TU58 TU58 PERF EXERCISER AH-E649C-MC APR 1982
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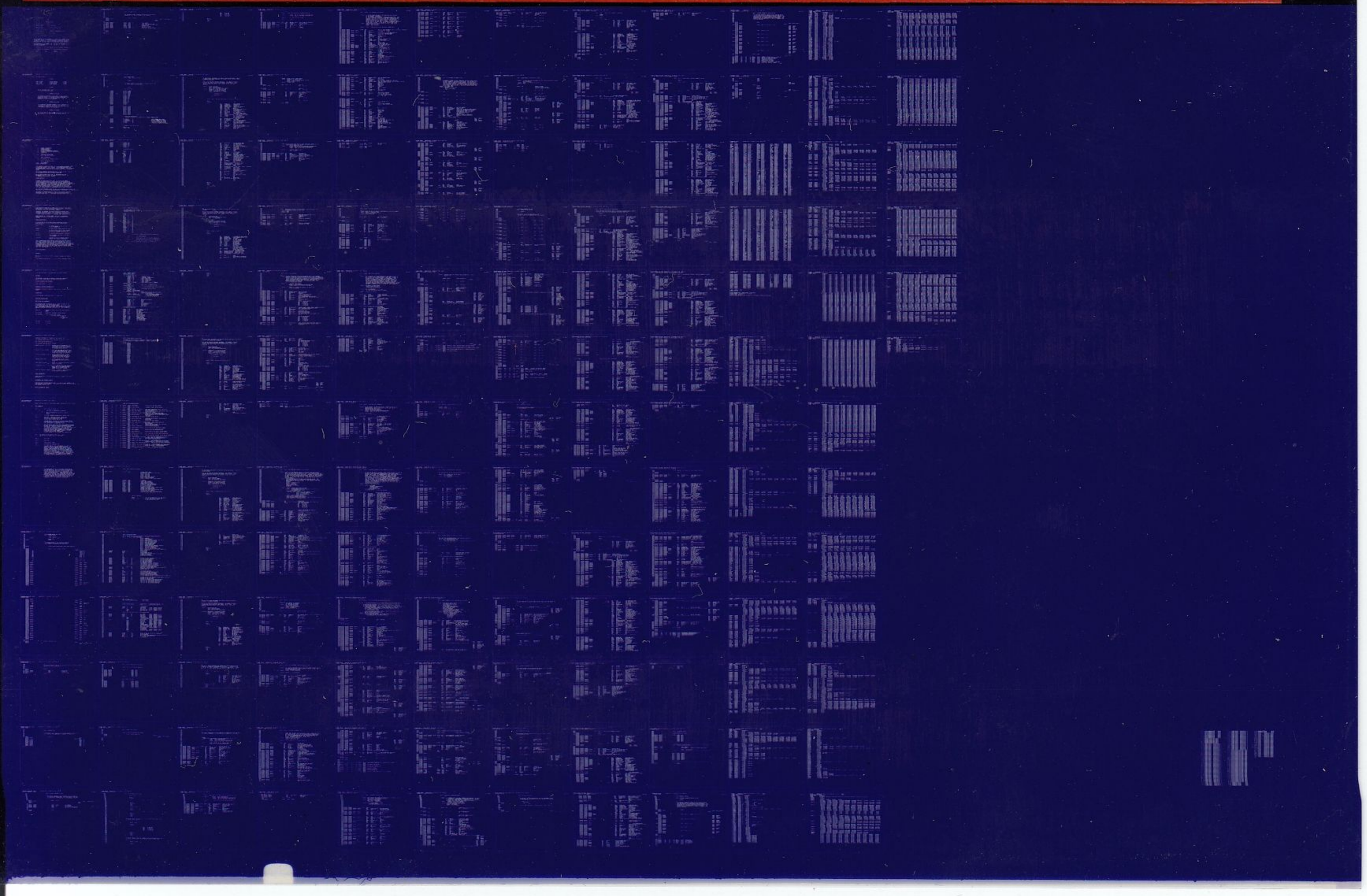
MADE IN USA



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IDENTIFICATION

PRODUCT CODE:	AC-E648C-MC
PRODUCT NAME:	CZTUUC0 TU58 PERF EXER
PRODUCT DATE:	SEPT 1981
MAINTAINER:	DIAGNOSTIC ENGINEERING GROUP
AUTHOR:	R. J. ROSS

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.SBTTL  REVISION HISTORY
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HISTORY

JUNE 18,1979	INITIAL RELEASE	CZTUUA0
JULY 1,1979	SECOND RELEASE	CZTUUB0
JUNE 1,1980	THIRD RELEASE	CZTUUB1
OCTOBER 1,1981	FOURTH RELEASE	CZTUUC0

CZTUUA0

1. INITIAL REALEASE--PERF. EXER. FOR UP TO 8 TU58 CONTROLLERS WITH ONE OR TWO DRIVES EACH.

CHANGES TO CZTUUA0

1. THE PROGRAM WAS MODIFIED TO RUN UNDER THE NEW DIAGNOSTIC SUPERVISOR CHSAA0. AS A RESULT OF THIS CONVERSION, THIS PROGRAM NOW OPERATES IN 8K AND PAPERTAPE DISTRIBUTION REQUIRES ONLY ONE PART AK-E650B-MC.

CHANGES TO CZTUUB0

1. "CLR @ XMSR(R5)" HAS BEEN CHANGED TO "DEC @ XMSR(R5)" TO ALLEVIATE THE PROBLEM OF DESTROYING ANY PREVIOUSLY SET PROGRAMMABLE SPEED IN THE DLV11-E,F, OR DC319 DLART WHEN THE TU58 INIT SEQUENCE WAS TERMINATED.

CHANGES TO CZTUUB1

1. TEST 8 WAS ADDED TO THE DIAGNOSTICS BECAUSE THE TU58 HAS BEEN UPDATED TO USE MODIFIED RADIAL SERIAL PROTOCOL.

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TABLE OF CONTENTS

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 IMPLEMENTS 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 IMPLEMENT THE COMMUNICATIONS PROTOCOL SIMPLIFIES CONTEXT SWITCHING FROM UNIT TO UNIT BY NOT REQUIRING 8 SEPARATE DEVICE STACKS IN ADDITION TO THE SYSTEM STACK. THE TEST CODE RUNS AS A CO-ROUTINE WITH THE SCHEDULER,SO A TEST CODE PROGRAM COUNTER IS MAINTAINED FOR EACH UNIT "TSTPC(R5)".

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 SCHED-

ULING 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, CALLED "UNIT'S DATA BLOCK". "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

PDP-11/LSI-11 CPU WITH AT LEAST 16K WORDS OF MEMORY AND CONSOLE DEVICE.

TU58 CONTROLLER AND DRIVE(S). DL, DLV, OR PDT COMPATABLE INTER-

FACE; AND REVISION "I" TU58 MICROCODE (OR LATER) ASSUMED.

1.2.2 SOFTWARE

THE PROGRAM IS REVISION D 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 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.

PRINT UNIT PROTOCOL SUMMARY (TEST 8) -- PRINTS A TABLE INDICATING THE PROTOCOL OF EACH UNIT.

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

TEST 8: THE FIRST PART OF TEST 8 DETERMINES IF A UNIT IS CAPABLE OF MODIFIED RADIAL SERIAL PROTOCOL. THIS PART OF THE TEST IS WRITTEN USING RADIAL SERIAL PROTOCOL, AND DETERMINES THE PROTOCOL OF A UNIT BY SENDING THE TU58 A GET CHARACTERISTICS COMMAND AND MONITORING THE RESPONSE. IF THE TU58 RETURNS AN END PACKET IT IS A MODIFIED UNIT. IF THE TU58 RETURNS A DATA PACKET IT IS A NON-MODIFIED UNIT. NOTE, THE DATA PACKET RETURNED ON A GET CHARACTERISTICS COMMAND IS NOT NORMAL, RATHER IT CONSISTS OF A DATA PACKET THAT IS 28. BYTES PLUS AN END PACKET WHICH IS 14. BYTES.

THE SECOND PART OF TEST 8 TESTS ONLY THOUGHS UNITS
THAT ARE MODIFIED. THIS IS ACHIEVED BY LETTING NON-
MODIFIED UNITS JUMP OVER CODE. IT WAS ASSUMED THAT IF
A UNIT CAN READ,WRITE,ETC... WHEN OPERATING IN RSP,
THEN IT CAN READ,WRITE,ETC... WHEN OPERATING IN MRSP.
THEREFORE ALL THAT HAD TO BE TESTED WAS THE ABILITY OF
MODIFIED UNIT TO BE ABLE TO SEND ONE BYTE AND WAIT FOR
A CONTINUE FROM THE HOST BEFORE SENDING THE NEXT BYTE.
A PROTOCOL SUMMARY OF THE UNITS IS ADVAILABLE BY AN-
SWERING YES (Y) TO SOFTWARE (SW) QUESTION # 5.

&

```
                                .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  CZTUU,C,0,3600.,1,PRI07
002000                                                          L$NAME::
002000  103                                                             .ASCII /C/
002001  132                                                             .ASCII /Z/
002002  124                                                             .ASCII /T/
002003  125                                                             .ASCII /U/
002004  125                                                             .ASCII /U/
002005  000                                                             .BYTE   0
002006  000                                                             .BYTE   0
002007  000                                                             .BYTE   0
002010                                                          L$REV::
002010  103                                                             .ASCII  /C/
002011                                                          L$DEPO::
002011  060                                                             .ASCII  /0/
002012                                                          L$UNIT::
002012  000001                                                          .WORD   T$PTHV
002014                                                          L$TIML::
002014  007020                                                          .WORD   3600.
002016                                                          L$HPCP::
002016  037614                                                          .WORD   L$HARD
002020                                                          L$SPCP::
002020  037756                                                          .WORD   L$SOFT
002022                                                          L$HPTP::
002022  002174                                                          .WORD   L$HW
002024                                                          L$SPTP::
002024  002206                                                          .WORD   L$SW
002026                                                          L$LADP::
002026  040422                                                          .WORD   L$LAST
002030                                                          L$STA::
002030  000000                                                          .WORD   0
002032                                                          L$CO::
002032  000000                                                          .WORD   0
002034                                                          L$DTYP::
002034  000001                                                          .WORD   1
002036                                                          L$APT::
002036  000000                                                          .WORD   0
002040                                                          L$DTP::
002040  002152                                                          .WORD   L$DISPATCH
002042                                                          L$PRIO::
002042  000340                                                          .WORD   PRI07
002044                                                          L$ENVI::
```

```
002044  000000                                          .WORD   0
002046                                          L$EXP1::
002046  000000                                          .WORD   0
002050                                          L$MREV::
002050     003                                          .BYTE   C$REVISION
002051     003                                          .BYTE   C$EDIT
002052                                          L$EF::
002052  000000                                          .WORD   0
002054  000000                                          .WORD   0
002056                                          L$SPC::
002056  000000                                          .WORD   0
002060                                          L$DEVP::
002060  005506                                          .WORD   L$DVTYP
002062                                          L$REPP::
002062  015014                                          .WORD   L$RPT
002064                                          L$EXP4::
002064  000000                                          .WORD   0
002066                                          L$EXP5::
002066  000000                                          .WORD   0
002070                                          L$AUT::
002070  017146                                          .WORD   L$AU
002072                                          L$DUT::
002072  017022                                          .WORD   L$DU
002074                                          L$LUN::
002074  000000                                          .WORD   0
002076                                          L$DESP::
002076  002122                                          .WORD   L$DESC
002100                                          L$LOAD::
002100  104035                                          EMT     E$LOAD
002102                                          L$ETP::
002102  000000                                          .WORD   0
002104                                          L$ICP::
002104  016030                                          .WORD   L$INIT
002106                                          L$CCP::
002106  017002                                          .WORD   L$CLEAN
002110                                          L$ACP::
002110  016620                                          .WORD   L$AUTO
002112                                          L$PRT::
002112  002142                                          .WORD   L$PROT
002114                                          L$TEST::
002114  000000                                          .WORD   0
002116                                          L$DLY::
002116  000000                                          .WORD   0
002120                                          L$HIME::
002120  000000                                          .WORD   0
495
496 002122                      DESCRIP <TU58 PERF EXER>
002122                                          L$DESC::
002122     124     125     065                          .ASCIZ  /TU58 PERF EXER/
                                                        .EVEN
```

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

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

```
                                .SBTTL  DISPATCH TABLE

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

                                        DISPATCH 8
002150                                                                  .WORD   8
002150  000010                                                  L$DISPATCH::
002152                                                                  .WORD   T1
002152  017150                                                          .WORD   T2
002154  017352                                                          .WORD   T3
002156  017624                                                          .WORD   T4
002160  021230                                                          .WORD   T5
002162  022220                                                          .WORD   T6
002164  023004                                                          .WORD   T7
002166  023774                                                          .WORD   T8
002170  024560
```

```
                        .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.
                        ;--

002172                          BGNHW   DFPTBL
002172  000004                                                  .WORD   L10001-L$HW/2
002174                                                          L$HW::
002174                                                          DFPTBL::

002174  176500                  .WORD   176500          ;CSR ADDRESS
002176  000300                  .WORD   300             ;VECTOR ADDR.
002200  000003                  .WORD   3               ;TEST DRIVE ZERO AND ONE
002202  000000                  .WORD   0               ;NOT PDT TYPE INTERFACE

002204                          ENDHW
002204                                                  L10001:
```

```
                                .SBTTL  SOFTWARE P-TABLE

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

002204                                  BGNSW   SFPTBL
002204  000007                                                         .WORD   L10002-L$SW/2
002206                                                                  L$SW::
002206                                                                  SFPTBL::

002206  000010                  LENGTH: .WORD   8.              ;TAPE LENGTH
002210  000001                  STAEOP: .WORD   1               ;PRINT STATISTICS AT EOP
002212  000001                  PRBUF:  .WORD   1               ;PRINT DATA BUF ON COMP. ERROR
002214  000001                  CMPDAT: .WORD   1               ;COMPARE DATA
002216  000001                  DRVCHK: .WORD   1               ;ADD DR # TO DATA
002220  000001                  EVLTHR: .WORD   1               ;THRESHOLD FOR EVL TEST
002222  000000                  PPSOT8: .WORD   0               ;PRINT UNIT PROTOCOL SUMMARY (TST8)

002224                                  ENDSW
002224                                                                  L10002:

002224                                  ENDMOD
```

```
                                .TITLE GLOBAL AREAS
                                .SBTTL  GLOBAL EQUATES SECTION
                                
                                
002224                                  BGNMOD
                                
                                ;++
                                ; THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
                                ; ARE USED IN MORE THAN ONE TEST.
                                ;--
                                
002224                                  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
                                ;
000040                          EF.START==      32.                     ; START COMMAND WAS ISSUED
000037                          EF.RESTART==    31.                     ; RESTART COMMAND WAS ISSUED
000036                          EF.CONTINUE==   30.                     ; CONTINUE COMMAND WAS ISSUED
000035                          EF.NEW==        29.                     ; A NEW PASS HAS BEEN STARTED
000034                          EF.PWR==        28.                     ; A POWER-FAIL/POWER-UP OCCURRED
                                ;
                                ;
                                ; PRIORITY LEVEL DEFINITIONS
                                ;
000340                          PRI07== 340
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
641
```

```
                        .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
000010                  OTL     ==      8.
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.
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
```

```
                        .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
                        ;GET CHARACTERISTICS DATA PACKET SIZE
000034                          RSGCDP == 28.           ;TOTAL BYTES FOR GET CHAR DATA PACKET
                                                        ;MINUS THE END PACKET
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
000012                          RSSGET == 12            ;GET CHARACTERISTICS
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
                        ;-----------------------------------------------------------------------
```

```
     752                                .SBTTL  ERROR MESSAGE DESCRIPTIONS
     753
     754                                ;THE TABLE OF ERROR MESSAGES (ADDRESSES).  ABNDX(R5) CONTAINS THE OFFSET
     755                                ;OF THE REASON.  IT'S ABSOLUTE ADDRESS IS RSNTAB + ABNDX(R5).
     756
     757 002224  002320                RSNTAB: MSNLOG
     758 002226  003052                        MSSFRD
     759 002230  003112                        MSSFWR
     760 002232  002534                        MSRNIT
     761 002234  002776                        MSQRSP
     762 002236  003256                        MSOVRN
     763 002240  002402                        MSCOM
     764 002242  003152                        MSHDRD
     765 002244  003214                        MSHDWR
     766 002246  002554                        MSHCHK
     767 002250  002304                        MSSKER
     768 002252  002512                        MSWPRO
     769 002254  002444                        MSNOMO
     770 002256  002616                        MSNIT
     771 002260  002632                        MSPART
     772 002262  002654                        MSUNIT
     773 002264  002702                        MSCMD
     774 002266  002716                        MSREC
     775 002270  002362                        MSSELF
     776 002272  002736                        MSWRSP
     777 002274  002762                        MSNRSP
     778 002276  002320                        MSNLOG
     779 002300  002462                        MSNOTP
     780 002302  003030                        MSTOSN
```

```
                                ;HERE ARE THE MESSAGES PROPER:

002304  123  105  105  MSSKER:: .ASCIZ /SEEK ERROR/            ;DEVICE COULD NOT READ HEADER
                      .EVEN
002320  123  131  123  MSNLOG:: .ASCIZ /SYSTEM ERROR/          ;DIAGNOSTIC HUNG. BETTER RE-BOOT
                      .EVEN
002336  102  101  104  MSBDA::  .ASCIZ  /BAD DATA IN PACKET/   ;HOST DATA CHECK FOUND ERROR, DEVICE MAY
                      .EVEN                                   ;HAVE READ CORRECTLY.
002362  123  105  114  MSSELF:: .ASCIZ /SELF TEST ERROR/       ;MICRO DIAGNOSTIC FAILED, BUT DEVICE COULD STILL
                      .EVEN                                   ;SEND AN END PACKET.
002402  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
002444  115  117  124  MSNOMO:: .ASCIZ /MOTOR STOPPED/         ;DEVICE COULD NOT GET ANY MEANINGFUL SIGNAL
                      .EVEN                                   ;FROM TAPE.
002462  103  101  122  MSNOTP:: .ASCIZ /CARTRIDGE NOT IN PLACE/ ;NO MEDIA OR BAD SWITCH
                      .EVEN
002512  127  122  111  MSWPRO:: .ASCIZ /WRITE PROTECTION/       ;CARTRIDGE WRITE PROTECT TAB MISSING OR
                      .EVEN                                   ;SWITCH BAD
002534  122  105  103  MSRNIT:: .ASCIZ /RECIEVING INIT/        ;DEVICE SENT INIT REQUEST
                      .EVEN
002554  110  117  123  MSHCHK:: .ASCIZ /HOST FOUND PACKET CHECKSUM ERROR/  ;DEVICE SENT PACK WITH
                      .EVEN                                   ;BAD CHECKSUM
002616  103  101  116  MSNIT::  .ASCIZ  /CAN'T INIT/          ;DEVICE SENT BYTE OTHER THAN "CONTINUE"
                      .EVEN                                   ;DURING INITIALIZATION
002632  120  101  122  MSPART:: .ASCIZ /PARTIAL OPERATION/     ;END OF MEDIUM ENCOUNTERED
                      .EVEN
002654  042  116  117  MSUNIT:: .ASCIZ /"NON-EXISTENT" DRIVE/  ;DEVICE RECV'D TOO LARGE DRIVE NUMBER
                      .EVEN
002702  102  101  104  MSCMD::  .ASCIZ  /BAD COMMAND/          ;DEVICE COULD NOT UNDERSTAND HOST
                      .EVEN
002716  102  101  104  MSREC::  .ASCIZ  /BAD RECORD NO./       ;DEVICE RECV'D TOO LARGE A RECORD NUMBER
                      .EVEN
002736  127  122  117  MSWRSP:: .ASCIZ /WRONG SUCCESS CODE/    ;HOST COULD NOT DECIPHER CODE IN END PACK
                      .EVEN
002762  116  117  040  MSNRSP:: .ASCIZ /NO RESPONSE/          ;TIME OUT WAITING FOR BYTE IN RCV BUF ON INTERFACE.
                      .EVEN
002776  111  116  104  MSQRSP:: .ASCIZ \INDECIPHERABLE FLAG BYTE\  ;HOST COULD NOT UNDERSTAND 1ST BYTE OF
                      .EVEN                                   ;RESPONSE FROM TU AS PROPER PROTOCOL
003030  124  111  115  MSTOSN:: .ASCIZ /TIME OUT ON SEND/      ;DLV 'READY' NEVER WENT HIGH
                      .EVEN
003052  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
003112  122  105  103  MSSFWR:: .ASCIZ /RECOV. DATA CHECK ERR ON WR OP/  ;SAME BUT WR OR WR VERIFY OPERATION
                      .EVEN
003152  125  116  122  MSHDRD:: .ASCIZ /UNRECOV. DATA CHECK ERR ON RD OP/  ;TU58 RESPONDED WITH "DATA-CHECK"
                      .EVEN                                   ;ERROR ON READ OP.  ;RETRIES UNSUCCESSFUL
003214  125  116  122  MSHDWR:: .ASCIZ /UNRECOV. DATA CHECK ERR ON WR OP/  ;SAME BUT WR OPERATION
                      .EVEN
003256  104  114  126  MSOVRN:: .ASCIZ /DLV ERROR IN RECEIVE/  ;DLV ERROR (THE CONTENTS PRINTED OUT)
                      .EVEN
```

```
                        .SBTTL  MISC STORAGE AND EQUATES

003304  000000          SYSTAT:: .WORD                  ;SYSTEM STATUS WORD
                                                        ;BIT7-BIT15 = 1ST BYTE OF PACK RCVD
                                                        ;BIT05 = NOT USED
                                                        ;BIT04 = NOT USED
                                                        ;BIT03 = NOT USED
                                                        ;BIT02 =RETRY BAD FLAG BYTE
                                                        ;BIT01 = RETRY OCCURRING
                                                        ;BIT00 = CHKSUM IS ODD (TEMP STORAGE)

003306  000000          TAPLEN:: .WORD                  ;# RECORDS
003310  000000          DEVPTR:: .WORD                  ;->NEXT UNIT ADDRESS
003312  000000          RCFLG::  .WORD                  ;TEMP STORE FOR GTBYTE
003314  000000          RCBCNT:  .WORD                  ;TEMP STORAGE FOR GTBYTE
003316  000004          FTLNM:   .WORD 4                ;NUMBER OF TRIES BEFORE ABORT
003320  000000          DONE::   .WORD                  ;1 IF TEST ALGORITHM COMPLETE
003322  000000          IDPTR::  .WORD                  ;PTR IN TESTID MACRO
003324  000000          TSTTOP:  .WORD                  ;POINTER TO CURRENT TEST
003326  000010          MXRTRY:: .WORD  8.              ;NUMBER OF RETRIES, BEFORE "HARD" ERROR
003330  000000          BLKER::  .WORD                  ;RECORD # FOR ERROR REPORT
003332  000000          SECREC:: .WORD                  ;RECORD # TO START AFTER SWITCHING TRACKS
003334  000000          PRNSIZ:: .WORD                  ;SIZE OF PACK FOR "PRNPAK"
003336  000000          ALLGON:: .WORD                  ;SECONDARY DON'T PRINT STATISTICS FLAG.
003340  000000          TEST8::  .WORD                  ;***** FLAG THAT INDICATES IF IN TST 8


                        ;               TIME OUT CONSTANTS:

003342  177777          CSNRDY::  -1            ;TIME OUT ON SEND DELAY (DLV NOT READY)
003344  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 = RETRY FLAG BYTE ERROR (DATA PACKS)
                                                ;BIT12 = TEMP STOR WRITE MACRO
                                                ;BIT11 = UNIT NOT BEING TESTED
                                                ;BIT10 = RETRYING DATA ERROR
                                                ;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 0DATA 1CMD
                                                ;BIT3  = RETRY FLAG BYTE ERR.(SEND COMMAND PACK)
                                                ;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                    ;BAD FLAG BYTE  ;OTL    ;MSQRSP ;******

                        ;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                    ;**RESERVED**
                        ;       WORD                    ;NO CARTRIDGE   ;NOCART ;MSNOTP ;ESNCRT
                        ;       WORD                    ;TIME OUT  SEND;TOSNDB  ;MSTOSN ;******

000202                  BLKEND  ==      130.            ;OFFSET OF END OF STATISTICS (RESERVED)
000204                  TUVECT  ==      132.            ;VECTOR ADDRESS
000206                  SAVCNT  ==       134.           ;BYTE COUNT SAVED DURING RETRY ON WRITE OPERATION
000210                  MRSP    ==      136.            ;***** FLAG INDICATING MRSP
000212                  BLKSIZ  ==      138.            ;** RESERVED **
                        ;-------------------------------------------------------------------
```

```
                                .SBTTL  DEVICE DATA BLOCK ALLOCATION

                                ;TABLE OF DEVICE DATA BLOCK ADDRESSES

003346  003366                BLKTBL::        .WORD   DEV0
003350  003600                                .WORD   DEV1
003352  004012                                .WORD   DEV2
003354  004224                                .WORD   DEV3
003356  004436                                .WORD   DEV4
003360  004650                                .WORD   DEV5
003362  005062                                .WORD   DEV6
003364  005274                LSTDEV::        .WORD   DEV7

                                ;AND STORAGE FOR EACH:

003366                          DEV0:           .BLKB   BLKSIZ
003600                          DEV1:           .BLKB   BLKSIZ
004012                          DEV2:           .BLKB   BLKSIZ
004224                          DEV3:           .BLKB   BLKSIZ
004436                          DEV4:           .BLKB   BLKSIZ
004650                          DEV5:           .BLKB   BLKSIZ
005062                          DEV6:           .BLKB   BLKSIZ
005274                          DEV7:           .BLKB   BLKSIZ
```

```
                                .SBTTL  GLOBAL TEXT SECTION

                                ;
                                ; NAMES OF DEVICES SUPPORTED BY PROGRAM
                                ;
                                        DEVTYP  <TU58 CONTROLLER>
005506                                                          L$DVTYP::
005506                                                                  .ASCIZ  /TU58 CONTROLLER/
005506  124  125  065                                                   .EVEN
```

```
                        .SBTTL  SYSTEM MACRO DEFINITIONS

                        .MACRO  PUSH    ,REG

                        .NLIST
                        .LIST ME
                        .LIST
                                        MOV     REG,-(SP)

                        .NLIST
                        .NLIST ME
                        .LIST
                        .ENDM

                        .MACRO  POP,REG

                        .NLIST
                        .LIST ME
                        .LIST
                                        MOV     (SP)+,REG

                        .NLIST
                        .NLIST ME
                        .LIST
                        .ENDM

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

                        .MACRO  SWAPIN

                        .NLIST
                        .LIST ME
                        .LIST
                                        MOV     6.(R5),R0
                                        MOV     8.(R5),R1
                                        MOV     10.(R5),R2
                                        MOV     12.(R5),R3
                                        MOV     14.(R5),R4

                        .NLIST
                        .NLIST ME
                        .LIST
                        .ENDM

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

                        .MACRO  SWAPOW

                        .NLIST
                        .LIST ME
```

```
1112                                    .LIST
1113                                                    MOV     R0,6.(R5)
1114                                                    MOV     R1,8.(R5)
1115                                                    MOV     R2,10.(R5)
1116                                                    MOV     R3,12.(R5)
1117                                                    MOV     R4,14.(R5)
1118
1119                                    .NLIST
1120                                    .NLIST ME
1121                                    .LIST
1122                                    .ENDM
```

```
                        ;++
                        ;THE WRITE MACRO IMPLEMENTS THE COMPLETE PROTOCOL NECESSARY TO BUILD
                        ;A COMMAND PACKET AND SUBSEQUENT DATA PACKETS (UNTIL THE BYTE COUNT
                        ;(BCNT) IS SATISFIED).
                        ;
                        ;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
                        ;           UNIT'S 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
                        ;             . ***
                        ;--

                                .MACRO  TUWRIT  PTRN,REC,BCNT,DR,VER,?A,?B,?C,?D,?E,?F,?G,?H,?T

                                .NLIST
                                .LIST ME
                                .LIST

                        T:      MOV     #TRBUF,R0       ;MAKE COMMAND PACKET:
                                MOVB    #RSCMND,@R0     ;COMMAND FLAG
                                MOVB    #RSMSIZ,1(R0)   ;THIS SIZE
                                MOVB    #RSSWR,2(R0)    ;INSERT OP CODE-WRITE
                                MOVB    VER,3.(R0)      ;VERIFY (1 OR 0)
                                MOVB    DR,4.(R0)       ;DRIVE #
                                MOVB    #020,5.(R0)     ;MAINTENANCE MODE SWITCH
                                CLR     6.(R0)          ;NO SEQUENCE #
                                MOV     BCNT,8.(R0)     ;TOTAL COUNT TO WRITE
                                MOV     REC,10.(R0)     ;AT  RECORD N
                                MOV     #RSMSIZ,R1      ;THE PACKET SIZE PLUS+2
                                TST     (R1)+           ;(FLAG AND COUNT) INTO R1
                                MOV     #RSSNSZ,SNDCNT(R5)  ;LOAD THE  SIZE TO SEND
                                CALL    CHKSUM          ;R0 --> R1=COUNT
                                MOV     R1,(R0)         ;PUT CHKSUM IN PACKET
                                                        ;SET UP EXPECTATIONS:
                                MOV     #RSCONT,XSFLG(R5)   ;THE FLAG
                                MOV     #1,XSCNT(R5)    ;THE COUNT
                                MOV     #1,XSPKNM(R5)   ;THE # PACKETS EXPECTED
                                MOV     BCNT,R2         ;GET # OF DATA BYTES
                                CALL    RSVP            ;SEND (AND RETURN TO SCHEDULER)
                                BIT     #BIT3,@R5       ;FLAG BYTE ERROR?
                                BNE     T               ;YES
                                BIC     #BIT12,@R5      ;FLAG FOR LAST PACKET
                        A:      MOV     #TRBUF,R0       ;POINT TO TOP OF BUFFER AGAIN
                                CMP     R2,#128.        ;START DATA PACKET(S)
                                BHI     B               ;BCNT > 128.!
                                MOV     R2,R1           ;BCNT<128.
```

```
1182                                    BIS     #BIT12,@R5      ;SO LAST PACKET NOW
1183                                    BR      C               ;USE REMAINING COUNT
1184                            B:      MOV     #128.,R1        ;USE 128. BYTES
1185                            C:      MOVB    R1,1(R0)        ;COPY COUNT TO BUFFER
1186                                    MOV     R1,R3           ;R3=COUNTER TO LOAD BUFFER
1187                                    MOVB    #RSDATA,@R0     ;FLAG FIRST
1188                                    TST     (R0)+           ;SKIP COUNT
1189                            D:      MOVB    PTRN,(R0)+      ;INSERT DATA
1190                                    DEC     R3              ;MORE?
1191                                    BHI     D               ;YES
1192                                    MOV     #TRBUF,R0       ;-->TOP AGAIN
1193                                    MOVB    1(R0),R1        ;GET COUNT
1194                                    BIC     #177400,R1      ;ZERO SIGN EXTEND
1195                                    MOV     R1,SNDCNT(R5)   ;HOW MANY TO SEND PLUS
1196                                    ADD     #4,SNDCNT(R5)   ;FLAG,COUNT,CHKSUM
1197                                    ADD     #2,R1           ;COMPENSATE FOR FLAG + COUNT
1198                                    CALL    CHKSUM          ;FOR CHECKSUM CALC.
1199                                    MOVB    R1,(R0)+        ;CHKSUM INTO PACKET
1200                                    SWAB    R1              ;EVEN ON AN ODD
1201                                    MOVB    R1,(R0)+        ;BYTE BOUNDARY
1202                                    BIT     #BIT12,@R5      ;LAST DATA PACKET?
1203                                    BEQ     E               ;NO
1204                                    MOV     #RSEND,XSFLG(R5)  ;YES-EXPECT 'END'
1205                                    MOV     #RSNDSZ,XSCNT(R5)  ;OF THIS SIZE
1206                                    MOV     #1,XSPKNM(R5)   ;AND 1 PACKET
1207                                    BR      F               ;SEND
1208                            E:      MOV     #RSCONT,XSFLG(R5)  ;(NOT LAST), EXPECT 'CONTINUE'
1209                                    MOV     #1,XSCNT(R5)    ;AND 1 BYTE
1210                                    MOV     #1,XSPKNM(R5)   ;AND 1 PACKET
1211                            F:      CALL    RSVP            ;SEND PACKET
1212                                                            ;AND RETURN TO SCHEDULER
1213                                    BIT     #BIT3,@R5       ;FLAG BYTE RETRY?
1214                                    BNE     T               ;YES
1215                                    BIT     #BIT10,@R5      ;RETRY DATA ERROR?
1216                                    BNE     G               ;YES
1217                                    SUB     #128.,R2        ;NO, MORE DATA TO SEND?
1218                                    BHI     A               ;YES
1219                                    BR      H               ;NO
1220                            G:      TURTRY  REC,BCNT,DR     ;RETRY HERE
1221                                    BIT     #BIT10!BIT3,@R5 ;RETRY AGAIN?
1222                                    BNE     G               ;YES
1223                            H:      NOP                     ;DONE
1224
1225                    .NLIST
1226                    .NLIST ME
1227                    .LIST
1228                    .ENDM
1229
```

```
                        ;++
                        ;THE SEEK MACRO IMPLIMENTS THE COMPLETE PROTOCOL TO INITIATE A SEEK
                        ;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
                        ;          UNITS TEST REGISTERS FROM SWAPIN
                        ;          TRBUF - BUFFER ADDRESS
                        ;
                        ; OUTPUTS -
                        ;          XSPKNM = # OF PACKETS EXPECTED
                        ;          XSFLG = FLAG BYTE OF 1ST PACKET
                        ;          XSCNT = BYTE COUNT OF 1ST PACKET
                        ;            . ***
                        ;            .   *  SUBSEQUENT XSFLGS
                        ;            .    >
                        ;            .   *  AND XSCNTS
                        ;            . ***
                        ;
                        ;--

                                .MACRO  TUSEEK  REC,DR,?A

                                .NLIST
                                .LIST ME
                                .LIST

                        A:      MOV     #TRBUF,R0       ;-->(POINT TO) XMIT BUFFER
                                MOVB    #RSCMND,@R0     ;FORM COMMAND MESSAGE PACK
                                MOVB    #RSMSIZ,1(R0)   ;THIS BIG
                                MOVB    #RSSSEK,2(R0)   ;OP CODE IS SEEK
                                MOV     REC,10.(R0)     ;TO THIS RECORD
                                MOVB    DR,4.(R0)       ;AND WHICH DRIVE
                                CLRB    3.(R0)          ;NO MODIFIER
                                CLRB    5.(R0)          ;NO SWITCHES
                                CLR     6.(R0)          ;NO SEQUENCE #
                                CLR     8.(R0)          ;NO BYTE COUNT
                                MOV     #RSMSIZ,R1      ;GET COUNT
                                TST     (R1)+           ;PLUS FLAG + BCNT
                                                        ;FOR CHECKSUM CALC
                                CALL    CHKSUM          ;R0-->TOP   R1=# OF BYTES
                                MOV     R1,(R0)         ;INSERT INTO PACKET
                                                        ;SET UP EXPECTATIONS:
                                MOV     #RSSNSZ,SNDCNT(R5)  ;HOW MANY TO SEND
                                MOVB    #RSCMND,XSFLG(R5)  ;EXPECT END PACK
                                MOV     #RSNDSZ,XSCNT(R5)  ;COUNT WITH THIS
                                MOV     #1.,XSPKNM(R5)  ;EXPECT ONLY 1 PACKET

                                CALL    RSVP            ;SEND
                                                        ;AND RETURN TO SCHEDULER
                                BIT     #BIT3,@R5       ;RETRY (FLAG BYTE ERROR)?
                                BNE     A               ;YES
```

```
1289                                    .NLIST
1290                                    .NLIST ME
1291                                    .LIST
1292                                    .ENDM
```

```
1295                            ;++
1296                            ;THE RETRY MACRO IMPLIMENTS THE COMPLETE PROTOCOL NECESSARY TO INITIATE
1297                            ;A RETRY (READ OPERATION) SEQUENCE.
1298                            ;
1299                            ;SETS UP THE EXPECTED PROTOCOL RESPONSES:  THE NUMBER OF PACKETS
1300                            ;(XSPKNM) AND THEIR FLAG BYTES AND COUNTS (XSFLG, XSCNT).  CALLS
1301                            ;'RSVP' TO SEND EACH PACKET, AND 'CHKSUM' TO CALC. THE PACKET
1302                            ;CHECKSUM.
1303                            ;
1304                            ; INPUTS  - DEVICE BLOCK @R5
1305                            ;           TRBUF - BUFFER ADDRESS
1306                            ;           UNITS TEST REGISTERS FROM SWAPIN
1307                            ;
1308                            ; OUTPUTS - SNDCNT(R5) = # OF BYTES TO SEND
1309                            ;           XSPKNM = # OF PACKETS EXPECTED
1310                            ;           XSFLG = FLAG BYTE OF 1ST PACKET
1311                            ;           XSCNT = BYTE COUNT OF 1ST PACKET
1312                            ;             . ***
1313                            ;             .   *  SUBSEQUENT XSFLGS
1314                            ;             .    >
1315                            ;             .   *  AND XSCNTS
1316                            ;             . ***
1317                            ;--
1318
1319                                    .MACRO  TURTRY  REC,BCNT,DR,?A,?B,?C,?D,?E
1320
1321                                    .NLIST
1322                                    .LIST ME
1323                                    .LIST
1324
1325                            D:      MOV     #TRBUF,R0           ;FORM CMND PACK:
1326                                    MOVB    #RSCMND,@R0         ;MESSAGE PACK TYPE
1327                                    MOVB    #RSMSIZ,1(R0)       ;THIS BIG
1328                                    MOVB    #RSSRD,2(R0)        ;OP CODE-READ
1329                                    MOV     REC,10.(R0)         ;THIS RECORD
1330                                    MOVB    DR,4.(R0)           ;THIS DRIVE
1331                                    CLRB    3(R0)               ;PRESET NORM THRESHOLD
1332                                    TSTB    @R5                 ;REDUCED?
1333                                    BPL     E                   ;NO
1334                                    INCB    3(R0)               ;YES-CHANGE THRESHOLD
1335                            E:      MOV     BCNT,8.(R0)         ;# BYTES DESIRED
1336                                    MOVB    #020,5.(R0)         ;MAINTENANCE MODE
1337                                    CLR     6.(R0)              ;NO SEQUENCE #
1338                                    MOV     #RSMSIZ,R1          ;SIZE OF PACKET
1339                                    TST     (R1)+               ;PLUS FLAG+COUNT INTO R1
1340                                    MOV     #RSSNSZ,SNDCNT(R5)  ;SET UP SIZE TO SEND
1341
1342                                    CALL    CHKSUM              ;FORM CHECKSUM R1=COUNT
1343                                    MOV     R1,(R0)             ;INSERT IN PACKET
1344
1345                                    MOV     BCNT,R1             ;SET EXPECTATIONS:
1346                                                                ;CALC # OF DATA PACKETS TO EXPECT
1347                                    MOV     #XSFLG,R3           ;OFFSET OF FLAG
1348                                    ADD     R5,R3               ;ABS. ADDR. OF XSFLG
1349                                    CLR     R2                  ;PRESET
1350                            A:      INC     R2                  ;# PACKETS EXPECTED
1351                                    MOV     #RSDATA,(R3)+       ;LOAD XSFLG
```

```
1352                                                    MOV     #132.,(R3)+     ;AND EXPECT COUNT
1353                                                    SUB     #128.,R1        ;NEG RESULT LAST TIME
1354                                                    BLOS    C               ;LAST TIME!
1355                                                    BR      A               ;MORE TO DO
1356                                            C:      INC     R2              ;ADD ONE FOR END PACK
1357                                                    MOV     R2,XSPKNM(R5)   ;SAVE # PACKETS TO EXPECT
1358                                                    MOV     #RSEND,(R3)+    ;EXPECT AN END
1359                                                    MOV     #RSNDSZ,(R3)    ;THIS BIG-14. BYTES
1360
1361                                                    CALL    RSVP            ;SEND
1362                                                                            ;AND RETURN TO SCHEDULER
1363
1364                                    .NLIST
1365                                    .NLIST ME
1366                                    .LIST
1367                                    .ENDM
```

```
1370                    ;++
1371                    ;THE READ MACRO IMPLIMENTS THE COMPLETE PROTOCOL NECESSARY TO INITIATE
1372                    ;A READ SEQUENCE.
1373                    ;
1374                    ;SETS UP THE EXPECTED PROTOCOL RESPONSES:  THE NUMBER OF PACKETS
1375                    ;(XSPKNM) AND THEIR FLAG BYTES AND COUNTS (XSFLG, XSCNT).  CALLS
1376                    ;'RSVP' TO SEND EACH PACKET, AND 'CHKSUM' TO CALC. THE PACKET
1377                    ;CHECKSUM.
1378                    ;
1379                    ; INPUTS  - DEVICE BLOCK @R5
1380                    ;           TRBUF - BUFFER ADDRESS
1381                    ;           UNITS TEST REGISTERS FROM SWAPIN
1382                    ;
1383                    ; OUTPUTS - SNDCNT(R5) = # OF BYTES TO SEND
1384                    ;           XSPKNM = # OF PACKETS EXPECTED
1385                    ;           XSFLG = FLAG BYTE OF 1ST PACKET
1386                    ;           XSCNT = BYTE COUNT OF 1ST PACKET
1387                    ;             . ***
1388                    ;             .   *  SUBSEQUENT XSFLGS
1389                    ;             .    >
1390                    ;             .   *  AND XSCNTS
1391                    ;             . ***
1392                    ;--
1393
1394                            .MACRO  TUREAD  REC,BCNT,DR,VER,?A,?B,?C,?D,?E
1395
1396                            .NLIST
1397                            .LIST ME
1398                            .LIST
1399
1400
1401                    E:      MOV     #TRBUF,R0       ;FORM CMND PACK:
1402                            MOVB    #RSCMND,@R0     ;MESSAGE PACK TYPE
1403                            MOVB    #RSMSIZ,1(R0)   ;THIS BIG
1404                            MOVB    #RSSRD,2(R0)    ;OP CODE IS READ
1405                            MOV     REC,10.(R0)     ;THIS RECORD
1406                            MOVB    DR,4.(R0)       ;THIS DRIVE
1407                            MOVB    VER,3.(R0)      ;VERIFY
1408                            MOV     BCNT,8.(R0)     ;TOTAL BYTES TO READ
1409                            MOVB    #020,5.(R0)     ;MAINTENANCE MODE
1410                            CLR     6.(R0)          ;NO SEQUENCE #
1411                            MOV     #RSMSIZ,R1      ;GET SIZE OF PACKET
1412                            TST     (R1)+           ;+2 FOR CHECKSUM
1413                            MOV     #RSSNSZ,SNDCNT(R5)  ;SIZE TO SEND
1414                            CALL    CHKSUM          ;FORM CHECKSUM R1=COUNT
1415                            MOV     R1,(R0)         ;INSERT CHECKSUM
1416
1417                            MOV     BCNT,R1         ;SET EXPECTATIONS:
1418                                                    ;CALC # OF DATA PACKETS TO EXPECT:
1419                            MOV     #XSFLG,R3       ;GET OFFSET
1420                            ADD     R5,R3           ;ABS. ADDR. OF XSFLG
1421                            CLR     R2              ;PRESET AS NONE
1422                    A:      INC     R2              ;# PACKETS EXPECTED
1423                            MOV     #RSDATA,(R3)+   ;LOAD XSFLG
1424                            MOV     #132.,(R3)+     ;AND EXPECTED COUNT
1425                            SUB     #128.,R1        ;NEG RESULT LAST TIME
1426                            BLOS    C               ;LAST TIME
```

```
1427                                            BR      A               ;MORE TO DO
1428                                    C:      INC     R2              ;ADD ONE FOR END PACK
1429                                            MOV     R2,XSPKNM(R5)   ;SAVE # PACKETS TO EXPECT
1430                                            MOV     #RSEND,(R3)+    ;EXPECT AN END ALSO...
1431                                            MOV     #RSNDSZ,(R3)    ;THIS BIG-14. BYTES
1432                                            CALL    RSVP            ;SEND
1433                                                                    ;AND RETURN TO SCHEDULER
1434                                    D:      BIT     #BIT10!BIT3,@R5 ;RETRY?
1435                                            BEQ     B               ;NO.
1436                                            TURTRY  REC,BCNT,DR     ;YES
1437                                            BR      D               ;ANOTHER RETRY?
1438                                    B:      NOP                     ;NO
1439
1440
1441                            .NLIST
1442                            .NLIST ME
1443                            .LIST
1444                            .ENDM
```

```
1447                            ;++
1448                            ;THE SELF TEST MACRO IMPLIMENTS THE COMPLETE PROTOCOL NECESSARY TO
1449                            ;INITIATE A 'DIAGNOSE' SEQUENCE.
1450                            ;
1451                            ;SETS UP THE EXPECTED PROTOCOL RESPONSES:  THE NUMBER OF PACKETS
1452                            ;(XSPKNM) AND THEIR FLAG BYTES AND COUNTS (XSFLG, XSCNT).  CALLS
1453                            ;'RSVP' TO SEND EACH PACKET, AND 'CHKSUM' TO CALC. THE PACKET
1454                            ;CHECKSUM.
1455                            ;
1456                            ; INPUTS  - DEVICE BLOCK @R5
1457                            ;           TRBUF - BUFFER ADDRESS
1458                            ;           UNITS REGISTERS TEST FROM SWAPIN
1459                            ;
1460                            ; OUTPUTS - SNDCNT(R5) = # OF BYTES TO SEND
1461                            ;           XSPKNM = # OF PACKETS EXPECTED
1462                            ;           XSFLG = FLAG BYTE OF 1ST PACKET
1463                            ;           XSCNT = BYTE COUNT OF 1ST PACKET
1464                            ;             . ***
1465                            ;             .   *  SUBSEQUENT XSFLGS
1466                            ;             .    >
1467                            ;             .   *  AND XSCNTS
1468                            ;             . ***
1469                            ;--
1470
1471                                    .MACRO  TUSELF  ?A
1472
1473                                    .NLIST
1474                                    .LIST ME
1475                                    .LIST
1476
1477                            A:      MOV     #TRBUF,R0           ;FORM COMMAND PACKET
1478                                    MOVB    #RSCMND,@R0         ;COMMAND FLAG
1479                                    MOVB    #RSMSIZ,1(R0)       ;SIZE OF MESSAGE
1480                                    MOVB    #RSSSLF,2(R0)       ;SELF TEST OPERATION
1481                                    CLRB    3(R0)               ;NO MODIFIER.
1482                                    CLR     4(R0)               ;NO DRIVE OR SWITCHES
1483                                    CLR     6(R0)               ;NO SEQUENCE NUMBER
1484                                    CLR     8.(R0)              ;NO BYTES
1485                                    CLR     10.(R0)             ;NO RECORD #
1486                                    MOV     #RSMSIZ,R1          ;GET SIZE
1487                                    TST     (R1)+               ;+2 FOR CHECKSUM
1488                                    MOV     #RSSNSZ,SNDCNT(R5)  ;SIZE TO SEND
1489                                    CALL    CHKSUM              ;FORM CHECKSUM
1490                                    MOV     R1,(R0)             ;INSERT INTO PACKET
1491                                    MOV     #RSEND,XSFLG(R5)    ;EXPECT END,
1492                                    MOV     #RSNDSZ,XSCNT(R5)   ;THIS BIG
1493                                    MOV     #1,XSPKNM(R5)       ;AND 1 PACKET
1494                                                                ;SEND
1495                                    CALL    RSVP                ;RETURN TO SCHEDULER
1496                                    BIT     #BIT3,@R5           ;RETRY?(BAD FLAG)
1497                                    BNE     A                   ;YES
1498
1499                                    .NLIST
1500                                    .NLIST ME
1501                                    .LIST
1502                                    .ENDM
```

```
1505                            ;++
1506                            ;THE TEST ID MACRO INTERFACES THE SUPERVISOR'S TEST DISPATCH TO THE
1507                            ;DIAGNOSTIC'S FORMAT BY IMPLEMENTING CALLS THAT:  1) INITIALIZE THE
1508                            ;PC OF THE TEST CODE (TSTPC(R5)),  2) ASSIGN THE 1ST DRIVES,  3) RUN
1509                            ;THE TEST,  4) SWITCH DRIVES AND REINITIALIZE, 5) RUN THE TEST AGAIN.
1510                            ;--
1511
1512                                    .MACRO  TSTID   ADDRES,?A
1513
1514                                    .NLIST
1515                                    .LIST ME
1516                                    .LIST
1517                                                    MOV     ADDRES,TSTTOP   ;SAVE ADDR OF TEST
1518                                                    CALL    SETUP           ;INIT UNITS TSTPC
1519                                                    CALL    SETDR           ;GET 1ST DRVS.
1520                                                    CALL    RUN             ;DO TEST
1521                                                    CALL    SWAPDR          ;GET NEXT DRVS.
1522                                                    BCC     A               ;BR NO 2ND DRVS
1523                                                    CALL    SETUP           ;REINIT UNITS TSTPC
1524                                                    CALL    RUN             ;REPEAT TEST
1525                                            A:                              ;DONE
1526                                    .NLIST
1527                                    .NLIST ME
1528                                    .LIST
1529                                    .ENDM
1530                            ;-----------------------------------------------------------------------
```

```
                                .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
                                ;--

005526  005002                  SWAPDR:: CLR    R2              ;FOR # OF DRIVE 1'S.
005530  012737  003346  005626          MOV     #BLKTBL,SWPTR   ;TABLE ADDR. OF 1ST UNIT
005536  017705  000064          1$:     MOV     @SWPTR,R5       ;GET DATA BLOCK ADDR.
005542  032715  100000                  BIT     #BIT15,@R5      ;ABORTED?
005546  001013                          BNE     3$              ;YES
005550  032765  000001  000060          BIT     #BIT0,DR(R5)    ;DID DR. 0?
005556  001007                          BNE     3$              ;NO, DID DR.1 1ST PASS
005560  032765  001000  000060          BIT     #BIT9,DR(R5)    ;YES; 1 SELECTED?
005566  001403                          BEQ     3$              ;NO, ALL DONE
005570  105265  000060                  INCB    DR(R5)          ;YES, SWAP
005574  005202                          INC     R2              ;ONE MORE TO TEST
005576  023727  005626  003364  3$:     CMP     SWPTR,#LSTDEV   ;LAST DEVICE?
005604  103004                          BHIS    4$              ;YES
005606  062737  000002  005626          ADD     #2,SWPTR        ;NO-POINT NEXT
005614  000750                          BR      1$              ;DO

005616  005702                  4$:     TST     R2              ;(CLEAR CARRY),MORE TO DO?
005620  001401                          BEQ     5$              ;NO
005622  000261                          SEC                     ;YES
005624  000207                  5$:     RETURN                  ;RETURN

005626  000000                  SWPTR:  .WORD
```

```
1634                                    ;++
1635                                    ; SETDR - SUBROUTINE TO GET DRIVE FOR 1ST PASS FOR EACH TEST
1636                                    ;
1637                                    ; INPUTS:       DR(R5) - DRIVE CONFIGURATION
1638                                    ;               BLKTBL - TOP OF DATA BLOCK ALLOCATION TABLE
1639                                    ;               LSTDEV - ADDR. OF LAST UNIT'S DATA BLOCK
1640                                    ;
1641                                    ; OUTPUTS:      DR(R5) IS SET TO TEST DRIVE 0 OR DRIVE 1
1642                                    ;--
1643
1644
1645 005630  012737  003346  005704  SETDR:: MOV     #BLKTBL,SETPTR  ;TABLE OF ADDR. 1ST UNIT
1646 005636  017705  000042          1$:     MOV     @SETPTR,R5      ;GET DATA BLOCK ADDR.
1647 005642  105065  000060                  CLRB    DR(R5)          ;PRESET AS DR0
1648 005646  032765  000400  000060          BIT     #BIT8,DR(R5)    ;DO DR0?
1649 005654  001002                          BNE     2$              ;YES
1650 005656  105265  000060                  INCB    DR(R5)          ;NO-USE DRIVE 1
1651 005662  023727  005704  003364  2$:     CMP     SETPTR,#LSTDEV  ;MORE UNITS
1652 005670  103004                          BHIS    3$              ;NO-EXIT
1653 005672  062737  000002  005704          ADD     #2,SETPTR       ;YES-GET TABLE ENTRY
1654 005700  000756                          BR      1$              ;CONFIGURE THAT UNIT
1655 005702  000207                  3$:     RETURN
1656 005704  000000                  SETPTR: .WORD
```

```
                                        ;++
                                        ; CLRALL - CLEARS INPUT BUFFER FOR RESPONSE FROM UNIT.
                                        ;
                                        ; INPUTS:       BLKTBL - TOP OF DATA BLOCK ALLOCATION TABLE
                                        ;               LSTDEV - ADDR. OF LAST UNIT'S DATA BLOCK
                                        ;
                                        ; OUTPUTS:      ALL UNITS BUFFERS CLEARED.
                                        ;
                                        ; CALLS:        CLRBUF
                                        ;--

005706  012737  003346  006000  CLRALL:: MOV     #BLKTBL,CLRPTR  ;TOP OF TABLE OF ADDRESSES
005714  017705  000060          1$:     MOV     @CLRPTR,R5      ;GET DATA BLOCK
005720  004737  005746                  CALL    CLRBUF          ;CLEAR IT'S RECEIVE BUFFER
005724  023727  006000  003364          CMP     CLRPTR,#LSTDEV  ;LAST DEV?
005732  103004                          BHIS    2$              ;YES
005734  062737  000002  006000          ADD     #2,CLRPTR       ;-->NEXT
005742  000764                          BR      1$              ;CONTINUE
005744  000207                  2$:     RETURN
```

```
                        ;++
                        ; CLRBUF - CLEARS 1 UNIT'S INPUT BUFFER.
                        ; INPUTS:  RCVBUF(R5) IS BUFFER START
                        ;          RCBFSZ - SIZE OF RECEIVE BUFFER IN BYTES
                        ;          RCBFSZ IS SIZE OF BUFFER
                        ; OUTPUTS:  CLEARED AREA.
                        ;--

005746                  CLRBUF:: PUSH   R0              ;SAVE R0
005746  010046                                         MOV     R0,-(SP)

005750                          PUSH    R4              ;SAVE R4
005750  010446                                         MOV     R4,-(SP)

005752  016500  000102          MOV     RCVBUF(R5),R0   ;GET ADDRESS OF BUFFER
005756  012704  001036          MOV     #RCBFSZ,R4      ;SIZE IN BYTES
005762  005020          1$:     CLR     (R0)+           ;CLEAR IT
005764  162704  000002          SUB     #2,R4           ;2 BYTES LESS
005770  001374                  BNE     1$              ;MORE
005772                          POP     R4              ;RESTORE
005772  012604                                         MOV     (SP)+,R4

005774                          POP     R0              ;
005774  012600                                         MOV     (SP)+,R0

005776  000207                  RETURN                  ;EXIT
006000  000000          CLRPTR: .WORD
```

```
                                        ;++
                                        ; 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
                                        ;--

006002  005037  003320          SETUP:: CLR     DONE                ;NOT DONE YET
006006  012737  003346  003322          MOV     #BLKTBL,IDPTR       ;TABLE TOP ADDR
006014  017705  175302          1$:     MOV     @IDPTR,R5           ;DEVICE'S DATA BLOCK
006020  013765  003324  000020          MOV     TSTTOP,TSTPC(R5)    ;INSERT PC FOR TOP OF TEST
006026  023727  003322  003364          CMP     IDPTR,#LSTDEV       ;ALL UNITS SET?
006034  103004                          BHIS    2$                  ;YES
006036  062737  000002  003322          ADD     #2,IDPTR            ;NO,GET NEXT POINTER
006044  000763                          BR      1$                  ;SET HIM UP
006046  000207                  2$:     RETURN                      ;DONE
```

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

006050  004737  006100          RUN::   CALL    NXTST           ;MAKE AND SEND NEXT PACK TO ALL
                                                                ;UNABORTED UNITS
006054  005737  003320                  TST     DONE            ;COMPLETE?
006060  001006                          BNE     2$              ;YES
006062  004737  007150                  CALL    GETANS          ;NO,GET ALL RESPONSES

006066                                  BREAK                   ;SUPERVISOR CHECK
006066  104422                                                          TRAP    C$BRK

006070  004737  010442                  CALL    CHKANS          ;CHECK ALL RESPONSES
006074  000765                          BR      RUN             ;CONTINUE TILL DONE
006076  000207          2$:     RETURN
```

```
                        .SBTTL  NXTST / THE SCHEDULER

                        ;++
                        ; NXTST - DISPATCH EXECUTION USING EACH UN-ABORTED UNIT'S TEST PROGRAM
                        ;         COUNTER, (TSTPC(R5)). (THE POINTER TO THE TEST CODE THAT COMPRISES
                        ;         MAKING A PACKET AND SENDING IT. CHECKS FIRST FOR ANY UN-ABORTED UNIT
                        ;         THAT IS RETRYING EITHER A DATA ERROR OR A 'INDECIPHERABLE FLAG BYTE'
                        ;         ERROR, IN ORDER TO SERVICE ONLY THAT UNIT THIS PASS.  INITS
                        ;        NON-RETRYING UNITS IF NECESSARY. IF NO RETRIES,DISPATCH ALL
                        ;         UNITS IN ROUND ROBIN FASHION.
                        ;
                        ; 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.(TO NOTIFY APT)
                        ;               SYSTAT IS UPDATED
                        ;--

006100  000240          NXTST:: NOP                     ;
006102  012737  003346  003310  MOV     #BLKTBL,DEVPTR  ;UNIT 0 TO START
006110  017705  175174  1$:     MOV     @DEVPTR,R5      ;GET DATA BLOCK
006114  005715          TST     @R5                     ;ABORTED?
006116  100504          BMI     2$                      ; YES... CHECK NEXT UNIT
006120  032715  000010  3$:     BIT     #BIT3,@R5       ;NO-RETRY 'BAD FLAG'?
006124  001040          BNE     5$                      ;YES...(SEND BREAK;THEN CMD PACK)
006126  032715  020000          BIT     #BIT13,@R5      ;NO-RETRYING STILL (NO END PACK YET)?
006132  001426          BEQ     7$                      ;NO...
006134  032715  000400          BIT     #BIT8,@R5       ;RETRYING A WRITE?
006140  001453          BEQ     4$                      ;NO...
006142                  SWAPIN                          ;YES-GET DEVICE REGESTERS
006142  016500  000006          MOV     6.(R5),R0
006146  016501  000010          MOV     8.(R5),R1
006152  016502  000012          MOV     10.(R5),R2
006156  016503  000014          MOV     12.(R5),R3
006162  016504  000016          MOV     14.(R5),R4

006166  020265  000206          CMP     R2,SAVCNT(R5)   ;CURRENT COUNT = SAVED COUNT? (WHERE WE STARTED)
006172  001036          BNE     4$                      ;NO...(CONTINUE SENDING DATA PACKS)
006174  042737  000004  003304  BIC     #BIT2,SYSTAT    ;YES-CLEAR RETRY FLAGS
006202  042715  020000          BIC     #BIT13,@R5      ;
006206  000450          BR      2$                      ;CHECK NEXT UNIT.
006210  032715  002000  7$:     BIT     #BIT10,@R5      ;NO-RETRY DATA ERROR?
006214  001445          BEQ     2$                      ;NO...ON TO NEXT UNIT
006216  052737  000002  003304  BIS     #BIT1,SYSTAT    ;SET RETRY STATUS TO 'DATA ERROR' TYPE
006224  000424          BR      6$                      ;YES...

006226                  5$:     SWAPIN                  ;GET DEVICE REGISTERS
006226  016500  000006          MOV     6.(R5),R0
006232  016501  000010          MOV     8.(R5),R1
006236  016502  000012          MOV     10.(R5),R2
006242  016503  000014          MOV     12.(R5),R3
006246  016504  000016          MOV     14.(R5),R4

006252  010265  000206          MOV     R2,SAVCNT(R5)   ;SAVE THE BYTE COUNT (FOR WRITE OPERATION)
                                                        ;TO MARK HOW MANY DATA PACKS TO SEND
006256  004737  013654          CALL    DOBRK           ;SEND INIT
```

```
1788 006262  032715  100000              BIT     #BIT15,@R5          ;ABORTED?
1789 006266  001020                      BNE     2$                  ;YES...
1790 006270  052737  000004  003304 4$:  BIS     #BIT2,SYSTAT        ;NOT ABORTED-SET RETRY STATUS
1791 006276                      6$:     SWAPIN                      ;GET DEVICE REGISTERS
     006276  016500  000006                                          MOV     6.(R5),R0
     006302  016501  000010                                          MOV     8.(R5),R1
     006306  016502  000012                                          MOV     10.(R5),R2
     006312  016503  000014                                          MOV     12.(R5),R3
     006316  016504  000016                                          MOV     14.(R5),R4

1792 006322  004775  000020              JSR     PC,@TSTPC(R5)       ;DO TEST FOR
1793 006326  000477                      BR      NXTRET              ;THIS UNIT ONLY-EXIT
1794 006330  023727  003310  003364 2$:  CMP     DEVPTR,#LSTDEV      ;TRY NEXT UNIT?
1795 006336  103004                      BHIS    NXTST2              ;NO
1796 006340  062737  000002  003310      ADD     #2.,DEVPTR          ;YES,->NEXT
1797 006346  000660                      BR      1$                  ;GET BLOCK
1798
1799 006350  005037  006530      NXTST2: CLR     ABONM               ;HERE=NO RETRIES TO DO, NO UNIT ABORTED YET
1800 006354  012737  003346  003310      MOV     #BLKTBL,DEVPTR      ;-->UNIT 0 STORAGE BLOCK
1801 006362  017705  174722      PERDEV: MOV     @DEVPTR,R5          ;R5-->NEXT DEVICE STORAGE BLOCK
1802
1803 006366  005715              3$:     TST     @R5                 ;ABORTED?
1804 006370  100426                      BMI     4$                  ;YES
1805 006372  032715  040000              BIT     #BIT14,@R5          ;SEND BREAK?
1806 006376  001407                      BEQ     6$                  ;NO
1807 006400  004737  013654              CALL    DOBRK               ;YES
1808 006404  032715  040000              BIT     #BIT14,@R5          ;SUCCESSFUL INIT?
1809 006410  001016                      BNE     4$                  ;NO ON TO NEXT UNIT
1810 006412  005715                      TST     @R5                 ;ABORTED?
1811 006414  100414                      BMI     4$                  ;YES-ON TO NEXT UNIT
1812 006416                      6$:     SWAPIN                      ;NO,GET DEVICE REGISTERS R0-R4 CONTAINING TEST PARAMETERS
     006416  016500  000006                                          MOV     6.(R5),R0
     006422  016501  000010                                          MOV     8.(R5),R1
     006426  016502  000012                                          MOV     10.(R5),R2
     006432  016503  000014                                          MOV     12.(R5),R3
     006436  016504  000016                                          MOV     14.(R5),R4

1813 006442  004775  000020              JSR     PC,@TSTPC(R5)       ;INITIATE 1 PACKET TRANSMISSION AND RETURN
1814 006446  005715              4$:     TST     @R5                 ;ABORTED?
1815 006450  100002                      BPL     8$                  ;NO-ON TO NEXT UNIT
1816 006452  005237  006530              INC     ABONM               ;YES...ONE MORE TALLIED
1817 006456  023727  003310  003364 8$:  CMP     DEVPTR,#LSTDEV      ;ALL TU'S TRIED?
1818 006464  103004                      BHIS    5$                  ;YES
1819 006466  062737  000002  003310      ADD     #2.,DEVPTR          ;NO THE ADDRESS+2=NEXT ADDRESS
1820 006474  000732                      BR      PERDEV              ;DO NEXT UNIT
1821 006476  022737  000010  006530 5$:  CMP     #8.,ABONM           ;ALL ABORTED?
1822 006504  001010                      BNE     NXTRET              ;NO
1823 006506                              ERRSF   100.,NOMOR          ;YES!
     006506  104454                                                          TRAP    C$ERSF
     006510  000144                                                          .WORD   100
     006512  006532                                                          .WORD   NOMOR
     006514  000000                                                          .WORD   0
1824 006516              11$:    BREAK                               ;SUPERVISOR BREAK
     006516  104422                                                          TRAP    C$BRK
1825 005520  005237  003336              INC     ALLGON              ;SET DON'T-PRINT STATISTICS FLAG
1826 006524                              DOCLN                       ;EXIT
     006524  104444                                                          TRAP    C$DCLN
```

```
 1827 006526  000207                    NXTRET: RETURN
 1828
 1829 006530  000000                    ABONM:  .WORD                          ;THE NUMBER OF ABORTED UNITS
 1830 006532     101      114      114  NOMOR:  .ASCIZ  /ALL UNITS ABORTED!/
 1831                                             .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.  IF NOT IN TEST 8, 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.  IF IN TEST 8 AND THE UNIT IS NOT MODIFIED, SKIP REST OF
                        ;        ROUTINE.  IF IN TEST 8 AND THE UNIT IS MODIFIED DO NOT SEND XOFF AND
                        ;        PROCEED NORMALLY.
                        ; 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.
                        ;--

006556  000240         RSVP::  NOP                     ;FINISH TEST
006560  012665 000020          MOV     (SP)+,TSTPC(R5) ;SAVE WHERE YOU WERE IN TEST BODY AND
006564                         SWAPOW                  ;SAVE TEST REGISTERS
006564  010065 000006          MOV     R0,6.(R5)
006570  010165 000010          MOV     R1,8.(R5)
006574  010265 000012          MOV     R2,10.(R5)
006600  010365 000014          MOV     R3,12.(R5)
006604  010465 000016          MOV     R4,14.(R5)

                                                        ;CORRECT FOR RETURN TO SCHEDULER
006610  022737 000002 003340          CMP     #2,TEST8        ;***** IS THIS TEST 8
006616  001007                       BNE     XFNSND          ;***** NO
006620  022765 000000 000210          CMP     #0,MRSP(R5)     ;***** IF SO, IS THIS UNIT MODIFIED
006626  001523                       BEQ     ENDRSP          ;***** YES
006630  012700 026174       NOXOFF: MOV     #TRBUF,R0       ;FOR NORMAL PACKET SEND
006634  000404                       BR      SND             ;SEND XOFF+PACKET
006636  012700 026173       XFNSND: MOV     #TRBUF-1,R0     ;POINT TO XOFF
006642  005265 000070               INC     SNDCNT(R5)      ;ONE MORE TO SEND, TOO.
006646  004737 007100       SND:    CALL    SNDBYT          ;SEND BYTE
006652  005715                       TST     @R5             ;R5--> TO STATUS BLK
006654  100510                       BMI     6$              ;ABORTED? YES...QUIT
006656  005365 000070               DEC     SNDCNT(R5)      ;NO, SEND MORE
```

```
1884 006662 001371                      BNE     SND             ;IF MORE TO SEND
1885 006664 012700 026174               MOV     #TRBUF,R0       ;-->BUFFER
1886 006670 016537 000064 003330        MOV     REC(R5),BLKER   ;PREPARE FOR RECEIVE
1887 006676 156565 000032 000033        BISB    XSPKNM(R5),XSPKNM+1(R5)  ;REPLICATE LO. BYTE TO HI FOR GTPAKS, CHKANS
1888 006704 005065 000076               CLR     SUCCS(R5)       ;NO SUCCESS YET
1889 006710 042715 001000               BIC     #BIT9,@R5       ;NO DATA CHK ERROR YET
1890 006714 016565 000102 000104        MOV     RCVBUF(R5),PKPTR(R5)  ;TOP OF RCV BUFFER GOES THE 1ST PACKET
1891 006722 012704 000034               MOV     #XSFLG,R4       ;FORM
1892 006726 060504                      ADD     R5,R4           ;ADDRESS
1893 006730 010465 000106               MOV     R4,XSPTR(R5)    ;OF 1ST XSFLG
1894
1895 006734 042715 000020               BIC     #BIT4,@R5       ;PRESET AS DATA PAK
1896 006740 121027 000002               CMPB    @R0,#RSCMND     ;WAS IT COMMAND PAK?
1897 006744 001054                      BNE     6$              ;NO...
1898 006746 116065 000002 000100        MOVB    2(R0),CMDSNT(R5)  ;YES-SAVE COMMAND
1899 006754 052715 000020               BIS     #BIT4,@R5       ;ITS CMND PAK
1900
1901 006760 032715 002000               BIT     #BIT10,@R5      ;RETRYING?
1902 006764 001044                      BNE     6$              ;YES-DON'T UPDATE ANY STATS OR CONDITION
1903 006766 126027 000002 000002        CMPB    2(R0),#RSSRD    ;NO,A READ?
1904 006774 001012                      BNE     4$              ;NO
1905 006776 042715 000400               BIC     #BIT8,@R5       ;(FOR HARD/SOFT LOGGING) RD/WR FLAG=0
1906 007002 004737 013504               CALL    WHCHDR          ;GET DRIVE
1907 007006 103403                      BCS     8$              ;
1908 007010 005265 000114               INC     RDN0(R5)        ;DRIVE 0
1909 007014 000402                      BR      4$              ;
1910 007016 005265 000116       8$:     INC     RDN1(R5)        ;DRIVE 1
1911
1912 007022 126027 000002 000003 4$:    CMPB    2(R0),#RSSWR    ;A WRITE?
1913 007030 001022                      BNE     6$              ;NO
1914 007032 052715 000400               BIS     #BIT8,@R5       ;YES, RD/WR FLAG=1
1915 007036 105760 000003               TSTB    3(R0)           ;VERIFY TOO?
1916 007042 001403                      BEQ     21$             ;NO
1917 007044 052715 000040               BIS     #BIT5,@R5       ;YES-SET VERIFY FLAG
1918 007050 000402                      BR      22$
1919 007052 042715 000040       21$:    BIC     #BIT5,@R5       ;(NO)-RESET VERIFY FLAG
1920 007056 004737 013504       22$:    CALL    WHCHDR          ;GET DRIVE NO
1921 007062 103403                      BCS     5$              ;CARRY=DR1
1922 007064 005265 000110               INC     WRTN0(R5)       ;# BLKS WRITTEN DR0
1923 007070 000402                      BR      6$              ;EXIT
1924
1925 007072 005265 000112       5$:     INC     WRTN1(R5)       ;# BLKS WRITTEN DRV1
1926 007076                     6$:
1927 007076 000207              ENDRSP: 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
                                ;--

007100                          SNDBYT:: PUSH   R1.             ;ENTER R0-->BYTE
007100  010146                                                  MOV     R1,-(SP)

007102  013701  003342          4$:     MOV     CSNRDY,R1       ;GET TIMEOUT CONSTANT FOR NOT READY ERROR
007106  105775  000026          1$:     TSTB    @XMSR(R5)       ;READY TO SEND?
007112  100412                          BMI     2$              ;YES
007114                                  PUSH    R0              ;NO, SAVE R0
007114  010046                                                  MOV     R0,-(SP)

007116                                  BREAK                   ;MONITOR BREAK
007116  104422                                                                          TRAP    C$BRK
007120                                  POP     R0              ;RESTORE
007120  012600                                                  MOV     (SP)+,R0

007122  005301                                  DEC     R1              ;ABORTED?
007124  001370                                  BNE     1$              ;NO
007126  012704  000056                          MOV     #TOSNDB,R4      ;YES,SET CODE FOR TIMEOUT ERROR
007132  004737  012500                          CALL    LOG             ;LOG IT
007136  000402                                  BR      3$              ;QUIT
007140  112075  000030          2$:     MOVB    (R0)+,@XMDB(R5) ;SEND IT
007144                          3$:     POP     R1              ;RESTORE
007144  012601                                                  MOV     (SP)+,R1

007146  000207                                  RETURN                  ;DONE
```

```
                                        .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.
                                        ;--

007150  000240                  GETANS:: NOP                             ;1 UNIT IF RETRY;  ELSE ALL
007152  032737  000006  003304          BIT     #BIT1!BIT2,SYSTAT        ;RETRY?
007160  001010                          BNE     1$                       ;YES
007162  012737  177777  010206          MOV     #-1,SERVST               ;PRESET NO UNITS SERVICED
007170  004737  005706                  CALL    CLRALL                   ;CLEAR ALL INPUT BUFFERS
007174  004737  007426                  CALL    GTPKS8                   ;GET ALL REPLYS
007200  000404                          BR      2$                       ;EXIT
007202  004737  005746          1$:     CALL    CLRBUF                   ;RETRY-CLEAR 1 UNIT ONLY
                                                                         ;R5->UNIT BY NXTST
007206  004737  007216                  CALL    GTPKS1                   ;GET 1 REPLY
007212  000207                  2$:     RETURN                           ;DONE

007214  000000                  GETPTR: .WORD
```

```
                        .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
                        ;--

007216  000240          GTPKS1:: NOP                    ;R5->THE UNIT
007220  012703  000034          MOV     #XSFLG,R3       ;THE OFFSET VALUE OF FLAG
007224  060503                  ADD     R5,R3           ;FORM THE ABSOLUTE ADDRESS
007226  010301                  MOV     R3,R1           ;R3-->ADDR. OF EXPECTED FLAG
007230  062701  000002          ADD     #2.,R1          ;R1-->ADDR. OF EXPECTED COUNT
007234  012700  007424          MOV     #EXON,R0        ;R0=ADDRESS
007240  004737  007100          CALL    SNDBYT          ;XON THE DEVICE
                                                        ;*** TIME CRITICAL
007244  016500  000102          MOV     RCVBUF(R5),R0   ;***--> TO THE BUFFER
007250  116502  000033          MOVB    XSPKNM+1(R5),R2 ;***GET THE # OF PACKETS TO RECEIVE
007254  032702  177400          BIT     #177400,R2      ;***SIGN UN-EXTEND
007260  011137  003314  1$:     MOV     @R1,RCBCNT      ;***HOW MANY BYTES IT SHOULD BE
007264  011337  003312          MOV     @R3,RCFLG       ;***WHAT THE FIRST BYTE SHOULD BE
007270  004737  010212          CALL    GTBYTE          ;***GET THE ALL IMPORTANT FLAG
007274  032715  100000          BIT     #BIT15,@R5      ;TIMEOUT?
007300  001050                  BNE     4$              ;YES
007302  005300                  DEC     R0              ;-> BYTE RECIEVED
007304  111037  003305          MOVB    @R0,SYSTAT+1    ;SAVE IT AS FLAG BYTE
007310  121037  003312          CMPB    @R0,RCFLG       ;1ST BYTE WHAT WAS EXPECTED?
007314  001420                  BEQ     2$              ;YES
007316  121027  000002          CMPB    @R0,#RSEND      ;NO, WAS IT END PAK?
007322  001006                  BNE     14$             ;NO
007324  012737  000016  003314  MOV     #RSNDSZ,RCBCNT  ;YES, USE END SIZE FOR COUNT
007332  012702  000001          MOV     #1,R2           ;AND ASSUME IT'S LAST PACKET!
007336  000407                  BR      2$              ;CONTINUE RECEIVE
007340  121027  000001  14$:    CMPB    @R0,#RSDATA     ;WAS IT DATA?
007344  001026                  BNE     4$              ;NO,CHKANS MAY FIND INIT...
007346  012737  000204  003314  MOV     #RSDASZ,RCBCNT  ;YES, SET FOR DATA PAK SIZE
007354  005202                  INC     R2              ;ONE MORE PACK THAN EXPECTED (END PACK)

007356  005200          2$:     INC     R0              ;RESTORE TO -> NEXT BYTE
007360  005337  003314  5$:     DEC     RCBCNT          ;THAT'S ONE LESS BYTE TO GO
007364  001411                  BEQ     3$              ;DONE
007366  004737  010212          CALL    GTBYTE          ;GET REST OF PACKET
007372  005765  000074          TST     DLV(R5)         ;ERROR
007376  001011                  BNE     4$              ;YES-ALL OVER
007400  032715  100000          BIT     #BIT15,@R5      ;OR IF ABORTED
007404  001006                  BNE     4$              ;THEN QUIT
007406  000764                  BR      5$              ;CONTINUE RECEIVE

007410  005302          3$:     DEC     R2              ;ONE LESS PACKET TO GO
007412  001403                  BEQ     4$              ;MORE PACKETS IN TRANSACTION?
                                                        ;YES
```

```
2043 007414  022121                    CMP     (R1)+,(R1)+     ;POINT TO NEW EXPECTED COUNT
2044 007416  022323                    CMP     (R3)+,(R3)+     ;AND FLAG,
2045 007420  000717                    BR      1$              ;AND RECEIVE,
2046 007422  000207              4$:   RETURN                  ;RETURN
2047
2048 007424      020             EXON:  .BYTE   RSXON
2049 007425      023             EXOFF: .BYTE   RSXOFF
```

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

                                ;++
                                ; GTPKS8 - IF IN TEST 8 AND THE UNIT IS NOT MODIFIED, SKIP THE REST
                                ;          OF THE ROUTINE.  OTHERWISE;
                                ;          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,
                                ;          AND NOT IN TEST 8, SEND "XOFF" TO ENHANCE THROUGHPUT AND GO ON
                                ;          TO NEXT UNIT (IF ANY).  IF IN TEST 8, DO NOT SEND "XOFFF".
                                ; 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
                                ;--

007426  000240                  GTPKS8:: NOP                    ;GET ALL UNITS RESPONSES XOFF IF DATA PAK (THROUGHPUT)
007430  022737  000002  003340          CMP     #2,TEST8        ;***** IS THIS TEST 8
007436  001006                        BNE     1$              ;***** NO
007440  022765  000000  000210        CMP     #0,MRSP(R5)     ;***** IF SO, IS THIS UNIT MODIFIED
007446  001002                        BNE     1$              ;***** YES, CONTINUE NORMALLY
007450  000137  010114                JMP     ENDGP8          ;***** ELSE, SKIP ROUTINE
007454  012737  003346  010210  1$:   MOV     #BLKTBL,GTPTR   ;->1ST
007462  017705  000522          GTAGIN: MOV     @GTPTR,R5       ;GET DATA BLOCK
007466  032715  100000                BIT     #BIT15,@R5      ;ABORTED?
007472  001403                        BEQ     2$              ;NO
007474  004737  010122                CALL    SETSRV          ;YES-SET' SERVICED' AND
007500  000564                        BR      GTDOWN          ;ON TO NEXT UNIT
007502  105765  000033          2$:   TSTB    XSPKNM+1(R5)    ;NO, ANY PACKETS LEFT?
007506  001003                        BNE     3$              ;YES
007510  004737  010122                CALL    SETSRV          ;NO-HE'S DONE
007514  000556                        BR      GTDOWN          ;SO ON TO NEXT UNIT
007516  105365  000033          3$:   DECB    XSPKNM+1(R5)    ;NOW ITS ONE LESS PACKET
007522  017537  000106  003312        MOV     @XSPTR(R5),RCFLG  ;GET EXPECTED FLAG
007530  062765  000002  000106        ADD     #2,XSPTR(R5)    ;--> COUNT
007536  017537  000106  003314        MOV     @XSPTR(R5),RCBCNT  ;AND EXPECTED COUNT
007544  022737  000002  003340        CMP     #2,TEST8        ;***** IF TEST 8
007552  001404                        BEQ     1$              ;***** DO NOT SEND XON
007554  012700  007424                MOV     #EXON,R0        ;-> XON
                                                              ;***TIME CRITICAL
007560  004737  007100                CALL    SNDBYT          ;***SEND IT
007564  016500  000104          1$:   MOV     PKPTR(R5),R0    ;***->WHERE 1ST BYTE GOES
007570  004737  010212                CALL    GTBYTE          ;***GET IT
007574  032715  100000                BIT     #BIT15,@R5      ;ABORTED?
007600  001403                        BEQ     4$              ;NO-CONTINUE
007602  105065  000033                CLRB    XSPKNM+1(R5)    ;YES-NO MORE PACKETS EXPECTED
007606  000521                        BR      GTDOWN          ;ON TO NEXT
007610  005300                  4$:   DEC     R0              ;-->BYTE JUST RECEIVED
007612  111037  003305                MOVB    @R0,SYSTAT+1    ;SAVE IT
007616  121037  003312                CMPB    @R0,RCFLG       ;IS IT WHAT EXPECTED?
007622  001436                        BEQ     GTOK            ;YES
007624  105065  000033        UNXPCT: CLRB    XSPKNM+1(R5)    ;NO, MUST BE LAST REPLY
007630  121027  000002                CMPB    @R0,#RSEND      ;MAYBE AN END PAK?
007634  001004                        BNE     4$              ;NO
```

```
2109 007636  012737  000016  003314          MOV     #RSNDSZ,RCBCNT  ;YES, USE PROPER COUNT
2110 007644  000406                          BR      GTUM            ;AND GET IT
2111 007646  121027  000001          4$:     CMPB    @R0,#RSDATA     ;IS IT DATA?
2112 007652  001077                          BNE     GTDOWN          ;NO, ALL OVER, CHKANS WILL INIT UNIT
2113 007654  012737  000222  003314          MOV     #RSDNSZ,RCBCNT  ;YES, USE COUNT OF DATA + END PAK SURE TO FOLLOW
2114 007662  005200                  GTUM:   INC     R0              ;WHERE TO STUFF THE REST
2115 007664  005337  003314          5$:     DEC     RCBCNT          ;ONE DOWN
2116 007670  001470                          BEQ     GTDOWN          ;NONE TO GO
2117 007672  004737  010212                  CALL    GTBYTE          ;MORE TO GO
2118 007676  032715  100000                  BIT     #BIT15,@R5      ;TIMEOUT?
2119 007702  001063                          BNE     GTDOWN          ;YES
2120 007704  005765  000074                  TST     DLV(R5)         ;BUT DLV ERROR?
2121 007710  001765                          BEQ     5$              ;NO
2122 007712  105065  000033                  CLRB    XSPKNM+1(R5)    ;YES-LAST TIME
2123 007716  000455                          BR      GTDOWN          ;ON TO NEXT
2124
2125 007720  005200                  GTOK:   INC     R0              ;NEXT PLACE IN BUFFER
2126 007722  022737  000002  003340  1$:     CMP     #2,TEST8        ;***** IF NOT TEST 8
2127 007730  001020                          BNE     7$              ;***** DO NOT SEND 'CONT'
2128 007732                                  PUSH    R0              ;*****SEND 'CONT' FOR MRSP
     007732  010046                          MOV     R0,-(SP)

2129 007734  012700  010116                  MOV     #MODRSP,R0      ;
2130 007740  004737  007100                  CALL    SNDBYT          ;
2131 007744  000240                          NOP
2132 007746  012737  000001  010120          MOV     #1,MRSDLY       ;***** ANOTHER DELAY
2133 007754  005000                  2$:     CLR     R0              ;*****
2134 007756  005300                  3$:     DEC     R0              ;***** TO GET AN ERROR
2135 007760  001376                          BNE     3$              ;***** IF MRSP DOESN'T WORK
2136 007762  005337  010120                  DEC     MRSDLY          ;*****
2137 007766  001372                          BNE     2$              ;
2138 007770                                  POP     R0              ;
     007770  012600                          MOV     (SP)+,R0

2139 007772  005337  003314          7$:     DEC     RCBCNT          ;MORE BYTES?
2140 007776  001413                          BEQ     4$              ;NO-ALL DONE
2141 010000  004737  010212                  CALL    GTBYTE          ;YES-GET IT
2142 010004  032715  100000                  BIT     #BIT15,@R5      ;TIMEOUT?
2143 010010  001020                          BNE     GTDOWN          ;YES
2144 010012  005765  000074                  TST     DLV(R5)         ;ERROR?
2145 010016  001741                          BEQ     1$              ;NO
2146 010020  105065  000033                  CLRB    XSPKNM+1(R5)    ;LAST TIME
2147 010024  000412                          BR      GTDOWN          ;EXIT
2148 010026  122775  000001  000104  4$:     CMPB    #RSDATA,@PKPTR(R5)  ;WAS DATA?
2149 010034  001006                          BNE     GTDOWN          ;NO, ALL DONE
2150 010036  010065  000104                  MOV     R0,PKPTR(R5)    ;START OF NEXT PACK NEXT TIME
2151 010042  012700  007425                  MOV     #EXOFF,R0       ;XOFF AND SEND TO
2152 010046  004737  007100                  CALL    SNDBYT          ;ENHANCE THROUGHPUT
2153 010052  062765  000002  000106  GTDOWN: ADD     #2.,XSPTR(R5)   ;NEXT XSFLG FOR NEXT TRY
2154 010060  023727  010210  003364          CMP     GTPTR,#LSTDEV   ;DONE ONE CYCLE ALL UNITS?
2155 010066  103005                          BHIS    1$              ;YES
2156 010070  062737  000002  010210          ADD     #2,GTPTR        ;NEXT UNIT
2157 010076  000137  007462                  JMP     GTAGIN          ;CONTINUE RECEIVE
2158 010102  105737  010206          1$:     TSTB    SERVST          ;DONE SERVICING ALL PAKS
2159                                                                 ;FROM ALL UNITS?
2160 010106  001402                          BEQ     ENDGP8          ;YES
```

```
   2161 010110  000137  007426                    JMP     GTPKS8          ;NO, KEEP TRYING
   2162 010114  000207                ENDGP8: RETURN                      ;RETURN
   2163
   2164 010116     020                MODRSP: .BYTE   RSCONT
   2165                                       .EVEN
   2166 010120  000000                MRSDLY: .WORD
```

```
                        .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
                        ;--

010122                  SETSRV: PUSH    R5              ;SET UNIT SERVICED
010122  010546                  MOV     R5,-(SP)

010124                          PUSH    R0
010124  010046                  MOV     R0,-(SP)

010126  011505                  MOV     @R5,R5          ;GET STAT WD
010130  042705  177770          BIC     #177770,R5      ;MASK UNIT #
010134  012700  010166          MOV     #SRVTBL,R0      ;->TOP OF BIT TABLE
010140  005705          1$:     TST     R5              ;RIGHT ONE?
010142  001404                  BEQ     2$              ;YES
010144  062700  000002          ADD     #2,R0           ;NO, ->NEXT
010150  005305                  DEC     R5              ;1 LESS
010152  000772                  BR      1$              ;CONTINUE
010154  041037  010206  2$:     BIC     @R0,SERVST      ;MOW IT DOWN
010160                          POP     R0
010160  012600                  MOV     (SP)+,R0

010162                          POP     R5
010162  012605                  MOV     (SP)+,R5

010164  000207                  RETURN                  ;RETURN

010166  000001          SRVTBL: .WORD   BIT0            ;BIT POSITION LOOKUP TABLE
010170  000002                  .WORD   BIT1
010172  000004                  .WORD   BIT2
010174  000010                  .WORD   BIT3
010176  000020                  .WORD   BIT4
010200  000040                  .WORD   BIT5
010202  000100                  .WORD   BIT6
010204  000200                  .WORD   BIT7

010206  000000          SERVST: .WORD
010210  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
                                ;--

010212  005037  010436          GTBYTE:: CLR    GBTMP           ;TIMEOUT REGISTER
010216  013704  003344                   MOV    CSRCVB,R4       ;TIMEOUT ERROR CONSTANT (MULTIPLIER)
010222  105775  000022          1$:      TSTB   @RCSR(R5)       ;READY?
010226  100013                           BPL    3$              ;NO
010230  017565  000024  000074         MOV    @RCDB(R5),DLV(R5)  ;GET ERROR + BYTE
010236  116520  000074                 MOVB   DLV(R5),(R0)+   ;COPY BYTE TO BUFFER
010242  005765  000074                 TST    DLV(R5)         ;ERROR?
010246  100472                         BMI    4$              ;YES-EXIT
010250  005065  000074                 CLR    DLV(R5)         ;NO-RESET
010254  000467                         BR     4$              ;AND EXIT
010256  005337  010436          3$:      DEC    GBTMP           ;DEC T.O. CONSTANT
010262  001357                         BNE    1$              ;STILL VALID

                                ;CODE TO SEE ^C DURING LONG SEEK OR REWIND
                                                               ;HERE GBTMP=0
010264  010037  010440                 MOV    R0,GBTMP2       ;R0 MUST BE PRESERVED!
010270  012700  007425                 MOV    #EXOFF,R0       ;QUIET THE DEVICE
010274  004737  007100                 CALL   SNDBYT          ;BY SENDING XOFF
010300  105775  000022          6$:      TSTB   @RCSR(R5)       ;CHARACTER SLOP OVER?
010304  100415                         BMI    5$              ;YES
010306  005337  010436                 DEC    GBTMP           ;NO-WAIT A WHILE
010312  105737  010436                 TSTB   GBTMP           ;DONE WAITING?
010316  001370                         BNE    6$              ;NO
010320                                 BREAK                  ;YES-NO SLOP OVER
        010320  104422                                                  TRAP    C$BRK
010322  012700  007424                 MOV    #EXON,R0        ;START DEVICE TALKING
010326  004737  007100                 CALL   SNDBYT          ;AGAIN
010332  013700  010440                 MOV    GBTMP2,R0       ;RESTORE R0
010336  000426                         BR     7$              ;END KLUGE
010340  013700  010440          5$:      MOV    GBTMP2,R0       ;RESTORE R0
010344  017565  000024  000074         MOV    @RCDB(R5),DLV(R5)  ;GET ERROR + BYTE
010352  116520  000074                 MOVB   DLV(R5),(R0)+   ;COPY BYTE TO BUFFER
010356  005765  000074                 TST    DLV(R5)         ;ERROR?
010362  100403                         BMI    17$             ;YES-EXIT
```

```
2262 010364  005065  000074              CLR     DLV(R5)          ;NO-CLEAR
2263 010370  000400                      BR      17$              ;EXIT
2264 010372  010037  010440      17$:    MOV     R0,GBTMP2        ;AGAIN SAVE R0
2265 010376  012700  007424              MOV     #EXON,R0         ;RESTORE TO TALKING STATE
2266 010402  004737  007100              CALL    SNDBYT           ;BY SENDING 'XON'
2267 010406  013700  010440              MOV     GBTMP2,R0        ;RESTORE R0
2268 010412  000410                      BR      4$               ;DONE
2269 010414  005037  010436      7$:     CLR      GBTMP
2270 010420  005304                      DEC     R4               ;TIMEOUT?
2271 010422  001277                      BNE     1$               ;NO
2272 010424  012704  000050              MOV     #TORCVB,R4       ;YES
2273 010430  004737  012500              CALL    LOG              ;LOG ERROR.
2274 010434  000207              4$:     RETURN                   ;RETURN
2275 010436  000000              GBTMP:  .WORD   0
2276 010440  000000              GBTMP2: .WORD   0
```

```
                        .SBTTL  CHKANS / CHECK DEVICE(S) RESPONSE

                        ;++
                        ; CHKANS - AS IN "GETANS", IF RETRYING DO ONLY 1 UNIT ELSE DO ALL NON-
                        ;          ABORTED UNITS.  NOTE, IF IN TEST 8 AND THE UNIT IS NOT
                        ;          MODIFIED DO NOT CHECK UNIT.
                        ; INPUTS:  IMPLIED SYSTAT BIT1 (RETRYING)
                        ;          BLKTBL - TOP OF DATA BLOCK ALLOCATION TABLE
                        ;          LSTDEV - ADDR. OF LAST UNIT'S DATA BLOCK
                        ;
                        ; OUTPUTS: NONE PASSED.
                        ;--

010442  000240          CHKANS:: NOP                    ;IF RETRY THEN CHECK ONE
                                                        ;ELSE CHECK ALL
010444  032737  000006  003304          BIT     #BIT1!BIT2,SYSTAT       ;RETRYING?
010452  001403                          BEQ     CHK8            ;NO DO NORMAL
010454  004737  010552                  CALL    CHKPKS          ;YES DO SINGLE UNIT
                                                        ;R5 -> UNIT
010460  000432                          BR      CHKANR          ;ALL DONE

010462  012737  003346  010550  CHK8:   MOV     #BLKTBL,CHKPTR  ;YOU KNOW ... TOP OF TABLE
010470  017705  000054          2$:     MOV     @CHKPTR,R5      ;GET UNIT'S BLOCK ADDRESS
010474  032715  100000                  BIT     #BIT15,@R5      ;ABORTED?
010500  001012                          BNE     3$              ;YES
010502  022737  000002  003340          CMP     #2,TEST8        ;***** IS THIS TEST 8
010510  001004                          BNE     1$              ;***** NO-CONTINUE NORMALLY
010512  022765  000000  000210          CMP     #0,MRSP(R5)     ;***** IF SO, IS THIS UNIT MODIFIED
010520  001402                          BEQ     3$              ;***** NO SKIP NEXT INSTR
010522  004737  010552          1$:     CALL    CHKPKS          ;NO, DO THIS GUY
010526  023727  010550  003364  3$:     CMP     CHKPTR,#LSTDEV  ;ALL DONE?
010534  103004                          BHIS    CHKANR          ;YES
010536  062737  000002  010550          ADD     #2,CHKPTR       ;NO,-->NEXT DEVICE
010544  000751                          BR      2$              ;DO DA

010546  000207          CHKANR: RETURN

010550  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.
                                ;          THIS ROUTINE IS ALSO USED TO DETERMINE THE PROTOCOL OF A UNIT.  IN
                                ;          THE FIRST PART OF TEST 8 A GET CHARACTERISTICS COMMAND PACKET WAS
                                ;          SENT TO THE TU58.  IF THE RESPONSE WAS A DATA PACKET, WHICH IS
                                ;          EXPECTED, THEN THE UNIT IS NOT MODIFIED, AND THE MRSP FLAG IS
                                ;          CLEARED.  IF THE RESPONSE IS AN END PACKET, WHICH WOULD BE
                                ;          HANDLED BY THIS ROUTINE AS AN UNKNOWN, THEN THE UNIT IS MODIFIED,
                                ;          AND THE MRSP FLAG IS SET.
                                ; INPUTS:  (IMPLIED) UNITS DATA BLOCK
                                ;
                                ; OUTPUTS: ERRORS - DLV ERROR
                                ;                 - UNKNOWN FLAG BYTE ERROR
                                ;                 - CHECKSUM ERROR
                                ;                 - DATA COMPARE ERROR
                                ;          R4 = ERROR NUMBER
                                ;          SYSTAT UPPER BYTE = 1ST BYTE OF RESPONSE
                                ;--

010552  000240                  CHKPKS:: NOP                    ;CHECK WHAT WAS RECIEVED
010554  042715  000010                  BIC     #BIT3,@R5       ;CLEAR 'BAD FLAG' RETRY BIT
010560  016500  000102                  MOV     RCVBUF(R5),R0   ;GET BUFFER ADDR.
010564  116502  000032                  MOVB    XSPKNM(R5),R2   ;AND # OF PACKETS EXPECTED
010570  012703  000034                  MOV     #XSFLG,R3       ;THE OFFSET VALUE
010574  060503                          ADD     R5,R3           ;R3-->THIS UNIT XSFLG AGAIN
010576  010301                          MOV     R3,R1           ;COPY TO R1
010600  062701  000002                  ADD     #2,R1           ;R1-->XSBCNT FOR 1ST PACKET
010604  010065  000104          1$:     MOV     R0,PKPTR(R5)    ;POINT TO PACKET
010610  111037  003305                  MOVB    @R0,SYSTAT+1    ;SAVE RCV'D BYTE
010614  011137  003314                  MOV     @R1,RCBCNT      ;GET COUNT
010620  011337  003312                  MOV     @R3,RCFLG       ;AND FLAG
010624  121013                          CMPB    @R0,@R3         ;1ST BYTE=EXPECTED?
010626  001057                          BNE     5$              ;UH OH...
010630  121027  000020                  CMPB    @R0,#RSCONT     ;OK, IS IT 1 BYTE?
010634  001534                          BEQ     7$              ;YES...ONTO NEXT PACK
                                                                ;NO, SO > 1 BYTE (NEVER EXPECT INIT!)
010636  013704  003314                  MOV     RCBCNT,R4       ;EXPECTED, SO COUNT MUST BE RIGHT
010642  005744                          TST     -(R4)           ;ADJUST FROM RECEIVE COUNT TO COUNT FOR CHECKSUM
010644  004737  013614                  CALL    CKCKSM          ;CHECK CHECKSUM
010650  103005                          BCC     2$              ;NO CARRY...NO INCORRECT
010652  012704  000022                  MOV     #BDCHK,R4       ;ERROR
010656  004737  012500                  CALL    LOG             ;LOG IT
010662  000521                          BR      7$              ;ON TO NEXT PACK
010664  122710  000002          2$:     CMPB    #RSEND,(R0)     ;END PAK?
010670  001005                          BNE     3$              ;NO
010672  004737  011146                  CALL    CHKEND          ;YES-CHECK
010676  012702  000001                  MOV     #1,R2           ;LAST PACKET
010702  000511                          BR      7$              ;AND FALL THROUGH
010704  122710  000001          3$:     CMPB    #RSDATA,@R0     ;DATA PAK?
010710  001012                          BNE     4$              ;NO
010712  022737  000001  003340          CMP     #1,TEST8        ;***** IS THIS TEST 8
```

```
2376 010720  001003                    BNE     11$             ;***** NO-CONTTINUE NORMALLY
2377 010722  005065  000210            CLR     MRSP(R5)        ;***** CLR MRSP FLAG
2378 010726  000402                    BR      12$             ;***** SKIP INSTR
2379 010730  004737  014414  11$:      CALL    COMPAR          ;YES-CHECK DATA
2380 010734  000474          12$:      BR      7$              ;ALL DONE?
2381 010736  052715  020010  4$:       BIS     #BIT3!BIT13,@R5 ;SET 'BAD FLAG' RETRY FLAGS
2382 010742  012704  000010            MOV     #OTL,R4         ;OUT TO LUNCH
2383 010746  005765  000074            TST     DLV(R5)         ;AH,BUT DLV ERROR?
2384 010752  001402                    BEQ     20$             ;NO
2385 010754  012704  000012            MOV     #OVRN,R4        ;YES-USE CORRECT ERROR #
2386 010760  004737  012500  20$:      CALL    LOG             ;TALLY
2387 010764  000467                    BR      8$              ;DONE
2388
2389                          ;HERE CHECKS UNEXPECTED RESPONSE
2390
2391 010766  122710  000004  5$:       CMPB    #RSINIT,@R0     ;INIT?
2392 010772  001007                    BNE     6$              ;NO
2393 010774  052715  020010            BIS     #BIT3!BIT13,@R5 ;YES-SET RETRY FLAGS
2394 011000  012704  000006            MOV     #RCINIT,R4      ; WE GOT AN INIT
2395 011004  004737  012500            CALL    LOG             ;TALLY IT
2396 011010  000455                    BR      8$              ;DONE
2397 011012  122710  000001  6$:       CMPB    #RSDATA,@R0     ;DATA PAK?
2398 011016  001013                    BNE     9$              ;NO
2399 011020  012704  000204            MOV     #RSDASZ,R4      ;YES, USE DATA SIZE
2400 011024  005744                    TST     -(R4)           ;ADJUST FOR CHKSUM
2401 011026  004737  013614            CALL    CKCKSM          ;AND CHECK
2402 011032  103430                    BCS     10$             ;GOOF
2403 011034  004737  014414            CALL    COMPAR          ;OK, HOW'S THE DATA?
2404                                                           ;EXPECTED END, GOT
2405                                                           ;DATA + END.
2406 011040  062700  000204            ADD     #RSDASZ,R0      ;POINT TO END PACK
2407 011044  000657                    BR      1$              ;CHECK IT, USE SAME XSFLG
2408
2409 011046  122710  000002  9$:       CMPB    #RSEND,(R0)     ;END?
2410 011052  001331                    BNE     4$              ;NO-OUT TO LUNCH
2411 011054  012704  000016            MOV     #RSSNSZ,R4      ;YES, TOTAL SIZE MINUS
2412 011060  005744                    TST     -(R4)           ;TWO (THE CHKSUM)
2413 011062  004737  013614            CALL    CKCKSM          ;CHECK IT
2414 011066  103412                    BCS     10$             ;OOPS
2415 011070  022737  000001  003340    CMP     #1,TEST8        ;***** IS THIS TEST 8
2416 011076  001003                    BNE     13$             ;***** NO-CONTINUE NORMALLY
2417 011100  012765  000001  000210    MOV     #1,MRSP(R5)     ;***** IF SO, SET THE MRSP FLAG
2418 011106  004737  011146  13$:      CALL    CHKEND          ;OK,NOW TEST SUC. CODE
2419
2420 011112  000414                    BR      8$              ;ALL DONE
2421
2422 011114  012704  000022  10$:      MOV     #BDCHK,R4       ;CHECKSUM ERROR
2423 011120  004737  012500            CALL    LOG
2424 011124  000407                    BR      8$              ;EXIT
2425
2426 011126  005302          7$:       DEC     R2              ;ANY PACKETS LEFT TO CHECK?
2427 011130  001405                    BEQ     8$              ;NO, ALL DONE
2428 011132  063700  003314            ADD     RCBCNT,R0       ;YES, POINT TO NEXT PACKET
2429 011136  022121                    CMP     (R1)+,(R1)+     ;POINT TO NEXT EXPECTED COUNT
2430 011140  022323                    CMP     (R3)+,(R3)+     ;AND EXPECTED FLAG
2431 011142  000620                    BR      1$              ;TRY ANOTHER,THEY'RE SMALL
2432 011144  000207          8$:       RETURN                  ;RETURN
```

```
                        .SBTTL  CHKEND / CHECK SUCCESS AND DETERMINE RETRY STATUS /

                        ;++
                        ; CHKEND - IF RETRYING;DETERMINE IF DATA ERROR OR BAD FLAG BYTE ERROR RETRY.
                        ;
                        ;       IF RETRYING BAD FLAG:RESET RETRY FLAG(SINCE OPERATION IS COMPLETE),
                        ;       AND CHECK SUCCESS CODE.
                        ;        IF RETRYING DATA ERROR ; 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 DATA ERROR;  CHECK IF 'DATA CHECK' ERROR SUCCESS CODE,
                        ;          AND IF SO,START RETRY, ELSE EXIT.
                        ; INPUTS:  IMPLIED  UNITS DATA BLOCK
                        ; OUTPUTS: RETRY (SYSTAT BIT 1AND 2), (BIT10 @R5) RESET IF RETRYING.
                        ;          -  DATA COMARE ERROR (BIT6 @R5) CLEARED.
                        ;          -   REDUCED/NORMAL GAIN (BIT7 @R5) ADJUSTED
                        ;--

011146  000240          CHKEND:: NOP
011150                          PUSH    R0              ;R0 --> END PAK
011150  010046                                          MOV     R0,-(SP)

011152                          PUSH    R4
011152  010446                                          MOV     R4,-(SP)

011154  032737  000006  003304  1$:     BIT     #BIT1!BIT2,SYSTAT       ;RETRYING?
011162  001406                        BEQ     NOREE           ;NO-CHECK NORMALLY
011164  032737  000004  003304        BIT     #BIT2,SYSTAT    ;IS IT BAD FLAG TYPE?
011172  001454                        BEQ     CHKREE          ;NO(DATA TYPE)
011174  042715  020000                BIC     #BIT13,@R5      ;YES, SO IF END PACK THEN RETRY'S COMPLETE
011200  004737  012164        NOREE:  CALL    CHKSUC          ;CHECK SUCCESS CODE
011204  032715  100000                BIT     #BIT15,@R5      ;ABORTED?
011210  001402                        BEQ     3$              ;NO,CONTINUE
011212  000137  011670                JMP     CHKRET          ;YES,EXIT
011216  105765  000077        3$:     TSTB    SUCCS+1(R5)     ;NO; HOW'D WE DO?
011222  001013                        BNE     CHKERR          ;NOT SO GOOD.
011224  032715  000100                BIT     #BIT6,@R5       ;OK, HOST FIND DATA PAK ERROR?
011230  001002                        BNE     2$              ;YES
011232  000137  011670                JMP     CHKRET          ;NO
011236  012704  000014        2$:     MOV     #BDCOM,R4       ;YES;  JUST BAD DATA-NO DATACHK ERR
011242  004737  012500                CALL    LOG             ;BAD DATA IN PACKET
011246  000137  011670                JMP     CHKRET          ;QUIT
011252  032715  001000        CHKERR: BIT     #BIT9,@R5       ;BAD SUCCESS; TU DATA CHK ERROR?
011256  001002                        BNE     1$              ;YES
011260  000137  011670                JMP     CHKRET          ;NO. ALL DONE.
011264  052715  002000        1$:     BIS     #BIT10,@R5      ;YES-START RETRY
011270  012765  000001  000002        MOV     #1,RETRY(R5)    ;CALL IT 1ST
011276                          PRINTX  #RTRYN,RETRY(R5)  ;** PRINT **
011276  016546  000002                                                  MOV     RETRY(R5),-(SP)
011302  012746  012050                                                  MOV     #RTRYN,-(SP)
011306  012746  000002                                                  MOV     #2,-(SP)
011312  010600                                                          MOV     SP,R0
011314  104415                                                          TRAP    C$PNTX
```

```
                011316  062706  000006                                                          ADD     #6,SP
2481            011322  000562          BR      CHKRET          ;ALL DONE
2482            011324  004737  012164  CHKREE: CALL    CHKSUC          ;CHECK SUCCESS CODE
2483            011330  105765  000077          TSTB    SUCCS+1(R5)     ; SUCCESSFUL YET?
2484            011334  001054          BNE     UNSUC           ;NO, CHECK COUNT
2485            011336          PRINTX  #RECOV,RETRY(R5)
                011336  016546  000002                                                          MOV     RETRY(R5),-(SP)
                011342  012746  011710                                                          MOV     #RECOV,-(SP)
                011346  012746  000002                                                          MOV     #2,-(SP)
                011352  010600                                                                  MOV     SP,R0
                011354  104415                                                                  TRAP    C$PNTX
                011356  062706  000006                                                          ADD     #6,SP
2486            011362  105715          TSTB    (R5)            ;DETERMINE THRESHOLD
2487            011364  100411          BMI     2$              ;IT'S MODIFIED
2488            011366          PRINTX  #THRSLO         ;NORMAL
                011366  012746  011770                                                          MOV     #THRSLO,-(SP)
                011372  012746  000001                                                          MOV     #1,-(SP)
                011376  010600                                                                  MOV     SP,R0
                011400  104415                                                                  TRAP    C$PNTX
                011402  062706  000004                                                          ADD     #4,SP
2489            011406  000410          BR      3$
2490            011410  2$:     PRINTX  #THRSHI         ;ENHANCED
                011410  012746  012016                                                          MOV     #THRSHI,-(SP)
                011414  012746  000001                                                          MOV     #1,-(SP)
                011420  010600                                                                  MOV     SP,R0
                011422  104415                                                                  TRAP    C$PNTX
                011424  062706  000004                                                          ADD     #4,SP
2491            011430  032715  000400  3$:     BIT     #BIT8,@R5       ;WRITE OR READ OPERATION?
2492            011434  001003          BNE     4$              ;WRITE
2493            011436  012704  000002          MOV     #SFTRD,R4       ;READ
2494            011442  000402          BR      5$
2495            011444  012704  000004  4$:     MOV     #SFTWR,R4       ;WRITE
2496            011450  004737  012500  5$:     CALL    LOG
2497            011454  005065  000002          CLR     RETRY(R5)       ;RESTORE TO NORMAL STATE
2498            011460  042715  002200          BIC     #BIT10!BIT7,@R5 ;NO RETRY, NORM THRESHOLD
2499            011464  000501          BR      CHKRET          ;QUIT
2500
2501            011466  000240  UNSUC:  NOP                     ;RETRYING;  SEE IF HARD YET
2502            011470  032715  001000          BIT     #BIT9,@R5       ;TU DATA CHECK ERROR?
2503            011474  001015          BNE     2$              ;YES
2504            011476          PRINTB  #RETERR         ;NO-''OTHER-ERROR'' ERROR
                011476  012746  012112                                                          MOV     #RETERR,-(SP)
                011502  012746  000001                                                          MOV     #1,-(SP)
                011506  010600                                                                  MOV     SP,R0
                011510  104414                                                                  TRAP    C$PNTB
                011512  062706  000004                                                          ADD     #4,SP
2505            011516  005065  000002          CLR     RETRY(R5)       ;NO RETRIES
2506            011522  042715  002200          BIC     #BIT10!BIT7,@R5 ;NO RETRY, NORM THRESHOLD
2507            011526  000460          BR      CHKRET          ;EXIT
2508            011530  023765  003326  000002  2$:     CMP     MXRTRY,RETRY(R5)  ;YES. DID WE GRADUATE TO HARD?
2509            011536  001425          BEQ     HRD1            ;YES
2510            011540  005265  000002          INC     RETRY(R5)       ;NO.  JUST ANOTHER
2511            011544          PRINTX  #RTRYN,RETRY(R5)  ;PRINT OUT
                011544  016546  000002                                                          MOV     RETRY(R5),-(SP)
                011550  012746  012050                                                          MOV     #RTRYN,-(SP)
                011554  012746  000002                                                          MOV     #2,-(SP)
                011560  010600                                                                  MOV     SP,R0
```

```
                011562  104415                                                                          TRAP    C$PNTX
                011564  062706  000006                                                                  ADD     #6,SP
2512            011570  032715  000200                  BIT     #BIT7,@R5       ;WAS NORMAL THRESHOLD?
2513            011574  001403                          BEQ     1$              ;YES-REDUCE GAIN
2514            011576  042715  000200                  BIC     #BIT7,@R5       ;NO-NORM
2515            011602  000432                          BR      CHKRET
2516            011604  052715  000200          1$:     BIS     #BIT7,@R5       ;REDUCED
2517            011610  000427                          BR      CHKRET          ;DONE
2518            011612  000240                  HRD1:   NOP                     ;HERE IS HARD ERROR!
2519            011614                                  PRINTX  #UNREC
                011614  012746  012070                                                                  MOV     #UNREC,-(SP)
                011620  012746  000001                                                                  MOV     #1,-(SP)
                011624  010600                                                                          MOV     SP,R0
                011626  104415                                                                          TRAP    C$PNTX
                011630  062706  000004                                                                  ADD     #4,SP
2520            011634  032715  000400                  BIT     #BIT8,@R5       ;RD OR WR?
2521            011640  001003                          BNE     4$              ;WRITE
2522            011642  012704  000016                  MOV     #HRDRD,R4       ;READ
2523            011646  000402                          BR      5$              ;LOG IT
2524            011650  012704  000020          4$:     MOV     #HRDWR,R4       ;WRITE
2525            011654  004737  012500          5$:     CALL    LOG             ;LOG IT
2526            011660  005065  000002                  CLR     RETRY(R5)       ;BACK TO NORMAL
2527            011664  042715  002200                  BIC     #BIT10!BIT7,@R5 ;NO RETRY, NOT REDUCED
2528
2529            011670  042737  000006  003304  CHKRET: BIC     #BIT1!BIT2,SYSTAT       ;NO SYSTEM RETRY NEXT PASS
2530            011676  042715  000100                  BIC     #BIT6,@R5       ;NO MORE HOST DATA CHECK ERROR
2531            011702                                  POP     R4
                011702  012604                                                  MOV     (SP)+,R4

2532            011704                                  POP     R0
                011704  012600                                                  MOV     (SP)+,R0

2533            011706  000207                          RETURN
2534
2535
2536            011710      045     101     122 RECOV:  .ASCIZ  /%ARECOVERED FROM DATA CHECK ERROR RETRY # %D1%N/
2537                                                    .EVEN
2538            011770      045     101     040 THRSLO: .ASCIZ  /%A NORMAL THRESHOLD%N/
2539                                                    .EVEN
2540            012016      045     101     040 THRSHI: .ASCIZ  /%A MODIFIED THRESHOLD %N/
2541                                                    .EVEN
2542            012050      045     101     122 RTRYN:  .ASCIZ  /%ARETRY # %D1%N/
2543                                                    .EVEN
2544            012070      045     101     125 UNREC:  .ASCIZ  /%AUNRECOVERABLE%N/
2545                                                    .EVEN
2546            012112      045     101     117 RETERR: .ASCIZ  /%AOTHER ERROR DURING RETRY : EXIT RETRY%N/
2547                                                    .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
                                ;--

012164  000240          CHKSUC:: NOP
012166  016065  000002  000076          MOV     2(R0),SUCCS(R5) ;R0-->END PACKET
012174  122760  000000  000003          CMPB    #ESOK,3(R0)     ;GET SUCCESS BYTE
012202  001535                         BEQ     12$             ;COMPLETE SUCCESS-EXIT

012204  122760  000001  000003          CMPB    #ESTRY,3(R0)    ;OK BUT RETRIES?
012212  001012                         BNE     20$             ;NO
012214  126527  000100  000002          CMPB    CMDSNT(R5),#RSSRD;A READ?
012222  001001                         BNE     22$             ;NO

012224  000520                         BR      10$             ;NO RETRIES IN MAINTENANCE'
012226  126527  000100  000003  22$:    CMPB    CMDSNT(R5),#RSSWR       ;A WRITE?
012234  001001                         BNE     20$             ;NO
012236  000513                         BR      10$             ;LOG IT
012240  122760  177737  000003  20$:    CMPB    #ESNOMO,3(R0)   ;NO MOTOR?
012246  001003                         BNE     1$              ;NO
012250  012704  000030                 MOV     #NOMOT,R4       ;YES-
012254  000506                         BR      11$             ;LOG

012256  122760  177757  000003  1$:     CMPB    #ESCKS,3(R0)    ;"DATA CHECK" ERROR?
012264  001003                         BNE     2$              ;NO
012266  052715  001000                 BIS     #BIT9,@R5       ;SET DATA-CHK-ERROR FLAG
012272  000501                         BR      12$             ;DONT LOG

012274  126527  000100  000007  2$:     CMPB    CMDSNT(R5),#RSSSLF  ;SELF TEST?
012302  001006                         BNE     3$              ;NOPE
012304  105760  000003                 TSTB    3(R0)           ;YES, NEG. IF ERROR
012310  100072                         BPL     12$             ;OK

012312  012704  000044                 MOV     #SLFER,R4       ;YES-ERROR
012316  000465                         BR      11$             ;LOG IT

012320  122760  177740  000003  3$:     CMPB    #ESSK,3(R0)     ;SEEK ERROR?
012326  001005                         BNE     4$              ;NO
012330  012704  000024                 MOV     #SKERR,R4       ;YES-
012334  052705  040000                 BIS     #BIT14,R5       ;SET 'DOBRK' FLAG
012340  000454                         BR      11$             ;LOG

012342  122760  177767  000003  4$:     CMPB    #ESNCRT,3(R0)   ;NO CART?
012350  001003                         BNE     5$              ;NO
012352  012704  000054                 MOV     #NCART,R4       ;YES-
012356  000445                         BR      11$             ;LOG
```

```
2607 012360  122760  177720  000003  5$:    CMPB   #ESCMD,3(R0)    ;NO UNDERSTAND HOST?
2608 012366  001003                        BNE    6$              ;NO
2609 012370  012704  000040                MOV    #CMNDER,R4      ;YES-
2610 012374  000436                        BR     11$             ;LOG
2611
2612 012376  122760  177770  000003  6$:    CMPB   #ESNONX,3(R0)   ;NON EXISTENT UNIT?
2613 012404  001003                        BNE    7$              ;NO
2614 012406  012704  000036                MOV    #NOUNIT,R4      ;YES-
2615 012412  000427                        BR     11$             ;LOG
2616
2617 012414  122760  177765  000003  7$:    CMPB   #ESWLOC,3(R0)   ;WRITE LOCKED?
2618 012422  001003                        BNE    8$              ;NO
2619 012424  012704  000026                MOV    #WRLOCK,R4      ;YES-
2620 012430  000420                        BR     11$             ;LOG
2621
2622 012432  122760  177776  000003  8$:    CMPB   #ESPART,3(R0)   ;PARTIAL OP?
2623 012440  001003                        BNE    9$              ;NO
2624 012442  012704  000034                MOV    #PARTL,R4       ;YES-
2625 012446  000411                        BR     11$             ;LOG
2626
2627 012450  122760  177711  000003  9$:    CMPB   #ESREC,3(R0)    ;WRONG RECORD?
2628 012456  001003                        BNE    10$             ;NO
2629 012460  012704  000042                MOV    #RECERR,R4      ;YES-
2630 012464  000402                        BR     11$             ;LOG
2631
2632 012466  012704  000046          10$:  MOV    #SUCOTL,R4      ;UNDEFINED
2633 012472  004737  012500          11$:  CALL   LOG             ;LOG ERROR
2634 012476  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
                                ;--

012500                          LOG::   PUSH    R0
012500  010046                                  MOV     R0,-(SP)

012502                                  PUSH    R1
012502  010146                                  MOV     R1,-(SP)

012504                                  PUSH    R3
012504  010346                                  MOV     R3,-(SP)

012506                                  PUSH    R4
012506  010446                                  MOV     R4,-(SP)


012510  011537  002074                  MOV     @R5,L$LUN       ;GET UNIT NUMBER
012514  042737  177770  002074          BIC     #177770,L$LUN   ;MASK IT OFF
012522  010465  000004                  MOV     R4,ABNDX(R5)    ;SAVE INDEX IN CASE OF ABORT MESSAGE
012526  012703  000120                  MOV     #LGOFST,R3      ;OFFSET TO LOW ORDER BYTE (DRIVE0)
012532  060403                          ADD     R4,R3           ;FORM INDEX OF PARAM. TO UPDATE
012534  060503                          ADD     R5,R3           ;FORM ABSOLUTE ADDR. THIS UNIT
012536  004737  013504                  CALL    WHCHDR          ;SEE WHICH DRIVE T'WAS
012542  103001                          BCC     2$              ;WAS DRIVE 0
012544  005203                          INC     R3              ;DRIVE 1; POINT TO UPPER BYTE
012546  122713  000377          2$:     CMPB    #255.,@R3       ;POTENTIAL OVERFLOW POSSIBLE?
012552  001005                          BNE     LOGOK           ;NO
012554                          LOG0:   ERRDF   0.,OVRFLO,ERRDES  ;YES
012554  104455                                                          TRAP    C$ERDF
012556  000000                                                          .WORD   0
012560  013400                                                          .WORD   OVRFLO
012562  013034                                                          .WORD   ERRDES
012564  000512                          BR      ABO             ;ABORT UNIT
012566  105213                  LOGOK:  INCB    @R3             ;INCREMENT THE ERROR
012570  111304                          MOVB    @R3,R4          ;TEMP'LY SAVE IT
012572  016503  000004                  MOV     ABNDX(R5),R3    ;GET INDEX AGAIN
012576  012701  002224                  MOV     #RSNTAB,R1      ;FORM ADRS OF MSG
012602  066501  000004                  ADD     ABNDX(R5),R1    ;LIKE THIS
012606  042701  000001                  BIC     #BIT0,R1        ;INSURE WORD BOUNDARY
012612  032737  000004  016616          BIT     #EVL,FLGLOC     ;EVL SELECTED?
012620  001414                          BEQ     LOGOK2          ;NO-CONT
```

```
 2678 012622  123704  002220                 CMPB    EVLTHR,R4       ;YES,OVER THRESHOLD?
 2679 012626  101011                         BHI     LOGOK2          ;NO
 2680 012630  010337  012642                 MOV     R3,DFTL1+2      ;YES,LOAD ERROR #
 2681 012634  011137  012644                 MOV     @R1,DFTL1+4     ;AND MESSAGE ADDR
 2682 012640                         DFTL1:  ERRDF   0,DFTL1,ERRDES  ;ERROR
      012640  104455                                                          TRAP    C$ERDF
      012642  000000                                                         .WORD   0
      012644  012640                                                         .WORD   DFTL1
      012646  013034                                                         .WORD   ERRDES
 2683 012650  000460                         BR      ABO             ;DROP IT
 2684 012652  120327  000014         LOGOK2: CMPB    R3,#BDCOM       ;'NEVER FATAL' TYPE?
 2685 012656  103011                         BHIS    NTSFT           ;NO
 2686 012660  010337  012672                 MOV     R3,LOG1+2       ;YES, ERROR CODE
 2687 012664  011137  012674                 MOV     @R1,LOG1+4      ;DESCRIPTION
 2688 012670                         LOG1:   ERRSOFT 0.,LOG1,ERRDES
      012670  104457                                                          TRAP    C$ERSOFT
      012672  000000                                                         .WORD   0
      012674  012670                                                         .WORD   LOG1
      012676  013034                                                         .WORD   ERRDES
 2689 012700  000450                         BR      LOGO            ;EXIT
 2690
 2691 012702  120327  000026         NTSFT:  CMPB    R3,#WRLOCK      ;ONE TRY?
 2692 012706  103411                         BLO     MABEE           ;NO, MAYBE A MULTIPLE
 2693 012710  010337  012722                 MOV     R3,LOG2+2.      ;YES
 2694 012714  011137  012724                 MOV     @R1,LOG2+4
 2695 012720                         LOG2:   ERRHRD  0,LOG2,ERRDES   ;PRINT HARD MESSAGE
      012720  104456                                                          TRAP    C$ERHRD
      012722  000000                                                         .WORD   0
      012724  012720                                                         .WORD   LOG2
      012726  013034                                                         .WORD   ERRDES
 2696 012730  000430                         BR      ABO             ;DROP UNIT
 2697
 2698 012732  042704  177400         MABEE:  BIC     #177400,R4      ;NEGATE SIGN EXTEND
 2699 012736  163704  003316         1$:     SUB     FTLNM,R4        ;SEE IF MULTIPLE OF
 2700 012742  001413                         BEQ     HRD             ;FTLNM-YES!
 2701 012744  103401                         BLO     SFT             ;NO
 2702 012746  000773                         BR      1$              ;NOT THERE YET
 2703
 2704 012750  010337  012762         SFT:    MOV     R3,LOG3+2       ;ERROR CODE
 2705 012754  011137  012764                 MOV     @R1,LOG3+4      ;DESCRIPTION
 2706 012760                         LOG3:   ERRSOFT 0,LOG3,ERRDES
      012760  104457                                                          TRAP    C$ERSOFT
      012762  000000                                                         .WORD   0
      012764  012760                                                         .WORD   LOG3
      012766  013034                                                         .WORD   ERRDES
 2707 012770  000414                         BR      LOGO            ;EXIT
 2708 012772  010337  013004         HRD:    MOV     R3,LOG3B+2      ;HARD ERROR CODE
 2709 012776  011137  013006                 MOV     @R1,LOG3B+4     ;DESCRIPTION
 2710 013002                         LOG3B:  ERRHRD  0,LOG3B,ERRDES
      013002  104456                                                          TRAP    C$ERHRD
      013004  000000                                                         .WORD   0
      013006  013002                                                         .WORD   LOG3B
      013010  013034                                                         .WORD   ERRDES
 2711
 2712 013012  011500         ABO:    MOV     @R5,R0          ;GET UNIT NUMBER
 2713 013014  042700  177770                 BIC     #177770,R0      ;UN-SIGN EXTEND
 2714 013020                                 DODU    R0              ;USE LOGICAL # TO DROP
```

```
                013020  104451                                                  TRAP    C$DODU
2715            013022                  LOGO:   POP     R4              ;RESTORE
                013022  012604                                          MOV     (SP)+,R4

2716            013024                          POP     R3
                013024  012603                                          MOV     (SP)+,R3

2717            013026                          POP     R1
                013026  012601                                          MOV     (SP)+,R1

2718            013030                          POP     R0
                013030  012600                                          MOV     (SP)+,R0

2719            013032  000207                  RETURN                  ;RETURN
```

```
                        ;++
                        ; ERRDES - CONTAINS CODE FOR EXTENDED ERROR INFORMATION:  DRIVE #,
                        ;          BLOCK #, ETC.
                        ;--

                                BGNMSG  ERRDES          ;ERROR DESCRIPTION
013034                                                                  ERRDES::
                                PUSH    R0
013034  010046                                 MOV     R0,-(SP)

                                PUSH    R2
013036  010246                                 MOV     R2,-(SP)

013040  005002                  CLR     R2              ;PRESET TO DATA TYPE
013042  032715  000020          BIT     #BIT4,@R5       ;WHAT PACK TYPE?
013046  001401                  BEQ     2$              ;DATA
013050  005202                  INC     R2              ;COMMAND
013052                  2$:     PRINTB  #UNIT,<B,DR(R5)>,R2,<B,SYSTAT+1>
013052  005046                                                          CLR     -(SP)
013054  153716  003305                                                  BISB    SYSTAT+1,(SP)
013060  010246                                                          MOV     R2,-(SP)
013062  005046                                                          CLR     -(SP)
013064  156516  000060                                                  BISB    DR(R5),(SP)
013070  012746  013226                                                  MOV     #UNIT,-(SP)
013074  012746  000004                                                  MOV     #4,-(SP)
013100  010600                                                          MOV     SP,R0
013102  104414                                                          TRAP    C$PNTB
013104  062706  000012                                                  ADD     #12,SP
013110  016500  000064          MOV     REC(R5),R0      ;RECORD NUMBER
013114  016502  000072          MOV     PATTEN(R5),R2   ;DATA EXPECTED
013120                          PRINTB  #RECID,R0,<B,CMDSNT(R5)>,<B,R2>,<B,SUCCS+1(R5)>
013120  005046                                                          CLR     -(SP)
013122  156516  000077                                                  BISB    SUCCS+1(R5),(SP)
013126  005046                                                          CLR     -(SP)
013130  150216                                                          BISB    R2,(SP)
013132  005046                                                          CLR     -(SP)
013134  156516  000100                                                  BISB    CMDSNT(R5),(SP)
013140  010046                                                          MOV     R0,-(SP)
013142  012746  013306                                                  MOV     #RECID,-(SP)
013146  012746  000005                                                  MOV     #5,-(SP)
013152  010600                                                          MOV     SP,R0
013154  104414                                                          TRAP    C$PNTB
013156  062706  000014                                                  ADD     #14,SP
013162  005765  000074          TST     DLV(R5)         ;DLV ERROR?
013166  001414                  BEQ     3$              ;NO
013170                          PRINTB  #RECID2,DLV(R5) ;YES-PRINT
013170  016546  000074                                                  MOV     DLV(R5),-(SP)
013174  012746  013462                                                  MOV     #RECID2,-(SP)
013200  012746  000002                                                  MOV     #2,-(SP)
013204  010600                                                          MOV     SP,R0
013206  104414                                                          TRAP    C$PNTB
013210  062706  000006                                                  ADD     #6,SP
013214  005065  000074          CLR     DLV(R5)         ;RESET
013220                  3$:     POP     R2              ;RESTORE
013220  012602                                  MOV     (SP)+,R2
```

```
2743 013222                            POP     R0
     013222  012600                            MOV     (SP)+,R0

2744 013224                            ENDMSG                  ;EXIT
     013224                                                          L10003:
     013224  104423                                                         TRAP    C$MSG
2745 013226     045     101     104  UNIT::  .ASCIZ  /%ADRIVE#  %01%A  PAK SENT %01%A FLAG RCVD %03%N/
2746                                 .EVEN
2747 013306     045     101     102  RECID:: .ASCIZ  /%ABLOCK#  %04%A COMMAND %02%A EXPCTD %03%A SUCCESS %03%N/
2748                                 .EVEN
2749 013400     103     101     116  OVRFLO: .ASCIZ  /CAN'T UPDATE ERROR OR STATISTIC:OVERFLOW PENDING/
2750                                 .EVEN
2751 013462     045     101     040  RECID2: .ASCIZ  /%A RCDB WAS %06%N/
2752                                 .EVEN
```

```
                                .SBTTL  WHCHDR / SEE WHICH DRIVE IS ACTIVE

                                ;++
                                ; INPUTS:  DR(R5)
                                ; OUTPUTS:  CARRY=DRIVE (1 OR 0)
                                ;--

013504  000241                  WHCHDR:: CLC                    ;CLEAR CARRY

013506  105765  000060                 TSTB    DR(R5)         ;DR 0?
013512  001401                   BEQ     2$                    ;YES
013514  000261                   SEC                           ;NO

013516  000207                  2$:     RETURN                 ;RETURN
```

```
                                .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
                                ;--

013520                          CHKSUM:: PUSH   R3
013520  010346                                   MOV     R3,-(SP)

013522                                   PUSH   R2
013522  010246                                   MOV     R2,-(SP)

013524  042737  000001  003304           BIC    #BIT0,SYSTAT    ;"CHECKSUM IS ODD" BIT
013532  032701  000001                   BIT    #BIT0,R1        ;AN ODD # OF BYTES?
013536  001403                           BEQ    1$              ;NO
013540  052737  000001  003304           BIS    #BIT0,SYSTAT    ;YES

013546  006001                    1$:    ROR    R1              ;/2 FOR WORDS

013550  005003                    2$:    CLR    R3              ;PREP CHECKSUM WORD

013552  062003                    3$:    ADD    (R0)+,R3        ;FORM SUM
013554  005503                           ADC    R3              ;WITH CARRY
013556  005301                           DEC    R1              ;MORE WORDS?
013560  001374                           BNE    3$              ;YES

013562  032737  000001  003304           BIT    #BIT0,SYSTAT    ;WAS IT ODD
013570  001405                           BEQ    4$              ;NO
013572  112002                           MOVB   (R0)+,R2        ;YES GET NEXT BYTE
013574  042702  177400                   BIC    #177400,R2      ;UN-SIGN EXTEND
013600  060203                           ADD    R2,R3           ;ADD IT IN
013602  005503                           ADC    R3              ;AND CARRY JUST IN CASE

013604  010301                    4$:    MOV    R3,R1           ;RETURN IT IN CORRECT PLACE
013606                                   POP    R2              ;RESTORE
013606  012602                                   MOV     (SP)+,R2

013610                                   POP    R3
013610  012603                                   MOV     (SP)+,R3

013612  000207                           RETURN                 ;RETURN
```

```
                                .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
                                ;--

013614                          CKCKSM:: PUSH   R1
013614  010146                                                  MOV     R1,-(SP)

013616                                  PUSH    R0              ;SAVE
013616  010046                                                  MOV     R0,-(SP)

013620  010401                          MOV     R4,R1           ;COPY BYTE COUNT TO CORRECT
013622  004737  013520                 CALL    CHKSUM          ;REGISTER FOR CHKSUM AND
                                                                ;FORM CHECKSUM

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

013626  122001                          CMPB    (R0)+,R1        ;LOWER ORDER CHECK
013630  001005                          BNE     2$              ;WRONG

013632  000301                          SWAB    R1              ;OK-PREP FOR

013634  122001                          CMPB    (R0)+,R1        ;HIGH ORDER CHECK
013636  001002                          BNE     2$              ;WRONG
013640  000241                          CLC                     ;OK-CLEAR SAILING

013642  000401                          BR      3$              ;EXIT

013644  000261                  2$:     SEC                     ;LET ERROR BE KNOWN

013646                          3$:     POP     R0
013646  012600                                                  MOV     (SP)+,R0

013650                                  POP     R1
013650  012601                                                  MOV     (SP)+,R1

013652  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
                        ;--

013654  105037  014407          DOBRK:: CLRB    INITWD+1        ;CLEAR BYTE RECEIVE ADDR
013660  005037  014410                  CLR     BRKTO           ;CLEAR TIME OUT CONSTANT
013664  052775  000001  000026        BIS     #BIT0,@XMSR(R5) ;SET 'BREAK'
013672  012765  000001  000100        MOV     #RSSNIT,CMDSNT(R5)  ;SAY WE SENT 'INIT'
013700  052715  000020                BIS     #BIT4,@R5       ;PAK SENT TYPE =COMMAND, SORT OF
013704  012704  000010                MOV     #8.,R4          ;BREAK-IT'S-BACK COUNT=8
013710                          1$:     BREAK                   ;SUPERVISOR TAKE FIVE
013710  104422                                                                  TRAP    C$BRK
                                                        ;FOR ^C CHECK, ETC.
013712  105775  000026                TSTB    @XMSR(R5)       ;READY?
013716  100410                      BMI     4$              ;YES
013720  005337  014410              DEC     BRKTO           ;NO,TIME OUT?
013724  001371                      BNE     1$              ;NO
013726  012704  000056              MOV     #TOSNDB,R4      ;YES, SET ERROR CODE
013732  004737  012500              CALL    LOG             ;LOG IT
013736  000535                      BR      3$              ;EXIT
013740  113775  014404  000030  4$: MOVB    BRKWD,@XMDB(R5) ;SEND NULL
013746  005037  014410              CLR     BRKTO           ;RESET TIME OUT
013752  005304                      DEC     R4              ;MORE NULLS TO SEND?
013754  001355                      BNE     1$              ;YES
013756  005375  000026              DEC     @XMSR(R5)       ;NO, CLEAR 'BREAK'
013762  017500  000024              MOV     @RCDB(R5),R0    ;HEAVE 'GARBAGE' 1ST BYTE
013766                          SETPRI  #PRI00          ;SET TO INTERRUPT FO SURE
013766  012700  000000                                                  MOV     #PRI00,R0
013772  104441                                                          TRAP    C$SPRI
013774                          SETVEC  TUVECT(R5),#RCVINT,#PRI07 ;SET VECTO INFO
013774  012746  000340                                                  MOV     #PRI07,-(SP)
014000  012746  014314                                                  MOV     #RCVINT,-(SP)
014004  016546  000204                                                  MOV     TUVECT(R5),-(SP)
014010  012746  000003                                                  MOV     #3,-(SP)
014014  104437                                                          TRAP    C$SVEC
014016  062706  000010                                                  ADD     #10,SP
014022  062765  000004  000204        ADD     #4,TUVECT(R5)   ;AND INC TO SND VECTOR
014030                          SETVEC  TUVECT(R5),#SNDINT,#PRI07;AND SET IT
014030  012746  000340                                                  MOV     #PRI07,-(SP)
```

```
                014034  012746  014300                                                  MOV     #SNDINT,-(SP)
                014040  016546  000204                                                  MOV     TUVECT(R5),-(SP)
                014044  012746  000003                                                  MOV     #3,-(SP)
                014050  104437                                                          TRAP    C$SVEC
                014052  062706  000010                                                  ADD     #10,SP
     2898       014056  162765  000004  000204          SUB     #4,TUVECT(R5)   ;RESET VECTOR ADDR.
     2899       014064  005037  014410                  CLR     BRKTO           ;RESET TIME OUT
     2900       014070  012704  014406                  MOV     #INITWD,R4      ;USE ADDR. FOR SNDBYT
     2901       014074  010437  014412                  MOV     R4,BRKPTR       ;AND SAVE FOR 'WAIT'
     2902       014100  052775  000100  000026        BIS     #BIT6,@XMSR(R5) ;ENABLE INTER.
     2903       014106  004737  014350                  CALL    WAIT            ;AND ENTER LOOP
     2904       014112  005715                          TST     @R5             ;ABORTED FROM TIME OUT?
     2905       014114  100446                          BMI     3$              ;YES-EXIT
     2906
     2907       014116  005037  014410                  CLR     BRKTO           ;RESET TIME OUT
     2908       014122  012704  014406                  MOV     #INITWD,R4      ;SEND SECOND INIT
     2909       014126  010437  014412                  MOV     R4,BRKPTR       ;SAVE POINTER AGAIN
     2910       014132  052775  000100  000026        BIS     #BIT6,@XMSR(R5) ;AND THEN ENABLE INT
     2911       014140  004737  014350                  CALL    WAIT            ;AND WAIT
     2912       014144  005715                          TST     @R5             ;IF ABORTED
     2913       014146  100431                          BMI     3$              ;THEN EXIT
     2914
     2915       014150  012704  014407                  MOV     #INITWD+1,R4    ;WHERE RESPONSE WILL GO (ADDRESS)
     2916       014154  010437  014412                  MOV     R4,BRKPTR       ;AND FOR 'WAIT'
     2917       014160  052775  000100  000022        BIS     #BIT6,@RCSR(R5) ;ENABLE RECIEVE INT.
     2918       014166  004737  014350                  CALL    WAIT            ;GET ANSWER
     2919       014172  005715                          TST     @R5             ;ABORTED?
     2920       014174  100416                          BMI     3$              ;YES.
     2921
     2922       014176  123727  014407  000020        CMPB    INITWD+1,#RSCONT  ;NO, IS IT 'CONTINUE'?
     2923       014204  001003                          BNE     2$              ;NOPE-ERROR
     2924
     2925       014206  042715  040000                  BIC     #BIT14,@R5      ;SUCCESSFUL, CLEAR DOBREAK FLAG
     2926       014212  000407                          BR      3$              ;EXIT
     2927
     2928       014214  113737  014407  003305  2$:     MOVB    INITWD+1,SYSTAT+1       ;SAVE BUM RESPONSE
     2929       014222  012704  000032                  MOV     #CNINIT,R4              ;CAN'T INIT CODE
     2930       014226  004737  012500                  CALL    LOG             ;LOG IT
     2931                                               ;SCHEDULER WILL TRY AGAIN IF NOT ABORTED
     2932
     2933       014232  042775  000100  000026  3$:     BIC     #BIT6,@XMSR(R5) ;CLEAR INTERRUPTS
     2934       014240  042775  000100  000022          BIC     #BIT6,@RCSR(R5) ; AND FOR RECIEVE
     2935       014246                                  CLRVEC  TUVECT(R5)      ;RELEASE RECIEVE VECT.
                014246  016500  000204                                                  MOV     TUVECT(R5),R0
                014252  104436                                                          TRAP    C$CVEC
     2936       014254  062765  000004  000204          ADD     #4,TUVECT(R5)   ;AND GET SEND ADDR.
     2937       014262                                  CLRVEC  TUVECT(R5)      ;AND RELEASE IT
                014262  016500  000204                                                  MOV     TUVECT(R5),R0
                014266  104436                                                          TRAP    C$CVEC
     2938       014270  162765  000004  000204          SUB     #4,TUVECT(R5)   ;RESTORE POINTER
     2939       014276  000207                          RETURN                  ;RETURN
```

```
                                .SBTTL  INTERRUPT SERVICE ROUTINES AND TIMER

014300                          BGNSRV  SNDINT                   ;"SEND" INTERRUPT SERVICE:
014300                                                                                  SNDINT::

014300  042775  000100  000026  SNDHND: BIC     #BIT6,@XMSR(R5) ;DISABLE INTERRUPT
014306  112475  000030                 MOVB    (R4)+,@XMDB(R5);OUTPUT BYTE
014312                          ENDSRV
014312                                                                                  L10004:
014312  000002                                                                                  RTI

014314                          BGNSRV  RCVINT                   ;"RCV" INTERRUPT SERVICE:
014314                                                                                  RCVINT::

014314  042775  000100  000022  RCVHND: BIC     #BIT6,@RCSR(R5) ;DISABLE INTS
014322  017565  000024  000074          MOV     @RCDB(R5),DLV(R5)       ;SAVE WORD
014330  116524  000074                 MOVB    DLV(R5),(R4)+   ;BYTE TO BUFFER
014334  005765  000074                 TST     DLV(R5)         ;ERROR?
014340  100402                         BMI     10$             ;YES
014342  005065  000074                 CLR     DLV(R5)         ;NO CLEAR ERROR
014346                          10$:
014346                          ENDSRV
014346                                                                                  L10005:
014346  000002                                                                                  RTI


014350  000240                  WAIT:   NOP                     ;WAIT  LOOP FOR
                                                                ;INTERRUPT SERVICING
014352  020437  014412                  CMP     R4,BRKPTR       ;IF=,THEN NO INTERRUPT
014356  001011                         BNE     1$              ;GOT ONE!
014360                                  BREAK                   ;SUPERVISOR BREAK
014360  104422                                                                          TRAP    C$BRK
014362                                  BREAK                   ;KILL SOME TIME
014362  104422                                                                          TRAP    C$BRK
014364  005337  014410                 DEC     BRKTO           ;TIME OUT?
014370  001367                         BNE     WAIT            ;NO...CONT.
014372  012704  000050                 MOV     #TORCVB,R4      ;YES LOAD ERROR #
014376  004737  012500                 CALL    LOG             ;LOG IT
014402  000207                  1$:     RETURN                  ;RETURN

014404  000000                  BRKWD:  .WORD   0               ;NULL
014406     004                  INITWD: .BYTE   RSINIT          ;INIT COMMAND
014407     000                          .BYTE   0               ;RSCONT IS EXPECTED HERE
014410  000000                  BRKTO:  .WORD   0               ;TIME OUT
014412  000000                  BRKPTR: .WORD   0               ;POINTER TO INITWD
```

```
                                .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
                                ;--

014414                          COMPAR:: PUSH   R0              ;COMPARE DATA IS DATA PACKET
014414  010046                                                  MOV     R0,-(SP)

014416                                   PUSH   R4              ;TO PATTERN WRITTEN
014416  010446                                                  MOV     R4,-(SP)

014420                                   PUSH   R1              ;USING BYTE COUNT IN PACKET
014420  010146                                                  MOV     R1,-(SP)

014422  005037  014572                     CLR    BDBYTS          ;CLEAR TOTAL WRONG
014426  016504  000104                     MOV    PKPTR(R5),R4    ;GET TOP OF PACKET
014432  005737  002214                     TST    CMPDAT          ;COMPARE SELECTED?
014436  001451                           BEQ    4$              ;NO-EXIT
014440  005204                           INC    R4              ;YES, LOCATE COUNT
014442  111401                           MOVB   @R4,R1          ;GET IT
014444  042701  177400                   BIC    #177400,R1      ;SIGN-UNEXTEND
                                                                ;MUST TEST BYTE-WISE...
014450  005204                           INC    R4              ;-->FIRST DATA  BYTE
014452  126524  000072           1$:     CMPB   PATTEN(R5),(R4)+  ;DATA-WHAT WAS EXPECTED?
014456  001402                           BEQ    2$              ;YES
014460  005237  014572                   INC    BDBYTS          ;NO, INCREMENT TOTAL WRONG
014464  005301                   2$:     DEC    R1              ;MORE LEFT?
014466  001371                           BNE    1$              ;YES
014470  005737  014572                   TST    BDBYTS          ;ANY WRONG?
014474  001432                           BEQ    4$              ;NO
014476  011537  002074                   MOV    @R5,L$LUN       ;GET UNIT NUMBER
014502  042737  177770  002074           BIC    #177770,L$LUN   ;MASK IT OFF
014510                                   ERRSOFT 0.,MSBDA,ERRDES  ;YES-PRINT 'BAD DATA IN PACKET' ERROR
014510  104457                                                          TRAP    C$ERSOFT
014512  000000                                                          .WORD   0
014514  002336                                                          .WORD   MSBDA
014516  013034                                                          .WORD   ERRDES
014520                                   PRINTB #DESC,BDBYTS
014520  013746  014572                                                  MOV     BDBYTS,-(SP)
014524  012746  014574                                                  MOV     #DESC,-(SP)
014530  012746  000002                                                  MOV     #2,-(SP)
014534  010600                                                          MOV     SP,R0
014536  104414                                                          TRAP    C$PNTB
014540  062706  000006                                                  ADD     #6,SP
014544  052715  000100                   BIS    #BIT6,@R5       ;LET 'EM KNOW UPSTAIRS-BAD DATA FLAG
```

```
3022 014550  012737  000204  003334          MOV     #132.,PRNSIZ    ;SIZE IS ONE DATA PACK
3023 014556  004737  014630                  CALL    PRNPAK          ;AND PRINT THE PACKET
3024 014562                          4$:     POP     R1              ;RESTORE
     014562  012601                                                  MOV     (SP)+,R1

3025 014564                                  POP     R4
     014564  012604                                                  MOV     (SP)+,R4

3026 014566                                  POP     R0
     014566  012600                                                  MOV     (SP)+,R0

3027
3028 014570  000207                          RETURN
3029
3030 014572  000000                  BDBYTS: .WORD
3031 014574     045      101      124 DESC:   .ASCIZ  /%ATOTAL BAD BYTES= %D3%A.%N/
3032                                         .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
                                ;--

014630  000240                  PRNPAK:: NOP                    ;PRINTS 1 PACKET
                                                                ;PKPTR(R5)->TOP OF PACKET
                                                                ;PRNSIZ (PASSED)=BYTE COUNT
014632                                  PUSH    R0
014632  010046                                                  MOV     R0,-(SP)

014634                                  PUSH    R4
014634  010446                                                  MOV     R4,-(SP)

014636  105737  002212                  TSTB    PRBUF           ;PRINT PACKET SELECTED?
014642  001451                          BEQ     4$              ;NO
014644  016504  000104                  MOV     PKPTR(R5),R4    ;YES-GET TOP OF PACK
014650  012737  000020  014774  1$:     MOV     #16.,LNCNT      ;16 BYTES PER LINE
014656  112437  014776          2$:     MOVB    (R4)+,PRDAT     ;AVOID SIGN EXTEND
014662                                  PRINTF  #PRFORM,<B,PRDAT>  ;PRINT BYTE
014662  005046                                                          CLR     -(SP)
014664  153716  014776                                                  BISB    PRDAT,(SP)
014670  012746  015000                                                  MOV     #PRFORM,-(SP)
014674  012746  000002                                                  MOV     #2,-(SP)
014700  010600                                                          MOV     SP,R0
014702  104417                                                          TRAP    C$PNTF
014704  062706  000006                                                  ADD     #6,SP
014710  005337  003334                  DEC     PRNSIZ          ;ONE LESS
014714  001414                          BEQ     3$              ;NO MORE
014716  005337  014774                  DEC     LNCNT           ;NEW LINE?
014722  001355                          BNE     2$              ;NOT YET
014724                                  PRINTF  #CARLF          ;YES
014724  012746  015010                                                  MOV     #CARLF,-(SP)
014730  012746  000001                                                  MOV     #1,-(SP)
014734  010600                                                          MOV     SP,R0
014736  104417                                                          TRAP    C$PNTF
014740  062706  000004                                                  ADD     #4,SP
014744  000741                          BR      1$              ;NEXT LINE
014746                          3$:     PRINTF  #CARLF          ;FINISH UP
014746  012746  015010                                                  MOV     #CARLF,-(SP)
014752  012746  000001                                                  MOV     #1,-(SP)
014756  010600                                                          MOV     SP,R0
014760  104417                                                          TRAP    C$PNTF
014762  062706  000004                                                  ADD     #4,SP
014766                          4$:     POP     R4
014766  012604                                                  MOV     (SP)+,R4

014770                                  POP     R0
014770  012600                                                  MOV     (SP)+,R0

014772  000207                  RETURN                          ;RETURN
```

```
3065
3066 014774  000000                    LNCNT:  .WORD
3067 014776  000000                    PRDAT:  .WORD
3068 015000     045     117     063    PRFORM: .ASCIZ  /%03%A /
3069                                            .EVEN
3070 015010     045     116     000    CARLF:  .ASCIZ  /%N/
3071                                            .EVEN
3072
3073 015014                            ENDMOD
3074
```

```
                        .TITLE MISCELLANEOUS SECTIONS
                        .SBTTL  REPORT CODING SECTION

                                BGNMOD

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

                                BGNRPT
015014                                                                  L$RPT::
                                PUSH    R0
015014  010046                                  MOV     R0,-(SP)

                                PUSH    R1
015016  010146                                  MOV     R1,-(SP)

                                PUSH    R2
015020  010246                                  MOV     R2,-(SP)

                                PUSH    R3
015022  010346                                  MOV     R3,-(SP)

                                PUSH    R4
015024  010446                                  MOV     R4,-(SP)

                                PUSH    R5
015026  010546                                  MOV     R5,-(SP)


                                BREAK
015030  104422                                                        TRAP    C$BRK
015032  012737  003346  015442  MOV     #BLKTBL,RPTR    ;GET 1ST DEVICE BLOCK
                        PRINTS  #STATHD         ;HEADER
015040  012746  015444                                                MOV     #STATHD,-(SP)
015044  012746  000001                                                MOV     #1,-(SP)
015050  010600                                                        MOV     SP,R0
015052  104416                                                        TRAP    C$PNTS
015054  062706  000004                                                ADD     #4,SP
                        BREAK                   ;^C CHECK
015060  104422                                                        TRAP    C$BRK
                        PRINTS  #STHD2          ;2ND HEADER
015062  012746  015720                                                MOV     #STHD2,-(SP)
015066  012746  000001                                                MOV     #1,-(SP)
015072  010600                                                        MOV     SP,R0
015074  104416                                                        TRAP    C$PNTS
015076  062706  000004                                                ADD     #4,SP
015102                  1$:     BREAK                   ;^C CHECK
015102  104422                                                        TRAP    C$BRK
015104  017705  000332          MOV     @RPTR,R5        ;GET DEVICE BLOCK
```

```
3139 015110  032715  004000                BIT     #BIT11,@R5      ;UNIT NOT TESTED?
3140 015114  001131                       BNE     2$              ;TRUE, DON'T PRINT STATISTICS
3141                                                               ;OK TO PRINT
3142 015116  011537  015440               MOV     @R5,RLUN        ;SAVE STATUS WORD
3143 015122  042737  177770  015440       BIC     #177770,RLUN    ;MASK UNIT NUM.
3144 015130  116501  000122               MOVB    SOFTR(R5),R1    ;SOFTREAD
3145 015134  042701  177400               BIC     #177400,R1      ;SIGN-UNEXTEND
3146 015140  116502  000124               MOVB    SOFTW(R5),R2    ;SOFT WRITE
3147 015144  042702  177400               BIC     #177400,R2      ;
3148 015150  116503  000136               MOVB    HARDR(R5),R3    ;HARD READ
3149 015154  042703  177400               BIC     #177400,R3      ;
3150 015160  116504  000140               MOVB    HARDW(R5),R4    ;HARD WRITE
3151 015164  042704  177400               BIC     #177400,R4      ;
3152 015170                               PRINTS  #FM0,RLUN       ;SUMMARY/UNIT #
     015170  013746  015440                                               MOV     RLUN,-(SP)
     015174  012746  015556                                               MOV     #FM0,-(SP)
     015200  012746  000002                                               MOV     #2,-(SP)
     015204  010600                                                       MOV     SP,R0
     015206  104416                                                       TRAP    C$PNTS
     015210  062706  000006                                               ADD     #6,SP
3153 015214                               PRINTS  #FM,#0,WRTN0(R5),RDN0(R5),<B,BDATA(R5)>,R1,R2,R3,R4
     015214  010446                                                       MOV     R4,-(SP)
     015216  010346                                                       MOV     R3,-(SP)
     015220  010246                                                       MOV     R2,-(SP)
     015222  010146                                                       MOV     R1,-(SP)
     015224  005046                                                       CLR     -(SP)
     015226  156516  000134                                               BISB    BDATA(R5),(SP)
     015232  016546  000114                                               MOV     RDN0(R5),-(SP)
     015236  016546  000110                                               MOV     WRTN0(R5),-(SP)
     015242  012746  000000                                               MOV     #0,-(SP)
     015246  012746  015574                                               MOV     #FM,-(SP)
     015252  012746  000011                                               MOV     #11,-(SP)
     015256  010600                                                       MOV     SP,R0
     015260  104416                                                       TRAP    C$PNTS
     015262  062706  000024                                               ADD     #24,SP
3154 015266  116501  000123               MOVB    SOFTR+1(R5),R1  ;SAME
3155 015272  042701  177400               BIC     #177400,R1      ;AS
3156 015276  116502  000125               MOVB    SOFTW+1(R5),R2  ;ABOVE
3157 015302  042702  177400               BIC     #177400,R2      ;THIS
3158 015306  116503  000137               MOVB    HARDR+1(R5),R3  ;TIME
3159 015312  042703  177400               BIC     #177400,R3      ;FOR
3160 015316  116504  000141               MOVB    HARDW+1(R5),R4  ;DRIVE
3161 015322  042704  177400               BIC     #177400,R4      ;ONE
3162
3163 015326                               PRINTS  #FM,#1,WRTN1(R5),RDN1(R5),<B,BDATA+1(R5)>,R1,R2,R3,R4
     015326  010446                                                       MOV     R4,-(SP)
     015330  010346                                                       MOV     R3,-(SP)
     015332  010246                                                       MOV     R2,-(SP)
     015334  010146                                                       MOV     R1,-(SP)
     015336  005046                                                       CLR     -(SP)
     015340  156516  000135                                               BISB    BDATA+1(R5),(SP)
     015344  016546  000116                                               MOV     RDN1(R5),-(SP)
     015350  016546  000112                                               MOV     WRTN1(R5),-(SP)
     015354  012746  000001                                               MOV     #1,-(SP)
     015360  012746  015574                                               MOV     #FM,-(SP)
     015364  012746  000011                                               MOV     #11,-(SP)
     015370  010600                                                       MOV     SP,R0
```

```
                                                                                        TRAP    C$PNTS
                                                                                        ADD     #24,SP
3164 015400  023727  015442  003364  2$:     CMP     RPTR,#LSTDEV    ;ALL UNITS DONE?
3165 015406  103005                          BHIS    3$              ;YES
3166 015410  062737  000002  015442          ADD     #2,RPTR         ;NO-DO
3167
3168 015416  000137  015102                  JMP     1$              ;MORE UNITS
3169
3170 015422                          3$:     POP     R5
     015422  012605                                                  MOV     (SP)+,R5
3171 015424                                  POP     R4
     015424  012604                                                  MOV     (SP)+,R4
3172 015426                                  POP     R3
     015426  012603                                                  MOV     (SP)+,R3
3173 015430                                  POP     R2
     015430  012602                                                  MOV     (SP)+,R2
3174 015432                                  POP     R1
     015432  012601                                                  MOV     (SP)+,R1
3175 015434                                  POP     R0
     015434  012600                                                  MOV     (SP)+,R0
3176 015436                                  ENDRPT
     015436                                                                     L10006:
     015436  104425                                                                TRAP    C$RPT
3177 015440  000000                  RLUN:   .WORD
3178 015442  000000                  RPTR:   .WORD
3179
3180 015444      045     116     045  STATHD: .ASCII  /%N%A      DR BLKS WR  BLKS RD  BDPAK  /
3181 015512      104     103     110          .ASCIZ  @DCHK/RD DCHK/WR  DCHK/RD DCHK/WR%N@
3182                                          .EVEN
3183 015556      045     101     125  FM0:    .ASCIZ  /%AUNIT %D1%N/
3184                                          .EVEN
3185
3186 015574      045     101     040  FM:     .ASCII  /%A      %D1%A %D5%A.   %D5%A.    %D3%A.    /
3187 015650      045     104     063          .ASCIZ  /%D3%A.   %D3%A.     %D3%A.    %D3%A.%N/
3188                                          .EVEN
3189 015720      045     101     040  STHD2:  .ASCII  /%A                                        /
3190 015765      122     105     103          .ASCIZ  /RECOV   RECOV   UNRECOV UNRECOV%N/
3191                                          .EVEN
3192 016030                                  ENDMOD
```

```
                                .SBTTL  INITIALIZE SECTION

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

016030                                  BGNINIT
016030                                                                          L$INIT::

016030 000240                   INIT:   NOP                     ;
016032 105037 016612                    CLRB    STRT            ;FOR STATS CLEAR
016036 005037 003340                    CLR     TEST8           ;***** CLR TST 8 FLAG
016042                                  READEF  #EF.START       ;START COMMAND?
016042 012700 000040                                                    MOV     #EF.START,R0
016046 104447                                                           TRAP    C$REFG
016050                                  BNCOMPLETE INIT2        ;NO
016050 103002                                                           BCC     INIT2
016052 005237 016612                    INC     STRT            ;YES, SET START FLAG
016056 012737 003346 003310     INIT2:  MOV     #BLKTBL,DEVPTR  ;SET ALL UNITS ABORTED:
016064 005004                           CLR     R4              ;UNIT NUMBER
016066 017705 165216            1$:     MOV     @DEVPTR,R5      ;GET POINTER
016072 010415                           MOV     R4,@R5          ;INSERT UNIT #
016074 052715 100000                    BIS     #BIT15,@R5        ;SET ABORTED
016100 052715 004000                    BIS     #BIT11,@R5      ;SET UNIT NOT TESTED
016104 006304                           ASL     R4              ;*2 FOR LOOK-UP
016106 016465 026152 000102             MOV     BUFTBL(R4),RCVBUF(R5)   ;SETUP POINTER TO UNIT'S BUFFER
016114 006204                           ASR     R4              ;CORRECT BACK TO UNIT #
016116 023727 003310 003364             CMP     DEVPTR,#LSTDEV  ;LAST DEVICE DONE?
016124 103005                           BHIS    CHECK           ;YES
016126 062737 000002 003310             ADD     #2,DEVPTR       ;NO-GET
016134 005204                           INC     R4              ;NEXT DEVICE AND
016136 000753                           BR      1$              ;SERVICE

016140 022737 000010 002012     CHECK:  CMP     #8.,L$UNIT      ;MAKE SURE NOT
016146 103005                           BHIS    GETHRD          ;TOO MANY UNITS
016150                                  ERRSF   101.,TOMANY             ;TOMANY-REQUEST ^C
016150 104454                                                           TRAP    C$ERSF
016152 000145                                                           .WORD   101
016154 016530                                                           .WORD   TOMANY
016156 000000                                                           .WORD   0
016160                                  DOCLN                   ;EXIT
016160 104444                                                           TRAP    C$DCLN

016162 012737 003346 003310     GETHRD: MOV     #BLKTBL,DEVPTR  ;INIT TABLE POINTER
016170 005004                           CLR     R4              ;CLEAR DEVICE COUNTER
016172 017705 165112            1$:     MOV     @DEVPTR,R5      ;GET STATUS WORD
016176 010437 002074                    MOV     R4,L$LUN        ;UNIT NUM. IN CASE ERROR
016202                                  GPHARD  R4,R2           ;GET HARD INFO
016202 010400                                                           MOV     R4,R0
016204 104442                                                           TRAP    C$GPHRD
016206 010002                                                           MOV     R0,R2
016210                                  BNCOMPLETE 3$
016210 103111                                                           BCC     3$
016212 042715 004000                    BIC     #BIT11,@R5      ;UNIT IS TESTED!
016216 012203                           MOV     (R2)+,R3        ;R3=CSR
016220 012265 000204                    MOV     (R2)+,TUVECT(R5)  ;GET VECTOR ADDRESS
```

```
3239 016224  112265  000061                MOVB    (R2)+,DR+1(R5)  ;SAVE UNIT SUMMARY
3240 016230  005202                        INC     R2              ;GET TO WORD BOUND
3241 016232  012237  016614                MOV     (R2)+,PDTFLG    ;AND GET PDT FLAG
3242 016236  052715  040000                BIS     #BIT14,@R5      ;SET SEND BREAK FLAG
3243 016242  032765  000400  000060        BIT     #BIT8,DR(R5)    ;DRIVE 0?
3244 016250  001011                        BNE     13$             ;YES
3245 016252  032765  001000  000060        BIT     #BIT9,DR(R5)    ;DRIVE 1?
3246 016260  001005                        BNE     13$             ;OK
3247 016262                                ERRSF   102.,NODRVS             ;NEITHER?!
     016262  104454                                                        TRAP    C$ERSF
     016264  000146                                                        .WORD   102
     016266  016560                                                        .WORD   NODRVS
     016270  000000                                                        .WORD   0
3248 016272                                DOCLN                   ;EXIT
     016272  104444                                                        TRAP    C$DCLN
3249
3250 016274  105737  016612          13$:  TSTB    STRT            ;START COMMAND?
3251 016300  001412                        BEQ     14$             ;NO, DONT CLEAR
3252                                                               ;YES-CLEAR STATS
3253 016302  012702  000202                MOV     #BLKEND,R2      ;R2-->END OF STATS
3254 016306  012701  000110                MOV     #WRTNO,R1       ;FORM ADDRESS OF START:
3255 016312  060501                        ADD     R5,R1           ;R1-->START OF STATS.
3256 016314  162702  000110                SUB     #WRTNO,R2       ;FORM # TO CLEAR
3257
3258 016320  105021                  2$:   CLRB    (R1)+           ;CLEAR 'EM
3259 016322  005302                        DEC     R2              ;MORE?
3260 016324  001375                        BNE     2$              ;YES
3261 016326  042715  100000          14$:  BIC     #BIT15,@R5        ;SET NOT ABORTED
3262 016332  010365  000022                MOV     R3,RCSR(R5)     ;GET DEVICE REGISTERS:
3263 016336  062703  000002                ADD     #2,R3
3264 016342  010365  000024                MOV     R3,RCDB(R5)
3265 016346  062703  000002                ADD     #2,R3
3266 016352  010365  000026                MOV     R3,XMSR(R5)
3267 016356  062703  000002                ADD     #2,R3
3268 016362  105737  016614                TSTB    PDTFLG          ;UNIT A PDT?
3269 016366  001402                        BEQ     4$              ;NO
3270 016370  162703  000004                SUB     #4,R3           ;YES...RCDB=XMDB
3271 016374  010365  000030          4$:   MOV     R3,XMDB(R5)
3272 016400  005065  000072                CLR     PATTEN(R5)      ;ZERO DATA PATTERN
3273 016404  005065  000002                CLR     RETRY(R5)       ;NO RETRIES
3274 016410  005065  000064                CLR     REC(R5)         ;NO RECORD
3275 016414  005065  000076                CLR     SUCCS(R5)       ;NO SUCCESS
3276 016420  005065  000074                CLR     DLV(R5)         ;NO DLV ERROR
3277 016424  005065  000210                CLR     MRSP(R5)        ;***** CLR MRSP INDICATOR
3278 016430  005037  003336                CLR     ALLGON          ;OK TO PRINT STATISTICS
3279 016434  062737  000002  003310  3$:   ADD     #2,DEVPTR       ;-->NEXT DEVICE
3280 016442  005204                        INC     R4              ;INCREMENT UNIT NUMBER
3281 016444  020437  002012                CMP     R4,L$UNIT       ;MORE UNITS?
3282 016450  001250                        BNE     1$              ;YES, GP HARD THE NEXT
3283
3284 016452  005037  003304                CLR     SYSTAT          ;SYSTEM STATUS WORD
3285 016456                                RFLAGS  FLGLOC          ;GET USER FLAGS
     016456  104421                                                        TRAP    C$RFLA
     016460  010037  016616                                                MOV     R0,FLGLOC
3286 016464  005037  003330          5$:   CLR     BLKER           ;NO ERROR
3287 016470  013737  002206  003306  SETLEN: MOV   LENGTH,TAPLEN   ;GET # OF RECORDS
3288 016476  006237  003306                ASR     TAPLEN          ;GET # BLOCKS PER TRACK
```

```
 3289 016502  012737  000200  003332          MOV     #200,SECREC     ;PRESET SECOND START AT 200
 3290 016510  022737  000200  003306          CMP     #200,TAPLEN     ;# BLKS > 128.?
 3291 016516  101003                          BHI     3$              ;NO-SWITCH TRACKS 2ND PASS
 3292 016520  012737  000400  003332          MOV     #400,SECREC     ;YES-START AT 400
 3302
 3314
 3315 016526                          3$:     ENDINIT
      016526                                                          L10007:
      016526  104411                                                          TRAP    C$INIT
 3316
 3317
 3318 016530     124     117     117  TOMANY: .ASCIZ  /TOO MANY UNITS MAX.=8 /
 3319                                          .EVEN
 3320 016560     123     105     114  NODRVS: .ASCIZ  /SELECT AT LEAST 1 DRIVE /
 3321                                          .EVEN
 3322 016612  000000                  STRT::  .WORD
 3323 016614  000000                  PDTFLG::.WORD           ;TU58 IS IN PDT
 3324 016616  000000                  FLGLOC::.WORD           ;USER FLAGS
```

```
3327                                    ;++
3328                                    ; THE AUTO DROP CODE IS INVOKED WHEN THE ADR FLAG IS SET AND CHECKS FOR
3329                                    ; A VALID INTERFACE LOCATION.  DROPS UNIT IF INTERFACE IS NOT THERE.
3330                                    ;--
3331
3332 016620                             BGNAUTO
        016620                                                                          L$AUTO::
3333 016620  000240                             NOP             ;AUTO DROP ROUTINE
3334 016622                             SETVEC  #4,#TRPHND,#PRI07       ;GET BUS TRAP VEC.
        016622  012746  000340                                                          MOV     #PRI07,-(SP)
        016626  012746  016730                                                          MOV     #TRPHND,-(SP)
        016632  012746  000004                                                          MOV     #4,-(SP)
        016636  012746  000003                                                          MOV     #3,-(SP)
        016642  104437                                                                  TRAP    C$SVEC
        016644  062706  000010                                                          ADD     #10,SP
3335 016650  012737  003346  016726        MOV     #BLKTBL,TRPPTR  ;GET TOP OF DATA BLOCK TABLE
3336 016656  017705  000044        1$:     MOV     @TRPPTR,R5      ;GET DATA BLOCK
3337 016662  032715  104000                BIT     #BIT15!BIT11,@R5  ;NOT TESTED OR ABORTED?
3338 016666  100403                        BMI     2$              ;YES
3339 016670  005775  000022                TST     @RCSR(R5)       ;NO-VALID ADDRESS?
3340 016674  000240                        NOP                     ;YES...(TRAP IF NOT)
3341 016676  023727  016726  003364  2$:   CMP     TRPPTR,#LSTDEV  ;MORE TO TRY?
3342 016704  103004                        BHIS    3$              ;NO
3343 016706  062737  000002  016726        ADD     #2,TRPPTR       ;ON TO NEXT
3344 016714  000760                        BR      1$              ;GET IT
3345 016716                        3$:     CLRVEC  #4              ;RESTORE
        016716  012700  000004                                                          MOV     #4,R0
        016722  104436                                                                  TRAP    C$CVEC
3346 016724                             ENDAUTO
        016724                                                                  L10010:
        016724  104461                                                                  TRAP    C$AUTO
3347 016726  000000                     TRPPTR: .WORD
3348
3349
3350
3351
3352                                    ;ILLEGAL ADDRESS TRAP HANDLER:
3353
3354 016730                             TRPHND: PRINTF  #MSAUTO         ;SAY "AUTO DROPPED"
        016730  012746  016762                                                          MOV     #MSAUTO,-(SP)
        016734  012746  000001                                                          MOV     #1,-(SP)
        016740  010600                                                                  MOV     SP,R0
        016742  104417                                                                  TRAP    C$PNTF
        016744  062706  000004                                                          ADD     #4,SP
3355 016750  011500                             MOV     @R5,R0          ;GET UNIT #
3356 016752  042700  177770                     BIC     #177770,R0      ;MASK IT OFF
3357 016756                                     DODU    R0              ;DROP HIM
        016756  104451                                                                  TRAP    C$DODU
3358 016760  000002                             RTI
3359 016762     045     101     101  MSAUTO: .ASCIZ  /%AAUTO DROP: %N/
```

```
                                .SBTTL  CLEANUP CODING SECTION

                                ;++
                                ; THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
                                ; AFTER THE HARDWARE TESTS HAVE BEEN PERFORMED.
                                ;--

017002                                  BGNCLN
017002                                                                  L$CLEAN::
017002  005737  003336                  TST     ALLGON          ;ENTRANCE FROM ALL-UNITS-ABORTED?
017006  001004                          BNE     1$              ;YES-EXIT
017010  005737  002210                  TST     STAEOP          ;NO-STATS AT EOP?
017014  001401                          BEQ     1$              ;NO
017016                                  DORPT                   ;YES
017016  104424                                                          TRAP    C$DRPT

017020                          1$:     ENDCLN
017020                                                                  L10011:
017020  104412                                                          TRAP    C$CLEAN
```

```
                                .SBTTL  DROP UNIT SECTION

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

                                        BGNDU
                                                                                L$DU::
                                                                ;R0=UNIT NUMBER
017022                                  PUSH    R0              ;SAVE IT
017022  010046                                                  MOV     R0,-(SP)

017024                                  PUSH     R5             ;SAVE PRESENT UNIT POINTER
017024  010546                                                  MOV     R5,-(SP)

017026  004737  017066                  CALL     GETR5          ;GET POINTER TO UNIT
017032  052715  100000                  BIS     #BIT15,@R5      ;SET ABORTED
017036                                  POP     R5              ;RESTORE PRESENT UNIT POINTER
017036  012605                                                  MOV     (SP)+,R5

017040                                  POP     R0              ;RETRIEVE UNIT NUMBER
017040  012600                                                  MOV     (SP)+,R0

017042                                  PRINTF  #ABOMSG,R0
017042  010046                                                          MOV     R0,-(SP)
017044  012746  017120                                                  MOV     #ABOMSG,-(SP)
017050  012746  000002                                                  MOV     #2,-(SP)
017054  010600                                                          MOV     SP,R0
017056  104417                                                          TRAP    C$PNTF
017060  062706  000006                                                  ADD     #6,SP

                                        ENDDU
                                                                L10012:
017064                                                                  TRAP    C$DU
017064  104453
017066  012737  003346  017116  GETR5:  MOV     #BLKTBL,PTR     ;-->UNIT 0
017074  017705  000016          1$:     MOV     @PTR,R5         ;GET STATUS WORD
017100  005300                          DEC     R0              ;CORRECT UNIT?
017102  100404                          BMI     2$              ;YES
017104  062737  000002  017116          ADD     #2,PTR          ;NO,-->NEXT
017112  000770                          BR      1$              ;CONTINUE
017114  000207                  2$:     RETURN
017116  000000                  PTR:    .WORD

017120      045     101     104 ABOMSG: .ASCIZ   /%ADROPPED UNIT %D1%N/
                                        .EVEN
```

```
                                .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.
                                ;--

017146                                  BGNAU
017146                                                                  L$AU::

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

                                        ENDAU
017146                                                                  L10013:
017146  104452                                                                  TRAP    C$AU
```

```
                        .SBTTL  TEST 1 / DEVICE SELF-DIAGNOSTIC EXECUTION

                                BGNMOD
                        .NLIST  ME,BEX

                                BGNTST
                                                                        T1::
                                TSTID   #TST1
017150  012737  017214  003324                MOV     #TST1,TSTTOP    ;SAVE ADDR OF TEST
017156  004737  006002                        CALL    SETUP           ;INIT UNITS TSTPC
017162  004737  005630                        CALL    SETDR           ;GET 1ST DRVS.
017166  004737  006050                        CALL    RUN             ;DO TEST
017172  004737  005526                        CALL    SWAPDR          ;GET NEXT DRVS.
017176  103004                               BCC     64$             ;BR NO 2ND DRVS
017200  004737  006002                        CALL    SETUP           ;REINIT UNITS TSTPC
017204  004737  006050                        CALL    RUN             ;REPEAT TEST
017210                                64$:                            ;DONE
                                EXIT TST
017210  104432                                                TRAP    C$EXIT
017212  000136                                                .WORD   L10014-.

                        TST1:   TUSELF

017214  012700  026174                64$:    MOV     #TRBUF,R0       ;FORM COMMAND PACKET
017220  112710  000002                        MOVB    #RSCMND,@R0     ;COMMAND FLAG
017224  112760  000012  000001              MOVB    #RSMSIZ,1(R0)   ;SIZE OF MESSAGE
017232  112760  000007  000002              MOVB    #RSSSLF,2(R0)   ;SELF TEST OPERATION
017240  105060  000003                       CLRB    3(R0)           ;NO MODIFIER.
017244  005060  000004                       CLR     4(R0)           ;NO DRIVE OR SWITCHES
017250  005060  000006                       CLR     6(R0)           ;NO SEQUENCE NUMBER
017254  005060  000010                       CLR     8.(R0)          ;NO BYTES
017260  005060  000012                       CLR     10.(R0)         ;NO RECORD #
017264  012701  000012                       MOV     #RSMSIZ,R1      ;GET SIZE
017270  005721                             TST     (R1)+           ;+2 FOR CHECKSUM
017272  012765  000016  000070              MOV     #RSSNSZ,SNDCNT(R5)  ;SIZE TO SEND
017300  004737  013520                       CALL    CHKSUM          ;FORM CHECKSUM
017304  010110                             MOV     R1,(R0)         ;INSERT INTO PACKET
017306  012765  000002  000034              MOV     #RSEND,XSFLG(R5)  ;EXPECT END,
017314  012765  000016  000036              MOV     #RSNDSZ,XSCNT(R5)  ;THIS BIG
017322  012765  000001  000032              MOV     #1,XSPKNM(R5)   ;AND 1 PACKET
                                                                    ;SEND
017330  004737  006556                       CALL    RSVP            ;RETURN TO SCHEDULER
017334  032715  000010                       BIT     #BIT3,@R5       ;RETRY?(BAD FLAG)
017340  001325                             BNE     64$             ;YES

3548 017342  005237  003320        INC     DONE
3549 017346  000207                RETURN
3550
3551
3552 017350                        ENDTST
017350                                                  L10014:
017350  104401                                                  TRAP    C$ETST
```

```
                        .SBTTL  TEST 2 / SEEK EOT,BOT

                        BGNTST
                                                                T2::
                        TSTID   #TST2
017352 012737 017416 003324             MOV     #TST2,TSTTOP    ;SAVE ADDR OF TEST
017360 004737 006002                    CALL    SETUP           ;INIT UNITS TSTPC
017364 004737 005630                    CALL    SETDR           ;GET 1ST DRVS.
017370 004737 006050                    CALL    RUN             ;DO TEST
017374 004737 005526                    CALL    SWAPDR          ;GET NEXT DRVS.
017400 103004                           BCC     64$             ;BR NO 2ND DRVS
017402 004737 006002                    CALL    SETUP           ;REINIT UNITS TSTPC
017406 004737 006050                    CALL    RUN             ;REPEAT TEST
017412                          64$:                            ;DONE
                        EXIT TST
017412 104432                                                           TRAP    C$EXIT
017414 000206                                                           .WORD   L10015-.

017416 005004           TST2:   CLR     R4                      ;R4=INDEX INTO RECORD TABLE
017420 016465 017606 000064 1$: MOV     RECDAT(R4),REC(R5)      ;GET THE RECORD

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

017426 012700 026174                    64$:    MOV     #TRBUF,R0       ;-->(POINT TO) XMIT BUFFER
017432 112710 000002                            MOVB    #RSCMND,@R0     ;FORM COMMAND MESSAGE PACK
017436 112760 000012 000001                     MOVB    #RSMSIZ,1(R0)   ;THIS BIG
017444 112760 000005 000002                     MOVB    #RSSSEK,2(R0)   ;OP CODE IS SEEK
017452 016560 000064 000012                     MOV     REC(R5),10.(R0) ;TO THIS RECORD
017460 116560 000060 000004                     MOVB    DR(R5),4.(R0)   ;AND WHICH DRIVE
017466 105060 000003                            CLRB    3.(R0)          ;NO MODIFIER
017472 105060 000005                            CLRB    5.(R0)          ;NO SWITCHES
017476 005060 000006                            CLR     6.(R0)          ;NO SEQUENCE #
017502 005060 000010                            CLR     8.(R0)          ;NO BYTE COUNT
017506 012701 000012                            MOV     #RSMSIZ,R1      ;GET COUNT
017512 005721                                   TST     (R1)+           ;PLUS FLAG + BCNT
                                                                        ;FOR CHECKSUM CALC
017514 004737 013520                            CALL    CHKSUM          ;R0-->TOP   R1=# OF BYTES
017520 010110                                   MOV     R1,(R0)         ;INSERT INTO PACKET
                                                                        ;SET UP EXPECTATIONS:
017522 012765 000016 000070                     MOV     #RSSNSZ,SNDCNT(R5)  ;HOW MANY TO SEND
017530 112765 000002 000034                     MOVB    #RSCMND,XSFLG(R5)   ;EXPECT END PACK
017536 012765 000016 000036                     MOV     #RSNDSZ,XSCNT(R5)   ;COUNT WITH THIS
017544 012765 000001 000032                     MOV     #1.,XSPKNM(R5)  ;EXPECT ONLY 1 PACKET

017552 004737 006556                            CALL    RSVP            ;SEND
                                                                        ;AND RETURN TO SCHEDULER
017556 032715 000010                            BIT     #BIT3,@R5       ;RETRY (FLAG BYTE ERROR)?
017562 001321                                   BNE     64$             ;YES

017564 062704 000002            ADD     #2,R4                   ;POINT TO NEXT RECORD
017570 026427 017606 177777     CMP     RECDAT(R4),#-1.         ;LAST ONE DONE?
017576 001310                   BNE     1$                      ;NO-LOOP
017600 005237 003320            INC     DONE                    ;YES-SET DONE FLAG
017604 000207                   RETURN
```

```
 3573 017606  000000                RECDAT: 0.      ;BOT
 3574 017610  000200                        200     ;BOT OTHER TRACK
 3575 017612  000177                        177     ;EOT
 3576 017614  000377                        377     ;EOT OTHER TRACK
 3577 017616  000400                        400     ;BOT AGAIN
 3578 017620  177777                        -1.
 3579 017622                                ENDTST
      017622                                                L10015:
      017622  104401                                              TRAP    C$ETST
```

```
                                .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.

                                        BGNTST
                                                                                T3::
                                        TSTID   #TST3
017624  012737  017670  003324                        MOV     #TST3,TSTTOP    ;SAVE ADDR OF TEST
017632  004737  006002                                CALL    SETUP           ;INIT UNITS TSTPC
017636  004737  005630                                CALL    SETDR           ;GET 1ST DRVS.
017642  004737  006050                                CALL    RUN             ;DO TEST
017646  004737  005526                                CALL    SWAPDR          ;GET NEXT DRVS.
017652  103004                                        BCC     64$             ;BR NO 2ND DRVS
017654  004737  006002                                CALL    SETUP           ;REINIT UNITS TSTPC
017660  004737  006050                                CALL    RUN             ;REPEAT TEST
017664                                          64$:                          ;DONE
                                        EXIT TST
017664  104432                                                          TRAP    C$EXIT
017666  001340                                                          .WORD   L10016-.

017670  012765  000100  000066  TST3:   MOV     #100,TMP(R5)    ;INIT TO HALF OF REMAINING
017676  005004                  CLR     R4              ;FOR INDEX INTO DATA TABLE
017700  005065  000064          CLR     REC(R5)         ;START AT RECORD 0
017704  016465  021214  000072  1$:     MOV     TST3PT(R4),PATTEN(R5)   ;GET DATA
017712                          TUWRIT  PATTEN(R5),REC(R5),#512.,DR(R5),#0
017712  012700  026174                          72$:    MOV     #TRBUF,R0       ;MAKE COMMAND PACKET:
017716  112710  000002                                  MOVB    #RSCMND,@R0     ;COMMAND FLAG
017722  112760  000012  000001                          MOVB    #RSMSIZ,1(R0)   ;THIS SIZE
017730  112760  000003  000002                          MOVB    #RSSWR,2(R0)    ;INSERT OP CODE-WRITE
017736  112760  000000  000003                          MOVB    #0,3.(R0)       ;VERIFY (1 OR 0)
017744  116560  000060  000004                          MOVB    DR(R5),4.(R0)   ;DRIVE #
017752  112760  000020  000005                          MOVB    #020,5.(R0)     ;MAINTENANCE MODE SWITCH
017760  005060  000006                                  CLR     6.(R0)          ;NO SEQUENCE #
017764  012760  001000  000010                          MOV     #512.,8.(R0)    ;TOTAL COUNT TO WRITE
017772  016560  000064  000012                          MOV     REC(R5),10.(R0) ;AT  RECORD N
020000  012701  000012                                  MOV     #RSMSIZ,R1      ;THE PACKET SIZE PLUS+2
020004  005721                                          TST     (R1)+           ;(FLAG AND COUNT) INTO R1
020006  012765  000016  000070                          MOV     #RSSNSZ,SNDCNT(R5)  ;LOAD THE  SIZE TO SEND
020014  004737  013520                                  CALL    CHKSUM          ;R0 --> R1=COUNT
020020  010110                                          MOV     R1,(R0)         ;PUT CHKSUM IN PACKET
                                                                                ;SET UP EXPECTATIONS:
020022  012765  000020  000034                          MOV     #RSCONT,XSFLG(R5)   ;THE FLAG
020030  012765  000001  000036                          MOV     #1,XSCNT(R5)    ;THE COUNT
020036  012765  000001  000032                          MOV     #1,XSPKNM(R5)   ;THE # PACKETS EXPECTED
020044  012702  001000                                  MOV     #512.,R2                ;GET # OF DATA BYTES
020050  004737  006556                                  CALL    RSVP            ;SEND (AND RETURN TO SCHEDULER)
020054  032715  000010                                  BIT     #BIT3,@R5       ;FLAG BYTE ERROR?
020060  001314                                          BNE     72$             ;YES
020062  042715  010000                                  BIC     #BIT12,@R5      ;FLAG FOR LAST PACKET
020066  012700  026174                  64$:    MOV     #TRBUF,R0       ;POINT TO TOP OF BUFFER AGAIN
020072  020227  000200                                  CMP     R2,#128.        ;START DATA PACKET(S)
020076  101004                                          BHI     65$             ;#512. > 128.!
020100  010201                                          MOV     R2,R1           ;#512.<128.
020102  052715  010000                                  BIS     #BIT12,@R5      ;SO LAST PACKET NOW
020106  000402                                          BR      66$             ;USE REMAINING COUNT
```

```
020110  012701  000200                65$:    MOV     #128.,R1        ;USE 128. BYTES
020114  110160  000001                66$:    MOVB    R1,1(R0)        ;COPY COUNT TO BUFFER
020120  010103                            MOV     R1,R3           ;R3=COUNTER TO LOAD BUFFER
020122  112710  000001                    MOVB    #RSDATA,@R0     ;FLAG FIRST
020126  005720                            TST     (R0)+           ;SKIP COUNT
020130  116520  000072                67$:    MOVB    PATTEN(R5),(R0)+        ;INSERT DATA
020134  005303                            DEC     R3              ;MORE?
020136  101374                            BHI     67$             ;YES
020140  012700  026174                    MOV     #TRBUF,R0       ;-->TOP AGAIN
020144  116001  000001                    MOVB    1(R0),R1        ;GET COUNT
020150  042701  177400                    BIC     #177400,R1      ;ZERO SIGN EXTEND
020154  010165  000070                    MOV     R1,SNDCNT(R5)   ;HOW MANY TO SEND PLUS
020160  062765  000004  000070            ADD     #4,SNDCNT(R5)   ;FLAG,COUNT,CHKSUM
020166  062701  000002                    ADD     #2,R1           ;COMPENSATE FOR FLAG + COUNT
020172  004737  013520                    CALL    CHKSUM          ;FOR CHECKSUM CALC.
020176  110120                            MOVB    R1,(R0)+        ;CHKSUM INTO PACKET
020200  000301                            SWAB    R1              ;EVEN ON AN ODD
020202  110120                            MOVB    R1,(R0)+        ;BYTE BOUNDARY
020204  032715  010000                    BIT     #BIT12,@R5      ;LAST DATA PACKET?
020210  001412                            BEQ     68$             ;NO
020212  012765  000002  000034            MOV     #RSEND,XSFLG(R5)  ;YES-EXPECT 'END'
020220  012765  000016  000036            MOV     #RSNDSZ,XSCNT(R5)  ;OF THIS SIZE
020226  012765  000001  000032            MOV     #1,XSPKNM(R5)   ;AND 1 PACKET
020234  000411                            BR      69$             ;SEND
020236  012765  000020  000034    68$:    MOV     #RSCONT,XSFLG(R5)  ;(NOT LAST), EXPECT 'CONTINUE'
020244  012765  000001  000036            MOV     #1,XSCNT(R5)    ;AND 1 BYTE
020252  012765  000001  000032            MOV     #1,XSPKNM(R5)   ;AND 1 PACKET
020260  004737  006556                69$:    CALL    RSVP            ;SEND PACKET
                                                                    ;AND RETURN TO SCHEDULER
020264  032715  000010                    BIT     #BIT3,@R5       ;FLAG BYTE RETRY?
020270  001210                            BNE     72$             ;YES
020272  032715  002000                    BIT     #BIT10,@R5      ;RETRY DATA ERROR?
020276  001004                            BNE     70$             ;YES
020300  162702  000200                    SUB     #128.,R2        ;NO, MORE DATA TO SEND?
020304  101270                            BHI     64$             ;YES
020306  000502                            BR      71$             ;NO
020310                              70$:    TURTRY  REC(R5),#512.,DR(R5)    ;RETRY HERE


020310  012700  026174                76$:    MOV     #TRBUF,R0       ;FORM CMND PACK:
020314  112710  000002                    MOVB    #RSCMND,@R0     ;MESSAGE PACK TYPE
020320  112760  000012  000001            MOVB    #RSMSIZ,1(R0)   ;THIS BIG
020326  112760  000002  000002            MOVB    #RSSRD,2(R0)    ;OP CODE-READ
020334  016560  000064  000012            MOV     REC(R5),10.(R0) ;THIS RECORD
020342  116560  000060  000004            MOVB    DR(R5),4.(R0)   ;THIS DRIVE
020350  105060  000003                    CLRB    3(R0)           ;PRESET NORM THRESHOLD
020354  105715                            TSTB    @R5             ;REDUCED?
020356  100002                            BPL     77$             ;NO
020360  105260  000003                    INCB    3(R0)           ;YES-CHANGE THRESHOLD
020364  012760  001000  000010    77$:    MOV     #512.,8.(R0)    ;# BYTES DESIRED
020372  112760  000020  000005            MOVB    #020,5.(R0)     ;MAINTENANCE MODE
020400  005060  000006                    CLR     6.(R0)          ;NO SEQUENCE #
020404  012701  000012                    MOV     #RSMSIZ,R1      ;SIZE OF PACKET
020410  005721                            TST     (R1)+           ;PLUS FLAG+COUNT INTO R1
020412  012765  000016  000070            MOV     #RSSNSZ,SNDCNT(R5)  ;SET UP SIZE TO SEND

020420  004737  013520                    CALL    CHKSUM          ;FORM CHECKSUM R1=COUNT
```

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                020424  010110                                          MOV     R1,(R0)         ;INSERT IN PACKET

                020426  012701  001000                                  MOV     #512.,R1                ;SET EXPECTATIONS:
                                                                                                ;CALC # OF DATA PACKETS TO EXPECT
                020432  012703  000034                                  MOV     #XSFLG,R3       ;OFFSET OF FLAG
                020436  060503                                          ADD     R5,R3           ;ABS. ADDR. OF XSFLG
                020440  005002                                          CLR     R2              ;PRESET
                020442  005202                                  73$:    INC     R2              ;# PACKETS EXPECTED
                020444  012723  000001                                  MOV     #RSDATA,(R3)+   ;LOAD XSFLG
                020450  012723  000204                                  MOV     #132.,(R3)+     ;AND EXPECT COUNT
                020454  162701  000200                                  SUB     #128.,R1        ;NEG RESULT LAST TIME
                020460  101401                                          BLOS    75$             ;LAST TIME!
                020462  000767                                          BR      73$             ;MORE TO DO
                020464  005202                                  75$:    INC     R2              ;ADD ONE FOR END PACK
                020466  010265  000032                                  MOV     R2,XSPKNM(R5)   ;SAVE # PACKETS TO EXPECT
                020472  012723  000002                                  MOV     #RSEND,(R3)+    ;EXPECT AN END
                020476  012713  000016                                  MOV     #RSNDSZ,(R3)    ;THIS BIG-14. BYTES

                020502  004737  006556                                  CALL    RSVP            ;SEND
                                                                                                ;AND RETURN TO SCHEDULER

   3597 020516                                  TUREAD  REC(R5),#512.,DR(R5),#0


                020516  012700  026174                          82$:    MOV     #TRBUF,R0       ;FORM CMND PACK:
                020522  112710  000002                                  MOVB    #RSCMND,@R0     ;MESSAGE PACK TYPE
                020526  112760  000012  000001                          MOVB    #RSMSIZ,1(R0)   ;THIS BIG
                020534  112760  000002  000002                          MOVB    #RSSRD,2(R0)    ;OP CODE IS READ
                020542  016560  000064  000012                          MOV     REC(R5),10.(R0) ;THIS RECORD
                020550  116560  000060  000004                          MOVB    DR(R5),4.(R0)   ;THIS DRIVE
                020556  112760  000000  000003                          MOVB    #0,3.(R0)       ;VERIFY
                020564  012760  001000  000010                          MOV     #512.,8.(R0)    ;TOTAL BYTES TO READ
                020572  112760  000020  000005                          MOVB    #020,5.(R0)     ;MAINTENANCE MODE
                020600  005060  000006                                  CLR     6.(R0)          ;NO SEQUENCE #
                020604  012701  000012                                  MOV     #RSMSIZ,R1      ;GET SIZE OF PACKET
                020610  005721                                          TST     (R1)+           ;+2 FOR CHECKSUM
                020612  012765  000016  000070                          MOV     #RSSNSZ,SNDCNT(R5)  ;SIZE TO SEND
                020620  004737  013520                                  CALL    CHKSUM          ;FORM CHECKSUM R1=COUNT
                020624  010110                                          MOV     R1,(R0)         ;INSERT CHECKSUM

                020626  012701  001000                                  MOV     #512.,R1                ;SET EXPECTATIONS:
                                                                                                ;CALC # OF DATA PACKETS TO EXPECT:
                020632  012703  000034                                  MOV     #XSFLG,R3       ;GET OFFSET
                020636  060503                                          ADD     R5,R3           ;ABS. ADDR. OF XSFLG
                020640  005002                                          CLR     R2              ;PRESET AS NONE
                020642  005202                                  78$:    INC     R2              ;# PACKETS EXPECTED
                020644  012723  000001                                  MOV     #RSDATA,(R3)+   ;LOAD XSFLG
                020650  012723  000204                                  MOV     #132.,(R3)+     ;AND EXPECTED COUNT
                020654  162701  000200                                  SUB     #128.,R1        ;NEG RESULT LAST TIME
                020660  101401                                          BLOS    80$             ;LAST TIME
                020662  000767                                          BR      78$             ;MORE TO DO
                020664  005202                                  80$:    INC     R2              ;ADD ONE FOR END PACK
                020666  010265  000032                                  MOV     R2,XSPKNM(R5)   ;SAVE # PACKETS TO EXPECT
                020672  012723  000002                                  MOV     #RSEND,(R3)+    ;EXPECT AN END ALSO...
                020676  012713  000016                                  MOV     #RSNDSZ,(R3)    ;THIS BIG-14. BYTES
                020702  004737  006556                                  CALL    RSVP            ;SEND
                                                                                                ;AND RETURN TO SCHEDULER
```

```
020706  032715  002010                          81$:    BIT     #BIT10!BIT3,@R5 ;RETRY?
020712  001500                                          BEQ     79$             ;NO.
020714                                                  TURTRY  REC(R5),#512.,DR(R5)    ;YES


020714  012700  026174                          86$:    MOV     #TRBUF,R0       ;FORM CMND PACK:
020720  112710  000002                                  MOVB    #RSCMND,@R0     ;MESSAGE PACK TYPE
020724  112760  000012  000001                          MOVB    #RSMSIZ,1(R0)   ;THIS BIG
020732  112760  000002  000002                          MOVB    #RSSRD,2(R0)    ;OP CODE-READ
020740  016560  000064  000012                          MOV     REC(R5),10.(R0) ;THIS RECORD
020746  116560  000060  000004                          MOVB    DR(R5),4.(R0)   ;THIS DRIVE
020754  105060  000003                                  CLRB    3(R0)           ;PRESET NORM THRESHOLD
020760  105715                                          TSTB    @R5             ;REDUCED?
020762  100002                                          BPL     87$             ;NO
020764  105260  000003                                  INCB    3(R0)           ;YES-CHANGE THRESHOLD
020770  012760  001000  000010                  87$:    MOV     #512.,8.(R0)    ;# BYTES DESIRED
020776  112760  000020  000005                          MOVB    #020,5.(R0)     ;MAINTENANCE MODE
021004  005060  000006                                  CLR     6.(R0)          ;NO SEQUENCE #
021010  012701  000012                                  MOV     #RSMSIZ,R1      ;SIZE OF PACKET
021014  005721                                          TST     (R1)+           ;PLUS FLAG+COUNT INTO R1
021016  012765  000016  000070                          MOV     #RSSNSZ,SNDCNT(R5)  ;SET UP SIZE TO SEND

021024  004737  013520                                  CALL    CHKSUM          ;FORM CHECKSUM R1=COUNT
021030  010110                                          MOV     R1,(R0)         ;INSERT IN PACKET

021032  012701  001000                                  MOV     #512.,R1                ;SET EXPECTATIONS:
                                                                                ;CALC # OF DATA PACKETS TO EXPECT
021036  012703  000034                                  MOV     #XSFLG,R3       ;OFFSET OF FLAG
021042  060503                                          ADD     R5,R3           ;ABS. ADDR. OF XSFLG
021044  005002                                          CLR     R2              ;PRESET
021046  005202                                  83$:    INC     R2              ;# PACKETS EXPECTED
021050  012723  000001                                  MOV     #RSDATA,(R3)+   ;LOAD XSFLG
021054  012723  000204                                  MOV     #132.,(R3)+     ;AND EXPECT COUNT
021060  162701  000200                                  SUB     #128.,R1        ;NEG RESULT LAST TIME
021064  101401                                          BLOS    85$             ;LAST TIME!
021066  000767                                          BR      83$             ;MORE TO DO
021070  005202                                  85$:    INC     R2              ;ADD ONE FOR END PACK
021072  010265  000032                                  MOV     R2,XSPKNM(R5)   ;SAVE # PACKETS TO EXPECT
021076  012723  000002                                  MOV     #RSEND,(R3)+    ;EXPECT AN END
021102  012713  000016                                  MOV     #RSNDSZ,(R3)    ;THIS BIG-14. BYTES

021106  004737  006556                                  CALL    RSVP            ;SEND
                                                                                ;AND RETURN TO SCHEDULER

3598 021116  062704  000002                  ADD     #2,R4           ;POINT TO NEXT DATA
3599 021122  005764  021214                  TST     TST3PT(R4)      ;END?
3600 021126  001402                          BEQ     2$              ;YES
3601 021130  000137  017704                  JMP     1$              ;NO-WRITE, READ NEW DATA
3602 021134  005004                  2$:     CLR     R4              ;POINT TO FIRST DATA
3603 021136  062765  000200  000064          ADD     #200,REC(R5)    ;BUT NOW USE ADJACENT RECORD
3604 021144  032765  001000  000064          BIT     #1000,REC(R5)   ;ALL ADJACENT RECORDS DONE?
3605 021152  001002                          BNE     3$              ;YES
3606 021154  000137  017704                  JMP     1$              ;NO-WRITE, READ AT NEW RECORD
3607 021160  162765  001000  000064  3$:     SUB     #1000,REC(R5)   ;RESTORE TO NEXT RECORD
3608 021166  066565  000066  000064          ADD     TMP(R5),REC(R5) ;HALF INTO REST OF TAPE
3609 021174  006265  000066                  ASR     TMP(R5)         ;HALF OF HALF FOR NEXT TIME
3610 021200  103402                          BCS     4$              ;DONE?
```

```
3611 021202  000137  017704            JMP     1$              ;NO
3612 021206  005237  003320    4$:     INC     DONE            ;YES-SET FLAG
3613 021212  000207                    RETURN
3614 021214  000000            TST3PT: .WORD   000000
3615 021216  125252                    .WORD   125252
3616 021220  177777                    .WORD   177777
3617 021222  052525                    .WORD   052525
3618 021224  000000                    .WORD   000000
3619
3620
3621 021226                            ENDTST
     021226                                                  L10016:
     021226  104401                                                  TRAP    C$ETST
```

```
                                .SBTTL  TEST 4 / WRITE SELECTED NUMBER OF BLOCKS

                                        BGNTST
                                                                                T4::
                                        TSTID   #TST4
021230  012737  021274  003324                        MOV     #TST4,TSTTOP    ;SAVE ADDR OF TEST
021236  004737  006002                                CALL    SETUP           ;INIT UNITS TSTPC
021242  004737  005630                                CALL    SETDR           ;GET 1ST DRVS.
021246  004737  006050                                CALL    RUN             ;DO TEST
021252  004737  005526                                CALL    SWAPDR          ;GET NEXT DRVS.
021256  103004                                        BCC     64$             ;BR NO 2ND DRVS
021260  004737  006002                                CALL    SETUP           ;REINIT UNITS TSTPC
021264  004737  006050                                CALL    RUN             ;REPEAT TEST
021270                                          64$:                          ;DONE
                                        EXIT TST
021270  104432                                                        TRAP    C$EXIT
021272  000724                                                        .WORD   L10017-.

021274  005065  000064          TST4:   CLR     REC(R5)         ;START AT REC 0
021300  013765  003306  000066          MOV     TAPLEN,TMP(R5)  ;GET THE # OF BLOCKS PER TRACK
021306  005065  000062                  CLR     TRK(R5)         ;TRK(R5)=1ST OR 2ND PASS COUNTER
021312  016565  000064  000072  1$:     MOV     REC(R5),PATTEN(R5)  ;USE RECORD NO. FOR DATA
021320  005737  002216                  TST     DRVCHK                  ;ADD DR #?
021324  001403                          BEQ     10$                     ;NO
021326  066565  000060  000072          ADD     DR(R5),PATTEN(R5)       ;YES, ADD DRIVE ID
021334                          10$:    TUWRIT  PATTEN(R5),REC(R5),#512.,DR(R5),#0
021334  012700  026174                                  72$:    MOV     #TRBUF,R0       ;MAKE COMMAND PACKET:
021340  112710  000002                                  MOVB    #RSCMND,@R0     ;COMMAND FLAG
021344  112760  000012  000001                          MOVB    #RSMSIZ,1(R0)   ;THIS SIZE
021352  112760  000003  000002                          MOVB    #RSSWR,2(R0)    ;INSERT OP CODE-WRITE
021360  112760  000000  000003                          MOVB    #0,3.(R0)       ;VERIFY (1 OR 0)
021366  116560  000060  000004                          MOVB    DR(R5),4.(R0)   ;DRIVE #
021374  112760  000020  000005                          MOVB    #020,5.(R0)     ;MAINTENANCE MODE SWITCH
021402  005060  000006                                  CLR     6.(R0)          ;NO SEQUENCE #
021406  012760  001000  000010                          MOV     #512.,8.(R0)    ;TOTAL COUNT TO WRITE
021414  016560  000064  000012                          MOV     REC(R5),10.(R0) ;AT  RECORD N
021422  012701  000012                                  MOV     #RSMSIZ,R1      ;THE PACKET SIZE PLUS+2
021426  005721                                          TST     (R1)+           ;(FLAG AND COUNT) INTO R1
021430  012765  000016  000070                          MOV     #RSSNSZ,SNDCNT(R5)  ;LOAD THE  SIZE TO SEND
021436  004737  013520                                  CALL    CHKSUM          ;R0 --> R1=COUNT
021442  010110                                          MOV     R1,(R0)         ;PUT CHKSUM IN PACKET
                                                                                ;SET UP EXPECTATIONS:
021444  012765  000020  000034                          MOV     #RSCONT,XSFLG(R5)   ;THE FLAG
021452  012765  000001  000036                          MOV     #1,XSCNT(R5)    ;THE COUNT
021460  012765  000001  000032                          MOV     #1,XSPKNM(R5)   ;THE # PACKETS EXPECTED
021466  012702  001000                                  MOV     #512.,R2                ;GET # OF DATA BYTES
021472  004737  006556                                  CALL    RSVP            ;SEND (AND RETURN TO SCHEDULER)
021476  032715  000010                                  BIT     #BIT3,@R5       ;FLAG BYTE ERROR?
021502  001314                                          BNE     72$             ;YES
021504  042715  010000                                  BIC     #BIT12,@R5      ;FLAG FOR LAST PACKET
021510  012700  026174                          64$:    MOV     #TRBUF,R0       ;POINT TO TOP OF BUFFER AGAIN
021514  020227  000200                                  CMP     R2,#128.        ;START DATA PACKET(S)
021520  101004                                          BHI     65$             ;#512. > 128.!
021522  010201                                          MOV     R2,R1           ;#512.<128.
021524  052715  010000                                  BIS     #BIT12,@R5      ;SO LAST PACKET NOW
```

```
021530  000402                                          BR      66$             ;USE REMAINING COUNT
021532  012701  000200                        65$:     MOV     #128.,R1        ;USE 128. BYTES
021536  110160  000001                        66$:     MOVB    R1,1(R0)        ;COPY COUNT TO BUFFER
021542  010103                                          MOV     R1,R3           ;R3=COUNTER TO LOAD BUFFER
021544  112710  000001                                MOVB    #RSDATA,@R0     ;FLAG FIRST
021550  005720                                          TST     (R0)+           ;SKIP COUNT
021552  116520  000072                        67$:     MOVB    PATTEN(R5),(R0)+        ;INSERT DATA
021556  005303                                          DEC     R3              ;MORE?
021560  101374                                          BHI     67$             ;YES
021562  012700  026174                                MOV     #TRBUF,R0       ;-->TOP AGAIN
021566  116001  000001                                MOVB    1(R0),R1        ;GET COUNT
021572  042701  177400                                BIC     #177400,R1      ;ZERO SIGN EXTEND
021576  010165  000070                                MOV     R1,SNDCNT(R5)   ;HOW MANY TO SEND PLUS
021602  062765  000004  000070                       ADD     #4,SNDCNT(R5)   ;FLAG,COUNT,CHKSUM
021610  062701  000002                                ADD     #2,R1           ;COMPENSATE FOR FLAG + COUNT
021614  004737  013520                                CALL    CHKSUM          ;FOR CHECKSUM CALC.
021620  110120                                          MOVB    R1,(R0)+        ;CHKSUM INTO PACKET
021622  000301                                          SWAB    R1              ;EVEN ON AN ODD
021624  110120                                          MOVB    R1,(R0)+        ;BYTE BOUNDARY
021626  032715  010000                                BIT     #BIT12,@R5      ;LAST DATA PACKET?
021632  001412                                          BEQ     68$             ;NO
021634  012765  000002  000034                       MOV     #RSEND,XSFLG(R5)  ;YES-EXPECT 'END'
021642  012765  000016  000036                       MOV     #RSNDSZ,XSCNT(R5)  ;OF THIS SIZE
021650  012765  000001  000032                       MOV     #1,XSPKNM(R5)   ;AND 1 PACKET
021656  000411                                          BR      69$             ;SEND
021660  012765  000020  000034                68$:     MOV     #RSCONT,XSFLG(R5)  ;(NOT LAST), EXPECT 'CONTINUE'
021666  012765  000001  000036                       MOV     #1,XSCNT(R5)    ;AND 1 BYTE
021674  012765  000001  000032                       MOV     #1,XSPKNM(R5)   ;AND 1 PACKET
021702  004737  006556                        69$:     CALL    RSVP            ;SEND PACKET
                                                                                ;AND RETURN TO SCHEDULER
021706  032715  000010                                BIT     #BIT3,@R5       ;FLAG BYTE RETRY?
021712  001210                                          BNE     72$             ;YES
021714  032715  002000                                BIT     #BIT10,@R5      ;RETRY DATA ERROR?
021720  001004                                          BNE     70$             ;YES
021722  162702  000200                                SUB     #128.,R2        ;NO, MORE DATA TO SEND?
021726  101270                                          BHI     64$             ;YES
021730  000502                                          BR      71$             ;NO
021732                                          70$:     TURTRY  REC(R5),#512.,DR(R5)    ;RETRY HERE


021732  012700  026174                        76$:     MOV     #TRBUF,R0       ;FORM CMND PACK:
021736  112710  000002                                MOVB    #RSCMND,@R0     ;MESSAGE PACK TYPE
021742  112760  000012  000001                       MOVB    #RSMSIZ,1(R0)   ;THIS BIG
021750  112760  000002  000002                       MOVB    #RSSRD,2(R0)    ;OP CODE-READ
021756  016560  000064  000012                       MOV     REC(R5),10.(R0) ;THIS RECORD
021764  116560  000060  000004                       MOVB    DR(R5),4.(R0)   ;THIS DRIVE
021772  105060  000003                                CLRB    3(R0)           ;PRESET NORM THRESHOLD
021776  105715                                          TSTB    @R5             ;REDUCED?
022000  100002                                          BPL     77$             ;NO
022002  105260  000003                                INCB    3(R0)           ;YES-CHANGE THRESHOLD
022006  012760  001000  000010                77$:     MOV     #512.,8.(R0)    ;# BYTES DESIRED
022014  112760  000020  000005                       MOVB    #020,5.(R0)     ;MAINTENANCE MODE
022022  005060  000006                                CLR     6.(R0)          ;NO SEQUENCE #
022026  012701  000012                                MOV     #RSMSIZ,R1      ;SIZE OF PACKET
022032  005721                                          TST     (R1)+           ;PLUS FLAG+COUNT INTO R1
022034  012765  000016  000070                       MOV     #RSSNSZ,SNDCNT(R5)  ;SET UP SIZE TO SEND
```

```
                022042  004737  013520                          CALL    CHKSUM          ;FORM CHECKSUM R1=COUNT
                022046  010110                                  MOV     R1,(R0)         ;INSERT IN PACKET

                022050  012701  001000                          MOV     #512.,R1                ;SET EXPECTATIONS:
                                                                                        ;CALC # OF DATA PACKETS TO EXPECT
                022054  012703  000034                          MOV     #XSFLG,R3       ;OFFSET OF FLAG
                022060  060503                                  ADD     R5,R3           ;ABS. ADDR. OF XSFLG
                022062  005002                                  CLR     R2              ;PRESET
                022064  005202                          73$:    INC     R2              ;# PACKETS EXPECTED
                022066  012723  000001                          MOV     #RSDATA,(R3)+   ;LOAD XSFLG
                022072  012723  000204                          MOV     #132.,(R3)+     ;AND EXPECT COUNT
                022076  162701  000200                          SUB     #128.,R1        ;NEG RESULT LAST TIME
                022102  101401                                  BLOS    75$             ;LAST TIME!
                022104  000767                                  BR      73$             ;MORE TO DO
                022106  005202                          75$:    INC     R2              ;ADD ONE FOR END PACK
                022110  010265  000032                          MOV     R2,XSPKNM(R5)   ;SAVE # PACKETS TO EXPECT
                022114  012723  000002                          MOV     #RSEND,(R3)+    ;EXPECT AN END
                022120  012713  000016                          MOV     #RSNDSZ,(R3)    ;THIS BIG-14. BYTES

                022124  004737  006556                          CALL    RSVP            ;SEND
                                                                                        ;AND RETURN TO SCHEDULER

  3640 022140   005365  000066                  DEC     TMP(R5)         ;DO ALL RECORDS FOR THIS TRACK?
  3641 022144   001404                          BEQ     2$              ;YES-GET OTHER TRACK
  3642 022146   005265  000064                  INC     REC(R5)         ;NO-ONTO NEXT RECORD
  3643 022152   000137  021312                  JMP     1$              ;EXECUTE THE WRITE
  3644 022156   005765  000062          2$:     TST     TRK(R5)         ;DONE 2 TRACKS?
  3645 022162   001012                          BNE     TST4EX          ;YES-EXIT
  3646 022164   005265  000062                  INC     TRK(R5)         ;NO-SET FLAG FOR NEXT PASS
  3647 022170   013765  003332  000064          MOV     SECREC,REC(R5)  ;GET NEW STARTING BLOCK #
  3648 022176   013765  003306  000066          MOV     TAPLEN,TMP(R5)  ;RESET # OF BLOCKS
  3649 022204   000137  021312                  JMP     1$              ;AND EXECUTE
  3650 022210   005237  003320          TST4EX: INC     DONE            ;DONE
  3651 022214   000207                          RETURN                  ;RETURN
  3652
  3653 022216                                   ENDTST
       022216                                                   L10017:
       022216   104401                                                  TRAP    C$ETST
```

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

                                        BGNTST
                                                                                T5::
                                        TSTID   #TST5
022220  012737  022264  003324                MOV     #TST5,TSTTOP    ;SAVE ADDR OF TEST
022226  004737  006002                        CALL    SETUP           ;INIT UNITS TSTPC
022232  004737  005630                        CALL    SETDR           ;GET 1ST DRVS.
022236  004737  006050                        CALL    RUN             ;DO TEST
022242  004737  005526                        CALL    SWAPDR          ;GET NEXT DRVS.
022246  103004                              BCC     64$             ;BR NO 2ND DRVS
022250  004737  006002                        CALL    SETUP           ;REINIT UNITS TSTPC
022254  004737  006050                        CALL    RUN             ;REPEAT TEST
022260                                64$:                            ;DONE
                                        EXIT TST
022260  104432                                                    TRAP    C$EXIT
022262  000520                                                    .WORD   L10020-.

022264  005065  000064        TST5:   CLR     REC(R5)             ;START AT REC 0
022270  013765  003306  000066        MOV     TAPLEN,TMP(R5)      ;GET THE # OF BLOCKS PER TRACK
022276  005065  000062                CLR     TRK(R5)             ;TRK(R5)=1ST OR 2ND PASS
022302  016565  000064  000072  1$:   MOV     REC(R5),PATTEN(R5)  ;USE RECORD NO. AS DATA
022310  005737  002216                TST     DRVCHK              ;ADD DR #?
022314  001403                        BEQ     10$                 ;NO
022316  066565  000060  000072        ADD     DR(R5),PATTEN(R5)   ;ADD IN DRIVE ID
022324                        10$:    TUREAD  REC(R5),#512.,DR(R5),#0

022324  012700  026174                68$:    MOV     #TRBUF,R0       ;FORM CMND PACK:
022330  112710  000002                        MOVB    #RSCMND,@R0     ;MESSAGE PACK TYPE
022334  112760  000012  000001              MOVB    #RSMSIZ,1(R0)   ;THIS BIG
022342  112760  000002  000002              MOVB    #RSSRD,2(R0)    ;OP CODE IS READ
022350  016560  000064  000012              MOV     REC(R5),10.(R0) ;THIS RECORD
022356  116560  000060  000004              MOVB    DR(R5),4.(R0)   ;THIS DRIVE
022364  112760  000000  000003              MOVB    #0,3.(R0)       ;VERIFY
022372  012760  001000  000010              MOV     #512.,8.(R0)    ;TOTAL BYTES TO READ
022400  112760  000020  000005              MOVB    #020,5.(R0)     ;MAINTENANCE MODE
022406  005060  000006                      CLR     6.(R0)          ;NO SEQUENCE #
022412  012701  000012                      MOV     #RSMSIZ,R1      ;GET SIZE OF PACKET
022416  005721                              TST     (R1)+           ;+2 FOR CHECKSUM
022420  012765  000016  000070              MOV     #RSSNSZ,SNDCNT(R5)  ;SIZE TO SEND
022426  004737  013520                      CALL    CHKSUM          ;FORM CHECKSUM R1=COUNT
022432  010110                              MOV     R1,(R0)         ;INSERT CHECKSUM

022434  012701  001000                      MOV     #512.,R1                ;SET EXPECTATIONS:
                                                                ;CALC # OF DATA PACKETS TO EXPECT:
022440  012703  000034                      MOV     #XSFLG,R3       ;GET OFFSET
022444  060503                              ADD     R5,R3           ;ABS. ADDR. OF XSFLG
022446  005002                              CLR     R2              ;PRESET AS NONE
022450  005202                      64$:    INC     R2              ;# PACKETS EXPECTED
022452  012723  000001                      MOV     #RSDATA,(R3)+   ;LOAD XSFLG
022456  012723  000204                      MOV     #132.,(R3)+     ;AND EXPECTED COUNT
022462  162701  000200                      SUB     #128.,R1        ;NEG RESULT LAST TIME
022466  101401                              BLOS    66$             ;LAST TIME
022470  000767                              BR      64$             ;MORE TO DO
022472  005202                      66$:    INC     R2              ;ADD ONE FOR END PACK
```

```
022474  010265  000032                          MOV     R2,XSPKNM(R5)   ;SAVE # PACKETS TO EXPECT
022500  012723  000002                          MOV     #RSEND,(R3)+    ;EXPECT AN END ALSO...
022504  012713  000016                          MOV     #RSNDSZ,(R3)    ;THIS BIG-14. BYTES
022510  004737  006556                          CALL    RSVP            ;SEND
                                                                        ;AND RETURN TO SCHEDULER
022514  032715  002010                  67$:    BIT     #BIT10!BIT3,@R5 ;RETRY?
022520  001500                                  BEQ     65$             ;NO.
022522                                          TURTRY  REC(R5),#512.,DR(R5)    ;YES


022522  012700  026174                  72$:    MOV     #TRBUF,R0       ;FORM CMND PACK:
022526  112710  000002                          MOVB    #RSCMND,@R0     ;MESSAGE PACK TYPE
022532  112760  000012  000001                  MOVB    #RSMSIZ,1(R0)   ;THIS BIG
022540  112760  000002  000002                  MOVB    #RSSRD,2(R0)    ;OP CODE-READ
022546  016560  000064  000012                  MOV     REC(R5),10.(R0) ;THIS RECORD
022554  116560  000060  000004                  MOVB    DR(R5),4.(R0)   ;THIS DRIVE
022562  105060  000003                          CLRB    3(R0)           ;PRESET NORM THRESHOLD
022566  105715                                  TSTB    @R5             ;REDUCED?
022570  100002                                  BPL     73$             ;NO
022572  105260  000003                          INCB    3(R0)           ;YES-CHANGE THRESHOLD
022576  012760  001000  000010          73$:    MOV     #512.,8.(R0)    ;# BYTES DESIRED
022604  112760  000020  000005                  MOVB    #020,5.(R0)     ;MAINTENANCE MODE
022612  005060  000006                          CLR     6.(R0)          ;NO SEQUENCE #
022616  012701  000012                          MOV     #RSMSIZ,R1      ;SIZE OF PACKET
022622  005721                                  TST     (R1)+           ;PLUS FLAG+COUNT INTO R1
022624  012765  000016  000070                  MOV     #RSSNSZ,SNDCNT(R5)  ;SET UP SIZE TO SEND

022632  004737  013520                          CALL    CHKSUM          ;FORM CHECKSUM R1=COUNT
022636  010110                                  MOV     R1,(R0)         ;INSERT IN PACKET

022640  012701  001000                          MOV     #512.,R1                ;SET EXPECTATIONS:
                                                                        ;CALC # OF DATA PACKETS TO EXPECT
022644  012703  000034                          MOV     #XSFLG,R3       ;OFFSET OF FLAG
022650  060503                                  ADD     R5,R3           ;ABS. ADDR. OF XSFLG
022652  005002                                  CLR     R2              ;PRESET
022654  005202                          69$:    INC     R2              ;# PACKETS EXPECTED
022656  012723  000001                          MOV     #RSDATA,(R3)+   ;LOAD XSFLG
022662  012723  000204                          MOV     #132.,(R3)+     ;AND EXPECT COUNT
022666  162701  000200                          SUB     #128.,R1        ;NEG RESULT LAST TIME
022672  101401                                  BLOS    71$             ;LAST TIME!
022674  000767                                  BR      69$             ;MORE TO DO
022676  005202                          71$:    INC     R2              ;ADD ONE FOR END PACK
022700  010265  000032                          MOV     R2,XSPKNM(R5)   ;SAVE # PACKETS TO EXPECT
022704  012723  000002                          MOV     #RSEND,(R3)+    ;EXPECT AN END
022710  012713  000016                          MOV     #RSNDSZ,(R3)    ;THIS BIG-14. BYTES

022714  004737  006556                          CALL    RSVP            ;SEND
                                                                        ;AND RETURN TO SCHEDULER

3671 022724  005365  000066                  DEC     TMP(R5)         ;DO ALL RECORDS THIS TRACK?
3672 022730  001404                          BEQ     2$              ;YES-GET OTHER TRACK
3673 022732  005265  000064                  INC     REC(R5)         ;NO-NEXT RECORD
3674 022736  000137  022302                  JMP     1$              ;EXECUTE THE READ
3675 022742  005765  000062          2$:     TST     TRK(R5)         ;DONE 2 TRACKS?
3676 022746  001012                          BNE     TST5EX          ;YES-EXIT
3677 022750  005265  000062                  INC     TRK(R5)         ;NO-SET FLAG FOR NEXT PASS
3678 022754  013765  003332  000064          MOV     SECREC,REC(R5)  ;GET NEW STARTING BLOCK #
```

```
 3679 022762  013765  003306  000066          MOV     TAPLEN,TMP(R5)  ;RESET # OF BLOCKS
 3680 022770  000137  022302                  JMP     1$              ;AND EXECUTE
 3681 022774  005237  003320          TST5EX: INC     DONE            ;DONE
 3682 023000  000207                          RETURN                  ;RETURN
 3683
 3684 023002                                  ENDTST
      023002                                                                  L10020:
      023002  104401                                                                 TRAP    C$ETST
```

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

                        BGNTST
                                                                        T6::
                        TSTID   #TST6
023004  012737  023050  003324                  MOV     #TST6,TSTTOP    ;SAVE ADDR OF TEST
023012  004737  006002                          CALL    SETUP           ;INIT UNITS TSTPC
023016  004737  005630                          CALL    SETDR           ;GET 1ST DRVS.
023022  004737  006050                          CALL    RUN             ;DO TEST
023026  004737  005526                          CALL    SWAPDR          ;GET NEXT DRVS.
023032  103004                                  BCC     64$             ;BR NO 2ND DRVS
023034  004737  006002                          CALL    SETUP           ;REINIT UNITS TSTPC
023040  004737  006050                          CALL    RUN             ;REPEAT TEST
023044                                  64$:                            ;DONE
                        EXIT TST
023044  104432                                                  TRAP    C$EXIT
023046  000724                                                  .WORD   L10021-.

023050  005065  000064          TST6:   CLR     REC(R5)         ;START AT REC 0
023054  013765  003306  000066          MOV     TAPLEN,TMP(R5)  ;GET THE # OF BLOCKS PER TRACK
023062  005065  000062                  CLR     TRK(R5)         ;TRK(R5)=1ST OR 2ND PASS
023066  016565  000064  000072  1$:     MOV     REC(R5),PATTEN(R5)  ;USE RECORD NO. FOR DATA
023074  005737  002216                  TST     DRVCHK          ;ADD DR #?
023100  001403                          BEQ     10$             ;NO
023102  066565  000060  000072          ADD     DR(R5),PATTEN(R5)       ;ADD DRIVE ID
023110                          10$:    TUWRIT  PATTEN(R5),REC(R5),#512.,DR(R5),#1
023110  012700  026174                          72$:    MOV     #TRBUF,R0       ;MAKE COMMAND PACKET:
023114  112710  000002                          MOVB    #RSCMND,@R0     ;COMMAND FLAG
023120  112760  000012  000001                  MOVB    #RSMSIZ,1(R0)   ;THIS SIZE
023126  112760  000003  000002                  MOVB    #RSSWR,2(R0)    ;INSERT OP CODE-WRITE
023134  112760  000001  000003                  MOVB    #1,3.(R0)       ;VERIFY (1 OR 0)
023142  116560  000060  000004                  MOVB    DR(R5),4.(R0)   ;DRIVE #
023150  112760  000020  000005                  MOVB    #020,5.(R0)     ;MAINTENANCE MODE SWITCH
023156  005060  000006                          CLR     6.(R0)          ;NO SEQUENCE #
023162  012760  001000  000010                  MOV     #512.,8.(R0)    ;TOTAL COUNT TO WRITE
023170  016560  000064  000012                  MOV     REC(R5),10.(R0) ;AT  RECORD N
023176  012701  000012                          MOV     #RSMSIZ,R1      ;THE PACKET SIZE PLUS+2
023202  005721                                  TST     (R1)+           ;(FLAG AND COUNT) INTO R1
023204  012765  000016  000070                  MOV     #RSSNSZ,SNDCNT(R5)  ;LOAD THE  SIZE TO SEND
023212  004737  013520                          CALL    CHKSUM          ;R0 --> R1=COUNT
023216  010110                                  MOV     R1,(R0)         ;PUT CHKSUM IN PACKET
                                                                        ;SET UP EXPECTATIONS:
023220  012765  000020  000034                  MOV     #RSCONT,XSFLG(R5)   ;THE FLAG
023226  012765  000001  000036                  MOV     #1,XSCNT(R5)    ;THE COUNT
023234  012765  000001  000032                  MOV     #1,XSPKNM(R5)   ;THE # PACKETS EXPECTED
023242  012702  001000                          MOV     #512.,R2                ;GET # OF DATA BYTES
023246  004737  006556                          CALL    RSVP            ;SEND (AND RETURN TO SCHEDULER)
023252  032715  000010                          BIT     #BIT3,@R5       ;FLAG BYTE ERROR?
023256  001314                                  BNE     72$             ;YES
023260  042715  010000                          BIC     #BIT12,@R5      ;FLAG FOR LAST PACKET
023264  012700  026174                  64$:    MOV     #TRBUF,R0       ;POINT TO TOP OF BUFFER AGAIN
023270  020227  000200                          CMP     R2,#128.        ;START DATA PACKET(S)
023274  101004                                  BHI     65$             ;#512. > 128.!
023276  010201                                  MOV     R2,R1           ;#512.<128.
023300  052715  010000                          BIS     #BIT12,@R5      ;SO LAST PACKET NOW
023304  000402                                  BR      66$             ;USE REMAINING COUNT
```

```
023306  012701  000200                  65$:    MOV     #128.,R1        ;USE 128. BYTES
023312  110160  000001                  66$:    MOVB    R1,1(R0)        ;COPY COUNT TO BUFFER
023316  010103                                  MOV     R1,R3           ;R3=COUNTER TO LOAD BUFFER
023320  112710  000001                          MOVB    #RSDATA,@R0     ;FLAG FIRST
023324  005720                                  TST     (R0)+           ;SKIP COUNT
023326  116520  000072                  67$:    MOVB    PATTEN(R5),(R0)+        ;INSERT DATA
023332  005303                                  DEC     R3              ;MORE?
023334  101374                                  BHI     67$             ;YES
023336  012700  026174                          MOV     #TRBUF,R0       ;-->TOP AGAIN
023342  116001  000001                          MOVB    1(R0),R1        ;GET COUNT
023346  042701  177400                          BIC     #177400,R1      ;ZERO SIGN EXTEND
023352  010165  000070                          MOV     R1,SNDCNT(R5)   ;HOW MANY TO SEND PLUS
023356  062765  000004  000070                  ADD     #4,SNDCNT(R5)   ;FLAG,COUNT,CHKSUM
023364  062701  000002                          ADD     #2,R1           ;COMPENSATE FOR FLAG + COUNT
023370  004737  013520                          CALL    CHKSUM          ;FOR CHECKSUM CALC.
023374  110120                                  MOVB    R1,(R0)+        ;CHKSUM INTO PACKET
023376  000301                                  SWAB    R1              ;EVEN ON AN ODD
023400  110120                                  MOVB    R1,(R0)+        ;BYTE BOUNDARY
023402  032715  010000                          BIT     #BIT12,@R5      ;LAST DATA PACKET?
023406  001412                                  BEQ     68$             ;NO
023410  012765  000002  000034                  MOV     #RSEND,XSFLG(R5)  ;YES-EXPECT 'END'
023416  012765  000016  000036                  MOV     #RSNDSZ,XSCNT(R5)  ;OF THIS SIZE
023424  012765  000001  000032                  MOV     #1,XSPKNM(R5)   ;AND 1 PACKET
023432  000411                                  BR      69$             ;SEND
023434  012765  000020  000034          68$:    MOV     #RSCONT,XSFLG(R5)  ;(NOT LAST), EXPECT 'CONTINUE'
023442  012765  000001  000036                  MOV     #1,XSCNT(R5)    ;AND 1 BYTE
023450  012765  000001  000032                  MOV     #1,XSPKNM(R5)   ;AND 1 PACKET
023456  004737  006556                  69$:    CALL    RSVP            ;SEND PACKET
                                                                        ;AND RETURN TO SCHEDULER
023462  032715  000010                          BIT     #BIT3,@R5       ;FLAG BYTE RETRY?
023466  001210                                  BNE     72$             ;YES
023470  032715  002000                          BIT     #BIT10,@R5      ;RETRY DATA ERROR?
023474  001004                                  BNE     70$             ;YES
023476  162702  000200                          SUB     #128.,R2        ;NO, MORE DATA TO SEND?
023502  101270                                  BHI     64$             ;YES
023504  000502                                  BR      71$             ;NO
023506                          70$:    TURTRY  REC(R5),#512.,DR(R5)    ;RETRY HERE


023506  012700  026174                  76$:    MOV     #TRBUF,R0       ;FORM CMND PACK:
023512  112710  000002                          MOVB    #RSCMND,@R0     ;MESSAGE PACK TYPE
023516  112760  000012  000001                  MOVB    #RSMSIZ,1(R0)   ;THIS BIG
023524  112760  000002  000002                  MOVB    #RSSRD,2(R0)    ;OP CODE-READ
023532  016560  000064  000012                  MOV     REC(R5),10.(R0) ;THIS RECORD
023540  116560  000060  000004                  MOVB    DR(R5),4.(R0)   ;THIS DRIVE
023546  105060  000003                          CLRB    3(R0)           ;PRESET NORM THRESHOLD
023552  105715                                  TSTB    @R5             ;REDUCED?
023554  100002                                  BPL     77$             ;NO
023556  105260  000003                          INCB    3(R0)           ;YES-CHANGE THRESHOLD
023562  012760  001000  000010          77$:    MOV     #512.,8.(R0)    ;# BYTES DESIRED
023570  112760  000020  000005                  MOVB    #020,5.(R0)     ;MAINTENANCE MODE
023576  005060  000006                          CLR     6.(R0)          ;NO SEQUENCE #
023602  012701  000012                          MOV     #RSMSIZ,R1      ;SIZE OF PACKET
023606  005721                                  TST     (R1)+           ;PLUS FLAG+COUNT INTO R1
023610  012765  000016  000070                  MOV     #RSSNSZ,SNDCNT(R5)  ;SET UP SIZE TO SEND

023616  004737  013520                          CALL    CHKSUM          ;FORM CHECKSUM R1=COUNT
```

```
023622  010110                                          MOV     R1,(R0)         ;INSERT IN PACKET

023624  012701  001000                                  MOV     #512.,R1                ;SET EXPECTATIONS:
                                                                                ;CALC # OF DATA PACKETS TO EXPECT
023630  012703  000034                                  MOV     #XSFLG,R3       ;OFFSET OF FLAG
023634  060503                                          ADD     R5,R3           ;ABS. ADDR. OF XSFLG
023636  005002                                          CLR     R2              ;PRESET
023640  005202                                  73$:    INC     R2              ;# PACKETS EXPECTED
023642  012723  000001                                  MOV     #RSDATA,(R3)+   ;LOAD XSFLG
023646  012723  000204                                  MOV     #132.,(R3)+     ;AND EXPECT COUNT
023652  162701  000200                                  SUB     #128.,R1        ;NEG RESULT LAST TIME
023656  101401                                          BLOS    75$             ;LAST TIME!
023660  000767                                          BR      73$             ;MORE TO DO
023662  005202                                  75$:    INC     R2              ;ADD ONE FOR END PACK
023664  010265  000032                                  MOV     R2,XSPKNM(R5)   ;SAVE # PACKETS TO EXPECT
023670  012723  000002                                  MOV     #RSEND,(R3)+    ;EXPECT AN END
023674  012713  000016                                  MOV     #RSNDSZ,(R3)    ;THIS BIG-14. BYTES

023700  004737  006556                                  CALL    RSVP            ;SEND
                                                                                ;AND RETURN TO SCHEDULER

 3702 023714  005365  000066                  DEC     TMP(R5)         ;DO ALL RECORDS FOR THIS TRACK?
 3703 023720  001404                          BEQ     2$              ;YES-GET OTHER TRACK
 3704 023722  005265  000064                  INC     REC(R5)         ;NO-NEXT RECORD
 3705 023726  000137  023066                  JMP     1$              ;EXECUTE THE WRITE
 3706 023732  005765  000062          2$:     TST     TRK(R5)         ;DONE 2 TRACKS?
 3707 023736  001012                          BNE     TST6EX          ;YES-EXIT
 3708 023740  005265  000062                  INC     TRK(R5)         ;NO-SET FLAG FOR NEXT PASS
 3709 023744  013765  003332  000064          MOV     SECREC,REC(R5)  ;GET NEW STARTING BLOCK #
 3710 023752  013765  003306  000066          MOV     TAPLEN,TMP(R5)  ;RESET # OF BLOCKS
 3711 023760  000137  023066                  JMP     1$              ;AND EXECUTE
 3712 023764  005237  003320          TST6EX: INC     DONE            ;DONE
 3713 023770  000207                          RETURN                  ;RETURN
 3714
 3715 023772                                  ENDTST
      023772                                                  L10021:
      023772  104401                                                  TRAP    C$ETST
```

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

                        BGNTST
                                                                        T7::
                        TSTID   #TST7
023774  012737  024040  003324                 MOV     #TST7,TSTTOP    ;SAVE ADDR OF TEST
024002  004737  006002                         CALL    SETUP           ;INIT UNITS TSTPC
024006  004737  005630                         CALL    SETDR           ;GET 1ST DRVS.
024012  004737  006050                         CALL    RUN             ;DO TEST
024016  004737  005526                         CALL    SWAPDR          ;GET NEXT DRVS.
024022  103004                                 BCC     64$             ;BR NO 2ND DRVS
024024  004737  006002                         CALL    SETUP           ;REINIT UNITS TSTPC
024030  004737  006050                         CALL    RUN             ;REPEAT TEST
024034                                  64$:                            ;DONE
                        EXIT TST
024034  104432                                                        TRAP    C$EXIT
024036  000520                                                        .WORD   L10022-.

024040  005065  000064          TST7:   CLR     REC(R5)                 ;START AT REC 0
024044  013765  003306  000066          MOV     TAPLEN,TMP(R5)          ;GET THE # OF BLOCKS PER TRACK
024052  005065  000062                  CLR     TRK(R5)                 ;TRK(R5)=1ST OR 2ND PASS
024056  016565  000064  000072  1$:     MOV     REC(R5),PATTEN(R5)      ;USE RECORD NO. FOR DATA
024064  005737  002216                  TST     DRVCHK                  ;ADD DR #?
024070  001403                          BEQ      10$                    ;NO
024072  066565  000060  000072          ADD     DR(R5),PATTEN(R5)       ;ADD DRIVE ID
024100                          10$:    TUREAD  REC(R5),#512.,DR(R5),#1


024100  012700  026174                  68$:    MOV     #TRBUF,R0       ;FORM CMND PACK:
024104  112710  000002                          MOVB    #RSCMND,@R0     ;MESSAGE PACK TYPE
024110  112760  000012  000001                  MOVB    #RSMSIZ,1(R0)   ;THIS BIG
024116  112760  000002  000002                  MOVB    #RSSRD,2(R0)    ;OP CODE IS READ
024124  016560  000064  000012                  MOV     REC(R5),10.(R0) ;THIS RECORD
024132  116560  000060  000004                  MOVB    DR(R5),4.(R0)   ;THIS DRIVE
024140  112760  000001  000003                  MOVB    #1,3.(R0)       ;VERIFY
024146  012760  001000  000010                  MOV     #512.,8.(R0)    ;TOTAL BYTES TO READ
024154  112760  000020  000005                  MOVB    #020,5.(R0)     ;MAINTENANCE MODE
024162  005060  000006                          CLR     6.(R0)          ;NO SEQUENCE #
024166  012701  000012                          MOV     #RSMSIZ,R1      ;GET SIZE OF PACKET
024172  005721                                  TST     (R1)+           ;+2 FOR CHECKSUM
024174  012765  000016  000070                  MOV     #RSSNSZ,SNDCNT(R5)  ;SIZE TO SEND
024202  004737  013520                          CALL    CHKSUM          ;FORM CHECKSUM R1=COUNT
024206  010110                                  MOV     R1,(R0)         ;INSERT CHECKSUM

024210  012701  001000                          MOV     #512.,R1                ;SET EXPECTATIONS:
                                                                        ;CALC # OF DATA PACKETS TO EXPECT:
024214  012703  000034                          MOV     #XSFLG,R3       ;GET OFFSET
024220  060503                                  ADD     R5,R3           ;ABS. ADDR. OF XSFLG
024222  005002                                  CLR     R2              ;PRESET AS NONE
024224  005202                          64$:    INC     R2              ;# PACKETS EXPECTED
024226  012723  000001                          MOV     #RSDATA,(R3)+   ;LOAD XSFLG
024232  012723  000204                          MOV     #132.,(R3)+     ;AND EXPECTED COUNT
024236  162701  000200                          SUB     #128.,R1        ;NEG RESULT LAST TIME
024242  101401                                  BLOS    66$             ;LAST TIME
024244  000767                                  BR      64$             ;MORE TO DO
024246  005202                          66$:    INC     R2              ;ADD ONE FOR END PACK
```

```
024250  010265  000032                          MOV     R2,XSPKNM(R5)   ;SAVE # PACKETS TO EXPECT
024254  012723  000002                          MOV     #RSEND,(R3)+    ;EXPECT AN END ALSO...
024260  012713  000016                          MOV     #RSNDSZ,(R3)    ;THIS BIG-14. BYTES
024264  004737  006556                          CALL    RSVP            ;SEND
                                                                        ;AND RETURN TO SCHEDULER
024270  032715  002010                  67$:    BIT     #BIT10!BIT3,@R5 ;RETRY?
024274  001500                                  BEQ     65$             ;NO.
024276                                          TURTRY  REC(R5),#512.,DR(R5)    ;YES


024276  012700  026174                  72$:    MOV     #TRBUF,R0       ;FORM CMND PACK:
024302  112710  000002                          MOVB    #RSCMND,@R0     ;MESSAGE PACK TYPE
024306  112760  000012  000001                  MOVB    #RSMSIZ,1(R0)   ;THIS BIG
024314  112760  000002  000002                  MOVB    #RSSRD,2(R0)    ;OP CODE-READ
024322  016560  000064  000012                  MOV     REC(R5),10.(R0) ;THIS RECORD
024330  116560  000060  000004                  MOVB    DR(R5),4.(R0)   ;THIS DRIVE
024336  105060  000003                          CLRB    3(R0)           ;PRESET NORM THRESHOLD
024342  105715                                  TSTB    @R5             ;REDUCED?
024344  100002                                  BPL     73$             ;NO
024346  105260  000003                          INCB    3(R0)           ;YES-CHANGE THRESHOLD
024352  012760  001000  000010          73$:    MOV     #512.,8.(R0)    ;# BYTES DESIRED
024360  112760  000020  000005                  MOVB    #020,5.(R0)     ;MAINTENANCE MODE
024366  005060  000006                          CLR     6.(R0)          ;NO SEQUENCE #
024372  012701  000012                          MOV     #RSMSIZ,R1      ;SIZE OF PACKET
024376  005721                                  TST     (R1)+           ;PLUS FLAG+COUNT INTO R1
024400  012765  000016  000070                  MOV     #RSSNSZ,SNDCNT(R5)  ;SET UP SIZE TO SEND

024406  004737  013520                          CALL    CHKSUM          ;FORM CHECKSUM R1=COUNT
024412  010110                                  MOV     R1,(R0)         ;INSERT IN PACKET

024414  012701  001000                          MOV     #512.,R1                ;SET EXPECTATIONS:
                                                                        ;CALC # OF DATA PACKETS TO EXPECT
024420  012703  000034                          MOV     #XSFLG,R3       ;OFFSET OF FLAG
024424  060503                                  ADD     R5,R3           ;ABS. ADDR. OF XSFLG
024426  005002                                  CLR     R2              ;PRESET
024430  005202                          69$:    INC     R2              ;# PACKETS EXPECTED
024432  012723  000001                          MOV     #RSDATA,(R3)+   ;LOAD XSFLG
024436  012723  000204                          MOV     #132.,(R3)+     ;AND EXPECT COUNT
024442  162701  000200                          SUB     #128.,R1        ;NEG RESULT LAST TIME
024446  101401                                  BLOS    71$             ;LAST TIME!
024450  000767                                  BR      69$             ;MORE TO DO
024452  005202                          71$:    INC     R2              ;ADD ONE FOR END PACK
024454  010265  000032                          MOV     R2,XSPKNM(R5)   ;SAVE # PACKETS TO EXPECT
024460  012723  000002                          MOV     #RSEND,(R3)+    ;EXPECT AN END
024464  012713  000016                          MOV     #RSNDSZ,(R3)    ;THIS BIG-14. BYTES

024470  004737  006556                          CALL    RSVP            ;SEND
                                                                        ;AND RETURN TO SCHEDULER

3733 024500  005365  000066                      DEC     TMP(R5)         ;DO ALL RECORDS THIS TRACK?
3734 024504  001404                              BEQ     2$              ;YES-GET OTHER TRACK
3735 024506  005265  000064                      INC     REC(R5)         ;NO-NEXT RECORD
3736 024512  000137  024056                      JMP     1$              ;EXECUTE THE READ
3737 024516  005765  000062              2$:     TST     TRK(R5)         ;DONE 2 TRACKS?
3738 024522  001012                              BNE     TST7EX          ;YES-EXIT
3739 024524  005265  000062                      INC     TRK(R5)         ;NO-SET FLAG FOR NEXT PASS
3740 024530  013765  003332  000064              MOV     SECREC,REC(R5)  ;GET NEW STARTING BLOCK #
```

```
 3741 024536  013765  003306  000066          MOV     TAPLEN,TMP(R5)  ;RESET # OF BLOCKS
 3742 024544  000137  024056                  JMP     1$              ;AND EXECUTE
 3743 024550  005237  003320          TST7EX: INC     DONE            ;DONE
 3744 024554  000207                          RETURN                  ;RETURN
 3745
 3746 024556                                  ENDTST
      024556                                                  L10022:
      024556  104401                                                  TRAP    C$ETST
```

```
                                .SBTTL  TEST 8 / TESTS MODIFIED RADIAL SERIAL PROTOCOL

024560                          BGNTST
024560                                                                  T8::

024560  012737  024602  003324  MOV     #TST8,TSTTOP    ;SAVE ADDR OF TEST
024566  004737  006002          CALL    SETUP           ;INIT UNITS TSTPC
024572  004737  006050          CALL    RUN             ;DO TEST
                                                        ;DONE

024576                          EXIT TST
024576  104432                                                  TRAP    C$EXIT
024600  000662                                                  .WORD   L10023-.

024602  012737  000001  003340  TST8:   MOV     #1,TEST8        ;INDICATES 1ST PART OF TST 8
024610  012700  026174          64$:    MOV     #TRBUF,R0       ;FORM COMMAND PACKET
024614  112710  000002          MOVB    #RSCMND,@R0     ;COMMAND FLAG
024620  112760  000012  000001  MOVB    #RSMSIZ,1(R0)   ;SIZE OF MESSAGE
024626  112760  000012  000002  MOVB    #RSSGET,2(R0)   ;GET CHARACTERISTICS
024634  105060  000003          CLRB    3(R0)           ;NO MODIFIER.
024640  005060  000004          CLR     4(R0)           ;NO DRIVE OR SWITCHES
024644  005060  000006          CLR     6(R0)           ;NO SEQUENCE NUMBER
024650  005060  000010          CLR     8.(R0)          ;NO BYTES
024654  005060  000012          CLR     10.(R0)         ;NO RECORD #
024660  012701  000012          MOV     #RSMSIZ,R1      ;GET SIZE
024664  005721                  TST     (R1)+           ;+2 FOR CHECKSUM
024666  012765  000016  000070  MOV     #RSSNSZ,SNDCNT(R5)  ;SIZE TO SEND
024674  004737  013520          CALL    CHKSUM          ;FORM CHECKSUM
024700  010110                  MOV     R1,(R0)         ;INSERT INTO PACKET
024702  012765  000001  000034  MOV     #RSDATA,XSFLG(R5)   ;EXPECT DATA PACKET
024710  012765  000034  000036  MOV     #RSGCDP,XSCNT(R5)   ;THIS BIG
024716  012765  000001  000032  MOV     #1,XSPKNM(R5)   ;AND 1 PACKET
                                                        ;SEND
024724  004737  006556          CALL    RSVP            ;RETURN TO SCHEDULER

024730  004737  013654          CALL    DOBRK           ;CLR POTENTIAL INTERFACE ERROR

024734  032715  000010          BIT     #BIT3,@R5       ;RETRY?(BAD FLAG)
024740  001323                  BNE     64$             ;YES

024742  012737  000002  003340  MOV     #2,TEST8        ;INDICATE 2ND PART OF TST 8

024750  012700  026174          65$:    MOV     #TRBUF,R0       ;-->(POINT TO) XMIT BUFFER
024754  112710  000002          MOVB    #RSCMND,@R0     ;FORM COMMAND MESSAGE PACK
024760  112760  000012  000001  MOVB    #RSMSIZ,1(R0)   ;THIS BIG
024766  112760  000001  000002  MOVB    #RSSNIT,2(R0)   ;OP CODE IS INITIALIZE
024774  013760  000064  000012  MOV     REC,10.(R0)     ;TO THIS RECORD
025002  105060  000003          CLRB    3.(R0)          ;NO MODIFIER
025006  105060  000004          CLRB    4.(R0)          ;NO DRIVE
025012  112760  000010  000005  MOVB    #BIT03,5.(R0)   ;SET MRSP SWITCH
025020  005060  000006          CLR     6.(R0)          ;NO SEQUENCE #
025024  005060  000010          CLR     8.(R0)          ;NO BYTE COUNT
025030  012701  000012          MOV     #RSMSIZ,R1      ;GET COUNT
025034  005721                  TST     (R1)+           ;PLUS FLAG + BCNT
                                                        ;FOR CHECKSUM CALC
025036  004737  013520          CALL    CHKSUM          ;R0-->TOP   R1=# OF BYTES
025042  010110                  MOV     R1,(R0)         ;INSERT INTO PACKET
```

```
3803                                                    ;SET UP EXPECTATIONS:
3804 025044  012765  000016  000070        MOV     #RSSNSZ,SNDCNT(R5)  ;HOW MANY TO SEND
3805 025052  112765  000002  000034        MOVB    #RSCMND,XSFLG(R5)   ;EXPECT END PACK
3806 025060  012765  000016  000036        MOV     #RSNDSZ,XSCNT(R5)   ;COUNT WITH THIS
3807 025066  012765  000001  000032        MOV     #1.,XSPKNM(R5)  ;EXPECT ONLY 1 PACKET
3808
3809 025074  004737  006556                CALL    RSVP            ;SEND
3810                                                    ;AND RETURN TO SCHEDULER
3811
3812 025100  032715  000010                BIT     #BIT3,@R5       ;RETRY (FLAG BYTE ERROR)?
3813 025104  001321                        BNE     65$             ;YES
3814
3815 025106  012700  026174        66$:    MOV     #TRBUF,R0       ;-->(POINT TO) XMIT BUFFER
3816 025112  112710  000002                MOVB    #RSCMND,@R0     ;FORM COMMAND MESSAGE PACK
3817 025116  112760  000012  000001        MOVB    #RSMSIZ,1(R0)   ;THIS BIG
3818 025124  112760  000000  000002        MOVB    #RSSNOP,2(R0)   ;OP CODE IS NO-OPERATION
3819 025132  013760  000064  000012        MOV     REC,10.(R0)     ;TO THIS RECORD
3820 025140  105060  000003                CLRB    3.(R0)          ;NO MODIFIER
3821 025144  105060  000004                CLRB    4.(R0)          ;NO DRIVE
3822 025150  112760  000010  000005        MOVB    #BIT03,5.(R0)   ;SET MRSP SWITCH
3823 025156  005060  000006                CLR     6.(R0)          ;NO SEQUENCE #
3824 025162  005060  000010                CLR     8.(R0)          ;NO BYTE COUNT
3825 025166  012701  000012                MOV     #RSMSIZ,R1      ;GET COUNT
3826 025172  005721                        TST     (R1)+           ;PLUS FLAG + BCNT
3827                                                    ;FOR CHECKSUM CALC
3828 025174  004737  013520                CALL    CHKSUM          ;R0-->TOP   R1=# OF BYTES
3829 025200  010110                        MOV     R1,(R0)         ;INSERT INTO PACKET
3830                                                    ;SET UP EXPECTATIONS:
3831 025202  012765  000016  000070        MOV     #RSSNSZ,SNDCNT(R5)  ;HOW MANY TO SEND
3832 025210  112765  000002  000034        MOVB    #RSCMND,XSFLG(R5)   ;EXPECT END PACK
3833 025216  012765  000016  000036        MOV     #RSNDSZ,XSCNT(R5)   ;COUNT WITH THIS
3834 025224  012765  000001  000032        MOV     #1.,XSPKNM(R5)  ;EXPECT ONLY 1 PACKET
3835
3836 025232  004737  006556                CALL    RSVP            ;SEND
3837                                                    ;AND RETURN TO SCHEDULER
3838
3839 025236  032715  000010                BIT     #BIT3,@R5       ;RETRY (FLAG BYTE ERROR)?
3840 025242  001321                        BNE     66$             ;YES
3841
3842 025244  005237  003320                INC     DONE
3843 025250  005037  003340                CLR     TEST8
3844
3845 025254  005737  002222                TST     PPSOT8          ;PROTOCOL SUMMARY @ END OF PASS
3846 025260  001477                        BEQ     ENDT8           ;NO
3847 025262  005037  025640                CLR     UNITNO          ;SET UNIT # TO ZERO
3848 025266                                PRINTF  #MSAGE1         ;PRINT HEADER
     025266  012746  025464                                                MOV     #MSAGE1,-(SP)
     025272  012746  000001                                                MOV     #1,-(SP)
     025276  010600                                                        MOV     SP,R0
     025300  104417                                                        TRAP    C$PNTF
     025302  062706  000004                                                ADD     #4,SP
3849 025306  012737  003346  003310        MOV     #BLKTBL,DEVPTR  ;SET ALL UNITS
3850 025314  017705  155770        1$:     MOV     @DEVPTR,R5      ;GET POINTER
3851 025320  005765  000000                TST     STATUS(R5)      ;IS UNIT ABORTED
3852 025324  100431                        BMI     3$              ;YES
3853 025326  005765  000210                TST     MRSP(R5)        ;IS UNIT MODIFIED
3854 025332  001413                        BEQ     2$              ;NO
```

```
3855 025334                                    PRINTF  #MSAGE2,UNITNO  ;MESSAGE FOR MODIFIED UNIT
     025334  013746  025640                                                MOV     UNITNO,-(SP)
     025340  012746  025525                                                MOV     #MSAGE2,-(SP)
     025344  012746  000002                                                MOV     #2,-(SP)
     025350  010600                                                        MOV     SP,R0
     025352  104417                                                        TRAP    C$PNTF
     025354  062706  000006                                                ADD     #6,SP
3856 025360  000425                            BR      4$              ;SEE IF LAST UNIT
3857 025362                            2$:     PRINTF  #MSAGE3,UNITNO  ;MESSAGE FOR NON-MODIFIED UNIT
     025362  013746  025640                                                MOV     UNITNO,-(SP)
     025366  012746  025561                                                MOV     #MSAGE3,-(SP)
     025372  012746  000002                                                MOV     #2,-(SP)
     025376  010600                                                        MOV     SP,R0
     025400  104417                                                        TRAP    C$PNTF
     025402  062706  000006                                                ADD     #6,SP
3858 025406  000412                            BR      4$              ;SEE IF LAST UNIT
3859 025410                            3$:     PRINTF  #MSAGE4,UNITNO  ;MESSAGE FOR ABORTED UNIT
     025410  013746  025640                                                MOV     UNITNO,-(SP)
     025414  012746  025610                                                MOV     #MSAGE4,-(SP)
     025420  012746  000002                                                MOV     #2,-(SP)
     025424  010600                                                        MOV     SP,R0
     025426  104417                                                        TRAP    C$PNTF
     025430  062706  000006                                                ADD     #6,SP
3860 025434  023727  003310  003364       4$:     CMP     DEVPTR,#LSTDEV  ;IS THIS THE LAST DEVICE
3861 025442  103006                            BHIS    ENDT8           ;YES
3862 025444  062737  000002  003310            ADD     #2,DEVPTR       ;GET NEXT UNIT
3863 025452  005237  025640                    INC     UNITNO          ;INC UNIT #
3864 025456  000716                            BR      1$
3865
3866 025460  000207                   ENDT8:   RETURN
3867
3868 025462                                    ENDTST
     025462                                                        L10023:
     025462  104401                                                        TRAP    C$ETST
3869
3870 025464    045     116     045     MSAGE1: .ASCIZ  /%N%S8%AUNIT NO%S9%S6%APROTOCOL%N/
3871 025525    045     116     045     MSAGE2: .ASCIZ  !%N%S9%S2%01%S9%S9%ARSP/MRSP!
3872 025561    045     116     045     MSAGE3: .ASCIZ  /%N%S9%S2%01%S9%S9%ARSP/
3873 025610    045     116     045     MSAGE4: .ASCIZ  /%N%S9%S2%01%S9%S9%A---/
3874                                           .EVEN
3875 025640  000000                   UNITNO:  .WORD
```

```
                                .SBTTL  PATCH AREA
000144                          .REPT   100.
                                .WORD
                                .ENDR
```

```
                                .SBTTL  I/O BUFFER AREAS:

                                ;WHO-GETS-WHAT-SPACE TABLE

026152  027232                  BUFTBL: .WORD   BUF0
026154  030270                          .WORD   BUF1
026156  031326                          .WORD   BUF2
026160  032364                          .WORD   BUF3
026162  033422                          .WORD   BUF4
026164  034460                          .WORD   BUF5
026166  035516                          .WORD   BUF6
026170  036554                          .WORD   BUF7

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

026172      023                         .BYTE RSXOFF
026173      023                         .BYTE RSXOFF    ;SEND XOFF BEFORE EVERY PACKET

026174                                  TRBUF:  .BLKB RCBFSZ
                                ;-------------------------------------------------------------------------

027232                          BUF0:   .BLKB   RCBFSZ
030270                          BUF1:   .BLKB   RCBFSZ
031326                          BUF2:   .BLKB   RCBFSZ
032364                          BUF3:   .BLKB   RCBFSZ
033422                          BUF4:   .BLKB   RCBFSZ
034460                          BUF5:   .BLKB   RCBFSZ
035516                          BUF6:   .BLKB   RCBFSZ
036554                          BUF7:   .BLKB   RCBFSZ

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

037612                                  ENDMOD
```

```
                                .TITLE PARAMETER CODING
                                .SBTTL  HARDWARE PARAMETER CODING SECTION
                                        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.
                                ;--
                                        BGNHRD
037612  000021                                                  .WORD L10024-L$HARD/2
037614                                                  L$HARD::
                                        GPRMA   MSG1,0,0,160000,177777,YES
037614  000031                                                  .WORD   T$CODE
037616  037656                                                  .WORD   MSG1
037620  160000                                                  .WORD   T$LOLIM
037622  177777                                                  .WORD   T$HILIM
                                        GPRMA   MSG1B,2,0,0,776,YES
037624  001031                                                  .WORD   T$CODE
037626  037667                                                  .WORD   MSG1B
037630  000000                                                  .WORD   T$LOLIM
037632  000776                                                  .WORD   T$HILIM
                                        GPRML   MSG1C,6,1,YES
037634  003130                                                  .WORD   T$CODE
037636  037704                                                  .WORD   MSG1C
037640  000001                                                  .WORD   1
                                        GPRML   MSG2,4,1,YES
037642  002130                                                  .WORD   T$CODE
037644  037722                                                  .WORD   MSG2
037646  000001                                                  .WORD   1
                                        GPRML   MSG3,4,2,YES
037650  002130                                                  .WORD   T$CODE
037652  037737                                                  .WORD   MSG3
037654  000002                                                  .WORD   2
                                        ENDHRD
037656                                                  .EVEN
037656                                                  L10024:
037656  124  125  065  MSG1:   .ASCIZ  /TU58 CSR/
037667  126  105  103  MSG1B:  .ASCIZ  /VECTOR ADDR./
037704  120  104  124  MSG1C:  .ASCIZ  /PDT INTERFACE/
037722  124  105  123  MSG2:   .ASCIZ  /TEST DRIVE 0/
037737  124  105  123  MSG3:   .ASCIZ  /TEST DRIVE 1/
                                .EVEN
```

```
                                                 .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.
                                                 ;--

037754                                                   BGNSFT
037754  000031                                                                                  .WORD L10025-L$SOFT/2
037756                                                                              L$SOFT::
037756                                                   GPRMD   MSG4,0,D,1777,8.,512.,YES
037756  000052                                                                                  .WORD   T$CODE
037760  040040                                                                                  .WORD   MSG4
037762  001777                                                                                  .WORD   1777
037764  000010                                                                                  .WORD   T$LOLIM
037766  001000                                                                                  .WORD   T$HILIM
037770                                                   GPRML   MSG4B,10,1,YES
037770  004130                                                                                  .WORD   T$CODE
037772  040105                                                                                  .WORD   MSG4B
037774  000001                                                                                  .WORD   1
037776                                                   GPRML   MSG5,2,1,YES
037776  001130                                                                                  .WORD   T$CODE
040000  040147                                                                                  .WORD   MSG5
040002  000001                                                                                  .WORD   1
040004                                                   GPRML   MSG6,6,1,YES
040004  003130                                                                                  .WORD   T$CODE
040006  040201                                                                                  .WORD   MSG6
040010  000001                                                                                  .WORD   1
040012                                                   GPRML   MSG7,4,1,YES
040012  002130                                                                                  .WORD   T$CODE
040014  040226                                                                                  .WORD   MSG7
040016  000001                                                                                  .WORD   1
040020                                                   GPRMD   MSG8,10.,D,377,1,254.,YES
040020  005052                                                                                  .WORD   T$CODE
040022  040254                                                                                  .WORD   MSG8
040024  000377                                                                                  .WORD   377
040026  000001                                                                                  .WORD   T$LOLIM
040030  000376                                                                                  .WORD   T$HILIM
040032                                                   GPRML   MSG9,12.,1,YES
040032  006130                                                                                  .WORD   T$CODE
040034  040315                                                                                  .WORD   MSG9
040036  000001                                                                                  .WORD   1
040040                                           SFTOUT: ENDSFT
                                                                                                .EVEN
040040                                                                              L10025:
040040     116       125       115       MSG4:     .ASCIZ  'NUMBER OF BLOCKS:TEST 4-7 (8 TO 512)'
040105     101       104       104       MSG4B:    .ASCIZ  /ADD DR # TO DATA PATTERN:TEST 4-7/
040147     123       124       101       MSG5:     .ASCIZ  /STATISTICS PRINTED AT EOP/
040201     103       117       115       MSG6:     .ASCIZ  /COMPARE DATA ON READ/
040226     120       122       111       MSG7:     .ASCIZ  /PRINT PACKET ON ERROR/
040254     043       040       105       MSG8:     .ASCIZ  /# ERRORS = DVC FATAL IF 'EVL'SET/
040315     120       122       111       MSG9:     .ASCIZ  /PRINT UNIT PROTOCOL SUMMARY (TEST 8)/
                                                   .EVEN
```

```
4063            000016                  .REPT   14.             ;LASTAD CORRECTION
4064                                    .WORD
4065                                    .ENDR
4072 040416                             LASTAD
                                                                        .EVEN
     040416  040436                                                    .WORD T$FREE
     040420  000006                                                    .WORD T$SIZE
     040422                     L$LAST::
4073 040422                             ENDMOD
4074
4075 040422                             BGNSETUP        1
4076 040422                             BGNPTAB
     040422  000000                                                    .WORD   0
     040424  000004                                                    .WORD   L10030-./2-1
     040426                                                 L10026:
4077 040426  176500                     176500
4078 040430  000300                     300
4079 040432  000003                     3
4080 040434  000000                     0
4081 040436                             ENDPTAB
     040436                                                 L10030:
4082 040436                             ENDSETUP
4083            000001                  .END
```

SYMBOL TABLE

```
ABNDX = 000004 G    CHKANS  010442 G    C$MSG = 000023      ESTRY = 000001 G    G$PRMA= 000001
ABO     013012      CHKEND  011146 G    C$OPEN= 000034      ESWLOC= 177765 G    G$PRMD= 000002
ABOMSG  017120      CHKERR  011252      C$PNTB= 000014      ESWR  = 177757        G$PRML= 000000
ABONM   006530      CHKPKS  010552 G    C$PNTF= 000017      EVL   = 000004 G    G$RADA= 000140
ADR   = 000020 G    CHKPTR  010550      C$PNTS= 000016      EVLTHR  002220        G$RADB= 000000
ALLGON  003336 G    CHKREE  011324      C$PNTX= 000015      EXOFF   007425        G$RADD= 000040
ASSEMB= 000010      CHKRET  011670      C$QIO = 000377      EXON    007424        G$RADL= 000120
BDATA = 000134 G    CHKSUC  012164 G    C$RDBU= 000007      E$END = 002100        G$RADO= 000020
BDBYTS  014572      CHKSUM  013520 G    C$REFG= 000047      E$LOAD= 000035        G$XFER= 000004
BDCHK = 000022 G    CHK8    010462      C$RESE= 000033      FLGLOC  016616 G    G$YES = 000010
BDCOM = 000014 G    CKCKSM  013614 G    C$REVI= 000003      FM      015574        HARDR = 000136 G
BIT0  = 000001 G    CLRALL  005706 G    C$RFLA= 000021      FM0     015556        HARDW = 000140 G
BIT00 = 000001 G    CLRBUF  005746 G    C$RPT = 000025      FTLNM   003316        HELP  = 000000
BIT01 = 000002 G    CLRPTR  006000      C$SEFG= 000046      F$AU  = 000015        HOE   = 100000 G
BIT02 = 000004 G    CMDSNT= 000100 G    C$SPRI= 000041      F$AUTO= 000020        HRD     012772
BIT03 = 000010 G    CMNDER= 000040 G    C$SVEC= 000037      F$BGN = 000040        HRDRD = 000016 G
BIT04 = 000020 G    CMPDAT  002214      C$TPRI= 000013      F$CLEA= 000007        HRDWR = 000020 G
BIT05 = 000040 G    CNINIT= 000032 G    DESC    014574      F$DU  = 000016        HRD1    011612
BIT06 = 000100 G    COMPAR  014414 G    DEVPTR  003310 G    F$END = 000041        IBE   = 010000 G
BIT07 = 000200 G    CSNRDY  003342 G    DEV0    003366      F$HARD= 000004        IDPTR   003322 G
BIT08 = 000400 G    CSRCVB  003344 G    DEV1    003600      F$HW  = 000013        IDU   = 000040 G
BIT09 = 001000 G    C$AU  = 000052      DEV2    004012      F$INIT= 000006        IER   = 020000 G
BIT1  = 000002 G    C$AUTO= 000061      DEV3    004224      F$JMP = 000050        INIT    016030
BIT10 = 002000 G    C$BRK = 000022      DEV4    004436      F$MOD = 000000        INITWD  014406
BIT11 = 004000 G    C$BSEG= 000004      DEV5    004650      F$MSG = 000011        INIT2   016056
BIT12 = 010000 G    C$BSUB= 000002      DEV6    005062      F$PROT= 000021        ISR   = 000100 G
BIT13 = 020000 G    C$CEFG= 000045      DEV7    005274      F$PWR = 000017        IXE   = 004000 G
BIT14 = 040000 G    C$CLCK= 000062      DFPTBL  002174 G    F$RPT = 000012        I$AU  = 000041
BIT15 = 100000 G    C$CLEA= 000012      DFTL1   012640      F$SEG = 000003        I$AUTO= 000041
BIT2  = 000004 G    C$CLOS= 000035      DIAGMC= 000000      F$SOFT= 000005        I$CLN = 000041
BIT3  = 000010 G    C$CLP1= 000006      DLV   = 000074 G    F$SRV = 000010        I$DU  = 000041
BIT4  = 000020 G    C$CVEC= 000036      DOBRK   013654 G    F$SUB = 000002        I$HRD = 000041
BIT5  = 000040 G    C$DCLN= 000044      DONE    003320 G    F$SW  = 000014        I$INIT= 000041
BIT6  = 000100 G    C$DODU= 000051      DR    = 000060 G    F$TEST= 000001        I$MOD = 000041
BIT7  = 000200 G    C$DRPT= 000024      DRVCHK  002216      GBTMP   010436        I$MSG = 000041
BIT8  = 000400 G    C$DU  = 000053      EF.CON= 000036 G    GBTMP2  010440        I$PROT= 000040
BIT9  = 001000 G    C$EDIT= 000003      EF.NEW= 000035 G    GETANS  007150 G    I$PTAB= 000041
BLKEND= 000202 G    C$ERDF= 000055      EF.PWR= 000034 G    GETHRD  016162        I$PWR = 000041
BLKER   003330 G    C$ERHR= 000056      EF.RES= 000037 G    GETPTR  007214        I$RPT = 000041
BLKSIZ= 000212 G    C$ERRO= 000060      EF.STA= 000040 G    GETR5   017066        I$SEG = 000041
BLKTBL  003346 G    C$ERSF= 000054      ENDGP8  010114      GTAGIN  007462        I$SETU= 000041
BOE   = 000400 G    C$ERSO= 000057      ENDRSP  007076      GTBYTE  010212 G    I$SFT = 000041
BRKPTR  014412      C$ESCA= 000010      ENDT8   025460      GTDOWN  010052        I$SRV = 000041
BRKTO   014410      C$ESEG= 000005      ERRDES  013034 G    GTOK    007720        I$SUB = 000041
BRKWD   014404      C$ESUB= 000003      ESABO = 177720 G    GTPKS1  007216 G    I$TST = 000041
BUFTBL  026152      C$ETST= 000001      ESCKS = 177757 G    GTPKS8  007426 G    J$JMP = 000167
BUF0    027232      C$EXIT= 000032      ESCKSM= 177757      GTPTR   010210        LENGTH  002206
BUF1    030270      C$GETB= 000026      ESCMD = 177720 G    GTUM    007662        LGOFST= 000120 G
BUF2    031326      C$GETW= 000027      ESNCRT= 177767 G    G$CNTO= 000200        LNCNT   014774
BUF3    032364      C$GMAN= 000043      ESNOMO= 177737 G    G$DELM= 000372        LOE   = 040000 G
BUF4    033422      C$GPHR= 000042      ESNONX= 177770 G    G$DISP= 000003        LOG     012500 G
BUF5    034460      C$GPLO= 000030      ESOK  = 000000 G    G$EXCP= 000400        LOG0    013022
BUF6    035516      C$GPRI= 000040      ESPART= 177776 G    G$HILI= 000002        LOGOK   012566
BUF7    036554      C$INIT= 000011      ESRD  = 177757      G$LOLI= 000001        LOGOK2  012652
CARLF   015010      C$INLP= 000020      ESREC = 177711 G    G$NO  = 000000        LOG0    012554
CHECK   016140      C$MANI= 000050      ESSK  = 177740 G    G$OFFS= 000400        LOG1    012670
CHKANR  010546      C$MEM = 000031      ESSLF = 177777 G    G$OFSI= 000376        LOG2    012720
```

SYMBOL TABLE

```
LOG3     012760          L10001  002204          MSQRSP  002776 G        PTR     017116          SFTOUT  040040
LOG3B    013002          L10002  002224          MSREC   002716 G        RCBCNT  003314          SFTRD = 000002 G
LOT   = 000010 G         L10003  013224          MSRNIT  002534 G        RCBFSZ= 001036 G        SFTWR = 000004 G
LSTDEV   003364 G        L10004  014312          MSSELF  002362 G        RCDB  = 000024 G        SKERR = 000024 G
L$ACP    002110 G        L10005  014346          MSSFRD  003052 G        RCFLG   003312 G        SLFER = 000044 G
L$APT    002036 G        L10006  015436          MSSFWR  003112 G        RCINIT= 000006 G        SND     006646
L$AU     017146 G        L10007  016526          MSSKER  002304 G        RCSR  = 000022 G        SNDBYT  007100 G
L$AUT    002070 G        L10010  016724          MSTOSN  003030 G        RCVBUF= 000102 G        SNDCNT= 000070 G
L$AUTO   016620 G        L10011  017020          MSUNIT  002654 G        RCVHND  014314          SNDHND  014300
L$CCP    002106 G        L10012  017064          MSWPRO  002512 G        RCVINT  014314 G        SNDINT  014300 G
L$CLEA   017002 G        L10013  017146          MSWRSP  002736 G        RDN0  = 000114 G        SOFTR = 000122 G
L$CO     002032 G        L10014  017350          MXRTRY  003326 G        RDN1  = 000116 G        SOFTW = 000124 G
L$DEPO   002011 G        L10015  017622          NCART = 000054 G        REC   = 000064 G        SRVTBL  010166
L$DESC   002122 G        L10016  021226          NODRVS  016560          RECDAT  017606          STAEOP  002210
L$DESP   002076 G        L10017  022216          NOMOR   006532          RECERR= 000042 G        STATHD  015444
L$DEVP   002060 G        L10020  023002          NOMOT = 000030 G        RECID   013306 G        STATUS= 000000 G
L$DISP   002152 G        L10021  023772          NOREE   011200          RECID2  013462          STHD2   015720
L$DLY    002116 G        L10022  024556          NOUNIT= 000036 G        RECOV   011710          STRT    016612 G
L$DTP    002040 G        L10023  025462          NOXOFF  006630          RETERR  012112          SUCCS = 000076 G
L$DTYP   002034 G        L10024  037656          NTSFT   012702          RETRY = 000002 G        SUCOTL= 000046 G
L$DU     017022 G        L10025  040040          NXTRET  006526          RLUN    015440          SVCGBL= 000000
L$DUT    002072 G        L10026  040426          NXTST   006100 G        RPTR    015442          SVCINS= 000001
L$DVTY   005506 G        L10030  040436          NXTST2  006350          RSCMND= 000002 G        SVCSUB= 000001
L$EF     002052 G        MABEE   012732          ONEFIL= 000001          RSCONT= 000020 G        SVCTAG= 000001
L$ENVI   002044 G        MODRSP  010116          OTL   = 000010 G        RSDASZ= 000204 G        SVCTST= 000001
L$ETP    002102 G        MRSDLY  010120          OVRFLO  013400          RSDATA= 000001 G        SWAPDR  005526 G
L$EXP1   002046 G        MRSP  = 000210 G        OVRN  = 000012 G        RSDNSZ= 000222 G        SWPTR   005626
L$EXP4   002064 G        MSAGE1  025464          O$APTS= 000000          RSEND = 000002 G        SYSTAT  003304 G
L$EXP5   002066 G        MSAGE2  025525          O$AU  = 000001          RSGCDP= 000034 G        S$LSYM= 010000
L$HARD   037614 G        MSAGE3  025561          O$BGNR= 000001          RSINIT= 000004 G        TAPLEN  003306 G
L$HIME   002120 G        MSAGE4  025610          O$BGNS= 000001          RSMSIZ= 000012 G        TEST8   003340 G
L$HPCP   002016 G        MSAUTO  016762          O$DU  = 000001          RSNDSZ= 000016 G        THRSHI  012016
L$HPTP   002022 G        MSBDA   002336 G        O$ERRT= 000000          RSNTAB  002224          THRSLO  011770
L$HW     002174 G        MSCMD   002702 G        O$GNSW= 000001          RSSEND= 000100 G        TMP   = 000066 G
L$ICP    002104 G        MSCOM   002402 G        O$POIN= 000001          RSSGET= 000012 G        TOMANY  016530
L$INIT   016030 G        MSG1    037656          O$SETU= 000001          RSSNIT= 000001 G        TORCVB= 000050 G
L$LADP   002026 G        MSG1B   037667          PARTL = 000034 G        RSSNOP= 000000 G        TOSNDB= 000056 G
L$LAST   040422 G        MSG1C   037704          PATTEN= 000072 G        RSSNSZ= 000016 G        TRBUF   026174
L$LOAD   002100 G        MSG2    037722          PDTFLG  016614 G        RSSRD = 000002 G        TRK   = 000062 G
L$LUN    002074 G        MSG3    037737          PERDEV  006362          RSSSEK= 000005 G        TRPHND  016730
L$MREV   002050 G        MSG4    040040          PKPTR = 000104 G        RSSSLF= 000007 G        TRPPTR  016726
L$NAME   002000 G        MSG4B   040105          PNT   = 001000 G        RSSWR = 000003 G        TSTPC = 000020 G
L$PRIO   002042 G        MSG5    040147          PPSOT8  002222          RSVP    006556 G        TSTTOP  003324
L$PROT   002142 G        MSG6    040201          PRBUF   002212          RSXOFF= 000023 G        TST1    017214
L$PRT    002112 G        MSG7    040226          PRDAT   014776          RSXON = 000020 G        TST2    017416
L$REPP   002062 G        MSG8    040254          PRFORM  015000          RTRYN   012050          TST3    017670
L$REV    002010 G        MSG9    040315          PRI   = 002000 G        RUN     006050 G        TST3PT  021214
L$RPT    015014 G        MSHCHK  002554 G        PRI00 = 000000 G        SAVCNT= 000206 G        TST4    021274
L$SOFT   037756 G        MSHDRD  003152 G        PRI01 = 000040 G        SECREC  003332 G        TST4EX  022210
L$SPC    002056 G        MSHDWR  003214 G        PRI02 = 000100 G        SERVST  010206          TST5    022264
L$SPCP   002020 G        MSNIT   002616 G        PRI03 = 000140 G        SETDR   005630 G        TST5EX  022774
L$SPTP   002024 G        MSNLOG  002320 G        PRI04 = 000200 G        SETLEN  016470          TST6    023050
L$STA    002030 G        MSNOMO  002444 G        PRI05 = 000240 G        SETPTR  005704          TST6EX  023764
L$SW     002206 G        MSNOTP  002462 G        PRI06 = 000300 G        SETSRV  010122          TST7    024040
L$TEST   002114 G        MSNRSP  002762 G        PRI07 = 000340 G        SETUP   006002 G        TST7EX  024550
L$TIML   002014 G        MSOVRN  003256 G        PRNPAK  014630 G        SFPTBL  002206 G        TST8    024602
L$UNIT   002012 G        MSPART  002632 G        PRNSIZ  003334 G        SFT     012750          TUVECT= 000204 G
```

PARAMETER CODING MACRO M1113 25-SEP-81 10:06 PAGE 126-3 SEQ 0122
SYMBOL TABLE

```
T$ARGC= 000002   T$PTAB= 010027   T$$DAT= 010030   T2      017352 G   WHCHDR  013504 G
T$CODE= 006130   T$PTHV= 000001   T$$DU = 010012   T3      017624 G   WRLOCK= 000026 G
T$ERRN= 000146   T$PTNU= 000001   T$$HAR= 010024   T4      021230 G   WRTN0 = 000110 G
T$EXCP= 000000   T$SAVL= 177777   T$$HW = 010001   T4TRY = 000132 G   WRTN1 = 000112 G
T$FLAG= 000040   T$SEGL= 177777   T$$INI= 010007   T5      022220 G   XFNSND  006636
T$FREE= 040436   T$SIZE= 000006   T$$MSG= 010003   T6      023004 G   XMDB  = 000030 G
T$GMAN= 000000   T$SUBN= 000000   T$$PC = 000001   T7      023774 G   XMSR  = 000026 G
T$HILI= 000376   T$TAGL= 177777   T$$PRO= 010000   T8      024560 G   XSCNT = 000036 G
T$LAST= 000001   T$TAGN= 010031   T$$PTA= 010027   UAM   = 000200 G   XSFLG = 000034 G
T$LOLI= 000001   T$TEMP= 000000   T$$RPT= 010006   UNIT    013226 G   XSPKNM= 000032 G
T$LSYM= 010000   T$TEST= 000010   T$$SOF= 010025   UNITNO  025640      XSPTR = 000106 G
T$LTNO= 000010   T$TSTM= 177777   T$$SRV= 010005   UNREC   012070      X$ALWA= 000000
T$NEST= 177777   T$TSTS= 000001   T$$SW = 010002   UNSUC   011466      X$FALS= 000040
T$NS0 = 000000   T$$AU = 010013   T$$TES= 010023   UNXPCT  007624      X$OFFS= 000400
T$NS1 = 000005   T$$AUT= 010010   T1      017150 G   WAIT    014350      X$TRUE= 000020
T$PCNT= 000000   T$$CLE= 010011   T1TRY = 000146 G
```

```
. ABS.  040436     000
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  33777 WORDS  ( 132 PAGES)
DYNAMIC MEMORY:  21558 WORDS  ( 82 PAGES)
ELAPSED TIME:  00:06:01
CZTUUC.BIN/EN:AMA:ABS,CZTUUC/CR/SP=LB1:[1,1]SVC/MLB,SY:[203,375]CZTUUC.MAC
```

CREF

SYMBOL CROSS REFERENCE

SYMBOL	VALUE		REFERENCES								
ABNDX	= 000004	G	#16-888	*72-2659	72-2672	72-2674					
ABO	013012		72-2669	72-2683	72-2696	#72-2712					
ABOMSG	017120		97-3413	#97-3443							
ABONM	006530		*49-1799	*49-1816	49-1821	#49-1829					
ADR	= 000020	G	#10-640								
ALLGON	003336	G	#15-857	*49-1825	*91-3278	95-3370					
ASSEMB	= 000010		5-451	5-451							
BDATA	= 000134	G	#17-940	89-3153	89-3163						
BDBYTS	014572		*86-3001	*86-3012	86-3015	86-3020	#86-3030				
BDCHK	= 000022	G	#11-668	66-2365	66-2422						
BDCOM	= 000014	G	#11-665	68-2472	72-2684						
BIT0	= 000001	G	#10-640	37-1615	60-2193	72-2675	78-2786	78-2787	78-2789	78-2800	82-2875
BIT00	= 000001	G	#10-640	10-640							
BIT01	= 000002	G	#10-640	10-640							
BIT02	= 000004	G	#10-640	10-640							
BIT03	= 000010	G	#10-640	10-640	116-3795	116-3822					
BIT04	= 000020	G	#10-640	10-640							
BIT05	= 000040	G	#10-640	10-640							
BIT06	= 000100	G	#10-640	10-640							
BIT07	= 000200	G	#10-640	10-640							
BIT08	= 000400	G	#10-640	10-640							
BIT09	= 001000	G	#10-640	10-640							
BIT1	= 000002	G	#10-640	49-1781	54-1972	60-2194	64-2294	68-2458	68-2529		
BIT10	= 002000	G	#10-640	49-1779	50-1901	68-2478	68-2498	68-2506	68-2527	106-3596	106-3596
			106-3597	108-3639	108-3639	110-3670	112-3701	112-3701	114-3732		
BIT11	= 004000	G	#10-640	89-3139	91-3215	91-3236	93-3337				
BIT12	= 010000	G	#10-640	106-3596	106-3596	106-3596	108-3639	108-3639	108-3639	112-3701	112-3701
			112-3701								
BIT13	= 020000	G	#10-640	49-1769	49-1777	66-2381	66-2393	68-2462			
BIT14	= 040000	G	#10-640	49-1805	49-1808	70-2599	82-2925	91-3242			
BIT15	= 100000	G	#10-640	37-1613	49-1788	56-2014	56-2036	58-2079	58-2098	58-2118	58-2142
			64-2302	68-2464	91-3214	91-3261	93-3337	97-3410			
BIT2	= 000004	G	#10-640	49-1776	49-1790	54-1972	60-2195	64-2294	68-2458	68-2460	68-2529
BIT3	= 000010	G	#10-640	49-1767	60-2196	66-2345	66-2381	66-2393	102-3547	104-3565	106-3596
			106-3596	106-3596	106-3597	108-3639	108-3639	108-3639	110-3670	112-3701	112-3701
			112-3701	114-3732	116-3783	116-3812	116-3839				
BIT4	= 000020	G	#10-640	50-1895	50-1899	60-2197	74-2731	82-2877			
BIT5	= 000040	G	#10-640	50-1917	50-1919	60-2198					
BIT6	= 000100	G	#10-640	60-2199	68-2469	68-2530	82-2902	82-2910	82-2917	82-2933	82-2934
			84-2946	84-2954	86-3021						
BIT7	= 000200	G	#10-640	60-2200	68-2498	68-2506	68-2512	68-2514	68-2516	68-2527	
BIT8	= 000400	G	#10-640	39-1648	49-1771	50-1905	50-1914	68-2491	68-2520	91-3243	
BIT9	= 001000	G	#10-640	37-1617	50-1889	68-2475	68-2502	70-2585	91-3245		
BLKEND	= 000202	G	#17-960	91-3253							
BLKER	003330	G	#15-854	*50-1886	*91-3286						
BLKSIZ	= 000212	G	#17-964	19-986	19-987	19-988	19-989	19-990	19-991	19-992	19-993
BLKTBL	003346	G	#19-974	37-1611	39-1645	41-1670	45-1713	49-1763	49-1800	58-2077	64-2300
			89-3133	91-3210	91-3230	93-3335	97-3434	116-3849			
BOE	= 000400	G	#10-640								
BRKPTR	014412		*82-2901	*82-2909	*82-2916	84-2967	#84-2981				
BRKTO	014410		*82-2874	*82-2883	*82-2889	*82-2899	*82-2907	*84-2971	#84-2980		
BRKWD	014404		82-2888	#84-2977							

SYMBOL	VALUE		REFERENCES								
BUFTBL	026152		91-3217	#120-3888							
BUF0	027232		120-3888	#120-3908							
BUF1	030270		120-3889	#120-3909							
BUF2	031326		120-3890	#120-3910							
BUF3	032364		120-3891	#120-3911							
BUF4	033422		120-3892	#120-3912							
BUF5	034460		120-3893	#120-3913							
BUF6	035516		120-3894	#120-3914							
BUF7	036554		120-3895	#120-3915							
CARLF	015010		88-3059	88-3061	#88-3070						
CHECK	016140		91-3220	#91-3225							
CHKANR	010546		64-2298	64-2310	#64-2314						
CHKANS	010442	G	47-1738	#64-2292							
CHKEND	011146	G	66-2370	66-2418	#68-2455						
CHKERR	011252		68-2468	#68-2475							
CHKPKS	010552	G	64-2296	64-2308	#66-2344						
CHKPTR	010550		*64-2300	64-2301	64-2309	*64-2311	#64-2316				
CHKREE	011324		68-2461	#68-2482							
CHKRET	011670		68-2466	68-2471	68-2474	68-2477	68-2481	68-2499	68-2507	68-2515	68-2517
			#68-2529								
CHKSUC	012164	G	68-2463	68-2482	#70-2564						
CHKSUM	013520	G	#78-2784	80-2827	102-3547	104-3565	106-3596	106-3596	106-3596	106-3597	106-3597
			108-3639	108-3639	108-3639	110-3670	110-3670	112-3701	112-3701	112-3701	114-3732
			114-3732	116-3773	116-3801	116-3828					
CHK8	010462		64-2295	#64-2300							
CKCKSM	013614	G	66-2363	66-2401	66-2413	#80-2824					
CLRALL	005706	G	#41-1670	54-1975							
CLRBUF	005746	G	41-1672	#43-1688	54-1978						
CLRPTR	006000		*41-1670	41-1671	41-1673	*41-1675	#43-1698				
CMDSNT	= 000100	G	#16-913	*50-1898	70-2571	70-2575	70-2588	74-2737	*82-2876		
CMNDER	= 000040	G	#11-675	70-2609							
CMPDAT	002214		#9-566	86-3003							
CNINIT	= 000032	G	#11-672	82-2929							
COMPAR	014414	G	66-2379	66-2403	#86-2998						
CSNRDY	003342	G	#15-864	52-1943							
CSRCVB	003344	G	#15-865	62-2230							
C$AU	= 000052		#5-451	99-3478							
C$AUTO	= 000061		#5-451	93-3346							
C$BRK	= 000022		#5-451	47-1736	49-1824	52-1947	62-2252	82-2879	84-2969	84-2970	89-3132
			89-3135	89-3137							
C$BSEG	= 000004		#5-451								
C$BSUB	= 000002		#5-451								
C$CEFG	= 000045		#5-451								
C$CLCK	= 000062		#5-451								
C$CLEA	= 000012		#5-451	95-3395							
C$CLOS	= 000035		#5-451								
C$CLP1	= 000006		#5-451								
C$CVEC	= 000036		#5-451	82-2935	82-2937	93-3345					
C$DCLN	= 000044		#5-451	49-1826	91-3228	91-3248					
C$DODU	= 000051		#5-451	72-2714	93-3357						
C$DRPT	= 000024		#5-451	95-3374							
C$DU	= 000053		#5-451	97-3433							

SYMBOL VALUE REFERENCES

```
C$EDIT  = 000003  #5-451  5-494
C$ERDF  = 000055  #5-451  72-2668  72-2682
C$ERHR  = 000056  #5-451  72-2695  72-2710
C$ERRO  = 000060  #5-451
C$ERSF  = 000054  #5-451  49-1823  91-3227  91-3247
C$ERSO  = 000057  #5-451  72-2688  72-2706  86-3019
C$ESCA  = 000010  #5-451
C$ESEG  = 000005  #5-451
C$ESUB  = 000003  #5-451
C$ETST  = 000001  #5-451  102-3552  104-3579  106-3621  108-3653  110-3684  112-3715  114-3746  116-3868
C$EXIT  = 000032  #5-451  102-3545  104-3559  106-3589  108-3629  110-3660  112-3691  114-3722  116-3758
C$GETB  = 000026  #5-451
C$GETW  = 000027  #5-451
C$GMAN  = 000043  #5-451
C$GPHR  = 000042  #5-451  91-3234
C$GPLO  = 000030  #5-451
C$GPRI  = 000040  #5-451
C$INIT  = 000011  #5-451  91-3315
C$INLP  = 000020  #5-451
C$MANI  = 000050  #5-451
C$MEM   = 000031  #5-451
C$MSG   = 000023  #5-451  74-2744
C$OPEN  = 000034  #5-451
C$PNTB  = 000014  #5-451  68-2504  74-2734  74-2737  74-2740  86-3020
C$PNTF  = 000017  #5-451  88-3054  88-3059  88-3061  93-3354  97-3413  116-3848  116-3855  116-3857
                  116-3859
C$PNTS  = 000016  #5-451  89-3134  89-3136  89-3152  89-3153  89-3163
C$PNTX  = 000015  #5-451  68-2480  68-2485  68-2488  68-2490  68-2511  68-2519
C$QIO   = 000377  #5-451
C$RDBU  = 000007  #5-451
C$REFG  = 000047  #5-451  91-3207
C$RESE  = 000033  #5-451  #5-451
C$REVI  = 000003  #5-451  5-494
C$RFLA  = 000021  #5-451  91-3285
C$RPT   = 000025  #5-451  89-3176
C$SEFG  = 000046  #5-451
C$SPRI  = 000041  #5-451  82-2894
C$SVEC  = 000037  #5-451  82-2895  82-2897  93-3334
C$TPRI  = 000013  #5-451
DESC      014574    86-3020  #86-3031
DEVPTR    003310 G  #15-846  *49-1763  49-1764  49-1794  *49-1796  *49-1800  49-1801  49-1817  *49-1819
                    *91-3210  91-3212  91-3219  *91-3221  *91-3230  91-3232  *91-3279  *116-3849  116-3850
                    116-3860  *116-3862
DEV0      003366    19-974  #19-986
DEV1      003600    19-975  #19-987
DEV2      004012    19-976  #19-988
DEV3      004224    19-977  #19-989
DEV4      004436    19-978  #19-990
DEV5      004650    19-979  #19-991
DEV6      005062    19-980  #19-992
DEV7      005274    19-981  #19-993
DFPTBL    002174 G  #8-539
```

SYMBOL CROSS REFERENCE CREF

SYMBOL	VALUE		REFERENCES								
DFTL1	012640		*72-2680	*72-2681	#72-2682	72-2682					
DIAGMC	= 000000		5-451	5-451							
DLV	= 000074	G	#16-911	56-2034	58-2120	58-2144	*62-2233	62-2234	62-2235	*62-2237	*62-2258
			62-2259	62-2260	*62-2262	66-2383	74-2738	74-2740	*74-2741	*84-2955	84-2956
			84-2957	*84-2959	*91-3276						
DOBRK	013654	G	49-1787	49-1807	#82-2873	116-3781					
DONE	003320	G	#15-850	*45-1712	47-1732	*102-3548	*104-3570	*106-3612	*108-3650	*110-3681	*112-3712
			*114-3743	*116-3842							
DR	= 000060	G	#16-904	37-1615	37-1617	*37-1619	*39-1647	39-1648	*39-1650	74-2734	76-2765
			*91-3239	91-3243	91-3245	104-3565	106-3596	106-3596	106-3597	106-3597	108-3638
			108-3639	108-3639	110-3669	110-3670	110-3670	112-3700	112-3701	112-3701	114-3731
			114-3732	114-3732							
DRVCHK	002216		#9-567	108-3636	110-3667	112-3698	114-3729				
EF.CON	= 000036	G	#10-640								
EF.NEW	= 000035	G	#10-640								
EF.PWR	= 000034	G	#10-640								
EF.RES	= 000037	G	#10-640								
EF.STA	= 000040	G	#10-640	91-3207							
ENDGP8	010114		58-2076	58-2160	#58-2162						
ENDRSP	007076		50-1875	#50-1927							
ENDT8	025460		116-3846	116-3861	#116-3866						
ERRDES	013034	G	72-2668	72-2682	72-2688	72-2695	72-2706	72-2710	#74-2727	86-3019	
ESABO	= 177720	G	#12-734								
ESCKS	= 177757	G	#12-745	12-747	12-748	12-749	70-2583				
ESCKSM	= 177757		#12-747								
ESCMD	= 177720	G	#12-743	70-2607							
ESNCRT	= 177767	G	#12-735	70-2602							
ESNOMO	= 177737	G	#12-742	70-2578							
ESNONX	= 177770	G	#12-736	70-2612							
ESOK	= 000000	G	#12-737	70-2566							
ESPART	= 177776	G	#12-738	70-2622							
ESRD	= 177757		#12-749								
ESREC	= 177711	G	#12-744	70-2627							
ESSK	= 177740	G	#12-739	70-2596							
ESSLF	= 177777	G	#12-746								
ESTRY	= 000001	G	#12-740	70-2569							
ESWLOC	= 177765	G	#12-741	70-2617							
ESWR	= 177757		#12-748								
EVL	= 000004	G	#10-640	72-2676							
EVLTHR	002220		#9-568	72-2678							
EXOFF	007425		#56-2049	58-2151	62-2245						
EXON	007424		56-2005	#56-2048	58-2093	62-2253	62-2265				
E$END	= 002100		#5-451								
E$LOAD	= 000035		#5-451	5-494							
FLGLOC	016616	G	72-2676	*91-3285	#91-3324						
FM	015574		89-3153	89-3163	#89-3186						
FMO	015556		89-3152	#89-3183							
FTLNM	003316		#15-849	72-2699							
F$AU	= 000015		#5-451	99-3455	99-3478						
F$AUTO	= 000020		#5-451	93-3332	93-3346						
F$BGN	= 000040		#5-451	5-477	6-503	9-580	10-633	74-2727	84-2944	84-2952	88-3073
			89-3117	89-3124	89-3192	91-3202	93-3332	95-3369	97-3405	99-3455	102-3540

SYMBOL	VALUE		REFERENCES								
			102-3543	102-3545	102-3552	104-3557	104-3559	104-3579	106-3587	106-3589	106-3621
			108-3627	108-3629	108-3653	110-3658	110-3660	110-3684	112-3689	112-3691	112-3715
			114-3720	114-3722	114-3746	116-3751	116-3758	116-3868	120-3919	122-3984	122-3995
			124-4038	126-4073	126-4075	126-4076	126-4076	126-4081	126-4082		
F$CLEA	= 000007		#5-451	95-3369	95-3395						
F$DU	= 000016		#5-451	97-3405	97-3433						
F$END	= 000041		#5-451	5-451	5-451	5-451	5-451	5-451	5-451	5-451	5-451
			5-451	5-451	5-451	5-451	5-451	5-451	5-451	5-451	5-477
			9-580	10-633	74-2744	84-2948	84-2961	88-3073	89-3117	89-3176	89-3192
			91-3315	93-3346	95-3395	97-3433	99-3478	102-3540	102-3543	102-3543	102-3543
			102-3545	102-3552	102-3552	104-3557	104-3557	104-3557	104-3559	104-3579	104-3579
			106-3587	106-3587	106-3587	106-3589	106-3621	106-3621	108-3627	108-3627	108-3627
			108-3629	108-3653	108-3653	110-3658	110-3658	110-3658	110-3660	110-3684	110-3684
			112-3689	112-3689	112-3689	112-3691	112-3715	112-3715	114-3720	114-3720	114-3720
			114-3722	114-3746	114-3746	116-3751	116-3751	116-3751	116-3758	116-3868	116-3868
			120-3919	122-3984	122-4010	124-4052	126-4073	126-4075	126-4076	126-4081	126-4082
F$HARD	= 000004		#5-451	122-3995	122-4010						
F$HW	= 000013		#5-451	8-539	8-552						
F$INIT	= 000006		#5-451	91-3202	91-3315						
F$JMP	= 000050		#5-451	102-3545	104-3559	106-3589	108-3629	110-3660	112-3691	114-3722	116-3758
F$MOD	= 000000		#5-451	5-477	9-580	10-633	88-3073	89-3117	89-3192	102-3540	120-3919
			122-3984	126-4073							
F$MSG	= 000011		#5-451	74-2727	74-2744						
F$PROT	= 000021		#5-451	6-503	6-507						
F$PWR	= 000017		#5-451								
F$RPT	= 000012		#5-451	89-3124	89-3176						
F$SEG	= 000003		#5-451								
F$SOFT	= 000005		#5-451	124-4038	124-4052						
F$SRV	= 000010		#5-451	84-2944	84-2948	84-2952	84-2961				
F$SUB	= 000002		#5-451								
F$SW	= 000014		#5-451	9-561	9-578						
F$TEST	= 000001		#5-451	102-3543	102-3552	104-3557	104-3579	106-3587	106-3621	108-3627	108-3653
			110-3658	110-3684	112-3689	112-3715	114-3720	114-3746	116-3751	116-3868	
GBTMP	010436		*62-2229	*62-2239	*62-2249	62-2250	*62-2269	#62-2275			
GBTMP2	010440		*62-2244	62-2255	62-2257	*62-2264	62-2267	#62-2276			
GETANS	007150	G	47-1734	#54-1971							
GETHRD	016162		91-3226	#91-3230							
GETPTR	007214		#54-1983								
GETR5	017066		97-3409	#97-3434							
GTAGIN	007462		#58-2078	58-2157							
GTBYTE	010212	G	56-2013	56-2033	58-2097	58-2117	58-2141	#62-2229			
GTDOWN	010052		58-2082	58-2086	58-2101	58-2112	58-2116	58-2119	58-2123	58-2143	58-2147
			58-2149	#58-2153							
GTOK	007720		58-2105	#58-2125							
GTPKS1	007216	G	54-1980	#56-2000							
GTPKS8	007426	G	54-1976	#58-2071	58-2161						
GTPTR	010210		*58-2077	58-2078	58-2154	*58-2156	#60-2203				
GTUM	007662		58-2110	#58-2114							
G$CNTO	= 000200		#5-451								
G$DELM	= 000372		#5-451								
G$DISP	= 000003		#5-451								
G$EXCP	= 000400		#5-451								

```
SYMBOL  VALUE          REFERENCES
G$HILI  = 000002       #5-451
G$LOLI  = 000001       #5-451
G$NO    = 000000       #5-451
G$OFFS  = 000400       #5-451    122-3998  122-3999  122-4000  122-4001  122-4002  124-4039  124-4040  124-4041
                        124-4042  124-4043  124-4044  124-4045
G$OFSI  = 000376       #5-451    122-3998  122-3999  122-4000  122-4001  122-4002  124-4039  124-4040  124-4041
                        124-4042  124-4043  124-4044  124-4045
G$PRMA  = 000001       #5-451    122-3998  122-3999
G$PRMD  = 000002       #5-451    124-4039  124-4044
G$PRML  = 000000       #5-451    122-4000  122-4001  122-4002  124-4040  124-4041  124-4042  124-4043  124-4045
G$RADA  = 000140       #5-451
G$RADB  = 000000       #5-451
G$RADD  = 000040       #5-451    124-4039  124-4044
G$RADL  = 000120       #5-451    122-4000  122-4001  122-4002  124-4040  124-4041  124-4042  124-4043  124-4045
G$RADO  = 000020       #5-451    122-3998  122-3999
G$XFER  = 000004       #5-451
G$YES   = 000010       #5-451    122-3998  122-3999  122-4000  122-4001  122-4002  124-4039  124-4040  124-4041
                        124-4042  124-4043  124-4044  124-4045
HARDR   = 000136   G   #17-941   89-3148   89-3158
HARDW   = 000140   G   #17-942   89-3150   89-3160
HELP    = 000000       #5-436    5-446     5-468     5-486     7-509     7-524     8-546     9-571     #10-585
                        10-623    10-642    19-994    19-1000   21-1016   21-1021   21-1029   21-1036   21-1041
                        21-1047   37-1543   37-1555   37-1560   37-1566   37-1571   37-1577   37-1585   37-1592
                        37-1598   37-1604   #89-3079  91-3293   91-3303   95-3376   95-3383   97-3415   97-3421
                        99-3458   99-3464   #100-3484 100-3525  100-3531  120-3920  120-3925  120-3935  #122-3946
                        122-4004  122-4020  124-4046  126-4066
HOE     = 100000   G   #10-640
HRD       012772       72-2700   #72-2708
HRDRD   = 000016   G   #11-666    68-2522
HRDWR   = 000020   G   #11-667    68-2524
HRD1      011612       68-2509   #68-2518
IBE     = 010000   G   #10-640
IDPTR     003322   G   #15-851    *45-1713  45-1714   45-1716   *45-1718
IDU     = 000040   G   #10-640
IER     = 020000   G   #10-640
INIT      016030       #91-3204
INITWD    014406       *82-2873   82-2900   82-2908   82-2915   82-2922   82-2928   #84-2978
INIT2     016056       91-3208   #91-3210
ISR     = 000100   G   #10-640
IXE     = 004000   G   #10-640
I$AU    = 000041       #5-451    #99-3455  #99-3478
I$AUTO  = 000041       #5-451    #93-3332  #93-3346
I$CLN   = 000041       #5-451    #95-3369  #95-3395
I$DU    = 000041       #5-451    #97-3405  #97-3433
I$HRD   = 000041       #122-3995 #122-4010
I$INIT  = 000041       #5-451    #91-3202  #91-3315
I$MOD   = 000041       #5-451     5-477    #5-477     9-580    #9-580    10-633    #10-633    88-3073   #88-3073
                        89-3117  #89-3117    89-3192  #89-3192   102-3540 #102-3540  120-3919  #120-3919  122-3984
                       #122-3984   126-4073 #126-4073
I$MSG   = 000041       #5-451    #74-2727  #74-2744
I$PROT  = 000040       #5-451    #6-503
I$PTAB  = 000041       #5-451     126-4076 #126-4076  126-4081 #126-4081
```

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SYMBOL  VALUE              REFERENCES
I$PWR   = 000041           #5-451
I$RPT   = 000041           #5-451      #89-3124    #89-3176
I$SEG   = 000041           #5-451       102-3543    104-3557    106-3587    108-3627    110-3658    112-3689    114-3720    116-3751
I$SETU  = 000041           #5-451       126-4075   #126-4075    126-4076    126-4082   #126-4082
I$SFT   = 000041           #124-4038   #124-4052
I$SRV   = 000041           #5-451      #84-2944    #84-2948    #84-2952    #84-2961
I$SUB   = 000041           #5-451       102-3543    104-3557    106-3587    108-3627    110-3658    112-3689    114-3720    116-3751
I$TST   = 000041           #5-451       102-3543   #102-3543    102-3545    102-3552   #102-3552   #102-3552    104-3557   #104-3557
                            104-3559    104-3579   #104-3579   #104-3579    106-3587   #106-3587    106-3589    106-3621   #106-3621
                           #106-3621    108-3627   #108-3627    108-3629    108-3653   #108-3653   #108-3653    110-3658   #110-3658
                            110-3660    110-3684   #110-3684   #110-3684    112-3689   #112-3689    112-3691    112-3715   #112-3715
                           #112-3715    114-3720   #114-3720    114-3722    114-3746   #114-3746   #114-3746    116-3751   #116-3751
                            116-3758    116-3868   #116-3868   #116-3868
J$JMP   = 000167           #5-451
LENGTH    002206           #9-563       91-3287
LGOFST  = 000120  G        #17-931      72-2660
LNCNT     014774           *88-3052    *88-3057    #88-3066
LOE     = 040000  G        #10-640
LOG       012500  G         52-1953     62-2273     66-2366     66-2386     66-2395     66-2423     68-2473     68-2496     68-2525
                            70-2633    #72-2652     82-2886     82-2930     84-2974
LOGO      013022           72-2689     72-2707    #72-2715
LOGOK     012566           72-2667    #72-2670
LOGOK2    012652           72-2677     72-2679    #72-2684
LOGO      012554           #72-2668
LOG1      012670           *72-2686    *72-2687    #72-2688    72-2688
LOG2      012720           *72-2693    *72-2694    #72-2695    72-2695
LOG3      012760           *72-2704    *72-2705    #72-2706    72-2706
LOG3B     013002           *72-2708    *72-2709    #72-2710    72-2710
LOT     = 000010  G        #10-640
LSTDEV    003364  G        #19-981      37-1621     39-1651     41-1673     45-1716     49-1794     49-1817     58-2154     64-2309
                            89-3164     91-3219     93-3341    116-3860
L$ACP     002110  G        #5-494
L$APT     002036  G        #5-494
L$AU      017146  G         5-494      #99-3455
L$AUT     002070  G        #5-494
L$AUTO    016620  G         5-494      #93-3332
L$CCP     002106  G        #5-494
L$CLEA    017002  G         5-494      #95-3369
L$CO      002032  G        #5-494
L$DEPO    002011  G        #5-494
L$DESC    002122  G         5-494      #5-496
L$DESP    002076  G        #5-494
L$DEVP    002060  G        #5-494
L$DISP    002152  G         5-494      #7-522
L$DLY     002116  G        #5-494
L$DTP     002040  G        #5-494
L$DTYP    002034  G        #5-494
L$DU      017022  G         5-494      #97-3405
L$DUT     002072  G        #5-494
L$DVTY    005506  G         5-494      #21-1014
L$EF      002052  G        #5-494
L$ENVI    002044  G        #5-494
```

SYMBOL	VALUE		REFERENCES				
L$ETP	002102	G	#5-494				
L$EXP1	002046	G	#5-494				
L$EXP4	002064	G	#5-494				
L$EXP5	002066	G	#5-494				
L$HARD	037614	G	5-494	122-3995	#122-3995		
L$HIME	002120	G	#5-494				
L$HPCP	002016	G	#5-494				
L$HPTP	002022	G	#5-494				
L$HW	002174	G	5-494	8-539	#8-539		
L$ICP	002104	G	#5-494				
L$INIT	016030	G	5-494	#91-3202			
L$LADP	002026	G	#5-494				
L$LAST	040422	G	5-494	#126-4072	126-4082		
L$LOAD	002100	G	#5-494				
L$LUN	002074	G	#5-494	*72-2657	*72-2658	*86-3017	*86-3018	*91-3233
L$MREV	002050	G	#5-494				
L$NAME	002000	G	#5-494				
L$PRIO	002042	G	#5-494				
L$PROT	002142	G	5-494	#6-503			
L$PRT	002112	G	#5-494				
L$REPP	002062	G	#5-494				
L$REV	002010	G	#5-494				
L$RPT	015014	G	5-494	#89-3124			
L$SOFT	037756	G	5-494	124-4038	#124-4038		
L$SPC	002056	G	#5-494				
L$SPCP	002020	G	#5-494				
L$SPTP	002024	G	#5-494				
L$STA	002030	G	#5-494				
L$SW	002206	G	5-494	9-561	#9-561		
L$TEST	002114	G	#5-494				
L$TIML	002014	G	#5-494				
L$UNIT	002012	G	#5-494	91-3225	91-3281		
L10001	002204		8-539	#8-552			
L10002	002224		9-561	#9-578			
L10003	013224		#74-2744				
L10004	014312		#84-2948				
L10005	014346		#84-2961				
L10006	015436		#89-3176				
L10007	016526		#91-3315				
L10010	016724		#93-3346				
L10011	017020		#95-3395				
L10012	017064		#97-3433				
L10013	017146		#99-3478				
L10014	017350		102-3545	#102-3552			
L10015	017622		104-3559	#104-3579			
L10016	021226		106-3589	#106-3621			
L10017	022216		108-3629	#108-3653			
L10020	023002		110-3660	#110-3684			
L10021	023772		112-3691	#112-3715			
L10022	024556		114-3722	#114-3746			
L10023	025462		116-3758	#116-3868			
L10024	037656		122-3995	#122-4010			

SYMBOL	VALUE		REFERENCES							
L10025	040040		124-4038	#124-4052						
L10026	040426		#126-4076							
L10030	040436		126-4076	#126-4081						
MABEE	012732		72-2692	#72-2698						
MODRSP	010116		58-2129	#58-2164						
MRSDLY	010120		*58-2132	*58-2136	#58-2166					
MRSP	= 000210	G	#17-963	50-1874	58-2074	64-2306	*66-2377	*66-2417	*91-3277	116-3853
MSAGE1	025464		116-3848	#116-3870						
MSAGE2	025525		116-3855	#116-3871						
MSAGE3	025561		116-3857	#116-3872						
MSAGE4	025610		116-3859	#116-3873						
MSAUTO	016762		93-3354	#93-3359						
MSBDA	002336	G	#14-788	86-3019						
MSCMD	002702	G	13-773	#14-810						
MSCOM	002402	G	13-763	#14-792						
MSG1	037656		122-3998	#122-4012						
MSG1B	037667		122-3999	#122-4013						
MSG1C	037704		122-4000	#122-4014						
MSG2	037722		122-4001	#122-4015						
MSG3	037737		122-4002	#122-4016						
MSG4	040040		124-4039	#124-4053						
MSG4B	040105		124-4040	#124-4054						
MSG5	040147		124-4041	#124-4055						
MSG6	040201		124-4042	#124-4056						
MSG7	040226		124-4043	#124-4057						
MSG8	040254		124-4044	#124-4058						
MSG9	040315		124-4045	#124-4059						
MSHCHK	002554	G	13-766	#14-802						
MSHDRD	003152	G	13-764	#14-826						
MSHDWR	003214	G	13-765	#14-828						
MSNIT	002616	G	13-770	#14-804						
MSNLOG	002320	G	13-757	13-778	#14-786					
MSNOMO	002444	G	13-769	#14-794						
MSNOTP	002462	G	13-779	#14-796						
MSNRSP	002762	G	13-777	#14-816						
MSOVRN	003256	G	13-762	#14-830						
MSPART	002632	G	13-771	#14-806						
MSQRSP	002776	G	13-761	#14-818						
MSREC	002716	G	13-774	#14-812						
MSRNIT	002534	G	13-760	#14-800						
MSSELF	002362	G	13-775	#14-790						
MSSFRD	003052	G	13-758	#14-822						
MSSFWR	003112	G	13-759	#14-824						
MSSKER	002304	G	13-767	#14-784						
MSTOSN	003030	G	13-780	#14-820						
MSUNIT	002654	G	13-772	#14-808						
MSWPRO	002512	G	13-768	#14-798						
MSWRSP	002736	G	13-776	#14-814						
MXRTRY	003326	G	#15-853	68-2508						
NCART	= 000054	G	#11-680	70-2604						
NODRVS	016560		91-3247	#91-3320						
NOMOR	006532		49-1823	#49-1830						

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SYMBOL  VALUE          REFERENCES
NOMOT   = 000030  G    #11-671     70-2580
NOREE     011200       68-2459   #68-2463
NOUNIT  = 000036  G    #11-674     70-2614
NOXOFF    006630       #50-1876
NTSFT     012702       72-2685   #72-2691
NXTRET    006526       49-1793   49-1822   #49-1827
NXTST     006100  G    47-1730   #49-1762
NXTST2    006350       49-1795   #49-1799
ONEFIL  = 000001       #2-4      2-8       4-432     5-433     5-472     9-581     10-582    10-595    88-3075
                       89-3076   89-3089   99-3480   100-3481  100-3492  121-3941  122-3942  122-3956
OTL     = 000010  G    #11-663     66-2382
OVRFLO    013400       72-2668   #74-2749
OVRN    = 000012  G    #11-664     66-2385
O$APTS  = 000000       #5-451      5-494
O$AU    = 000001       #5-451    #5-484    5-494
O$BGNR  = 000001       #5-451    #5-484    5-494
O$BGNS  = 000001       #5-451    #5-484    5-494
O$DU    = 000001       #5-451    #5-484    5-494
O$ERRT  = 000000       #5-451      5-494
O$GNSW  = 000001       #5-451    #5-484    5-494
O$POIN  = 000001       #5-451    #5-484    #5-484    #5-484    #5-484    #5-484    #5-484    5-484     5-494
O$SETU  = 000001       #5-451    #5-484    5-494     126-4072
PARTL   = 000034  G    #11-673     70-2624
PATTEN  = 000072  G    #16-910     74-2736   86-3010   *91-3272  *106-3595   106-3596  *108-3635 *108-3638 108-3639
                       *110-3666 *110-3669 *112-3697 *112-3700   112-3701  *114-3728 *114-3731
PDTFLG    016614  G    *91-3241    91-3268   #91-3323
PERDEV    006362       #49-1801    49-1820
PKPTR   = 000104  G    #16-916   *50-1890   58-2096   58-2148   *58-2150  *66-2352  86-3002   88-3051
PNT     = 001000  G    #10-640
PPSOT8    002222       #9-569      116-3845
PRBUF     002212       #9-565      88-3049
PRDAT     014776       *88-3053    88-3054   #88-3067
PRFORM    015000       88-3054   #88-3068
PRI     = 002000  G    #10-640
PRI00   = 000000  G    #10-640     82-2894
PRI01   = 000040  G    #10-640
PRI02   = 000100  G    #10-640
PRI03   = 000140  G    #10-640
PRI04   = 000200  G    #10-640
PRI05   = 000240  G    #10-640
PRI06   = 000300  G    #10-640
PRI07   = 000340  G    5-494     #10-640   82-2895   82-2897   93-3334
PRNPAK    014630  G    86-3023   #88-3044
PRNSIZ    003334  G    #15-856   *86-3022  *88-3055
PTR       017116       *97-3434    97-3435   *97-3438  #97-3441
RCBCNT    003314       #15-848   *56-2011  *56-2022  *56-2027  *56-2031  *58-2090  *58-2109  *58-2113  *58-2115
                       *58-2139  *66-2354   66-2361   66-2428
RCBFSZ  = 001036  G    #12-718     43-1691   120-3904  120-3908  120-3909  120-3910  120-3911  120-3912  120-3913
                       120-3914  120-3915
RCDB    = 000024  G    #16-896     62-2233   62-2258   82-2893   84-2955   *91-3264
RCFLG     003312  G    #15-847   *56-2012  56-2018   *58-2088  58-2104   *66-2355
RCINIT  = 000006  G    #11-662     66-2394
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SYMBOL	VALUE		REFERENCES								
RCSR	= 000022	G	#16-895	62-2231	62-2247	82-2917	82-2934	84-2954	*91-3262	93-3339	
RCVBUF	= 000102	G	#16-915	43-1690	50-1890	56-2008	66-2346	*91-3217			
RCVHND	014314		#84-2954								
RCVINT	014314	G	82-2895	#84-2952							
RDN0	= 000114	G	#16-920	*50-1908	89-3153						
RDN1	= 000116	G	#16-921	*50-1910	89-3163						
REC	= 000064	G	#16-906	50-1886	74-2735	*91-3274	*104-3563	104-3565	*106-3594	106-3596	106-3596
			106-3597	106-3597	*106-3603	106-3604	*106-3607	*106-3608	*108-3632	108-3635	108-3639
			108-3639	*108-3642	*108-3647	*110-3663	110-3666	110-3670	110-3670	*110-3673	*110-3678
			*112-3694	112-3697	112-3701	112-3701	*112-3704	*112-3709	*114-3725	114-3728	114-3732
			114-3732	*114-3735	*114-3740	116-3792	116-3819				
RECDAT	017606		104-3563	104-3568	#104-3573						
RECERR	= 000042	G	#11-676	70-2629							
RECID	013306	G	74-2737	#74-2747							
RECID2	013462		74-2740	#74-2751							
RECOV	011710		68-2485	#68-2536							
RETERR	012112		68-2504	#68-2546							
RETRY	= 000002	G	#16-887	*68-2479	68-2480	68-2485	*68-2497	*68-2505	68-2508	*68-2510	68-2511
			*68-2526	*91-3273							
RLUN	015440		*89-3142	*89-3143	89-3152	#89-3177					
RPTR	015442		*89-3133	89-3138	89-3164	*89-3166	#89-3178				
RSCMND	= 000002	G	#12-698	12-704	50-1896	102-3547	104-3565	104-3565	106-3596	106-3596	106-3597
			106-3597	108-3639	108-3639	110-3670	110-3670	112-3701	112-3701	114-3732	114-3732
			116-3762	116-3789	116-3805	116-3816	116-3832				
RSCONT	= 000020	G	#12-699	58-2164	66-2358	82-2922	106-3596	106-3596	108-3639	108-3639	112-3701
			112-3701								
RSDASZ	= 000204	G	#12-711	12-713	12-718	56-2027	66-2399	66-2406			
RSDATA	= 000001	G	#12-703	56-2025	58-2111	58-2148	66-2373	66-2397	106-3596	106-3596	106-3597
			106-3597	108-3639	108-3639	110-3670	110-3670	112-3701	112-3701	114-3732	114-3732
			116-3775								
RSDNSZ	= 000222	G	#12-713	58-2113							
RSEND	= 000002	G	#12-704	56-2020	58-2107	66-2368	66-2409	102-3547	106-3596	106-3596	106-3597
			106-3597	108-3639	108-3639	110-3670	110-3670	112-3701	112-3701	114-3732	114-3732
RSGCDP	= 000034	G	#12-715	116-3776							
RSINIT	= 000004	G	#12-702	66-2391	84-2978						
RSMSIZ	= 000012	G	#12-709	12-717	102-3547	102-3547	104-3565	104-3565	106-3596	106-3596	106-3596
			106-3596	106-3597	106-3597	106-3597	106-3597	108-3639	108-3639	108-3639	108-3639
			110-3670	110-3670	110-3670	110-3670	112-3701	112-3701	112-3701	112-3701	114-3732
			114-3732	114-3732	114-3732	116-3763	116-3770	116-3790	116-3798	116-3817	116-3825
RSNDSZ	= 000016	G	#12-707	12-713	12-718	56-2022	58-2109	102-3547	104-3565	106-3596	106-3596
			106-3597	106-3597	108-3639	108-3639	110-3670	110-3670	112-3701	112-3701	114-3732
			114-3732	116-3806	116-3833						
RSNTAB	002224		#13-757	72-2673							
RSSEND	= 000100	G	#12-723								
RSSGET	= 000012	G	#12-727	116-3764							
RSSNIT	= 000001	G	#12-729	82-2876	116-3791						
RSSNOP	= 000000	G	#12-728	116-3818							
RSSNSZ	= 000016	G	#12-717	66-2411	102-3547	104-3565	106-3596	106-3596	106-3597	106-3597	108-3639
			108-3639	110-3670	110-3670	112-3701	112-3701	114-3732	114-3732	116-3772	116-3804
			116-3831								
RSSRD	= 000002	G	#12-725	50-1903	70-2571	106-3596	106-3597	106-3597	108-3639	110-3670	110-3670
			112-3701	114-3732	114-3732						

SYMBOL CROSS REFERENCE CREF

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SYMBOL  VALUE          REFERENCES
RSSSEK  = 000005  G    #12-726     104-3565
RSSSLF  = 000007  G    #12-730     70-2588     102-3547
RSSWR   = 000003  G    #12-724     50-1912     70-2575     106-3596    108-3639    112-3701
RSVP      006556  G    #50-1867    102-3547    104-3565    106-3596    106-3596    106-3596    106-3597    106-3597    108-3639
                       108-3639    108-3639    110-3670    110-3670    112-3701    112-3701    112-3701    114-3732    114-3732
                       116-3779    116-3809    116-3836
RSXOFF  = 000023  G    #12-701     56-2049     120-3901    120-3902
RSXON   = 000020  G    #12-700     56-2048
RTRYN     012050       68-2480     68-2511     #68-2542
RUN       006050  G    #47-1730    47-1739     102-3544    102-3544    104-3558    104-3558    106-3588    106-3588    108-3628
                       108-3628    110-3659    110-3659    112-3690    112-3690    114-3721    114-3721    116-3755
SAVCNT  = 000206  G    #17-962     49-1774     *49-1785
SECREC    003332  G    #15-855     *91-3289    *91-3292    108-3647    110-3678    112-3709    114-3740
SERVST    010206       *54-1974    58-2158     *60-2188    #60-2202
SETDR     005630  G    #39-1645    102-3544    104-3558    106-3588    108-3628    110-3659    112-3690    114-3721
SETLEN    016470       #91-3287
SETPTR    005704       *39-1645    39-1646     39-1651     *39-1653    #39-1656
SETSRV    010122       58-2081     58-2085     #60-2178
SETUP     006002  G    #45-1712    102-3544    102-3544    104-3558    104-3558    106-3588    106-3588    108-3628    108-3628
                       110-3659    110-3659    112-3690    112-3690    114-3721    114-3721    116-3754
SFPTBL    002206  G    #9-561
SFT       012750       72-2701     #72-2704
SFTOUT    040040       #124-4052
SFTRD   = 000002  G    #11-660     68-2493
SFTWR   = 000004  G    #11-661     68-2495
SKERR   = 000024  G    #11-669     70-2598
SLFER   = 000044  G    #11-677     70-2593
SND       006646       50-1877     #50-1880    50-1884
SNDBYT    007100  G    50-1880     #52-1942    56-2006     58-2095     58-2130     58-2152     62-2246     62-2254     62-2266
SNDCNT  = 000070  G    #16-909     *50-1879    *50-1883    *102-3547   *104-3565   *106-3596   *106-3596   *106-3596   *106-3596
                       *106-3597   *106-3597   *108-3639   *108-3639   *108-3639   *108-3639   *110-3670   *110-3670   *112-3701
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SYMBOL VALUE REFERENCES

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                       *112-3708   *114-3727    114-3737   *114-3739
TRPHND    016730        93-3334    #93-3354
TRPPTR    016726       *93-3335     93-3336     93-3341    *93-3343    #93-3347
TSTPC   = 000020  G    #16-894     *45-1715     49-1792     49-1813    *50-1868
TSTTOP    003324       #15-852      45-1715    *102-3544   *104-3558   *106-3588   *108-3628   *110-3659   *112-3690   *114-3721
                       *116-3753
TST1      017214        102-3544   #102-3547
TST2      017416        104-3558   #104-3562
TST3      017670        106-3588   #106-3592
TST3PT    021214        106-3595    106-3599   #106-3614
TST4      021274        108-3628   #108-3632
TST4EX    022210        108-3645   #108-3650
TST5      022264        110-3659   #110-3663
TST5EX    022774        110-3676   #110-3681
TST6      023050        112-3690   #112-3694
TST6EX    023764        112-3707   #112-3712
TST7      024040        114-3721   #114-3725
TST7EX    024550        114-3738   #114-3743
TST8      024602        116-3753   #116-3760
TUVECT  = 000204  G    #17-961      82-2895    *82-2896     82-2897    *82-2898     82-2935    *82-2936     82-2937    *82-2938
                       *91-3238
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T$EXCP  = 000000     #122-3998   122-3998   #122-3999   122-3999  #124-4039   124-4039  #124-4044   124-4044
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                      114-3722  #116-3758   #116-3758   116-3758   116-3758
T$FREE  = 040436      126-4072  #126-4082
T$GMAN  = 000000     #5-451
T$HILI  = 000376     #122-3998   122-3998   #122-3999   122-3999  #124-4039   124-4039  #124-4044   124-4044
T$LAST  = 000001     #5-451     #126-4072    126-4075
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T$LSYM  = 010000     #5-451       5-451       8-552       9-578     74-2744    84-2948    84-2961    89-3176    91-3315
                      93-3346     95-3395     97-3433     99-3478   102-3552   104-3579   106-3621   108-3653   110-3684
                      112-3715   114-3746    116-3868    122-4010   124-4052
T$LTNO  = 000010     #126-4072
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                      9-561      #9-561       9-561       9-578      9-578      9-578     #9-578      9-580      9-580
                      9-580      #9-580      10-633     #10-633     10-633     74-2727   #74-2727    74-2727    74-2744
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T$NS0   = 000000     #5-477       9-580      #10-633     88-3073   #89-3117    89-3192   #91-3202    91-3315   #93-3332
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                     #122-3984   126-4073
T$NS1   = 000005     #6-503       6-507      #8-539       8-552     #9-561      9-578     #74-2727    74-2744   #84-2944
                      84-2948    #84-2952     84-2961   #89-3124    89-3176   #102-3543   102-3552  #104-3557   104-3579
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T$PCNT  = 000000     #126-4075   126-4076   #126-4076   126-4076
T$PTAB  = 010027     #126-4076   126-4076
T$PTHV  = 000001      5-494     #126-4082
T$PTNU  = 000001     #5-451      126-4076   #126-4076   126-4082   126-4082
T$SAVL  = 177777     #5-451
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SYMBOL CROSS REFERENCE
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T$TAGL	= 177777	#5-451								
T$TAGN	= 010031	#5-451	6-503	6-503	#6-503	8-539	8-539	#8-539	9-561	9-561
		#9-561	74-2727	74-2727	#74-2727	84-2944	84-2944	#84-2944	84-2952	84-2952
		#84-2952	89-3124	89-3124	#89-3124	91-3202	91-3202	#91-3202	93-3332	93-3332
		#93-3332	95-3369	95-3369	#95-3369	97-3405	97-3405	#97-3405	99-3455	99-3455
		#99-3455	102-3543	102-3543	#102-3543	104-3557	104-3557	#104-3557	106-3587	106-3587
		#106-3587	108-3627	108-3627	#108-3627	110-3658	110-3658	#110-3658	112-3689	112-3689
		#112-3689	114-3720	114-3720	#114-3720	116-3751	116-3751	#116-3751	122-3995	122-3995
		#122-3995	124-4038	124-4038	#124-4038	126-4075	126-4075	#126-4075	126-4076	126-4076
		#126-4076	126-4076	126-4076	#126-4076					
T$TEMP	= 000000	#6-507	6-507	#7-522	7-522	7-522	#7-522	7-522	7-522	#7-522
		7-522	7-522	#7-522	7-522	7-522	#7-522	7-522	7-522	#7-522
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		#8-552	8-552	#9-578	9-578	#9-580	9-580	#74-2744	74-2744	#84-2948
		84-2948	#84-2961	84-2961	#88-3073	88-3073	#89-3176	89-3176	#89-3192	89-3192
		#91-3315	91-3315	#93-3346	93-3346	#95-3395	95-3395	#97-3433	97-3433	#99-3478
		99-3478	#102-3545	102-3545	#102-3552	102-3552	#104-3559	104-3559	#104-3579	104-3579
		#106-3589	106-3589	#106-3621	106-3621	#108-3629	108-3629	#108-3653	108-3653	#110-3660
		110-3660	#110-3684	110-3684	#112-3691	112-3691	#112-3715	112-3715	#114-3722	114-3722
		#114-3746	114-3746	#116-3758	116-3758	#116-3868	116-3868	#120-3919	120-3919	#122-3998
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		124-4045	#124-4052	124-4052	#126-4073	126-4073				
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		106-3587	108-3627	#108-3627	108-3627	110-3658	#110-3658	110-3658	112-3689	#112-3689
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T$TSTM	= 177777	#5-451	47-1736	49-1823	49-1824	49-1826	52-1947	62-2252	68-2480	68-2485
		68-2488	68-2490	68-2504	68-2511	68-2519	72-2668	72-2682	72-2688	72-2695
		72-2706	72-2710	72-2714	74-2734	74-2737	74-2740	74-2744	82-2879	82-2894
		82-2895	82-2897	82-2935	82-2937	84-2969	84-2970	86-3019	86-3020	88-3054
		88-3059	88-3061	89-3132	89-3134	89-3135	89-3136	89-3137	89-3152	89-3153
		89-3163	89-3176	91-3207	91-3227	91-3228	91-3234	91-3247	91-3248	91-3285
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		97-3433	99-3478	102-3545	102-3552	104-3559	104-3579	106-3589	106-3621	108-3629
		108-3653	110-3660	110-3684	112-3691	112-3715	114-3722	.14-3746	116-3758	116-3848
		116-3855	116-3857	116-3859	116-3868					
T$TSTS	= 000001	#5-451	#102-3543	#104-3557	#106-3587	#108-3627	#110-3658	#112-3689	#114-3720	#116-3751
T$$AU	= 010013	#99-3455	99-3478							
T$$AUT	= 010010	#93-3332	93-3346							
T$$CLE	= 010011	#95-3369	95-3395							
T$$DAT	= 010030	#126-4076	126-4076	126-4081						
T$$DU	= 010012	#97-3405	97-3433							
T$$HAR	= 010024	#122-3995	122-3995	122-4010						

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T$$INI   = 010007          #91-3202    91-3315
T$$MSG   = 010003          #74-2727    74-2744
T$$PC    = 000001          #126-4075   126-4082
T$$PRO   = 010000          #6-503
T$$PTA   = 010027          #126-4075   126-4076   #126-4076
T$$RPT   = 010006          #89-3124    89-3176
T$$SOF   = 010025          #124-4038   124-4038    124-4052
T$$SRV   = 010005          #84-2944    84-2948    #84-2952    84-2961
T$$SW    = 010002          #9-561      9-561       9-578
T$$TES   = 010023          #102-3543   102-3545    102-3552   #104-3557   104-3559   104-3579   #106-3587   106-3589   106-3621
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                           #114-3720   114-3722    114-3746   #116-3751   116-3758   116-3868
T1       017150  G          7-522      #102-3543
T1TRY    = 000146  G        #17-945
T2       017352  G          7-522      #104-3557
T3       017624  G          7-522      #106-3587
T4       021230  G          7-522      #108-3627
T4TRY    = 000132  G        #17-939
T5       022220  G          7-522      #110-3658
T6       023004  G          7-522      #112-3689
T7       023774  G          7-522      #114-3720
T8       024560  G          7-522      #116-3751
UAM      = 000200  G        #10-640
UNIT     013226  G          74-2734    #74-2745
UNITNO   025640             *116-3847   116-3855    116-3857    116-3859   *116-3863  #116-3875
UNREC    012070             68-2519    #68-2544
UNSUC    011466             68-2484    #68-2501
UNXPCT   007624            #58-2106
WAIT     014350             82-2903     82-2911     82-2918    #84-2965    84-2972
WHCHDR   013504  G          50-1906     50-1920     72-2663    #76-2763
WRLOCK   = 000026  G        #11-670     70-2619     72-2691
WRTN0    = 000110  G        #16-918    *50-1922     89-3153     91-3254    91-3256
WRTN1    = 000112  G        #16-919    *50-1925     89-3163
XFNSND   006636             50-1873    #50-1878
XMDB     = 000030  G        #16-898     52-1955     82-2888     84-2947   *91-3271
XMSR     = 000026  G        #16-897     52-1944     82-2875     82-2881    82-2892    82-2902    82-2910    82-2933    84-2946
                           *91-3266
XSCNT    = 000036  G        #16-901    *102-3547   *104-3565   *106-3596  *106-3596  *106-3596  *108-3639  *108-3639  *108-3639
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XSFLG    = 000034  G        #16-900     50-1891     56-2001     66-2348   *102-3547  *104-3565  *106-3596  *106-3596  *106-3596
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                           *112-3701   *112-3701   *114-3732   *114-3732  *116-3777  *116-3807  *116-3834
XSPTR    = 000106  G        #16-917    *50-1893     58-2088    *58-2089    58-2090   *58-2153
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X$FALS   = 000040           #5-451
X$OFFS   = 000400           #5-451
X$TRUE   = 000020           #5-451
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MACRO NAME	REFERENCES									
BGNAU	#99-3455									
BGNAUT	93-3332									
BGNCLN	#95-3369									
BGNDU	#97-3405									
BGNHRD	122-3995									
BGNHW	#8-539									
BGNINI	91-3202									
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	#89-3137	89-3137	#89-3152	89-3152	#89-3153	89-3153	#89-3163	89-3163	#89-3176	89-3176
	#91-3207	91-3207	#91-3227	#91-3227	91-3227	#91-3228	91-3228	#91-3234	91-3234	#91-3247
	#91-3247	91-3247	#91-3248	91-3248	#91-3285	91-3285	#91-3315	91-3315	#93-3334	93-3334
	#93-3345	93-3345	#93-3346	93-3346	#93-3354	93-3354	#93-3357	93-3357	#95-3374	95-3374
	#95-3395	95-3395	#97-3413	97-3413	#97-3433	97-3433	#99-3478	99-3478	#102-3545	102-3545
	#102-3552	102-3552	#104-3559	104-3559	#104-3579	104-3579	#106-3589	106-3589	#106-3621	106-3621
	#108-3629	108-3629	#108-3653	108-3653	#110-3660	110-3660	#110-3684	110-3684	#112-3691	112-3691
	#112-3715	112-3715	#114-3722	114-3722	#114-3746	114-3746	#116-3758	116-3758	#116-3848	116-3848
	#116-3855	116-3855	#116-3857	116-3857	#116-3859	116-3859	#116-3868	116-3868		
MSWORD	#5-494	#5-494	#7-522	#7-522	#7-522	#7-522	#7-522	#7-522	#7-522	#7-522
	#7-522	#7-522	#49-1823	#49-1823	#49-1823	#49-1823	#72-2668	#72-2668	#72-2668	#72-2668
	#72-2682	#72-2682	#72-2682	#72-2682	#72-2688	#72-2688	#72-2688	#72-2688	#72-2695	#72-2695
	#72-2695	#72-2695	#72-2706	#72-2706	#72-2706	#72-2706	#72-2710	#72-2710	#72-2710	#72-2710
	#86-3019	#86-3019	#86-3019	#86-3019	#91-3227	#91-3227	#91-3227	#91-3227	#91-3247	#91-3247
	#91-3247	#91-3247	#102-3545	#104-3559	#106-3589	#108-3629	#110-3660	#112-3691	#114-3722	#116-3758
	#122-3998	#122-3998	#122-3999	#122-3999	#122-4000	#122-4000	#122-4001	#122-4001	#122-4002	#122-4002
	#124-4039	#124-4039	#124-4040	#124-4040	#124-4041	#124-4041	#124-4042	#124-4042	#124-4043	#124-4043
	#124-4044	#124-4044	#124-4045	#124-4045	#126-4076	#126-4076				
POINTE	5-484									
POP	#23-1070	43-1695	43-1696	52-1948	52-1956	58-2138	60-2189	60-2190	68-2531	68-2532
	72-2715	72-2716	72-2717	72-2718	74-2742	74-2743	78-2808	78-2809	80-2846	80-2847
	86-3024	86-3025	86-3026	88-3062	88-3063	89-3170	89-3171	89-3172	89-3173	89-3174
	89-3175	97-3411	97-3412							
PRINTB	#68-2504	#74-2734	#74-2737	#74-2740	#86-3020					
PRINTF	88-3054	88-3059	88-3061	93-3354	97-3413	116-3848	116-3855	116-3857	116-3859	
PRINTS	#89-3134	#89-3136	#89-3152	#89-3153	#89-3163					
PRINTX	68-2480	68-2485	68-2488	68-2490	68-2511	68-2519				
PUSH	#23-1057	43-1688	43-1689	52-1942	52-1946	58-2128	60-2178	60-2179	68-2456	68-2457
	72-2652	72-2653	72-2654	72-2655	74-2728	74-2729	78-2784	78-2785	80-2824	80-2825
	86-2998	86-2999	86-3000	88-3047	88-3048	89-3125	89-3126	89-3127	89-3128	89-3129

MACRO NAME	REFERENCES							
	89-3130	97-3407	97-3408					
READEF	#91-3207							
RFLAGS	#91-3285							
SETPRI	82-2894							
SETVEC	82-2895	82-2897	93-3334					
SVC	#5-450	5-451						
SWAPIN	#23-1087	#49-1773	#49-1784	#49-1791	#49-1812			
SWAPOW	#23-1108	50-1869						
TSTID	#35-1512	102-3544	104-3558	106-3588	108-3628	110-3659	112-3690	114-3721
TUREAD	#31-1394	#106-3597	#110-3670	#114-3732				
TURTRY	#29-1319	#106-3596	#106-3597	#108-3639	#110-3670	#112-3701	#114-3732	
TUSEEK	#27-1257	104-3565						
TUSELF	#33-1471	#102-3547						
TUWRIT	#25-1149	106-3596	108-3639	112-3701				