2457 84-2457 #84-2463 84-2463
#84-2470 84-2470 #84-2481 84-2481 #84-2485 84-2485 #98-2795 98-2795 #103-3002

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SYMBOL CROSS REFERENCE CREF V01

SYMBOL	VALUE	REFERENCES
		103-3002 #103-3022 103-3022
T$EXCP	= 000000	#132-3643 132-3643 #132-3644 132-3644 #134-3686 134-3686 #134-3692 134-3692
T$FLAG	= 000040	#114-3319 #114-3319 114-3319 114-3319 #116-3333 #116-3333 116-3333 116-3333 #118-3363
		#118-3363 118-3363 118-3363 #120-3403 #120-3403 120-3403 120-3403 #122-3434 #122-3434
		122-3434 122-3434 #124-3465 #124-3465 124-3465 124-3465 #126-3496 #126-3496 126-3496
		126-3496
T$FREE	= 036574	136-3720 #136-3730
T$GMAN	= 000000	#5-380
T$HILI	= 000376	#132-3643 132-3643 #132-3644 132-3644 #134-3686 134-3686 #134-3692 134-3692
T$LAST	= 000001	#5-380 #136-3720 136-3723
T$LOLI	= 000001	#132-3643 132-3643 #132-3644 132-3644 #134-3686 134-3686 #134-3692 134-3692
T$LSYM	= 010000	#5-380 5-380 11-485 13-511 86-2519 96-2724 96-2737 101-2952 103-3089
		105-3120 107-3169 109-3207 111-3252 114-3326 116-3353 118-3395 120-3427 122-3458
		124-3489 126-3520 132-3655 134-3700
T$LTNO	= 000007	#136-3720
T$NEST	= 177777	#5-380 5-406 #5-406 5-406 7-433 #7-433 7-433 7-437 7-437
		7-437 #7-437 11-472 #11-472 11-472 11-485 11-485 11-485 #11-485
		13-495 #13-495 13-495 13-511 13-511 13-511 #13-511 13-513 13-513
		13-513 #13-513 14-566 #14-566 14-566 86-2502 #86-2502 86-2502 86-2519
		86-2519 86-2519 #86-2519 96-2720 #96-2720 96-2720 96-2724 96-2724 96-2724
		#96-2724 96-2728 #96-2728 96-2728 96-2737 96-2737 96-2737 #96-2737 100-2849
		100-2849 100-2849 #100-2849 101-2893 #101-2893 101-2893 101-2900 #101-2900 101-2900
		101-2952 101-2952 101-2952 #101-2952 101-2968 101-2968 101-2968 #101-2968 103-2978
		#103-2978 103-2978 103-3089 103-3089 103-3089 #103-3089 105-3106 #105-3106 105-3106
		105-3120 105-3120 105-3120 #105-3120 107-3143 #107-3143 107-3143 107-3169 107-3169
		107-3169 #107-3169 109-3179 #109-3179 109-3179 109-3207 109-3207 109-3207 #109-3207
		111-3229 #111-3229 111-3229 111-3252 111-3252 111-3252 #111-3252 114-3314 #114-3314
		114-3314 114-3317 #114-3317 114-3317 114-3326 114-3326 114-3326 #114-3326 116-3331
		#116-3331 116-3331 116-3353 116-3353 116-3353 #116-3353 118-3361 #118-3361 118-3361
		118-3395 118-3395 118-3395 #118-3395 120-3401 #120-3401 120-3401 120-3427 120-3427
		120-3427 #120-3427 122-3432 #122-3432 122-3432 122-3458 122-3458 122-3458 #122-3458
		124-3463 #124-3463 124-3463 124-3489 124-3489 124-3489 #124-3489 126-3494 #126-3494
		126-3494 126-3520 126-3520 126-3520 #126-3520 130-3564 130-3564 130-3564 #130-3564
		132-3629 #132-3629 132-3629 132-3640 #132-3640 132-3640 132-3655 132-3655 132-3655
		#132-3655 134-3684 #134-3684 134-3684 134-3700 134-3700 134-3700 #134-3700 136-3721
		136-3721 136-3721 #136-3721
T$NS0	= 000000	#5-406 13-513 #14-566 100-2849 #101-2893 101-2968 #103-2978 103-3089 #105-3106
		105-3120 #107-3143 107-3169 #109-3179 109-3207 #111-3229 111-3252 #114-3314 130-3564
		#132-3629 136-3721
T$NS1	= 000005	#7-433 7-437 #11-472 11-485 #13-495 13-511 #86-2502 86-2519 #96-2720
		96-2724 #96-2728 96-2737 #101-2900 101-2952 #114-3317 114-3326 #116-3331 116-3353
		#118-3361 118-3395 #120-3401 120-3427 #122-3432 122-3458 #124-3463 124-3489 #126-3494
		126-3520 #132-3640 132-3655 #134-3684 134-3700
T$PCNT	= 000000	#136-3723 136-3724 #136-3724 136-3724
T$PTAB	= 010026	#136-3724 136-3724
T$PTHV	= 000001	5-423 #136-3730
T$PTNU	= 000001	#5-380 136-3724 #136-3724 136-3730 136-3730
T$SAVL	= 177777	#5-380
T$SEGL	= 177777	#5-380
T$SIZE	= 000006	136-3720 #136-3730
T$SUBN	= 000000	#5-380 #114-3317 #116-3331 #118-3361 #120-3401 #122-3432 #124-3463 #126-3494
T$TAGL	= 177777	#5-380

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SYMBOL CROSS REFERENCE CREF V01

SYMBOL	VALUE	REFERENCES								
T$TAGN	= 010030	#5-380	7-433	7-433	#7-433	11-472	11-472	#11-472	13-495	13-495
		#13-495	86-2502	86-2502	#86-2502	96-2720	96-2720	#96-2720	96-2728	96-2728
		#96-2728	101-2900	101-2900	#101-2900	103-2978	103-2978	#103-2978	105-3106	105-3106
		#105-3106	107-3143	107-3143	#107-3143	109-3179	109-3179	#109-3179	111-3229	111-3229
		#111-3229	114-3317	114-3317	#114-3317	116-3331	116-3331	#116-3331	118-3361	118-3361
		#118-3361	120-3401	120-3401	#120-3401	122-3432	122-3432	#122-3432	124-3463	124-3463
		#124-3463	126-3494	126-3494	#126-3494	132-3640	132-3640	#132-3640	134-3684	134-3684
		#134-3684	136-3723	136-3723	#136-3723	136-3724	136-3724	#136-3724	136-3724	136-3724
		#136-3724								
T$TEMP	= 000000	#7-437	7-437	#9-453	9-453	9-453	#9-453	9-453	9-453	#9-453
		9-453	9-453	#9-453	9-453	9-453	#9-453	9-453	9-453	#9-453
		9-453	9-453	#9-453	9-453	9-453	#9-453	#11-485	11-485	#13-511
		13-511	#13-513	13-513	#86-2519	86-2519	#96-2724	96-2724	#96-2737	96-2737
		#100-2849	100-2849	#101-2952	101-2952	#101-2968	101-2968	#103-3089	103-3089	#105-3120
		105-3120	#107-3169	107-3169	#109-3207	109-3207	#111-3252	111-3252	#114-3319	114-3319
		#114-3326	114-3326	#116-3333	116-3333	#116-3353	116-3353	#118-3363	118-3363	#118-3395
		118-3395	#120-3403	120-3403	#120-3427	120-3427	#122-3434	122-3434	#122-3458	122-3458
		#124-3465	124-3465	#124-3489	124-3489	#126-3496	126-3496	#126-3520	126-3520	#130-3564
		130-3564	#132-3643	132-3643	#132-3643	132-3643	#132-3643	132-3643	#132-3644	132-3644
		#132-3644	132-3644	#132-3644	132-3644	#132-3645	132-3645	#132-3645	132-3645	#132-3645
		132-3645	#132-3646	132-3646	#132-3646	132-3646	#132-3646	132-3646	#132-3647	132-3647
		#132-3647	132-3647	#132-3647	132-3647	#132-3655	132-3655	#134-3686	134-3686	#134-3686
		134-3686	#134-3686	134-3686	#134-3687	134-3687	#134-3687	134-3687	#134-3687	134-3687
		#134-3688	134-3688	#134-3688	134-3688	#134-3688	134-3688	#134-3689	134-3689	#134-3689
		134-3689	#134-3689	134-3689	#134-3690	134-3690	#134-3690	134-3690	#134-3690	134-3690
		#134-3692	134-3692	#134-3692	134-3692	#134-3692	134-3692	#134-3700	134-3700	#136-3721
		136-3721								
T$TEST	= 000007	#5-380	114-3317	#114-3317	114-3317	116-3331	#116-3331	116-3331	118-3361	#118-3361
		118-3361	120-3401	#120-3401	120-3401	122-3432	#122-3432	122-3432	124-3463	#124-3463
		124-3463	126-3494	#126-3494	126-3494	136-3720				
T$TSTM	= 177777	#5-380	58-1594	60-1656	60-1657	60-1659	64-1774	74-2052	80-2256	80-2261
		80-2264	80-2266	80-2280	80-2287	80-2295	84-2443	84-2457	84-2463	84-2470
		84-2481	84-2485	84-2489	86-2509	86-2512	86-2515	86-2519	94-2654	94-2670
		94-2671	94-2673	94-2711	94-2713	96-2745	96-2746	98-2795	98-2796	100-2830
		100-2835	100-2837	101-2908	101-2910	101-2911	101-2912	101-2913	101-2928	101-2929
		101-2939	101-2952	103-2982	103-3002	103-3003	103-3009	103-3022	103-3023	103-3059
		103-3089	105-3108	105-3119	105-3120	105-3128	105-3131	107-3148	107-3169	109-3187
		109-3207	111-3252	114-3319	114-3326	116-3333	116-3353	118-3363	118-3395	120-3403
		120-3427	122-3434	122-3458	124-3465	124-3489	126-3496	126-3520		
T$TSTS	= 000001	#5-380	#114-3317	#116-3331	#118-3361	#120-3401	#122-3432	#124-3463	#126-3494	
T$$AU	= 010013	#111-3229	111-3252							
T$$AUT	= 010010	#105-3106	105-3120							
T$$CLE	= 010011	#107-3143	107-3169							
T$$DAT	= 010027	#136-3724	136-3724	136-3729						
T$$DU	= 010012	#109-3179	109-3207							
T$$HAR	= 010023	#132-3640	132-3640	132-3655						
T$$HW	= 010001	#11-472	11-472	11-485						
T$$INI	= 010007	#103-2978	103-3089							
T$$MSG	= 010003	#86-2502	86-2519							
T$$PC	= 000001	#136-3723	136-3730							
T$$PRO	= 010000	#7-433								
T$$PTA	= 010026	#136-3723	136-3724	#136-3724						

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CNTUUA     CREATED BY  MACRO  ON 15-DEC-82 AT 12:55     PAGE 17
SYMBOL CROSS REFERENCE                                  CREF   V01

SYMBOL   VALUE                REFERENCES
T$$RPT   = 010006             #101-2900   101-2952
T$$SOF   = 010024             #134-3684   134-3684   134-3700
T$$SRV   = 010005             #96-2720    96-2724    #96-2726    96-2737
T$$SW    = 010002             #13-495     13-495     13-511
T$$TES   = 010022             #114-3317   114-3319   114-3326   #116-3331   116-3333   116-3353   #118-3361   118-3363   118-3395
                              #120-3401   120-3403   120-3427   #122-3432   122-3434   122-3458   #124-3463   124-3465   124-3489
                              #126-3494   126-3496   126-3520
T1         016506   G         9-453      #114-3317
T1TRY    = 000146   G        #28-883
T2         016702   G         9-453      #116-3331
T3         017146   G         9-453      #118-3361
T4         020536   G         9-453      #120-3401
T4TRY    = 000132   G        #28-877
T5         021512   G         9-453      #122-3432
T6         022276   G         9-453      #124-3463
T7         023252   G         9-453      #126-3494
UAM      = 000200   G        #14-573
UNIT       012574   G         86-2509    #86-2520
UNREC      011442             80-2295    #80-2320
UNSUC      011040             80-2260    #80-2277
UNXPCT     007356            #70-1924
WAIT       013716             94-2679     94-2687    94-2694    #96-2741    96-2748
WHCHDR     013052   G         62-1734     62-1748    84-2438    #88-2538
WRLOCK   = 000026   G        #16-603      82-2394    84-2466
WRTN0    = 000110   G        #26-855     *62-1750    101-2929    103-3029    103-3031
WRTN1    = 000112   G        #26-856     *62-1753    101-2939
XFNSND     006416            #62-1704
XMDB     = 000030   G        #26-835      64-1782    94-2663     96-2723    *103-3046
XMSR     = 000026   G        #26-834      64-1771    94-2650     94-2656     94-2668    94-2678    94-2686    94-2709    96-2722
                             *103-3041
XSCNT    = 000036   G        #26-838     *114-3321  *116-3339  *118-3370  *118-3370  *118-3370  *120-3413  *120-3413  *120-3413
                             *124-3475   *124-3475  *124-3475
XSFLG    = 000034   G        #26-837      62-1719    68-1828    78-2135    *114-3321  *116-3339  *118-3370  *118-3370  *118-3370
                              118-3370    118-3371   118-3371  *120-3413  *120-3413  *120-3413   120-3413   122-3444   122-3444
                             *124-3475   *124-3475  *124-3475   124-3475   126-3506   126-3506
XSPKNM   = 000032   G        #26-836      62-1715   *62-1715    68-1836    70-1903   *70-1907   *70-1918   *70-1924   *70-1940
                             *70-1951     78-2134   *114-3321  *116-3339  *118-3370  *118-3370  *118-3370  *118-3370  *118-3371
                             *118-3371   *120-3413  *120-3413  *120-3413  *120-3413  *122-3444  *122-3444  *124-3475  *124-3475
                             *124-3475   *124-3475  *126-3506  *126-3506
XSPTR    = 000106   G        #26-854     *62-1721    70-1908   *70-1909    70-1910   *70-1958
X$ALWA   = 000000            #5-380
X$FALS   = 000040            #5-380
X$OFFS   = 000400            #5-380
X$TRUE   = 000020            #5-380
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MACRO CROSS REFERENCE CREF V01

MACRO NAME	REFERENCES									
BGNAU	111-3229									
BGNAUT	105-3106									
BGNCLN	107-3143									
BGNDU	109-3179									
BGNHRD	132-3640									
BGNHW	11-472									
BGNINI	103-2978									
BGNMOD	5-406	14-566	101-2893	114-3314	132-3629					
BGNMSG	86-2502									
BGNPRO	7-433									
BGNPTA	136-3724									
BGNRPT	101-2900									
BGNSET	136-3723									
BGNSFT	134-3684									
BGNSRV	96-2720	96-2728								
BGNSW	13-495									
BGNTST	114-3317	116-3331	118-3361	120-3401	122-3432	124-3463	126-3494			
BNCOMP	103-2983	103-3010								
BREAK	58-1594	60-1657	64-1774	74-2052	94-2654	96-2745	96-2746	101-2908	101-2911	101-2913
CLRVEC	94-2711	94-2713	105-3119							
DESCRI	5-425									
DEVTYP	32-952									
DISPAT	9-453									
DOCLN	60-1659	103-3003	103-3023							
DODU	84-2489	105-3131								
DORPT	107-3148									
ENDAU	111-3252									
ENDAUT	105-3120									
ENDCLN	107-3169									
ENDDU	109-3207									
ENDHRD	132-3655									
ENDHW	11-485									
ENDINI	103-3089									
ENDMOD	13-513	100-2849	101-2968	130-3564	136-3721					
ENDMSG	86-2519									
ENDPRO	7-437									
ENDPTA	136-3729									
ENDRPT	101-2952									
ENDSET	136-3730									
ENDSFT	134-3700									
ENDSRV	96-2724	96-2737								
ENDSW	13-511									
ENDTST	114-3326	116-3353	118-3395	120-3427	122-3458	124-3489	126-3520			
EQUALS	14-573									
ERRDF	84-2443	84-2457								
ERRHRD	84-2470	84-2485								
ERRSF	60-1656	103-3002	103-3022							
ERRSOF	84-2463	84-2481	98-2795							
EXIT	114-3319	116-3333	118-3363	120-3403	122-3434	124-3465	126-3496			
GPHARD	103-3009									
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