PDT-11

110/130 SYS EXER

CVKDBA0

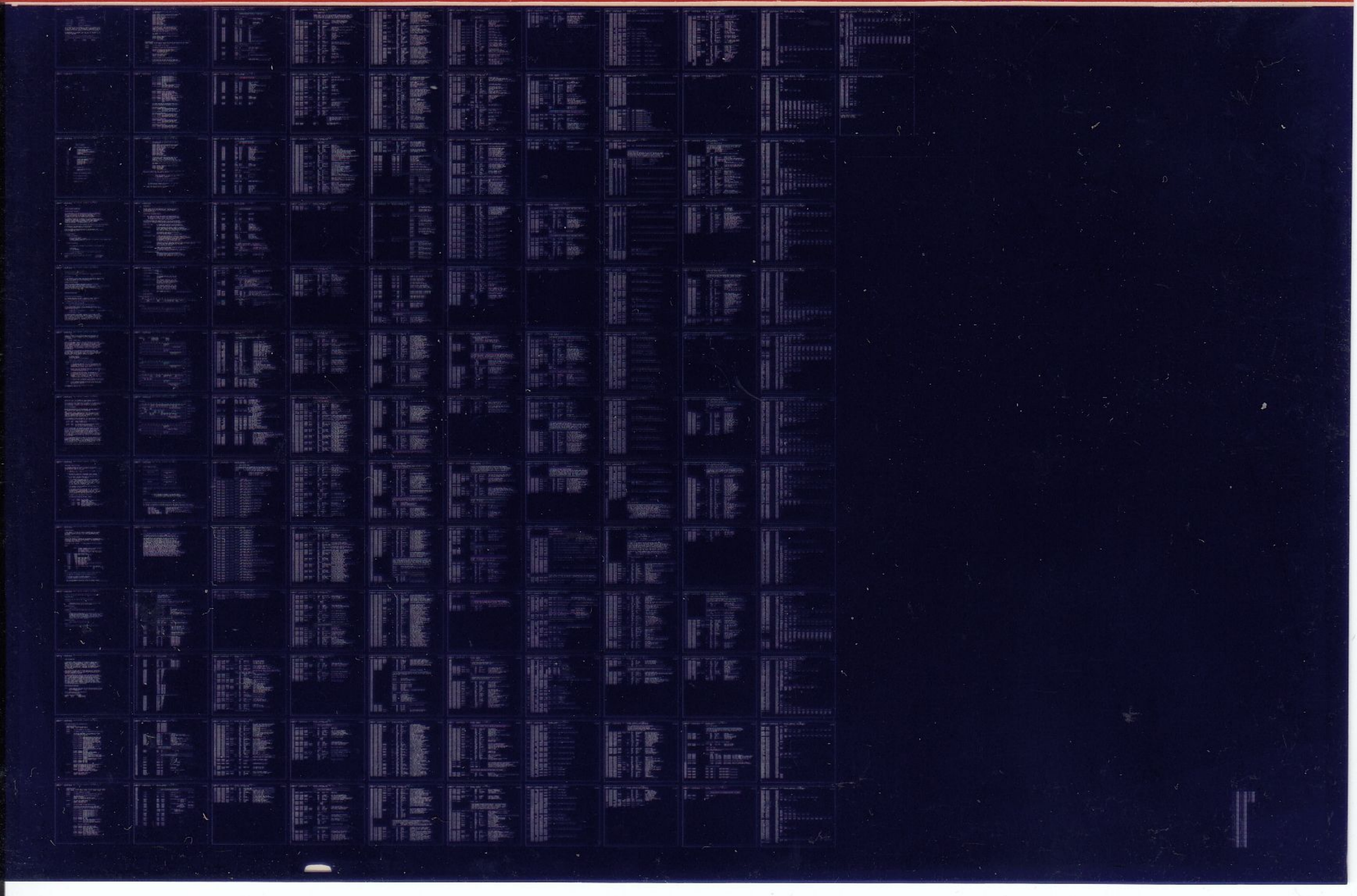
AH-F401A-MC

FICHE 1 OF 1

MAY 1979

digital

MADE IN USA



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.REM %
```

IDENTIFICATION

PRODUCT CODE: AC-F400A-MC

PRODUCT NAME: CVKDBA0 PDT-11 110/130 SYS EX

PRODUCT DATE: APRIL 1979

MAINTAINER: DIAGNOSTIC ENGINEERING

HISTORY

REVISION	DATE
A	APRIL, 1979

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1.0 GENERAL PROGRAM INFORMATION.

1.1 PROGRAM PURPOSE (ABSTRACT).

THE CVKDBA0 PDT-11 110/130 SYSTEM EXERCISER TESTS THE PROCESSOR'S ABILITY TO OPERATE ALL ITS PERIPHERALS IN INTERRUPT MODE AT THE SAME TIME WITH EMPHASIS ON THE TU58 TAPE SUBSYSTEMS.
IT SHOULD BE NOTED THAT THIS PROGRAM IS NOT A DIAGNOSTIC OF THE PERIPHERALS BUT A SERIES OF SYSTEM INTERACTION TESTS.

THE PROGRAM IS DEFAULTED TO EXERCISE THE CLUSTER TERMINALS AND THE COMMUNICATION (COMM) PORT IN INTERNAL LOOPBACK MODE (MAINTENANCE MODE).
THE DEFAULT CAN BE CHANGED TO EXERCISE THE CLUSTER TERMINALS AND/OR THE COMM PORT IN EXTERNAL LOOPBACK (SPECIAL LOOPBACK CONNECTORS REQUIRED). SEE PROGRAM OPTIONS SEC. 2.4.

TESTING OF THE PHYSICAL CLUSTER TERMINALS OR COMM DEVICE WILL NOT BE PERFORMED.

THE PRINTER WILL BE EXERCISED IF SIZING DETERMINES IT TO BE PRESENT OR IF AN EXTERNAL LOOPBACK CONNECTOR IS INSTALLED.

AFTER THE MEMORY HAS BEEN TESTED AND ALL THE PERIPHERALS ARE BEING EXERCISED AND INTERRUPTING, THE TU58 SUBSYSTEM TESTS WILL BEGIN.
SEE TEST SUMMARY SEC. 7.0.

1.2 SYSTEM REQUIREMENTS.

HARDWARE REQUIREMENTS:

PDT-11 110/130 SYSTEM
8K MEMORY (8K WORDS) - MINIMUM
EXTERNAL LOOPBACK CONNECTORS (OPTIONAL) FOR COMM AND CLUSTER TERMINAL PORTS.
(SEE PROGRAM OPTIONS SEC. 2.4)

SOFTWARE REQUIREMENTS:

THIS EXERCISER IS DESIGNED TO RUN IN ANY OF THE FOLLOWING WAYS:

STAND ALONE
WITH APT MONITOR
WITH XXDP MONITOR

IT IS NOT DESIGNED TO RUN WITH THE DIAGNOSTIC SUPERVISOR.

1.3 RELATED DOCUMENTS AND STANDARDS.

DIAGNOSTIC ENGINEERING STANDARDS AND CONVENTIONS	175-003-009-02
APT	MD-11-DZZMA
SYSMAC	MD-11-DZQAC

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

THIS EXERCISER ASSUMES THAT THE POWER UP SELF TEST RUNS ERROR FREE.

1.5 ASSUMPTIONS

IF THE PROGRAM IS TO BE LOADED AND EXECUTED FROM THE APT MANUFACTURING SYSTEM, IT IS ASSUMED THAT LOCATION $DEVM HAS BEEN INITIALIZED TO THE CONFIGURATION OF THE PDT-11 TO BE TESTED.

1.6 RUNNING SYSTEMS PROGRAMS

UNLESS THE SYSTEMS PROGRAMS ARE KNOWN TO INITIALIZE THE BAUD RATES OF EACH DEVICE THRU THE PARAMETER REGISTER, THE OPERATOR SHOULD POWER DOWN AND UP AGAIN WHEN FINISHED RUNNING THIS EXERCISER. THIS IS TO RESTORE THE PDT-11 TO ITS DEFAULT BAUD RATES. OTHERWISE, THE DEVICES WILL ATTEMPT TO RUN AT WHATEVER BAUD RATES WERE LAST USED BY THIS EXERCISER.

2.0 OPERATING INSTRUCTIONS.

2.1 LOADING AND STARTING PROCEDURES.

USE STANDARD PROCEDURE FOR PDP-11 ABSOLUTE BINARY FORMATTED MEDIA, OR PROCEDURE FOR LOADING PROGRAMS UNDER XXDP MEDIA.

THE PROGRAM WILL AUTO-START AFTER LOADING TO LOCATION 'START'.

IT CAN BE STARTED FROM LOCATION 200.

NOTE: ALL RESTARTS MUST BE FROM LOCATION 240.

THE FOLLOWING EXAMPLE SHOWS A TYPICAL PROGRAM STARTUP ON A 24K SYSTEM WITHOUT A PRINTER AND THE OPERATOR DROPPING CLUSTER TERMINAL NUMBER TWO FROM THE TEST.

```
CVKDBA0 PDT-11 110/130 SYS EX.       0 PASSES      0 TOTAL ERRORS (     0 SOFT)

SWR = XXXXXX    NEW =
```

THE PROGRAM SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER (SWREG AT LOCATION 176) FROM THE CONSOLE. XXXXXX IN THE ABOVE TYPEOUT IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER. REFER TO SECTION 2.3, STEPS 3 AND 4, FOR OPERATOR ACTION AND THE OPERATIONAL SWITCH SETTINGS. IN ORDER TO DROP A DEVICE FROM THE TEST, AS IN THIS EXAMPLE, THE OPERATOR MUST SET BIT 14 (40000) IN THE SWITCH REGISTER.

IF BIT 14 (40000) IS SET IN THE SOFTWARE SWITCH REGISTER, THE PROGRAM WILL ALLOW THE OPERATOR TO CHANGE LOCATION $DEVM VIA THE CONSOLE. IF BIT 14 (40000) IS SET, THE PROGRAM WILL TYPE THE FOLLOWING:

```
$DEVM = XXXXXX  NEW =
```

XXXXXX IN THE ABOVE TYPEOUT IS THE OCTAL CONTENTS OF THE DEVICE MAP, LOCATION $DEVM. REFER TO SECTION 2.3, STEPS 3 AND 4, FOR THE METHOD USED TO CHANGE THE LOCATION. ALL REFERENCES IN SECTION 2.3, STEP 3, TO LOCATION 176 OR SOFTWARE SWITCH REGISTER WILL IMPLY LOCATION $DEVM. REFER TO SECTION 2.4.1 FOR A DEFINITION OF EACH BIT IN LOCATION $DEVM. FOR THIS EXAMPLE, TO DROP CLUSTER TERMINAL NUMBER TWO FROM THE TEST, THE OPERATOR MUST SET BIT 13 (20000) INTO LOCATION $DEVM.

THE PROGRAM, AFTER THE OPERATOR HAS PERFORMED THE ABOVE, WILL AUTOSIZE MEMORY, DETERMINE WHAT OPTIONS ARE PRESENT (PRINTER, CLUSTER AND TU58), WHAT DEVICES ARE NOT TO BE TESTED VIA LOCATION $DEVM, AND THEN TYPEOUT ON THE CONSOLE TERMINAL ITS FINDINGS. FOR THE EXAMPLE ABOVE, THE PROGRAM WILL TYPE THE FOLLOWING:

```
24K MEMORY PRESENT
PRINTER NOT PRESENT
CLUSTER TERMINAL #2 TESTING DROPPED

INSERT SCRATCH CASSETTES, TYPE 'P' TO PROCEED
```

(PROGRAM HALTS AND WAITS FOR 'P' AND THEN CONTINUES)

NOTE1: IF THE OPERATOR INDICATES VIA THE SWITCH REGISTER THAT THE CONSOLE TERMINAL IS A VT132, ALL REFERENCES IN THIS DOCUMENT AND ALL TYPEOUTS BY THE PROGRAM DESCRIBING OR INDICATING THE VT100 WILL IMPLY VT132.

NOTE2: BECAUSE HALTS ARE PROHIBITED UNDER APT, IT WILL ASSUME SCRATCH CASSETTES ARE ALREADY IN THE DRIVES AND BYPASS PRINTING THE WARNING MESSAGE AND THE HALT.

NOTE3: IF RUNNING IN XXDP CHAIN MODE, THE PROGRAM WILL SET BIT 8 IN $DEVM TO DROP TESTING ON TU58 TAPE UNIT 0 (LOAD DEVICE). THE WARNING MESSAGE AND HALT WILL BE BYPASSED BY THE PROGRAM. IF BIT 9 IN $DEVM IS SET TO A ZERO, THE PROGRAM WILL TEST TU58 TAPE UNIT 1. IT IS ASSUMED THAT A SCRATCH CASSETTE IS IN TAPE DRIVE UNIT 1.

NOTE4: IF TU58 TESTING IS INHIBITED (1400 IN $DEVM), OR THE SYSTEM IS A PDT-11 110, THE CASSETTE MESSAGE AND HALT ARE BYPASSED.

NOTE5: IF THE PROGRAM DETERMINES AN OPTION IS NOT PRESENT AND $DEVM INDICATES THE OPTION IS TO BE TESTED, THE PROGRAM WILL NOT TEST THE DEVICE.

THE PROGRAM WILL BEGIN ACTUAL TESTING AT THIS POINT.
SEE SUMMARY OF TESTS SEC. 7.0.

DURING THE TESTS, THE PROGRAM WILL PRINT PROGRESS REPORTS (SEE SEC. 4.0) IF BIT 12 IS SET IN THE SWREG (SEE SEC 2.3).

END OF PASS AND TOTAL ERROR COUNT IS PRINTED AT THE CONCLUSION OF TESTING. THE PROGRAM WILL THEN JUMP TO THE BEGINNING OF THE ACTUAL TESTING AND THE SEQUENCE IS REPEATED UNTIL STOPPED BY THE OPERATOR

2.2 SPECIAL ENVIRONMENTS.

BEFORE INITIATING PDT-11 TESTING UNDER APT, THE UNIT UNDER TEST MUST BE INITIALIZED EITHER BY THE KEYBOARD RESET FUNCTION OR BY TURNING THE UNIT UNDER TEST OFF AND THEN ON.

IF SYNCHRONOUS (SYNC) COMMUNICATION (COMM) TESTS ARE RUN (BIT10 IN $DEVM = 0) WHEN RUNNING UNDER APT, THE ASYNCHRONOUS 'ASYNC) COMM TESTS SHOULD ALSO BE RUN (BIT11 IN $DEVM = 0). THIS WILL LEAVE THE COMM PORT SETUP IN ASYNC MODE SO APT WILL BE ABLE TO COMMUNICATE WITH THE UNIT UNDER TEST (UUT).

IF THE PROGRAM IS TO BE RUN UNDER APT, SET LOCATION $ENV TO 001 AND LOCATION $ENVM TO THE DESIRED SETTINGS FROM THE BITS LISTED BELOW:

BIT5=0	(000)	ENABLE CONSOLE OUTPUT - FIRST PASS ONLY
BIT5=1	(040)	DISABLE CONSOLE OUTPUT
BIT7=0	(000)	USE PROGRAM DEFAULT SWITCH SETTINGS (000000)
BIT7=1	(200)	USE APT SWITCH REGISTER ($SWREG) (SEE SECTION 2.3 FOR OPERATIONAL SWITCH SETTINGS)

IF BIT 5 EQUALS ZERO, THE PROGRAM WILL REPORT DURING THE FIRST PASS OF THE PROGRAM, AUTO-SIZING INFORMATION, DEVICES DROPPED FROM THE TEST AS SPECIFIED BY $DEVM, ERRORS, AND THE END OF PASS PRINTOUT. BIT 5 IS UNCONDITIONALLY SET AT THE END OF PASS TO ENSURE THAT TYPEOUTS ARE NOT SENT OVER THE COMM PORT TO APT. IF THIS IS NOT DONE, APT WOULD REPORT A HUNG DIAGNOSTIC. SETTING BIT 7 EQUAL TO A 1, WILL ALLOW THE PROGRAM TO USE LOCATION $SWREG AS THE SOFTWARE SWITCH REGISTER (SEE SECTION 2.3 FOR OPERATIONAL SWITCH SETTING).

IF IT IS NECCESSARY TO ALLOW A NUMBER OF TU58 SOFT ERRORS TO OCCUR BEFORE REPORTING AN ERROR TO APT, SET LOCATION $USWR TO THE OCTAL NUMBER OF ALLOWABLE ERRORS. IF THE PROGRAM DETECTS A SOFT ERROR ON THE TU58 TAPE DRIVE GREATER THAN THE NUMBER IN $USWR, THE ERROR WILL BE REPORTED TO APT. LOCATION $USWR IS NORMALLY SET TO ZERO WHICH WILL CAUSE ALL SOFT ERRORS TO BE REPORTED TO APT.

THE DEVICE MAP ($DEVM) SHOULD BE SET UP AS DESCRIBED IN SECTION 2.4.1

2.3 OPERATIONAL SWITCH SETTINGS

THIS PROGRAM SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER (SWREG AT LOC. 176) FROM THE CONSOLE. THIS CAN BE ACCOMPLISHED BY DOING THE FOLLOWING:

1) TYPE CONTROL G <^G>; (THIS WILL ALLOW THE CONSOLE TO ENTER DATA INTO LOC. 176).

2) THE MACHINE WILL THEN TYPE:' SWR=XXXXXX NEW=' (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)

3) AFTER THE 'NEW=' HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE OF THE FOLLOWING AT THE CONSOLE:

   A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A <CR>. (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED). LEADING ZEROS NEED NOT BE TYPED, AND IF MORE THAN 6 DIGITS ARE TYPED, THE LAST 6 WILL BE USED. IF A <CR> IS THE FIRST KEY DEPRESSED, THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.

   B) IF A CONTROL U <^U> IS DEPRESSED THEN THE PROGRAM WILL SEND YOU BACK TO STEP 3.

   C) IF THE INPUT CHARACTER IS NOT ONE OF THE CHARACTERS MENTIONED ABOVE, A QUESTION MARK (?) WILL BE TYPED FOLLOWED BY A CARRIAGE RETURN AND A LINE FEED. ANY INPUT TYPED UP TO THE UNRECOGNIZABLE CHARACTER WILL BE IGNORED AND THE PROGRAM WILL SEND YOU BACK TO STEP 3 ABOVE.

4) THE DIAGNOSTIC WILL CONTINUE ON TYPING <CR>.

SOFTWARE SWITCH REGISTER OPTIONS (SWREG)

```
BIT 15 SET = 100000 = HALT ON ERROR
    14 SET =  40000 = CHANGE $DEVM VIA CONSOLE (ONLY AT
                      PROGRAM START TIME).
    13 SET =  20000 = INHIBIT ERROR TYPEOUTS
    12 SET =  10000 = ENABLE PERFORMANCE REPORTS
    10 SET =   2000 = BELL AND BLINKING BOLD TYPEOUT ON ERROR
    09 SET =   1000 = CONSOLE TERMINAL IS A VT132 (SEE
                      SECTION 2.1 NOTE1)
```

2.4 PROGRAM OPTIONS.

TYPING CONTROL C (^C) ON THE CONSOLE KEYBOARD AFTER THE PROGRAM HAS STARTED TESTING THE PDT-11, WILL CAUSE THE PROGRAM TO BE RESTARTED. REFER TO SECTION 2.1 OF THIS DOCUMENT FOR STARTING PROCEDURES.

2.4.1 DEVICE MAP--TESTING CONTROL

A DEVICE MAP ($DEVM) IS EXAMINED BY THE PROGRAM TO DETERMINE WHICH DEVICES WILL BE TESTED, THE CLUSTER TERMINALS, THE ASYNCHRONOUS (ASYNC)/ SYNCHRONOUS (SYNC) COMMUNICATION (COMM) PORT, THE PRINTER, CLOCK, VT100, MEMORY AND THE TU58.

THE DEFAULT VALUE = 000017 IT CAN BE CHANGED TO DO THE FOLLOWING:

$DEVM

```
                  000017= INTERNAL LOOPBACK FOR ALL CLUSTER TERMINALS.
                          INTERNAL LOOPBACK FOR COMM PORT.
                          TEST CLUSTER OPTION
                          TEST PRINTER, ASYNC/SYNC COMM PORTS, VT100,
                          TEST TU58 DRIVE 0 AND 1, CLOCK, AND MEMORY.

BIT 15 SET=       100000= DROP PRINTER TESTS
    14 SET=        40000= DROP CLUSTER TERM #3 TESTS
    13 SET=        20000=                   #2
    12 SET=        10000=                   #1
    11 SET=         4000= DROP ASYNC COMM TESTS
    10 SET=         2000= DROP  SYNC COMM TESTS
     9 SET=         1000= DROP TU58 DRIVE 1 TESTS
     8 SET=          400= DROP TU58 DRIVE 0 TESTS
     7 SET=          200= DROP CLOCK TESTS
     6 SET=          100= DROP VT100 TESTS
     5 SET=           40= TU58 SEQUENTIAL BLOCK TESTING (0-777 OCTAL)
     4 SET=           20= DROP MEMORY TESTS

BIT  3 SET=           10= INT. LOOPBACK (MAINT MODE) FOR COMM PORT
     2 SET=            4=                            FOR CLUSTER TERM #1
     1 SET=            2=                            FOR              #2
     0 SET=            1=                            FOR              #3
```

NOTES:

1. THE CLUSTER TERMINALS ARE INTENDED TO RUN IN LOOPBACK MODE ONLY.

2. THE COMM PORT IS INTENDED TO RUN IN LOOPBACK MODE ONLY.

3. THE PRINTER IS TESTED IN TRANSMIT MODE ONLY.
   IT WILL BE EXERCISED IF SIZING DETERMINES IT IS PRESENT
   OR LOOPBACK CONNECTOR INSTALLED AND BIT 15 = 0.

4. THE CLUSTER TERMINALS CAN NOT BE TESTED IN EXTERNAL LOOPBACK
   WHEN THE COMM PORT IS INITIALIZED TO RUN IN INTERNAL LOOPBACK ($DEVM XXXX10).

5. BITS 14-10 SETTINGS ($DEVM) WILL OVERRIDE BITS 3-0 SETTINGS.

2.5 EXECUTION TIMES.

ASSUMING ALL DEVICES AND NO TAPE SUBSYSTEMS PRESENT:

1'ST PASS:

APPROXIMATELY 80 SEC TO TEST VT100, CLOCK, PRINTER, COMM DEVICES (SYNC/ASYNC) AND CLUSTER TERMINALS.

SUBSEQUENT PASSES:

SAME AS ABOVE.

ASSUMING ALL DEVICES AND TAPE SUBSYSTEM (TU58) PRESENT:

1'ST PASS:

MAXIMUM TIME OF APPROXIMATELY 10.5 MINUTES TO TEST ALL DEVICES AS ABOVE AND BOTH TU58 TAPE DRIVES. TEST TIME WILL VARY CONSIDERABLY WITHIN THE 10.5 MINUTES WHILE TESTING THE TU58 TAPE DRIVES BECAUSE OF RANDOM BLOCK SELECTION CAUSING VARYING SEARCH TIMES. THIS CAN BE MINIMIZED BY SEQUENTIAL BLOCK TESTING IF SELECTED (BIT5 IN $DEVM = 1).

SUBSEQUENT PASSES:

SAME AS ABOVE FOR THE TAPE SUBSYSTEM.

2.6 POWER FAIL

THERE IS NO POWER FAIL AUTO-RESTART CAPABILITY IN THE PDT-11.

3.0 ERROR INFORMATION.

A "WATCH-DOG" TIMER IS USED BY THE PROGRAM AT VARIOUS TIMES TO ENSURE THAT THE VT100 IS RUNNING. IF XOFF IS TRANSMITTED MANUALLY WHILE THE PROGRAM IS EXECUTING THE "WATCH-DOG" TIMER CODE AND XON IS NOT TRANSMITTED MANUALLY IN THE ALLOTTED AMOUNT OF TIME, A TIMEOUT WILL OCCUR AND THE PROGRAM WILL REPORT A "VT100 HUNG" ERROR MESSAGE. THEREFORE, THE OPERATOR SHOULD NOT PRESS ANY KEYS ON THE VT100 KEYBOARD WHICH WILL CAUSE XOFF TO BE SENT.

WHEN TESTING THE TU58, THE SOFT ERROR COUNT WILL BE INCREMENTED (FOLLOWING THE ERROR REPORT), IF THE TU58 INDICATES IN ITS SUCCESS CODE BYTE (CONTAINED IN THE END PACKET) THAT THE READ OR WRITE FUNCTION SUCCEEDED WITH RETRIES.

ALL DEVICE ERRORS ON THE TU58 WILL CAUSE THE PROGRAM TO REPORT THE ERROR AND THEN DROP TESTING OF THE TU58 UNTIL THE NEXT PROGRAM PASS. A HARD READ OR WRITE ERROR DETECTED ON THE TU58 DRIVES WILL CAUSE THE PROGRAM TO REPORT THE ERROR AND DROP THE FAILING DRIVE FOR THIS PASS. IF ANOTHER DRIVE IS AVAILABLE, THE PROGRAM WILL START TESTING ON THIS DRIVE FOLLOWING THE MESSAGE "TU58 TAPE UNIT X DONE" (X=UNIT NUMBER). A SOFT READ OR WRITE ERROR WILL CAUSE THE PROGRAM TO CONTINUE TESTING ON THIS DRIVE FOLLOWING THE ERROR MESSAGE. A SOFT ERROR IS WHEN THE TU58 INDICATES THAT THE FUNCTION SUCCEEDED BUT WITH RETRIES.

3.1 ERROR REPORTING PROCEDURE.

NOTE: VT100 LINES 2-13 ARE USED FOR THE SCROLLING REGION FOR ERROR AND PERFORMANCE REPORTS. (LINES 14-24 ARE USED FOR DISPLAY TESTS, IF ENABLED.)

TYPICAL ERROR PRINTOUTS ARE SHOWN BELOW:
(ALL VALUES TYPED ARE OCTAL.)

```
CLUSTER TERM #3 DATA COMP ERR
ERROR #     ERR PC        EXPECT   RECVD
000011      006516        000200   000100
```

TU58 ERROR PRINTOUTS ARE DESCRIBED BELOW:

TU58 DEVICE ERROR
ERROR # ERR PC ERR WRD OP-CODE UNIT #
AAAAAA BBBBBB CCCCCC DDDDDD EEEEEE

AAAAAA= THE OCTAL NUMBER OF THE ERROR

BBBBBB= THE ADDRESS AT WHICH THE PROGRAM DETECTED THE FAILURE

CCCCCC= THE DEVICE ERROR WORD. A (1) IN ANY OF THE BITS
IN THE WORD INDICATES THE ERROR DETECTED. EACH
BIT IS DEFINED AS FOLLOWS:

BIT15=1 (100000) WHEN WAITING FOR A FLAG BYTE, AN
UNDEFINED CHARACTER WAS RECEIVED.
BIT14=1 (040000) WHEN READING A BLOCK, MORE THAN
4 DATA PACKETS WERE RECEIVED.
BIT13=1 (020000) WHEN WRITING A BLOCK, MORE THAN
4 CONT FLAG BYTES WERE RECEIVED.
BIT12=1 (010000) WHEN READING A BLOCK, A CONT FLAG
BYTE WAS RECEIVED.
BIT11=1 (004000) WHEN WRITING A BLOCK, A DATA FLAG
BYTE WAS RECEIVED.
BIT10=1 (002000) AN INIT FLAG BYTE WAS RECEIVED
DURING THE OPERATION.
BIT09=1 (001000) WHEN INITING THE DEVICE, THE 2ND
CHARACTER RECEIVED WAS NOT A CONT
FLAG BYTE.
BIT08=1 (000400) NOT USED
BIT07=1 (000200) TU58 HUNG (TIMEOUT ERROR)
BIT06=1 (000100) RECEIVER DONE FLAG NOT SET ON
RECEIVER INTERRUPT.
BIT05=1 (000040) PROGRAM RECEIVE BUFFER OVERFLOWED.
THE TU58 TRANSMTTED TOO MANY CHARACTERS.
BIT04=1 (000020) TRANSMIT READY NOT SET ON TRANSMIT
INTERRUPT.
BIT03=1 (000010) TRANSMIT INTERRUPTED WITH TRANSMIT
INTERRUPT ENABLE CLEARED.
BIT02=1 (000004) NOT USED
BIT01=1 (000002) NOT USED
BIT00=1 (000001) NOT USED

DDDDDD= THE FUNCTION BEING EXECUTED WHEN ERROR WAS DETECTED.
000004= THE PROGRAM WAS INITIALIZING THE TU58
000003= THE PROGRAM WAS WRITING A BLOCK
000403= THE PROGRAM WAS DOING A WRITE AND VERIFY
ON A BLOCK. (TU58 COMMAND)
000002= THE PROGRAM WAS READING A BLOCK.
000402= THE PROGRAM WAS READING A BLOCK WITH
INCREASED THRESHOLD. (TU58 COMMAND)

EEEEEE= THE TU58 UNIT NUMBER UNDER TEST
000000= TU58 DRIVE UNIT 0
000001= TU58 DRIVE UNIT 1

```
TU58 WRITE ERROR
ERROR # ERR PC  OP-CODE UNIT #  BLOCK # PKT WRD SUCCESS BYT CNT SUMMARY
AAAAAA  BBBBBB  CCCCCC  DDDDDD  EEEEEE  FFFFFF  GGGGGG  HHHHHH  IIIIII

AAAAAA=      THE OCTAL NUMBER OF THE ERROR

BBBBBB=      THE ADDRESS AT WHICH THE PROGRAM DETECTED A FAILURE.

CCCCCC=      THE FUNCTION THAT WAS BEING EXECUTED WHEN THE
             ERROR WAS DETECTED.
             000003= THE PROGRAM WAS WRITING A BLOCK
             000403= THE PROGRAM WAS DOING A WRITE VERIFY ON A BLOCK

DDDDDD=      THE TU58 UNIT NUMBER UNDER TEST
             000000= TU58 DRIVE UNIT 0
             000001= TU58 DRIVE UNIT 1

EEEEEE=      THE BLOCK NUMBER THAT WAS BEING WRITTEN

FFFFFF=      ACCUMULATED FUNCTION AND END PACKET ERROR WORD.
             A (1) IN ANY OF THE BITS IN THE WORD INDICATES THE
             ERROR(S) DETECTED. EACH BIT IS DEFINED AS FOLLOWS:

             BIT15=1 (100000) AN ERROR WAS DETECTED WHILE
                              READING DATA PACKET 4
             BIT14=1 (040000) AN ERROR WAS DETECTED WHILE
                              READING DATA PACKET 3
             BIT13=1 (020000) AN ERROR WAS DETECTED WHILE
                              READING DATA PACKET 2
             BIT12=1 (010000) AN ERROR WAS DETECTED WHILE
                              READING DATA PACKET 1
             BIT11=1 (004000) NOT USED
             BIT10=1 (002000) NOT USED
             BIT09=1 (001000) LESS THAN 4 DATA PACKETS RECEIVED
                              DURING READ OPERATION.
             BIT08=1 (000400) LESS THAN 4 CONTINUE FLAG BYTES
                              RECEIVED DURING WRITE OPERATION

                     END PACKET ERROR BITS

             BIT07=1 (000200) PACKET CHECKSUM FAILURE
             BIT06=1 (000100) PACKET BYTE COUNT INCORRECT
             BIT05=1 (000040) PACKET OP-CODE BYTE NOT EQUAL
                              END PACKET OP-CODE
             BIT04=1 (000020) TU58 REPORTING FAILURE DURING
                              OPERATION. SEE GGGGGG.
             BIT03=1 (000010) UNIT NUMBER NOT EQUAL UNIT UNDER TEST
             BIT02=1 (000004) PACKET SEQUENCE NUMBER NOT 0
             BIT01=1 (000002) PACKET DATA BYTE COUNT NOT
                              EQUAL TO A BLOCK (1000 OCTAL)
             BIT00=1 (000001) PACKET SUMMARY BITS INDICATES AN ERROR
```

GGGGGG= THE SUCCESS CODE BYTE AS READ FROM THE TU58 IN THE END PACKET.

000000= NORMAL SUCCESS (TU58 DETECTED NO ERRORS)
000001= SUCCESS BUT WITH RETRIES (SOFT ERROR)
000377= FAILED SELF-TEST
000376= PARTIAL OPERATION (END OF MEDIUM)
000370= BAD UNIT NUMBER
000367- NO CARTRIDGE
000365= WRITE PROTECTED
000357= DATA CHECK ERROR
000340= SEEK ERROR
000337= MOTOR STOPPED
000320= BAD OP-CODE
000311= BAD RECORD NUMBER

HHHHHH= THE DATA BYTE COUNT WORD AS READ FROM THE TU58 IN THE END PACKET. THIS WORD INDICATES THE NUMBER OF READ/WRITE DATA BYTES TRANSFERRED DURING THE OPERATION. IF ALL OF THE DATA WAS TRANSFERRED, THIS WORD SHOULD BE EQUAL TO 1000 OCTAL (# OF BYTES IN A BLOCK).

IIIIII= THE SUMMARY WORD AS READ FROM THE TU58 IN THE END PACKET.

10XXXX= SPECIAL CONDITIONS (ERRORS) SEE GGGGGG.
04XXXX= TRANSFER ERROR
02XXXX= MOTION ERROR
01XXXX= LOGIC ERROR
XXXX=RESERVED BITS

TU58 READ ERROR
ERROR # ERR PC OP-CODE UNIT # BLOCK # PKT WRD DAT WRD SUCCESS BYT CNT SUMMARY
AAAAAA BBBBBB CCCCCC DDDDDD EEEEEE FFFFFF GGGGGG HHHHHH IIIIII JJJJJJ

AAAAAA= THE OCTAL NUMBER OF THE ERROR.

BBBBBB= THE ADDRESS AT WHICH THE FAILURE WAS DETECTED

CCCCCC= THE FUNCTION BEING EXECUTED WHEN ERROR WAS DETECTED
000002= THE PROGRAM WAS READING A BLOCK
000402= THE PROGRAM WAS READING A BLOCK WITH INCREASED THRESHOLD.

DDDDDD= THE TU58 UNIT NUMBER UNDER TEST
000000= TU58 DRIVE UNIT 0
000001= TU58 DRIVE UNIT 1

EEEEEE= THE BLOCK NUMBER THAT WAS BEING READ

FFFFFF= ACCUMULATED FUNCTION AND END PACKET ERROR WORD.
A (1) IN ANY OF THE BITS IN THE WORD INDICATES THE ERROR(S) DETECTED. EACH BIT IS DEFINED AS FOLLOWS:

BIT15=1 (100000) AN ERROR WAS DETECTED WHILE

```
                                READING DATA PACKET 4
                        BIT14=1 (040000) AN ERROR WAS DETECTED WHILE
                                READING DATA PACKET 3
                        BIT13=1 (020000) AN ERROR WAS DETECTED WHILE
                                READING DATA PACKET 2
                        BIT12=1 (010000) AN ERROR WAS DETECTED WHILE
                                READING DATA PACKET 1
                        BIT11=1 (004000) NOT USED
                        BIT10=1 (002000) NOT USED
                        BIT09=1 (001000) LESS THAN 4 DATA PACKETS RECEIVED
                                DURING READ OPERATION.
                        BIT08=1 (000400) LESS THAN 4 CONTINUE FLAG BYTES
                                RECEIVED DURING WRITE OPERATION

                              END PACKET ERROR BITS

                        BIT07=1 (000200) PACKET CHECKSUM FAILURE
                        BIT06=1 (000100) PACKET BYTE COUNT INCORRECT
                        BIT05=1 (000040) PACKET OP-CODE BYTE NOT EQUAL
                                END PACKET OP-CODE
                        BIT04=1 (000020) TU58 REPORTING FAILURE DURING
                                OPERATION. SEE HHHHHH.
                        BIT03=1 (000010) UNIT NUMBER NOT EQUAL UNIT UNDER TEST
                        BIT02=1 (000004) PACKET SEQUENCE NUMBER NOT 0
                        BIT01=1 (000002) PACKET DATA BYTE COUNT NOT
                                EQUAL TO A BLOCK (1000 OCTAL)
                        BIT00=1 (000001) PACKET SUMMARY BITS INDICATES AN
                                ERROR.

GGGGGG=         THIS WORD CONTAINS THE ACCUMULATED ERROR BITS
                FOR EACH OF THE DATA PACKETS READ.  A (1) IN ANY
                OF THE BITS INDICATES A FAILURE WAS DETECTED.

                DATA PACKET 4 ERROR BITS
                BIT14=1 (040000) DATA PACKET CHECKSUM FAILURE
                BIT13=1 (020000) DATA CHECKSUM FAILURE (READ
                                 CHECKSUM NOT EQUAL WRITE)
                BIT12=1 (010000) DATA PACKET BYTE COUNT INCORRECT

                DATA PACKET 3 ERROR BITS
                BIT11=1 (004000) DATA PACKET CHECKSUM FAILURE
                BIT10=1 (002000) DATA CHECKSUM FAILURE (READ
                                 CHECKSUM NOT EQUAL WRITE)
                BIT09=1 (001000) DATA PACKET BYTE COUNT INCORRECT

                DATA PACKET 2 ERROR BITS
                BIT08=1 (000400) DATA PACKET CHECKSUM FAILURE
                BIT07=1 (000200) DATA CHECKSUM FAILURE (READ
                                 CHECKSUM NOT EQUAL WRITE)
                BIT06=1 (000100) DATA PACKET BYTE COUNT INCORRECT

                DATA PACKET 1 ERROR BITS
                BIT05=1 (000040) DATA PACKET CHECKSUM FAILURE
                BIT04=1 (000020) DATA CHECKSUM FAILURE (READ
                                 CHECKSUM NOT EQUAL WRITE)
                BIT03=1 (000010) DATA PACKET BYTE COUNT INCORRECT
```

HHHHHH= THE SUCCESS CODE BYTE AS READ FROM THE TU58 IN
THE END PACKET.

000000= NORMAL SUCCESS (TU58 DETECTED NO ERRORS)
000001= SUCCESS BUT WITH RETRIES (SOFT ERROR)
000377= FAILED SELF-TEST
000376= PARTIAL OPERATION (END OF MEDIUM)
000370- BAD UNIT NUMBER
000367= NO CARTRIDGE
000365= WRITE PROTECTED
000357= DATA CHECK ERROR
000340= SEEK ERROR
000337= MOTOR STOPPED
000320= BAD OP-CODE
000311= BAD RECORD NUMBER

IIIIII= THE DATA BYTE COUNT WORD AS READ FROM THE TU58
IN THE END PACKET. THIS WORD INDICATES THE
NUMBER OF DATA BYTES TRANSFERRED DURING THE
OPERATION. IF ALL THE DATA PACKETS WERE READ, THIS
NUMBER SHOULD EQUAL 1000 OCTAL (# OF BYTES IN A BLOCK)

JJJJJJ= THE SUMMARY WORD AS READ FROM THE TU58 IN THE
END PACKET.

10XXXX= SPECIAL CONDITIONS (ERRORS) SEE HHHHHH.
04XXXX= TRANSFER ERROR
02XXXX= MOTION ERROR
01XXXX= LOGIC ERROR
XXXX=RESERVED BITS

BITS 15,13, AND 10 OF THE SWITCH REGISTER (SWREG) CONTROL THE
SEQUENCE OF EVENTS AFTER AN ERROR IS DETECTED.

BIT 15 SET: CAUSES THE PROGRAM TO HALT IN THE ERROR ROUTINE.
IF THE PROGRAM IS CONTINUED BY TYPING 'P',
THE PROGRAM WILL PROCEED.

BIT 13 SET: DISABLES THE PRINTING OF THE ERROR MESSAGE.

BIT 10 SET: CAUSES THE BELL TO RING ON ERROR.

THE ERROR ROUTINE SUPPORTS THE CONTROL G <^G> FUNCTION.
REFER TO SECTION 2.3 FOR DETAILS.

NOTE: SINCE THERE ARE NO SPECIFIC TEST NUMBERS, API WILL
REPORT ALL ERRORS AS TEST 0 ERRORS.

3.2 ERROR HALTS.

THE ONLY HALTS IN THE EXERCISER ARE AFTER PRINTING THE CASSETTE WARNING MESSAGE AND IN THE ERROR ROUTINE. THE LATTER HALT IS EXECUTED ONLY IF BIT 15 OF THE SWITCH REGISTER (SWREG) IS SET WHEN AN ERROR OCCURS.

4.0 PROGRESS AND PERFORMANCE REPORTS

NOTE: THE SCROLLING REGION FOR PROGRESS AND ERROR REPORTS WILL BE LINES 2-13. LINES 14-24 WILL BE A SEPERATE SCROLLING REGION FOR VT100 DISPLAY TESTS. LINE 1 WILL ALWAYS DISPLAY THE PROGRAM TITLE, PASS COUNT, AND ERROR COUNT.

THE FOLLOWING REPORTS ARE ENABLED BY BIT 12 IN THE SWITCH REGISTER (SWREG LOC 176) AND WILL APPEAR FOLLOWING LOADING AND STARTING AS DESCRIBED IN SECTION 2.1 (ASSUMING ALL DEVICES ARE TO BE TESTED AND NO ERRORS):

MEMORY TESTS DONE	ALL MEMORY FROM LOCATION 0 TO THE BEGINNING OF THE XXDP MONITOR/ABSOLUTE LOADER HAS BEEN TESTED.
VT100 RUNNING	ESCAPE SEQUENCES FOR TERMINAL IDENTIFY, DIAGNOSTIC STATUS, AND CURSOR REPORTS HAVE BEEN SENT AND RECEIVED BACK FROM THE VT100. THE VT100 DISPLAY TESTS (VISUAL VERIFY ONLY) ARE LEFT RUNNING IN INTERRUPT MODE AT 4800 BAUD.
CLOCK RUNNING	100 INTERRUPTS HAVE BEEN DETECTED BEFORE EXERCISING THE NEXT DEVICE. THE CLOCK CONTINUES RUNNING IN INTERRUPT MODE.
PRINTER RUNNING (DONE)	5 LINES HAVE BEEN PRINTED WITH ERROR BIT CHECKING ONLY. THE PRINTER RUNS CONTINUOUSLY IN INTERRUPT MODE AT 1200 BAUD. ITS ACTUAL PERFORMANCE IS A VISUAL CHECK IF PRINTER CONNECTED. IF THE PRINTER WAS RUNNING IN EXTERNAL LOOPBACK MODE, THE PROGRAM WILL REPORT "PRINTER DONE" AND NO FURTHER TESTING WILL BE PERFORMED THIS PASS.
SYNC COMM DONE	CHARACTERS 0 THRU 377 HAVE BEEN TRANSMITTED AND RECEIVED WITH ODD PARITY ENABLED. INTERRUPTS ARE THEN DISABLED AND THE SYNC COMM IS NO LONGER EXERCISED. THIS IS SO THAT THE ASYNC COMM CAN BE EXERCISED FOR THE DURATION OF THE PASS.
ASYNC COMM RUNNING	CHARS 0 THRU 377 HAVE BEEN TRANSMITTED AND RECEIVED BEFORE EXERCISING THE NEXT DEVICE. IT CONTINUES RUNNING IN INTERRUPT MODE AT 9600 BAUD WITH ODD PARITY ENABLED AND REPEATS THE 0 THRU 377 CYCLE
CLUSTER TERMINAL #1 RUNNING	CHARACTERS 0 THRU 377 HAVE BEEN TRANSMITTED AND RECEIVED BEFORE EXERCISING THE NEXT DEVICE. THE TERMINAL KEEPS RUNNING CONTINUOUSLY AT 300 BAUD IN INTERRUPT MODE AND REPEATS THE 0 THRU 377 CYCLE

CLUSTER TERMINAL #2 RUNNING	SAME AS #1
CLUSTER TERMINAL #3 RUNNING	SAME AS #1
TU58 RUNNING	THIS MESSAGE INDICATES THAT THE TU58 HAS RESPONDED TO THE INITIALIZATION SEQUENCE.
TU58 TAPE UNIT 0 DONE	THIS MESSAGE INDICATES THAT TEN BLOCKS HAVE BEEN WRITTEN AND READ ON THIS UNIT. NO FURTHER TESTING IS DONE ON THIS UNIT SO THAT THE NEXT UNIT CAN BE TESTED IF AVAILABLE.
TU58 TAPE UNIT 1 DONE	THIS MESSAGE INDICATES THAT TEN BLOCKS HAVE BEEN WRITTEN AND READ ON THIS UNIT. THIS IS THE LAST DEVICE UNDER TEST FOR THIS PASS, THEREFORE, THE TESTING IS STOPPED FOR THIS PASS.
END OF PASS #1	TOTAL ERRORS THIS PASS: 0 SOFT ERRORS THIS PASS: 0 (...AND ENTIRE PROCESS REPEATS)

5.0 DEVICE REGISTERS.

PARAMETER REGISTER:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
		PORT SELECT			BAUD RATE			USR LT2	USR LT1	PAR TYP	PAR EN	CHAR LENGTH		MAIN		177420 (WP ONLY)

LINE CLOCK: VECTOR: 100

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
									CLK IE							177546

CONSOLE: ADDR: 177560-177566 VECTOR: 60/64
CLUSTER #1: 176500-176506 300/304
#2: 176510-176516 310/314
#3: 176520-176526 320/324

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
TKS									RCVR DONE	RCVR IE						
TKB	KB DATA BUFFER															
TPS									XMIT RDY	XMIT IE						
TPB	PRINTER DATA BUFFER (WRITE ONLY)															

PRINTER: VECTOR: 200

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
PRS	ERR								PRIN RDY	PRIN IE							177514
PRB	PRINTER DATA BUFFER (WRITE ONLY)																177516

ASYNC MODEM: VECTOR: 330/334

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
RCSR	DSI	RING	CTS	CAR DET		SEC REC	DSET RDY		RCVR DONE	RCVR IE	DSET IE		SEC XMIT	RTS	DTR		176610
RBUF	ERR	OR ERR	FR ERR	PAR ERR					RECEIVER DATA BUFFER								176612
XCSR									XMIT RDY	XMIT IE						BRK	176614
XBUF	TRANSMITTER DATA BUFFER (WRITE ONLY)																176616

SYNC MODEM:

VECTOR: 340/344

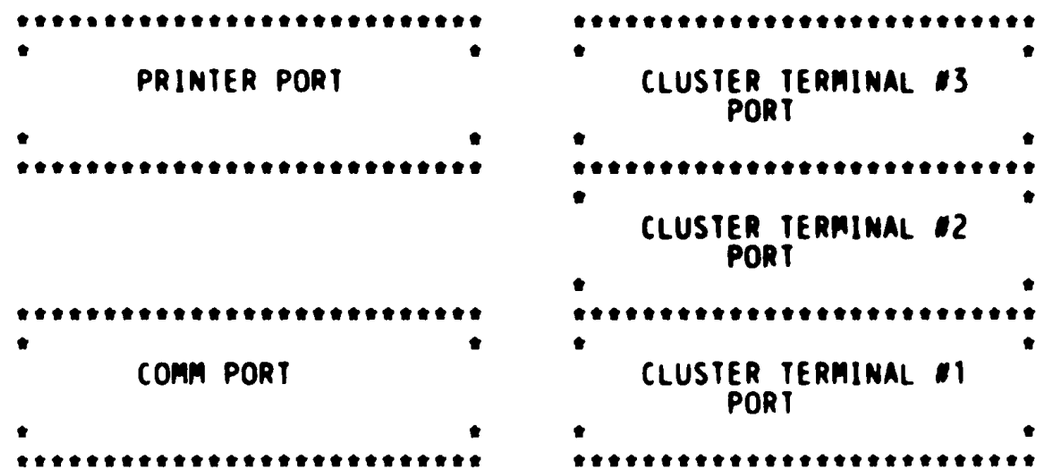
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
RCSR	DSC	RING	CTS	CAR DET	REC ACT	SEC REC	DSET RDY	STRP SYNC	RCVR DONE	RCVR IE	DSET IE	SRCH SYNC	SEC XMIT	RTS	DTR		176620
RBUF	ERR	OR ERR		PAR ERR					RECEIVER DATA BUFFER								176622 (RD ONLY)
PCSR		SYNC CHAR			WORD LENGTH		PAR IE	EVEN PAR	SYNC REG								176622 (WR ONLY)
XCSR	DNA			MA MODE	MA CLK			MAST RST	XMIT RDY	XMIT IE	DNA IE	SEND	H/F DUP				176624
XBUF	TRANSMITTER DATA BUFFER (WRITE ONLY)																176626

TU58:

VECTOR: 260/264

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
RXCS									RCVR DONE	RCVR IE							177170
RXDB TXDB	COMMON DATA BUFFER																177172
TXCS									XMIT RDY	XMIT IE						BRK	177174

6.0 DEVICE CONNECTOR LAYOUT



7.0 SUMMARY OF TESTS (SEE PROGRAM LISTING FOR DETAILS ON SPECIFIC TESTS)

PHASE 1

MEMORY TESTS
A. LOC 0 THRU END OF PROGRAM IS TESTED FOR TIMEOUT.
B. END OF PROGRAM TO BOTTOM OF XXDP MONITOR/ABSOLUTE LOADER IS TESTED WITH A 125252 AND 052525 OCTAL PATTERN.
C. IF 28K PRESENT, MEMORY FROM 28K TO 30K IS SIMILARLY TESTED.

PHASE 2

ALL AVAILABLE PERIPHERALS ARE EXERCISED IN INTERRUPT MODE UNTIL END OF PASS.

SEE SECTION 2.4 FOR DETAILS OF SETTING UP THE DEVICE MAP ($DEVM) FOR DEVICE TO BE TESTED.
SEE SECTION 4.0 FOR DETAILS ON PROGRESS REPORTS. THE PROGRAM FLOW FOR PHASE 2 IS AS FOLLOWS:

START VT100	VT100 LINK VERIFIED USING ESCAPE SEQUENCES. DISPLAY TESTS LEFT RUNNING.
START LINE CLOCK	INTERRUPTS ARE DETECTED.
START PRINTER	CONTINUOUS LINES ARE PRINTED.
START SYNC COMM PORT	CHARS 27 THRU 377 " " " 1 PASS ONLY
START ASYNC COMM PORT	CHARS 0 THRU 377 TESTED CONTINUOUSLY.
START CLUSTER TERMINAL #1	CHARS 0 THRU 377 ARE XMITTED, REC'D AND TESTED.
START CLUSTER TERMINAL #2	SAME
START CLUSTER TERMINAL #3	SAME

PHASE 3

WHILE THE ABOVE DEVICES ARE INTERRUPTING RANDOMLY, TU58 SUBSYSTEM TESTS BEGIN:

THE PROGRAM INITIALIZES THE TU58 BY SENDING THE TU58 "INIT"
SEQUENCE AND WAITING FOR THE APPROPRIATE RESPONSE FROM THE TU58.

FOR THE PURPOSE OF THIS EXERCISER, THE TAPE IS DIVIDED INTO TWO
TAPE RANGES; THE FIRST HALF AND THE SECOND HALF OF TAPE. THE
PROGRAM GENERATES A RANDOM NUMBER TO DETERMINE WHICH HALF OF
THE TAPE IS TO BE EXERCISED DURING THIS PASS OF THE PROGRAM. THIS
TAPE RANGE WILL BE USED IN TESTING BOTH TU58 DRIVES FOR THIS PASS
OF THE PROGRAM. ALL BLOCK NUMBERS TO BE EXERCISED ARE GENERATED
RANDOMLY AND THEY ARE MASKED TO THE TAPE RANGE SELECTED. IF BIT5 IN
$DEVM IS SET, THE BLOCK NUMBERS GENERATED WILL BE SEQUENTIAL INSTEAD
OF RANDOM, AND THE TAPE WILL NOT BE DIVIDED INTO TAPE RANGES. ALL
TRANSFERS TO THE TU58 ARE ONE BLOCK TRANSFERS (1000 OCTAL BYTES).
ALL DATA TO BE WRITTEN IN A BLOCK WILL BE GENERATED RANDOMLY.
THE WRITE FUNCTION WILL BE RANDOMLY SELECTED FOR EACH BLOCK AS
WRITE OR WRITE VERIFY. THE READ FUNCTION WILL BE RANDOMLY
SELECTED FOR EACH BLOCK AS READ OR READ WITH INCREASED THRESHOLD.
IF BIT 5 IN $DEVM IS SET, THE WRITE AND READ FUNCTION WILL STRICTLY
BE A WRITE AND READ FUNCTION AND NOT A WRITE VERIFY OR READ WITH INCREASED
THRESHOLD. FOR EACH BLOCK TO BE EXERCISED, THE PROGRAM WILL WRITE THE BLOCK
AND THEN READ AND CHECK THE BLOCK TO BE CORRECT. THE PROGRAM
EXERCISES TEN RANDOM BLOCKS (SEQUENTIAL IF $DEVM BIT5 = 1) PER TU58
TAPE DRIVE BEFORE EXERCISING THE NEXT TU58 TAPE DRIVE THE SAME WAY.

%

```
6638                                    .TITLE  CVKDBA0 PDT-11 110/130 SYS EX.
 (1)                                    ;*COPYRIGHT (C) 1979
 (1)                                    ;*DIGITAL EQUIPMENT CORP.
 (1)                                    ;*MAYNARD, MASS. 01754
 (1)                                    ;*
 (1)                                    ;*PROGRAM BY BRUCE HANSEN
 (1)                                    ;*
 (1)                                    ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
 (1)                                    ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
 (1)                                    ;*
6639
6640                                    .SBTTL  OPERATIONAL SWITCH SETTINGS
6641                                    ;
6642                                    ;       SWITCH          USE
6643                                    ;       ------          ---
6644                                    ;         15            HALT ON ERROR
6645                                    ;         14            CHANGE $DEVM VIA KEYBOARD (PROGRAM START
6646                                    ;                       TIME ONLY)
6647                                    ;         13            INHIBIT ERROR TYPEOUTS
6648                                    ;         12            ENABLE PERFORMANCE REPORTS
6649                                    ;         10            BELL AND REVERSE VIDEO TYPEOUT ON ERROR
6650                                    ;         09            CONSOLE TERMINAL IS A VT132.
6651                                    ;
6652
6653
6654                                    .SBTTL  BASIC DEFINITIONS
 (1)
 (1)                                    ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
 (1)            001100                  STACK=  1100
 (1)                                    .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
 (1)                                    .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL
 (1)
 (1)                                    ;*MISCELLANEOUS DEFINITIONS
 (1)            000011                  HT=     11              ;;CODE FOR HORIZONTAL TAB
 (1)            000012                  LF=     12              ;;CODE FOR LINE FEED
 (1)            000015                  CR=     15              ;;CODE FOR CARRIAGE RETURN
 (1)            000200                  CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED
 (1)            177776                  PS=     177776          ;;PROCESSOR STATUS WORD
 (1)                                    .EQUIV  PS,PSW
 (1)            177774                  STKLMT= 177774          ;;STACK LIMIT REGISTER
 (1)            177772                  PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
 (1)            177570                  DSWR=   177570          ;;HARDWARE SWITCH REGISTER
 (1)            177570                  DDISP=  177570          ;;HARDWARE DISPLAY REGISTER
 (1)
 (1)                                    ;*GENERAL PURPOSE REGISTER DEFINITIONS
 (1)            000000                  R0=     %0              ;;GENERAL REGISTER
 (1)            000001                  R1=     %1              ;;GENERAL REGISTER
 (1)            000002                  R2=     %2              ;;GENERAL REGISTER
 (1)            000003                  R3=     %3              ;;GENERAL REGISTER
 (1)            000004                  R4=     %4              ;;GENERAL REGISTER
 (1)            000005                  R5=     %5              ;;GENERAL REGISTER
 (1)            000006                  R6=     %6              ;;GENERAL REGISTER
 (1)            000007                  R7=     %7              ;;GENERAL REGISTER
 (1)            000006                  SP=     %6              ;;STACK POINTER
 (1)            000007                  PC=     %7              ;;PROGRAM COUNTER
```

```
(1)
(1)                                     ;*PRIORITY LEVEL DEFINITIONS
(1)             000000                  PR0=    0               ;;PRIORITY LEVEL 0
(1)             000040                  PR1=    40              ;;PRIORITY LEVEL 1
(1)             000100                  PR2=    100             ;;PRIORITY LEVEL 2
(1)             000140                  PR3=    140             ;;PRIORITY LEVEL 3
(1)             000200                  PR4=    200             ;;PRIORITY LEVEL 4
(1)             000240                  PR5=    240             ;;PRIORITY LEVEL 5
(1)             000300                  PR6=    300             ;;PRIORITY LEVEL 6
(1)             000340                  PR7=    340             ;;PRIORITY LEVEL 7
(1)
(1)                                     ;*"SWITCH REGISTER" SWITCH DEFINITIONS
(1)             100000                  SW15=   100000
(1)             040000                  SW14=   40000
(1)             020000                  SW13=   20000
(1)             010000                  SW12=   10000
(1)             004000                  SW11=   4000
(1)             002000                  SW10=   2000
(1)             001000                  SW09=   1000
(1)             000400                  SW08=   400
(1)             000200                  SW07=   200
(1)             000100                  SW06=   100
(1)             000040                  SW05=   40
(1)             000020                  SW04=   20
(1)             000010                  SW03=   10
(1)             000004                  SW02=   4
(1)             000002                  SW01=   2
(1)             000001                  SW00=   1
(1)                                     .EQUIV  SW09,SW9
(1)                                     .EQUIV  SW08,SW8
(1)                                     .EQUIV  SW07,SW7
(1)                                     .EQUIV  SW06,SW6
(1)                                     .EQUIV  SW05,SW5
(1)                                     .EQUIV  SW04,SW4
(1)                                     .EQUIV  SW03,SW3
(1)                                     .EQUIV  SW02,SW2
(1)                                     .EQUIV  SW01,SW1
(1)                                     .EQUIV  SW00,SW0
(1)
(1)                                     ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
(1)             100000                  BIT15=  100000
(1)             040000                  BIT14=  40000
(1)             020000                  BIT13=  20000
(1)             010000                  BIT12=  10000
(1)             004000                  BIT11=  4000
(1)             002000                  BIT10=  2000
(1)             001000                  BIT09=  1000
(1)             000400                  BIT08=  400
(1)             000200                  BIT07=  200
(1)             000100                  BIT06=  100
(1)             000040                  BIT05=  40
(1)             000020                  BIT04=  20
(1)             000010                  BIT03=  10
(1)             000004                  BIT02=  4
(1)             000002                  BIT01=  2
(1)             000001                  BIT00=  1
```

```
  (1)                                .EQUIV  BIT09,BIT9
  (1)                                .EQUIV  BIT08,BIT8
  (1)                                .EQUIV  BIT07,BIT7
  (1)                                .EQUIV  BIT06,BIT6
  (1)                                .EQUIV  BIT05,BIT5
  (1)                                .EQUIV  BIT04,BIT4
  (1)                                .EQUIV  BIT03,BIT3
  (1)                                .EQUIV  BIT02,BIT2
  (1)                                .EQUIV  BIT01,BIT1
  (1)                                .EQUIV  BIT00,BIT0
  (1)
  (1)                                ;*BASIC "CPU" TRAP VECTOR ADDRESSES
  (1)           000004               ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
  (1)           000010               RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
  (1)           000014               TBITVEC=14              ;;"T" BIT
  (1)           000014               TRTVEC= 14              ;;TRACE TRAP
  (1)           000014               BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
  (1)           000020               IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
  (1)           000024               PWRVEC= 24              ;;POWER FAIL
  (1)           000030               EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
  (1)           000034               TRAPVEC=34              ;;"TRAP" TRAP
  (1)           000060               TKVEC=  60              ;;TTY KEYBOARD VECTOR
  (1)           000064               TPVEC=  64              ;;TTY PRINTER VECTOR
  (1)           000240               PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
 6655
 6656                                ;;*************************************************************
 6657                                ; SPECIAL ASCII CHARACTERS
 6658                                ;;*************************************************************
 6659
 6660           000033               ESC=    33                      ;ESCAPE
 6661           000021               XON=    21
 6662           000023               XOFF=   23
 6663
 6664                                ;;*************************************************************
 6665                                ;*      PDT-11 110/130 DEVICE VECTORS
 6666                                ;;*************************************************************
 6667
 6668           000200               PRVEC=  200             ;PRINTER
 6669
 6670           000100               CLKVEC= 100             ;LINE CLOCK
 6671
 6672           000330               AMRVEC= 330             ;ASYNC MODEM RECVR
 6673           000334               AMXVEC= 334             ;             XMITR
 6674
 6675           000340               SMRVEC= 340             ;SYNC MODEM RECVR
 6676           000344               SMXVEC= 344             ;            XMITR
 6677
 6678           000260               TURVEC= 260             ;TU58 RECVR
 6679           000264               TUTVEC= 264             ;TU58 XMITR
 6680
 6681           000300               TK1VEC= 300             ;CLUSTER TERM #1 VECTORS
 6682           000304               TP1VEC= 304
 6683           000310               TK2VEC= 310             ;             #2
 6684           000314               TP2VEC= 314
 6685           000320               TK3VEC= 320             ;             #3
 6686           000324               TP3VEC= 324
```

```
6687
6688                                    ;;*****************************************************************
6689                                    ;       PDT-11 110/130 DEVICE REGISTERS
6690                                    ;;*****************************************************************
6691
6692            177420                  PARAM=  177420          ;PARAMETER REGISTER             (WRITE ONLY)
6693
6694            177546                  CLK=    177546          ;LINE CLOCK
6695
6696            177514                  PRS=    177514          ;PRINTER STATUS REG
6697            177516                  PRB=    177516          ;       BUFFER                  (WRITE ONLY)
6698
6699            176610                  AMRC=   176610          ;ASYNC MODEM RECVR STATUS REG
6700            176612                  AMRB=   176612          ;                   BUFFER
6701            176614                  AMXC=   176614          ;             XMITR STATUS REG
6702            176616                  AMXB=   176616          ;                   BUFFER      (WRITE ONLY)
6703
6704            176620                  SMRC=   176620          ;SYNC MODEM RECVR STATUS REG
6705            176622                  SMRB=   176622          ;                   BUFFER      (READ ONLY)
6706            176622                  SMPAR=  176622          ;             PARAMETER REG     (WRITE ONLY)
6707            176624                  SMXC=   176624          ;           XMITR STATUS REG
6708            176626                  SMXB=   176626          ;                   BUFFER      (WRITE ONLY)
6709
6710            177170                  TURCSR= 177170          ;TU58 RECEIVER CSR
6711            177172                  TURXDB= 177172          ;       COMMON DATA BUFFER
6712            177174                  TUXCSR= 177174          ;       TRANSMITTER CSR
6713
6714            176500                  TK1S=   176500          ;CLUSTER TERMINAL #1
6715            176502                  TK1B=   176502
6716            176504                  TP1S=   176504
6717            176506                  TP1B=   176506
6718
6719            176510                  TK2S=   176510          ;                   #2
6720            176512                  TK2B=   176512
6721            176514                  TP2S=   176514
6722            176516                  TP2B=   176516
6723
6724            176520                  TK3S=   176520          ;                   #3
6725            176522                  TK3B=   176522
6726            176524                  TP3S=   176524
6727            176526                  TP3B=   176526
```

```
6729
6730                                    ;;*****************************************************************
6731                                    ;*      PARAMETER REGISTER EQUATES      WRITE ONLY
6732                                    ;;*****************************************************************
6733
6734                                    ;BIT 14-12  PORT SELECT
6735                                    ;
6736            010000                  CONSOL= 10000           ;SELECT CONSOLE TERMINAL
6737            000000                  CT1=    0               ;       CLUSTER TERMINAL #1
6738            050000                  CT2=    50000           ;                       #2
6739            060000                  CT3=    60000           ;                       #3
6740            020000                  PRT=    20000           ;       PRINTER PORT
6741            030000                  AMOD=   30000           ;       ASYNC COMM PORT
6742            040000                  ULITE=  40000           ;       USER LIGHTS
6743
6744                                    ;BIT 11-8  BAUD RATE    (DELTA = 400)
6745                                    ;
6746            000000                  B50=    0               ;50 BAUD
6747            000400                  B75=    400             ;75
6748            001000                  B110=   1000            ;110
6749            001400                  B134=   1400            ;134.5
6750            002000                  B150=   2000            ;150
6751            002400                  B300=   2400            ;300
6752            003000                  B600=   3000            ;600
6753            003400                  B1200=  3400            ;1200
6754            004000                  B1800=  4000            ;1800
6755            004400                  B2000=  4400            ;2000
6756            005000                  B2400=  5000            ;2400 (CLUSTER DEFAULT)
6757            005400                  B3600=  5400            ;3600
6758            006000                  B4800=  6000            ;4800
6759            006400                  B7200=  6400            ;7200
6760            007000                  B9600=  7000            ;9600 (PRINTER AND ASYNC DEFAULT)
6761            007400                  B19200= 7400            ;19200
6762                                    ;
6763                                    ;IF 110 BAUD SELECTED, 2 STOP BITS ARE ASSUMED.
6764
6765                                    ;BITS 4-5 PARITY CONTROL
6766                                    ;
6767            000060                  EPAR=   60              ;EVEN PARITY ENABLE
6768            000020                  OPAR=   20              ;ODD PARITY ENABLE (DEFAULT)
6769
6770                                    ;BITS 3-2  CHARACTER LENGTH (DELTA = 4)
6771                                    ;
6772            000000                  CHAR5=  0               ;5 BITS/CHAR
6773            000004                  CHAR6=  4               ;6
6774            000010                  CHAR7=  10              ;7
6775            000014                  CHAR8=  14              ;8 (PRINTER,TERMINAL,MODEM DEFAULT)
6776
6777                                    ;BIT 1  MAINTENANCE BIT
6778                                    ;
6779            000002                  MAINT=  BIT1            ;ENABLE MAINT MODE
6780                                                            ;PRINTER AND TU58 DO NOT HAVE MAINT MODE
```

```
                                ;;*****************************************************************
                                ;*      ASYNC MODEM BIT DEFINITIONS
                                ;;*****************************************************************

                                ;RCSR
                                ;
100000                          DSI=    BIT15           ;DATA SET INTERRUPT
040000                          RING=   BIT14           ;RING
020000                          CTS=    BIT13           ;CLEAR TO SEND
010000                          CDET=   BIT12           ;CARRIER DETECTED
002000                          SREC=   BIT10           ;SECONDARY RECD/SUPERVISORY RECD
001000                          DSRDY=  BIT9            ;DATA SET RDY
000200                          DONE=   BIT7            ;RECVR DONE
000100                          IE=     BIT6            ;RECVR IE
000040                          DSIE=   BIT5            ;DATA SET IE
000010                          SXMIT=  BIT3            ;SECONDARY XMIT/SUPERV XMIT
000004                          RTS=    BIT2            ;REQ TO SEND
000002                          DTR=    BIT1            ;DATA TERMINAL RDY

                                ;RBUF
                                ;
100000                          ERR=    BIT15           ;ERROR
040000                          ORERR=  BIT14           ;OVERRUN ERROR
020000                          FRERR=  BIT13           ;FRAMING ERROR
010000                          PARERR= BIT12           ;PARITY ERROR

                                ;XCSR
                                ;
000200                          RDY=    BIT7            ;XMIT RDY
000100                          IE=     BIT6            ;XMIT IE
000001                          BREAK=  BIT0            ;BREAK
```

```
                                ;;*****************************************************************
                                ;*      SYNC MODEM BIT DEFINITIONS
                                ;;*****************************************************************

                                ;RCSR
                                ;
100000                          DSC=    BIT15           ;DATA SET CHANGE
040000                          RING=   BIT14           ;RING
020000                          CTS=    BIT13           ;CLEAR TO SEND
010000                          CDET=   BIT12           ;CARRIER DETECTED
004000                          RACT=   BIT11           ;RECVR ACTIVE
002000                          SREC=   BIT10           ;SECONDARY RECD/SUPERVISORY RECD
001000                          DSRDY=  BIT9            ;DATA SET RDY
000400                          STSYN=  BIT8            ;STRIP SYNC
000200                          DONE=   BIT7            ;RECVR DONE
000100                          IE=     BIT6            ;RECVR IE
000040                          DSIE=   BIT5            ;DATA SET IE
000020                          SRSYN=  BIT4            ;SEARCH SYNC
000010                          SXMIT=  BIT3            ;SECONDARY XMIT/SUPERV XMIT
000004                          RTS=    BIT2            ;REQ TO SEND
000002                          DTR=    BIT1            ;DATA TERMINAL RDY

                                ;RBUF
                                ;
100000                          ERR=    BIT15           ;ERROR
040000                          ORERR=  BIT14           ;OVERRUN ERROR
010000                          PARERR= BIT12           ;PARITY ERROR

                                ;PARCSR  PARAMETER CONT REG
                                ;
000000                          SYNC2=  0               ;2 SYNC CHARS (DEFAULT)
040000                          SYNC1=  BIT14           ;1

                                ;BITS 10-11     WORD LENGTH
                                ;
000000                          CHR5=   0               ;5 BITS/CHAR
002000                          CHR6=   2000            ;6
004000                          CHR7=   4000            ;7
006000                          CHR8=   6000            ;8 (DEFAULT)

                                ;BITS 8-9 PARITY CONTROL
                                ;
001400                          ENVPAR= 1400            ;ENABLE EVEN PARITY
001000                          ODDPAR= 1000            ;ENABLE ODD PARITY (DEFAULT)

                                ;XCSR
                                ;
100000                          DNA=    BIT15           ;DATA NOT AVAIL
010000                          MM=     BIT12           ;MAINT MODE
004000                          MCLK=   BIT11           ;MAINT CLOCK
000400                          MR=     BIT8            ;MASTER RESET
000200                          RDY=    BIT7            ;XMIT RDY
000100                          IE=     BIT6            ;XMIT IE
000040                          DNAIE=  BIT5            ;DATA NOT AVAIL IE
000020                          SEND=   BIT4            ;SEND
000010                          HFDUP=  BIT3            ;1=HALF DUPLEX, 0=FULL DUPLEX (DEFAULT = 0 FOR TESTS)
```

```
                                ;;*****************************************************************
                                ;*      TU58 BIT DEFINITIONS
                                ;;*****************************************************************

                                ;RCSR
                                ;
000200                          RDONE=  BIT7            ;RECVR DONE
000100                          IE=     BIT6            ;RECVR IE

                                ;TXCS
                                ;
000200                          RDY=    BIT7            ;XMIT RDY
000100                          IE=     BIT6            ;XMIT IE
000001                          BREAK=  BIT0            ;XMIT BREAK

                                ;LEVEL 1 CODES (FLAG BYTE)
                                ;
000020                          TCONT=  20              ;CONTINUE
000004                          TINIT=  4               ;INIT PROTOCOL
000001                          TDATA=  1               ;DATA PACKET
000002                          TCMDPK= 2               ;COMMAND PACKET
000012                          TMSG=   12              ;COMMAND PACKET SIZE
000200                          TMSIZ=  128.            ;DATA PACKET SIZE
000010                          TRTRY=  10              ;RETRY COUNTER FOR ERRORS
001000                          TWC=    512.            ;READ/WRITE WORD COUNT

                                ;LEVEL 2 CODES (OPCODE)
                                ;
000000                          TNOP=   0               ;NO OPERATION
000001                          INITT=  1               ;INITIALIZE
000002                          TREAD=  2               ;READ FUNCTION
000003                          TWRITE= 3               ;WRITE FUNCTION
000007                          TDIAGN= 7               ;DIAGNOSE FUNCTION
000100                          TENDPK= 100             ;END PACKET FROM PERIPHERAL

                                .SBTTL  TRAP CATCHER
 (1)
 (1)    000000                          .=0
 (1)                            ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
 (1)                            ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
 (1)                            ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
 (1)    000174                  .=174
 (1)  000174  000000            DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
 (1)  000176  000000            SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER
                                ;;*****************************************************************
                                ;*      SWITCH REGISTER
                                ;;*****************************************************************

000174                          .=174
000174  000000                 DISPREG:        .WORD   0       ;SOFTWARE DISPLAY REG
000176  000000                 SWREG:  .WORD 0                 ;SOFTWARE SWITCH REG


000200                          .=200
```

```
  6918  000200  000137  001716                    JMP     START           ;USE ONLY ONCE. WILL BE OVERLAID BY
  6919                                                                      ;PRINTER VECTOR ADDR.
  6920          000240                            .=240
  6921  000240  000137  001716                    JMP     START           ;RESTART ADDR
  6922
  6923          001000                    .=1000
  6924                                    .SBTTL  APT PARAMETER BLOCK
   (1)
   (2)                                    ;;**************************************************************
   (1)                                    ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
   (2)                                    ;;**************************************************************
   (1)          001000                            .$X=.   ;;SAVE CURRENT LOCATION
   (1)          000024                            .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
   (1)  000024  000200                            200     ;;FOR APT START UP
   (1)          000044                            .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
   (1)  000044  001000                            $APTHDR ;;POINT TO APT HEADER BLOCK
   (1)          001000                            .=.$X   ;;RESET LOCATION COUNTER
   (2)                                    ;;**************************************************************
   (1)                                    ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
   (1)                                    ;INTERFACE SPEC.
   (1)
   (1)  001000                            $APTHD:
   (1)  001000  000000                    $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
   (1)  001002  001170                    $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
   (1)  001004  001166                    $TSTM:  .WORD   630.    ;;RUN TIM OF LONGEST TEST
   (1)  001006  001166                    $PASTM: .WORD   630.    ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
   (1)  001010  000000                    $UNITM: .WORD   0       ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
   (1)  001012  000030                            .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
  6925                                    .SBTTL  ACT11 HOOKS
   (1)
   (2)                                    ;;**************************************************************
   (1)                                    ;HOOKS REQUIRED BY ACT11
   (1)          001014                            $SVPC=.                 ;SAVE PC
   (1)          000046                            .=46
   (1)  000046  011560                            $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
   (1)          000052                            .=52
   (1)  000052  000000                            .WORD   0               ;;2)SET LOC.52 TO ZERO
   (1)          001014                            .=$SVPC                 ;; RESTORE PC
```

```
 6942                                   .SBTTL  COMMON TAGS
  (1)
  (2)                                   ;;*****************************************************************
  (1)                                   ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
  (1)                                   ;*USED IN THE PROGRAM.
  (1)
  (1)           001100                          .=1100
  (1)  001100                           $CMTAG:                         ;;START OF COMMON TAGS
  (1)  001100  000000                           .WORD   0
  (1)  001102     000                   $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
  (1)  001103     000                   $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
  (1)  001104  000000                   $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
  (1)  001106  000000                   $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
  (1)  001110  000000                   $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
  (1)  001112  000000                   $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
  (1)  001114     000                   $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
  (1)  001115     001                   $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
  (1)  001116  000000                   $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
  (1)  001120  000000                   $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
  (1)  001122  000000                   $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
  (1)  001124  000000                   $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
  (1)  001126  000000                   $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
  (1)  001130  000000                           .WORD   0               ;;RESERVED--NOT TO BE USED
  (1)  001132  000000                           .WORD   0
  (1)  001134     000                   $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
  (1)  001135     000                   $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
  (1)  001136  000000                           .WORD   0
  (1)  001140  177570                   SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
  (1)  001142  177570                   DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
  (1)  001144  177560                   $TKS:   177560                  ;;TTY KBD STATUS
  (1)  001146  177562                   $TKB:   177562                  ;;TTY KBD BUFFER
  (1)  001150  177564                   $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
  (1)  001152  177566                   $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
  (1)  001154     000                   $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
  (1)  001155     002                   $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
  (1)  001156     012                   $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
  (1)  001157     000                   $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
  (1)  001160  177607  000377           $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
  (1)  001164     077                   $QUES:  .ASCII  /?/             ;;QUESTION MARK
  (1)  001165     015                   $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
  (1)  001166  000012                   $LF:    .ASCIZ  <12>            ;;LINE FEED
  (2)                                   ;;*****************************************************************
  (2)                                   .SBTTL  APT MAILBOX-ETABLE
  (2)
  (3)                                   ;;*****************************************************************
  (2)                                   .EVEN
  (2)  001170                           $MAIL:                          ;;APT MAILBOX
  (2)  001170  000000                   $MSGTY: .WORD   AMSGTY           ;;MESSAGE TYPE CODE
  (2)  001172  000000                   $FATAL: .WORD   AFATAL           ;;FATAL ERROR NUMBER
  (2)  001174  000000                   $TESTN: .WORD   ATESTN           ;;TEST NUMBER
  (2)  001176  000000                   $PASS:  .WORD   APASS            ;;PASS COUNT
  (2)  001200  000000                   $DEVCT: .WORD   ADEVCT           ;;DEVICE COUNT
  (2)  001202  000000                   $UNIT:  .WORD   AUNIT            ;;I/O UNIT NUMBER
  (2)  001204  000000                   $MSGAD: .WORD   AMSGAD           ;;MESSAGE ADDRESS
  (2)  001206  000000                   $MSGLG: .WORD   AMSGLG           ;;MESSAGE LENGTH
  (2)  001210                           $ETABLE:                        ;;APT ENVIRONMENT TABLE
```

```
(2)  001210     000                $ENV:    .BYTE   AENV    ;;ENVIRONMENT BYTE
(2)  001211     000                $ENVM:   .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
(2)  001212  000000                $SWREG:  .WORD   ASWREG  ;;APT SWITCH REGISTER
(2)  001214  000000                $USWR:   .WORD   AUSWR   ;;USER SWITCHES
(2)  001216  000000                $CPUOP:  .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
(2)                                ;*                       BITS 15-11=CPU TYPE
(2)                                ;*                              11/04=01,11/05=02,11/20=03,11/40=04,11/45-05
(2)                                ;*                              11/70=06,PDQ=07,Q=10
(2)                                ;*                       BIT 10=REAL TIME CLOCK
(2)                                ;*                       BIT  9=FLOATING POINT PROCESSOR
(2)                                ;*                       BIT  8=MEMORY MANAGEMENT
(2)  001220     000                $MAMS1:  .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
(2)  001221     000                $MTYP1:  .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
(2)                                ;*                       MEM.TYPE BYTE   --  (HIGH BYTE)
(2)                                ;*                              900 NSEC CORE=001
(2)                                ;*                              300 NSEC BIPOLAR=002
(2)                                ;*                              500 NSEC MOS=003
(2)  001222  000000                $MADR1:  .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
(2)                                ;*                         MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPF" ABOVE
(2)  001224     000                $MAMS2:  .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
(2)  001225     000                $MTYP2:  .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
(2)  001226  000000                $MADR2:  .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
(2)  001230     000                $MAMS3:  .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
(2)  001231     000                $MTYP3:  .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
(2)  001232  000000                $MADR3:  .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
(2)  001234     000                $MAMS4:  .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
(2)  001235     000                $MTYP4:  .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
(2)  001236  000000                $MADR4:  .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
(2)  001240  000300                $VECT1:  .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
(2)  001242  000000                $VECT2:  .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
(2)  001244  176500                $BASE:   .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
(2)  001246  000017                $DEVM:   .WORD   ADEVM   ;;DEVICE MAP
(2)  001250                        $ETEND:
(2)                                .MEXIT
(3)  001250     001                TYPFLG:  .BYTE   1               ;CLEAR WHEN DISPLAY PROCESS IS ACTIVE
(3)                                                                 ; (MORE COMMENTS AT "$TYPE")
(3)  001251     000                ESCFLG:  .BYTE   0               ;SET TO 1 WHEN DISPLAY PROCESS IS TYPING AN ESCAPE SEQUE
(3)  001252     000                GFLAG:   .BYTE   0               ;SET TO 1 WHEN CONTROL G RECEIVED WHILE IN TYPE ROUTINE
(3)  001253     000                XFLAG:   .BYTE   0               ;SET TO 1 IF XOFF HAS BEEN RECEIVED
(3)  001254  000000                VTDONE:  .WORD   0               ;SET TO 1 WHEN DISPLAY PROCESS FINISHES A PASS
(3)  001256  000000                SERTTL:  .WORD   0               ;TOTAL SOFT ERROR COUNT
(3)  001260  000000                SERUN0:  .WORD   0               ;SOFT ERROR COUNTER UNIT 0
(3)  001262  000000                SERUN1:  .WORD   0               ;SOFT ERROR COUNTER UNIT 1
(3)  001264  000000                KILFLG:  .WORD   0               ;EOP DEVICE KILL FLAG
(3)  001266  000000                DEVACT:  .WORD   0               ;DEVICE ACTIVE FLAG
(3)  001270  000000                DELFLG:  .WORD   0               ;VIDEO PAUSE CONTROL FLAG
(3)  001272  000000                DELCNT:  .WORD   0               ;VIDEO PAUSE CONTROL COUNT
(3)  001274  000000                DEVCHG:  .WORD   0               ;CHANGE DEVICE MAP VIA KBD IF SET
```

```
  (1)                                   .SBTTL  ERROR POINTER TABLE
  (1)
  (1)                                   ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
  (1)                                   ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
  (1)                                   ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
  (1)                                   ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
  (1)                                   ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:
  (1)
  (1)                                   ;*      EM              ;;POINTS TO THE ERROR MESSAGE
  (1)                                   ;*      DH              ;;POINTS TO THE DATA HEADER
  (1)                                   ;*      DT              ;;POINTS TO THE DATA
  (1)                                   ;*      DF              ;;POINTS TO THE DATA FORMAT
  (1)
  (1)
  (1)  001276                           $ERRTB:
6943                                    ;;          GLOBAL DATA
6944
6945  001276  017171  020545  021254    ;ERR 01 - MEMORY TIMEOUT ON READ (0-$LSTAD)
      001304  000000                            .WORD   EM1,DH2,DT2,0
6946
6947  001306  017171  020545  021254    ;ERR 02 - MEMORY TIMEOUT ON WRITE [$LSTAD - (MAXMEM-LOADER AREA)]
      001314  000000                            .WORD   EM1,DH2,DT2,0
6948
6949  001316  017210  020571  021264    ;ERR 03 - MEMORY DATA COMPARE ERROR [$LSTAD - (MAXMEM-LOADER AREA)]
      001324  000000                            .WORD   EM2,DH3,DT3,0
6950
6951  001326  017171  020545  021254    ;ERR 04 - MEMORY TIMEOUT ON WRITE (160000 - 167776)
      001334  000000                            .WORD   EM1,DH2,DT2,0
6952
6953  001336  017210  020571  021264    ;ERR 05 - MEMORY DATA COMPARE ERROR (160000 - 167776)
      001344  000000                            .WORD   EM2,DH3,DT3,0
6954
6955  001346  017242  020526  021246    ;ERR 06 - SYNCHRONOUS COMM DID NOT RECEIVE SYNC CHARACTER
      001354  000000                            .WORD   EM3,DH1,DT1,0
6956
6957  001356  017306  020633  021300    ;ERR 07 - PRINTER STATUS ERROR
      001364  000000                            .WORD   EM4,DH4,DT4,0
6958
6959  001366  017333  020664  021310    ;ERR 10 - CLUSTER TERMINAL #1 DATA COMPARE ERROR
      001374  000000                            .WORD   EM5,DH5,DT5,0
6960
6961  001376  017371  020664  021322    ;ERR 11 - CLUSTER TERMINAL #2 DATA COMPARE ERROR
      001404  000000                            .WORD   EM6,DH5,DT6,0
6962
6963  001406  017427  020664  021334    ;ERR 12 - CLUSTER TERMINAL #3 DATA COMPARE ERROR
      001414  000000                            .WORD   EM7,DH5,DT7,0
6964
6965  001416  017465  020664  021346    ;ERR 13 - ASYNCHRONOUS COMM DATA COMPARE ERROR
      001424  000000                            .WORD   EM8,DH5,DT8,0
6966
6967  001426  017516  020664  021346    ;ERR 14 - SYNCHRONOUS COMM DATA COMPARE ERROR
      001434  000000                            .WORD   EM9,DH5,DT8,0
6968
6969  001436  017546  020526  021246    ;ERR 15 - CLOCK HUNG
      001444  000000                            .WORD   EM23,DH1,DT1,0
6970                                    ;ERR 16 - PRINTER HUNG
```

```
 6971  001446  017557  020633  021300          .WORD   EM24,DH4,DT4,0
       001454  000000
 6972                                  ;ERR 17 - CLUSTER TERMINAL #1 HUNG
 6973  001456  017574  020526  021246          .WORD   EM25,DH1,DT1,0
       001464  000000
 6974                                  ;ERR 20 - CLUSTER TERMINAL #2 HUNG
 6975  001466  017611  020526  021246          .WORD   EM26,DH1,DT1,0
       001474  000000
 6976                                  ;ERR 21 - CLUSTER TERMINAL #3 HUNG
 6977  001476  017626  020526  021246          .WORD   EM27,DH1,DT1,0
       001504  000000
 6978                                  ;ERR 22 - SYNCHRONOUS COMM HUNG
 6979  001506  017643  020526  021246          .WORD   EM28,DH1,DT1,0
       001514  000000
 6980                                  ;ERR 23 - ASYNCHRONOUS COMM HUNG
 6981  001516  017662  020526  021246          .WORD   EM29,DH1,DT1,0
       001524  000000
 6982                                  ;ERR 24 - SYNCHRONOUS COMM DATA AVAILABLE NOT SET (SPARE ERROR LOCATION)
 6983  001526  017702  020526  021246          .WORD   EM32,DH1,DT1,0
       001534  000000
 6984                                  ;ERR 25 - NO RESPONSE FROM THE VT100
 6985  001536  020076  020526  021246          .WORD   EM125,DH1,DT1,0
       001544  000000
 6986                                  ;ERR 26 - SYNCHRONOUS COMM - RECEIVER DONE NOT SET
 6987  001546  020006  020526  021246          .WORD   EM34,DH1,DT1,0
       001554  000000
 6988                                  ;ERR 27 - ROM TIMED OUT AT ADDRESS 170000
 6989  001556  020045  020526  021246          .WORD   EM127,DH1,DT1,0
       001564  000000
 6990                                  ;ERR 30 - VT100 REPORTED SELF-TEST FAILURE
 6991  001566  020125  020526  021246          .WORD   EM130,DH1,DT1,0
       001574  000000
 6992                                  ;ERR 31 - OPTION PRESENT (STP) NOT DETECTED BY THE VT100
 6993  001576  020166  020721  021360          .WORD   EM131,DH31,DT31,0
       001604  000000
 6994                                  ;ERR 32 - UNRECOGNIZED RESPONSE FROM VT100 (ESC SEQ NOT EQUAL EXPECTED)
 6995  001606  020241  020526  021246          .WORD   EM132,DH1,DT1,0
       001614  000000
 6996                                  ;ERR 33 - SYNCHRONOUS COMM MODEM LOOPBACK SIGNALS NOT SET IN CSR
 6997  001616  020302  020664  021370          .WORD   EM133,DH5,DT33,0
       001624  000000
 6998                                  ;ERR 34 - VT100 HUNG
 6999  001626  020063  020526  021246          .WORD   EM134,DH1,DT1,0
       001634  000000
 7000                                  ;ERR 35 - ASYNCHRONOUS COMM MODEM LOOPBACK SIGNALS NOT SET IN CSR
 7001  001636  020362  020664  021370          .WORD   EM140,DH5,DT33,0
       001644  000000
 7002                                  ;ERR 36 - TU58 DEVICE ERROR
 7003  001646  020443  020750  021402          .WORD   EM135,DH32,DT34,0
       001654  000000
 7004                                  ;ERR 37 - TU58 WRITE ERROR (HARD ERROR)
 7005  001656  020465  021020  021416          .WORD   EM136,DH33,DT35,0
       001664  000000
 7006                                  ;ERR 40 - TU58 READ ERROR (HARD ERROR)
 7007  001666  020506  021127  021442          .WORD   EM137,DH34,DT36,0
       001674  000000
```

```
 7008                                          ;ERR 41 - TU58 WRITE ERROR (SOFT ERROR - SUCCESS WITH RETRIES)
 7009  001676  020465  021020  021416                   .WORD   EM136,DH33,DT35,0
       001704  000000
 7010                                          ;ERR 42 - TU58 READ ERROR (SOFT ERROR - SUCCESS WITH RETRIES)
 7011  001706  020506  021127  021442                   .WORD   EM137,DH34,DT36,0
       001714  000000
```

```
 7013                                          .SBTTL  PROGRAM
 7014
 7015  001716  012706  001100          START:  MOV     #STACK,SP       ;SET UP STACK POINTER
 7035  001722  012746  000340                  MOV     #PR7,-(SP)      ;;PUT NEW PS ON STACK
  (1)  001726  012746  001734                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
  (1)  001732  000002                          RTI                     ;;POP NEW PC AND PS
  (1)  001734                          64$:
 7036  001734  122737  000001  001210          CMPB    #APTENV,$ENV    ;CHECK IF RUNNING UNDER APT
 7037  001742  001401                          BEQ     START1          ;IF YES THEN SKIP RESET INSTRUCTION
 7038  001744  000005                          RESET                   ;CLEAR THE WORLD !!!!!
 7039  001746  012737  013462  000060  START1: MOV     #TKSRV1,TKVEC   ;SETUP KEYBOARD INTERRUPT VECTOR
 7040  001754  012737  000340  000062          MOV     #PR7,TKVEC+2
 7041  001762  105737  177565                  TSTB    @#177565        ;TEST ODD BYTE ON CONSOLE IN CASE LOADED BY APT.
 7042                                                                  ;THIS WILL RESTORE COMM/CONSOLE ADDRESSES TO NORMAL.
 7044                                          .SBTTL  INITIALIZE THE COMMON TAGS
  (1)                                         ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
  (1)  001766  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
  (1)  001772  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
  (1)  001774  022706  001140                  CMP     #SWR,R6 ;;DONE?
  (1)  002000  001374                          BNE     .-6             ;;LOOP BACK IF NO
  (1)  002002  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
  (1)                                         ;;INITIALIZE A FEW VECTORS
  (1)  002006  012737  025570  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
  (1)  002014  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
  (1)  002022  012737  027112  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
  (1)  002030  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
  (2)                                         ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
  (2)                                         ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
  (2)  002036  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
  (2)  002042  012737  002076  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
  (2)  002050  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
  (2)  002056  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
  (2)  002064  022777  177777  177046          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
  (2)  002072  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
  (2)                                                                  ;;AND  THE HARDWARE SWR IS NOT = -1
  (2)  002074  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
  (2)  002076  012716  002104          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
  (2)  002102  000002                          RTI
  (2)  002104  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
  (2)  002112  012737  000174  001142          MOV     #DISPREG,DISPLAY
  (2)  002120  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
  (1)
  (2)  002124  005037  001176                  CLR     $PASS           ;;CLEAR PASS COUNT
  (2)  002130  132737  000200  001211          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
  (2)  002136  001403                          BEQ     67$             ;;YES,USE NON-APT SWITCH
  (2)  002140  012737  001212  001140          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
  (2)  002146                          67$:
 7045
 7046  002146  012700  001250                  MOV     #TYPFLG,R0      ;CLEAR FLAGS
 7047  002152  005020                  1$:     CLR     (R0)+           ;CLEAR THE LOCATION
 7048  002154  022700  001276                  CMP     #$ERRTB,R0      ;CHECK TO SEE IF DONE
 7049  002160  001374                          BNE     1$              ;CLEAR NEXT LOCATION IF NOT DONE
 7050  002162  105037  014344                  CLRB    XIEFLG
 7051  002166  012737  000777  007040          MOV     #777,BLKNUM
 7052
 7053                                          ;TYPE THE PROGRAM NAME--INITIALIZE VT100 ATTRIBUTES
```

```
7054  002174  112737  000001  001250          MOVB    #1,TYPFLG       ;SET "TYPE" UP TO NOT NEED TO USE ESCAPE
7055                                                                    ;SEQUENCES UNTIL VT100 TESTING STARTS.
7056  002202  104401  015670                  TYPE,   TITLE           ;INITIALIZE SCREEN AND TYPE TITLE
7057  002206  005737  000042                  TST     @#42            ;ARE WE RUNNING UNDER XXDP/ACT?
7058  002212  001023                          BNE     2$              ;BRANCH IF YES
7059  002214  122737  000001  001210          CMPB    #APTENV,$ENV    ;ARE WE RUNNING UNDER APT?
7060  002222  001417                          BEQ     2$              ;BRANCH IF YES
7061  002224  023727  001140  000176          CMP     SWR,#SWREG      ;SOFTWARE SWITCH REGISTER SELECTED??
7062  002232  001031                          BNE     3$              ;BRANCH IF NOT
7063  002234  104406                          GTSWR                   ;GET SOFTWARE SWITCH REGISTER SETTINGS
7064  002236  032777  040000  176674          BIT     #BIT14,@SWR     ;CHECK IF DEVICE MAP IS TO BE CHANGED
7065  002244  001424                          BEQ     3$              ;IF 0 DO NOT CHANGE DEVICE MAP
7066  002246  005237  001274                  INC     DEVCHG          ;SET SOFTWARE FLAG
7067  002252  104406                          GTSWR                   ;GO GET NEW VALUE
7068  002254  005037  001274                  CLR     DEVCHG          ;CLEAR DEVICE MAP CHANGE FLAG
7069  002260  000416                          BR      3$
7070  002262  112737  000001  001134  2$:     MOVB    #1,$AUTOB       ;SET AUTO-MODE INDICATOR
7071  002270  022737  011560  000042          CMP     #$ENDAD,@#42    ;CHECK IF ACT11
7072  002276  001407                          BEQ     3$              ;IF YES ASSUME SCRATCH DRIVES IN 0 & 1
7073  002300  122737  000020  000041          CMPB    #20,@#41        ;CHECK IF XXDP CHAIN MODE
7074  002306  001003                          BNE     3$              ;IF NOT CHAIN MODE THEN CONTINUE
7075  002310  052737  000400  001246          BIS     #BIT8,$DEVM     ;DROP LOAD MEDIA FROM THE DEVICE MAP
7076  002316  004737  011602          3$:     JSR     PC,SIZE         ;SEE WHO IS ON THE SYSTEM
7077  002322  123727  001210  000001          CMPB    $ENV,#APTENV    ;ARE WE RUNNING UNDER APT?
7078  002330  001421                          BEQ     LOOP            ;BR IF YES & DONT HALT
7079  002332  005737  000042                  TST     @#42            ;CHECK IF LOADED UNDER XXDP/ACT11
7080  002336  001016                          BNE     LOOP            ;IF YES SKIP WARNING AND HALT MESSAGE
7081  002340  005737  012620                  TST     TUPRES          ;CHECK IF TU58 IS PRESENT
7082  002344  001413                          BEQ     LOOP            ;TU58 IS NOT PRESENT
7083  002346  032737  000400  001246          BIT     #BIT8,$DEVM     ;TU58 TAPE UNIT 0 THERE?
7084  002354  001404                          BEQ     4$              ;BR IF YES
7085  002356  032737  001000  001246          BIT     #BIT9,$DEVM     ;TU58 TAPE UNIT 1 THERE?
7086  002364  001003                          BNE     LOOP            ;BR IF NO
7087  002366  104401  016714          4$:     TYPE    ,WARNING        ;INSERT SCRATCH TU58 CASSETTES
7088  002372  000000                          HALT
7089  002374  012706  001100          LOOP:   MOV     #STACK,SP       ;LOOP HERE AFTER EOP & RESET STACK
7090  002400  004737  013270                  JSR     PC,TIMER1       ;TIMER TO ALLOW 'P' TO PRINT BEFORE RESET
7091
7092  002404  000005                          RESET                   ;CLEAR ALL INTERRUPT ENABLES
7093  002406  012737  000102  000100          MOV     #CLKVEC+2,CLKVEC ;SETUP CLOCK TRAP CATCHER
7094  002414  005037  000102                  CLR     CLKVEC+2        ;
7095
7096  002420  005037  001264                  CLR     KILFLG          ;CLEAR EOP DEVICE KILL FLAG
7097  002424  005037  001266                  CLR     DEVACT          ;CLEAR DEVICE ACTIVE FLAG
7098
7099  002430                          5$:
 (1)  002430  012746  000000                  MOV     #PR0,-(SP)      ;;PUT NEW PS ON STACK
 (1)  002434  012746  002442                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
 (1)  002440  000002                          RTI                     ;;POP NEW PC AND PS
 (1)  002442                          64$:
7100
7101  002442  032737  000010  001246          BIT     #BIT3,$DEVM     ;CHECK IF EXTERNAL LOOPBACK
7102  002450  001007                          BNE     1$              ;IF NOT SETUP FOR INTERNAL LOOPBACK
7103  002452  042737  000002  176610          BIC     #DTR,@MRC       ;TOGGLE DTR TO SETUP COMM PORT
7104  002460  052737  000002  176610          BIS     #DTR,@MRC       ;
7105  002466  000406                          BR      2$              ;GO SETUP COMM PORT
```

```
 7106  002470  042737  000006  176610  1$:     BIC     #<RTS!DTR>,AMRC ;TOGGLE DTR AND RTS TO SETUP COMM PORT
 7107  002476  052737  000006  176610          BIS     #<RTS!DTR>,AMRC ;
 7108  002504  012737  037014  177420  2$:     MOV     #<AMOD!B9600!CHAR8>,PARAM ;SETUP COMM PARAMETER REGISTER
 7109  002512  005737  176610                  TST     AMRC            ;CLEAR DSI BIT IF SET
 7110  002516  004737  013270                  JSR     PC,TIMER1       ;TIMER TO ALLOW PREVIOUS XFERS TO FINISH
 7111  002522  122737  000001  001210          CMPB    #APTENV,$ENV    ;CHECK TO SEE IF APT
 7112  002530  001011                          BNE     3$              ;IF NOT APT SET KBD INT ENA ACTIVE
 7113  002532  005737  001176                  TST     $PASS           ;CHECK IF FIRST PASS
 7114  002536  001406                          BEQ     3$              ;IF FIRST PASS SET KBD INT ENA
 7115  002540  105037  001135                  CLRB    $INTAG          ;SET NON-INTERRUPT MODE INDICATOR
 7116  002544  042777  000100  176372          BIC     #IE,@$TKS       ;CLEAR RECEIVER INT ENABLE FOR KEYBOARD
 7117  002552  000406                          BR      4$              ;GO CLEAR PASS ERRORS
 7118  002554  112737  000001  001135  3$:     MOVB    #1,$INTAG       ;SET INTERRUPT MODE INDICATOR
 7119  002562  052777  000100  176354          BIS     #IE,@$TKS       ;ALLOW KEYBOARD INTERRUPTS
 7120  002570  005037  026332          4$:     CLR     PERR            ;PASS ERR COUNT FOR EOP TYPEOUT
 7121  002574  005037  026334                  CLR     PSERR           ;PASS SOFT ERR COUNT FOR EOP TYPEOUT
```

```
                                ;;*****************************************************************
                                ;       MEMORY TESTS
                                ;
                                ;MEMORY FROM 0 TO THE LAST LOC OF PROGRAM (LSTAD) IS TESTED FOR TIMEOUT.
                                ;MEMORY FROM 'LSTAD' TO THE BOTTOM OF THE XXDP MONITOR/ABS LOADER
                                ;IS TESTED BY A PASS OF A 1010 PATT FOLLOWED BY A PASS OF 0101 PATTERN.
                                ;IF THE SYSTEM HAS A 28K MEMORY, 28K TO 30K WILL BE TESTED SIMILARLY.
                                ;;*****************************************************************

002600  032737  000020  001246  MEMTST: BIT     #BIT4,$DEVM     ;CHECK IF MEMORY TEST DROPPED
002606  001402                          BEQ     7$              ;IF NOT GO DO THE MEMORY TEST
002610  000137  003244                  JMP     VTTST           ;GO CHECK FOR VT100 TESTING
002614  012737  013420  000004  7$:     MOV     #INTSRV,ERRVEC  ;SETUP TIMEOUT TRAP ADDR
002622  012737  000340  000006          MOV     #PR7,ERRVEC+2

002630  013703  012640                  MOV     MAXMEM,R3
002634  162703  000300                  SUB     #300,R3         ;TEST ONLY AS FAR AS ABS LOADER IF NOT XXDP
002640  005737  000042                  TST     @#42            ;XXDP OR ACT?
002644  001402                          BEQ     5$              ;BRANCH IF NOT
002646  162703  005370                  SUB     #<1500.*2>-300,R3 ;TEST ONLY TO BOTTOM OF XXDP MONITOR
002652  005004                  5$:     CLR     R4              ;ADDR POINTER
002654  005037  013460          1$:     CLR     INTFLG
002660  005714                          TST     (R4)            ;TEST LOCS 0 THRU END OF PGM.
002662  005737  013460                  TST     INTFLG          ;TIMEOUT?
002666  001403                          BEQ     2$              ;BR IF NO
002670  010437  003242                  MOV     R4,ADDR         ;FOR ERR TYP
002674  104001                          ERROR+1                 ;TIMEOUT ON READ
002676  062704  000002          2$:     ADD     #2,R4           ;BUMP ADDR
002702  020427  031666                  CMP     R4,#LSTAD       ;AT END?
002706  001362                          BNE     1$              ;BR IF NO

002710  005037  003234                  CLR     MEMCT
002714  012737  125252  003240          MOV     #125252,PAT     ;DATA PATT FOR 1'ST PASS
002722  012704  031666          8$:     MOV     #LSTAD,R4       ;ADDR POINTER. R/W LOCS LSTAD THRU
                                                                ;BOT OF RT11 OR BOT OF ABS LOADER
002726  005037  013460          3$:     CLR     INTFLG
002732  013714  003240                  MOV     PAT,(R4)        ;WRITE
002736  005737  013460                  TST     INTFLG          ;TIMEOUT?
002742  001403                          BEQ     4$              ;BR IF NO
002744  010437  003242                  MOV     R4,ADDR         ;FOR ERR TYP
002750  104002                          ERROR+2                 ;TIMEOUT ON WRITE
002752  011437  003236          4$:     MOV     (R4),MEMHLD     ;READ
002756  023737  003236  003240          CMP     MEMHLD,PAT      ;COMPARE
002764  001403                          BEQ     6$
002766  010437  003242                  MOV     R4,ADDR         ;FOR ERR TYP
002772  104003                          ERROR+3                 ;COMPARE ERROR

002774  062704  000002          6$:     ADD     #2,R4           ;BUMP POINTER
003000  020403                          CMP     R4,R3           ;AT BOT OF ABS LOADER?
003002  001351                          BNE     3$              ;BR IN NO
003004  005737  003234                  TST     MEMCT
003010  001006                          BNE     9$
003012  005237  003234                  INC     MEMCT
003016  012737  052525  003240          MOV     #052525,PAT     ;DATA PATT FOR 2'ND PASS
003024  000736                          BR      8$              ;REPEAT
```

```
 7179  003026  023727  012640  157776  9$:     CMP     MAXMEM,#157776  ;DO WE HAVE 28K?
 7180  003034  001047                          BNE     15$             ;BR IF NO & EXIT
 7181
 7182  003036  012737  125252  003240          MOV     #125252,PAT     ;DATA PATT FOR 1'ST PASS OF HI MEM
 7183  003044  012704  160000          10$:    MOV     #160000,R4      ;ADDR PTR TO TOP OF 28K
 7184  003050  005037  013460          11$:    CLR     INTFLG
 7185  003054  013714  003240                  MOV     PAT,(R4)        ;WRITE
 7186  003060  005737  013460                  TST     INTFLG
 7187  003064  001403                          BEQ     12$
 7188  003066  010437  003242                  MOV     R4,ADDR         ;FOR ERR TYP
 7189  003072  104004                          ERROR+4                 ;TIMEOUT
 7190  003074  011437  003236          12$:    MOV     (R4),MEMHLD     ;READ
 7191  003100  023737  003236  003240          CMP     MEMHLD,PAT      ;COMPARE
 7192  003106  001403                          BEQ     14$
 7193  003110  010437  003242                  MOV     R4,ADDR         ;FOR ERR TYP
 7194  003114  104005                          ERROR+5                 ;COMPARE ERROR
 7195
 7196  003116  062704  000002          14$:    ADD     #2,R4
 7197  003122  020427  167776                  CMP     R4,#167776      ;AT END OF 30K?
 7198  003126  001350                          BNE     11$             ;BR IF NO
 7199
 7200  003130  005237  003234                  INC     MEMCT
 7201  003134  023727  003234  000003          CMP     MEMCT,#3
 7202  003142  001404                          BEQ     15$
 7203  003144  012737  052525  003240          MOV     #052525,PAT     ;DATA PATT FOR 2'ND HALF OF HI MEM
 7204  003152  000734                          BR      10$             ;REPEAT
 7205
 7206  003154  005037  013460          15$:    CLR     INTFLG          ;CLEAR FLAG TO DETECT INTERRUPT
 7207  003160  005737  170000                  TST     @#170000        ;TEST ROM SPACE
 7208  003164  005737  013460                  TST     INTFLG          ;WAS THERE A TRAP?
 7209  003170  001401                          BEQ     16$             ;BRANCH IF NOT
 7210  003172  104027                          ERROR+27                ;ROM NOT PRESENT
 7211
 7212  003174  012737  000006  000004  16$:    MOV     #ERRVEC+2,ERRVEC ;RESTORE TIMEOUT VECTOR
 7213  003202  005037  000006                  CLR     ERRVEC+2
 7214
 7215  003206  032777  010000  175724          BIT     #BIT12,@SWR     ;SKIP TYPEOUT IF NOT SET
 7216  003214  001413                          BEQ     VTTST
 7217  003216  104401  017057                  TYPE    ,MEMORY
 7218  003222  104401  017074                  TYPE    ,DUN
 7219  003226  004737  013376                  JSR     PC,GFLCHK       ;CHECK IF ^G TYPED WHILE TYPING
 7220  003232  000404                          BR      VTTST
 7221
 7222  003234  000000                  MEMCT:  0               ;0 = MEM FROM LSTAD TO MONITOR/ABS LOADER W/ 125252 PATT
 7223                                                          ;1 = SAME WITH 052525 PATT
 7224                                                          ;1 = MEM FROM 28K TO 30K WITH 125252 PAT
 7225                                                          ;2 = SAME WITH 052525 PATT
 7226                                                          ;3 = EXIT
 7227
 7228  003236  000000                  MEMHLD: 0               ;PUT MEMORY READ HERE
 7229  003240  000000                  PAT:    0               ;PATT TO BE WRITTEN & READ
 7230  003242  000000                  ADDR:   0               ;ADDR UNDER TEST
```

```
                                        ;;*****************************************************************
                                        ;       START VT100
                                        ;;*****************************************************************

003244  032737  000100  00'246  VTTST:  BIT     #BIT6,$DEVM     ;DROP TEST?
003252  001142                          BNE     CLKTST          ;BRANCH IF YES
003254  122737  000001  001210          CMPB    #APTENV,@#$ENV  ;CHECK IF ON APT
003262  001003                          BNE     7$              ;BR IF NOT
003264  005737  001176                  TST     $PASS           ;CHECK IF FIRST PASS
003270  001133                          BNE     CLKTST          ;CAN ONLY RUN DISPLAY TESTS THE FIRST PASS
003272  105037  001254          /$:     CLRB    VTDONE          ;FLAG THAT DISPLAY PROCESS HAS NOT COMPLETED
003276  004537  012666                  JSR     R5,VTTALK       ;SEND AND RECEIVE AN ESCAPE SEQUENCE
003302  016331                            STATRQ                ;TEXT TO SEND REQUEST DEVICE STATUS
003304  016344                            DSTATR                ;TEXT TO EXPECT--DEVICE STATUS REPORT
003306  000524                          BR      CLKTST          ;RETURN FOR XMITTER HUNG
003310  000413                          BR      2$              ;RETURN FOR RECEIVER HUNG OR UNRECOGNIZED RESPONSE
003312  122737  000060  014012          CMPB    #'0,OPTCHR      ;TEST THE OPTION CHARACTER THAT WAS RECEIVED
003320  001407                          BEQ     2$              ;BRANCH IF IT INDICATED OK STATUS
003322  122737  000063  014012          CMPB    #'3,OPTCHR      ;CHECK IF IT INDICATED BAD STAUTS
003330  001402                          BEQ     1$              ;BRANCH IF IT DID
003332  104032                          ERROR+32                ;UNRECOGNIZED ESCAPE SEQUNCE FOR STATUS REPORT
003334  000401                          BR      2$
003336  104030                  1$:     ERROR+30                ;VT100 REPORTED SELF-TEST FAILURE
003340  012737  016351  003372  2$:     MOV     #TIDNTF,9$      ;SETUP FOR VT100 IDENIFY SEQUENCE
003346  032777  001000  175564          BIT     #BIT9,@SWR      ;CHECK IF VT132 OR VT100
003354  001403                          BEQ     8$              ;IF 0 THEN VT100
003356  012737  016361  003372          MOV     #VIDNTF,9$      ;SETUP FOR VT132 IDENTIFY SEQUENCE
003364  004537  012666          8$:     JSR     R5,VTTALK       ;INITIATE ANOTHER FSCAPE SEQUENCE
003370  016340                            IDENRQ                ;TEXT TO SEND--REQUEST TERMINAL ID
003372  016351                  9$:       TIDNTF                ;EXPECTED TEXT--TERMINAL IDENTIFY
003374  000471                          BR      CLKTST          ;XMITTER HUNG RETURN
003376  000435                          BR      6$              ;RECEIVER HUNG OR UNRECOGNIZED RESPONSE
003400  122737  000060  014012          CMPB    #'0,OPTCHR      ;CHECK IF THE OPTION CHAR > ASCII 0
003406  101004                          BHI     3$              ;BRANCH IF NOT
003410  122737  000067  014012          CMPB    #'7,OPTCHR      ;CHECK IF IT WAS < ASCII 7
003416  103002                          BHIS    4$              ;BRANCH IF IT WAS (WITHIN RANGE)
003420  104032                  3$:     ERROR+32                ;UNRECOGNIZED ESCAPE SEQUNCE FOR TERMINAL IDENTIFY
003422  000423                          BR      6$
003424  132737  000001  014012  4$:     BITB    #BIT0,OPTCHR    ;MAKE SURE OPTION PRESENT WAS ASSERTED (STP)
003432  001005                          BNE     5$              ;BRANCH IF IT WAS
003434  042737  177770  014012          BIC     #^C7,OPTCHR     ;MAKE CHARACTER NON-ASCII FOR ERROR REPORT
003442  104031                          ERROR+31                ;OPTION PRESENT (STP) NOT ASSERTED TO VT100
003444  000412                          BR      6$
003446  005737  001176          5$:     TST     $PASS           ;CHECK IF FIRST PASS
003452  001007                          BNE     6$              ;BRANCH IF NOT
003454  113737  014012  016430          MOVB    OPTCHR,OPCHTX   ;MOVE THE ASCII CHARACTER INTO TEXT STRING
003462  104401  016371                  TYPE    ,OPTPRE         ;REPORT THE OPTION PRESENT PARAMETER
003466  004737  013376                  JSR     PC,GFLCHK       ;CHECK IF ^G TYPED DURING TYPEOUT
003472  012737  014114  000064  6$:     MOV     #TPSRV,TPVEC    ;SET UP DISPLAY PROCESS INTERRUPT VECTOR
003500  012737  000340  000066          MOV     #PR7,TPVEC+2    ;SET PRIORITY
003506  012737  021470  014346          MOV     #DSPTXT,TXTPTR  ;SET UP POINTER TO DISPLAY TEXT
003514  105037  001250                  CLRB    TYPFLG          ;FLAG THAT DISPLAY PROCESS IS ACTIVE
003520  052737  000200  001266          BIS     #BIT7,DEVACT    ;SET VT100 ACTIVE FLAG
003526  052777  000100  175414          BIS     #IE,@$TPS       ;SET  XMIT INTERRUPT ENABLE
                                                                ; (RCVR IE ALREADY ON)
003534  032777  010000  175376          BIT     #BIT12,@SWR     ;SKIP TYPEOUT IF NOT SET
```

```
 7288  003542  001406                          BEQ     CLKTST
 7289  003544  104407                          SAVEVT                  ;ALLOW 2 TYPEOUTS ON SAME LINE
 7290  003546  104401  016516                  TYPE    ,DSPTST
 7291  003552  104401  017045                  TYPE    ,RUN
 7292  003556  104410                          RESTVT                  ;RESTORE VT100 DISPLAY
```

```
 7294                                   ;;*****************************************************************
 7295 .                                 ;       START LINE CLOCK
 7296                                   ;;*****************************************************************
 7297
 7298  003560  032737  000200  001246  CLKTST: BIT     #BIT7,$DEVM     ;DROP TEST?
 7299  003566  001045                         BNE     PRTST           ;;BR IF YES
 7300  003570  122737  000001  001210         CMPB    #APTENV,@#$ENV  ;CHECK IF APT
 7301  003576  001003                         BNE     1$              ;IF NOT APT DO THE TEST
 7302  003600  005737  001176                 TST     $PASS           ;APT - CHECK IF FIRST PASS
 7303  003604  001036                         BNE     PRTST           ;;IF NOT SKIP THE TEST
 7304  003606  012737  013420  000100  1$:     MOV     #INTSRV,CLKVEC  ;SETUP VECTOR AREA
 7305  003614  012737  000200  000102         MOV     #200,CLKVEC+2   ;LOCKOUT OTHER INTER.
 7306  003622  005037  013460                 CLR     INTFLG
 7307  003626  052737  000100  177546         BIS     #IE,CLK         ;SET CLOCK LOOSE!
 7308
 7309  003634  004537  013156                 JSR     R5,TIMER        ;SEE IF INTFLG GOES TO 100
 7310  003640  013460                           INTFLG
 7311  003642  000100                           100
 7312  003644  104015                         ERROR+15                ;CLK NOT RESPONDING
 7313  003646  000415                         BR      PRTST
 7314  003650  052737  000100  001266         BIS     #BIT6,DEVACT    ;SET CLOCK ACTIVE FLAG
 7315
 7316  003656  032777  010000  175254         BIT     #BIT12,@SWR     ;SKIP TYPEOUT IF NOT SET
 7317  003664  001406                         BEQ     PRTST
 7318  003666  104407                         SAVEVT                  ;ALLOW 2 TYPEOUTS ON SAME LINE
 7319  003670  104401  016571                 TYPE    ,CLOCK
 7320  003674  104401  017045                 TYPE    ,RUN
 7321  003700  104410                         RESTVT                  ;RESTORE VT100 DISPLAY
```

```
 7323                                   ;;*****************************************************************
 7324                                   ;       START PRINTER
 7325                                   ;;*****************************************************************
 7326
 7327  003702  005737  012614  PRTST:  TST     PRPRES          ;THERE?
 7328  003706  001465                  BEQ     SMTST           ;;BR IF NO
 7329  003710  032737  100000  001246  BIT     #BIT15,$DEVM    ;DROP TEST?
 7330  003716  001061                  BNE     SMTST           ;;BR IF YES
 7331
 7332  003720  012737  023414  177420  MOV     #<PRT!B1200!CHAR8>,PARAM        ;SETUP BAUD RATE & CHAR LENGTH
 7333  003726  012737  014350  000200  MOV     #PRSRV,PRVEC    ;ELSE SETUP PRINTER VECTOR
 7334  003734  012737  000200  000202  MOV     #200,PRVEC+2    ;LOCKOUT INT ERR
 7335
 7336  003742  005037  014514          CLR     LINCT           ;CLEAR LINE CTR
 7337
 7338  003746  012737  000015  014512  MOV     #CR,PRCHR       ;CHAR TO BE PRINTED
 7339                                                          ;START WITH 'DEL' (177) IF IT IS NEEDED TO CLEAR BUFF
 7340  003754  052737  000100  177514  BIS     #IE,PRS         ;SET PRINTER LOOSE!
 7341                                                          ;WILL PRINT CONTINUOUS LINES
 7342                                                          ;EA BEGINNING WITH ASCII 40 THRU 176
 7343  003762  004537  013156          JSR     R5,TIMER        ;SEE IF LINCT GOES TO 5
 7344  003766  014514                    LINCT
 7345  003770  000005                    5
 7346  003772  104016                  ERROR+16                ;PRINTER NOT RESPONDING
 7347  003774  000432                  BR      SMTST
 7348
 7349  003776  005737  012616          TST     PRPORT          ;CHECK FOR EXTERNAL LOOP-BACK
 7350  004002  001404                  BEQ     2$              ;IF NOT THEN CONTINUE
 7351  004004  042737  000100  177514  BIC     #IE,PRS         ;EXTERNAL - SHUT DOWN PRINTER
 7352  004012  000403                  BR      3$              ;GO REPORT PRINTER DONE
 7353  004014  052737  000040  001266  2$:     BIS     #BIT5,DEVACT    ;SET PRINTER ACTIVE FLAG
 7354  004022  032777  010000  175110  3$:     BIT     #BIT12,@SWR     ;SKIP TYPEOUT IF NOT SET
 7355  004030  001414                  BEQ     SMTST
 7356  004032  104407                  SAVEVT                  ;ALLOW 2 TYPEOUTS ON SAME LINE
 7357  004034  104401  016561          TYPE    ,PRINT
 7358  004040  005737  012616          TST     PRPORT          ;CHECK FOR EXTERNAL LOOP-BACK
 7359  004044  001403                  BEQ     4$              ;IF NOT THEN CONTINUE
 7360  004046  104401  016605          TYPE    ,PORT           ;PRINT TERMINATION REPORT
 7361  004052  000402                  BR      5$              ;RESTORE CURSOR AND DO NEXT TEST
 7362  004054  104401  017045  4$:     TYPE    ,RUN
 7363  004060  104410          5$:     RESTVT                  ;RESTORE VT100 DISPLAY
```

```
                                        ;;*****************************************************************
                                        ;       START SYNC COMM PORT
                                        ;;*****************************************************************

004062  032737  002000  001246  SMTST:  BIT     #BIT10,$DEVM    ;DROP TEST?
004070  001007                          BNE     1$              ;BRANCH IF YES
004072  122737  000001  001210          CMPB    #APTENV,$ENV    ;CHECK IF ON APT
004100  001005                          BNE     NOAPTS          ;BRANCH IF NOT
004102  005737  001176                  TST     $PASS           ;FIRST PASS?
004106  001402                          BEQ     NOAPTS          ;DO TEST IF 1ST PASS
004110  000137  004642          1$:     JMP     AMTST           ;SKIP THE TEST

004114  005037  015342          NOAPTS: CLR     LSTCHR          ;CLEAR LAST CHARACTER FLAG FOR XMIT
004120  052737  000400  176624          BIS     #MR,SMXC        ;MASTER RESET
004126  052737  004000  176624          BIS     #MCLK,SMXC      ;MAINT CLOCK

004134  012737  007026  176622          MOV     #<CHR8!ODDPAR!026>,SMPAR ;SETUP SYNC PARAMETER REGISTER
004142  032737  000010  001246          BIT     #BIT3,$DEVM     ;CHECK FOR EXTERNAL LOOPBACK
004150  001407                          BEQ     1$              ;IF 0 DO SYNC COMM MODEM CHECK
004152  052737  014000  176624          BIS     #<MM!MCLK>,SMXC ;IF 1 SET MAINT MODE FOR INT LOOPBACK
004160  052737  000026  176620          BIS     #<RTS!DTR!SRSYN>,SMRC   ;SET SEARCH SYNC
004166  000526                          BR      2$              ;GO DO THE TEST

004170  012737  122006  004640  1$:     MOV     #<DSC!CTS!SREC!RTS!DTR>,EXPMRC ;SETUP EXPECTED RESULTS
004176  005737  176620                  TST     SMRC            ;CLEAR ANY FLAGS THAT MIGHT BE SET
004202  012737  000006  176620          MOV     #<RTS!DTR>,SMRC ;SET DTR AND RTS
004210  013737  176620  004636          MOV     SMRC,SAVMRC     ;READ CSR REGISTER AND SAVE
004216  023737  004636  004640          CMP     SAVMRC,EXPMRC   ;CHECK RESULTS TO BE EXPECTED
004224  001402                          BEQ     7$              ;IF EQUAL THEN CONTINUE
004226  104033                          ERROR+33                ;SYNC COMM MODEM SIGNAL ERROR
004230  000574                          BR      6$              ;EXIT THE TEST
004232  042737  100000  004640  7$:     BIC     #DSC,EXPMRC     ;CLEAR EXPECTED DSC BIT FOR 2ND READ
004240  013737  176620  004636          MOV     SMRC,SAVMRC     ;READ SYNC COMM CSR REGISTER
004246  023737  004636  004640          CMP     SAVMRC,EXPMRC   ;CHECK THAT DSC WENT TO 0
004254  001402                          BEQ     8$              ;IF EQUAL THEN CONTINUE
004256  104033                          ERROR+33                ;SYNC COMM MODEM SIGNAL ERROR
004260  000560                          BR      6$              ;EXIT THE TEST
004262  012737  151012  004640  8$:     MOV     #<DSC!RING!CDET!DSRDY!SXMIT!DTR>,EXPMRC ;SETUP EXPECTED
004270  012737  000012  176620          MOV     #<SXMIT!DTR>,SMRC ;SET SECONDARY XMIT AND DTR
004276  013737  176620  004636          MOV     SMRC,SAVMRC     ;READ SYNC COMM CSR AND SAVE
004304  023737  004636  004640          CMP     SAVMRC,EXPMRC   ;CHECK RESULTS
004312  001402                          BEQ     9$              ;IF EQUAL THEN CONTINUE
004314  104033                          ERROR+33                ;SYNC COMM MODEM SIGNAL FAILURE
004316  000541                          BR      6$              ;EXIT THE TEST
004320  042737  100000  004640  9$:     BIC     #DSC,EXPMRC     ;CLEAR EXPECTED DSC BIT
004326  013737  176620  004636          MOV     SMRC,SAVMRC     ;READ SYNC COMM CSR REGISTER
004334  023737  004636  004640          CMP     SAVMRC,EXPMRC   ;CHECK THE RESULTS
004342  001402                          BEQ     10$             ;CONTINUE IF EQUAL
004344  104033                          ERROR+33                ;SYNC COMM MODEM SIGNAL FAILURE
004346  000525                          BR      6$              ;EXIT THE TEST
004350  012737  100002  004640  10$:    MOV     #<DSC!DTR>,EXPMRC ;SETUP EXPECTED RESULTS
004356  012737  000002  176620          MOV     #DTR,SMRC       ;SET DATA TERMINAL READY
004364  013737  176620  004636          MOV     SMRC,SAVMRC     ;READ COMM CSR REGISTER
004372  023737  004636  004640          CMP     SAVMRC,EXPMRC   ;CHECK RESULTS TO EQUAL EXPECTED
004400  001402                          BEQ     11$             ;IF EQUAL THEN CONTINUE
004402  104033                          ERROR+33                ;SYNC COMM MODEM SIGNAL FAILURE
```

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7421  004404  000506                          BR      6$              ;EXIT THE TEST
7422
7423  004406  122737  000001  001210  11$:    CMPB    #APTENV,$ENV    ;CHECK IF ON APT
7424  004414  001006                          BNE     12$             ;IF NOT LEAVE DTR SET ONLY
7425  004416  012737  000026  176620          MOV     #<DTR!RTS!SRSYN>,SMRC ;SET APT EXTERNAL LOOPBACK
7426  004424  005737  176620                  TST     SMRC            ;CLEAR DSC BIT
7427  004430  000405                          BR      2$              ;GO START THE TEST
7428  004432  012737  000022  176620  12$:    MOV     #<DTR!SRSYN>,SMRC ;SET NON-APT EXTERNAL LOOP SIGNAL
7429  004440  005737  176620                  TST     SMRC            ;CLEAR DSC BIT IF SET
7430
7431  004444  052737  000020  176624  2$:     BIS     #SEND,SMXC      ;ENABLE XMIT SEND
7432  004452  012737  000026  176626          MOV     #026,SMXB       ;XMIT SYNC CHAR
7433
7434  004460  004537  013304                  JSR     R5,TIMER2       ;WAIT FOR DONE
7435  004464  176620                              SMRC
7436  004466  000200                              DONE
7437  004470  104026                          ERROR+26                ;NO DONE
7438  004472  000453                          BR      6$              ;EXIT
7439
7440  004474  013737  176622  015246          MOV     SMRB,COMHLD     ;READ WORD
7441  004502  023727  015246  000026          CMP     COMHLD,#026     ;IS IT SYNC CHAR?
7442  004510  001402                          BEQ     4$              ;BR IF YES
7443  004512  104006                          ERROR+6                 ;DID NOT REC SYNC CHAR
7444  004514  000424                          BR      5$              ;EXIT
7445
7446  004516  004537  012642          4$:     JSR     R5,SETVEC       ;SETUP VECTOR AREA
7447  004522  000340                              SMRVEC
7448  004524  015344                              SMRSRV
7449  004526  015252                              SMXSRV
7450
7451  004530  012737  000027  015244          MOV     #027,COMCHR     ;1'ST CHAR TO BE XMITTED
7452  004536  052737  000100  176620          BIS     #IE,SMRC        ;SET SYNC MODEM LOOSE!
7453  004544  052737  000100  176624          BIS     #IE,SMXC
7454
7455  004552  004537  013156                  JSR     R5,TIMER        ;SEE IF COMCHR GOES TO ALL 1'S (DONE)
7456  004556  015244                              COMCHR
7457  004560  177777                              177777
7458  004562  104022                          ERROR+22                ;SYNCH COMM NOT RESPONDING
7459  004564  000240                          NOP
7460
7461  004566  012737  000400  176624  5$:     MOV     #MR,SMXC        ;MASTER RESET
7462  004574  032777  010000  174336          BIT     #BIT12,@SWR     ;DO TYPEOUT IF SET
7463  004602  001417                          BEQ     AMTST           ;EXIT IF NOT
7464  004604  104407                          SAVEVT                  ;ALLOW 2 TYPEOUTS ON SAME LINE
7465  004606  104401  016534                  TYPE    ,SCOM
7466  004612  104401  017074                  TYPE    ,DUN
7467  004616  104410                          RESTVT                  ;RESTORE VT100 DISPLAY
7468  004620  000410                          BR      AMTST
7469
7470  004622  012737  000400  176624  6$:     MOV     #MR,SMXC        ;MASTER RESET
7471  004630  005737  176620                  TST     SMRC
7472  004634  000402                          BR      AMTST           ;GO CHECK FOR ASYNC TEST
7473
7474  004636  000000          SAVMRC: .WORD   0                       ;COMM RCVR CSR SAVED HERE
7475  004640  071000          EXPMRC: .WORD   DSRDY!RING!CTS!CDET
```

```
                                        ;;*****************************************************************
                                        ;       START ASYNC COMM PORT
                                        ;;*****************************************************************

004642  032737  004000  001246  AMTST:  BIT     #BIT11,$DEVM    ;DROP TEST?
004650  001007                          BNE     8$              ;IF YES THEN SKIP TEST
004652  122737  000001  001210          CMPB    #APTENV,$ENV    ;CHECK IF ON APT
004660  001005                          BNE     2$              ;BRANCH IF NOT
004662  005737  001176                  TST     $PASS           ;BYPASS TEST AFTER FIRST PASS ON APT
004666  001402                          BEQ     2$
004670  000137  005314          8$:     JMP     CL1TST          ;GO CHECK FOR CLUSTER OPTION
                                        ;
004674  032737  000010  001246  2$:     BIT     #BIT3,$DEVM     ;CHECK FOR EXTERNAL LOOPBACK
004702  001414                          BEQ     1$              ;IF EXTERNAL GO DO MODEM TESTS
004704  042737  000006  176610          BIC     #<RTS!DTR>,AMRC ;TOGGLE DTR AND RTS TO SETUP INTERNAL LOOP
004712  052737  000006  176610          BIS     #<RTS!DTR>,AMRC ;
004720  005737  176610                  TST     AMRC            ;CLEAR ANY BITS THAT MAY HAVE SET
004724  012737  037036  177420          MOV     #<AMOD!B9600!OPAR!CHAR8!MAINT>,PARAM ;SETUP PARAMETERS
004732  000523                          BR      TSTAM           ;GO TEST ASYNC COMM PORT

004734  012737  037034  177420  1$:     MOV     #<AMOD!B9600!OPAR!CHAR8>,PARAM ;SETUP PARAMETERS FOR EXT
004742  012737  122006  004640          MOV     #<DSI!CTS!SREC!RTS!DTR>,EXPMRC  ;SETUP EXPECTED CSR REG
004750  005737  176610                  TST     AMRC            ;CLEAR ANY BITS THAT MAY BE SET
004754  012737  000006  176610          MOV     #<RTS!DTR>,AMRC ;SET RTS AND DTR IN CSR REGISTER
004762  013737  176610  004636          MOV     AMRC,SAVMRC     ;SAVE ASYN CSR REGISTER
004770  023737  004636  004640          CMP     SAVMRC,EXPMRC   ;CHECK TO SEE IF EQUAL
004776  001402                          BEQ     3$              ;IF EQUAL THEN CONTINUE
005000  104035                          ERROR+35                ;ASYNC COMM MODEM FAILURE
005002  000544                          BR      CL1TST          ;EXIT TO CLUSTER TES1
005004  042737  100000  004640  3$:     BIC     #DSI,EXPMRC     ;CLEAR EXPECTED DSI BIT FOR 2ND READ
005012  013737  176610  004636          MOV     AMRC,SAVMRC     ;READ ASYNC COMM AND SAVE
005020  023737  004636  004640          CMP     SAVMRC,EXPMRC   ;CHECK THAT DSI WENT AWAY
005026  001402                          BEQ     4$              ;IF EQUAL THEN CONTINUE
005030  104035                          ERROR+35                ;ASYNC COMM MODEM FAILURE
005032  000530                          BR      CL1TST          ;GO CHECK FOR CLUSTER
005034  012737  151012  004640  4$:     MOV     #<DSI!RING!CDET!DSRDY!SXMIT!DTR>,EXPMRC ;SETUP EXPECTED CSR
005042  012737  000012  176610          MOV     #<SXMIT!DTR>,AMRC       ;SET SEC XMIT AND DTR
005050  013737  176610  004636          MOV     AMRC,SAVMRC     ;READ ASYNC COMM CSR AND SAVE
005056  023737  004636  004640          CMP     SAVMRC,EXPMRC   ;CHECK TO SEE IF EQUAL
005064  001402                          BEQ     5$              ;IF EQUAL THEN CONTINUE
005066  104035                          ERROR+35                ;ASYNC COMM MODEM FAILURE
005070  000511                          BR      CL1TST          ;GO CHECK FOR CLUSTER TERMINALS
005072  042737  100000  004640  5$:     BIC     #DSI,EXPMRC     ;CLEAR DSI IN EXPECTER CSR
005100  013737  176610  004636          MOV     AMRC,SAVMRC     ;READ ASYNC COMM CSR AND SAVE
005106  023737  004636  004640          CMP     SAVMRC,EXPMRC   ;CHECK TO SEE IF EQUAL
005114  001402                          BEQ     6$              ;IF EQUAL THEN CONTINUE
005116  104035                          ERROR+35                ;ASYNC COMM MODEM FAILURE
005120  000475                          BR      CL1TST          ;GO CHECK FOR CLUSTER TERMINALS
005122  012737  100002  004640  6$:     MOV     #<DSI!DTR>,EXPMRC ;SETUP EXPECTED ASYNC COMM CSR
005130  012737  000002  176610          MOV     #DTR,AMRC       ;SET DATA TERMINAL READY BY ITSELF
005136  013737  176610  004636          MOV     AMRC,SAVMRC     ;READ ASYN COMM CSR AND SAVE IT
005144  023737  004636  004640          CMP     SAVMRC,EXPMRC   ;CHECK TO SEE IF EQUAL
005152  001402                          BEQ     7$              ;IF EQUAL THEN CONTINUE
005154  104035                          ERROR+35                ;ASYNC COMM MODEM FAILURE
005156  000456                          BR      CL1TST          ;GO CHECK FOR CLUSTER TERMINALS
```

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 7533
 7534  005160  122737  000001  001210  7$:     CMPB    #APTENV,$ENV    ;CHECK TO SEE IF APT
 7535  005166  001003                          BNE     9$              ;IF NOT CONTINUE
 7536  005170  012737  000006  176610          MOV     #<RTS!DTR>,AMRC ;SET APT EXTERNAL LOOPBACK BIT
 7537  005176  005737  176610          9$:     TST     AMRC            ;ISSUED TO CLEAR DSI BIT
 7538
 7539  005202  004537  012642          TSTAM:  JSR     R5,SETVEC       ;SETUP VECTOR AREA
 7540  005206  000330                              AMRVEC
 7541  005210  015112                              AMRSRV
 7542  005212  015074                              AMXSRV
 7543
 7544  005214  005037  015244                      CLR     COMCHR          ;CHAR TO BE XMITTED
 7545  005220  005037  015250                      CLR     COMCNT          ;CLEAR COUNT OF CHARACTER PASSES
 7546  005224  013737  176612  015246              MOV     AMRB,COMHLD     ;CLR OUT ANY PREVIOUS STORED WORD
 7547  005232  052737  000100  176610              BIS     #IE,AMRC        ;SET ASYNC MODEM LOOSE!
 7548  005240  052737  000100  176614              BIS     #IE,AMXC
 7549
 7550  005246  004537  013156                      JSR     R5,TIMER        ;SEE IF COMCNT GOES TO 1
 7551  005252  015250                                COMCNT
 7552  005254  000001                              1
 7553  005256  104023                              ERROR+23                ;ASYNC COMM NOT RESPONDING
 7554  005260  000415                              BR      CL1TST
 7555  005262  052737  000020  001266              BIS     #BIT4,DEVACT    ;SET ASYNC COMM ACTIVE FLAG
 7556
 7557  005270  032777  010000  173642              BIT     #BIT12,@SWR     ;SKIP TYPEOUT IF NOT SET
 7558  005276  001406                              BEQ     CL1TST
 7559  005300  104407                              SAVEVT                  ;ALLOW 2 TYPEOUTS ON SAME LINE
 7560  005302  104401  016546                      TYPE    ,ACOM
 7561  005306  104401  017045                      TYPE    ,RUN
 7562  005312  104410                              RESTVT                  ;RESTORE VT100 DISPLAY
 7563
 7564                                  ;;**************************************************************
 7565                                  ;       START CLUSTER TERMINAL #1
 7566                                  ;;**************************************************************
 7567
 7568  005314  005737  012612          CL1TST: TST     CLPRES          ;OPTION PRESENT?
 7569  005320  001002                          BNE     1$              ;;BR IF YES
 7570  005322  000137  006074                  JMP     TUTST           ;GO CHECK FOR TU58
 7571
 7572  005326  032737  000010  001246  1$:     BIT     #BIT3,$DEVM     ;CHECK FOR INT.EXT LOOPBACK
 7573  005334  001404                          BEQ     2$              ;IF EXTERNAL GO SET DTR
 7574  005336  052737  000006  176610          BIS     #<RTS!DTR>,AMRC ;INTERNAL SET RTS AND DTR
 7575  005344  000403                          BR      3$              ;GO SEE IF TU58 ACTIVE
 7576  005346  052737  000002  176610  2$:     BIS     #DTR,AMRC       ;EXTERNAL - ONLY SET DTR
 7577
 7578  005354  012737  002416  014636  3$:     MOV     #<B300!CHAR8!MAINT>,CTPARM ;300 BAUD
 7579  005362  032737  010000  001246          BIT     #BIT12,$DEVM    ;DROP TEST ?
 7580  005370  001063                          BNE     CL2TST          ;BRANCH IF YES
 7581  005372  013700  014636                  MOV     CTPARM,R0       ;GET CLUSTER PARAMETERS
 7582  005376  052700  000000                  BIS     #CT1,R0         ;SELECT CLUSTER TERMINAL 1
 7583  005402  032737  000001  001246          BIT     #BIT0,$DEVM     ;CHECK IF INTERNAL LOOPBACK
 7584  005410  001002                          BNE     4$              ;IF INTERNAL GO LOAD PARAMETER REGISTER
 7585  005412  042700  000002                  BIC     #MAINT,R0       ;EXTERNAL CLEAR INTERNAL LOOPBACK BIT
 7586  005416  010037  177420          4$:     MOV     R0,PARAM        ;SETUP CLUSTER PARAMETER 1
 7587
 7588  005422  004537  012642                  JSR     R5,SETVEC       ;SETUP INTERR VECTORS
```

```
 7589  005426  000300                          TK1VEC
 7590  005430  014536                          TK1SRV
 7591  005432  014520                          TP1SRV
 7592
 7593  005434  005037  014630                  CLR     T1CHR           ;CHAR TO BE XMITTED
 7594  005440  005037  014634                  CLR     T1CNT           ;CLEAR COUNT OF CHARACTER PASSES
 7595  005444  013737  176502  014632          MOV     TK1B,T1HLD      ;READ CHAR (CLEAR STALE DATA)
 7596  005452  052737  000100  176500          BIS     #IE,TK1S        ;SET CLUSTER TERM #1 LOOSE!
 7597  005460  052737  000100  176504          BIS     #IE,TP1S
 7598
 7599  005466  004537  013156                  JSR     R5,TIMER        ;SEE IF T1CNT GOES TO 1
 7600  005472  014634                            T1CNT
 7601  005474  000001                            1
 7602  005476  104017                          ERROR+17                ;CLUSTER TERM 1 NOT RESPONDING
 7603  005500  000417                          BR      CL2TST
 7604  005502  052737  000010  001266          BIS     #BIT3,DEVACT    ;SET CLUSTER TERMINAL 1 ACTIVE FLAG
 7605
 7606  005510  032777  010000  173422          BIT     #BIT12,@SWR     ;SKIP TYPEOUT IF NOT SET
 7607  005516  001410                          BEQ     CL2TST
 7608  005520  104407                          SAVEVT                  ;ALLOW 3 TYPEOUTS ON SAME LINE
 7609  005522  104401  016465                  TYPE    ,CLTERM
 7610  005526  104401  016510                  TYPE    ,T1
 7611  005532  104401  017045                  TYPE    ,RUN
 7612  005536  104410                          RESTVT                  ;RESTORE VT100 DISPLAY
```

```
 7614                                   ;;*****************************************************************
 7615                                   ;       START CLUSTER TERMINAL #2
 7616                                   ;;*****************************************************************
 7617
 7618  005540  032737  020000  001246  CL2TST: BIT     #BIT13,$DEVM    ;DROP TEST?
 7619  005546  001063                         BNE     CL3TST          ;;BR IF YES
 7620
 7621  005550  013700  014636                 MOV     CTPARM,R0       ;GET THE CLUSTER PARAMETER
 7622  005554  052700  050000                 BIS     #CT2,R0         ;SELECT CLUSTER TERMINAL 2
 7623  005560  032737  000002  001246         BIT     #BIT1,$DEVM     ;CHECK IF INTERNAL LOOPBACK
 7624  005566  001002                         BNE     1$              ;IF INTERNAL GO LOAD PARAMETER
 7625  005570  042700  000002                 BIC     #MAINT,R0       ;EXTERNAL CLEAR INTERNAL LOOPBACK BIT
 7626  005574  010037  177420          1$:    MOV     R0,PARAM        ;SETUP CLUSTER TERMINAL 2
 7627
 7628  005600  004537  012642                 JSR     R5,SETVEC       ;SETUP INTERR VECTORS
 7629  005604  000310                             TK2VEC
 7630  005606  014656                             TK2SRV
 7631  005610  014640                             TP2SRV
 7632
 7633  005612  005037  014750                 CLR     T2CHR           ;CHAR TO BE XMITTED
 7634  005616  005037  014754                 CLR     T2CNT           ;CLEAR COUNT OF CHARACTER PASSES
 7635  005622  013737  176512  014752         MOV     TK2B,T2HLD      ;READ CHAR (CLEAR STALE DATA)
 7636  005630  052737  000100  176510         BIS     #IE,TK2S        ;SET CLUSTER TERM #2 LOOSE!
 7637  005636  052737  000100  176514         BIS     #IE,TP2S
 7638
 7639  005644  004537  013156                 JSR     R5,TIMER        ;SEE IF T2CNT GOES TO 1
 7640  005650  014754                             T2CNT
 7641  005652  000001                             1
 7642  005654  104020                         ERROR+20                ;CLUSTER TERM 2 NOT RESPONDING
 7643  005656  000417                         BR      CL3TST
 7644  005660  052737  000004  001266         BIS     #BIT2,DEVACT    ;SET CLUSTER TERMINAL 2 ACTIVE FLAG
 7645
 7646  005666  032777  010000  173244         BIT     #BIT12,@SWR     ;SKIP TYPEOUT IF NOT SET
 7647  005674  001410                         BEQ     CL3TST
 7648  005676  104407                         SAVEVT                  ;ALLOW 3 TYPEOUTS ON SAME LINE
 7649  005700  104401  016465                 TYPE    ,CLTERM
 7650  005704  104401  016512                 TYPE    ,T2
 7651  005710  104401  017045                 TYPE    ,RUN
 7652  005714  104410                         RESTVT                  ;RESTORE VT100 DISPLAY
```

```
                                        ;;*****************************************************************
                                        ;       START CLUSTER TERMINAL #3
                                        ;;*****************************************************************

005716  032737  040000  001246  CL3TST: BIT     #BIT14,$DEVM    ;DROP TEST?
005724  001063                          BNE     TUTST           ;;BR IF YES

005726  013700  014636                  MOV     CTPARM,R0       ;GET THE CLUSTER PARAMETERS
005732  052700  060000                  BIS     #CT3,R0         ;SET CLUSTER TERMINAL 3 SELECT
005736  032737  000004  001246          BIT     #BIT2,$DEVM     ;CHECK IF INTERNAL LOOPBACK
005744  001002                          BNE     1$              ;IF INTERNAL GO LOAD PARAMETER REGISTER
005746  042700  000002                  BIC     #MAINT,R0       ;EXTERNAL CLEAR INTERNAL LOOPBACK BIT
005752  010037  177420          1$:     MOV     R0,PARAM        ;SETUP CLUSTER TERMINAL 3

005756  004537  012642                  JSR     R5,SETVEC       ;SETUP INTERR VECTORS
005762  000320                              TK3VEC
005764  014774                              TK3SRV
005766  014756                              TP3SRV

005770  005037  015066                  CLR     T3CHR           ;CHAR TO BE XMITTED
005774  005037  015072                  CLR     T3CNT           ;CLEAR COUNT OF CHARACTER PASSES
006000  013737  176522  015070          MOV     TK3B,T3HLD      ;READ CHAR (CLEAR STALE DATA)
006006  052737  000100  176520          BIS     #IE,TK3S        ;SET CLUSTER TERM #3 LOOSE!
006014  052737  000100  176524          BIS     #IE,TP3S

006022  004537  013156                  JSR     R5,TIMER        ;SEE IF T3CNT GOES TO 1
006026  015072                            T3CNT
006030  000001                            1
006032  104021                          ERROR+21                ;CLUSTER TERM 3 NOT RESPONDING
006034  000417                          BR      TUTST           ;CHECK FOR TU58
006036  052737  000002  001266          BIS     #BIT1,DEVACT    ;SET CLUSTER TERMINAL 3 ACTIVE FLAG

006044  032777  010000  173066          BIT     #BIT12,@SWR     ;SKIP TYPEOUT IF NOT SET
006052  001410                          BEQ     TUTST           ;CHECK FOR TU58
006054  104407                          SAVEVT                  ;ALLOW 3 TYPEOUTS ON SAME LINE
006056  104401  016465                  TYPE    ,CLTERM
006062  104401  016514                  TYPE    ,T3
006066  104401  017045                  TYPE    ,RUN
006072  104410                          RESTVT                  ;RESTORE VT100 DISPLAY


                                        ;;*****************************************************************
                                        ;*      START TU58 TESTING
                                        ;;*****************************************************************

006074  005737  012620          TUTST:  TST     TUPRES          ;CHECK TO SEE IF TU58 PRESENT
006100  001002                          BNE     TUINIT          ;IF PRESENT CHECK TO SEE IF ACTIVE
006102  000137  011230                  JMP     EOP             ;TU58 NOT PRESENT END OF TEST

006106  005037  007032          TUINIT: CLR     UNITNM          ;SET TU58 UNIT NUMBER TO 0
006112  032737  000400  001246          BIT     #BIT8,$DEVM     ;CHECK IF UNIT 0 SELECTED
006120  001410                          BEQ     2$              ;IF SELECTED START TESTING
006122  032737  001000  001246          BIT     #BIT9,$DEVM     ;CHECK IF UNIT 1 SELECTED
006130  001402                          BEQ     1$              ;IF SELECTED BUMP UNIT NUMBER AND START
006132  000137  011230                  JMP     EOP             ;NEITHER UNIT SELECTED ABORT TEST
006136  005237  007032          1$:     INC     UNITNM          ;SET UNIT TO UNIT 1
```

```
 7710  006142  005037  177170          2$:     CLR     TURCSR          ;CLEAR RECEIVER TU58 CSR REGISTER
 7711  006146  005037  177174                  CLR     TUXCSR          ;CLEAR TRANSMIT TU58 CSR REGISTER
 7712  006152  005737  177172                  TST     TURXDB          ;CLEAR RECEIVER FLAG IF SET
 7713  006156  012737  030210  007054          MOV     #TURDBF,TURPNT  ;SETUP BUFFER ADDRESS FOR STORING CHAR
 7714  006164  013737  007054  007056          MOV     TURPNT,TUBUFP   ;SETUP BUFFER ADDRESS FOR GETTING CHAR
 7715  006172  005037  007064                  CLR     TU58ER          ;CLEAR INTERRUPT SERVICE ERROR WORD
 7716  006176  012737  000004  007030          MOV     #TINIT,OPCODE   ;SETUP OPCODE FOR ERROR PRINTOUT
 7717  006204  004537  012642                  JSR     R5,SETVEC       ;GO SETUP TU58 VECTORS
 7718  006210  000260                          TURVEC                  ;TU58 RECEIVER VECTOR ADDRESS
 7719  006212  015600                          TURCVR                  ;TU58 RECEIVER INT SERVICE ROUTINE
 7720  006214  015444                          TUXMIT                  ;TU58 TRANSMIT INT SERVICE ROUTINE
 7721  006216  012737  177777  007102          MOV     #-1,BRKFLG      ;SET BREAK FLAG
 7722  006224  004537  007532                  JSR     R5,SNDPKT       ;GO INIT THE DEVICE AND SET RECEIVER INT ENA
 7723  006230  007152                          .WORD   TUIMSG
 7724  006232  012700  000002                  MOV     #2,R0           ;SETUP TO RECEIVE 1 UNKNOWN CHAR FROM TU58
 7725  006236  004537  007622          3$:     JSR     R5,GETCHR       ;GO GET A CHARACTER FROM TU58
 7726  006242  000415                          BR      4$              ;DEVICE ERROR
 7727  006244  122737  00002C  007104          CMPB    #TCONT,TUCHR    ;CHECK IF CONTINUE
 7728  006252  001414                          BEQ     5$              ;IF CONTINUE THEN DEVICE READY
 7729  006254  005300                          DEC     R0              ;DECREMENT UNKNOWN CHAR COUNTER
 7730  006256  001367                          BNE     3$              ;GO GET NEXT CHAR - SHOULD BE CONT
 7731  006260  052737  001000  007064          BIS     #BIT9,TU58ER    ;SET BIT INDICATING TU58 INIT PROBLEM
 7732  006266  005037  177170                  CLR     TURCSR          ;CLEAR INTERRUPT ENABLES
 7733  006272  005037  177174                  CLR     TUXCSR          ;
 7734  006276  104036          4$:     ERROR+36                        ;DEVICE ERROR
 7735  006300  000137  011230                  JMP     EOP             ;EXIT TU58 TEST CAN NOT INIT DEVICE
 7736  006304  042737  000100  177170  5$:     BIC     #IE,TURCSR      ;CLEAR RECEIVER INT ENABLE
 7737  006312  004737  026336                  JSR     PC,$RAND        ;GO GENERATE RANDOM TAPE RANGE
 7738  006316  005037  007044                  CLR     HILOWF          ;SET TAPE RANGE TO LOWER HALF
 7739  006322  105737  026436                  TSTB    $LONUM          ;IF BIT 7=0 THEN RANGE IS LOW
 7740  006326  100003                          BPL     6$              ;GO START TESTING ON LOW RANGE
 7741  006330  052737  000100  007044          BIS     #BIT6,HILOWF    ;SET HIGH RANGE BIT
 7742  006336  032777  010000  172574  6$:     BIT     #BIT12,@SWR     ;CHECK IF PERFORAMNCE REPORT ENABLED
 7743  006344  001406                          BEQ     TSTT58          ;IF NOT SKIP PERFORMANCE REPORT
 7744  006346  104407                          SAVEVT                  ;SAVE THE CURSOR POSITION
 7745  006350  104401  016452                  TYPE    ,TU58M          ;TYPE TU58 RUNNING
 7746  006354  104401  01'045                  TYPE    ,RUN
 7747  006360  104410                          RESTVT                  ;RESTORE THE CURSOR POSITION
 7748  006362  012737  000012  007046  TSTT58: MOV     #10.,BLKCNT     ;SETUP TO DO 10 BLOCKS PER DRIVE
 7749  006370  042737  000100  177170  TSTTU:  BIC     #IE,TURCSR      ;CLEAR RECEIVER INTERRUPT ENABLE
 7750  006376  042737  000100  177174          BIC     #IE,TUXCSR      ;CLEAR TRANSMIT INTERRUPT ENABLE
 7751  006404  005737  177172                  TST     TURXDB          ;CLEAR RECEIVE FLAG IF IT WAS SET
 7752  006410  012737  030210  007054          MOV     #TURDBF,TURPNT  ;SETUP BUFFER ADDRESS FOR STORING CHAR
 7753  006416  013737  007054  007056          MOV     TURPNT,TUBUFP   ;SETUP BUFFER ADDRESS FOR GETTING CHAR
 7754  006424  052737  000100  177170          BIS     #IE,TURCSR      ;SET RECEIVER INTERRUPT ENABLE
 7755  006432  005037  007064                  CLR     TU58ER          ;CLEAR TU58 INT SRV ERROR FLAG
 7756  006436  005037  007070                  CLR     CONTFL          ;CLEAR CONTINUE FLAG COUNTER
 7757  006442  005037  007072                  CLR     DATAFL          ;CLEAR DATA PACKET COUNTER
 7758  006446  005037  007062                  CLR     PKTERR          ;CLEAR DATA/END PACKET ERROR FLAG
 7759  006452  004537  007156                  JSR     R5,BLDPKT       ;GO BUILD WRITE COMMAND PACKET
 7760  006456  000003                          .WORD   TWRITE
 7761  006460  012700  007136                  MOV     #WRTTBL,R0      ;SETUP POINTER TO WRITE PACKET ADDRESSES
 7762  006464  012037  006476          1$:     MOV     (R0)+,2$        ;GET ADDRESS OF PACKET AND SAVE
 7763  006470  001411                          BEQ     3$              ;IF ALL DONE - WAIT FOR END PACKET
 7764  006472  004537  007532                  JSR     R5,SNDPKT       ;GO SEND THE COMMAND OR DATA PACKET
 7765  006476  007026          2$:     .WORD   FLAG                    ;THIS ADDRESS WILL CHANGE
```

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 7766  006500  011037  006512                    MOV     (R0),22$        ;GET ADDRESS OF NEXT PACKET TO BUILD
 7767  006504  001403                            BEQ     3$              ;IF TERMINATOR WAIT FOR END PACKET
 7768  006506  004537  007426                    JSR     R5,WTDPAK       ;GO BUILD WRITE DATA PACKET
 7769  006512  027170                  22$:      .WORD   WTPK1           ;THIS ADDRESS WILL CHANGE
 7770
 7771  006514  004537  007742            3$:     JSR     R5,GETPKT       ;GO WAIT AND SERVICE PACKET
 7772  006520  000403                            BR      4$              ;DEVICE ERROR
 7773  006522  000760                            BR      1$              ;CONT - SEND NEXT PACKET IF ANY
 7774  006524  000404                            BR      5$              ;END PACKET ERROR DETECTED
 7775  006526  000414                            BR      7$              ;END PACKET NO ERRORS DETECTED
 7776  006530  104036                  4$:       ERROR+36                ;DEVICE ERROR
 7777  006532  000137  011230                    JMP     EOP             ;EXIT TO END OF PASS IF CONTINUED
 7778
 7779  006536  122737  000001  007074    5$:     CMPB    #1,SUCCES       ;CHECK IF SUCCESS WITH RETRIES
 7780  006544  001402                            BEQ     6$              ;IF YES THEN PRINT ERROR AND CONTINUE
 7781  006546  104037                            ERROR+37                ;REPORT FATAL ERROR FOR THIS DRIVE
 7782  006550  000442                            BR      13$             ;GO TO NEXT DRIVE IF AVAILABLE
 7783  006552  004537  011142            6$:     JSR     R5,SOFTER       ;GO CHECK IF SOFT ERROR TO BE REPORTED
 7784  006556  104041                            ERROR+41                ;REPORT SOFT ERROR DURING WRITE
 7785  006560  005037  007064            7$:     CLR     TU58ER          ;CLEAR ERROR FLAG FOR INT SRV
 7786  006564  005037  007062                    CLR     PKTERR          ;CLEAR PACKET ERROR FLAG
 7787  006570  004537  007156                    JSR     R5,BLDPKT       ;GO BUILD READ PACKET
 7788  006574  000002                            .WORD   TREAD
 7789  006576  004537  007532                    JSR     R5,SNDPKT       ;GO SEND THE PACKET
 7790  006602  007026                            .WORD   FLAG            ;ADDRESS OF COMMAND PACKET
 7791  006604  004537  007742            8$:     JSR     R5,GETPKT       ;GO WAIT AND SERVICE PACKET
 7792  006610  000403                            BR      9$              ;DEVICE ERROR
 7793  006612  000774                            BR      8$              ;DATA PACKET - GET NEXT PACKET
 7794  006614  000404                            BR      10$             ;END PACKET ERROR DETECTED
 7795  006616  000414                            BR      12$             ;END PACKET NO ERRORS DETECTED
 7796  006620  104036                  9$:       ERROR+36                ;DEVICE ERROR DURING READ
 7797  006622  000137  011230                    JMP     EOP             ;ABORT TU58 TESTING ON DEVICE FAILURE
 7798  006626  122737  000001  007074   10$:     CMPB    #1,SUCCES       ;CHECK IF SUCCESS WITH RETRIES
 7799  006634  001402                            BEQ     11$             ;IF YES UPDATE SOFT ERROR AND CONT
 7800  006636  104040                            ERROR+40                ;REPORT FATAL ERROR FOR THIS DEVICE
 7801  006640  000406                            BR      13$             ;GO CHECK FOR NEXT DRIVE
 7802  006642  004537  011142           11$:     JSR     R5,SOFTER       ;GO CHECK IF SOFT ERROR TO BE REPORTED
 7803  006646  104042                            ERROR+42                ;REPORT SOFT ERROR AND CONT IF ALLOWED
 7804  006650  005337  007046           12$:     DEC     BLKCNT          ;DECREMENT BLOCK COUNTER
 7805  006654  001245                            BNE     TSTTU           ;IF NOT 0 DO NEXT BLOCK
 7806
 7807  006656  005737  007032           13$:     TST     UNITNM          ;CHECK IF UNIT 1
 7808  006662  001035                            BNE     15$             ;IF UNIT 1 THEN EXIT
 7809  006664  032777  010000  172246            BIT     #BIT12,@SWR     ;CHECK IF PERFORMANCE REPORT
 7810  006672  001410                            BEQ     14$             ;IF NOT THEN SKIP TYPE OUT
 7811  006674  104407                            SAVEVT                  ;SAVE THE CURSOR POSITION
 7812  006676  104401  016457                    TYPE    ,TU58MS         ;TYPE TU58 TAPE UNIT 0 DONE
 7813  006702  104401  016773                    TYPE    ,DRV0
 7814  006706  104401  017074                    TYPE    ,DUN
 7815  006712  104410                            RESTVT                  ;RESTORE THE CURSOR POSITION
 7816  006714  032737  001000  001246   14$:     BIT     #BIT9,$DEVM     ;CHECK IF UNIT 1 SELECTED
 7817  006722  001031                            BNE     16$             ;IF NOT THEN EXIT THE TEST
 7818  006724  005237  007032                    INC     UNITNM          ;UPDATE THE UNIT NUMBER TO 1
 7819  006730  032737  000040  001246            BIT     #BIT5,$DEVM     ;CHECK IF SEQUENTIAL BLOCKS
 7820  006736  001611                            BEQ     TSTT58          ;IF 0 THEN RANDOM BLOCKS SELECTED
 7821  006740  162737  000012  007040            SUB     #10.,BLKNUM     ;BACK UP BLOCK NUMBER FOR TAPE UNIT 1
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 7822  006746  042737  177000  007040          BIC     #177000,BLKNUM  ;MASK TO BLOCK NUMBER RANGES
 7823  006754  000602                          BR      TSTT58          ;GO DO TEST ON DRIVE 1
 7824  006756  032777  010000  172154  15$:     BIT     #BIT12,@SWR     ;CHECK IF PERFORMANCE REPORT
 7825  006764  001410                          BEQ     16$             ;IF NOT THEN EXIT THE TEST
 7826  006766  104407                          SAVEVT                  ;SAVE THE CURSOR POSITION
 7827  006770  104401  016457                  TYPE    ,TU58MS         ;TYPE TU58 TAPE UNIT 1 DONE
 7828  006774  104401  017007                  TYPE    ,DRV1
 7829  007000  104401  017074                  TYPE    ,DUN
 7830  007004  104410                          RESTVT                  ;RESTORE THE CURSOR POSITION
 7831  007006  042737  000100  177170  16$:     BIC     #IE,TURCSR      ;CLEAR RECEIVER INT ENABLE BIT
 7832  007014  042737  000100  177174          BIC     #IE,TUXCSR      ;CLEAR TRANSMIT INT ENABLE BIT
 7833  007022  000137  011230                  JMP     EOP             ;GO TO EOP ROUTINE
 7834
 7835                                  ;COMMAND PACKET TO TU58
 7836                                  ;
 7837  007026  000000                  FLAG:   .WORD   0               ;HAS PACKET BYTE COUNT AND COMMAND FLAG
 7838  007030  000000                  OPCODE: .WORD   0               ;HAS OPCODE AND MODIFIER
 7839  007032  000000                  UNITNM: .WORD   0               ;HAS UNIT NUMBER
 7840  007034  000000                  SEQNUM: .WORD   0               ;N/A FOR TU58
 7841  007036  000000                  BYTCNT: .WORD   0               ;BLOCK BYTE COUNT
 7842  007040  000000                  BLKNUM: .WORD   0               ;HAS BLOCK NUMBER
 7843  007042  000000                  CKSUM:  .WORD   0               ;COMMAND PACKET CHECKSUM WORD
 7844
 7845  007044  000000                  HILOWF: .WORD   0               ;TAPE RANGE INDICATOR
 7846  007046  000000                  BLKCNT: .WORD   0               ;NUMBER OF TOTAL BLOCKS LEFT TO EXER
 7847
 7848  007050  000000                  TUXPNT: .WORD   0               ;POINTER TO WRITE PACKET DATA
 7849  007052  000000                  TUXCNT: .WORD   0               ;NUMBER OF BYTES TO BE TRANSMITTED
 7850
 7851  007054  000000                  TURPNT: .WORD   0               ;POINTER TO RECV BUFFER FOR STORING BYTE
 7852  007056  000000                  TUBUFP: .WORD   0               ;POINTER TO RECV BUFFER FOR GETTING CHAR
 7853
 7854  007060  000000                  PKTPNT: .WORD   0               ;POINTER TO END PACKET IN RECV BUFFER
 7855                                  ;*
 7856                                  ;;*****************************************************************
 7857                                  ;*
 7858  007062  000000                  PKTERR: .WORD   0               ;END PACKET ERROR WORD BIT DEFINITIONS
 7859                                                                  ;
 7860                                                                  ;BIT15=1        READ PACKET 4 FAILED
 7861                                                                  ;
 7862                                                                  ;BIT14=1        READ PACKET 3 FAILED
 7863                                                                  ;BIT13=1        READ PACKET 2 FAILED
 7864                                                                  ;BIT12=1        READ PACKET 1 FAILED
 7865                                                                  ;
 7866                                                                  ;BIT11=1
 7867                                                                  ;BIT10=1
 7868                                                                  ;BIT09=1        READ - < 4 DATA PACKETS RECV'D
 7869                                                                  ;
 7870                                                                  ;BIT08=1        WRITE - < 4 CONT RECV'D
 7871                                                                  ;
 7872                                                                  ;    END PACKET ERROR BITS
 7873                                                                  ;
 7874                                                                  ;BIT07=1        CHECKSUM ERROR
 7875                                                                  ;BIT06=1        PACKET BYTE COUNT ERROR
 7876                                                                  ;
 7877                                                                  ;BIT05=1        OPCODE ERROR
```

```
                                                        ;BIT04=1        SUCCESS CODE FAILURE
                                                        ;BIT03=1        UNIT NUMBER READ INCORRECT
                                                        ;
                                                        ;BIT02=1        SEQUENCE NUMBER NOT 0
                                                        ;BIT01=1        DATA BYTE COUNT INCORRECT
                                                        ;BIT00=1        SUMMARY WORD FAILURE
                                                        ;
                                ;*
                                ;;*****************************************************************
                                ;*
007064  000000                  TU58ER: .WORD   0       ;DEVICE ERROR WORD BIT DEFINITIONS
                                                        ;
                                                        ;BIT15=1        UNRECOGNIZABLE CHAR RECV'D
                                                        ;
                                                        ;BIT14=1        > 4 DATA PACKETS RECV'D
                                                        ;BIT13=1        > 4 CONT RECV'D DURING WRITE
                                                        ;BIT12=1        CONT RECV'D DURING READ
                                                        ;
                                                        ;BIT11=1        DATA RECV'D DURING WRITE
                                                        ;BIT10=1        INIT RECV'D
                                                        ;BIT09=1        ERROR INITTING THE TU58
                                                        ;
                                                        ;BIT08=1
                                                        ;BIT07=1        DEVICE TIMEOUT ERROR
                                                        ;BIT06=1        RECVR DONE NOT SET ON INTERRUPT
                                                        ;
                                                        ;BIT05=1        RECVR BUFFER OVERFLOWED
                                                        ;BIT04=1        XMIT RDY NOT SET ON INTERRUPT
                                                        ;BIT03=1        XMIT INTERRUPT WITH IE CLEARED
                                                        ;
                                                        ;BIT02=1
                                                        ;BIT01=1
                                                        ;BIT00=1
                                ;*
                                ;;*****************************************************************
                                ;*
                                ;*
007066  000000                  DPKTER: .WORD   0       ;ACCUMULATED DATA PAKET ERROR WORD
                                                        ;DATA PACKET 4 ERROR BITS
                                                        ;BIT14=1          PACKET CHECKSUM FAILURE
                                                        ;BIT13=1          DATA CHECKSUM FAILURE
                                                        ;BIT12=1          PACKET BYTE COUNT INCORRECT
                                                        ;
                                                        ;DATA PACKET 3 ERROR BITS
                                                        ;BIT11=1          PACKET CHECKSUM FAILURE
                                                        ;BIT10=1          DATA CHECKSUM FAILURE
                                                        ;BIT09=1          PACKET BYTE COUNT INCORRECT
                                                        ;
                                                        ;DATA PACKET 2 ERROR BITS
                                                        ;BIT08=1          PACKET CHECKSUM FAILURE
                                                        ;BIT07=1          DATA CHECKSUM FAILURE
                                                        ;BIT06=1          PACKET BYTE COUNT INCORRECT
                                                        ;
                                                        ;DATA PACKET 1 ERROR BITS
                                                        ;BIT05=1          PACKET CHECKSUM FAILURE
                                                        ;BIT04=1          DATA CHECKSUM FAILURE
```

```
                                                        ;BIT03=1        PACKET BYTE COUNT INCORRECT
                                ;*
                                ;;*****************************************************************
                                ;*

007070  000000                  CONTFL: .WORD   0               ;NUMBER OF CONT FLAGS RECEIVED FROM TU58
007072  000000                  DATAFL: .WORD   0               ;NUMBER OF DATA FLAGS RECEIVED FROM TU58

007074  000000                  SUCCES: .WORD   0               ;DATA PACKET SUCCESS CODE
007076  000000                  BYTECT: .WORD   0               ;DATA PACKET DATA WORD COUNT
007100  000000                  SUMARY: .WORD   0               ;DATA PACKET SUMMARY WORD

007102  000000                  BRKFLG: .WORD   0               ;SET WHEN INITTING DEVICE
007104  000000                  TUCHR:  .WORD   0               ;BYTE READ FROM RECEIVE BUFFER

007106  000000                  WRKSUM: .WORD   0               ;POINTER TO WRITE CHECKSUM TABLE
007110  000000                  WRKERR: .WORD   0               ;POINTER TO DATA PACKET ERROR FLAGS
007112  000000                  WRKPNT: .WORD   0               ;POINTER TO DATA PACKET ADDRESS TABLE
007114  000000                  DERFLG: .WORD   0               ;USED TO SET PKTERR WHEN DATA PACKET ERR

007116  000000                  DATPNT: .WORD   0               ;POINTER TO DATA PACKET 1 STARTING ADD
007120  000000                          .WORD   0               ;POINTER TO DATA PACKET 2 STARTING ADD
007122  000000                          .WORD   0               ;POINTER TO DATA PACKET 3 STARTING ADD
007124  000000                          .WORD   0               ;POINTER TO DATA PACKET 4 STARTING ADD

007126  000000                  DERTBL: .WORD   0               ;ERROR WORD FOR DATA PACKET 1
007130  000000                          .WORD   0               ;ERROR WORD FOR DATA PACKET 2
007132  000000                          .WORD   0               ;ERROR WORD FOR DATA PACKET 3
007134  000000                          .WORD   0               ;ERROR WORD FOR DATA PACKET 4


                                ;THE FOLLOWING TABLE CONTAINS POINTERS FOR WRITE PACKETS

007136  007026                  WRTTBL: .WORD   FLAG             ;ADDRESS OF COMMAND PACKET
007140  027170                  WRTPNT: .WORD   WTPK1            ;ADDRESS OF WRITE PACKET 1
007142  027374                          .WORD   WTPK2            ;ADDRESS OF WRITE PACKET 2
007144  027600                          .WORD   WTPK3            ;ADDRESS OF WRITE PACKET 3
007146  030004                          .WORD   WTPK4            ;ADDRESS OF WRITE PACKET 4
007150  000000                          .WORD   0                ;TABLE TERMINATOR

007152      000     000     004 TUIMSG: .BYTE   0,0,TINIT,TINIT
007155      004

                                ;;*****************************************************************
                                ;*THE FOLLOWING ROUTINE WILL BUILD THE PACKETS SPECIFIED BY THE
                                ;*FUNCTION SELECTED.
                                ;;*****************************************************************

007156  010046                  BLDPKT: MOV     R0,-(SP)         ;SAVE ROUTINES WORKING REGISTER
007160  022715  000003                  CMP     #TWRITE,(R5)     ;CHECK IF FUNCTION = WRITE
007164  001024                          BNE     1$               ;IF NOT WRITE - BRANCH
007166  032737  000040  001246          BIT     #BIT5,$DEVM      ;CHECK IF SEQUENTIAL BLOCKS SELECTED
007174  001406                          BEQ     5$               ;IF NOT SELECTED GENERATE RANDOM NUMBER
007176  005237  007040                  INC     BLKNUM           ;INCREMENT BLOCK NUMBER
007202  042737  177000  007040          BIC     #177000,BLKNUM   ;MASK TO BLOCK NUMBER RANGE
```

```
 7989  007210  000412                          BR      1$              ;GO BUILD REST OF PACKET
 7990  007212  004737  026336          5$:     JSR     PC,$RAND        ;GENERATE RANDOM BLOCK NUMBER
 7991  007216  013700  026436                  MOV     $LONUM,R0       ;GET A RANDOM NUMBER
 7992  007222  042700  177100                  BIC     #177100,R0      ;MASK TO LOW RANGE BLOCK NUMBER
 7993  007226  053700  007044                  BIS     HILOWF,R0       ;SET BLOCK TO HIGH OR LOW RANGE
 7994  007232  010037  007040                  MOV     R0,BLKNUM       ;SAVE THE BLOCK NUMBER IN PACKET
 7995  007236  112737  000012  007027  1$:     MOVB    #TMSG,FLAG+1    ;SETUP PACKET BYTE COUNT
 7996  007244  112737  000002  007026          MOVB    #TCMDPK,FLAG    ;SETUP COMMAND PACKET INDICATOR
 7997  007252  011537  007030                  MOV     (R5),OPCODE     ;GET THE FUNCTION AND SAVE
 7998  007256  032737  000040  001246          BIT     #BIT5,$DEVM     ;CHECK IF SEQUENTIAL BLOCK TESTING
 7999  007264  001010                          BNE     2$              ;IF SEQUENTIAL DO NOT GENERATE RANDOM MODIFIER
 8000  007266  004737  026336                  JSR     PC,$RAND        ;GENERATE RANDOM MODIFIER
 8001  007272  105737  026436                  TSTB    $LONUM          ;IF BIT 7=0 THEN NORMAL READ/WRITE
 8002  007276  100003                          BPL     2$              ;BRANCH IF NORMAL FUNCTION
 8003  007300  052737  000400  007030          BIS     #BIT8,OPCODE    ;SET MODIFIER
 8004  007306  005037  007034          2$:     CLR     SEQNUM          ;CLEAR THE SEQUENCE NUMBER
 8005  007312  012737  001000  007036          MOV     #TWC,BYTCNT     ;SET BYTE COUNT TO 512 BYTES (1 BLOCK)
 8006  007320  022725  000007                  CMP     #TDIAGN,(R5)+   ;CHECK IF FUNCTION WAS DIAGNOSE
 8007  007324  001007                          BNE     3$              ;IF NOT GO BUILD PACKET CHECKSUM
 8008  007326  042737  000400  007030          BIC     #BIT8,OPCODE    ;CLEAR MODIFIER FOR FUNCTION
 8009  007334  005037  007036                  CLR     BYTCNT          ;CLEAR DATA BYTE COUNT
 8010  007340  005037  007040                  CLR     BLKNUM          ;CLEAR BLOCK NUMBER NO TAPE MOTION
 8011  007344  004537  007356          3$:     JSR     R5,BLDCHK       ;GO BUILD CHECKSUM FOR COMMAND PASKET
 8012  007350  007026                          .WORD   FLAG            ;ADDRESS OF PACKET TO BE CHECKSUMMED
 8013  007352  012600                  4$:     MOV     (SP)+,R0        ;RESTORE WORKING REGISTER
 8014  007354  000205                          RTS     R5              ;RETURN BACK TO THE TEST
 8015
 8016                                  ;;*****************************************************************
 8017                                  ;ROUTINE TO BUILD COMMAND AND DATA PACKET CHECKSUMS
 8018                                  ;
 8019                                  ;;*****************************************************************
 8020
 8021  007356  010046          BLDCHK: MOV     R0,-(SP)        ;SAVE ROUTINE WORKING REGISTERS
 8022  007360  010146                  MOV     R1,-(SP)        ;
 8023  007362  010246                  MOV     R2,-(SP)        ;
 8024  007364  012500                  MOV     (R5)+,R0        ;GET ADDRESS OF PACKET TO CHECKSUM
 8025  007366  011002                  MOV     (R0),R2         ;GET FLAG AND PACKET BYTE COUNT
 8026  007370  000302                  SWAB    R2              ;SWAP FLAG WITH PACKET BYTE COUNT
 8027  007372  042702  177400          BIC     #177400,R2      ;DROP FLAG BYTE
 8028  007376  006202                  ASR     R2              ;DIVIDE BY 2 FOR WORD COUNT
 8029  007400  005202                  INC     R2              ;ADD IN FLAG AND PACKET BYTE COUNT
 8030  007402  005001                  CLR     R1              ;USE R1 TO CALCULATE CHECKSUM
 8031  007404  062001          1$:     ADD     (R0)+,R1        ;BUILD CHECKSUM VALUE
 8032  007406  005501                  ADC     R1              ;DO END AROUND CARRY
 8033  007410  005302                  DEC     R2              ;CHECKSUM FINISHED?
 8034  007412  001374                  BNE     1$              ;IF NOT DO NEXT BYTE
 8035  007414  010110                  MOV     R1,(R0)         ;SAVE CHECKSUM IN PACKET
 8036  007416  012602                  MOV     (SP)+,R2        ;RESTORE WORKING REGISTERS
 8037  007420  012601                  MOV     (SP)+,R1        ;
 8038  007422  012600                  MOV     (SP)+,R0        ;
 8039  007424  000205                  RTS     R5              ;RETURN BACK TO CALLING ROUTINE
 8040
 8041                                  ;;*****************************************************************
 8042                                  ;THIS ROUTINE GENERATES RANDOM DATA AND BUILDS WRITE DATA PACKETS
 8043                                  ;
 8044                                  ;;*****************************************************************
```

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 8045
 8046  007426  010046                 WTDPAK: MOV     R0,-(SP)        ;SAVE ROUTINES WORKING REGISTERS
 8047  007430  010146                         MOV     R1,-(SP)        ;
 8048  007432  010246                         MOV     R2,-(SP)        ;
 8049  007434  010346                         MOV     R3,-(SP)        ;
 8050  007436  010446                         MOV     R4,-(SP)        ;
 8051  007440  012500                         MOV     (R5)+,R0        ;GET ADDRESS OF PACKET TO BUILD
 8052  007442  012702  000041                 MOV     #TMSIZ/4+1,R2   ;SETUP PACKET WC/2 +1 FOR FLAG WORD
 8053  007446  012710  100001                 MOV     #100001,(R0)    ;SAVE DATA FLAG AND PACKET BYTE COUNT
 8054  007452  005001                         CLR     R1              ;CLEAR WORKING CHECKSUM
 8055  007454  012704  000001                 MOV     #1,R4           ;SETUP TO ADD FLAG AND BYTE COUNT TO CKSUM
 8056  007460  000407                         BR      3$              ;GO ADD FLAG AND BYTE COUNT TO CKSUM
 8057  007462  012703  026440         1$:     MOV     #$LONUM+2,R3    ;SETUP ADDRESS OF RANDOM NUMBER +2
 8058  007466  012704  000002                 MOV     #2,R4           ;SETUP WORKING COUNTER FOR 2 RANDOM #'S
 8059  007472  004737  026336                 JSR     PC,$RAND        ;GENERATE TWO RANDOM NUMBERS
 8060  007476  014310                 2$:     MOV     -(R3),(R0)      ;SAVE RANDOM NUMBER IN MEMORY
 8061  007500  062001                 3$:     ADD     (R0)+,R1        ;ADD NUMBER TO CHECKSUM
 8062  007502  005501                         ADC     R1              ;DO END AROUND CARRY
 8063  007504  005304                         DEC     R4              ;DECREMENT RANDOM WORKING COUNTER
 8064  007506  001373                         BNE     2$              ;IF NOT 0 GET NEXT RANDOM NUMBER
 8065  007510  005302                         DEC     R2              ;DECREMENT PACKET WC/2 +1
 8066  007512  001363                         BNE     1$              ;GO GET NEXT TWO WORDS
 8067  007514  010120                         MOV     R1,(R0)+        ;SAVE THE CHECKSUM IN MEMORY
 8068  007516  012604                         MOV     (SP)+,R4        ;RESTORE THE WORKING REGISTERS
 8069  007520  012603                         MOV     (SP)+,R3        ;
 8070  007522  012602                         MOV     (SP)+,R2        ;
 8071  007524  012601                         MOV     (SP)+,R1        ;
 8072  007526  012600                         MOV     (SP)+,R0        ;
 8073  007530  000205                         RTS     R5              ;RETURN BACK AND WAIT FOR FLAG BYTE
 8074
 8075
 8076                                 ;;*****************************************************************
 8077                                 ;*THE FOLLOWING ROUTINE WILL SETUP POINTERS TO THE COMMAND OR DATA
 8078                                 ;*PACKET TO BE SENT. CALL PLUS 2 CONTAINS THE POINTER TO THE PACKET TO
 8079                                 ;*BE SENT.  THE TU58 XMIT INTERRUPT ENABLE BIT WILL BE SET ON EXIT.
 8080                                 ;;*****************************************************************
 8081
 8082  007532  010046                 SNDPKT: MOV     R0,-(SP)        ;SAVE WORKING REGISTER
 8083  007534  017500  000000                 MOV     @(R5),R0        ;GET FLAG AND BYTE COUNT WORD
 8084  007540  000300                         SWAB    R0              ;EXCHANGE BYTES
 8085  007542  042700  177400                 BIC     #177400,R0      ;CLEAR THE FLAG BYTE
 8086  007546  062700  000004                 ADD     #4,R0           ;ADD FLAG AND CHECKSUM WORDS TO BYTE COUNT
 8087  007552  010037  007052                 MOV     R0,TUXCNT       ;SAVE THE TOTAL PACKET BYTE COUNT
 8088  007556  012537  007050                 MOV     (R5)+,TUXPNT    ;SETUP THE TRANSMIT POINTER TO PACKET
 8089  007562  012600                         MOV     (SP)+,R0        ;RESTORE THE WORKING REGISTER
 8090  007564  005737  007102                 TST     BRKFLG          ;CHECK IF BREAK BEING PERFORMED
 8091  007570  001410                         BEQ     1$              ;IF NOT THEN SET IF BIT
 8092  007572  052737  000001  177174         BIS     #BREAK,TUXCSR   ;SET THE BREAK BIT IN XMIT CSR REGISTER
 8093  007600  005737  177172                 TST     TURXDB          ;CLEAR RECEIVE FLAG IF ANY SET
 8094  007604  052737  000100  177170         BIS     #IE,TURCSR      ;SET RECEIVER INT ENABLE BIT
 8095  007612  052737  000100  177174 1$:     BIS     #IE,TUXCSR      ;SET TRANSMIT INTERRUPT ENABLE
 8096  007620  000205                 2$:     RTS     R5              ;RETURN BACK TO THE TEST
 8097
 8098                                 ;;*****************************************************************
 8099                                 ;*THE FOLLOWING ROUTINE WILL GET A CHARACTER FROM THE TU58 READ MEMORY
 8100                                 ;*BUFFER AND SAVE IT IN LOCATION TUCHR.  IF THE ROUTINE DETECTS A FAILURE
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 8101                                   ;*IN THE RECEIVE/TRANSMIT INTERRUPT SERVICE ROUTINES, THE ROUTINE WILL
 8102                                   ;*RETURN TO CALL+2, OTHERWISE, THE RETURN IS TO CALL+4.  IF A TIMEOUT
 8103                                   ;*ERROR, RETURN IS ALSO TO CALL+2.
 8104                                   ;;*****************************************************************
 8105
 8106  007622  010046                  GETCHR: MOV     R0,-(SP)        ;SAVE THE WORKING REGISTER
 8107  007624  010146                          MOV     R1,-(SP)
 8108  007626  010246                          MOV     R2,-(SP)
 8109  007630  013700  007056                  MOV     TUBUFP,R0       ;GET ADDRESS OF READ BUFFER POINTER
 8110  007634  005001                          CLR     R1              ;SETUP TIMEOUT REGISTERS
 8111  007636  012702  000021                  MOV     #17.,R2         ;
 8112  007642  005737  007064          1$:     TST     TU58ER          ;CHECK IF ANY ERRORS DETECTED BY INT SRV
 8113  007646  001021                          BNE     3$              ;IF ERROR RETURN TO CALL+2
 8114  007650  023700  007054                  CMP     TURPNT,R0       ;CHECK IF CHARACTER RECEIVED
 8115  007654  101405                          BLOS    2$              ;IF NOT GO CHECK FOR DEVICE TIMEOUT
 8116  007656  112037  007104                  MOVB    (R0)+,TUCHR     ;GET THE CHARACTER FROM MEMORY
 8117  007662  010037  007056                  MOV     R0,TUBUFP       ;UPDATE MEMORY BUFFER POINTER
 8118  007666  000416                          BR      4$              ;RETURN CALL+4 - CHAR RECEIVED
 8119  007670  005301                  2$:     DEC     R1              ;DECREMENT 1ST TIMEOUT COUNTER
 8120  007672  001363                          BNE     1$              ;WAIT AGAIN IF NOT 0
 8121  007674  005237  001200                  INC     $DEVCT          ;INDICATE TO APT PROGRAM STILL RUNNING
 8122  007700  005302                          DEC     R2              ;CHECK IF 2ND COUNTER OVERFLOWED
 8123  007702  001357                          BNE     1$              ;IF NOT GO WAIT AGAIN
 8124  007704  052737  000200  007064          BIS     #BIT7,TU58ER    ;SET TIMEOUT ERROR BIT
 8125  007712  005037  177170          3$:     CLR     TURCSR          ;CLEAR BOTH RECV AND XMIT CSR REGISTERS
 8126  007716  005037  177174                  CLR     TUXCSR
 8127  007722  000403                          BR      5$              ;RESTORE WORKING REGISTERS RETURN CALL+2
 8128  007724  005725                  4$:     TST     (R5)+           ;BUMP POINTER PAST DEVICE FAILURE ADDRESS
 8129  007726  005237  001200                  INC     $DEVCT          ;INDICATE TO APT PROGRAM STILL RUNNING
 8130  007732  012602                  5$:     MOV     (SP)+,R2        ;RESTORE THE WORKING REGISTERS
 8131  007734  012601                          MOV     (SP)+,R1
 8132  007736  012600                          MOV     (SP)+,R0
 8133  007740  000205                          RTS     R5              ;RETURN BACK TO PROGRAM
 8134
 8135                                   ;;*****************************************************************
 8136                                   ;*THE FOLLOWING ROUTINE WILL READ A CHARACTER AND DETERMINE WHAT
 8137                                   ;*FUNCTION IS TO BE PERFORMED. THE PROGRAM WILL THEN GO TO THE FUNCTION
 8138                                   ;ROUTINE AND SERVICE IT.  THE RETURNS ARE LISTED BELOW FOR THE FUNCTION.
 8139                                   ;*
 8140                                   ;*CALL+2        DEVICE ERROR
 8141                                   ;*CALL+4        (READ)DATA PACKET/(WRITE)CONT
 8142                                   ;*CALL+6        END PACKET ERROR DETECTED
 8143                                   ;*CALL+10       END PACKET NO ERRORS DETECTED
 8144                                   ;;*****************************************************************
 8145
 8146  007742  010046                  GETPKT: MOV     R0,-(SP)        ;SAVE THE WORKING REGISTER
 8147  007744  004537  007622                  JSR     R5,GETCHR       ;GO GET A CHARACTER FROM BUFFER
 8148  007750  000461                          BR      6$              ;DEVICE ERROR RETURN CALL+2
 8149  007752  113700  007104                  MOVB    TUCHR,R0        ;GET THE CHARACTER READ
 8150  007756  122700  000020                  CMPB    #TCONT,R0       ;CHECK IF IT WAS A CONTINUE
 8151  007762  001022                          BNE     2$              ;IF NOT CHECK IF IT WAS AN INIT
 8152  007764  122737  000003  007030          CMPB    #TWRITE,OPCODE  ;CHECK IF FUNCTION WAS WRITE
 8153  007772  001404                          BEQ     1$              ;IF WRITE - COUNT THE NUMBER OF CONT'S
 8154  007774  052737  010000  007064          BIS     #BIT12,TU58ER   ;SET BIT INDICATING CONT RECV'D DURING READ
 8155  010002  000444                          BR      6$              ;DEVICE ERROR RETURN CALL+2
 8156  010004  005237  007070          1$:     INC     CONTFL          ;INCREMENT CONTINUE FLAG COUNTER
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 8157  010010  122737  000004  007070          CMPB    #4,CONTFL       ;CHECK IF MORE THEN 4 CONT'S
 8158  010016  103045                          BHIS    9$              ;IF 4 OR LESS RETURN TO CALL+4
 8159  010020  052737  020000  007064          BIS     #BIT13,TU58ER   ;SET BIT INDICATING MORE THEN 4 CONT'S
 8160  010026  000432                          BR      6$              ;DEVICE ERROR RETURN CALL+2
 8161  010030  122700  000004          2$:     CMPB    #TINIT,R0       ;CHECK IF INIT CODE
 8162  010034  001004                          BNE     3$              ;IF NOT GO CHECK TO SEE IF DATA PACKET
 8163  010036  052737  002000  007064          BIS     #BIT10,TU58ER   ;SET BIT INDICATING INIT RECEIVED
 8164  010044  000423                          BR      6$              ;DEVICE ERROR RETURN CALL+2
 8165  010046  122700  000001          3$:     CMPB    #TDATA,R0       ;CHECK IF DATA PACKET
 8166  010052  001004                          BNE     4$              ;IF NOT GO CHECK FOR END PACKET
 8167  010054  004537  010140                  JSR     R5,DATPKT       ;GO READ IN THE PACKET
 8168  010060  000415                          BR      6$              ;DEVICE ERROR RETURN CALL+2
 8169  010062  000423                          BR      9$              ;NO DEVICE FAILURE RETURN CALL+4
 8170  010064  122700  000002          4$:     CMPB    #TCMDPK,R0      ;CHECK IF END PACKET
 8171  010070  001404                          BEQ     5$              ;IF END PACKET GO READ IT
 8172  010072  052737  100000  007064          BIS     #BIT15,TU58ER   ;SET BIT INDICATING UNRECOGNIZABLE CHAR
 8173  010100  000405                          BR      6$              ;DEVICE FAILURE RETURN CALL+2
 8174  010102  004537  010512          5$:     JSR     R5,ENDPKT       ;GO READ IN THE END PACKET
 8175  010106  000402                          BR      6$              ;DEVICE FAILURE RETURN CALL+2
 8176  010110  000407                          BR      8$              ;PACKET ERROR RETRETURN CALL+6
 8177  010112  000405                          BR      7$              ;NO ERRORS RETURN CALL+10
 8178  010114  005037  177170          6$:     CLR     TURCSR          ;CLEAR CSR REGISTERS
 8179  010120  005037  177174                  CLR     TUXCSR          ;
 8180  010124  000403                          BR      10$             ;DEVICE ERROR RETURN CALL+2
 8181  010126  005725                  7$:     TST     (R5)+           ;END PACKET RETURN NO ERRORS CALL+10
 8182  010130  005725                  8$:     TST     (R5)+           ;END PACKET ERROR DETECTED RETURN CALL+6
 8183  010132  005725                  9$:     TST     (R5)+           ;DATA PACKET OR CONT RETURN CALL+4
 8184  010134  012600                  10$:    MOV     (SP)+,R0        ;RESTORE THE WORKING REGISTER
 8185  010136  000205                          RTS     R5              ;RETURN BACK TO PROGRAM
 8186
 8187                                  ;;**************************************************************************
 8188                                  ;*THE FOLLOWING ROUTINE WILL READ AND CHECK DATA PACKETS RECEIVED FROM
 8189                                  ;*TU58.  IF AN ERROR IS DETECTED, LOCATION PKTERR WILL INDICATE A DATA
 8190                                  ;*PACKET FAILURE FOR THE PACKET RECEIVED. TABLE DERTBL WILL CONTAIN THE
 8191                                  ;*ERROR BITS FOR THE FAILING PACKET. TABLE DATPNT WILL CONTAIN THE
 8192                                  ;*STARTING ADDRESSES OF THE DATA PACKETS AS STORED IN THE MEMORY BUFFER.
 8193                                  ;*BIT DEFINITIONS OF DATA PACKET ERROR FLAG AS STORED IN DERTBL ARE:
 8194                                  ;*
 8195                                  ;*BIT14=1        PACKET CHECKSUM FAILURE
 8196                                  ;*BIT13=1        DATA CHECKSUM FAILURE (READ NOT EQUAL WRITE CHECKSUM)
 8197                                  ;*BIT12=1        PACKET BYTE COUNT READ NOT EQUAL EXPECTED
 8198                                  ;*
 8199                                  ;*RETURNS
 8200                                  ;*
 8201                                  ;*CALL+2         DEVICE ERROR
 8202                                  ;*CALL+4         GOOD RETURN (PACKET ERRORS MAY BE PENDING)
 8203                                  ;*
 8204                                  ;;**************************************************************************
 8205
 8206  010140  010046          DATPKT: MOV     R0,-(SP)        ;SAVE THE WORKING REGISTERS
 8207  010142  010146                  MOV     R1,-(SP)        ;
 8208  010144  010246                  MOV     R2,-(SP)        ;
 8209  010146  010346                  MOV     R3,-(SP)        ;
 8210  010150  010446                  MOV     R4,-(SP)        ;
 8211  010152  122737  000002  007030          CMPB    #TREAD,OPCODE   ;CHECK IF FUNCTION WAS READ
 8212  010160  001404                          BEQ     1$              ;IF FUNCTION IS READ THEN CONTINUE
```

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 8213  010162  052737  004000  007064          BIS     #BIT11,TU58ER   ;SET BIT INDICATING DATA PACKET DURING WRITE
 8214  010170  000542                          BR      12$             ;RETURN CALL+2 DEVICE ERROR
 8215  010172  005737  007072          1$:     TST     DATAFL          ;CHECK IF FIRST PACKET
 8216  010176  001025                          BNE     2$              ;IF NOT FIRST TIME CONTINUE
 8217  010200  012737  007140  007106          MOV     #WRTPNT,WRKSUM  ;TABLE POINTER TO WRITE PACKET ADDRESSES
 8218  010206  012737  007126  007110          MOV     #DERTBL,WRKERR  ;TABLE POINTER TO THIS PACKETS ERROR
 8219  010214  012737  007116  007112          MOV     #DATPNT,WRKPNT  ;TABLE POINTER TO PACKETS STARTING ADDRESS
 8220  010222  012737  010000  007114          MOV     #BIT12,DERFLG   ;SET PACKET ERROR FLAG TO 1ST PACKET
 8221  010230  012700  007126                  MOV     #DERTBL,R0      ;SETUP TO CLEAR DATA PACKET ERROR TABLE
 8222  010234  012701  000004                  MOV     #4,R1           ;
 8223  010240  005020                  20$:    CLR     (R0)+           ;CLEAR THE LOCATION IN TABLE
 8224  010242  005301                          DEC     R1              ;DECREMENT TABLE COUNTER
 8225  010244  001375                          BNE     20$             ;NO NEXT LOCATION IF NOT 0
 8226  010246  005037  007066                  CLR     DPKTER          ;CLEAR ACCUMULATED PACKET ERROR WORD
 8227  010252  005237  007072          2$:     INC     DATAFL          ;INCREMENT DATA PACKET COUNTER
 8228  010256  022737  000004  007072          CMP     #4,DATAFL       ;CHECK IF 4 DATA PACKETS OR LESS
 8229  010264  103004                          BHIS    3$              ;CONTINUE IF 4 OR LESS
 8230  010266  052737  040000  007064          BIS     #BIT14,TU58ER   ;MORE THEN 4 DATA PACKETS RECEIVED
 8231  010274  000500                          BR      12$             ;RETURN CALL+2 DEVICE ERROR
 8232  010276  013700  007056          3$:     MOV     TUBUFP,R0       ;GET UPDATED BUFFER POINTER
 8233  010302  005300                          DEC     R0              ;BACK UP TO START OF DATA PACKET
 8234  010304  010077  176602                  MOV     R0,@WRKPNT      ;SAVE DATA PACKET POINTER IN TABLE
 8235  010310  005003                          CLR     R3              ;CLEAR WORKING WORD
 8236  010312  005004                          CLR     R4              ;SET CHECKSUM INITIALLY TO 0
 8237  010314  012701  000101                  MOV     #TMSIZ+2/2,R1   ;SETUP PACKET EXPECTED WC -1
 8238  010320  012702  000002                  MOV     #2,R2           ;SETUP BYTE COUNT FOR READING A WORD
 8239  010324  000406                          BR      6$              ;GO ADD CHARACTER READ TO CHECKSUM
 8240  010326  012702  000002          4$:     MOV     #2,R2           ;SETUP BYTE COUNT FOR READING A WORD
 8241  010332  005003                          CLR     R3              ;CLEAR THE WORKING WORD
 8242  010334  004537  007622          5$:     JSR     R5,GETCHR       ;GO GET A CHARACTER FROM THE BUFFER
 8243  010340  000456                          BR      12$             ;DEVICE ERROR RETURN CALL+2
 8244  010342  152003                  6$:     BISB    (R0)+,R3        ;ADD BYTE TO WORKING WORD
 8245  010344  000303                          SWAB    R3              ;EXCHANGE BYTES
 8246  010346  005302                          DEC     R2              ;DECREMENT WORD BYTE COUNT
 8247  010350  001371                          BNE     5$              ;IF NOT WORD GET NEXT BYTE
 8248  010352  005301                          DEC     R1              ;DECREMENT PACKET WC
 8249  010354  100403                          BMI     7$              ;IF MINUS THEN CHECKSUM READ IS IN R3
 8250  010356  060304                          ADD     R3,R4           ;ADD WORD TO CHECKSUM
 8251  010360  005504                          ADC     R4              ;ADD END AROUND CARRY
 8252  010362  000761                          BR      4$              ;GO READ NEXT WORD
 8253  010364  005001                  7$:     CLR     R1              ;CLEAR WORKING ERROR REGISTER
 8254  010366  020304                          CMP     R3,R4           ;COMPARE CHECKSUM CALCULATED WITH READ
 8255  010370  001402                          BEQ     8$              ;IF EQUAL THEN CONTINUE
 8256  010372  052701  040000                  BIS     #BIT14,R1       ;SET PACKET CHECKSUM ERROR BIT
 8257  010376  017702  176504          8$:     MOV     @WRKSUM,R2      ;GET ADDRESS OF WRITE PACKET
 8258  010402  026203  000202                  CMP     TMSIZ+2(R2),R3  ;CHECK WRITE CHECKSUM WITH ONE READ
 8259  010406  001402                          BEQ     9$              ;IF EQUAL THEN CONTINUE
 8260  010410  052701  020000                  BIS     #BIT13,R1       ;SET DATA CHECKSUM FAILURE
 8261  010414  017700  176472          9$:     MOV     @WRKPNT,R0      ;GET STARTING ADDRESS OF DATA PACKET
 8262  010420  105720                          TSTB    (R0)+           ;BUMP POINTER TO PACKET BYTE COUNT
 8263  010422  122710  000200                  CMPB    #TMSIZ,(R0)     ;CHECK DATA PACKET BYTE COUNT
 8264  010426  001402                          BEQ     10$             ;IF EQUAL THEN CONTINUE
 8265  010430  052701  010000                  BIS     #BIT12,R1       ;SET PACKET BYTE COUNT ERROR BIT
 8266  010434  010177  176450          10$:    MOV     R1,@WRKERR      ;SAVE ERROR WORD IN ERROR TABLE
 8267  010440  001403                          BEQ     11$             ;IF NO ERRORS DO NOT SET PKTERR
 8268  010442  053737  007114  007062          BIS     DERFLG,PKTERR   ;SET ERROR INDICATOR FOR THIS PACKET
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 8269  010450  012702  000002          11$:    MOV     #2,R2           ;SETUP POINTER UPDATE COUNTER
 8270  010454  060237  007106                  ADD     R2,WRKSUM       ;UPDATE WRITE PACKET TABLE POINTER
 8271  010460  060237  007110                  ADD     R2,WRKERR       ;UPDATE DATA PACKET ERROR POINTER
 8272  010464  060237  007112                  ADD     R2,WRKPNT       ;UPDATE DATA PACKET ADDRESS TABLE POINTER
 8273  010470  006337  007114                  ASL     DERFLG          ;UPDATE PACKET ERROR FLAG
 8274  010474  005725                          TST     (R5)+           ;BUMP POINTER PAST DEVICE ERROR RETURN
 8275  010476  012604                  12$:    MOV     (SP)+,R4        ;RESTORE THE ROUTINES WORKING REGISTERS
 8276  010500  012603                          MOV     (SP)+,R3        ;
 8277  010502  012602                          MOV     (SP)+,R2        ;
 8278  010504  012601                          MOV     (SP)+,R1        ;
 8279  010506  012600                          MOV     (SP)+,R0        ;
 8280  010510  000205                          RTS     R5              ;RETURN BACK TO PROGRAM
 8281
 8282                                  ;;*****************************************************************
 8283                                  ;*THE FOLLOWING ROUTINE WILL RECEIVE AND CHECK THE END PACKET RECEIVED
 8284                                  ;*FROM THE TU58.  LOCATION PKTERR WILL CONTAIN PACKET ERROR INFORMATION
 8285                                  ;*ON EXIT FROM THIS ROUTINE.
 8286                                  ;*
 8287                                  ;*RETURN
 8288                                  ;*
 8289                                  ;*CALL+2         DEVICE ERROR
 8290                                  ;*CALL+4         END PACKET ERROR DETECTED
 8291                                  ;*CALL+6         END PACKET NO ERROR DETECTED
 8292                                  ;*
 8293                                  ;*LOCATION PKTERR BIT DEFINITIONS
 8294                                  ;*
 8295                                  ;*BIT15=1        READ PACKET 4 FAILED
 8296                                  ;*BIT14=1        READ PACKET 3 FAILED
 8297                                  ;*BIT13=1        READ PACKET 2 FAILED
 8298                                  ;*BIT12=1        READ PACKET 1 FAILED
 8299                                  ;*BIT11=1        NOT USED
 8300                                  ;*BIT10=1        NOT USED
 8301                                  ;*BIT09=1        READ OPERATION - 4 DATA PACKETS NOT RECEIVED
 8302                                  ;*BIT08=1        WRITE OPERATION - 4 CONTINUES NOT RECEIVED
 8303                                  ;*
 8304                                  ;*      END PACKET ERROR BITS
 8305                                  ;*
 8306                                  ;*BIT07=1        CHECKSUM ERROR
 8307                                  ;*BIT06=1        PACKET BYTE COUNT ERROR
 8308                                  ;*BIT05=1        OPCODE ERROR
 8309                                  ;*BIT04=1        SUCCESS CODE FAILURE
 8310                                  ;*BIT03=1        UNIT NUMBER READ INCORRECT
 8311                                  ;*BIT02=1        SEQUENCE NUMBER NOT 0
 8312                                  ;*BIT01=1        DATA BYTE COUNT WORD INCORRECT
 8313                                  ;*BIT00=1        SUMMARY WORD FAILURE
 8314                                  ;*
 8315                                  ;;*****************************************************************
 8316
 8317  010512  010046          ENDPKT: MOV     R0,-(SP)        ;SAVE ALL WORKING REGISTERS
 8318  010514  010146                  MOV     R1,-(SP)        ;
 8319  010516  010246                  MOV     R2,-(SP)        ;
 8320  010520  010346                  MOV     R3,-(SP)        ;
 8321  010522  010446                  MOV     R4,-(SP)        ;
 8322  010524  013700  007056          MOV     TUBUFP,R0       ;GET UPDATED BUFFER POINTER
 8323  010530  005300                  DEC     R0              ;BACK UP TO START OF END PACKET
 8324  010532  010037  007060          MOV     R0,PKTPNT       ;SAVE END PACKET POINTER
```

```
 8325  010536  005003                          CLR     R3              ;CLEAR WORKING WORD
 8326  010540  005004                          CLR     R4              ;SET CHECKSUM INITIALLY TO 0
 8327  010542  012701  000006                  MOV     #TMSG+2/2,R1    ;SETUP PACKET EXPECTED WC -1
 8328  010546  012702  000002                  MOV     #2,R2           ;SETUP BYTE COUNT FOR READING A WORD
 8329  010552  000406                          BR      3$              ;GO ADD THIS CHARACTER TO CHECKSUM
 8330  010554  012702  000002          1$:     MOV     #2,R2           ;SETUP BYTE COUNT FOR READING A WORD
 8331  010560  005003                          CLR     R3              ;CLEAR THE WORKING WORD
 8332  010562  004537  007622          2$:     JSR     R5,GETCHR       ;GO GET A BYTE FROM MEMORY
 8333  010566  000557                          BR      17$             ;DEVICE ERROR RETURN CALL+2
 8334  010570  152003                  3$:     BISB    (R0)+,R3        ;ADD BYTE TO WORKING WORD
 8335  010572  000303                          SWAB    R3              ;EXCHANGE IT
 8336  010574  005302                          DEC     R2              ;DECREMENT WORD BYTE COUNT
 8337  010576  001371                          BNE     2$              ;GO GET 2ND BYTE OF WORD
 8338  010600  005301                          DEC     R1              ;DECREMENT PACKET WORD COUNT
 8339  010602  100403                          BMI     4$              ;IF MINUS THE WC - CHECKSUM IN R3
 8340  010604  060304                          ADD     R3,R4           ;ADD WORD READ TO CHECKSUM
 8341  010606  005504                          ADC     R4              ;ADD END AROUND CARRY
 8342  010610  000761                          BR      1$              ;GO GET NEXT TWO BYTES FROM MEMORY
 8343  010612  005001                  4$:     CLR     R1              ;CLEAR PACKET ERROR REGISTER
 8344  010614  020304                          CMP     R3,R4           ;CHECK FOR CHECKSUM ERROR
 8345  010616  001402                          BEQ     5$              ;IF GOOD THEN CONTINUE
 8346  010620  052701  000200                  BIS     #BIT7,R1        ;SET PACKET CHECKSUM ERROR BIT
 8347  010624  013700  007060          5$:     MOV     PKTPNT,R0       ;GET POINTER TO PACKET
 8348  010630  105720                          TSTB    (R0)+           ;BUMP POINTER TO PACKET BYTE COUNTER
 8349  010632  123720  007027                  CMPB    FLAG+1,(R0)+    ;CHECK PACKET BYTE COUNT
 8350  010636  001402                          BEQ     6$              ;IF OK THEN CONTINUE
 8351  010640  052701  000100                  BIS     #BIT6,R1        ;SET PACKET BYTE COUNT ERROR BIT
 8352  010644  122720  000100          6$:     CMPB    #TENDPK,(R0)+   ;CHECK OPCODE TO BF END PACKET
 8353  010650  001402                          BEQ     7$              ;IF IT IS THEN CONTINUE
 8354  010652  052701  000040                  BIS     #BIT5,R1        ;SET NOT END PACKET OPCODE ERROR BIT
 8355  010656  112037  007074          7$:     MOVB    (R0)+,SUCCES    ;CHECK SUCCESS CODE BYTE TO BE 0
 8356  010662  001402                          BEQ     8$              ;IF SUCCESS CODE = 0 THEN CONTINUE
 8357  010664  052701  000020                  BIS     #BIT4,R1        ;SET SUCCESS CODE ERROR BIT
 8358  010670  123720  007032          8$:     CMPB    UNITNM,(R0)+    ;CHECK UNIT NUMBER TO BE =
 8359  010674  001402                          BEQ     9$              ;IF SAME UNIT NUMBER THEN CONT
 8360  010676  052701  000010                  BIS     #BIT3,R1        ;SET UNIT NUMBER ERROR BIT
 8361  010702  105720                  9$:     TSTB    (R0)+           ;BUMP POINTER TO SEQUENCE NUMBER
 8362  010704  105720                          TSTB    (R0)+           ;CHECK LOW BYTE TO BE 0
 8363  010706  001402                          BEQ     10$             ;IF SEQ NUMBER = 0 THEN BRANCH
 8364  010710  052701  000004                  BIS     #BIT2,R1        ;SET SEQUENCE NUMBER ERROR BIT
 8365  010714  105720                  10$:    TSTB    (R0)+           ;CHECK HIGH BYTE OF SEQUENCE NUMBER
 8366  010716  001402                          BEQ     11$             ;IF 0 THEN CONTINUE
 8367  010720  052701  000004                  BIS     #BIT2,R1        ;SET SEQUENCE NUMBER ERROR BIT
 8368  010724  111037  007076          11$:    MOVB    (R0),BYTECT     ;SAVE LOW BYTE OF DATA BYTE COUNT
 8369  010730  123720  007036                  CMPB    BYTCNT,(R0)+    ;CHECK LOW BYTE OF BYTE COUNT
 8370  010734  001402                          BEQ     12$             ;IF GOOD THEN CONTINUE
 8371  010736  052701  000002                  BIS     #BIT1,R1        ;SET DATA BYTE COUNT ERROR BIT
 8372  010742  111037  007077          12$:    MOVB    (R0),BYTECT+1   ;SAVE HIGH BYTE OF DATA BYTE COUNT
 8373  010746  123720  007037                  CMPB    BYTCNT+1,(R0)+  ;CHECK HIGH BYE OF DATA BYTE COUNT
 8374  010752  001402                          BEQ     13$             ;IF OK THEN CONTINUE
 8375  010754  052701  000002                  BIS     #BIT1,R1        ;SET DATA BYTE COUNT ERROR BIT
 8376  010760  112037  007100          13$:    MOVB    (R0)+,SUMARY    ;SAVE LOW BYTE OF SUMMARY WORD
 8377  010764  112037  007101                  MOVB    (R0)+,SUMARY+1  ;SAVE HIGH BYTE OF SUMMARY WORD
 8378  010770  032737  170000  007100          BIT     #170000,SUMARY  ;CHECK SUMMARY ERROR BITS TO BE 0
 8379  010776  001402                          BEQ     14$             ;IF NO ERROR BITS SET CONTINUE
 8380  011000  052701  000001                  BIS     #BIT0,R1        ;SET SUMMARY ERROR BIT
```

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 8381  011004  122737  000003  007030  14$:    CMPB    #TWRITE,OPCODE  ;CHECK FUNCTION TO BE WRITE
 8382  011012  001006                          BNE     15$             ;IF NOT WRITE THEN EXIT
 8383  011014  022737  000004  007070          CMP     #4,CONTFL       ;CHECK IF 4 CONTINUES WERE RECEIVED
 8384  011022  001402                          BEQ     15$             ;IF 4 CONTINUES THEN EXIT
 8385  011024  052701  000400                  BIS     #BIT8,R1        ;SET BIT INDICATING INCORRECT # OF CONT
 8386  011030  122737  000002  007030  15$:    CMPB    #TREAD,OPCODE   ;CHECK IF FUNCTION WAS READ PACKET
 8387  011036  001006                          BNE     16$             ;IF NOT THEN SET ERROR BITS IF ANY
 8388  011040  022737  000004  007072          CMP     #4,DATAFL       ;CHECK IF 4 DATA PACKETS RECEIVED
 8389  011046  001402                          BEQ     16$             ;IF YES THEN CONTINUE
 8390  011050  052701  001000                  BIS     #BIT9,R1        ;SET BIT INDICATING DATA PACKET INCOMPLETE
 8391  011054  050137  007062          16$:    BIS     R1,PKTERR       ;SAVE END PACKET ERROR INFORMATION
 8392  011060  005725                          TST     (R5)+           ;BUMP POINTER TO END PACKET ERROR RETURN
 8393  011062  012700  007126                  MOV     #DERTBL,R0      ;GET ADDRESS OF DATA PACKET ERROR TABLE
 8394  011066  012702  000004                  MOV     #4,R2           ;SETUP TO BUILD DATA PACKET ERROR WORD
 8395  011072  005001                          CLR     R1              ;CLEAR WORKING ERROR WORD
 8396  011074  052001          18$:    BIS     (R0)+,R1        ;SET THE ERROR BITS FROM THIS PACKET
 8397  011076  005302                          DEC     R2              ;CHECK IF ALL 4 PACKETS BUILT
 8398  011100  001404                          BEQ     19$             ;IF YES THEN CHECK TO SEE IF ERRORS
 8399  011102  006201                          ASR     R1              ;MOVE THE PACKET ERROR BITS TO POSITION
 8400  011104  006201                          ASR     R1              ;
 8401  011106  006201                          ASR     R1
 8402  011110  000771                          BR      18$             ;GO GET NEXT PACKET ERROR BITS
 8403  011112  010137  007066          19$:    MOV     R1,DPKTER       ;SAVE THE ACCUMULATED DATA PACKET ERROR BITS
 8404  011116  005737  007062                  TST     PKTERR          ;CHECK IF ANY ERRORS DETECTED
 8405  011122  001001                          BNE     17$             ;IF YES THEN RETURN CALL+4
 8406  011124  005725                          TST     (R5)+           ;RETURN CALL+6 NO ERROR DETECTED
 8407  011126  012604          17$:    MOV     (SP)+,R4        ;RESTORE WORKING REGISTERS
 8408  011130  012603                          MOV     (SP)+,R3        ;
 8409  011132  012602                          MOV     (SP)+,R2        ;
 8410  011134  012601                          MOV     (SP)+,R1        ;
 8411  011136  012600                          MOV     (SP)+,R0        ;
 8412  011140  000205                          RTS     R5              ;RETURN BACK TO THE TEST
 8413
 8414                          ;;*****************************************************************
 8415                          ;*THIS ROUTINE WILL DETERMINE IF A TU58 SOFT ERROR IS TO BE REPORTED.
 8416                          ;*LOCATION $USWR CONTAINS THE ALLOWABLE NUMBER OF SOFT ERRORS (DEFAULT
 8417                          ;*VALUE EQUALS 000000). THE PROGRAM WILL RETURN TO
 8418                          ;*CALL+2        ERROR RETURN - SOFT ERRORS ON THIS DRIVE EXCEEDS ALLOWED #
 8419                          ;*CALL+4        SOFT ERROR IS ALLOWED - CONT WITHOUT REPORTING THE ERROR
 8420                          ;;*****************************************************************
 8421
 8422  011142  005237  001256  SOFTER: INC     SERTTL          ;INCREMENT TOTAL SOFT ERROR COUNTER
 8423  011146  005237  026334          INC     PSERR           ;INCREMENT EOP SOFT ERROR COUNTER
 8424  011152  005737  007032          TST     UNITNM          ;CHECK TO SEE WHICH UNIT ERROR OCCURED
 8425  011156  001011                  BNE     1$              ;BR IF UNIT 1
 8426  011160  005237  001260          INC     SERUN0          ;INCREMENT UNIT 0'S SOFT ERROR COUNTER
 8427  011164  023737  001214  001260  CMP     $USWR,SERUN0    ;CHECK IF ALLOWED SOFT ERROR CNT EXCEEDED
 8428  011172  103014                  BHIS    2$              ;IF $USWR >= SERUN0 DON'T REPORT ERROR
 8429  011174  005037  001260          CLR     SERUN0          ;CLEAR UNIT 0'S SOFT ERROR COUNTER
 8430  011200  000412                  BR      3$              ;RETURN AND REPORT ERROR
 8431  011202  005237  001262  1$:     INC     SERUN1          ;INCREMENT UNIT 1'S COFT ERROR COUNTER
 8432  011206  023737  001214  001262  CMP     $USWR,SERUN1    ;CHECK IF SOFT ERROR COUNT EXCEEDED
 8433  011214  103003                  BHIS    2$              ;IF $USWR >= SERUN1 DON'T REPORT ERROR
 8434  011216  005037  001262          CLR     SERUN1          ;CLEAR UNIT 1'S SOFT ERROR COUNTER
 8435  011222  000401                  BR      3$              ;RETURN AND REPORT ERROR
 8436  011224  005725          2$:     TST     (R5)+           ;SOFT ERROR ALLOWED - DON'T REPORT ERROR
```

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 8437  011226  000205                  3$:     RTS     R5              ;RETURN BACK TO CALL +2 OR +4
 8438
 8439
 8440
 8441                                  ;;*****************************************************************
 8442                                  ;       END OF PASS
 8443                                  ;;*****************************************************************
 8444
 8445  011230  005237  001264          EOP:    INC     KILFLG          ;SET DEVICE KILL FLAG
 8446  011234  004537  013156                  JSR     R5,TIMER        ;GO WAIT FOR ALL DEVICES TO SHUT DOWN
 8447  011240  001266                          DEVACT                  ;DEVICE ACTIVE FLAG
 8448  011242  000000                          0                       ;SHOULD GO TO 0
 8449  011244  000240                          NOP                     ;ERROR RETURN
 8450  011246  000401                          BR      EOPERR          ;GO REPORT THE HUNG DEVICE
 8451  011250  000443                          BR      EOP1            ;NO ERROR - CHECK VIDEO PROCESSER
 8452  011252  032737  000200  001266  EOPERR: BIT     #BIT7,DEVACT    ;CHECK IF VT100 HUNG
 8453  011260  001401                          BEQ     1$
 8454  011262  104034                          ERROR+34                ;VT100 HUNG
 8455  011264  032737  000100  001266  1$:     BIT     #BIT6,DEVACT    ;CHECK IF CLOCK HUNG
 8456  011272  001401                          BEQ     2$
 8457  011274  104015                          ERROR+15                ;CLOCK HUNG
 8458  011276  032737  000040  001266  2$:     BIT     #BIT5,DEVACT    ;CHECK IF PRINTER HUNG
 8459  011304  001401                          BEQ     3$
 8460  011306  104016                          ERROR+16                ;PRINTER HUNG
 8461  011310  032737  000020  001266  3$:     BIT     #BIT4,DEVACT    ;CHECK IF ASYNC COMM HUNG
 8462  011316  001401                          BEQ     4$
 8463  011320  104023                          ERROR+23                ;ASYNC COMM HUNG
 8464  011322  032737  000010  001266  4$:     BIT     #BIT3,DEVACT    ;CHECK IF CLUSTER TERMINAL 1 HUNG
 8465  011330  001401                          BEQ     5$
 8466  011332  104017                          ERROR+17                ;CLUSTER TERMINAL 1 HUNG
 8467  011334  032737  000004  001266  5$:     BIT     #BIT2,DEVACT    ;CHECK IF CLUSTER TERMINAL 2 HUNG
 8468  011342  001401                          BEQ     6$              ;
 8469  011344  104020                          ERROR+20                ;CLUSTER TERMINAL 2 HUNG
 8470  011346  032737  000002  001266  6$:     BIT     #BIT1,DEVACT    ;CHECK IF CLUSTER TERMINAL 3 HUNG
 8471  011354  001401                          BEQ     EOP1            ;IF NOT ERRORS ARE DONE FOR THIS PASS
 8472  011356  104021                          ERROR+21                ;CLUSTER TERMINAL 3 HUNG
 8473  011360  004737  013270          EOP1:   JSR     PC,TIMER1       ;DELAY FOR OPERATOR TO SEE DISPLAY
 8474  011364  004737  013270                  JSR     PC,TIMER1       ;
 8475  011370  005037  001264                  CLR     KILFLG          ;SET KILL FLAG TO 0
 8476  011374  005037  001266                  CLR     DEVACT          ;CLEAR DEVICE ACTIVE FLAG
 8477  011400  105737  001250                  TSTB    TYPFLG          ;DOING VT100 DISPLAY TESTING?
 8478  011404  001001                          BNE     1$              ;BRANCH IF NOT - DECLARE END OF PASS
 8479  011406  104407                          SAVEVT                  ;POSITION AT LINE 13 AND KEEP PRIORITY HIGH
 8480
 8481  011410                          1$:                             ;RAISE PRIORITY IN CASE CAME FROM ABOVE
 8482  011410  012746  000340                  MOV     #PR7,-(SP)      ;;PUT NEW PS ON STACK
  (1)  011414  012746  011422                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
  (1)  011420  000002                          RTI                     ;;POP NEW PC AND PS
  (1)  011422                          64$:
 8483  011422  104401  016236                  TYPE    ,SAVCON         ;SAVE THE CURSOR POSITION AND ATTRIBUTES
 8484  011426  005237  001176                  INC     $PASS           ;BUMP PASS CTR
 8485  011432  104401                          TYPE                    ;POSITION CURSOR OVER PASS COUNT (LINE 1) AND
 8486  011434  016175                          PASPOS                  ;  SET REVERSE VIDEO
 8487  011436  013746  001176                  MOV     $PASS,-(SP)     ;PUSH PASS COUNT ONTO STACK
 8488  011442  104405                          TYPDS                   ;TYPE PASS COUNT IN DECIMAL
 8489  011444  104401  011577                  TYPE    ,RESCUR         ;RESTORE CURSOR POSITION
```

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 8490  011450  122737  000001  001210          CMPB    #APTENV,$ENV    ;RUNNING UNDER APT ?
 8491  011456  001003                          BNE     3$              ;IF NOT ERASE SCREEN AND REPORT EOP
 8492  011460  104401  016302                  TYPE    ,ENDAPT         ;APT, LEAVE LAST DISPLAY PATTERN ON SCREEN
 8493  011464  000402                          BR      4$              ;CONTINUE THE EOP PRINTOUT
 8494  011466  104401  016277          3$:     TYPE    ,ENDPAS         ;ERASE TO END OF SCREEN AND TYPE END PASS MESSAGE
 8495
 8496  011472  104401  017103          4$:     TYPE    ,MSG3
 8497  011476  013746  026332                  MOV     PERR,-(SP)      ;;SAVE PERR FOR TYPEOUT
  (1)  011502  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
 8498  011504  104401  017135                  TYPE    ,MSG4
 8499  011510  013746  026334                  MOV     PSERR,-(SP)     ;;SAVE PSERR FOR TYPEOUT
  (1)  011514  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
 8500  011516  104401  001165                  TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
 8501  011522  104401  011574                  TYPE    ,NULL           ;NULL CHAR
 8502  011526  004737  013376                  JSR     PC,GFLCHK       ;CHECK IF ^G TYPED DURING TYPEOUT
 8503  011532  122737  000001  001210          CMPB    #APTENV,$ENV    ;RUNNING UNDER APT?
 8504  011540  001003                          BNE     $GET42          ;IF NOT CHECK FOR XXDP CHAIN MODE
 8505  011542  152737  000040  001211          BISB    #APTCSUP,$ENVM  ;UNCONDITIONALLY SET CONSOLE SUPPRESS BIT
 8506
 8507  011550  013700  000042          $GET42: MOV     @#42,R0         ;INSURE R0 CONTAINS THE MONITOR
 8508  011554  001405                          BEQ     $DOAGN          ;BRANCH IF NO MONITOR
 8509  011556  000005                          RESET                   ;CLEAR THE WORLD
 8510  011560  004710                  $ENDAD: JSR     PC,(R0)         ;GO TO MONITOR
 8511  011562  000240                          NOP                     ;SAVE ROOM
 8512  011564  000240                          NOP                     ;FOR
 8513  011566  000240                          NOP                     ;ACT11
 8514  011570  000137                  $DOAGN: JMP     @(PC)+          ;RETURN
 8515  011572  002374                  $RTRN:  .WORD   LOOP            ;
 8516
 8517  011574     377     377     000  NULL:   .BYTE   -1,-1,0         ;NULL CHAR STRING
 8518  011577     033     070     000  RESCUR: .BYTE   ESC,70,0         ;RESTORE CURSOR (<ESC>8)
 8519                                          .EVEN
 8520                                  .SBTTL PROGRAM SUBROUTINES
 8521
 8522  011602  012737  013420  000004  SIZE:   MOV     #INTSRV,ERRVEC  ;SETUP TIMEOUT TRAP ADDR
 8523  011610  012737  000340  000006          MOV     #PR7,ERRVEC+2   ;LOCKOUT INTERR
 8524  011616  005037  013460                  CLR     INTFLG
 8525  011622  012700  017776                  MOV     #17776,R0       ;SIZE MEM. START WITH 4K
 8526  011626  005001                          CLR     R1              ;MEM MAP, 1=4K, 2=8K, ETC
 8527  011630  005037  013460                  CLR     INTFLG
 8528  011634  005710                  16$:    TST     (R0)
 8529  011636  005737  013460                  TST     INTFLG          ;GOT TIMEOUT INTERR?
 8530  011642  001007                          BNE     17$             ;BR IF YES
 8531  011644  005201                          INC     R1
 8532  011646  020027  157776                  CMP     R0,#157776      ;DONE 28K MEM?
 8533  011652  001405                          BEQ     10$             ;BRANCH IF YES
 8534  011654  062700  020000                  ADD     #20000,R0       ;GO TO NEXT 4K
 8535  011660  000765                          BR      16$
 8536  011662  162700  020000          17$:    SUB     #20000,R0       ;RESET R0 BACK TO HIGHEST NON-TIMED OUT ADDR
 8537  011666  010037  012640          10$:    MOV     R0,MAXMEM       ;SAVE
 8538  011672  006301                          ASL     R1              ;MULT BY 2
 8539  011674  016137  012620  011704          MOV     MEMTBL-2(R1),18$
 8540  011702  104401                          TYPE
 8541  011704  000000                  18$:    .WORD   0               ;MEM SIZE
 8542  011706  104401  016655                  TYPE    ,MEM
 8543  011712  004737  013376                  JSR     PC,GFLCHK       ;CHECK IF ^G TYPED DURING TYPEOUT
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 8544
 8545                                   ;CHECK TO SEE IF CLUSTER OPTION PRESENT BY ADDRESSING CSR REGISTER.
 8546                                   ;IF ONE CSR ADDRESS NOT PRESENT, THEN CLUSTER OPTION NOT PRESENT.
 8547
 8548  011716  005037  012612                 CLR     CLPRES          ;CLEAR FLAGS INDICATING CLUSTER NOT PRESENT
 8549  011722  005000                          CLR     R0              ;
 8550  011724  005037  013460                 CLR     INTFLG          ;CLEAR PROGRAM INTERRUPT FLAG
 8551  011730  012700  176500                 MOV     #TK1S,R0        ;SETUP 1ST CLUSTER CSR ADDRESS
 8552  011734  005710                  1$:    TST     (R0)            ;TEST CLUSTER CSR REGISTER
 8553  011736  005737  013460                 TST     INTFLG          ;CHECK TO SEE IF TIMEOUT
 8554  011742  001006                          BNE     2$              ;IF YES THEN OPTION NOT PRESENT
 8555  011744  020027  176520                 CMP     R0,#TK3S        ;CHECK TO SEE IF DONE ALL 3
 8556  011750  001412                          BEQ     3$              ;IF YES THEN CLUSTER PRESENT
 8557  011752  062700  000010                 ADD     #10,R0          ;UPDATE CSR ADDRESS TO NEXT CLUSTER CSR
 8558  011756  000766                          BR      1$              ;GO TRY THIS CSR ADDRESS
 8559  011760  104401  016433          2$:    TYPE    ,CLOPT          ;TYPE CLUSTER OPTION NOT PRESENT
 8560  011764  104401  016676                 TYPE    ,NOTPRES        ;
 8561  011770  004737  013376                 JSR     PC,GFLCHK       ;CHECK IF CONTROL G TYPED
 8562  011774  000402                          BR      4$              ;GO CHECK TO SEE IF TU58 PRESENT
 8563  011776  005237  012612          3$:    INC     CLPRES          ;INDICATE CLUSTER OPTION PRESENT
 8564
 8565                                   ;THE FOLLOWING CODE WILL CHECK TO SEE IF THE TU58 IS PRESENT
 8566
 8567  012002  005037  012620          4$:    CLR     TUPRES          ;CLEAR FLAG INDICATING TU58 NOT PRESENT
 8568  012006  005037  013460                 CLR     INTFLG          ;CLEAR PROGRAM INTERRUPT FLAG
 8569  012012  042737  000100  177170         BIC     #IE,TURCSR      ;CLEAR RECEIVER INTERRUPT ENABLE
 8570  012020  005737  013460                 TST     INTFLG          ;CHECK TO SEE IF TIMEOUT OCCURED
 8571  012024  001407                          BEQ     8$              ;IF NOT THEN OPTION PRESENT
 8572  012026  104401  016452                 TYPE    ,TU58M          ;TYPE TU58 NOT PRESENT
 8573  012032  104401  016676                 TYPE    ,NOTPRES        ;
 8574  012036  004737  013376                 JSR     PC,GFLCHK       ;CHECK IF CONTROL G TYPED
 8575  012042  000402                          BR      9$              ;GO RESET TIMEOUT VECTOR
 8576  012044  005237  012620          8$:    INC     TUPRES          ;SET TU58 PRESENT FLAG
 8577  012050  012737  000006  000004  9$:    MOV     #ERRVEC+2,ERRVEC ;RESTORE TIMEOUT VECTOR
 8578  012056  005037  000006                 CLR     ERRVEC+2                ;
 8579
 8580                                   ;THE FOLLOWING CODE WILL CHECK TO SEE IF THE PRINTER OPTION IS PRESENT.
 8581                                   ;AND SET DTR IF ASYNC COMM IS TO BE IN EXTERNAL LOOPBACK
 8582
 8583  012062  005037  176610                 CLR     AMRC            ;CLEAR COMM CSR REGISTER
 8584  012066  052737  000016  176610         BIS     #<SXMIT!RTS!DTR>,AMRC ;TOGGLE BITS TO CLEAR COMM
 8585  012074  042737  000016  176610         BIC     #<SXMIT!RTS!DTR>,AMRC   ;
 8586  012102  005737  176610                 TST     AMRC            ;READ TO CLEAR BITS THAT MAY SET
 8587  012106  012737  037014  177420         MOV     #<AMOD!B9600!CHAR8>,PARAM ;SETUP COMM PARAMETER REG
 8588  012114  005037  012614                 CLR     PRPRES          ;CLEAR PRINTER PRESENT FLAG
 8589  012120  005037  012616                 CLR     PRPORT          ;CLEAR PRINTER EXT LOOPBACK FLAG
 8590  012124  005737  177514                 TST     PRS             ;CHECK FOR PRINTER ERROR
 8591  012130  100402                          BMI     6$              ;IF ERROR - CHECK EXTERNAL LOOPBACK MODE
 8592  012132  005237  012614                 INC     PRPRES          ;SET PRINTER PRESENT FLAG
 8593  012136  032737  000010  001246  6$:    BIT     #BIT3,$DEVM     ;CHECK IF COMM EXTERNAL LOOPBACK
 8594  012144  001407                          BEQ     7$              ;IF YES THEN DO FURTHER CHECKS
 8595  012146  052737  000006  176610         BIS     #<RTS!DTR>,AMRC ;SET RTS AND DTR FOR INTERNAL LOOPBACK
 8596  012154  005737  012614                 TST     PRPRES          ;WAS THE PRINTER PRESENT
 8597  012160  001027                          BNE     15$             ;IF YES THEN CHECK DROP DEVICE FLAGS
 8598  012162  000420                          BR      5$              ;GO PRINT PRINTER NOT PRESENT
 8599  012164  012737  000002  176610  7$:    MOV     #DTR,AMRC       ;SET COMM DTR TO SET EXTERNAL LOOPBACK
```

```
 8600  012172  005737  176610                    TST     AMRC            ;TO CLEAR ANY BITS THAT MAY SET
 8601  012176  005737  012614                    TST     PRPRES          ;CHECK TO SEE IF PRINTER ALREADY PRESENT
 8602  012202  001016                            BNE     15$             ;IF YES THEN CHECK DROP DEVICE BITS
 8603  012204  005737  177514                    TST     PRS             ;CHECK PRINTER AGAIN FOR ERROR
 8604  012210  100405                            BMI     5$              ;IF ERROR THEN PRINTER NOT PRESENT
 8605  012212  005237  012616                    INC     PRPORT          ;SET PRINTER EXT LOOPBACK FLAG
 8606  012216  005237  012614                    INC     PRPRES          ;SET PRINTER PRESENT FLAG
 8607  012222  000406                            BR      15$             ;GO CHECK DROP DEVICE BITS
 8608  012224  104401  016561          5$:       TYPE    ,PRINT          ;TYPE PRINTER NOT PRESENT
 8609  012230  104401  016676                    TYPE    ,NOTPRES        ;
 8610  012234  004737  013376                    JSR     PC,GFLCHK       ;CHECK IF CONTROL G TYPED WHILE PRINTING
 8611
 8612  012240  032737  100000  001246  15$:     BIT     #BIT15,$DEVM    ;DROP PRINTER TEST?
 8613  012246  001406                            BEQ     19$             ;BR IF NO
 8614  012250  104401  016561                    TYPE    ,PRINT
 8615  012254  104401  017023                    TYPE    ,DROP
 8616  012260  004737  013376                    JSR     PC,GFLCHK       ;CHECK IF ^G TYPED DURING TYPEOUT
 8617
 8618  012264  032737  010000  001246  19$:     BIT     #BIT12,$DEVM    ;DROP CLUSTER TERM #1?
 8619  012272  001410                            BEQ     20$             ;BR IF NO
 8620  012274  104401  016465                    TYPE    ,CLTERM
 8621  012300  104401  016510                    TYPE    ,T1
 8622  012304  104401  017023                    TYPE    ,DROP
 8623  012310  004737  013376                    JSR     PC,GFLCHK       ;CHECK IF ^G TYPED DURING TYPEOUT
 8624
 8625  012314  032737  020000  001246  20$:     BIT     #BIT13,$DEVM    ;DROP CLUSTER TERM #2?
 8626  012322  001410                            BEQ     21$             ;BR IF NO
 8627  012324  104401  016465                    TYPE    ,CLTERM
 8628  012330  104401  016512                    TYPE    ,T2
 8629  012334  104401  017023                    TYPE    ,DROP
 8630  012340  004737  013376                    JSR     PC,GFLCHK       ;CHECK IF ^G TYPED DURING TYPEOUT
 8631
 8632  012344  032737  040000  001246  21$:     BIT     #BIT14,$DEVM    ;DROP CLUSTER TERM #3?
 8633  012352  001410                            BEQ     22$             ;BR IF NO
 8634  012354  104401  016465                    TYPE    ,CLTERM
 8635  012360  104401  016514                    TYPE    ,T3
 8636  012364  104401  017023                    TYPE    ,DROP
 8637  012370  004737  013376                    JSR     PC,GFLCHK       ;CHECK IF ^G TYPED DURING TYPEOUT
 8638
 8639  012374  032737  004000  001246  22$:     BIT     #BIT11,$DEVM    ;DROP ASYNC COMM TEST?
 8640  012402  001406                            BEQ     23$             ;BR IF NO
 8641  012404  104401  016546                    TYPE    ,ACOM
 8642  012410  104401  017023                    TYPE    ,DROP
 8643  012414  004737  013376                    JSR     PC,GFLCHK       ;CHECK IF ^G TYPED DURING TYPEOUT
 8644
 8645  012420  032737  002000  001246  23$:     BIT     #BIT10,$DEVM    ;DROP SYNC COMM TEST?
 8646  012426  001406                            BEQ     24$             ;BR IF NO
 8647  012430  104401  016534                    TYPE    ,SCOM
 8648  012434  104401  017023                    TYPE    ,DROP
 8649  012440  004737  013376                    JSR     PC,GFLCHK       ;CHECK IF ^G TYPED DURING TYPEOUT
 8650
 8651  012444  032737  000400  001246  24$:     BIT     #BIT8,$DEVM     ;DROP TU58 UNIT 0 TESTS?
 8652  012452  001406                            BEQ     25$             ;BR IF NO
 8653  012454  104401  016773                    TYPE    ,DRV0
 8654  012460  104401  017023                    TYPE    ,DROP
 8655  012464  004737  013376                    JSR     PC,GFLCHK       ;CHECK IF ^G TYPED DURING TYPEOUT
```

```
 8656
 8657  012470  032737  001000  001246  25$:    BIT     #BIT9,$DEVM     ;DROP TU58 UNIT 1 TESTS?
 8658  012476  001406                          BEQ     26$             ;BR IF NO
 8659  012500  104401  017007                  TYPE    ,DRV1
 8660  012504  104401  017023                  TYPE    ,DROP
 8661  012510  004737  013376                  JSR     PC,GFLCHK       ;CHECK IF ^G TYPED DURING TYPEOUT
 8662
 8663  012514  032737  000200  001246  26$:    BIT     #BIT7,$DEVM     ;DROP CLOCK TESTS?
 8664  012522  001406                          BEQ     27$             ;BR IF NO
 8665  012524  104401  016571                  TYPE    ,CLOCK
 8666  012530  104401  017023                  TYPE    ,DROP
 8667  012534  004737  013376                  JSR     PC,GFLCHK       ;CHECK IF ^G TYPED DURING TYPEOUT
 8668
 8669  012540  032737  000100  001246  27$:    BIT     #BIT6,$DEVM     ;DROP VT00 TEST ?
 8670  012546  001406                          BEQ     28$             ;IF NOT THEN EXIT
 8671  012550  104401  016577                  TYPE    ,VT100  ;TYPE VT100 DROPPED
 8672  012554  104401  017023                  TYPE    ,DROP
 8673  012560  004737  013376                  JSR     PC,GFLCHK       ;CHECK IF CONTROL G TYPED
 8674  012564  032737  000020  001246  28$:    BIT     #BIT4,$DEVM     ;CHECK IF MEMORY TEST TO BE DROPPED
 8675  012572  001406                          BEQ     29$             ;IF NOT THEN EXIT AND START TEST
 8676  012574  104401  017057                  TYPE    ,MEMORY         ;TYPE MEMORY TESTS TESTING DROPPED
 8677  012600  104401  017023                  TYPE    ,DROP
 8678  012604  004737  013376                  JSR     PC,GFLCHK       ;CHECK IF CONTROL G TYPED
 8679  012610  000207                  29$:    RTS     PC              ;RETURN BACK TO PROGRAM
 8680
 8681  012612  000000                  CLPRES: 0                       ;CLUSTER PRESENT = NON-ZERO
 8682  012614  000000                  PRPRES: 0                       ;PRINTER PRESENT = NON-ZERO
 8683  012616  000000                  PRPORT: 0                       ;1=PRINTER ENABLED THROUGH LOOPBACK
 8684  012620  000000                  TUPRES: 0                       ;TU58 PRESENT = NON-ZERO
 8685  012622  016623                  MEMTBL: M4K                     ;MSG ADDRESSES
 8686  012624  016626                          M8K
 8687  012626  016631                          M12K
 8688  012630  016635                          M16K
 8689  012632  016641                          M20K
 8690  012634  016645                          M24K
 8691  012636  016651                          M30K
 8692  012640  000000                  MAXMEM: 0                       ;MAX MEMORY
```

```
 8694                                ;;*****************************************************************
 8695                                ;* ROUTINE TO SET 2 CONSECUTIVE INTERRUPT VECTORS
 8696                                ;* 3 ARGUMENTS ARE PASSED THRU R5:
 8697                                ;*      VECTOR ADDRESS
 8698                                ;*      INTERRUPT SERVICE ROUTINE ADDRESS FOR RECVR
 8699                                ;*      INTERRUPT SERVICE ROUTINE ADDRESS FOR XMITTER.
 8700                                ;* PRIORITY WILL BE SET TO DISABLE FURTHUR INTERR.
 8701                                ;;*****************************************************************
 8702
 8703  012642  010046                SETVEC: MOV     R0,-(SP)                ;SAVE
 8704  012644  012500                        MOV     (R5)+,R0                ;GET VECTOR ADDR
 8705  012646  012520                        MOV     (R5)+,(R0)+             ;PUT SERV ROUTINE ADDR THERE
 8706  012650  012720  000340                MOV     #PR7,(R0)+              ;DISABLE INTERR
 8707  012654  012520                        MOV     (R5)+,(R0)+             ;GET XMIT SERV ADDR NEXT
 8708  012656  012710  000340                MOV     #PR7,(R0)
 8709  012662  012600                        MOV     (SP)+,R0                ;RESTORE
 8710  012664  000205                        RTS     R5
 8711
 8712                                ;;*****************************************************************
 8713                                ;THIS SUBROUTINE IS USED TO SEND AND ACCEPT AN ESCAPE SEQUENCE FORM THE VT100.
 8714                                ;IT ACCEPTS TWO ARGUMENTS: 1)POINTER TO TEXT TO SEND, AND 2) POINTER TO TEXT TO
 8715                                ;EXPECT BACK FROM VT100.  THE EXPECTED RECEIVED TEXT MAY CONTAIN A NEGATIVE
 8716                                ;BYTE (BIT 7 SET) TO FLAG THAT ANY CHARACTER IS ACCEPTABLE AS A MATCH IN THAT
 8717                                ;POSITION.  THE ACTUAL CHARACTER RECEIVED IS STORED IN "OPTCHR".  (NOTE THAT ONLY
 8718                                ;THE LAST SUCH CHARACTER WILL BE SAVED.)  THREE RETURNS ARE USED, AS FOLLOWS:
 8719                                ;       JSR     R5,VTTALK
 8720                                ;         ARG1                  ;POINTER TO TEXT TO SEND
 8721                                ;         ARG2                  ;POINTER TO TEXT TO EXPECT BACK
 8722                                ;       RETURN1                 ;XMITTER HUNG (ERROR HAS BEEN REPORTED)
 8723                                ;       RETURN2                 ;RECEIVER HUNG OR UNRECOGNIZED RESPONSE (ERROR REPORTED)
 8724                                ;       RETURN3                 ;EVERYTHING OK
 8725                                ;;*****************************************************************
 8726
 8727  012666  012537  014346        VTTALK: MOV     (R5)+,TXTPTR    ;SET POINTER TO SEND TEXT
 8728  012672  012537  014016                MOV     (R5)+,RCVPTR    ;SET POINTER TO EXPECTED RECEIVED TEXT
 8729  012676  105037  014012                CLRB    OPTCHR          ;CLEAR OPTIONAL CHARCTER
 8730  012702  005037  014112                CLR     XMTDUN          ;CLEAR DONE FLAG FOR XMITTER
 8731  012706  005037  014014                CLR     RCVDUN          ;  AND FOR RECEIVER
 8732  012712  105037  014013                CLRB    ESEQFL          ;NO ESCAPE SEQUENCE RECEIVED YET
 8733  012716  005037  001270                CLR     DELFLG          ;CLEAR PAUSE COUNT FLAG
 8734  012722  004537  012642                JSR     R5,SETVEC       ;SET UP INTERRUPT VECTORS
 8735  012726  000060                          TKVEC
 8736  012730  013622                          TKSRV2
 8737  012732  014020                          TPSRV2
 8738  012734  052777  000100  166206        BIS     #IE,@$TPS       ;SET XMIT INTERRUPT ENABLE (RCVR ALREADY SET)
 8739  012742  004537  013156                JSR     R5,TIMER        ;WAIT FOR XMITTER INT SERV TO FLAG IT IS DONE
 8740  012746  014112                          XMTDUN
 8741  012750  000001                          1
 8742  012752  104034                        ERROR+34                ;VT100 NOT GETTING XMIT INTERRUPTS
 8743  012754  000423                        BR      5$
 8744
 8745  012756  004537  013156                JSR     R5,TIMER        ;WAIT FOR RECEIVER TO FINISH RECEIVING
 8746  012762  014014                          RCVDUN
 8747  012764  000001                          1
 8748  012766  000405                        BR      1$              ;ERROR RETURN
 8749  012770  000240                        NOP                     ;NEED TWO WORDS FOR GOOD RETURN
```

```
 8750
 8751  012772  105737  014015                TSTB    RCVDUN+1        ;CHECK IF RESPONSE WAS UNRECOGNIZED
 8752  012776  001410                        BEQ     3$              ;BRANCH IF NOT -- ALL OK
 8753  013000  000405                        BR      2$              ;UNRECOGNIZED ESCAPE SEQ
 8754
 8755  013002  105737  014013          1$:   TSTB    ESEQFL          ;CHECK IF ANY CHARACTER WERE RECEIVED
 8756  013006  001002                        BNE     2$              ;BR IF YES--REPORT UNRECOGNIZED RESPONSE
 8757  013010  104025                        ERROR+25                ;NO RESPONSE FROM VT100
 8758  013012  000403                        BR      4$
 8759  013014  104032                  2$:   ERROR+32                ;UNRECOGNIZED RESPONSE FROM VT100
 8760  013016  000401                        BR      4$
 8761  013020  005725                  3$:   TST     (R5)+           ;BUMP RETURN TWICE FOR OK RETURN
 8762  013022  005725                  4$:   TST     (R5)+           ;BUMP ONLY ONCE FOR RCVR HUNG OR BAD RESPONSE
 8763  013024  000205                  5$:   RTS     R5
```

```
 8765                                   ;;****************************************************************
 8766                                   ;"SAVEVT" IS A TRAP INSTRUCTION AND WILL CAUSE THE VT100 CURSOR AND
 8767                                   ;ATTRIBUTES TO BE SAVED AND "TYPE" SET UP TO NOT SAVE AND RESTORE CURSORS.
 8768                                   ;IT WILL SET THE SCROLLING REGION TO 2-13.  "RESTVT" IS THE COMPLEMENTARY
 8769                                   ;TRAP CALL, WHICH RESTORES ATTRIBUTES AND RETURNS THE SCROLLING REGION TO
 8770                                   ;THE DISPLAY AREA.  THE PROCESSOR PRIORITY IS FORCED TO REMAIN HIGH
 8771                                   ;BETWEEN SAVEVT AND RESTVT CALLS.
 8772                                   ;;****************************************************************
 8773
 8774  013026  113737  001250  013102  T.SAVT: MOVB    TYPFLG,SAVFLG   ;SAVE THE STATE OF TYPFLG; DON'T NEED TO DO
 8775  013034  001021                          BNE     2$              ; ANYTHING IF DISPLAY PROCESS NOT ACTIVE
 8776  013036  032777  000200  166104  1$:     BIT     #RDY,@$TPS      ;WAIT FOR READY BEFORE CLEARING INT ENA
 8777  013044  001774                          BEQ     1$              ;
 8778  013046  042777  000100  166074          BIC     #IE,@$TPS       ;CLEAR XMIT INTERRUPT ENABLE
 8779  013054  016637  000002  013104          MOV     2(SP),SAVPSW    ;SAVE THE CALLING PRIORITY
 8780  013062  052766  000340  000002          BIS     #PR7,2(SP)      ;FORCE HIGH PRIORITY ON RTI
 8781  013070  105237  001250                  INCB    TYPFLG          ;INSURE NO SAVE OR RESTORE CURSOR ISSUED BY "TYPE"
 8782  013074  104401  016241                  TYPE    ,SAVCUR         ;SAVE CURSOR AND ATTRIBUTES
 8783  013100  000002                  2$:     RTI                     ;RETURN
 8784
 8785  013102  000000                  SAVFLG: .WORD   0
 8786  013104  000000                  SAVPSW: .WORD   0
 8787
 8788  013106  004737  013376          T.RSVT: JSR     PC,GFLCHK       ;CHECK IF ^G TYPED DURING TYPEOUT
 8789  013112  105737  013102                  TSTB    SAVFLG          ;CHECK IF ANYTHING WAS DONE ON SAVEVT CALL
 8790  013116  001016                          BNE     2$              ;BRANCH IF NOT--DON'T DO ANYTHING NOW EITHER
 8791  013120  104401  016264                  TYPE    ,RESDSP         ;RESTORE CURSOR AND ATTRIBUTES AND DISPLAY AREA
 8792  013124  032777  000200  166016  1$:     BIT     #RDY,@$TPS      ;CHECK TRANSMIT READY BIT
 8793  013132  001774                          BEQ     1$              ;WAIT FOR IT TO BECOME READY BEFORE SETTING INT ENA
 8794  013134  052777  000100  166006          BIS     #IE,@$TPS       ;RESTORE XMIT IE
 8795  013142  105337  001250                  DECB    TYPFLG          ;RESTORE FLAG TO PREVIOUS VALUE
 8796  013146  013766  013104  000002          MOV     SAVPSW,2(SP)    ;RESTORE ORIGINAL SAVEVT CALLER'S PRIORITY
 8797  013154  000002                  2$:     RTI
 8798                                   ;;****************************************************************
 8799
 8800                                   ;;****************************************************************
 8801                                   ;WATCHDOG TIMER TO PREVENT DEVICES FROM ENTERING AN ENDLESS WAIT LOOP
 8802                                   ;RETURN     IF TIMED OUT
 8803                                   ;RETURN +4 IF NOT TIMED OUT & JUMP OVER ERROR
 8804                                   ;;****************************************************************
 8805
 8806  013156  012537  013264  TIMER:  MOV     (R5)+,FLGHLD    ;GET FLAG
 8807  013162  012537  013266          MOV     (R5)+,CTHLD     ;GET COUNT THAT FLAG SHOULD GO TO
 88 8
 8809  013166  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
  (2)  013170  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 8810  013172  012701  000005          MOV     #5,R1
 8811  013176  005000                  CLR     R0
 8812  013200  005737  001264  1$:     TST     KILFLG          ;IS IT EOP ?
 8813  013204  001405                  BEQ     5$              ;IF NOT DO NORMAL TIMER
 8814  013206  027737  000052  013266  CMP     @FLGHLD,CTHLD   ;ALL DEVICES DEAD YET ?
 8815  013214  001414                  BEQ     2$              ;IF YES THEN EXIT
 8816  013216  000404                  BR      6$              ;OTHERWISE INCREMENT TIMER
 8817  013220  027737  000040  013266  5$:     CMP     @FLGHLD,CTHLD   ;RESPONDING?
 8818  013226  103007                  BHIS    2$              ;BR IF YES
 8819  013230  005300                  6$:     DEC     R0              ;ELSE DEC COUNTER
```

```
 8820  013232  001362                          BNE     1$              ;BR IF NOT TIMED OUT
 8821  013234  005237  001200                  INC     $DEVCT          ;FOR APT TO INDICATE PRG RUNNING
 8822  013240  005301                          DEC     R1
 8823  013242  001355                          BNE     4$
 8824  013244  000404                          BR      3$              ;ELSE TIMED OUT
 8825
 8826  013246  062705  000004          2$:     ADD     #4,R5           ;JUMP OVER ERROR ON RETURN
 8827  013252  005237  001200                  INC     $DEVCT          ;FOR APT
 8828  013256                          3$:
  (2)  013256  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
  (2)  013260  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
 8829  013262  000205                          RTS     R5
 8830
 8831  013264  000000                  FLGHLD: 0
 8832  013266  000000                  CTHLD:  0
 8833
 8834                                  ;;*****************************************************************
 8835                                  ;       GENERAL TIMER
 8836                                  ;;*****************************************************************
 8837
 8838  013270  010046                  TIMER1: MOV     R0,-(SP)        ;SAVE R0 ON STACK
 8839  013272  005000                          CLR     R0
 8840  013274  005300                          DEC     R0
 8841  013276  001376                          BNE     .-2
 8842  013300  012600                          MOV     (SP)+,R0        ;RESTORE R0
 8843  013302  000207                          RTS     PC
 8844
 8845
 8846                                  ;;*****************************************************************
 8847                                  ;WATCHDOG TIMER TO PREVENT DEVICES FROM ENTERING AN ENDLESS WAIT LOOP
 8848                                  ;RETURN    IF TIMED OUT
 8849                                  ;RETURN +4 IF NOT TIMED OUT & JUMP OVER ERROR
 8850                                  ;;*****************************************************************
 8851
 8852  013304  012537  013372  TIMER2: MOV     (R5)+,REGHLD    ;GET REG
 8853  013310  012537  013374          MOV     (R5)+,BITHLD    ;GET BIT TO BE TESTED
 8854
 8855  013314  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
  (2)  013316  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 8856  013320  012701  000002          MOV     #2,R1
 8857  013324  005000          4$:     CLR     R0
 8858  013326  033777  013374  000036  1$:     BIT     BITHLD,@REGHLD  ;BIT THERE?
 8859  013334  001007                  BNE     2$              ;BR IF YES
 8860  013336  005300                  DEC     R0              ;ELSE DEC COUNTER
 8861  013340  001372                  BNE     1$              ;BR IF NOT TIMED OUT
 8862  013342  005237  001200          INC     $DEVCT          ;FOR APT TO INDICATE PRG RUNNING
 8863  013346  005301                  DEC     R1
 8864  013350  001365                  BNE     4$
 8865  013352  000404                  BR      3$              ;ELSE TIMED OUT
 8866
 8867  013354  062705  000004          2$:     ADD     #4,R5           ;JUMP OVER ERROR ON RETURN
 8868  013360  005237  001200          INC     $DEVCT          ;FOR APT
 8869  013364                          3$:
  (2)  013364  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
  (2)  013366  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
 8870  013370  000205                  RTS     R5
```

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 8871
 8872  013372  000000                  REGHLD: 0
 8873  013374  000000                  BITHLD: 0
 8874
 8875
 8876                                  ;;*****************************************************************
 8877                                  ;THIS SUBROUTINE MUST BE CALLED WITH THE DISPLAY PROCESS DISABLED--
 8878                                  ;I.E. WITH THE CURSOR IN NORMAL MESSAGE POSITION.  (E.G. EITHER BEFORE
 8879                                  ;IT IS STARTED, FROM RESTVT TRAP CALL, OR AFTER IT HAS BEEN STOPPED (EOP).)
 8880                                  ;;*************** ***************************************************
 8881
 8882  013376  105737  001252         GFLCHK: TSTB    GFLAG           ;CHECK IF CONTROL-G RECEIVED WHILE TYPING
 8883  013402  001405                          BEQ     1$              ;BRANCH IF NOT
 8884  013404  104401  025257                 TYPE    ,$CNTLG
 8885  013410  104406                          GTSWR
 8886  013412  105037  001252                 CLRB    GFLAG
 8887  013416  000207                  1$:     RTS     PC
```

```
                                        .SBTTL  INTERRUPT HANDLERS

                                        ;;*****************************************************************
                                        ; GENERAL SERVICE ROUTINE TO BUMP 'INTFLG'
                                        ; CALLING ROUTINE WILL KNOW WHAT TO DO
                                        ;;*****************************************************************

013420  005237  013460          INTSRV: INC     INTFLG
013424  005737  001264                  TST     KILFLG          ;IS IT TIME TO KILL THE CLOCK
013430  001412                          BEQ     1$              ;IF 0 THEN NOT TIME YET
013432  032737  000200  001246          BIT     #BIT7,$DEVM     ;CHECK IF CLOCK WAS ACTIVE
013440  001006                          BNE     1$              ;IF NOT THEN EXIT
013442  042737  000100  177546          BIC     #IE,CLK         ;CLEAR THE CLOCKS INTERRUPT ENABLE BIT
013450  042737  000100  001266          BIC     #BIT6,DEVACT    ;SET THE DEVICE TO INACTIVE STATE
013456  000002                  1$:     RTI                     ;RETURN BACK TO PROGRAM

013460  000000                  INTFLG: 0

                                        ;;*****************************************************************
                                        ; STANDARD CONSOLE RECEIVER INTERRUPT SERVICE ROUTINE
                                        ; HANDLES XON, XOFF, AND CONTROL-G
                                        ;;*****************************************************************

013462  017746  165460          TKSRV1: MOV     @$TKB,-(SP)     ;SAVE CHARACTER ON STACK
013466  042716  177600                  BIC     #^C177,(SP)     ;STRIP ALL BUT ASCII
013472  021627  000021                  CMP     (SP),#XON       ;IS IT AN XON?
013476  001013                          BNE     1$              ;BRANCH IF NOT
013500  105037  001253                  CLRB    XFLAG           ;ALLOW TYPEOUTS
013504  105737  014344                  TSTB    XIEFLG          ;REQUESTED TO SET XMIT INTERRUPT ENABLE?
013510  001442                          BEQ     TKS1EN          ;BRANCH IF NOT
013512  052777  000100  165430          BIS     #IE,@$TPS
013520  105037  014344                  CLRB    XIEFLG          ;AND TURN OFF FLAG
013524  000434                          BR      TKS1EN          ;POP CHARACTER AND EXIT
013526  022716  000023          1$:     CMP     #XOFF,(SP)      ;CHECK IF CHARACTER WAS XOFF
013532  001004                          BNE     2$              ;BRANCH IF NOT
013534  112737  000001  001253          MOVB    #1,XFLAG        ;DO NOT ALLOW OUTPUT
013542  000425                          BR      TKS1EN          ;POP CHARACTER AND EXIT
013544  122737  000001  001134  2$:     CMPB    #1,$AUTOB       ;AUTO MODE?
013552  001421                          BEQ     TKS1EN          ;BRANCH IF YES--IGNORE ALL OTHER INPUT
013554  021627  000007                  CMP     (SP),#7         ;WAS CHARACTER A CONTROL-G?
013560  001407                          BEQ     3$              ;IF YES THEN TAKE CARE OF IT
013562  021627  000003                  CMP     (SP),#3         ;CHECK IF CONTROL C
013566  001013                          BNE     TKS1EN          ;IF NOT THEN EXIT
013570  004737  013270                  JSR     PC,TIMER1       ;DELAY TO ALLOW DEVICES TO SHUTUP
013574  000137  001716                  JMP     @#START         ;RESTART THE PROGRAM
013600  104407                  3$:     SAVEVT                  ;SAVE VT100 STATE
013602  104401  025257                  TYPE    ,$CNTLG         ;TYPE "^G"
013606  104406                          GTSWR                   ;ALLOW SWITCH REGISTER CHANGE
013610  105037  001252                  CLRB    GFLAG           ;IN CASE ^G TYPED WHILE TYPING SWR MSG
013614  104410                          RESTVT                  ;RESTORE VT100 STATE
013616  005726                  TKS1EN: TST     (SP)+           ;POP CHARACTER OFF STACK
013620  000002                          RTI
```

```
 8942                                   ;;*****************************************************************
 8943                                   ; VT100 RECEIVER INTERRUPT SERVICE ROUTINE FOR PROCESSING ESCAPE SEQUENCES
 8944                                   ;;*****************************************************************
 8945
 8946  013622  017746  165320          TKSRV2: MOV     @$TKB,-(SP)     ;GET CHARACTER
 8947  013626  042716  177600                  BIC     #^C177,(SP)     ;STRIP PARITY OFF
 8948  013632  105737  014013                  TSTB    ESEQFL          ;ESCAPE SEQUENCE BEING RECEIVED?
 8949  013636  100435                          BMI     3$              ;BRANCH IF YES
 8950  013640  122716  000021                  CMPB    #XON,(SP)       ;WAS CHARACTER AN XON?
 8951  013644  001013                          BNE     1$              ;BRANCH IF NOT
 8952  013646  105037  001253                  CLRB    XFLAG           ;CLEAR XOFF FLAG
 8953  013652  105737  014344                  TSTB    XIEFLG          ;REQUESTED TO SET XMIT INTERRUPT ENABLE?
 8954  013656  001453                          BEQ     99$             ;BRANCH IF NOT
 8955  013660  052777  000100  165262          BIS     #IE,@$TPS
 8956  013666  105037  014344                  CLRB    XIEFLG          ;AND TURN OFF FLAG
 8957  013672  000445                          BR      99$
 8958  013674  122716  000023          1$:     CMPB    #XOFF,(SP)      ;WAS CHARACTER AN XOFF?
 8959  013700  001004                          BNE     2$              ;BRANCH IF NOT
 8960  013702  112737  000001  001253          MOVB    #1,XFLAG        ;SET XOFF FLAG
 8961  013710  000436                          BR      99$
 8962  013712  105237  014013          2$:     INCB    ESEQFL          ;FLAG THAT A CHARACTER RECEIVED
 8963  013716  122716  000033                  CMPB    #ESC,(SP)       ;WAS THE CHARACTER AN ESCAPE?
 8964  013722  001031                          BNE     99$             ;BRANCH IF NOT, THROW CHARACTER AWAY
 8965  013724  112737  177777  014013          MOVB    #-1,ESEQFL      ;FLAG THAT WE ARE NOW RECEIVING AN ESCAPE SEQ
 8966  013732  105777  000060          3$:     TSTB    @RCVPTR         ;SHOULD WE ACCEPT ANY CHARACTER?
 8967  013736  100003                          BPL     4$              ;BRANCH IF NOT
 8968  013740  111637  014012                  MOVB    (SP),OPTCHR     ;SAVE THE CHARACTER
 8969  013744  000406                          BR      5$
 8970  013746  121677  000044          4$:     CMPB    (SP),@RCVPTR    ;CHARACTER OK?
 8971  013752  001403                          BEQ     5$              ;BRANCH IF YES
 8972  013754  105237  014015                  INCB    RCVDUN+1        ;FLAG AN ERROR
 8973  013760  000407                          BR      6$
 8974  013762  005237  014016          5$:     INC     RCVPTR          ;BUMP TO NEXT CHARACTER
 8975  013766  105777  000024                  TSTB    @RCVPTR         ;CHECK IF AT END OF TEXT
 8976  013772  001005                          BNE     99$             ;BRANCH IF NOT
 8977  013774  105237  014014                  INCB    RCVDUN          ;FLAG DONE
 8978  014000  012737  013462  000060  6$:     MOV     #TKSRV1,@#TKVEC ;RESTORE STANDARD INTERRUPT SERVICE
 8979  014006  005726                  99$:    TST     (SP)+           ;POP CHARACTER OFF STACK
 8980  014010  000002                          RTI
 8981
 8982  014012     000                  OPTCHR: .BYTE   0               ;LAST "OPTIONAL CHARACTER" (WILDCARD MATCH) STORED HERE
 8983                                                                  ;MUST BE AN EVEN BYTE FOR ERROR TYPEOUT
 8984  014013     000                  ESEQFL: .BYTE   0               ;NEGATIVE WHEN ESCAPE SEQUENCE BEING PROCESSED
 8985                                                                  ;POSITIVE IF CHARACTERS RECEIVED BUT NO "ESC"
 8986  014014  000000                  RCVDUN: .WORD   0               ;LOW BYTE SET IF DONE NO ERRORS--HI BYTE IF ERRORS
 8987  014016  000000                  RCVPTR: .WORD   0               ;POINTER TO EXPECTED RECEIVED TEXT
 8988
 8989                                   ;;*****************************************************************
 8990                                   ;XMITTER INTERRUPT HANDLER FOR XMITTING SINGLE TEXT STRINGS
 8991                                   ;;*****************************************************************
 8992
 8993  014020  105737  001253          TPSRV2: TSTB    XFLAG           ;OK TO XMIT?
 8994  014024  001406                          BEQ     1$              ;BRANCH IF YES
 8995  014026  105237  014344                  INCB    XIEFLG          ;REQUEST RCIEVER INT SERV TO TURN IF BACK ON WHEN XON RE
 8996  014032  042777  000100  165110          BIC     #IE,@$TPS       ;TURN OFF INT ENABL
 8997  014040  000002                          RTI                     ;EXIT--RETURN WHEN XON RECEIVED
```

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 8998  014042  117746  000300          1$:     MOVB    @TXTPTR,-(SP)   ;GET THE CHARACTER TO TYPE
 8999  014046  001410                          BEQ     2$              ;BRANCH IF TERMINATOR
 9000  014050  112737  000001  001251          MOVB    #1,ESCFLG       ;FLAG AN ESCAPE SEQUENCE
 9001  014056  012677  165070                  MOV     (SP)+,@$TPB     ;TYPE CHARACTER
 9002  014062  005237  014346                  INC     TXTPTR          ;BUMP POINTER TO NEXT CHARACTER
 9003  014066  000002                          RTI
 9004
 9005  014070  042777  000100  165052  2$:     BIC     #IE,@$TPS       ;TURN OFF INTERRUPTS
 9006  014076  005237  014112                  INC     XMTDUN          ;FLAG THAT I AM DONE
 9007  014102  105037  001251                  CLRB    ESCFLG          ;DONE SENDING SEQUENCE
 9008  014106  005726                          TST     (SP)+           ;POP TERMINATOR OFF STACK
 9009  014110  000002                          RTI
 9010
 9011  014112  000000                  XMTDUN: .WORD   0
 9012
 9013                                  ;;*****************************************************************
 9014                                  ; VT100 TRANSMIT INTERRUPT SERVICE ROUTINE.  THIS DISPLAY PROCESS
 9015                                  ; LOOKS FOR SPECIAL CHARACTERS FOLLOWING A 0 TERMINATOR.  IF THE
 9016                                  ; HIGH ORDER BIT OF THE BYTE IS SET, THEN IT IS TAKEN AS A NEGATIVE
 9017                                  ; COUNT FOR A "PAUSE" TO GIVE TIME TO VIEW THE DISPLAY.  TWO 0
 9018                                  ; BYTES IN A ROW TERMINATE THE ENTIRE DISPLAY TEXT.
 9019                                  ;;*****************************************************************
 9020
 9021  014114  032777  000200  165026  TPSRV:  BIT     #RDY,@$TPS      ;CHECK TO SEE IF READY SET - NEEDED FOR
 9022                                                                  ;FALSE INTERRUPTS
 9023  014122  001431                          BEQ     9$              ;IF NOT THEN RETURN BACK TO PROGRAM
 9024  014124  105737  001253                  TSTB    XFLAG           ;OK TO XMIT?
 9025  014130  001406                          BEQ     1$              ;BRANCH IF YES
 9026  014132  105237  014344                  INCB    XIEFLG          ;REQUEST RECEIVER INT SERV TO TURN IE BACK ON WHEN XON R
 9027  014136  042777  000100  165004          BIC     #IE,@$TPS       ;TURN OFF INT ENABL
 9028  014144  000002                          RTI                     ;EXIT--RETURN WHEN XON RECEIVED
 9029  014146  005737  001270          1$:     TST     DELFLG          ;CHECK IF PAUSE COUNT IN PROGRESS
 9030  014152  001063                          BNE     6$              ;IF IT IS SEND DELETE CHARACTER
 9031  014154  117746  000166                  MOVB    @TXTPTR,-(SP)   ;GET THE CHARACTER
 9032  014160  001414                          BEQ     4$              ;BRANCH IF TERMINATOR
 9033  014162  122716  000033          2$:     CMPB    #ESC,(SP)       ;IS IT AN ESCAPE?
 9034  014166  001002                          BNE     3$              ;BRANCH IF NOT
 9035  014170  105237  001251                  INCB    ESCFLG          ;SET ESCAPE SEQUENCE FLAG
 9036  014174  012677  164752          3$:     MOV     (SP)+,@$TPB     ;TYPE THE CHARACTER
 9037  014200  005237  014346                  INC     TXTPTR          ;BUMP POINTER TO THE NEXT CHARACTER
 9038  014204  000002                  8$:     RTI                     ;RETURN TO INTERRUPTED PROCESS
 9039  014206  000240                  9$:     NOP
 9040  014210  000002                          RTI                     ;FALSE INTERRUPT RETURN BACK TO PROGRAM
 9041
 9042  014212  005237  014346          4$:     INC     TXTPTR          ;SKIP OVER TERMINATOR
 9043  014216  105037  001251                  CLRB    ESCFLG          ;FLAG THAT ESCAPE SEQUENCE IS FINISHED
 9044  014222  117716  000120                  MOVB    @TXTPTR,(SP)    ;REPLACE TERMINATOR ON STACK WITH NEXT CHARACTER
 9045  014226  100424                          BMI     5$              ;BRANCH IF A PAUSE  COUNT
 9046  014230  001354                          BNE     2$              ;BRANCH IF NOT 2ND TERMINATOR (TYPE CHARACTER)
 9047  014232  012737  021467  014346          MOV     #DSPTXT-1,TXTPTR ;RESET TEXTPOINTER TO DISPLAY TEXT
 9048  014240  012737  000001  001254          MOV     #1,VTDONE       ;FLAG THAT PROCESS HAS COMPLETED A PASS
 9049  014246  112716  177777                  MOVB    #-1,(SP)        ;REPLACE TERMINATOR ON STACK WITH A PAUSE COUNT
 9050  014252  005737  001264                  TST     KILFLG          ;IS IT EOP TIME YET
 9051  014256  001410                          BEQ     5$              ;IF NOT REPEAT TEST
 9052  014260  042737  000200  001266          BIC     #BIT7,DEVACT    ;SET VT100 INACTIVE
 9053  014266  105726                          TSTB    (SP)+           ;POP TERMINATOR OFF THE STACK
```

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 9054  014270  042777  000100  164652          BIC     #IE,@$TPS       ;CLEAR TRANSMITTER INTERRUPT ENABLE
 9055  014276  000421                          BR      7$              ;RETURN BACK TO THE PROGRAM
 9056
 9057  014300  105726                  5$:     TSTB    (SP)+           ;POP TERMINATOR OFF THE STACK
 9058  014302  005237  014346                  INC     TXTPTR          ;BUMP POINTER PAST PAUSE CONTROL
 9059  014306  012737  177777  001270          MOV     #-1,DELFLG      ;SET PAUSE CONTROL FLAG
 9060  014314  012737  001750  001272          MOV     #1000.,DELCNT   ;SETUP DELAY COUNTER FOR ABOUT 1 SEC
 9061  014322  112777  000177  164622  6$:     MOVB    #177,@$TPB      ;SEND DELETE TO VT100
 9062  014330  005337  001272                  DEC     DELCNT          ;DECREMENT DELAY COUNTER
 9063  014334  001002                          BNE     7$              ;IF NOT 0 THEN EXIT
 9064  014336  005037  001270                  CLR     DELFLG          ;CLEAR PAUSE CONTROL FLAG
 9065  014342  000002                  7$:     RTI                     ;RETURN FROM INTERRUPT
 9066
 9067  014344     000                  XIEFLG: .BYTE   0               ;FLAG FOR RECEIVER INT SERV TO TURN ON XMIT IE ON XON
 9068          014346                          .EVEN
 9069  014346  000000                  TXTPTR: .WORD   0               ;POINTER TO TEXT BEING TYPED
 9070
```

```
 9072                                   ;;*****************************************************************
 9073                                   ;PRINTER  INTERRUPT HANDLER: VALUES FROM 40 THRU 176.
 9074                                   ;;*****************************************************************
 9075
 9076  014350  013737  177514  014516  PRSRV:  MOV     PRS,SPRS                ;STORE
 9077  014356  100002                          BPL     1$              ;BR IF ERROR BIT NOT SET
 9078  014360  104007                          ERROR+7                 ;PRINTER STATUS ERROR
 9079  014362  000002                          RTI
 9080  014364  013737  014512  177516  1$:     MOV     PRCHR,PRB       ;ELSE PRINT CHAR
 9081  014372  023727  014512  000015          CMP     PRCHR,#CR       ;JUST DID A CARRIAGE RETURN?
 9082  014400  001413                          BEQ     2$              ;BRANCH IF YES
 9083  014402  023727  014512  000012          CMP     PRCHR,#LF       ;JUST DID LF?
 9084  014410  001413                          BEQ     3$              ;BR IF YES
 9085  014412  023727  014512  000176          CMP     PRCHR,#176      ;DID LAST CHAR?
 9086  014420  001413                          BEQ     4$              ;BR IF YES
 9087  014422  005237  014512                  INC     PRCHR           ;BUMP CHAR
 9088  014426  000430                          BR      5$
 9089
 9090  014430  012737  000012  014512  2$:     MOV     #LF,PRCHR       ;DO LINE FEED NEXT
 9091  014436  000424                          BR      5$
 9092  014440  012737  000040  014512  3$:     MOV     #40,PRCHR       ;START ON LOOP VALUES NEXT
 9093  014446  000420                          BR      5$
 9094  014450  012737  000015  014512  4$:     MOV     #CR,PRCHR       ;DO CR AND START OVER
 9095  014456  005237  014514                  INC     LINCT           ;COUNT THE LINE
 9096  014462  005237  001200                  INC     $DEVCT          ;COUNTER FOR APT INDICATES RUNNING
 9097  014466  005737  001264                  TST     KILFLG          ;TIME TO KILL THE PRINTER
 9098  014472  001406                          BEQ     5$              ;IF NOT THEN EXIT FOR NEXT INTERRUPT
 9099  014474  042737  000100  177514          BIC     #IE,PRS         ;CLEAR PRINTER INTERRUPT ENABLE BIT
 9100  014502  042737  000040  001266          BIC     #BIT5,DEVACT    ;SET PRINTER INACTIVE FLAG
 9101  014510  000002                  5$:     RTI
 9102
 9103  014512  000000                  PRCHR:  0                       ;CHAR TO BE PRINTED
 9104  014514  000000                  LINCT:  0                       ;LINE CTR
 9105  014516  000000                  SPRS:   0                       ;STORE PRINTER CSR
 9106
 9107                                   ;;*****************************************************************
 9108                                   ;CLUSTER TERMINAL #1 INTERRUPT HANDLER: LOOP VALUES 0 THRU 377.
 9109                                   ;;*****************************************************************
 9110
 9111  014520  042737  000100  176504  TP1SRV: BIC     #IE,TP1S        ;DISABLE INTER, RECV'R WILL TURN BACK ON
 9112  014526  113737  014630  176506          MOVB    T1CHR,TP1B      ;PRINT CHAR
 9113  014534  000002                          RTI
 9114
 9115  014536  113737  176502  014632  TK1SRV: MOVB    TK1B,T1HLD      ;STORE CHAR
 9116  014544  123737  014632  014630          CMPB    T1HLD,T1CHR     ;OK?
 9117  014552  001401                          BEQ     1$              ;BR IF YES
 9118  014554  104010                          ERROR+10                ;CHAR COMP ERROR
 9119
 9120  014556  105237  014630          1$:     INCB    T1CHR           ;UPDATE THE CHARACTER
 9121  014562  001016                          BNE     3$              ;IF NOT DONE RETURN AND PRINT NEXT CHAR
 9122  014564  005237  014634                  INC     T1CNT           ;INCREMENT LOOP COUNT
 9123  014570  005237  001200                  INC     $DEVCT          ;COUNTER FOR APT INDICATES RUNNING
 9124  014574  005737  001264                  TST     KILFLG          ;TIME TO KILL CLUSTER
 9125  014600  001407                          BEQ     3$              ;NO GO DO NEXT CHARACTER
 9126  014602  042737  000100  176500          BIC     #IE,TK1S        ;CLEAR RECEIVER INTERRUPT ENABLE
 9127  014610  042737  000010  001266          BIC     #BIT3,DEVACT    ;CLEAR CLUSTER 1 ACTIVE FLAG
```

```
 9128  014616  000403                          BR      4$              ;RETURN BACK TO PROGRAM
 9129  014620  052737  000100  176504  3$:     BIS     #IE,TP1S        ;ALLOW PRINTER INTERR
 9130  014626  000002                  4$:     RTI
 9131
 9132  014630  000000                  T1CHR:  0                       ;CHAR TO XMITT
 9133  014632  000000                  T1HLD:  0                       ;REC'D CHAR
 9134  014634  000000                  T1CNT:  .WORD   0
 9135  014636  000000                  CTPARM: .WORD   0               ;CONTAINS BAUD RATE, 8 CHAR BIT, AND MAINT BIT
```

```
 9137                                   ;;*****************************************************************
 9138                                   ;CLUSTER TERMINAL #2 INTERRUPT HANDLER: LOOP VALUES 0 THRU 377.
 9139                                   ;;*****************************************************************
 9140
 9141  014640  042737  000100  176514  TP2SRV: BIC     #IE,TP2S        ;DISABLE INTER, RECV'R WILL TURN BACK ON
 9142  014646  113737  014750  176516          MOVB    T2CHR,TP2B      ;PRINT CHAR
 9143  014654  000002                          RTI
 9144
 9145  014656  113737  176512  014752  TK2SRV: MOVB    TK2B,T2HLD      ;STORE CHAR
 9146  014664  123737  014752  014750          CMPB    T2HLD,T2CHR     ;OK?
 9147  014672  001401                          BEQ     1$              ;BR IF YES
 9148  014674  104011                          ERROR+11                ;CHAR COMP ERROR
 9149
 9150  014676  105237  014750          1$:     INCB    T2CHR           ;UPDATE THE CHARACTER
 9151  014702  001016                          BNE     3$              ;IF NOT DONE SETUP TO DO NEXT CHAR
 9152  014704  005237  014754                  INC     T2CNT           ;INCREMENT LOOP COUNT
 9153  014710  005237  001200                  INC     $DEVCT          ;INCREMENT COUNTER FOR APT
 9154  014714  005737  001264                  TST     KILFLG          ;TIME TO KILL CLUSTER
 9155  014720  001407                          BEQ     3$              ;NO GO DO NEXT CHARACTER
 9156  014722  042737  000100  176510          BIC     #IE,TK2S        ;CLEAR RECEIVER INTERRUPT ENABLE
 9157  014730  042737  000004  001266          BIC     #BIT2,DEVACT    ;CLEAR CLUSTER 2 ACTIVE FLAG
 9158  014736  000403                          BR      4$              ;RETURN BACK TO PROGRAM
 9159  014740  052737  000100  176514  3$:     BIS     #IE,TP2S        ;ALLOW PRINTER INTERR
 9160  014746  000002                  4$:     RTI
 9161
 9162  014750  000000                  T2CHR:  0                       ;CHAR TO XMITT
 9163  014752  000000                  T2HLD:  0                       ;REC'D CHAR
 9164  014754  000000                  T2CNT:  .WORD   0
 9165
 9166                                   ;;*****************************************************************
 9167                                   ;CLUSTER TERMINAL #3 INTERRUPT HANDLER: LOOP VALUES 0 THRU 377.
 9168                                   ;;*****************************************************************
 9169
 9170  014756  042737  000100  176524  TP3SRV: BIC     #IE,TP3S        ;DISABLE INTER, RECV'R WILL TURN BACK ON
 9171  014764  113737  015066  176526          MOVB    T3CHR,TP3B      ;PRINT CHAR
 9172  014772  000002                          RTI
 9173
 9174  014774  113737  176522  015070  TK3SRV: MOVB    TK3B,T3HLD      ;STORE CHAR
 9175  015002  123737  015070  015066          CMPB    T3HLD,T3CHR     ;OK?
 9176  015010  001401                          BEQ     1$              ;BR IF YES
 9177  015012  104012                          ERROR+12                ;CHAR COMP ERROR
 9178
 9179  015014  105237  015066          1$:     INCB    T3CHR           ;UPDATE THE CHARACTER
 9180  015020  001016                          BNE     3$              ;IF NOT DONE GO TRANSMIT THIS CHAR
 9181  015022  005237  015072                  INC     T3CNT           ;INCREMENT LOOP COUNT
 9182  015026  005237  001200                  INC     $DEVCT          ;INCREMENT COUNTER FOR APT
 9183  015032  005737  001264                  TST     KILFLG          ;TIME TO KILL THE DEVICE
 9184  015036  001407                          BEQ     3$              ;NO GO DO NEXT CHARACTER
 9185  015040  042737  000100  176520          BIC     #IE,TK3S        ;CLEAR RECEIVER INTERRUPT ENABLE
 9186  015046  042737  000002  001266          BIC     #BIT1,DEVACT    ;CLEAR CLUSTER 3 ACTIVE FLAG
 9187  015054  000403                          BR      4$              ;RETRUN BACK TO PROGRAM
 9188  015056  052737  000100  176524  3$:     BIS     #IE,TP3S        ;ALLOW PRINTER INTERR
 9189  015064  000002                  4$:     RTI
 9190
 9191  015066  000000                  T3CHR:  0                       ;CHAR TO XMITT
 9192  015070  000000                  T3HLD:  0                       ;REC'D CHAR
```

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  9193  015072  000000                T3CNT:  .WORD   0
```

```
 9195                                   ;;*****************************************************************
 9196                                   ;ASYNC COMM PORT INTERRUPT HANDLER: LOOP VALUES 0 THRU 377.
 9197                                   ;;*****************************************************************
 9198
 9199  015074  042737  000100  176614  AMXSRV: BIC     #IE,AMXC        ;DISABLE INTER, RECV'R WILL TURN BACK ON
 9200  015102  113737  015244  176616          MOVB    COMCHR,AMXB     ;XMITT CHAR
 9201  015110  000002                          RTI
 9202
 9203  015112  113737  176612  015246  AMRSRV: MOVB    AMRB,COMHLD     ;STORE CHAR
 9204  015120  123737  015246  015244          CMPB    COMHLD,COMCHR   ;OK?
 9205  015126  001401                          BEQ     1$              ;BR IF YES
 9206  015130  104013                          ERROR+13                ;CHAR COMPARE ERROR
 9207
 9208  015132  105237  015244          1$:     INCB    COMCHR          ;UPDATE THE CHARACTER
 9209  015136  001036                          BNE     3$              ;GO TRANSMIT THIS CHAR IF NOT LAST
 9210  015140  005237  015250                  INC     COMCNT          ;INCREMENT LOOP COUNTER
 9211  015144  005237  001200                  INC     $DEVCT          ;COUNTER FOR APT INDICATING DEVICE RUNNING
 9212  015150  005737  001264                  TST     KILFLG          ;TIME TO KILL ASYN COMM
 9213  015154  001427                          BEQ     3$              ;IF NOT ALLOW NEXT XMIT INTERRUPT
 9214  015156  042737  000020  001266          BIC     #BIT4,DEVACT    ;CLEAR ASYNC COMM ACTIVE FLAG
 9215  015164  042737  000100  176614          BIC     #IE,AMXC        ;DISABLE XMIT INTERRUPTS
 9216  015172  042737  000100  176610          BIC     #IE,AMRC        ;DISABLE RECEIVER INTERRUPTS
 9217  015200  012737  037014  177420          MOV     #<AMOD!B9600!CHAR8>,PARAM ;TAKE OUT OF INTERNAL LOOPBACK
 9218                                                                  ;IF IT WAS SELECTED
 9219  015206  032737  000010  001246          BIT     #BIT3,$DEVM     ;CHECK FOR EXT LOOPBACK UNDER APT
 9220  015214  001012                          BNE     4$              ;IF NOT EXTERNAL EXIT
 9221  015216  052737  000006  176610          BIS     #<RTS!DTR>,AMRC ;TOGGLE RTS TO CLEAR EXT LOOPBACK
 9222  015224  042737  000004  176610          BIC     #RTS,AMRC       ;
 9223  015232  000403                          BR      4$
 9224  015234  052737  000100  176614  3$:     BIS     #IE,AMXC        ;ALLOW XMIT INTERR
 9225  015242  000002                  4$:     RTI
 9226
 9227  015244  000000                  COMCHR: 0                       ;XMIT CHAR
 9228  015246  000000                  COMHLD: 0                       ;REC'D CHAR
 9229  015250  000000                  COMCNT: .WORD   0
 9230
 9231                                   ;;*****************************************************************
 9232                                   ;SYNC COMM PORT INTERRUPT HANDLER: LOOP VALUES 27 THRU 377.
 9233                                   ;;*****************************************************************
 9234
 9235  015252  042737  000100  176624  SMXSRV: BIC     #IE,SMXC        ;DISABLE INTER, RECV'R WILL TURN BACK ON
 9236  015260  013737  015244  176626          MOV     COMCHR,SMXB     ;XMITT CHAR
 9237  015266  023727  015244  000377          CMP     COMCHR,#377     ;LAST CHAR?
 9238  015274  001021                          BNE     2$              ;BR IF NO
 9239  015276  005737  015342                  TST     LSTCHR          ;WAS DUMMY PAD CHARACTER TRANSMITTED?
 9240  015302  001006                          BNE     1$              ;BRANCH IF YES
 9241  015304  005237  015342                  INC     LSTCHR          ;NO--FLAG THAT IS IS ABOUT TO BE
 9242  015310  052737  000100  176624          BIS     #IE,SMXC        ;ALLOW INTERRUPT SO CAN SHUT DOWN FAST
 9243  015316  000002                          RTI
 9244
 9245  015320  042737  000020  176624  1$:     BIC     #SEND,SMXC      ;NO MORE TO SEND
 9246  015326  042737  000004  176620          BIC     #RTS,SMRC       ;DROP REQUEST TO SEND
 9247  015334  005237  001200                  INC     $DEVCT          ;COUNTER FOR APT TO INDICATE DEVICE RUNNING
 9248  015340  000002                  2$:     RTI
 9249
 9250  015342  000000                  LSTCHR. .WORD   0
```

```
 9251
 9252
 9253  015344  013737  176622  015246  SMRSRV: MOV     SMRB,COMHLD     ;STORE CHAR
 9254  015352  123727  015246  000026          CMPB    COMHLD,#026     ;IGNORE SYNC CHARS
 9255  015360  001430                          BEQ     4$
 9256  015362  023737  015246  015244          CMP     COMHLD,COMCHR   ;OK?
 9257  015370  001401                          BEQ     1$              ;BR IF YES
 9258  015372  104014                          ERROR+14                ;CHAR COMPARE ERROR
 9259
 9260  015374  023727  015244  000377  1$:     CMP     COMCHR,#377     ;LAST CHAR?
 9261  015402  001403                          BEQ     2$              ;BR IF YES
 9262  015404  005237  015244                  INC     COMCHR          ;ELSE BUMP
 9263  015410  000411                          BR      3$
 9264
 9265  015412  012737  177777  015244  2$:     MOV     #-1,COMCHR      ;INDICATE DONE
 9266  015420  042737  000100  176620          BIC     #IE,SMRC        ;ALL DONE
 9267  015426  005237  001200                  INC     $DEVCT          ;COUNTER FOR APT INDICTES DEVICE RUNNING
 9268  015432  000403                          BR      4$
 9269  015434  052737  000100  176624  3$:     BIS     #IE,SMXC        ;ALLOW XMIT INTERR
 9270  015442  000002                  4$:     RTI
 9271
 9272
 9273                                  ;;*****************************************************************
 9274                                  ;*TU58 TRANSMIT INTERRUPT SERVICE ROUTINE
 9275                                  ;*LOCATIONS TUXPNT AND TUXCNT MUST BE SETUP PRIOR TO TURNING THE INTERRUPT
 9276                                  ;*ENABLE BIT ON IN THE TU58 XCSR REGISTER.  WHEN TUXCNT GOES TO ZERO OR
 9277                                  ;*UPON AN ERROR CONDITION, THE INTERRUPT ENABLE BIT WILL BE CLEARED.
 9278                                  ;*LOCATION TU58ER WILL CONTAIN HARDWARE ERROR STATUS.  BIT 4 SET INDICATES
 9279                                  ;*AN INTERRUPT OCCURED WITH RDY BIT CLEARED.  BIT 3 SET INDICATES AN
 9280                                  ;*INTERRUPT OCCURED WHEN INTERRUPT ENABLE WAS CLEARED.
 9281                                  ;;*****************************************************************
 9282
 9283  015444  010046                  TUXMIT: MOV     R0,-(SP)        ;SAVE THE WORKING REGISTER
 9284  015446  032737  000200  177174          BIT     #RDY,TUXCSR     ;CHECK TO SEE IF XMIT RDY SET
 9285  015454  001004                          BNE     1$              ;IF SET THEN CONTINUE
 9286  015456  052737  000020  007064          BIS     #BIT4,TU58ER    ;SET ERROR BIT INDICATING RDY NOT SET
 9287  015464  000440                          BR      3$              ;EXIT INT SRV WITH INT ENABLE CLEARED
 9288  015466  005737  007052          1$:     TST     TUXCNT          ;CHECK TO SEE IF INTERRUPT EXPECTED
 9289  015472  001004                          BNE     2$              ;IF NOT 0 THEN EXPECTED INTERRUPT
 9290  015474  052737  000010  007064          BIS     #BIT3,TU58ER    ;SET BIT INDICATING INTERRUPT NOT EXPECTED
 9291  015502  000431                          BR      3$              ;EXIT INT SRV WITH INT ENABLE CLEARED
 9292  015504  005337  007052          2$:     DEC     TUXCNT          ;DECREMENT BYTE COUNTER
 9293  015510  001003                          BNE     5$              ;IF NOT 0 TRANSMIT NEXT BYTE
 9294  015512  042737  000100  177174          BIC     #IE,TUXCSR
 9295  015520  013700  007050          5$:     MOV     TUXPNT,R0       ;GET POINTER TO TRANSMIT BUFFER
 9296  015524  112037  177172                  MOVB    (R0)+,TURXDB    ;WRITE THE BYTE TO THE TU58
 9297  015530  010037  007050                  MOV     R0,TUXPNT       ;RESTORE THE UPDATED BUFFER POINTER
 9298  015534  005737  007102                  TST     BRKFLG          ;CHECK IF BREAK IN PROGRESS
 9299  015540  001415                          BEQ     4$              ;IF NOT BREAK THEN EXIT
 9300  015542  022737  000002  007052          CMP     #2,TUXCNT       ;CHECK IF 2ND NULL CHARACTER
 9301  015550  001011                          BNE     4$              ;IF NOT 2ND NULL THEN EXIT
 9302  015552  042737  000001  177174          BIC     #BREAK,TUXCSR   ;CLEAR BREAK AFTER 2ND NULL TRANSMITTED
 9303  015560  005037  007102                  CLR     BRKFLG          ;CLEAR THE BREAK SOFTWARE FLAG
 9304  015564  000403                          BR      4$              ;IF NOT 0 THEN EXIT
 9305  015566  042737  000100  177174  3$:     BIC     #IE,TUXCSR      ;CLEAR IE ON DONE OR ERROR CONDITION
 9306  015574  012600                  4$:     MOV     (SP)+,R0        ;RESTORE WORKING REGISTER
```

```
 9307  015576  000002                          RTI                         ;RETURN BACK TO PROGRAM
 9308
 9309                                  ;;*****************************************************************
 9310                                  ;*TU58 RECEIVER INTERRUPT SERVICE ROUTINE
 9311                                  ;*THIS ROUTINE WILL READ CHARACTERS FROM THE TU58 AND STORE THEM INTO A
 9312                                  ;*READ MEMORY BUFFER.  LOCATION TURPNT MUST BE SETUP PRIOR TO TURNING
 9313                                  ;*THE INTERRUPT ENABLE BIT ON IN THE TU58 RCSR REGISTER.  UPON AN ERROR
 9314                                  ;*CONDITION, THE INTERRUPT ENABLE BIT WILL BE CLEARED.  LOCATION TU58ER
 9315                                  ;*WILL CONTAIN THE HARDWARE ERROR STATUS.  BIT 6 INDICATES AN INTERRUPT
 9316                                  ;*OCCURED WITH RECEIVER READY BIT A ZERO.  BIT 5 INDICATES THE TU58 IS
 9317                                  ;CONTINUOUSLY SENDING DATA AND THE RECEIVE MEMORY BUFFER IS FILLED.
 9318                                  ;;*****************************************************************
 9319
 9320  015600  010046                  TURCVR: MOV     R0,-(SP)            ;SAVE THE WORKING REGISTER
 9321  015602  032737  000200  177170          BIT     #RDONE,TURCSR       ;CHECK TO SEE IF RECEIVER DONE BIT SET
 9322  015610  001004                          BNE     1$                  ;IF SET THEN CONTINUE
 9323  015612  052737  000100  007064          BIS     #BIT6,TU58ER        ;SET BIT INDICATING RECEIVER DONE NOT SET
 9324  015620  000416                          BR      3$                  ;EXIT WITH INTERRUPT ENABLE CLEARED
 9325  015622  013700  007054          1$:     MOV     TURPNT,R0           ;GET READ BUFFER POINTER
 9326  015626  020027  031664                  CMP     R0,#TURDLA          ;CHECK TO SEE IF LESS THEN LAST ADDRESS
 9327  015632  101404                          BLOS    2$                  ;IF LESS THEN GO PUT DATA INTO MEMORY BUFFER
 9328  015634  052737  000040  007064          BIS     #BIT5,TU58ER        ;SET BUFFER FULL INDICATOR
 9329  015642  000405                          BR      3$                  ;EXIT WITH INTERRUPT ENABLE CLEARED
 9330  015644  113720  177172          2$:     MOVB    TURXDB,(R0)+        ;SAVE BYTE INTO READ BUFFER
 9331  015650  010037  007054                  MOV     R0,TURPNT           ;UPDATE READ BUFFER POINTER
 9332  015654  000403                          BR      4$                  ;EXIT BACK TO PROGRAM
 9333  015656  042737  000100  177170  3$:     BIC     #IE,TURCSR          ;ERROR - CLEAR INT ENA BIT
 9334  015664  012600                  4$:     MOV     (SP)+,R0            ;RESTORE THE WORKING REGISTER
 9335  015666  000002                          RTI                         ;RETURN BACK TO THE PROGRAM
 9336
```

```
 9338                                   .SBTTL  PROGRAM MESSAGES
 9339
 9340                                   ;;*****************************************************************
 9341                                   ; MESSAGES & ERROR FORMATS
 9342                                   ;;*****************************************************************
 9343
 9344                                   .ENABL LC                       ;LOWER CASE MUST BE ALLOWED IN ESCAPE SEQUENCES
 9345
 9346  015670  036033  055433  045062  TITLE:  .ASCII  <ESC>/</<ESC>/[2J/<ESC>/[?4h/   ;ANSI MODE;ERASE SCREEN;SET SMOOTH SCROL
       015676  055433  032077    150
 9347  015703     033  037533  035461         .ASCII  <ESC>/[?1;3;5;6;9l/             ;80 COLUMN, ABSOLUTE ORG, NORMAL VIDEO
       015710  035463  035465  035466
       015716  066071
 9348  015720  055433  063463  055433         .ASCII  <ESC>/[3g/<ESC>/[;9H/<ESC>/H/<ESC>/[;17H/<ESC>/H/       ;CLEAR ALL TABS,
       015726  034473  015510  015510
       015734  035533  033461  015510
       015742     110
 9349  015743     033  035533  032462         .ASCII  <ESC>/[;25H/<ESC>/H/<ESC>/[;33H/<ESC>/H/        ;SET TABS AT COLUMNS 25,
       015750  015510  015510  035533
       015756  031463  015510     110
 9350  015763     033  035533  030464         .ASCII  <ESC>/[;41H/<ESC>/H/<ESC>/[;49H/<ESC>/H/        ;TABS AT COLS 41,49
       015770  015510  015510  035533
       015776  034464  015510     110
 9351  016003     033  035533  033465         .ASCII  <ESC>/[;57H/<ESC>/H/<ESC>/[;65H/<ESC>/H/<ESC>/[;73H/<ESC>/H/  ;TABS
       016010  015510  015510  035533
       016016  032466  015510  015510
       016024  035533  031467  015510
       016032     110
 9352  016033     033  031133  030473         .ASCII  <ESC>/[2;13r/<ESC>/[0;7m/       ;SCROLLING REGION LINES 2-13; REVERSE VI
       016040  071063  055433  035460
       016046  066467
 9353  016050  053103  042113  040502         .ASCII  *CVKDBA0 PDT-11 110/130 SYS EX.        0 PASSES*
       016056  020060  042120  026524
       016064  030461  030440  030061
       016072  030457  030063  051440
       016100  051531  042440  027130
       016106  020040  020040  020040
       016114  020040  020060  040520
       016122  051523  051505
 9354  016126  020040  020040  020040         .ASCIZ  /      0 TOTAL ERRORS (     0 SOFT)/<CRLF><ESC>/[m/  ;RETURN TO NORMAL V
       016134  020060  047524  040524
       016142  020114  051105  047522
       016150  051522  024040  020040
       016156  020040  030040  051440
       016164  043117  024524  015600
       016172  066533     000
 9355
 9356                                   ;PASPOS, ERRPOS, AND SERPOS ARE FOR DIRECT CURSOR ADDRESSING OF THE PASS AND ERROR
 9357                                   ;COUNTS ON LINE 1.  IF THE TITLE MESSAGE IS CHANGED, THEY MAY HAVE TO BE CHANGED ALSO.
 9358  016175     033  035533  032063  PASPOS: .ASCIZ  <ESC>/[;34H/<ESC>/[0;7m/ ;DIRECT CURSOR ADDRESS TO PASS NUMBER, REVERSE
       016202  015510  030133  033473
       016210  000155
 9359  016212  055433  032073  044070  ERRPOS: .ASCIZ  <ESC>/[;48H/<ESC>/[0;7m/        ;DIRECT CURSOR ADDRESS TO ERROR NUMBER,
       016220  055433  035460  066467
       016226     000
 9360  016227     033  035533  034466  SERPOS: .ASCIZ  <ESC>/[;69H/            ;DIRECT CURSOR ADDRESS TO SOFT ERROR COUNT
```

```
        016234  000110
 9361
 9362   016236  033433     000          SAVCON: .ASCIZ  <ESC>/7/                ;SAVE CURSOR POSITION ONLY
 9363   016241     033     067          SAVCUR: .ASCII  <ESC>/7/                 ;SAVE CURSOR AND POSITION AT LINE 13
 9364   016243     033  031133  030473  LINE13: .ASCIZ  <ESC>/[2;13r/<ESC>/[m/<ESC>/[13;H/  ;SCROLL 2-13;ALL ATTRIBUTES OFF;LINE
        016250  071063  055433  015555
        016256  030533  035463  000110
 9365   016264  055433  032061  031073  RESDSP: .ASCIZ  <ESC>/[14;24r/<ESC>/8/           ;SCROLL 14-24 AND RESTORE CURSOR
        016272  071064  034033     000
 9366   016277     033  045133          ENDPAS: .ASCII  <ESC>/[J/
 9367   016302  055433  032477  042554  ENDAPT: .ASCIZ  <ESC>/[?5lEND PASS/      ;ERASE TO END OF SCREEN; NORMAL VIDEO;  TYPE END
        016310  042116  050040  051501
        016316  000123
 9368   016320  055433  035460  035461  BLKBLD: .ASCIZ  <ESC>/[0;1;5m/                   ;BLINKING AND BOLD
        016326  066465     000
 9369   016331     033  015474  032533  STATRQ: .ASCIZ  <ESC>/</<ESC>/[5n/       ;REQUEST STATUS REPORT
        016336  000156
 9370   016340  055433  000143          IDENRQ: .ASCIZ  <ESC>/[c/                ;REQUEST TERMINAL IDENTIFY
 9371                                   ;;*****************************************************************
 9372                                   ;RCVR INT SERV TEXT INCLUDES WILDCARD MATCH CHARACTERS OF NEGATIVE BYTES
 9373   016344  055433  067377     000  DSTATR: .ASCIZ  <ESC>/[/<377>/n/                ;DEVICE STATUS REPORT
 9374   016351     033  037533  035461  TIDNTF: .ASCIZ  <ESC>/[?1;/<377>/c/              ;TERMINAL IDENTIFY (VT100)
        016356  061777     000
 9375   016361     033  037533  035464  VIDNTF: .ASCIZ  <ESC>/[?4;/<377>/c/              ;TERMIANL IDENTIFY (VT132)
        016366  061777     000
 9376                                   ;;*****************************************************************
 9377
 9378   016371     126  030524  030060  OPTPRE: .ASCII  /VT100 REPORTS OPTION PRESENT = /
        016376  051040  050105  051117
        016404  051524  047440  052120
        016412  047511  020116  051120
        016420  051505  047105  020124
        016426  020075
 9379   016430     000                  OPCHTX: .BYTE   0                ;OPTION PRESENT PARAMETER RECEIVED PLACED HERE
 9380   016431     200     000                  .BYTE   CRLF,0           ;<CR><LF> AND TERMINATOR
 9381   016433     103  052514  052123  CLOPT:  .ASCIZ  /CLUSTER OPTION/
        016440  051105  047440  052120
        016446  047511  000116
 9382   016452  052524  034065     000  TU58M:  .ASCIZ  /TU58/
 9383   016457     124  032525  020070  TU58MS: .ASCIZ  /TU58 /
        016464     000
 9384   016465     103  052514  052123  CLTERM: .ASCIZ  /CLUSTER TERMINAL #/
        016472  051105  052040  051105
        016500  044515  040516  020114
        016506  000043
 9385   016510  000061                  T1:     .ASCIZ  /1/
 9386   016512  000062                  T2:     .ASCIZ  /2/
 9387   016514  000063                  T3:     .ASCIZ  /3/
 9388   016516  044504  050123  040514  DSPTST: .ASCIZ  /DISPLAY TESTS/
        016524  020131  042524  052123
        016532  000123
 9389   016534  054523  041516  041440  SCOM:   .ASCIZ  /SYNC COMM/
        016542  046517  000115
 9390   016546  051501  047131  020103  ACOM:   .ASCIZ  /ASYNC COMM/
        016554  047503  046515     000
 9391   016561     120  044522  052116  PRINT:  .ASCIZ  /PRINTER/
```

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                016566  051105     000
 9392           016571     103  047514  045503  CLOCK:  .ASCIZ  /CLOCK/
                016576     000
 9393           016577     126  030524  030060  VT100:  .ASCIZ  /VT100/
                016604     000
 9394           016605     040  047520  052122  PORT:   .ASCIZ  / PORT TESTED/<CRLF>
                016612  052040  051505  042524
                016620  100104     000
 9395           016623     064  000113          M4K:    .ASCIZ  /4K/
 9396           016626  045470     000          M8K:    .ASCIZ  /8K/
 9397           016631     061  045462     000  M12K:   .ASCIZ  /12K/
 9398           016635     061  045466     000  M16K:   .ASCIZ  /16K/
 9399           016641     062  045460     000  M20K:   .ASCIZ  /20K/
 9400           016645     062  045464     000  M24K:   .ASCIZ  /24K/
 9401           016651     063  045460     000  M30K:   .ASCIZ  /30K/
 9402           016655     040  042515  047515  MEM:    .ASCIZ  / MEMORY PRESENT/<CRLF>
                016662  054522  050040  042522
                016670  042523  052116  000200
 9403           016676  047040  052117  050040  NOTPRES:        .ASCIZ  / NOT PRESENT/<CRLF>
                016704  042522  042523  052116
                016712  000200
 9404           016714  044600  051516  051105  WARNING:        .ASCIZ  <CRLF>/INSERT SCRATCH CASSETTES, TYPE 'P' TO PROCEED/
                016722  020124  041523  040522
                016730  041524  020110  040503
                016736  051523  052105  042524
                016744  026123  052040  050131
                016752  020105  050047  020047
                016760  047524  050040  047522
                016766  042503  042105     000
 9405           016773     124  050101  020105  DRV0:   .ASCIZ  /TAPE UNIT 0/
                017000  047125  052111  030040
                017006     000
 9406           017007     124  050101  020105  DRV1:   .ASCIZ  /TAPE UNIT 1/
                017014  047125  052111  030440
                017022     000
 9407           017023     040  042524  052123  DROP:   .ASCIZ  / TESTING DROPPED/<CRLF>
                017030  047111  020107  051104
                017036  050117  042520  100104
                017044     000
 9408           017045     040  052522  047116  RUN:    .ASCIZ  / RUNNING/<CRLF>
                017052  047111  100107     000
 9409           017057     115  046505  051117  MEMORY: .ASCIZ  /MEMORY TESTS/
                017064  020131  042524  052123
                017072  000123
 9410           017074  042040  047117  100105  DUN:    .ASCIZ  / DONE/<CRLF>
                017102     000
  411           017103     011  052011  052117  MSG3:   .ASCIZ  <HT><HT>/TOTAL ERRORS THIS PASS:/
                017110  046101  042440  051122
                017116  051117  020123  044124
                017124  051511  050040  051501
                017132  035123     000
 9412           017135     200  004411  051411  MSG4:   .ASCIZ  <CRLF><HT><HT><HT>/SOFT ERRORS THIS PASS: /
                017142  043117  020124  051105
                017150  047522  051522  052040
                017156  044510  020123  040520
                017164  051523  020072     000
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 9413  017171     115  046505  051117  EM1:    .ASCIZ  /MEMORY TIMEOUT/
       017176  020131  044524  042515
       017204  052517  000124
 9414  017210  042515  047515  054522  EM2:    .ASCIZ  /MEMORY DATA COMPARE ERROR/
       017216  042040  052101  020101
       017224  047503  050115  051101
       017232  020105  051105  047522
       017240  000122
 9415  017242  054523  041516  041440  EM3:    .ASCIZ  /SYNC COMM DID NOT RECEIVE SYNC CHAR/
       017250  046517  020115  044504
       017256  020104  047516  020124
       017264  042522  042503  053111
       017272  020105  054523  041516
       017300  041440  040510  000122
 9416  017306  051120  047111  042524  EM4:    .ASCIZ  /PRINTER STATUS ERROR/
       017314  020122  052123  052101
       017322  051525  042440  051122
       017330  051117     000
 9417  017333     103  052514  052123  EM5:    .ASCIZ  /CLUSTER TERM #1 DATA COMP ERR/
       017340  051105  052040  051105
       017346  020115  030443  042040
       017354  052101  020101  047503
       017362  050115  042440  051122
       017370     000
 9418  017371     103  052514  052123  EM6:    .ASCIZ  /CLUSTER TERM #2 DATA COMP ERR/
       017376  051105  052040  051105
       017404  020115  031043  042040
       017412  052101  020101  047503
       017420  050115  042440  051122
       017426     000
 9419  017427     103  052514  052123  EM7:    .ASCIZ  /CLUSTER TERM #3 DATA COMP ERR/
       017434  051105  052040  051105
       017442  020115  031443  042040
       017450  052101  020101  047503
       017456  050115  042440  051122
       017464     000
 9420  017465     101  054523  041516  EM8:    .ASCIZ  /ASYNC COMM DATA COMP ERR/
       017472  041440  046517  020115
       017500  040504  040524  041440
       017506  046517  020120  051105
       017514  000122
 9421  017516  054523  041516  041440  EM9:    .ASCIZ  /SYNC COMM DATA COMP ERR/
       017524  046517  020115  040504
       017532  040524  041440  046517
       017540  020120  051105  000122
 9422  017546  046103  020113  052510  EM23:   .ASCIZ  /CLK HUNG/
       017554  043516     000
 9423  017557     120  044522  052116  EM24:   .ASCIZ  /PRINTER HUNG/
       017564  051105  044040  047125
       017572  000107
 9424  017574  042524  046522  021440  EM25:   .ASCIZ  /TERM #1 HUNG/
       017602  020061  052510  043516
       017610     000
 9425  017611     124  051105  020115  EM26:   .ASCIZ  /TERM #2 HUNG/
       017616  031043  044040  047125
       017624  000107
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 9426  017626  042524  046522  021440  EM27:   .ASCIZ  /TERM #3 HUNG/
       017634  020063  052510  043516
       017642     000
 9427  017643     123  047131  020103  EM28:   .ASCIZ  /SYNC COMM HUNG/
       017650  047503  046515  044040
       017656  047125  000107
 9428  017662  051501  047131  020103  EM29:   .ASCIZ  /ASYNC COMM HUNG/
       017670  047503  046515  044040
       017676  047125  000107
 9429  017702  054523  041516  041440  EM32:   .ASCIZ  /SYNC COMM - DATA NOT AVAIL NOT SET/
       017710  046517  020115  020055
       017716  040504  040524  047040
       017724  052117  040440  040526
       017732  046111  047040  052117
       017740  051440  052105     000
 9430  017745     123  047131  020103  EM33:   .ASCIZ  /SYNC COMM - RECVR ACTIVE NOT SET/
       017752  047503  046515  020440
       017760  051040  041505  051126
       017766  040440  052103  053111
       017774  020105  047516  020124
       020002  042523  000124
 9431  020006  054523  041516  041440  EM34:   .ASCIZ  /SYNC COMM - RECVR DONE NOT SET/
       020014  046517  020115  020055
       020022  042522  053103  020122
       020030  047504  042516  047040
       020036  052117  051440  052105
       020044     000
 9432  020045     122  046517  052040  EM127:  .ASCIZ  /ROM TIMED OUT/
       020052  046511  042105  047440
       020060  052125     000
 9433  020063     126  030524  030060  EM134:  .ASCIZ  /VT100 HUNG/
       020070  044040  047125  000107
 9434  020076  047516  051040  051505  EM125:  .ASCIZ  /NO RESPONSE FROM VT100/
       020104  047520  051516  020105
       020112  051106  046517  053040
       020120  030524  030060     000
 9435  020125     126  030524  030060  EM130:  .ASCIZ  /VT100 REPORTED SELF-TEST FAILURE/
       020132  051040  050105  051117
       020140  042524  020104  042523
       020146  043114  052055  051505
       020154  020124  040506  046111
       020162  051125  000105
 9436  020166  050117  044524  047117  EM131:  .ASCIZ  /OPTION PRESENT (STP) NOT DETECTED BY VT100/
       020174  050040  042522  042523
       020202  052116  024040  052123
       020210  024520  047040  052117
       020216  042040  052105  041505
       020224  042524  020104  054502
       020232  053040  030524  030060
       020240     000
 9437  020241     125  051116  041505  EM132:  .ASCIZ  /UNRECOGNIZED RESPONSE FROM VT100/
       020246  043517  044516  042532
       020254  020104  042522  050123
       020262  047117  042523  043040
       020270  047522  020115  052126
       020276  030061  000060
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 9438  020302  054523  041516  041440  EM133:  .ASCIZ  /SYNC COMM MODEM LOOPBACK SIGNALS NOT SET IN CSR/
       020310  046517  020115  047515
       020316  042504  020115  047514
       020324  050117  040502  045503
       020332  051440  043511  040516
       020340  051514  047040  052117
       020346  051440  052105  044440
       020354  020116  051503  000122
 9439  020362  051501  047131  020103  EM140:  .ASCIZ  /ASYNC COMM MODEM LOOPBACK SIGNALS NOT SET IN CSR/
       020370  047503  046515  046440
       020376  042117  046505  046040
       020404  047517  041120  041501
       020412  020113  044523  047107
       020420  046101  020123  047516
       020426  020124  042523  020124
       020434  047111  041440  051123
       020442     000
 9440  020443     124  032525  020070  EM135:  .ASCIZ  /TU58 DEVICE ERROR/
       020450  042504  044526  042503
       020456  042440  051122  051117
       020464     000
 9441  020465     124  032525  020070  EM136:  .ASCIZ  /TU58 WRITE ERROR/
       020472  051127  052111  020105
       020500  051105  047522  000122
 9442  020506  052524  034065  051040  EM137:  .ASCIZ  /TU58 READ ERROR/
       020514  040505  020104  051105
       020522  047522  000122
 9443  020526  051105  047522  020122  DH1:    .ASCIZ  /ERROR #        ERR PC/
       020534  004443  051105  020122
       020542  041520     000
 9444  020545     105  051122  051117  DH2:    .ASCIZ  /ERROR #        ERR PC  ADDR/
       020552  021440  042411  051122
       020560  050040  004503  042101
       020566  051104     000
 9445  020571     105  051122  051117  DH3:    .ASCIZ  /ERROR #        ERR PC  ADDR    EXPECT  RECVD/
       020576  021440  042411  051122
       020604  050040  004503  042101
       020612  051104  042411  050130
       020620  041505  020124  051040
       020626  041505  042126     000
 9446  020633     105  051122  051117  DH4:    .ASCIZ  /ERROR #        ERR PC  PR STATUS/
       020640  021440  042411  051122
       020646  050040  004503  051120
       020654  051440  040524  052524
       020662  000123
 9447  020664  051105  047522  020122  DH5:    .ASCIZ  /ERROR #        ERR PC  EXPECT  RECVD/
       020672  004443  051105  020122
       020700  041520  042411  050130
       020706  041505  020124  051040
       020714  041505  042126     000
 9448  020721     105  051122  051117  DH31:   .ASCIZ  /ERROR #        ERR PC  OPTPRES/
       020726  021440  042411  051122
       020734  050040  004503  050117
       020742  050124  042522  000123
 9449  020750  051105  047522  020122  DH32:   .ASCIZ  /ERROR #        ERR PC  ERR WRD OP-CODE UNIT #  /
       020756  004443  051105  020122
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                020764  041520  042411  051122
                020772  053440  042122  047440
                021000  026520  047503  042504
                021006  052440  044516  020124
                021014  020043  000040
 9450           021020  051105  047522  020122  DH33:   .ASCIZ  /ERROR #       ERR PC  OP-CODE UNIT #  BLOCK # PKT WRD SUCCESS BYT CNT
                021026  004443  051105  020122
                021034  041520  047411  026520
                021042  047503  042504  052440
                021050  044516  020124  020043
                021056  041040  047514  045503
                021064  021440  050040  052113
                021072  053440  042122  051440
                021100  041525  042503  051523
                021106  041040  052131  041440
                021114  052116  051440  046525
                021122  040515  054522     000
 9451           021127     105  051122  051117  DH34:   .ASCIZ  /ERROR #       ERR PC  OP-CODE UNIT #  BLOCK # PKT WRD DAT WRD SUCCESS
                021134  021440  042411  051122
                021142  050040  004503  050117
                021150  041455  042117  020105
                021156  047125  052111  021440
                021164  020040  046102  041517
                021172  020113  020043  045520
                021200  020124  051127  020104
                021206  040504  020124  051127
                021214  020104  052523  041503
                021222  051505  020123  054502
                021230  020124  047103  020124
                021236  052523  046515  051101
                021244  000131
 9452
 9453                                    .EVEN
 9454
 9455           021246  026330  001116  000000  DT1:    .WORD   ERRNUM,$ERRPC,0
 9456           021254  026330  001116  003242  DT2:    .WORD   ERRNUM,$ERRPC,ADDR,0
                021262  000000
 9457           021264  026330  001116  003242  DT3:    .WORD   ERRNUM,$ERRPC,ADDR,PAT,MEMHLD,0
                021272  003240  003236  000000
 9458           021300  026330  001116  014516  DT4:    .WORD   ERRNUM,$ERRPC,SPRS,0
                021306  000000
 9459           021310  026330  001116  014630  DT5:    .WORD   ERRNUM,$ERRPC,T1CHR,T1HLD,0
                021316  014632  000000
 9460           021322  026330  001116  014750  DT6:    .WORD   ERRNUM,$ERRPC,T2CHR,T2HLD,0
                021330  014752  000000
 9461           021334  026330  001116  015066  DT7:    .WORD   ERRNUM,$ERRPC,T3CHR,T3HLD,0
                021342  015070  000000
 9462           021346  026330  001116  015244  DT8:    .WORD   ERRNUM,$ERRPC,COMCHR,COMHLD,0
                021354  015246  000000
 9463           021360  026330  001116  014012  DT31:   .WORD   ERRNUM,$ERRPC,OPTCHR,0
                021366  000000
 9464           021370  026330  001116  004640  DT33:   .WORD   ERRNUM,$ERRPC,EXPMRC,SAVMRC,0
                021376  004636  000000
 9465           021402  026330  001116  007064  DT34:   .WORD   ERRNUM,$ERRPC,TU58ER,OPCODE,UNITNM,0
                021410  007030  007032  000000
 9466           021416  026330  001116  007030  DT35:   .WORD   ERRNUM,$ERRPC,OPCODE,UNITNM,BLKNUM,PKTERR,SUCCES,BYTECT,SUMARY,0
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        021424  007032  007040  007062
        021432  007074  007076  007100
        021440  000000
 9467   021442  026330  001116  007030  DT36:   .WORD   ERRNUM,$ERRPC,OPCODE,UNITNM,BLKNUM,PKTERR,DPKTER,SUCCES,BYTECT,SUMARY,0
        021450  007032  007040  007062
        021456  007066  007074  007076
        021464  007100  000000
 9468
 9469                                   ;;*****************************************************************
 9470                                   ;DISPLAY PROCESS TEXT
 9471                                   ;FOR THIS TEXT TO BE COMPATIBLE WITH THE TYPE ROUTINE, ALL ESCAPE
 9472                                   ;SEQUENCES SHOULD BE FOLLOWED BY A ZERO BYTE.  ANY ZERO BYTE MAY, IF DESIRED,
 9473                                   ;BE FOLLOWED BY A NEGATIVE BYTE, WHICH IS A NEGATIVE "PAUSE COUNT".  THIS WILL
 9474                                   ;PAUSE THE DISPLAY PROCESS (ALLOWING THE DISPLAY TO BE READ).
 9475                                   ;THE ENTIRE DISPLAY TEXT IS TERMINATED BY TWO ZERO BYTES IN A ROW
 9476                                   ;;*****************************************************************
 9477
 9478   021470  055433  032061  031073  DSPTXT: .ASCIZ  <ESC>/[14;24r/          ;SCROLL 14-24
        021476  071064     000
 9479   021501     033  031133  035464          .ASCIZ  <ESC>/[24;1H/          ;CURSOR POSITION
        021506  044061     000
 9480   021511     033  030133  030473          .ASCIZ  <ESC>/[0;1q/           ;LED 1 ON
        021516  000161
 9481   021520  051525  040440  041523          .ASCII  /US ASCII CHARACTER SET/<CR><LF>
        021526  044511  041440  040510
        021534  040522  052103  051105
        021542  051440  052105  005015
 9482   021550     040     041     042          .BYTE   40,41,42,43,44,45,46,47,50,51,52,53,54,55,56,57,60,61,62,63,64,65,66,67,
        021553     043     044     045
        021556     046     047     050
        021561     051     052     053
        021564     054     055     056
        021567     057     060     061
        021572     062     063     064
        021575     065     066     067
        021600     070     071     072
        021603     073     074     075
        021606     076     077
 9483   021610     100     101     102          .BYTE   100,101,102,103,104,105,106,107,110,111,112,113,114,115,116,117,CR,LF
        021613     103     104     105
        021616     106     107     110
        021621     111     112     113
        021624     114     115     116
        021627     117     015     012
 9484   021632     120     121     122          .BYTE   120,121,122,123,124,125,126,127,130,131,132,133,134,135,136,137,140,141,
        021635     123     124     125
        021640     126     127     130
        021643     131     132     133
        021646     134     135     136
        021651     137     140     141
        021654     142     143     144
        021657     145     146     147
 9485   021662     150     151     152          .BYTE   150,151,152,153,154,155,156,157,160,161,162,163,164,165,166,167,170,171,
        021665     153     154     155
        021670     156     157     160
        021673     161     162     163
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        021676     164     165     166
        021701     167     170     171
        021704     172     173     174
        021707     175     176     015
        021712     012     012
 9486   021714  051107  050101  044510          .ASCIZ  /GRAPHIC CHARACTER SET/<CR><LF><ESC>/(0/        ;SELECT GRAPHIC CHAR SET
        021722  020103  044103  051101
        021730  041501  042524  020122
        021736  042523  006524  015412
        021744  030050     000
 9487   021747     040     041     042          .BYTE   40,41,42,43,44,45,46,47,50,51,52,53,54,55,56,57,60,61,62,63,64,65,66,67,
        021752     043     044     045
        021755     046     047     050
        021760     051     052     053
        021763     054     055     056
        021766     057     060     061
        021771     062     063     064
        021774     065     066     067
        021777     070     071     072
        022002     073     074     075
        022005     076     077
 9488   022007     100     101     102          .BYTE   100,101,102,103,104,105,106,107,110,111,112,113,114,115,116,117,CR,LF
        022012     103     104     105
        022015     106     107     110
        022020     111     112     113
        022023     114     115     116
        022026     117     015     012
 9489   022031     120     121     122          .BYTE   120,121,122,123,124,125,126,127,130,131,132,133,134,135,136,137,140,141,
        022034     123     124     125
        022037     126     127     130
        022042     131     132     133
        022045     134     135     136
        022050     137     140     141
        022053     142     143     144
        022056     145     146     147
 9490   022061     150     151     152          .BYTE   150,151,152,153,154,155,156,157,160,161,162,163,164,165,166,167,170,171,
        022064     153     154     155
        022067     156     157     160
        022072     161     162     163
        022075     164     165     166
        022100     167     170     171
        022103     172     173     174
        022106     175     176     015
        022111     012     012
 9491   022113     033  041050     000          .ASCIZ  <ESC>/(B/                ;RESTORE NORMAL CHARACTER SET
 9492   022117     374                          .BYTE   374
 9493   022120  005015  044514  042516          .ASCII  <CR><LF>/LINE SIZE TEST/<CR><LF>
        022126  051440  055111  020105
        022134  042524  052123  005015
 9494   022142  005015  021433  000063          .ASCIZ  <CR><LF><ESC><43><63>
 9495   022150  044124  051511  046040          .ASCII  /THIS LINE IS DOUBLE-HEIGHT DOUBLE-WIDTH/
        022156  047111  020105  051511
        022164  042040  052517  046102
        022172  026505  042510  043511
        022200  052110  042040  052517
        022206  046102  026505  044527
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        022214  052104     110
 9496   022217     015  015412  032043          .ASCIZ  <CR><LF><ESC><43><64>
        022224     000
 9497   022225     124  044510  020123          .ASCII  /THIS LINE IS DOUBLE-HEIGHT DOUBLE-WIDTH/<CR><LF>
        022232  044514  042516  044440
        022240  020123  047504  041125
        022246  042514  044055  044505
        022254  044107  020124  047504
        022262  041125  042514  053455
        022270  042111  044124  005015
 9498   022276  005015  021433  000066          .ASCIZ  <CR><LF><ESC><43><66>
 9499   022304  044124  051511  046040          .ASCII  /THIS LINE IS SINGLE-HEIGHT DOUBLE-WIDTH/<CR><LF>
        022312  047111  020105  051511
        022320  051440  047111  046107
        022326  026505  042510  043511
        022334  052110  042040  052517
        022342  046102  026505  044527
        022350  052104  006510     012
 9500   022355     015  015412  032443          .ASCIZ  <CR><LF><ESC><43><65>
        022362     000
 9501   022363     124  044510  020123          .ASCIZ  /THIS LINE IS SINGLE-HEIGHT SINGLE-WIDTH/<CR><LF>
        022370  044514  042516  044440
        022376  020123  044523  043516
        022404  042514  044055  044505
        022412  044107  020124  044523
        022420  043516  042514  053455
        022426  042111  044124  005015
        022434     000
 9502   022435     376                          .BYTE   376
 9503   022436  055433  035460  070462          .ASCIZ  <ESC>/[0;2q/            ;LFD 2
        022444     000
 9504   022445     015  040412  052124          .ASCII  <CR><LF>/ATTRIBUTE DISPLAY TEST/<CR><LF><LF>
        022452  044522  052502  042524
        022460  042040  051511  046120
        022466  054501  052040  051505
        022474  006524  005012
 9505   022500  055433  066460     000          .ASCIZ  <ESC><133><60><155>
 9506   022505     124  044510  020123          .ASCII  /THIS LINE IS NORMAL - NO ATTRIBUTES/<CR><LF>
        022512  044514  042516  044440
        022520  020123  047516  046522
        022526  046101  026440  047040
        022534  020117  052101  051124
        022542  041111  052125  051505
        022550  005015
 9507   022552  055433  035460  066461          .ASCIZ  <ESC><133><60><73><61><155>
        022560     000
 9508   022561     124  044510  020123          .ASCII  /THIS LINE IS BOLD/<CR><LF>
        022566  044514  042516  044440
        022574  020123  047502  042114
        022602  005015
 9509   022604  055433  035460  066464          .ASCIZ  <ESC><133><60><73><64><155>
        022612     000
 9510   022613     124  044510  020123          .ASCII  /THIS LINE IS UNDERLINED/<CR><LF>
        022620  044514  042516  044440
        022626  020123  047125  042504
        022634  046122  047111  042105
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        022642  005015
 9511   022644  055433  035460  035461          .ASCIZ  <ESC><133><60><73><61><73><64><155>
        022652  066464     000
 9512   022655     124  044510  020123           ASCII  /THIS LINE IS BOLD AND UNDERLINED/<CR><LF>
        022662  044514  042516  044440
        022670  020123  047502  042114
        022676  040440  042116  052440
        022704  042116  051105  044514
        022712  042516  006504     012
 9513   022717     033  030133  032473          .ASCIZ  <ESC><133><60><73><65><155>
        022724  000155
 9514   022726  044124  051511  046040          .ASCII  /THIS LINE IS BLINKING/<CR><LF>
        022734  047111  020105  051511
        022742  041040  044514  045516
        022750  047111  006507     012
 9515   022755     033  030133  032473          .ASCIZ  <ESC><133><60><73><65><73><61><155>
        022762  030473  000155
 9516   022766  055433  035460  070463          .ASCIZ  <ESC>/[0;3q/            ;LED 3
        022774     000
 9517   022775     124  044510  020123          .ASCII  /THIS LINE IS BLINKING AND BOLD/<CR><LF>
        023002  044514  042516  044440
        023010  020123  046102  047111
        023016  044513  043516  040440
        023024  042116  041040  046117
        023032  006504     012
 9518   023035     033  030133  032473          .ASCIZ  <ESC><133><60><73><65><73><64><155>
        023042  032073  000155
 9519   023046  044124  051511  046040          .ASCII  /THIS LINE IS BLINKING AND UNDERLINED/<CR><LF>
        023054  047111  020105  051511
        023062  041040  044514  045516
        023070  047111  020107  047101
        023076  020104  047125  042504
        023104  046122  047111  042105
        023112  005015
 9520   023114  055433  035460  035465          .ASCIZ  <ESC><133><60><73><65><73><61><73><64><155>
        023122  035461  066464     000
 9521   023127     124  044510  020123          .ASCII  /THIS LINE IS BLINKING, UNDERLINED AND BOLD/<CR><LF>
        023134  044514  042516  044440
        023142  020123  046102  047111
        023150  044513  043516  020054
        023156  047125  042504  046122
        023164  047111  042105  040440
        023172  042116  041040  046117
        023200  006504     012
 9522   023203     033  030133  033473          .ASCIZ  <ESC><133><60><73><67><155>
        023210  000155
 9523   023212     376                          .BYTE   376
 9524   023213     015  052012  044510          .ASCII  <CR><LF>/THIS LINE IS REVERSE VIDEO/<CR><LF>
        023220  020123  044514  042516
        023226  044440  020123  042522
        023234  042526  051522  020105
        023242  044526  042504  006517
        023250     012
 9525   023251     033  030133  033473          .ASCIZ  <ESC><133><60><73><67><73><61><155>
        023256  030473  000155
 9526   023262  044124  051511  046040          .ASCII  /THIS LINE IS REVERSE VIDEO AND BOLD/<CR><LF>
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        023270  047111  020105  051511
        023276  051040  053105  051105
        023304  042523  053040  042111
        023312  047505  040440  042116
        023320  041040  046117  006504
        023326     012
 9527   023327     033  030133  033473          .ASCIZ  <ESC><133><60><73><67><73><64><155>
        023334  032073  000155
 9528   023340  044124  051511  046040          .ASCII  /THIS LINE IS REVERSE VIDEO AND UNDERLINED/<CR><LF>
        023346  047111  020105  051511
        023354  051040  053105  051105
        023362  042523  053040  042111
        023370  047505  040440  042116
        023376  052440  042116  051105
        023404  044514  042516  006504
        023412     012
 9529   023413     033  030133  032073          .ASCIZ  <ESC>/[0;4q/            ;LED 4
        023420  000161
 9530   023422  055433  035460  035467          .ASCIZ  <ESC><133><60><73><67><73><61><73><64><155>
        023430  035461  066464     000
 9531   023435     124  044510  020123          .ASCII  /THIS LINE IS REVERSE VIDEO, BOLD AND UNDERLINED/<CR><LF>
        023442  044514  042516  044440
        023450  020123  042522  042526
        023456  051522  020105  044526
        023464  042504  026117  041040
        023472  046117  020104  047101
        023500  020104  047125  042504
        023506  046122  047111  042105
        023514  005015
 9532   023516  055433  035460  035467          .ASCIZ  <ESC><133><60><73><67><73><65><155>
        023524  066465     000
 9533   023527     124  044510  020123          .ASCII  /THIS LINE IS REVERSE VIDEO AND BLINKING/<CR><LF>
        023534  044514  042516  044440
        023542  020123  042522  042526
        023550  051522  020105  044526
        023556  042504  020117  047101
        023564  020104  046102  047111
        023572  044513  043516  005015
 9534   023600  055433  035460  035467          .ASCIZ  <ESC><133><60><73><67><73><65><73><61><155>
        023606  035465  066461     000
 9535   023613     124  044510  020123          .ASCII  /THIS LINE IS REVERSE VIDEO, BLINKING AND BOLD/<CR><LF>
        023620  044514  042516  044440
        023626  020123  042522  042526
        023634  051522  020105  044526
        023642  042504  026117  041040
        023650  044514  045516  047111
        023656  020107  047101  020104
        023664  047502  042114  005015
 9536   023672  055433  035460  035467          .ASCIZ  <ESC><133><60><73><67><73><65><73><64><155>
        023700  035465  066464     000
 9537   023705     124  044510  020123          .ASCII  /THIS LINE IS REVERSE VIDEO, BLINKING AND UNDERLINED/<CR><LF>
        023712  044514  042516  044440
        023720  020123  042522  042526
        023726  051522  020105  044526
        023734  042504  026117  041040
        023742  044514  045516  047111
```

```
        023750  020107  047101  020104
        023756  047125  042504  046122
        023764  047111  042105  005015
 9538   023772  055433  035460  035467          .ASCIZ  <ESC><133><60><73><67><73><65><73><64><73><61><155>
        024000  035465  035464  066461
        024006     000
 9539   024007     124  044510  020123          .ASCII  /THIS LINE IS REVERSE VIDEO, BLINKING, UNDERLINED AND BOLD/<CR><LF>
        024014  044514  042516  044440
        024022  020123  042522  042526
        024030  051522  020105  044526
        024036  042504  026117  041040
        024044  044514  045516  047111
        024052  026107  052440  042116
        024060  051105  044514  042516
        024066  020104  047101  020104
        024074  047502  042114  005015
 9540   024102  055433  066460     000  ATTOFF: .ASCIZ  <ESC><133><60><155>             ;ALL ATTRIBUTES OFF
 9541   024107     376                          .BYTE   376
 9542   024110  055433  000161                  .ASCIZ  <ESC>/[q/                   ;ALL LED'S OFF
 9543   024114  005015  044103  047101          .ASCIZ  <CR><LF>/CHANGING SCREEN TO BLACK ON WHITE/<ESC><133><77><65><150>
        024122  044507  043516  051440
        024130  051103  042505  020116
        024136  047524  041040  040514
        024144  045503  047440  020116
        024152  044127  052111  015505
        024160  037533  064065     000
 9544   024165     376                          .BYTE   376                         ;PAUSE WHILE SCREEN STAYS REVERSED
 9545   024166  041415  040510  043516          .ASCIZ  <CR>/CHANGING SCREEN TO WHITE ON BLACK/<ESC><133><77><65><154>
        024174  047111  020107  041523
        024202  042522  047105  052040
        024210  020117  044127  052111
        024216  020105  047117  041040
        024224  040514  045503  055433
        024232  032477  000154
 9546   024236  005015                          .ASCII  <CR><LF>
 9547   024240     000     000                  .BYTE   0,0                         ;FINAL TERMINATOR
 9548
 9549                                    .EVEN
 9550                                    .SBTTL  TYPE ROUTINE
 9551
 9552                                    ;;*****************************************************************
 9553                                    ;ROUTINE TO TYPE ASCII MESSAGE. MESSAGE MUST TERMINATE WITH A ZERO BYTE.
 9554                                    ;THIS ROUTINE IS FUNCTIONALLY THE SAME AS SYSMAC'S ".$TYPE" AND IS USED IN THE
 9555                                    ;SAME WAY.  IT WAS COPIED AND EDITED FROM SYSMAC.  HORIZONTAL TAB PROCESSOR WAS REMOVED.
 9556                                    ;THE SYSMAC TYPE ROUTINE COULD NOT BE USED FOR 3 REASONS:
 9557                                    ;1) IT DID NOT SUPPORT XON, XOFF (THOUGH FUTURE VERSIONS MAY).
 9570                                    ;2) IN ORDER TO OPERATE ALONG WITH VT100 DISPLAY PROCESS, THE TYPE ROUTINE
 9571                                    ;   MUST FIRST ISSUE SAVE CURSOR COMMAND AND POSITION THE CURSOR AND RESTORE THE
 9572                                    ;   CURSOR AT THE END.  THUS, THE FLOW TO TYPE A MESSAGE IS:
 9573                                    ;       1) FIRST TYPE SAVE CURSOR MESSAGE TO SAVE CURSOR AND ATTRIBUTES AND TO
 9574                                    ;          SET UP THE SCREEN PROPERLY;
 9575                                    ;       2) TYPE THE MESSAGE (FROM THE ORIGINAL TYPE STATEMENT)
 9576                                    ;       3) TYPE RESTORE CURSOR MESSAGE TO TO RETURN SCREEN TO PREVIOUS STATE.
 9577                                    ;   TYPING THE SAVECURSOR AND RESTORE CURSOR COMMANDS IS DONE WITH A TYPE CALL
 9578                                    ;   AND SOME FLAGS FOR HOUSEKEEPING.  THE FLOWCHARTS DEALING WITH THIS PORTION OF
 9579                                    ;   THE CODE FOLLOWS.
```

```
 9580                                   ;
 9581                                   ;[$TYPE]
 9582                                   ;[1$:]    IF TYPFLG = 0
 9583                                   ;                 THEN    SET TYPFLG = -1
 9584                                   ;                         TYPE, SAVCUR            ;TYPE THE SAVE CURSOR MESSAGE
 9585                                   ;[20$:ETC] PROCESS (TYPE) THE MESSAGE FORM THE CALL
 9586                                   ;[100$:]  IF TYPFLG = 0
 9587                                   ;                 THEN    SET TYPFLG = -1
 9588                                   ;                         TYPE, RESDSP            ;TYPE THE RESTORE CURSOR MESSAGE
 9589                                   ;                 ELSE    IF TYPFLG < 0 (=-1) THEN SET TYPFLG = 0
 9590                                   ;[101$:]  RETURN
 9591                                   ;
 9592                                   ;THE SYMBOL TYPFLG CONTROLS THE SAVE AND RESTORE CURSOR PROCESS.
 9593                                   ;IF TYPFLG > 0 (AND NOT= 0), THEN ESCAPE SEQUENCES TO SAVE AND RESTORE THE
 9594                                   ;CURSOR POSITION WILL NOT BE SENT TO THE VT100.  THIS WILL BE THE CASE IF VT100
 9595                                   ;DISPLAY TESTS WERE NEVER STARTED, WHICH WILL SPEED UP TYPEOUTS. IT ALSO
 9596                                   ;*! MUST !* BE THE CASE IF IT IS DESIRED TO TYPE OUT PORTIONS OF A LINE
 9597                                   ;WITHOUT A CARRIAGE RETURN AT THE END.  (E.G. IN THE PAUSE BETWEEN INDIVIDUAL
 9598                                   ;DATA TYPEOUTS ON THE SAME LINE IN THE ERROR ROUTINE.)  THIS CAN BE TAKEN
 9599                                   ;CARE OF AUTOMATICALLY WITH THE "SAVEVT" AND "RESTVT" TRAP CALLS.
 9600                                   ;
 9601                                   ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
 9602                                   ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
 9603                                   ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
 9604                                   ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
 9605                                   ;*
 9606                                   ;*CALL:
 9607                                   ;*1) USING A TRAP INSTRUCTION
 9608                                   ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
 9609                                   ;*OR
 9610                                   ;*      TYPE
 9611                                   ;*      MESADR
 9612                                   ;*
 9613
 9614  024242  105737  001251           $TYPE:  TSTB    ESCFLG          ;WAS AN ESCAPE SEQUENCE BEING TYPED BY DISPLAY PROCESS?
 9615  024246  001402                           BEQ     1$              ;BRANCH IF NOT
 9616  024250  004737  024672                   JSR     PC,FINESC       ;FINISH TYPING THE ESCAPE SEQUENCE
 9617  024254  105737  001250           1$:     TSTB    TYPFLG          ;SHOULD I SAVE THE CURSOR POSITION?
 9618  024260  001007                           BNE     20$             ;BRANCH IF NOT
 9619  024262  042777  000100  154660           BIC     #IE,@$TPS       ;CLEAR XMIT IE
 9620  024270  105137  001250                   COMB    TYPFLG          ;SET FLAG TO -1
 9621  024274  104401  016241                   TYPE,   SAVCUR          ;SAVE CURSOR POSITION AND ATTRIBUTES
 9622  024300  042777  000100  154636   20$:    BIC     #IE,@$TKS       ;TURN OFF KEYBD IE TO AVOID SPURIOUS 8085 INTERRUPTS
 9623  024306  010046                           MOV     R0,-(SP)        ;;SAVE R0
 9624  024310  017600  000002                   MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
 9625  024314  122737  000001  001210           CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 9626  024322  001011                           BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
 9627  024324  132737  000100  001211           BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
 9628  024332  001405                           BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
 9629  024334  010037  024344                   MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
 9630  024340  004737  025530                   JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
 9631  024344  000000                   61$:    .WORD   0               ;;MESSAGE ADDRESS
 9632  024346  132737  000040  001211   62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
 9633  024354  001003                           BNE     60$             ;;YES,SKIP TYPE OUT
 9634  024356  112046                   2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 9635  024360  001031                           BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
```

```
 9636  024362  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
 9637  024364  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
 9638  024366  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
 9639  024372  105737  001250          100$:   TSTB    TYPFLG          ;SHOULD I RESTORE THE CURSOR?
 9640  024376  001010                          BNE     101$            ;BRANCH IF NO
 9641  024400  105137  001250                  COMB    TYPFLG          ;SET FLAG TO -1
 9642  024404  104401  016264                  TYPE,   RESDSP          ;RESTORE THE CURSOR AND ATTRIBUTES AND DISPLAY AREA
 9643  024410  052777  000100  154532          BIS     #IE,@$TPS       ;RESTORE XMIT IE
 9644  024416  000403                          BR      102$
 9645  024420  100002                  101$:   BPL     102$            ;BRANCH IF THE TYPFLG WAS NON-ZERO AND POSITIVE
 9646  024422  105037  001250                  CLRB    TYPFLG          ;SET THE TYPFLG TO 0
 9647  024426  105737  001135          102$:   TSTB    $INTAG          ;CHECK INT MODE INTICATOR
 9648  024432  001403                          BEQ     103$            ;IF SET DO NOT SET KBD INT ENA BIT
 9649  024434  052777  000100  154502          BIS     #IE,@$TKS       ;RESTORE IE FOR KEYBD
 9650  024442  000002                  103$:   RTI                     ;;RETURN
 9651  024444  122716  000200          4$:     CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
 9652  024450  001010                          BNE     5$
 9653  024452  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
 9654  024454  105237  001250                  INCB    TYPFLG          ;INSURE NO CURSOR SAVING
 9655  024460  104401                          TYPE                    ;;TYPE A CR AND LF
 9656  024462  001165                          $CRLF
 9657  024464  105337  001250                  DECB    TYPFLG          ;RESTORE THE FLAG
 9658  024470  000732                          BR      2$              ;;GET NEXT CHARACTER
 9659  024472  004737  024524          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
 9660  024476  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
 9661  024502  001325                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
 9662  024504  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
 9663                                                                  ;;AND THE NULL CHAR.
 9664  024510  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
 9665  024514  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
 9666  024516  004737  024524                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
 9667  024522  000772                          BR      7$              ;;LOOP
 9668
 9669  024524  032777  000200  154416  $TYPEC: BIT     #RDY,@$TPS      ;WAIT UNTIL PRINTER IS READY
 9670  024532  001774                          BEQ     $TYPEC
 9671  024534  032777  000200  154402  1$:     BIT     #RDY,@$TKS      ;CHECK IF CHARACTER TO BE READ
 9672  024542  001444                          BEQ     5$              ;BRANCH IF NOT
 9673  024544  017746  154376                  MOV     @$TKB,-(SP)     ;READ CHARACTER
 9674  024550  042716  177600                  BIC     #^C177,(SP)     ;MASK ALL BUT ASCII
 9675  024554  022716  000023                  CMP     #XOFF,(SP)      ;XOFF?
 9676  024560  001003                          BNE     2$              ;BR IF NO
 9677  024562  112737  000001  001253          MOVB    #1,XFLAG        ;FLAG XOFF STATUS
 9678  024570  022716  000021          2$:     CMP     #XON,(SP)       ;XON?
 9679  024574  001004                          BNE     3$              ;BR IF NO
 9680  024576  105037  001253                  CLRB    XFLAG           ;FLAG XON STATUS
 9681  024602  105037  014344                  CLRB    XIEFLG          ;CLEAR FLAG THAT IN ENABLE DESIRED (WILL BE
 9682                                                                  ;SET ON RTI OR BY CALL & RESTORE SEQUENCE
 9683
 9684  024606  122737  000001  001134  3$:     CMPB    #1,$AUTOB       ;AUTO MODE?
 9685  024614  001002                          BNE     33$             ;IF NOT CHECK FOR CONTROL G OR C
 9686  024616  005726                          TST     (SP)+           ;POP CHARACTER OFF STACK
 9687  024620  000415                          BR      5$              ;EXIT  IF XOF FLAG NOT SET
 9688  024622  022716  000007          33$:    CMP     #7,(SP)         ;CONTROL-G?
 9689  024626  001003                          BNE     4$              ;BR IF NOT
 9690  024630  112737  000001  001252          MOVB    #1,GFLAG        ;FLAG THAT CONTROL-G NEEDS HANDLING
 9691  024636  022726  000003          4$:     CMP     #3,(SP)+        ;CHECK IF A CONTROL C WAS TYPED
```

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 9692  024642  001004                          BNE     5$              ;IF NOT THEN CONTINUE
 9693  024644  004737  013270                  JSR     PC,TIMER1       ;DELAY TO ALLOW DEVICES TO SHUTUP
 9694  024650  000137  001716                  JMP     @#START         ;RESTART THE PROGRAM
 9695  024654  105737  001253          5$:     TSTB    XFLAG           ;WAIT FOR XON STATUS
 9696  024660  001325                          BNE     1$
 9697  024662  016677  000002  154262          MOV     2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
 9698  024670  000207          $TYPEX: RTS     PC
 9699
 9700                                          ;;*****************************************************************
 9701                                          ;THIS SUBROUTINE FINISHES TYPING AN ESCAPE SEQUENCE STARTED BY THE XMIT INTERRUPT
 9702                                          ;SERVICE ROUTINE (VT100 TESTING).
 9703
 9704  024672  105037  001251          FINESC: CLRB    ESCFLG          ;CLEAR THE ESCAPE FLAG
 9705  024676  013737  014346  024724          MOV     TXTPTR,1$       ;SAVE THE POINTER TO THE UNFINISHED ESCAPE SEQUENCE
 9706  024704  105237  001250                  INCB    TYPFLG          ;MAKE SURE TYPE DOES NOT SAVE AND RESTORE CURSOR
 9707  024710  017746  154234                  MOV     @$TPS,-(SP)     ;SAVE STATE OF XMIT IE
 9708  024714  042777  000100  154226          BIC     #IE,@$TPS       ;AND THEN CLEAR IT
 9709  024722  104401                          TYPE
 9710  024724  000000          1$:     .WORD   0               ;POINTER TO UNFINISHED ESC SEQ
 9711  024726  012677  154216                  MOV     (SP)+,@$TPS     ;RESTORE STATE OF XMIT IE
 9712  024732  105337  001250                  DECB    TYPFLG          ;RESTORE FLAG FOR CURSOR TO PREVIOUS VALUE
 9713  024736  105777  167404          2$:     TSTB    @TXTPTR         ;MODIFY TXTPTR TO POINT AFTER ESCAPE SEQUENCE
 9714  024742  001403                          BEQ     3$              ;BRANCH IF POINTING TO TERMINATOR
 9715  024744  005237  014346                  INC     TXTPTR          ;POINT IT TO NEXT BYTE
 9716  024750  000772                          BR      2$              ;GO CHECK IF AT TERMINATOR
 9717  024752  000207          3$:     RTS     PC
```

```
 9719                                   .SBTTL  SOFTWARE SWITCH REGISTER CHANGE ROUTINE
 9720                                   ;;*****************************************************************
 9721                                   ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
 9722                                   ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
 9723                                   ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
 9724                                   ;*WHEN OPERATING IN TTY FLAG MODE.
 9725
 9726  024754  017737  154170  025250  $GTSWR: MOV     @$TPS,GSAVIE    ;SAVE THE STATE OF XMIT IE
 9727  024762  042777  000100  154160          BIC     #IE,@$TPS       ;AND THEN CLEAR XMIT IE
 9728  024770  005737  001274                  TST     DEVCHG          ;CHECK IF TO BE DEVICE MAP
 9729  024774  001406                          BEQ     1$              ;IF 0 THEN SWITCH REGISTER CHANGE
 9730  024776  104401  025306                  TYPE    ,MDEVM          ;TYPE CURRENT CONTENTS
 9731  025002  013746  001246                  MOV     $DEVM,-(SP)     ;;SAVE $DEVM FOR TYPEOUT
  (1)  025006  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 9732  025010  000405                          BR      2$              ;GO TYPE THE NEW QUETION
 9733  025012  104401  025264          1$:     TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
 9734  025016  013746  000176                  MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
  (1)  025022  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 9735  025024  104401  025275          2$:     TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
 9736  025030  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
 9737  025032  005046                          CLR     -(SP)           ;;THE NEW SWR
 9738  025034  105777  154104          7$:     TSTB    @$TKS           ;;CHAR THERE?
 9739  025040  100375                          BPL     7$              ;;IF NOT TRY AGAIN
 9740
 9741  025042  117746  154100                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
 9742  025046  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
 9743  025052  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
 9744  025056  001005                          BNE     10$             ;;BRANCH IF NOT
 9745  025060  104401  025252                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
 9746  025064  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
 9747  025070  000757                          BR      19$             ;;LET'S TRY IT AGAIN
 9748
 9749
 9750  025072  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
 9751  025076  001034                          BNE     16$             ;;BRANCH IF NO
 9752  025100  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
 9753  025104  001412                          BEQ     11$             ;;BRANCH IF YES
 9754  025106  005737  001274                  TST     DEVCHG          ;;CHECK IF DEVICE MAP CHANGE
 9755  025112  001404                          BEQ     3$              ;;IF 0 THEN SWITCH REGISTER CHANGE
 9756  025114  016637  000002  001246          MOV     2(SP),$DEVM     ;;SAVE NEW $DEVM
 9757  025122  000403                          BR      11$             ;;GET READY TO EXIT
 9758  025124  016677  000002  154006  3$:     MOV     2(SP),@SWR      ;;SAVE NEW SWR
 9759  025132  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
 9760  025136  104401  001165          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
 9761  025142  123727  001135  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
 9762  025150  001003                          BNE     15$             ;;BRANCH IF NOT
 9763  025152  052777  000100  153764          BIS     #IE,@$TKS       ;;RE-ENABLE TTY KBD INTERRUPTS
 9764  025160  013777  025250  153762  15$:    MOV     GSAVIE,@$TPS    ;RESTORE THE STATE OF XMIT IE
 9765  025166  000002                          RTI                     ;;RETURN
 9766  025170  004737  024524          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
 9767  025174  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
 9768  025200  002420                          BLT     18$             ;;BRANCH IF YES
 9769  025202  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
 9770  025206  003015                          BGT     18$             ;;BRANCH IF YES
 9771  025210  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
 9772  025214  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
```

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 9773  025220  001403                          BEQ     17$             ;;BRANCH IF YES
 9774  025222  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
 9775  025224  006316                          ASL     (SP)            ;;   CHAR OVER TO MAKE
 9776  025226  006316                          ASL     (SP)            ;;   ROOM FOR NEW ONE.
 9777  025230  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
 9778  025234  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
 9779  025240  000675                          BR      7$              ;;GET THE NEXT ONE
 9780  025242  104401  001164          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
 9781  025246  000706                          BR      20$             ;;SIMULATE CONTROL-U
 9782  025250  000000                  GSAVIE: .WORD   0               ;STATE OF XMIT IE STORED HERE
 9783  025252  052536  005015     000  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL "U"
 9784  025257     136  006507  000012  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL "G"
 9785  025264  005015  053523  020122  $MSWR:  .ASCIZ  <15><12>/SWR = /
       025272  020075     000
 9786  025275     040  047040  053505  $MNEW:  .ASCIZ  /  NEW = /
       025302  036440  000040
 9787  025306  005015  042044  053105  MDEVM:  .ASCIZ  <15><12>/$DEVM = /
       025314  020115  020075     000
 9788          025322                          .EVEN
```

```
 9790                                   .SBTTL  APT COMMUNICATIONS ROUTINE
  (1)
  (2)                                   ;;*****************************************************************
  (1)  025322  112737  000001  025566  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
  (1)  025330  112737  000001  025564  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
  (1)  025336  000403                          BR      $ATYC
  (1)  025340  112737  000001  025566  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
  (1)  025346                          $ATYC:
  (3)  025346  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
  (3)  025350  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
  (1)  025352  105737  025564                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
  (1)  025356  001450                          BEQ     5$              ;;IF NOT:  BR
  (1)  025360  122737  000001  001210          CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
  (1)  025366  001031                          BNE     3$              ;;IF NOT:  BR
  (1)  025370  132737  000100  001211          BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
  (1)  025376  001425                          BEQ     3$              ;;IF NOT:  BR
  (1)  025400  017600  000004                  MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
  (1)  025404  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
  (1)  025412  005737  001170          1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
  (1)  025416  001375                          BNE     1$              ;;IF NOT:  WAIT
  (1)  025420  010037  001204                  MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
  (1)  025424  105720                  2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
  (1)  025426  001376                          BNE     2$
  (1)  025430  163700  001204                  SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
  (1)  025434  006200                          ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
  (1)  025436  010037  001206                  MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
  (1)  025442  012737  000004  001170          MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
  (1)  025450  000413                          BR      5$
  (1)  025452  017637  000004  025476  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
  (1)  025460  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
  (3)  025466  013746  177776                  MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
  (1)  025472  004737  024242                  JSR     PC,$TYPE        ;;CALL TYPE MACRO
  (1)  025476  000000                  4$:     .WORD   0
  (1)  025500                          5$:
  (1)  025500  105737  025566          10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
  (1)  025504  001416                          BEQ     12$             ;;IF NOT:  BR
  (1)  025506  005737  001210                  TST     $ENV            ;;RUNNING UNDER APT?
  (1)  025512  001413                          BEQ     12$             ;;IF NOT:  BR
  (1)  025514  005737  001170          11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
  (1)  025520  001375                          BNE     11$             ;;IF NOT:  WAIT
  (1)  025522  017637  000004  001172          MOV     @4(SP),$FATAL   ;;GET ERROR #
  (1)  025530  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
  (1)  025536  005237  001170                  INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
  (1)  025542  105037  025566          12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
  (1)  025546  105037  025565                  CLRB    $LFLG           ;;CLEAR LOG FLAG
  (1)  025552  105037  025564                  CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
  (3)  025556  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
  (3)  025560  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
  (1)  025562  000207                          RTS     PC              ;;RETURN
  (1)  025564     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
  (1)  025565     000          $LFLG:  .BYTE   0               ;;LOG FLAG
  (1)  025566     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
  (1)          025570                  .EVEN
  (1)          000200          APTSIZE=200
  (1)          000001          APTENV=001
  (1)          000100          APTSPOOL=100
```

```
(1)           000040  .               APTCSUP=040
```

```
 9841                                   .SBTTL  ERROR HANDLER ROUTINE
  (1)
  (2)                                   ;;**********************************************************************
  (1)                                   ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
  (1)                                   ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
  (1)                                   ;*AND GO TO MYTYPE ON ERROR
  (1)                                   ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
  (1)                                   ;*SW15=1        HALT ON ERROR
  (1)                                   ;*SW13=1        INHIBIT ERROR TYPEOUTS
  (1)                                   ;*SW10=1        BELL ON ERROR
  (1)                                   ;*CALL
  (1)                                   ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
  (1)
  (1)  025570                           $ERROR:
  (3)  025570  005237  026332                   INC     PERR            ;COUNT THE PASS ERRORS
  (3)  025574  122737  000001  001210           CMPB    #APTENV,$ENV    ;CHECK IF APT
  (3)  025602  001024                           BNE     90$             ;IF NOT DO NORMAL ERROR PROCEDURE
  (3)  025604  012737  037014  177420           MOV     #<AMOD!B9600!CHAR8>,PARAM ;OPEN ASYN COMM PORT TO WORLD
  (3)  025612  052737  000016  176610           BIS     #<RTS!SXMIT!DTR>,AMRC ;TOGGLE DTR TO CLEAR EXT LOOPBACK
  (3)  025620  042737  000016  176610           BIC     #<RTS!SXMIT!DTR>,AMRC ;
  (3)  025626  005737  176610                   TST     AMRC            ;CLEAR DSC/DSI BITS
  (3)  025632  005037  176610                   CLR     AMRC            ;CLEAR OUT THE INT ENA BITS FOR COMM
  (3)  025636  005037  176614                   CLR     AMXC            ;
  (3)  025642  105037  001135                   CLRB    $INTAG          ;CLEAR RECEIVER INT MODE INDICATOR
  (3)  025646  042737  000100  177546           BIC     #IE,CLK         ;CLEAR THE CLOCKS INTERRUPT ENABLE BIT
  (3)  025654  104407                   90$:    SAVEVT                  ;SAVE THE VT100 DISPLAY STATE
  (3)
  (3)                                   ;*SW10=1        BLINKING AND BOLD ON ERROR
  (3)
  (3)  025656  032777  002000  153254           BIT     #BIT10,@SWR     ;CHECK SWITCH 10
  (3)  025664  001406                           BEQ     100$            ;BRANCH IF NOT SET
  (3)  025666  032777  020000  153244           BIT     #BIT13,@SWR     ;TYPEOUTS INHIBITED?
  (3)  025674  001002                           BNE     100$            ;BRANCH IF YES
  (3)  025676  104401  016320                   TYPE    ,BLKBLD         ;BLINKING BOLD FOR ERROR TYPEOUT
  (3)  025702                           100$:
  (1)  025702  105237  001103           7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
  (1)  025706  001775                           BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
  (1)  025710  013777  001102  153224           MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
  (1)  025716  032777  002000  153214           BIT     #BIT10,@SWR     ;;BELL ON ERROR?
  (1)  025724  001402                           BEQ     1$              ;;NO - SKIP
  (1)  025726  104401  001160                   TYPE    ,$BELL          ;;RING BELL
  (1)  025732  005237  001112           1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
  (1)  025736  011637  001116                   MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
  (1)  025742  162737  000002  001116           SUB     #2,$ERRPC
  (1)  025750  117737  153142  001114           MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
  (1)  025756  032777  020000  153154           BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
  (1)  025764  001004                           BNE     20$             ;;SKIP TYPEOUTS
  (1)  025766  004737  026306                   JSR     PC,MYTYPE       ;;GO TO USER ERROR ROUTINE
  (1)  025772  104401  001165                   TYPE    ,$CRLF
  (1)  025776                           20$:
  (1)  025776  122737  000001  001210           CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
  (1)  026004  001007                           BNE     2$              ;;NO,SKIP APT ERROR REPORT
  (1)  026006  113737  001114  026020           MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
  (1)  026014  004737  025340                   JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
  (1)  026020     000                   21$:    .BYTE   0
  (1)  026021     000                           .BYTE   0
```

```
(1)  026022  000777                    22$:    BR      22$             ;;APT ERROR LOOP
(1)  026024  005777  153110            2$:     TST     @SWR            ;;HALT ON ERROR
(1)  026030  100001                            BPL     3$              ;;SKIP IF CONTINUE
(1)  026032  000000                            HALT                    ;;HALT ON ERROR!
(1)  026034                            3$:
(3)  026034  104401  024102                    TYPE    ,ATTOFF         ;ALL ATTRIBUTES OFF IN CASE TYPED IN BLINKING BOLD
(3)  026040  104410                            RESTVT                  ;RESTORE VT100 TO DISPLAY STATE
(3)  026042  017746  153102                    MOV     @$TPS,-(SP)     ;SAVE STATE OF XMIT IE
(3)  026046  042777  000100  153074            BIC     #IE,@$TPS       ;AND THEN CLEAR IT
(3)  026054  105237  001250                    INCB    TYPFLG          ;KEEP TYPE FROM SAVING CURSORS
(3)  026060  104401  016236                    TYPE    ,SAVCON         ;SAVE THE CURSOR POSITION ONLY
(3)  026064  104401  016212                    TYPE    ,ERRPOS         ;POSITION CURSOR OVER ERROR COUNT
(4)  026070  013746  001112                    MOV     $ERTTL,-(SP)    ;;SAVE $ERTTL FOR TYPEOUT
(4)  026074  104405                            TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
(3)  026076  104401  016227                    TYPE    ,SERPOS         ;POSITION CURSOR OVER SOFT ERROR COUNT
(4)  026102  013746  001256                    MOV     SERTTL,-(SP)    ;;SAVE SERTTL FOR TYPEOUT
(4)  026106  104405                            TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
(3)  026110  104401  011577                    TYPE    ,RESCUR         ;RESTORE THE CURSOR POSITION
(3)  026114  012677  153030                    MOV     (SP)+,@$TPS     ;RESTORE STATE OF XMIT IE
(3)  026120  105337  001250                    DECB    TYPFLG          ;RESTORE STATE OF TYPFLG
(3)  026124  105737  001252                    TSTB    GFLAG           ;SEE IF ^G TYPED DURING TYPEOUTS
(3)  026130  001407                            BEQ     101$            ;BR IF NOT (NOTE THAT GFLCHK SUB. CANNOT BE USED)
(3)  026132  104407                            SAVEVT                  ;SAVE THE POSITION
(3)  026134  104401  025257                    TYPE    ,$CNTLG
(3)  026140  104406                            GTSWR
(3)  026142  105037  001252                    CLRB    GFLAG           ;CLEAR THE CONTROL G TYPED FLAG
(3)  026146  104410                            RESTVT
(3)  026150  000002                    101$:   RTI
```

```
 9843                                   .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
  (1)
  (2)                                   ;;**********************************************************************
  (1)                                   ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
  (1)                                   ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
  (1)                                   ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
  (1)
  (1)  026152                           $ERRTYP:
  (1)  026152  104401  001165                   TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
  (1)  026156  010046                           MOV     R0,-(SP)        ;;SAVE R0
  (1)  026160  005000                           CLR     R0              ;;PICKUP THE ITEM INDEX
  (1)  026162  153700  001114                   BISB    @#$ITEMB,R0
  (1)  026166  001004                           BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
  (1)                                                                   ;;TYPE THE PC OF THE ERROR
  (2)  026170  013746  001116                   MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
  (2)                                                                   ;;ERROR ADDRESS
  (2)  026174  104402                           TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
  (1)  026176  000426                           BR      6$              ;;GET OUT
  (1)  026200  005300                   1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
  (1)  026202  006300                           ASL     R0              ;;      WORK FOR THE ERROR TABLE
  (1)  026204  006300                           ASL     R0
  (1)  026206  006300                           ASL     R0
  (1)  026210  062700  001276                   ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
  (1)  026214  012037  026224                   MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
  (1)  026220  001404                           BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
  (1)  026222  104401                           TYPE                    ;;TYPE THE "ERROR MESSAGE"
  (1)  026224  000000                   2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
  (1)  026226  104401  001165                   TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
  (1)  026232  012037  026242           3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
  (1)  026236  001404                           BEQ     5$              ;;SKIP TYPEOUT IF 0
  (1)  026240  104401                           TYPE                    ;;TYPE THE "DATA HEADER"
  (1)  026242  000000                   4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
  (1)  026244  104401  001165                   TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
  (1)  026250  011000                   5$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
  (1)  026252  001004                           BNE     7$              ;;GO TYPE THE DATA
  (1)  026254  012600                   6$:     MOV     (SP)+,R0        ;;RESTORE R0
  (1)  026256  104401  001165                   TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
  (1)  026262  000207                           RTS     PC              ;;RETURN
  (1)  026264                           7$:
  (2)  026264  013046                           MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
  (2)  026266  104402                           TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
  (1)  026270  005710                           TST     (R0)            ;;IS THERE ANOTHER NUMBER?
  (1)  026272  001770                           BEQ     6$              ;;BR IF NO
  (1)  026274  104401  026302                   TYPE    ,8$             ;;TYPE TWO(2) SPACES
  (1)  026300  000771                           BR      7$              ;;LOOP
  (1)  026302  020040      000          8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
  (1)          026306                           .EVEN
 9844
 9845
 9846
 9847  026306  113737  001114  026330  MYTYPE: MOVB    $ITEMB,ERRNUM   ;FOR ERROR TYPEOUT
 9848  026314  013737  001116  001174          MOV     $ERRPC,$TESTN   ;FOR APT
 9849  026322  004737  026152                  JSR     PC,$ERRTYP      ;TYPE ERR MSG
 9850  026326  000207                          RTS     PC
 9851
 9852  026330  000000                  ERRNUM: 0                       ;FOR ERR TYPEOUT
```

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 9853
 9854  026332  000000                  PERR:   0                       ;PASS ERR COUNT
 9855  026334  000000                  PSERR:  0                       ;PASS SOFT ERR COUNT... ALL FOR EOP TYPEOUT
```

```
 9857                                   .SBTTL  RANDOM NUMBER GENERATOR ROUTINE
  (1)
  (2)                                   ;;**********************************************************************
  (1)                                   ;*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
  (1)                                   ;*WITH A RANGE OF 0 TO 2(+33)-1.
  (1)                                   ;*CALL:
  (1)                                   ;*      JSR     PC,$RAND        ;;CALL THE ROUTINE
  (1)                                   ;*      RETURN                  ;;RETURN HERE THE RANDOM
  (1)                                   ;*                              ;;NUMBER WILL BE IN
  (1)                                   ;*                              ;;$HINUM,$LONUM
  (1)
  (1)  026336                           $RAND:
  (3)  026336  010046                           MOV     R0,-(SP)        ;;PUSH R0 ON STACK
  (3)  026340  010146                           MOV     R1,-(SP)        ;;PUSH R1 ON STACK
  (3)  026342  010246                           MOV     R2,-(SP)        ;;PUSH R2 ON STACK
  (1)  026344  013700  026436                   MOV     $LONUM,R0       ;;SET R0 WITH LOW
  (1)  026350  013701  026434                   MOV     $HINUM,R1       ;;SET R1 WITH HIGH
  (1)  026354  012702  177771                   MOV     #-7,R2          ;;SET SHIFT COUNT
  (1)  026360  006300                   1$:     ASL     R0              ;;SHIFT R0 LEFT AND
  (1)  026362  006101                           ROL     R1              ;;ROTATE CARRY INTO R1 AND
  (1)  026364  005202                           INC     R2              ;;CHECK FOR DONE
  (1)  026366  001374                           BNE     1$              ;;CONTINUE SHIFT LOOP
  (1)  026370  063700  026436                   ADD     $LONUM,R0       ;;ADD NUMBER TO MAKE X 129
  (1)  026374  005501                           ADC     R1              ;;PROPOGATE CARRY
  (1)  026376  063701  026434                   ADD     $HINUM,R1       ;;ADD NUMBER TO MAKE X 129
  (1)  026402  062700  001057                   ADD     #1057,R0        ;;ADD LOW CONSTANT
  (1)  026406  005501                           ADC     R1              ;;PROPOGATE CARRY
  (1)  026410  062701  047401                   ADD     #47401,R1       ;;ADD HIGH CONSTANT
  (1)  026414  010037  026436                   MOV     R0,$LONUM       ;;SAVE R0
  (1)  026420  010137  026434                   MOV     R1,$HINUM       ;;SAVE R1
  (3)  026424  012602                           MOV     (SP)+,R2        ;;POP STACK INTO R2
  (3)  026426  012601                           MOV     (SP)+,R1        ;;POP STACK INTO R1
  (3)  026430  012600                           MOV     (SP)+,R0        ;;POP STACK INTO R0
  (1)  026432  000207                           RTS     PC              ;;RETURN
  (1)  026434  176543                   $HINUM: .WORD   176543
  (1)  026436  123456                   $LONUM: .WORD   123456
```

```
 9859                                   .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
  (1)
  (2)                                   ;;**********************************************************************
  (1)                                   ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
  (1)                                   ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
  (1)                                   ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
  (1)                                   ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
  (1)                                   ;*REPLACED WITH SPACES.
  (1)                                   ;*CALL:
  (1)                                   ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
  (1)                                   ;*      TYPDS                   ;;GO TO THE ROUTINE
  (1)
  (1)  026440                           $TYPDS:
  (3)  026440  010046                           MOV     R0,-(SP)        ;;PUSH R0 ON STACK
  (3)  026442  010146                           MOV     R1,-(SP)        ;;PUSH R1 ON STACK
  (3)  026444  010246                           MOV     R2,-(SP)        ;;PUSH R2 ON STACK
  (3)  026446  010346                           MOV     R3,-(SP)        ;;PUSH R3 ON STACK
  (3)  026450  010546                           MOV     R5,-(SP)        ;;PUSH R5 ON STACK
  (1)  026452  012746  020200                   MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
  (1)  026456  016605  000020                   MOV     20(SP),R5       ;;GET THE INPUT NUMBER
  (1)  026462  100004                           BPL     1$              ;;BR IF INPUT IS POS.
  (1)  026464  005405                           NEG     R5              ;;MAKE THE BINARY NUMBER POS.
  (1)  026466  112766  000055  000001           MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
  (1)  026474  005000                   1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
  (1)  026476  012703  026654                   MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
  (1)  026502  112723  000040                   MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
  (1)  026506  005002                   2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
  (1)  026510  016001  026644                   MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
  (1)  026514  160105                   3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
  (1)  026516  002402                           BLT     4$              ;;BR IF DONE
  (1)  026520  005202                           INC     R2              ;;INCREASE THE BCD DIGIT BY 1
  (1)  026522  000774                           BR      3$
  (1)  026524  060105                   4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
  (1)  026526  005702                           TST     R2              ;;CHECK IF BCD DIGIT=0
  (1)  026530  001002                           BNE     5$              ;;FALL THROUGH IF 0
  (1)  026532  105716                           TSTB    (SP)            ;;STILL DOING LEADING 0'S?
  (1)  026534  100407                           BMI     7$              ;;BR IF YES
  (1)  026536  106316                   5$:     ASLB    (SP)            ;;MSD?
  (1)  026540  103003                           BCC     6$              ;;BR IF NO
  (1)  026542  116663  000001  177777           MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
  (1)  026550  052702  000060           6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
  (1)  026554  052702  000040           7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
  (1)  026560  110223                           MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
  (1)  026562  005720                           TST     (R0)+           ;;JUST INCREMENTING
  (1)  026564  020027  000010                   CMP     R0,#10          ;;CHECK THE TABLE INDEX
  (1)  026570  002746                           BLT     2$              ;;GO DO THE NEXT DIGIT
  (1)  026572  003002                           BGT     8$              ;;GO TO EXIT
  (1)  026574  010502                           MOV     R5,R2           ;;GET THE LSD
  (1)  026576  000764                           BR      6$              ;;GO CHANGE TO ASCII
  (1)  026600  105726                   8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
  (1)  026602  100003                           BPL     9$              ;;BR IF NO
  (1)  026604  116663  177777  177776           MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
  (1)  026612  105013                   9$:     CLRB    (R3)            ;;SET THE TERMINATOR
  (3)  026614  012605                           MOV     (SP)+,R5        ;;POP STACK INTO R5
  (3)  026616  012603                           MOV     (SP)+,R3        ;;POP STACK INTO R3
  (3)  026620  012602                           MOV     (SP)+,R2        ;;POP STACK INTO R2
```

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   (3)  026622  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
   (3)  026624  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
   (1)  026626  104401  026654                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
   (1)  026632  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
   (1)  026640  012616                          MOV     (SP)+,(SP)
   (1)  026642  000002                          RTI                     ;;RETURN TO USER
   (1)  026644  023420                $DTBL:    10000.
   (1)  026646  001750                          1000.
   (1)  026650  000144                          100.
   (1)  026652  000012                          10.
   (1)  026654  000004                $DBLK:    .BLKW   4
```

```
 9861                                   .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
  (1)
  (2)                                   ;;**********************************************************************
  (1)                                   ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
  (1)                                   ;*OCTAL (ASCII) NUMBER AND TYPE IT.
  (1)                                   ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
  (1)                                   ;*CALL:
  (1)                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
  (1)                                   ;*      TYPOS                   ;;CALL FOR TYPEOUT
  (1)                                   ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
  (1)                                   ;*      .BYTE   M               ;;M=1 OR 0
  (1)                                   ;*                                      ;;1=TYPE LEADING ZEROS
  (1)                                   ;*                                      ;;0=SUPPRESS LEADING ZEROS
  (1)                                   ;*
  (1)                                   ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
  (1)                                   ;*$TYPOS OR $TYPOC
  (1)                                   ;*CALL:
  (1)                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
  (1)                                   ;*      TYPON                   ;;CALL FOR TYPEOUT
  (1)                                   ;*
  (1)                                   ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
  (1)                                   ;*CALL:
  (1)                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
  (1)                                   ;*      TYPOC                   ;;CALL FOR TYPEOUT
  (1)
  (1)  026664  017646  000000           $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
  (1)  026670  116637  000001  027107           MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
  (1)  026676  112637  027111                   MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
  (1)  026702  062716  000002                   ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
  (1)  026706  000406                           BR      $TYPON
  (1)  026710  112737  000001  027107   $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
  (1)  026716  112737  000006  027111           MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
  (1)  026724  112737  000005  027105   $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
  (1)  026732  010346                           MOV     R3,-(SP)        ;;SAVE R3
  (1)  026734  010446                           MOV     R4,-(SP)        ;;SAVE R4
  (1)  026736  010546                           MOV     R5,-(SP)        ;;SAVE R5
  (1)  026740  113704  027111                   MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
  (1)  026744  005404                           NEG     R4
  (1)  026746  062704  000006                   ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
  (1)  026752  110437  027110                   MOVB    R4,$OMODE       ;;SAVE IT FOR USE
  (1)  026756  113704  027107                   MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
  (1)  026762  016605  000012                   MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
  (1)  026766  005003                           CLR     R3              ;;CLEAR THE OUTPUT WORD
  (1)  026770  006105                   1$:     ROL     R5              ;;ROTATE MSB INTO "C"
  (1)  026772  000404                           BR      3$              ;;GO DO MSB
  (1)  026774  006105                   2$:     ROL     R5              ;;FORM THIS DIGIT
  (1)  026776  006105                           ROL     R5
  (1)  027000  006105                           ROL     R5
  (1)  027002  010503                           MOV     R5,R3
  (1)  027004  006103                   3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
  (1)  027006  105337  027110                   DECB    $OMODE          ;;TYPE THIS DIGIT?
  (1)  027012  100016                           BPL     7$              ;;BR IF NO
  (1)  027014  042703  177770                   BIC     #177770,R3      ;;GET RID OF JUNK
  (1)  027020  001002                           BNE     4$              ;;TEST FOR 0
  (1)  027022  005704                           TST     R4              ;;SUPPRESS THIS 0?
  (1)  027024  001403                           BEQ     5$              ;;BR IF YES
```

```
(1)  027026  005204                 4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
(1)  027030  052703  000060                 BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
(1)  027034  052703  000040         5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
(1)  027040  110337  027104                 MOVB    R3,8$           ;;SAVE FOR TYPING
(1)  027044  104401  027104                 TYPE    ,8$             ;;GO TYPE THIS DIGIT
(1)  027050  105337  027106         7$:     DECB    $OCNT           ;;COUNT BY 1
(1)  027054  003347                         BGT     2$              ;;BR IF MORE TO DO
(1)  027056  002402                         BLT     6$              ;;BR IF DONE
(1)  027060  005204                         INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
(1)  027062  000744                         BR      2$              ;;GO DO THE LAST DIGIT
(1)  027064  012605                 6$:     MOV     (SP)+,R5        ;;RESTORE R5
(1)  027066  012604                         MOV     (SP)+,R4        ;;RESTORE R4
(1)  027070  012603                         MOV     (SP)+,R3        ;;RESTORE R3
(1)  027072  016666  000002  000004         MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
(1)  027100  012616                         MOV     (SP)+,(SP)
(1)  027102  000002                         RTI                     ;;RETURN
(1)  027104     000                 8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
(1)  027105     000                         .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
(1)  027106     000                 $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
(1)  027107     000                 $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
(1)  027110  000000                 $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
```

```
 9863                                   .SBTTL  TRAP DECODER
  (1)
  (2)                                   ;;*****************************************************************
  (1)                                   ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
  (1)                                   ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
  (1)                                   ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
  (1)                                   ;*GO TO THAT ROUTINE.
  (1)
  (1)  027112  010046                   $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
  (1)  027114  016600  000002                   MOV     2(SP),R0        ;;GET TRAP ADDRESS
  (1)  027120  005740                           TST     -(R0)           ;;BACKUP BY 2
  (1)  027122  111000                           MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
  (1)  027124  006300                           ASL     R0              ;;POSITION FOR INDEXING
  (1)  027126  016000  027146                   MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
  (1)  027132  000200                           RTS     R0              ;;GO TO ROUTINE
  (1)
  (1)
  (1)                                   ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
  (1)
  (1)  027134  011646                   $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
  (1)  027136  016666  000004  000002           MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
  (1)  027144  000002                           RTI                     ;;RESTORE THE PSW
  (1)
  (3)                                   .SBTTL  TRAP TABLE
  (3)
  (3)                                   ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
  (3)                                   ;*BY THE "TRAP" INSTRUCTION.
  (3)
  (3)                                   ;       ROUTINE
  (3)                                   ;       -------
  (3)  027146  027134                   $TRPAD: .WORD   $TRAP2
  (3)  027150  024242                           $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
  (3)  027152  026710                           $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
  (3)  027154  026664                           $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
  (3)  027156  026724                           $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
  (3)  027160  026440                           $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
  (1)
  (3)  027162  024754                           $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING
  (1)
 9864  027164  013026                           T.SAVT  ;;CALL=SAVEVT   TRAP+7(104407)  SAVE VT100 CURSOR AND ATTRIBUTES
 9865  027166  013106                           T.RSVT  ;;CALL=RESTVT   TRAP+10(104410) RESTORE VT100 CURSOR AND ATTRIBUTES
 9866
 9867
 9868                                   ;WRITE DATA PACKET BUFFER
 9869                                   ;
 9870  027170  000000                   WTPK1:  .WORD   0       ;WRITE DATA PACKET 1
 9876  027372  000000                   CKPK1:  .WORD   0       ;WRITE DATA PACKET 1 CHECKSUM WORD
 9877
 9878  027374  000000                   WTPK2:  .WORD   0       ;WRITE DATA PACKET 2
 9884  027576  000000                   CKPK2:  .WORD   0       ;WRITE DATA PACKET 2 CHECKSUM WORD
 9885
 9886  027600  000000                   WTPK3:  .WORD   0       ;WRITE DATA PACKET 3
 9892  030002  000000                   CKPK3:  .WORD   0       ;WRITE DATA PACKET 3 CHECKSUM WORD
 9893
 9894  030004  000000                   WTPK4:  .WORD   0       ;WRITE DATA PACKET 4
 9900  030206  000000                   CKPK4:  .WORD   0       ;WRITE DATA PACKET 4 CHECKSUM WORD
```

```
 9901
 9902                                   ;;*****************************************************************
 9903                                   ;*      TU58 READ BUFFER (TOTAL RESERVED LOCATIONS = 407 WORDS)
 9904                                   ;;*****************************************************************
 9905
 9906  030210  000000                  TURDBF: .WORD   0
 9912  031664  000000                  TURDLA: .WORD   0
 9913
 9914  031666                          LSTAD:
 9915          000001                  .END
```

```
ABASE = 176500           6632#   6942
ACDW1 = 000000           6942
ACDW2 = 000000           6942
ACOM    016546           7560    8641    9390#
ACPUOP= 000000           6942
ADDR    003242           7148*   7162*   7167*   7188*   7193*   7230#   9456    9457
ADDW0 = 000000           6942
ADDW1 = 000000           6942
ADDW10= 000000           6942
ADDW11= 000000           6942
ADDW12= 000000           6942
ADDW13= 000000           6942
ADDW14= 000000           6942
ADDW15= 000000           6942
ADDW2 = 000000           6942
ADDW3 = 000000           6942
ADDW4 = 000000           6942
ADDW5 = 000000           6942
ADDW6 = 000000           6942
ADDW7 = 000000           6942
ADDW8 = 000000           6942
ADDW9 = 000000           6942
ADEVCT= 000000           6942
ADEVM = 000017           6633#   6942
AENV  = 000000           6942
AENVM = 000000           6942
AFATAL= 000000           6942
AMADR1= 000000           6942
AMADR2= 000000           6942
AMADR3= 000000           6942
AMADR4= 000000           6942
AMAMS1= 000000           6942
AMAMS2= 000000           6942
AMAMS3= 000000           6942
AMAMS4= 000000           6942
AMOD  = 030000           6741#   7108    7495    7498    8587    9217    9841
AMRB  = 176612           6700#   7546    9203
AMRC  = 176610           6699#   7103*   7104*   7106*   7107*   7109    7492*   7493*   7494    7500    7501*   7502    7508
                         7514*   7515    7521    7527*   7528    7536*   7537    7547*   7574*   7576*   8583*   8584*   8585*
                         8586    8595*   8599*   8600    9216*   9221*   9222*   9841*
AMRSRV  015112           7541    9203#
AMRVEC= 000330           6672#   7540
AMSGAD= 000000           6942
AMSGLG= 000000           6942
AMSGTY= 000000           6942
AMTST   004642           7375    7463    7468    7472    7481#
AMTYP1= 000000           6942
AMTYP2= 000000           6942
AMTYP3= 000000           6942
AMTYP4= 000000           6942
AMXB  = 176616           6702#   9200*
AMXC  = 176614           6701#   7548*   9199*   9215*   9224*   9841*
AMXSRV  015074           7542    9199#
AMXVEC= 000334           6673#
APASS = 000000           6942
APRIOR= 000000           6942
```

```
APTCSU= 000040           8505    9632    9790#
APTENV= 000001           7036    7059    7077    7111    7238    7300    7371    7423    7483    7534    8490    8503    9625
                         9790#   9841
APTSIZ= 000200           7044    9790#
APTSPO= 000100           9627    9790#
ASWREG= 000000           6942
ATESTN= 000000           6942
ATTOFF  024102           9540#   9841
AUNIT = 000000           6942
AUSWR = 000000           6635#   6942
AVECT1= 000300           6634#   6942
AVECT2= 000000           6942
BITHLD  013374           8853*   8858    8873#
BIT0  = 000001           6654#   6812    6885    7270    7583    8380
BIT00 = 000001           6654#
BIT01 = 000002           6654#
BIT02 = 000004           6654#
BIT03 = 000010           6654#
BIT04 = 000020           6654#
BIT05 = 000040           6654#
BIT06 = 000100           6654#
BIT07 = 000200           6654#
BIT08 = 000400           6654#
BIT09 = 001000           6654#
BIT1  = 000002           6654#   6779    6799    6834    7623    7684    8371    8375    8470    9186
BIT10 = 002000           6654#   6792    6825    7369    8163    8645    9841
BIT11 = 004000           6654#   6824    6863    7481    8213    8639
BIT12 = 010000           6654#   6791    6806    6823    6840    6862    7215    7287    7316    7354    7462    7557    7579
                         7606    7646    7686    7742    7809    7824    8154    8220    8265    8618
BIT13 = 020000           6654#   6790    6805    6822    7618    8159    8260    8625    9841
BIT14 = 040000           6654#   6789    6804    6821    6839    6845    7064    7658    8230    8256    8632
BIT15 = 100000           6654#   6788    6803    6820    6838    6861    7329    8172    8612
BIT2  = 000004           6654#   6798    6833    7644    7663    8364    8367    8467    9157
BIT3  = 000010           6654#   6797    6832    6869    7101    7382    7490    7572    7604    8360    8464    8593    9127
                         9219    9290
BIT4  = 000020           6654#   6831    6868    7132    7555    8357    8461    8674    9214    9286
BIT5  = 000040           6654#   6796    6830    6867    7353    7819    7985    7998    8354    8458    9100    9328
BIT6  = 000100           6654#   6795    6811    6829    6866    6879    6884    7236    7314    7741    8351    8455    8669
                         8902    9323
BIT7  = 000200           6654#   6794    6810    6828    6865    6878    6883    7284    7298    8124    8346    8452    8663
                         8899    9052
BIT8  = 000400           6654#   6827    6864    7075    7083    7704    8003    8008    8385    8651
BIT9  = 001000           6654#   6793    6826    7085    7256    7706    7731    7816    8390    8657
BLDCHK  007356           8011    8021#
BLDPKT  007156           7759    7787    7982#
BLKBLD  016320           9368#   9841
BLKCNT  007046           7748*   7804*   7846#
BLKNUM  007040           7051*   7821*   7822*   7842#   7987*   7988*   7994*   8010*   9466    9467
BPTVEC= 000014           6654#
BREAK = 000001           6812#   6885#   8092    9302
BRKFLG  007102           7721*   7946#   8090    9298    9303*
BYTCNT  007036           7841#   8005*   8009*   8369    8373
BYTECT  007076           7943#   8368*   8372*   9466    9467
B110  = 001000           6748#
B1200 = 003400           6753#   7332
B134  = 001400           6749#
```

```
B150  = 002000           6750#
B1800 = 004000           6754#
B19200= 007400           6761#
B2000 = 004400           6755#
B2400 = 005000           6756#
B300  = 002400           6751#   7578
B3600 = 005400           6757#
B4800 = 006000           6758#
B50   = 000000           6746#
B600  = 003000           6752#
B7200 = 006400           6759#
B75   = 000400           6747#
B9600 = 007000           6760#   7108    7495    7498    8587    9217    9841
CDET  = 010000           6791#   6823#   7402    7475    7513
CHAR5 = 000000           6772#
CHAR6 = 000004           6773#
CHAR7 = 000010           6774#
CHAR8 = 000014           6775#   7108    7332    7495    7498    7578    8587    9217    9841
CHR5  = 000000           6849#
CHR6  = 002000           6850#
CHR7  = 004000           6851#
CHR8  = 006000           6852#   7381
CKPK1   027372           9876#
CKPK2   027576           9884#
CKPK3   030002           9892#
CKPK4   030206           9900#
CKSUM   007042           7843#
CLK   = 177546           6694#   7307*   8901*   9841*
CLKTST  003560           7237    7241    7246    7262    7288    7298#
CLKVEC= 000100           6670#   7093*   7094*   7304*   7305*
CLOCK   016571           7319    8665    9392#
CLOPT   016433           8559    9381#
CLPRES  012612           7568    8548*   8563*   8681#
CLTERM  016465           7609    7649    7689    8620    8627    8634    9384#
CL1TST  005314           7487    7506    7512    7519    7525    7532    7554    7558    7568#
CL2TST  005540           7580    7603    7607    7618#
CL3TST  005716           7619    7643    7647    7658#
COMCHR  015244           7451*   7456    7544*   9200    9204    9208*   9227#   9236    9237    9256    9260    9262*   9265*
                         9462
COMCNT  015250           7545*   7551    9210*   9229#
COMHLD  015246           7440*   7441    7546*   9203*   9204    9228#   9253*   9254    9256    9462
CONSOL= 010000           6736#
CONTFL  007070           7756*   7939#   8156*   8157    8383
CR    = 000015           6654#   7338    9081    9094    9481    9483    9485    9486    9488    9490    9493    9494    9496
                         9497    9498    9499    9500    9501    9504    9506    9508    9510    9512    9514    9517    9519
                         9521    9524    9526    9528    9531    9533    9535    9537    9539    9543    9545    9546
CRLF  = 000200           6654#   9354    9380    9394    9402    9403    9404    9407    9408    9410    9412    9651
CTHLD   013266           8807*   8814    8817    8832#
CTPARM  014636           7578*   7581    7621    7661    9135#
CTS   = 020000           6790#   6822#   7388    7475    7499
CT1   = 000000           6737#   7582
CT2   = 050000           6738#   7622
CT3   = 060000           6739#   7662
DATAFL  007072           7757*   7940#   8215    8227*   8228    8388
DATPKT  010140           8167    8206#
DATPNT  007116           7955#   8219
```

```
DDISP = 177570          6654#   6942    7044
DELCNT  001272          6942#   9060*   9062*
DELFLG  001270          6942#   8733*   9029    9059*   9064*
DERFLG  007114          7952#   8220*   8268    8273*
DERTBL  007126          7960#   8218    8221    8393
DEVACT  001266          6942#   7097*   7284*   7314*   7353*   7555*   7604*   7644*   7684*   8447    8452    8455    8458
                        8461    8464    8467    8470    8476*   8902*   9052*   9100*   9127*   9157*   9186*   9214*
DEVCMG  001274          6942#   7066*   7068*   9728    9754
DH1     020526          6955    6969    6973    6975    6977    6979    6981    6983    6985    6987    6989    6991    6995
                        6999    9443#
DH2     020545          6945    6947    6951    9444#
DH3     020571          6949    6953    9445#
DH31    020721          6993    9448#
DH32    020750          7003    9449#
DH33    021020          7005    7009    9450#
DH34    021127          7007    7011    9451#
DH4     020633          6957    6971    9446#
DH5     020664          6959    6961    6963    6965    6967    6997    7001    9447#
DISPLA  001142          6942#   7044*   9841*
DISPRE  000174          6907#   6913#   7044
DNA   = 100000          6861#
DNAIE = 000040          6867#
DONE  = 000200          6794#   6828#   7436
DPKTER  007066          7915#   8226*   8403*   9467
DROP    017023          8615    8622    8629    8636    8642    8648    8654    8660    8666    8672    8677    9407#
DRV0    016773          7813    8653    9405#
DRV1    017007          7828    8659    9406#
DSC   = 100000          6820#   7388    7396    7402    7409    7415
DSI   = 100000          6788#   7499    7507    7513    7520    7526
DSIE  = 000040          6796#   6830#
DSPTST  016516          7290    9388#
DSPTXT  021470          7282    9047    9478#
DSRDY = 001000          6793#   6826#   7402    7475    7513
DSTATR  016344          7245    9373#
DSWR  = 177570          6654#   6942    7044
DTR   = 000002          6799#   6834#   7103    7104    7106    7107    7385    7388    7390    7402    7403    7415    7416
                        7425    7428    7492    7493    7499    7501    7513    7514    7526    7527    7536    7574    7576
                        8584    8585    8595    8599    9221    9841
DT1     021246          6955    6969    6973    6975    6977    6979    6981    6983    6985    6987    6989    6991    6995
                        6999    9455#
DT2     021254          6945    6947    6951    9456#
DT3     021264          6949    6953    9457#
DT31    021360          6993    9463#
DT33    021370          6997    7001    9464#
DT34    021402          7003    9465#
DT35    021416          7005    7009    9466#
DT36    021442          7007    7011    9467#
DT4     021300          6957    6971    9458#
DT5     021310          6959    9459#
DT6     021322          6961    9460#
DT7     021334          6963    9461#
DT8     021346          6965    6967    9462#
DUN     017074          7218    7466    7814    7829    9410#
EMTVEC= 000030          6654#   7044*
EM1     017171          6945    6947    6951    9413#
EM125   020076          6985    9434#
```

```
EM127   020045          6989    9432#
EM130   020125          6991    9435#
EM131   020166          6993    9436#
EM132   020241          6995    9437#
EM133   020302          6997    9438#
EM134   020063          6999    9433#
EM135   020443          7003    9440#
EM136   020465          7005    7009    9441#
EM137   020506          7007    7011    9442#
EM140   020362          7001    9439#
EM2     017210          6949    6953    9414#
EM23    017546          6969    9422#
EM24    017557          6971    9423#
EM25    017574          6973    9424#
EM26    017611          6975    9425#
EM27    017626          6977    9426#
EM28    017643          6979    9427#
EM29    017662          6981    9428#
EM3     017242          6955    9415#
EM32    017702          6983    9429#
EM33    017745          9430#
EM34    020006          6987    9431#
EM4     017306          6957    9416#
EM5     017333          6959    9417#
EM6     017371          6961    9418#
EM7     017427          6963    9419#
EM8     017465          6965    9420#
EM9     017516          6967    9421#
ENDAPT  016302          8492    9367#
ENDPAS  016277          8494    9366#
ENDPKT  010512          8174    8317#
ENVPAR= 001400          6856#
EOP     011230          7701    7708    7735    7777    7797    7833    8445#
EOPERR  011252          8450    8452#
EOP1    011360          8451    8471    8473#
EPAR  = 000060          6767#
ERR   = 100000          6803#   6838#
ERRNUM  026330          9455    9456    9457    9458    9459    9460    9461    9462    9463    9464    9465    9466    9467
                        9847*   9852#
ERRPOS  016212          9359#   9841
ERRVEC= 000004          6654#   7044*   7135*   7136*   7212*   7213*   8522*   8523*   8577*   8578*
ESC   = 000033          6660#   8518    8963    9033    9346    9347    9348    9349    9350    9351    9352    9354    9358
                        9359    9360    9362    9363    9364    9365    9366    9367    9368    9369    9370    9373    9374
                        9375    9478    9479    9480    9486    9491    9494    9496    9498    9500    9503    9505    9507
                        9509    9511    9513    9515    9516    9518    9520    9522    9525    9527    9529    9530    9532
                        9534    9536    9538    9540    9542    9543    9545
ESCFLG  001251          6942#   9000*   9007*   9035*   9043*   9614    9704*
ESEQFL  014013          8732*   8755    8948    8962*   8965*   8984#
EXPMRC  004640          7388*   7392    7396*   7398    7402*   7405    7409*   7411    7415*   7418    7475#   7499*   7503
                        7507*   7509    7513*   7516    7520*   7522    7526*   7529    9464
FINESC  024672          9616    9704#
FLAG    007026          7765    7790    7837#   7968    7995*   7996*   8012    8349
FLGHLD  013264          8806*   8814    8817    8831#
FRERR = 020000          6805#
GETCHR  007622          7725    8106#   8147    8242    8332
GETPKT  007742          7771    7791    8146#
```

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GFLAG   001252          6942#  8882   8886*  8937*  9690*  9841*
GFLCHK  013376          7219   7279   8502   8543   8561   8574   8610   8616   8623   8630   8637   8643   8649
                        8655   8661   8667   8673   8678   8788   8882#
GNS     = ****** U      6907   9863   9864   9865
GSAVIE  025250          9726*  9764   9782#
GTSWR   = 104406        7063   7067   8885   8936   9841   9863#
HFDUP   = 000010        6869#
HILOWF  007044          7738*  7741*  7845#  7993
HT      = 000011        6654#  9411   9412
IDENRQ  016340          7260   9370#
'E      = 000100        6795#  6811#  6829#  6866#  6879#  6884#  7116   7119   7285   7307   7340   7351   7452
                        7453   7547   7548   7596   7597   7636   7637   7676   7677   7736   7749   7750   7754
                        7831   7832   8094   8095   8569   8738   8778   8794   8901   8919   8955   8996   9005
                        9027   9054   9099   9111   9126   9129   9141   9156   9159   9170   9185   9188   9199
                        9215   9216   9224   9235   9242   9266   9269   9294   9305   9333   9619   9622   9643
                        9649   9708   9727   9763   9841
INITT   = 000001        6901#
INTFLG  013460          7144*  7146   7158*  7160   7184*  7186   7206*  7208   7306*  7310   8524*  8527*  8529
                        8550*  8553   8568*  8570   8896*  8905#
INTSRV  013420          7135   7304   8522   8896#
IOTVEC= 000020          6654#
KILFLG  001264          6942#  7096*  8445*  8475*  8812   8897   9050   9097   9124   9154   9183   9212
LF      = 000012        6654#  9083   9090   9481   9483   9485   9486   9488   9490   9493   9494   9496   9497
                        9498   9499   9500   9501   9504   9506   9508   9510   9512   9514   9517   9519   9521
                        9524   9526   9528   9531   9533   9535   9537   9539   9543   9546
LINCT   014514          7336*  7344   9095*  9104#
LINE13  016243          9364#
LOOP    002374          7078   7080   7082   7086   7089#  8515
LSTAD   031666          7151   7156   9914#
LSTCHR  015342          7377*  9239   9241*  9250#
MAINT   = 000002        6779#  7495   7578   7585   7625   7665
MAXMEM  012640          7138   7179   8537*  8692#
MCLK    = 004000        6863#  7379   7384
MDEVM   025306          9730   9787#
MEM     016655          8542   9402#
MEMCT   003234          7154*  7173   7175*  7200*  7201   7222#
MEMHID  003236          7164*  7165   7190*  7191   7228#  9457
MEMORY  017057          7217   8676   9409#
MEMTBL  012622          8539   8685#
MEMTST  002600          7132#
MM      = 010000        6862#  7384
MR      = 000400        6864#  7378   7461   7470
MSG3    017103          8496   9411#
MSG4    017135          8498   9412#
MYTYPE  026306          9841   9847#
M12K    016631          8687   9397#
M16K    016635          8688   9398#
M20K    016641          8689   9399#
M24K    016645          8690   9400#
M30K    016651          8691   9401#
M4K     016623          8685   9395#
M8K     016626          8686   9396#
NOAPTS  004114          7372   7374   7377#
NOTPRE  016676          8560   8573   8609   9403#
NULL    011574          8501   8517#
ODDPAR= 001000          6857#  7381
```

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OPAR  = 000020          6768#   7495    7498
OPCHTX  016430          7277*   9379#
OPCODE  007030          7716*   7838#   7997*   8003*   8008*   8152    8211    8381    8386    9465    9466    9467
OPTCHR  014012          7248    7250    7264    7266    7270    7272*   7277    8729*   8968*   8982#   9463
OPTPRE  016371          7278    9378#
ORERR = 040000          6804#   6839#
PARAM = 177420          6692#   7108*   7332*   7495*   7498*   7586*   7626*   7666*   8587*   9217*   9841*
PARERR= 010000          6806#   6840#
PASPOS  016175          8486    9358#
PAT     003240          7155*   7159    7165    7176*   7182*   7185    7191    7203*   7229#   9457
PERR    026332          7120*   8497    9841*   9854#
PIRQ  = 177772          6654#
PIRQVE= 000240          6654#
PKTERR  007062          7758*   7786*   7858#   8268*   8391*   8404    9466    9467
PKTPNT  007060          7854#   8324*   8347
PORT    016605          7360    9394#
PRB   = 177516          6697#   9080*
PRCHR   014512          7338*   9080    9081    9083    9085    9087*   9090*   9092*   9094*   9103#
PRINT   016561          7357    8608    8614    9391#
PRPORT  012616          7349    7358    8589*   8605*   8683#
PRPRES  012614          7327    8588*   8592*   8596    8601    8606*   8682#
PRS   = 177514          6696#   7340*   7351*   8590    8603    9076    9099*
PRSRV   014350          7333    9076#
PRT   = 020000          6740#   7332
PRTST   003702          7299    7303    7313    7317    7327#
PRVEC = 000200          6668#   7333*   7334*
PR0   = 000000          6654#   7099
PR1   = 000040          6654#
PR2   = 000100          6654#
PR3   = 000140          6654#
PR4   = 000200          6654#
PR5   = 000240          6654#
PR6   = 000300          6654#
PR7   = 000340          6654#   7035    7040    7136    7281    8482    8523    8706    8708    8780
PS    = 177776          6654#
PSERR   026334          7121*   8423*   8499    9855#
PSW   = 177776          6654#
PWRVEC= 000024          6654#
RACT  = 004000          6824#
RCVDUN  014014          8731*   8746    8751    8972*   8977*   8986#
RCVPTR  014016          8728*   8966    8970    8974*   8975    8987#
RDONE = 000200          6878#   9321
RDY   = 000200          6810#   6865#   6883#   8776    8792    9021    9284    9669    9671
REGHLD  013372          8852*   8858    8872#
RESCUR  011577          8489    8518#   9841
RESDSP  016264          8791    9365#   9642
RESTVT= 104410          7292    7321    7363    7467    7562    7612    7652    7692    7747    7815    7830    8938    9841
                        9865#
RESVEC= 000010          6654#
RING  = 040000          6789#   6821#   7402    7475    7513
RTS   = 000004          6798#   6833#   7106    7107    7385    7388    7390    7425    7492    7493    7499    7501    7536
                        7574    8584    8585    8595    9221    9222    9246    9841
RUN     017045          7291    7320    7362    7561    7611    7651    7691    7746    9408#
SAVCON  016236          8483    9362#   9841
SAVCUR  016241          8782    9363#   9621
SAVEVT= 104407          7289    7318    7356    7464    7559    7608    7648    7688    7744    7811    7826    8479    8934
```

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                        9841    9864#
SAVFLG  013102          8774*   8785#   8789
SAVMRC  004636          7391*   7392    7397*   7398    7404*   7405    7410*   7411    7417*   7418    7474#   7502*   7503
                        7508*   7509    7515*   7516    7521*   7522    7528*   7529    9464
SAVPSW  013104          8779*   8786#   8796
SCOM    016534          7465    8647    9389#
SEND  = 000020          6868#   7431    9245
SEQNUM  007034          7840#   8004*
SERPOS  016227          9360#   9841
SERTTL  001256          6942#   8422*   9841
SERUN0  001260          6942#   8426*   8427    8429*
SERUN1  001262          6942#   8431*   8432    8434*
SETVEC  012642          7446    7539    7588    7628    7668    7717    8703#   8734
SIZE    011602          7076    8522#
SMPAR = 176622          6706#   7381*
SMRB  = 176622          6705#   7440    9253
SMRC  = 176620          6704#   7385*   7389    7390*   7391    7397    7403*   7404    7410    7416*   7417    7425*   7426
                        7428*   7429    7435    7452*   7471    9246*   9266*
SMRSRV  015344          7448    9253#
SMRVEC= 000340          6675#   7447
SMTST   004062          7328    7330    7347    7355    7369#
SMXB  = 176626          6708#   7432*   9236*
SMXC  = 176624          6707#   7378*   7379*   7384*   7431*   7453*   7461*   7470*   9235*   9242*   9245*   9269*
SMXSRV  015252          7449    9235#
SMXVEC= 000344          6676#
SNDPKT  007532          7722    7764    7789    8082#
SOFTER  011142          7783    7802    8422#
SPRS    014516          9076*   9105#   9458
SREC  = 002000          6792#   6825#   7388    7499
SRSYN = 000020          6831#   7385    7425    7428
STACK = 001100          6654#   7015    7044    7089
START   001716          6918    6921    7015#   8933    9694
START1  001746          7037    7039#
STATRQ  016331          7244    9369#
STKLMT= 177774          6654#
STSYN = 000400          6827#
SUCCFS  007074          7779    7798    7942#   8355*   9466    9467
SUMARY  007100          7944#   8376*   8377*   8378    9466    9467
SWR     001140          6942#   7044*   7061    7064    7215    7256    7287    7316    7354    7462    7557    7606    7646
                        7686    7742    7809    7824    9758*   9841
SWREG   000176          6907#   6914#   7044    7061    9734
SW0   = 000001          6654#
SW00  = 000001          6654#
SW01  = 000002          6654#
SW02  = 000004          6654#
SW03  = 000010          6654#
SW04  = 000020          6654#
SW05  = 000040          6654#
SW06  = 000100          6654#
SW07  = 000200          6654#
SW08  = 000400          6654#
SW09  = 001000          6654#
SW1   = 000002          6654#
SW10  = 002000          6654#
SW11  = 004000          6654#
SW12  = 010000          6654#
```

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SW13   = 020000           6654#
SW14   = 040000           6654#
SW15   = 100000           6654#
SW2    = 000004           6654#
SW3    = 000010           6654#
SW4    = 000020           6654#
SW5    = 000040           6654#
SW6    = 000100           6654#
SW7    = 000200           6654#
SW8    = 000400           6654#
SW9    = 001000           6654#
SXMIT  = 000010           6797#  6832#  7402  7403  7513  7514  8584  8585  9841
SYNC1  = 040000           6845#
SYNC2  = 000000           6844#
TBITVE= 000014            6654#
TCMDPK= 000002            6892#  7996  8170
TCONT  = 000020           6889#  7727  8150
TDATA  = 000001           6891#  8165
TDIAGN= 000007            6904#  8006
TENDPK= 000100            6905#  8352
TIDNTF  016351            7255   7261  9374#
TIMER   013156            7309   7343  7455  7550  7599  7639  7679  8446  8739  8745  8806#
TIMER1  013270            7090   7110  8473  8474  8838#  8932  9693
TIMER2  013304            7434   8852#
TINIT  = 000004           6890#  7716  7975  8161
TITLE   015670            7056   9346#
TKSRV1  013462            7039   8912#  8978
TKSRV2  013622            8736   8946#
TKS1EN  013616            8918   8921  8925  8927  8931  8939#
TKVEC  = 000060           6654#  7039*  7040*  8735  8978*
TK1B   = 176502           6715#  7595  9115
TK1S   = 176500           6714#  7596*  8551  9126*
TK1SRV  014536            7590   9115#
TK1VEC= 000300            6681#  7589
TK2B   = 176512           6720#  7635  9145
TK2S   = 176510           6719#  7636*  9156*
TK2SRV  014656            7630   9145#
TK2VEC= 000310            6683#  7629
TK3B   = 176522           6725#  7675  9174
TK3S   = 176520           6724#  7676*  8555  9185*
TK3SRV  014774            7670   9174#
TK3VEC= 000320            6685#  7669
TMSG   = 000012           6893#  7995  8327
TMSIZ  = 000200           6894#  8052  8237  8258  8263
TNOP   = 000000           6900#
TPSRV   014114            7280   9021#
TPSRV2  014020            8737   8993#
TPVEC  = 000064           6654#  7280*  7281*
TP1B   = 176506           6717#  9112*
TP1S   = 176504           6716#  7597*  9111*  9129*
TP1SRV  014520            7591   9111#
TP1VEC= 000304            6682#
TP2B   = 176516           6722#  9142*
TP2S   = 176514           6721#  7637*  9141*  9159*
TP2SRV  014640            7631   9141#
TP2VEC= 000314            6684#
```

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TP3B   = 176526          6727#  9171*
TP3S   = 176524          6726#  7677*  9170*  9188*
TP3SRV  014756           7671   9170#
TP3VEC= 000324           6686#
TRAPVE= 000034           6654#  7044*
TREAD  = 000002          6902#  7788   8211   8386
TRTRY  = 000010          6895#
TRTVEC= 000014           6654#
TSTAM   005202           7496   7539#
TSTTU   006370           7749#  7805
TSTT58  006362           7743   7748#  7820   7823
TUBUFP  007056           7714*  7753*  7852#  8109   8117*  8232   8322
TUCHR   007104           7727   7947#  8116*  8149
TUIMSG  007152           7723   7975#
TUINIT  006106           7700   7703#
TUPRES  012620           7081   7699   8567*  8576*  8684#
TURCSR= 177170           6710#  7710*  7732*  7736*  7749*  7754*  7831*  8094*  8125*  8178*  8569*  9321   9333*
TURCVR  015600           7719   9320#
TURDBF  030210           7713   7752   9906#
TURDLA  031664           9326   9912#
TURPNT  007054           7713*  7714   7752*  7753   7851#  8114   9325   9331*
TURVEC= 000260           6678#  7718
TURXDB= 177172           6711#  7712   7751   8093   9296*  9330
TUTST   006074           7570   7659   7683   7687   7699#
TUTVEC= 000264           6679#
TUXCNT  007052           7849#  8087*  9288   9292*  9300
TUXCSR= 177174           6712#  7711*  7733*  7750*  7832*  8092*  8095*  8126*  8179*  9284   9294*  9302*  9305*
TUXMIT  015444           7720   9283#
TUXPNT  007050           7848#  8088*  9295   9297*
TU58ER  007064           7715*  7731*  7755*  7785*  7888#  8112   8124*  8154*  8159*  8163*  8172*  8213*  8230*
                         9286*  9290*  9323*  9328*  9465
TU58M   016452           7745   8572   9382#
TU58MS  016457           7812   7827   9383#
TWC    = 001000          6896#  8005
TWRITE= 000003           6903#  7760   7983   8152   8381
TXTPTR  014346           7282*  8727*  8998   9002*  9031   9037*  9042*  9044   9047*  9058*  9069#  9705   9713
                         9715*
TYPDS  = 104405          8488   8497   8499   9841   9863#
TYPE   = 104401          7056   7087   7217   7218   7278   7290   7291   7319   7320   7357   7360   7362   7465
                         7466   7560   7561   7609   7610   7611   7649   7650   7651   7689   7690   7691   7745
                         7746   7812   7813   7814   7827   7828   7829   8483   8485   8489   8492   8494   8496
                         8498   8500   8501   8540   8542   8559   8560   8572   8573   8608   8609   8614   8615
                         8620   8621   8622   8627   8628   8629   8634   8635   8636   8641   8642   8647   8648
                         8653   8654   8659   8660   8665   8666   8671   8672   8676   8677   8782   8791   8884
                         8935   9621   9642   9655   9709   9730   9733   9735   9745   9760   9780   9841   9843
                         9859   9861   9863#
TYPFLG  001250           6942#  7046   7054*  7283*  8477   8774   8781*  8795*  9617   9620*  9639   9641*  9646*
                         9654*  9657*  9706*  9712*  9841*
TYPOC  = 104402          9731   9734   9843   9863#
TYPON  = 104404          9863#
TYPOS  = 104403          9863#
T.RSVT  013106           8788#  9865
T.SAVT  013026           8774#  9864
T1      016510           7610   8621   9385#
T1CHR   014630           7593*  9112   9116   9120*  9132#  9459
T1CNT   014634           7594*  7600   9122*  9134#
```

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T1HLD   014632          7595*  9115*  9116   9133#  9459
T2      016512          7650   8628   9386#
T2CHR   014750          7633*  9142   9146   9150*  9162#  9460
T2CNT   014754          7634*  7640   9152*  9164#
T2HLD   014752          7635*  9145*  9146   9163#  9460
T3      016514          7690   8635   9387#
T3CHR   015066          7673*  9171   9175   9179*  9191#  9461
T3CNT   015072          7674*  7680   9181*  9193#
T3HLD   015070          7675*  9174*  9175   9192#  9461
ULITE = 040000          6742#
UNITNM  007032          7703*  7709*  7807   7818*  7839#  8358   8424   9465   9466   9467
VIDNTF  016361          7258   9375#
VTDONE  001254          6942#  7242*  9048*
VTTALK  012666          7243   7259   8727#
VTTST   003244          7134   7216   7220   7236#
VT100   016577          8671   9393#
WARNIN  016714          7087   9404#
WRKERR  007110          7950#  8218*  8266*  8271*
WRKPNT  007112          7951#  8219*  8234*  8261   8272*
WRKSUM  007106          7949#  8217*  8257   8270*
WRTPNT  007140          7969#  8217
WRTTBL  007136          7761   7968#
WTDPAK  007426          7768   8046#
WTPK1   027170          7769   7969   9870#
WTPK2   027374          7970   9878#
WTPK3   027600          7971   9886#
WTPK4   030004          7972   9894#
XFLAG   001253          6942#  8916*  8924*  8952*  8960*  8993   9024   9677*  9680*  9695
XIEFLG  014344          7050*  8917   8920*  8953   8956*  8995*  9026*  9067#  9681*
XMTDUN  014112          8730*  8740   9006*  9011#
XOFF  = 000023          6662#  8922   8958   9675
XON   = 000021          6661#  8914   8950   9678
$APTHD  001000          6924#
$ASTAT= ****** U        9790
$ATYC   025346          9790#
$ATY1   025322          9790#
$ATY3   025330          9630   9790#
$ATY4   025340          9790#  9841
$AUTOB  001134          6942#  7070*  8926   9684
$BASE   001244          6942#
$BDADR  001122          6942#
$BDDAT  001126          6942#
$BELL   001160          6942#  9841
$CKSWR= ****** U        9863
$CMTAG  001100          6942#  7044
$CM3  = 000000          6942#
$CNTLG  025257          8884   8935   9784#  9841
$CNTLU  025252          9745   9783#
$CPUOP  001216          6942#
$CRLF   001165          6942#  8500   9656   9760   9841   9843
$DBLK   026654          9859#
$DEVCT  001200          6942#  8121*  8129*  8821*  8827*  8862*  8868*  9096*  9123*  9153*  9182*  9211*  9247*
                        9267*
$DEVM   001246          6942#  7075*  7083   7085   7101   7132   7236   7298   7329   7369   7382   7481   7490
                        7572   7579   7583   7618   7623   7658   7663   7704   7706   7816   7819   7985   7998
                        8593   8612   8618   8625   8632   8639   8645   8651   8657   8663   8669   8674   8899
```

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                        9219    9731    9756*
$DOAGN  011570          8508    8514#
$DTBL   026644          9859#
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                        9467    9841*   9843    9848
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$INTAG  001135          6942#   7115*   7118*   9647    9761    9841*
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$MADR3  001232          6942#
$MADR4  001236          6942#
$MAIL   001170          6924    6942#   7044    9841
$MAMS1  001220          6942#
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$MFLG   025564          9790#*
$MNEW   025275          9735    9786#
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$MSWR   025264          9733    9785#
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$MTYP3  001231            6942#
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$NULL   001154            6942#   9662
$OCNT   027106            9861#*
$OMODE  027110            9861#*
$PASS   001176            6942#   7044*   7113    7240    7275    7302    7373    7485    8484*   8487
$PASTM  001006            6924#
$QUES   001164            6942#   9780    9841
$RAND   026336            7737    7990    8000    8059    9857#
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$TYPEX  024670            9698#
$TYPOC  026710            9861#   9863
$TYPON  026724            9861#   9863
$TYPOS  026664            9861#   9863
$UNIT   001202            6942#
$UNITM  001010            6924#
$USWR   001214            6942#   8427    8432
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$VECT2  001242            6942#
$OFILL  027107            9861#*
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.     = 031666            6907#   6912#   6917#   6920#   6923#   6924#   6925#   6942#   7044    8841    9068#   9788#   9790#
                          9841    9843#   9859#
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.$X   = 001000            6924#
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COMMEN  1526#  6654#
ENDCOM  1538#  6654#
ENDERR  9815#  9841
ERROR   6654#  7149  7163  7168  7189  7194  7210  7252  7254  7268  7273  7312  7346  7394  7400
        7407   7413  7420  7437  7443  7458  7505  7511  7518  7524  7531  7553  7602  7642  7682
        7734   7776  7781  7784  7796  7800  7803  8454  8457  8460  8463  8466  8469  8472  8742
        8757   8759  9078  9118  9148  9177  9206  9258
ESCAPE  1654#  6654#
GETPRI  1278#  6654#
GETSWR  1725#  6654#
MULT    4393#  6654#
NEWTST  1585#  6654#
POP     2103#  6654#  8828  8869  9790  9857  9859
PUSH    2095#  6654#  8809  8855  9790  9857  9859
REPORT  5352#  6624#  6654#
SCOPE   6654#
SETPRI  1246#  6654#  7035  7099  8482
SETTRA  9863#  9864   9865
SETUP   1302#  6654#  7044
SKIP    1688#  6654#  7299  7303  7328  7330  7569  7619  7659
SLASH   1478#  6654#
SPACE   6654#
STARS   1447#  6654#  6656  6658  6664  6666  6688  6690  6730  6732  6782  6784  6814  6816  6872
        6874   6908   6910  6924  6925  6942  7123  7130  7232  7234  7294  7296  7323  7325  7365
        7367   7477   7479  7564  7566  7614  7616  7654  7656  7695  7697  7856  7886  7912  7936
        7977   7980   8016  8019  8041  8044  8076  8080  8098  8104  8135  8144  8187  8204  8282
        8315   8414   8420  8441  8443  8694  8701  8712  8725  8765  8772  8798  8800  8804  8834
        8836   8846   8850  8876  8880  8891  8894  8907  8910  8942  8944  8989  8991  9013  9019
        9072   9074   9107  9109  9137  9139  9166  9168  9195  9197  9231  9233  9273  9281  9309
        9318   9340   9342  9371  9376  9469  9476  9552  9700  9720  9790  9841  9843  9857  9859
        9861   9863   9902  9904
SWRSU   1416#  6654#  7044#
TRMTRP  9863#
TYPBIN  2039#  6654#
TYPDFC  2009#  6654#  8497  8499  9841
TYPNAM  1779#  6654#
TYPNUM  1976#  6654#
TYPOCS  1929#  6654#
TYPOCT  1892#  6654#  9731  9734  9843
TYPTXT  1846#  6654#
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$$CMTM  6942#
$$ESCA  1667#  6654#
$$NEWT  1621#  6654#
$$SET   9863#  9864   9865
$$SETM  7044#
$$SKIP  1701#  6654#
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.HEADE    50#  6622#  6638
.KT11    319#
.SETUP  1180#  6622#  7043
.SWRMI    92#  6623#
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.$APTB  5005#  6624#  6942#
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.$APTY    5436#    6624#    9790
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.$CATC     905#    6622#    6907
.$CMTA    1016#    6622#    6942
.$DB2D    4591#
.$DB2O    4714#
.$DIV     4494#
.$EOP     2162#    6622#
.$ERRO    2643#    6623#    9841
.$ERRT    2838#    6623#    9843
.$MULT    4431#
.$POWE    4143#
.$RAND    4218#    6624#    9857
.$RDDE    3814#
.$RDOC    3723#
.$READ    3328#    6622#
.$R2AZ    4858#
.$SAVE    3889#
.$SB2D    4675#
.$SB2O    4776#
.$SCOP    2397#    6623#
.$SIZE    4271#
.$SUPR    4814#
.$TRAP    3991#    6623#    9863
.$TYPB    3221#
.$TYPD    3144#    6623#    9859
.$TYPE    2925#    6622#
.$TYPO    3048#    6624#    9861
.$40CA     944#
.1170      498#


. ABS.   031666      000


 ERRORS DETECTED:  0

 CVKDBA,CVKDBA/CRF=SYSMAC.SML,CVKDBA.P11
 RUN-TIME: 53 62 4 SECONDS
 RUN-TIME RATIO: 257/121=2.1
 CORE USED:  34K  (67 PAGES)
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