PDM70

DIAGNOSTIC

MD-11-DZPMA-B

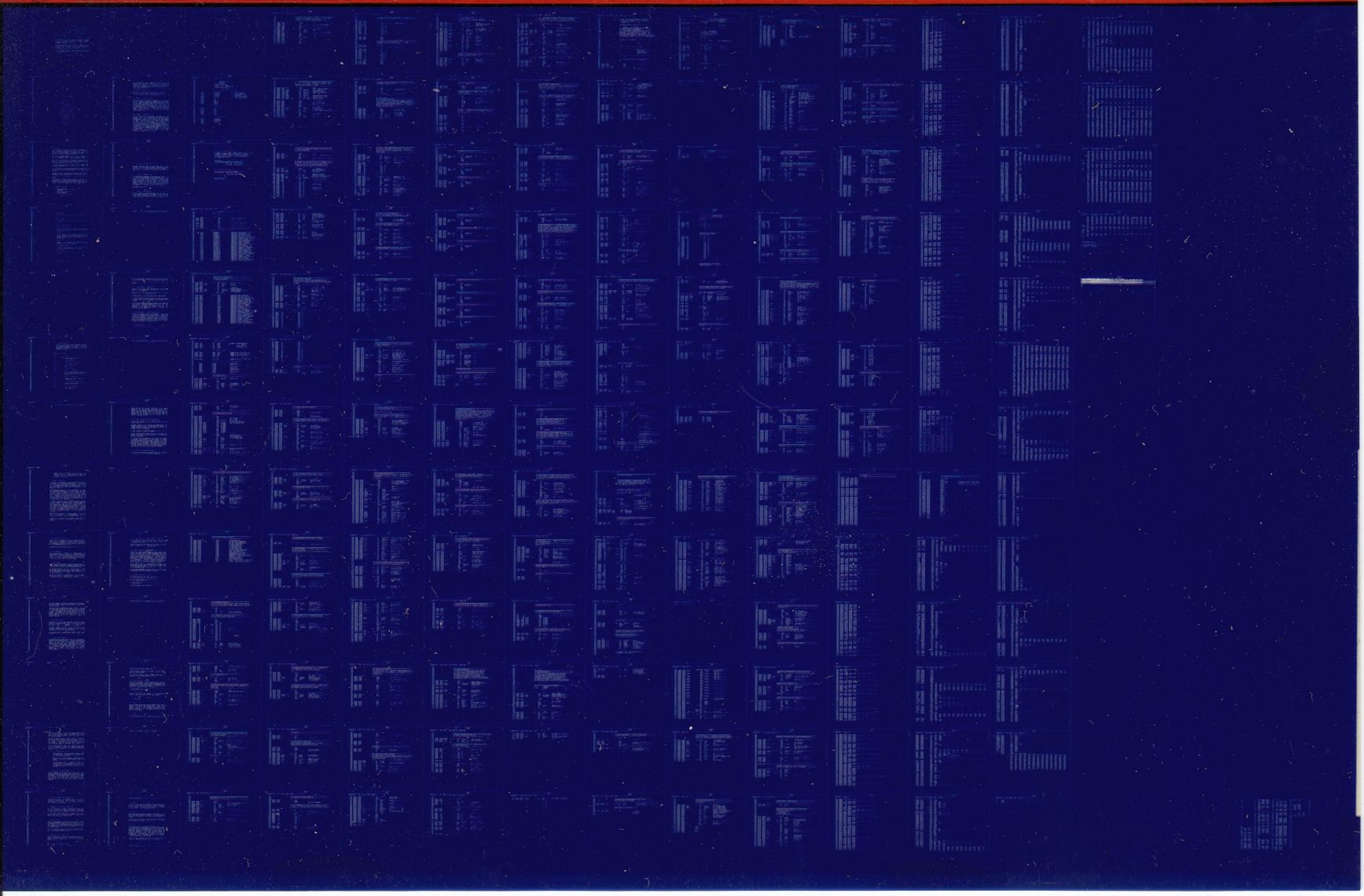
EP-DZPMA-B-DL-A

FICHE 1 OF 1

NOV 1976

digital

MADE IN USA



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IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DZPMA-A-D
PRODUCT NAME:	PDM70 DIAGNOSTIC TEST
DATE CREATED:	NOVEMBER 16, 1973
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	EARL L. BOUSE

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1.0 ABSTRACT

THIS IS A DESCRIPTION ON LOADING, USING AND INTERPRETING THE PDM70 DIAGNOSTIC PROGRAM. THE PROGRAM IS COMPRISED OF TWENTY-THREE KEYBOARD SELECTABLE TESTS WHICH TEST AND AID IN CHECKOUT OF THE PDM70 SYSTEM. THE PROGRAM IS STRUCTURED TO GIVE THE USER THE OPTION OF TESTING ANY OF THE MODULES COMPRISING THE PDM70 ON AN INDIVIDUAL OR SYSTEM TEST BASIS.

THE DIAGNOSTIC PROGRAM RESIDES IN A PDP-11 AND IS INTERFACED VIA A DL11 (ASYNCHRONOUS SERIAL LINE) TO THE PDM70. THE PDP-11 IS USED AS A COMBINATION CONTROL, SOURCE AND DESTINATION MODULE.

EACH MODULE TEST PROGRAM IS INDIVIDUALLY OUTLINED IN THIS WRITE-UP. THE SCOPE LOOPING TECHNIQUE AND MODULE ADDRESSING SCHEME IS IN GENERAL THE SAME FOR ALL MODULES WITH ANY UNIQUE CHARACTERISTICS POINTED OUT IN THE MODULE OUTLINE.

THE CONSOLE TELEPRINTER IS USED TO SELECT THE TEST PROGRAMS AND TO CONTROL THE DIAGNOSTIC. THE DIAGNOSTIC RUNS IN THREE MODES; MONITOR, WAIT AND RUN.

THE 'MONITOR MODE' IS ENTERED WHEN THE PROGRAM IS LOADED OR AT ANY TIME A NEW TEST IS TO BE SELECTED. HERE THE PROGRAM WAITS, DECODES AND THEN EXECUTES THE SELECTED TEST TYPED IN FROM THE KEYBOARD.

WHEN THE 'WAIT MODE' IS ENTERED THE PROGRAM HAS TO WAIT FOR ANY PARAMETERS (SUCH AS A MODULE ADDRESS) TO BE INPUTTED, A SIGNAL TO BE SCOPED OR TO STOP PROGRAM EXECUTION IF AN ERROR IS DETECTED.

THE 'RUN MODE' IS WHEN THE PROGRAM IS ACTUALLY EXECUTING A TEST PROGRAM.

THE TELEPRINTER KEYBOARD IS ALWAYS ACTIVE AND WILL RESPOND TO ANY KEYBOARD INPUT. ALL USERS RESPONSES ENTERED MUST END WITH A 'CR' (CARRIAGE RETURN) AND MAY NOT CONTAIN SPACES OR NULL CHARACTERS. 'RUBOUT' MAY BE USED TO ERASE ANY PREVIOUSLY ENTERED CHARACTERS. IF RUBOUT IS TYPED, THE ERASED CHARACTER WILL BE ECHOED BACK.

2.0 REQUIREMENTS (EQUIPMENT)

1. PDM70 MOTHER BOARD.
2. CLOCK MODULE (M7379-SET TO CORRESPOND TO THE DL11 FREQ.)
3. POWER SUPPLY
4. PDP-11 W/DL11 & 8K OF MEMORY
5. CONSOLE TELEPRINTER
6. PDM70 INTERFACE MODULE

   A. THIS CAN EITHER BE A DF11 OR A SERIAL I/O MODULE (M7385)

3.0 LOADING PROCEDURE

1. USE STANDARD PROCEDURE FOR LOADING BINARY TAPES.

4.0 STARTING PROCEDURE

1. THE PROGRAM IS SELF STARTING WITH A RESTART ADDRESS OF "200".

5.0 TELEPRINTER CONTROL SWITCHES

1. RETURN TO MONITOR (↑C)*

   TYPING A '↑C' AT ANY TIME WILL ENABLE THE PROGRAM TO RETURN TO THE KEYBOARD MONITOR AND WAIT FOR A NEW TEST TO BE ENTERED.

2. CONTINUE (C)

   IF A '↑C' HAS BEEN TYPED, RETURNING CONTROL TO THE KEYBOARD MONITOR, AND THE USER WISHES TO RESTART THE LAST TEST HE WAS RUNNING, HE CAN SIMPLY TYPE 'C' CARRIAGE RETURN AND CONTINUE WITHOUT HAVING TO RE-TYPE THE TEST NAME.

3. RESTART (↑R)*

   TYPING A '↑R' WILL ENABLE THE CURRENT TEST TO BE RESTARTED. IF A '↑R' IS TYPED WHILE IN MONITOR MODE, THE ENTIRE TEST PROTOCOL IS RETYPED.

4. MODULE ADDRESS UPDATING (↑A)*

   TYPING A '↑A' WHILE RUNNING ANY OF THE MODULE PROGRAMS WILL ENABLE A NEW MODULE ADDRESS TO BE ENTERED.

5. EXIT WAIT MODE (CR)

   TYPING 'CR' WILL ENABLE THE PROGRAM TO CONTINUE FROM THE WAIT MODE.

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* ALL CONTROL CHARACTERS ARE OBTAINED BY TYPING THE 'CTRL AND THE

F01

206 CHARACTER DESIGNATED' KEYS SIMULTANEOUSLY.

6. SUPPRESS PRINTING (↑O)

TYPING A '↑O' TELLS THE COMPUTER TO SUPPRESS THE REST OF THE TELEPRINTER OUTPUT. FOR INSTANCE, IF THE COMPUTER WAS TYPING OUT A MESSAGE AND THE USER KNEW WHAT THE MESSAGE WAS GOING TO BE, HE COULD TYPE A '↑O' AND ENABLE THE PROGRAM TO CONTINUE WITHOUT WAITING FOR THE ENTIRE MESSAGE TO BE PRINTED.

6.0 CONSOLE SWITCH SETTINGS

SWITCH	FUNCTION
SW15=0	ENTER THE 'WAIT MODE' AND WAIT FOR 'CR' ON ERROR DETECTION
SW15=1	CONTINUE ON ERROR
SW14=0	CONTINUE ON TO NEXT SUBTEST
SW14=1	LOOP ON CURRENT SUBTEST
SW13=0	ENABLE PRINTOUTS
SW13=1	INHIBIT PRINTOUTS
SW12=0	NORMAL DL11 TRANSMISSION
SW12=1	ENTER THE 'WAIT MODE' AND WAIT FOR A 'CR' TO TRANSMIT EACH CHARACTER. AS EACH CHARACTER IS TRANSMITTED IT IS ALSO PRINTED.
SW11=0	NORMAL DL11 TRANSMISSION
SW11=1	TRANSMIT THE CURRENT CHARACTER UNTIL SW11 IS RESET TO '0'.
SW10=0	RUN THE ENTIRE MODULE TEST PROGRAM
SW10=1	INHIBIT THE MANUAL INTERVENTION TESTS IN THE MODULE TEST PROGRAM
SW09=0	NORMAL DL11 TRANSMISSION
SW09=1	INHIBIT TRANSMITTER DELAY (SCOPE LOOPING AID)

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   263                          NOTE:  THE FUNCTIONS OF THE LOWER BITS (0-8) VARY  IN  USAGE  AND
   264                                 ARE  OUTLINED  IN  THE  APPLICABLE  TEST DESCRIPTIONS.  IN
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GENERAL THOUGH, DATA SWITCHES '0-3' ARE USED IN THE EXERCISER TESTS TO ENABLE THE USER TO SELECT ANY PARTICULAR MODULE MODE. IN THESE CASES, THE PROGRAM ADDS A CODE OF '60' TO THE NUMBER READ FROM THE SWITCHES TO REPRESENT AN ASCII NUMBER.

7.0 SERIAL I/O INPUT OPTION

AS MENTIONED IN THE ABSTRACT, THE PDM70 MODULES CAN BE TESTED IN TWO MODES; PER MODULE BASES OR SYSTEM TEST. IF THE MODULE IS TESTED INDIVIDUALLY A DF11 IS PLUGGED DIRECTLY INTO THE CONTROL SLOT OF THE PDM70 MOTHER BOARD. THIS ENABLES THE PDP-11 TO ACT AS A COMBINATION CONTROL, SOURCE AND DESTINATION MODULE. IN THIS CASE, THE SYSTEM CLOCK MUST BE SET TO CORRESPOND TO THE CLOCK FREQUENCY OF THE DL11.

WHEN THE MODULE IS TESTED IN A SYSTEM ENVIRONMENT, THE BASIC SYSTEM CONFIGURATION CONSISTS OF A : CONTROL, CLOCK, 'KGM' (KNOWN GOOD SERIAL INPUT/OUTPUT MODULE) AND A 'MUT' (MODULE UNDER TEST). THE 'KGM' SHOULD BE VERIFIED AS SUCH BY TESTING IT WITH THE M7385I TEST (REFER TO SECTION 12.13). THE 'KGM' CAN BE INSERTED IN ANY MODULE SLOT AND THEN CABLED TO THE DL11 OUTPUT OF THE PDP-11. THIS MODULE IS TO BE SET UP WITH THE "D" JUMPER OUT AND THE "L" JUMPER IN SO THAT IT IS INITIALIZED ON POWER UP. THE SYSTEM CLOCK MUST BE SET EITHER EQUAL TO OR GREATER THAN, THE INPUT DEVICES (E.G. DL11) BAUD NOTE. PROGRAMS ARE THEN SENT FROM THE PDP-11 STORED IN THE CONTROL MODULE.

NOT OBVIOUS TO THE USER IS THE EXTRA ADDRESSING WHICH IS 'PADDED' IN WHEN THE SERIAL I/O MODULE IS USED. THIS PADDING SERVES TWO FUNCTIONS. FIRST, IT FACILITATES LOADING A LEGAL PROGRAM INTO THE CONTROL MODULE 'FIFO' (FIRST-IN, FIRST-OUT BUFFER). THIS MEANS STARTING EACH PROGRAM WITH AN 'STX' AND ENDING IT WITH AN 'ETX'. PADDING ISN'T NECESSARY WHEN THE MODULE IS TESTED ON A MODULE BASIS. ALSO, EXTRA ADDRESSING MUST BE ADDED TO ADDRESS THE 'KGM'. THE PROGRAM HAS TO BE CERTAIN THAT THE 'KGM' NEVER LOSES CONTROL OF A PROGRAM SINCE THIS IS THE ONLY INTERFACE TO THE PDP-11. BY SETTING DATA SWITCH 12, THE USER CAN SINGLE STEP ANY MODULE TEST PROGRAM AND EXAMINE WHAT THIS PADDED PROGRAM LOOKS LIKE.

WHEN THE PROGRAM IS STARTED, IT ASKS IF A SERIAL I/O IS BEING USED. IF IT IS, TYPE 'YES' OR 'Y' CARRIAGE RETURN. IF IT'S NOT, TYPE 'NO', 'N' OR SIMPLY 'CR'. THIS PARAMETER CAN BE CHANGED AT ANY TIME BY TYPING A '↑R' WHILE IN THE MONITOR MODE.

IF THE 'KGM' I/O IS BEING USED, THE PROGRAM WILL THEN ASK FOR THE ADDRESS OF THIS MODULE. THIS CAN BE ANY ADDRESS EXCEPT '17' WHICH FIT THE GUIDE LINES DESCRIBED IN SECTION 9.0 (MODULE ADDRESSING).

8.0 DL11 ADDRESS SETUP PROCEDURE

AFTER SETTING UP THE SERIAL I/O OPTION, THE PROGRAM PRINTS "DL11 ADRS., VEC.?". THIS ENABLES THE USER TO SELECT HIS OWN DL11 DEVICE AND VECTOR ADDRESSES. BY SIMPLY TYPING 'CR', THE DEFAULT RCSR ADDRESS OF '175610' AND VECTOR ADDRESS OF '300' ARE USED. IF THESE ADDRESSES ARE TO BE MODIFIED, TYPE THE RCSR ADDRESS AND THE VECTOR ADDRESS SEPERATED BY A COMMA.

THE USER SHOULD NOTE THAT BOTH THE DL11 AND THE SERIAL I/O MODULE ARE NORMALLY SETUP FOR 7 BIT EVEN PARITY.

9.0 MODULE ADDRESSING

WHEN A MODULE PROGRAM IS SELECTED, THE PROGRAM REQUESTS THE MODULE ADDRESS BEFORE THE TEST IS RUN. THIS ADDRESS CAN BE ANY NUMBER FROM '0-17'*. THE ONLY RESTRICTION IS THAT IF THE SERIAL INPUT OPTION IS BEING USED, THESE TWO MODULE ADDRESSES MUST NOT CONFLICT. IF THEY DO, A NEW MODULE ADDRESS WILL BE REQUESTED. TYPING A '↑A' AT ANY POINT WHILE A MODULE PROGRAM IS RUNNING WILL CAUSE THE PROGRAM TO REQUEST A NEW MODULE ADDRESS.

10.0 MODULE ERRORS

WHEN A MODULE ERROR IS DETECTED, THE FAILING SUBTEST NUMBER, M.A. (MEMORY ADDRESS) WHERE ERROR OCCURRED AND A DESCRIPTIVE MESSAGE OF THE FAILURE ARE TYPED OUT. THE PROGRAM THEN ENTERS THE 'WAIT MODE' UNTIL A 'CR' IS TYPED ENABLING THE PROGRAM TO CONTINUE.

WHEN AN ERROR IS DETECTED, THE 'M.A.' SHOULD BE USED TO LOCATE THE FAILING SUBTEST IN THE LISTING. HERE THE USER WILL FIND A WRITTEN DISCRIPTION OF WHAT THE SUBTEST WAS ATTEMPTING TO DO. THE TEST CAN THEN BE ANALYZED AND THEN LOOPED IF NECESSARY UNTIL THE FAILURE IS FIXED.

WHEN A MODULE IS FAILING THE FIRST SUBTEST, IT IS A GOOD IDEA TO RE-CHECK THE MODULE TO MAKE SURE THAT IT WAS SET UP CORRECTLY WITH THE CORRECT SWITCH & JUMPER SETTINGS. THE IDEAL SITUATION, IF POSSIBLE, WOULD BE TO FIRST TEST A KNOWN GOOD MODULE.

11.0 SCOPE LOOPING

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* THE MODULE ADDRESS IS INTERPRETTED AS AN OCTAL VALUE.

EACH MODULE ADDRESS TEST PROGRAM IS COMPRISED OF ANY NUMBER OF INDIVIDUAL SUBTESTS. WHEN A MODULE PROGRAM IS RUN THESE SUBTESTS ARE RUN AS A WHOLE, OTHERWISE, WHEN ONE SUBTEST FINISHES THE NEXT SUBTEST IS EXECUTED.

THERE ARE TWO WAYS OF RUNNING ANY SELECTED SUUBTEST; THE USER MAY RUN THE 'SUBX' ROUTINE (REFER TO SECTION 13.1) OR RUN THROUGH THE ENTIRE MODULE PROGRAM UNTIL THE SELECTED SUBTEST IS REACHED. IF THE LATTER METHOD IS USED, LOAD THE NUMBER OF THE SUBTEST TO BE LOOPED IN THE CONSOLE SWITCH REGISTER AND START THE MODULE PROGRAM. THE PROGRAM WILL TYPE 'SCOPE BREAK AT XXX' WHEN THE SUBTEST IS REACHED. NOW SET CONSOLE SWITCH '14' TO LOOP ON THE CURRENT SUBTEST AND THEN TYPE 'CR'. THE PROGRAM WILL THEN RUN THE SELECTED SUBTEST UNTIL SWITCH '14' IS RESET TO '0' ENABLING THE PROGRAM TO CONTINUE.

12.0 MODULE TEST PROGRAMS

THE FOLLOWING IS A LIST AND DESCRIPTION OF ALL THE MODULE PROGRAMS. IT SHOULD BE NOTED THAT IN THE PROGRAM TEST PROTOCOL EACH MODULE PROGRAM ENDS WITH A LETTER. THIS LETTER INDICATES THE TYPE OF TEST; A = ADDRESSING, C = CALIBRATION*, E = EXERCISER, G = GAIN*, I = INTERFACE, R = REPEATIBILITY*.

THE MODULE ADDRESS TEST SHOULD BE RUN AND PROVED FULLY OPERATIONAL BEFORE RUNNING ANY OF THE OTHER TESTS. THIS TEST VERIFIES THAT THE MODULE CAN BE ADDRESSED AND THAT IT WORKS 'FUNCTIONALLY' IN ALL ITS INTENDED DATA MODES.

THE USER SHOULD REFER TO THE ENGINEERING SPECIFICATIONS TO VERIFY THAT THE SWITCHES AND JUMPERS ARE SET UP CORRECTLY BEFORE RUNNING ANY TESTS.

12.1. M7380A, CONTROL MODULE TEST

THIS PROGRAM TAKES THE CONTROL MODULE THRU THE INITIALIZATION, ADDRESS AND DATA MODES RESPECTIVELY. INITIALLY, TWO PROGRAMS ARE STORED IN THE CONTROL MODULE 'FIFO'. THE SECOND PROGRAM IS HEADED WITH A 'DC4' SO IT WILL NOT BE RECIRCULATED. WITH THE FIRST PROGRAM IN THE DATA MODE, A '500' WORD RANDOM DATA BUFFER IS CIRCULATED THRU THE CONTROL MODULE. AFTER VERIFYING THE DATA, AN 'EOT' IS ISSUED. THIS ENABLES THE SECOND PROGRAM TO BE CALLED OUT. THE DATA MODE IS AGAIN CHECKED AND ANOTHER 'EOT' IS ISSUED ENABLING THE FIRST PROGRAM IS BE RE-CALLED. ONCE VERIFIED, ANOTHER 'EOT' IS ISSUED. A CHECK IS THEN MADE THAT THE SECOND PROGRAM, HEADED WITH A 'DC4', NO LONGER EXISTS . THE 'FIFO' IS THEN REPROGRAMMED.

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                                * APPLY TO THE A/D MODULE ONLY.
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THIS PROGRAM CONSISTS OF '64' CHARACTERS ENABLING THE CONTROL 'FIFO' TO BE COMPLETELY FILLED. THE PROGRAM CONSISTS OF ONE SOURCE AND ONE DESTINATION ADDRESS. THE REMAINING 55 LOCATIONS ARE FILLED WITH RANDOM LITERAL CHARACTERS. THE PROGRAM IS THEN CALLED OUT AND VERIFIED.

THE LAST TEST CHECKS THE DELAY TIMES OF THE 'SYN' CHARACTER. THIS TEST REQUIRES A '110 BAUD' CONSOLE DEVICE SUCH AS A 'TTY' IN ORDER TO RUN. THE CRYSTAL CLOCK IN THE TTY IS USED TO TIME THE 'SYN' DELAYS. IF THE CONSOLE DEVICE IS NOT AVAILABLE, THIS TEST WILL NOT PASS. ALL THE DELAYS, 1-9, ARE TESTED IN ORDER. THE TESTS MAKES TWO CHECKS AT EACH DELAY. FIRST, THAT THE DELAY ISN'T TOO SHORT AND SECOND, THAT THE DELAY ISN'T TOO LONG.

THIS COMPLETES THE CONTROL MODULE TESTS. HOWEVER, IF DATA SW10 IS SET THE PROGRAM WILL ALSO TEST THE M7387 HARDWARE READIN MODULE (1). OTHERWISE, THE MESSAGE 'TEST COMPLETE' IS PRINTED AND THE PROGRAM WILL CONTINUE TO CYCLE THRU THE CONTROL TEST UNTIL STOPPED.

1. M7387, HARDWARE READ-IN MODULE

   AS MENTIONED ABOVE, THIS TEST IS RUN IN CONJUNCTION WITH THE M7380A TEST. THE TEST REQUIRES THE USER TO INSERT THE M7387 MODULE WITH A DIAGNOSTIC 'PROM' PROGRAM INTO SLOT 'P5' OF THE MOTHER BOARD.

   AFTER THE MODULE HAS BEEN INSERTED, THE PDM70 SHOULD BE POWERED UP. THIS WILL ENABLE THE PROM PROGRAM TO BE READ OUT, STORED IN THE CONTROL MODULES FIFO, AND THEN EXECUTED.

   THE PROM PROGRAM IS SETUP TO ADDRESS THE SERIAL I/O DESTINATION MODULE AND THEN SEND LITERAL DATA. AFTER VERIFING THE DATA, THE MESSAGE "PROM OK" IS TYPED. IF THIS MESSAGE IS NOT TYPED IMMEDIATELY AFTER POWER UP, NO DATA WAS EVER RECEIVED, THUS INDICATING AN ERROR CONDITION.

12.2. M7381A, BCD INPUT MODULE ADDRESS TEST

THIS TEST ADDRESSES THE 'BCD' MODULE IN ALL FOUR(4) DATA MODES VERIFYING INTERNAL AND EXTERNAL DEVICE FLAG OPERATION. IT IS SUGGESTED THAT THE M7381E TEST SHOULD BE RUN IF ANY DATA ERRORS ARE REPORTED. HERE THE USER CAN READILY IDENTIFY THE DATA ERROR BY THE TYPEOUT. THE CUSTOMER SWITCHES (WHICH SELECT HOW MANY DIGITS ARE READ) ARE TESTED BY THE PROGRAM REQUESTING UNIQUE SWITCH SETTINGS. SETTING DATA 'SW10' WILL INHIBIT THE MANUAL INTERVENTION TESTS. THIS MODULE HAS TO BE TESTED WITH THE 'L' JUMPER OUT.

12.3. M7381E, BCD INPUT MODULE EXERCISER TEST

THIS PROGRAM CONTINUOUSLY LOOPS ADDRESSING THE BCD MODULE AND PRINTING THE RECEIVED DATA. DATA SWITCHES '0 & 1' ARE USED TO SELECT ANY ONE OF THE FOUR (4) 'BCD' DATA MODES. THE SWITCH SETTINGS MAY BE SET AND RESET ANY TIME. DATA SW13 CAN ALSO BE SET TO INHIBIT THE DATA PRINTOUT.

12.4. M7382A, BCD OUTPUT MODULE ADDRESSING TEST

THIS TEST IS COMPRISED OF A SERIES OF SUBTESTS WHICH OUTPUT KNOWN DATA TO THE 'BCD' OUTPUT MODULE. ONCE THE DATA IS TRANSMITTED, THE USER IS NOTIFIED OF THE TRANSMITTED PATTERN. THE PROGRAM THEN ENTERS THE 'WAIT' MODE ENABLING THE USER TO VERIFY THE DATA.

THE LAST SUBTEST REQUESTS FOR THE USER TO SCOPE FOR THE SIGNAL 'OUTPUT DONE H & L'. THE PROGRAM WILL INDEFINITELY HANG IN THIS SUBTEST UNTIL EITHER '↑R' IS TYPED TO RESTART THE M7382A TEST OR '↑C' IS TYPED TO RETURN TO THE MONITOR.

12.5. BCD I/O TEST

THIS IS AN EXERCISE TEST UTILIZING BOTH THE BCD 'INPUT & OUTPUT' MODULES. AN INCREMENTING BCD COUNT IS SENT TO THE OUTPUT MODULE AND WRAPPED AROUND VIA A SPECIAL CABLE TO THE INPUT MODULE. THE INPUT MODULE IS THEN ADDRESSED, ENABLING THE DATA TO BE READ. THE RECEIVED DATA IS VERIFIED AGAINST THE TRANSMITTED DATA. THIS TEST VERIFIES THAT ALL DATA LINES ARE GOOD AND THAT NO TWO LINES ARE SHORTED TOGETHER.

THE INPUT MODULE CAN BE SET UP TO USE EITHER INTERNAL OR EXTERNAL SYNC. IF EXTERNAL SYNC IS SELECTED, THE SYNC SIGNAL IS SUPPLIED FROM THE BCD OUTPUT MODULE VIA THE CABLE.

12.6. M7383A, A/D MODULE ADDRESS TEST

THIS TEST ADDRESSES THE A/D MODULE AND VERIFIES THE CORRECT DATA FORMAT IS RECEIVED FROM THE MODULE. THE EXTERNAL SYNC FUNCTION IS ALSO TESTED. IT SHOULD BE NOTED THAT THIS TEST MAKES NO ATTEMPT TO VERIFY WHEATHER OR NOT THE A/D IS CONVERTING THE CORRECT VALUES.

12.7. M7383C, A/D CALIBRATION ROUTINE

THIS TEST RUNS IN A CONTINUOUS LOOP ADDRESSING THE A/D MODULE AND

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                                PRINTING  THE  CONVERSION  VALUE.   AFTER  ACCEPTING  THE  MODULE
                                ADDRESS, THE PROGRAM TYPES "REMOTE  DST.?".  THIS  IS  AN  OPTION
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WHICH ENABLES THE USER TO SEND THE CONVERSION DATA TO A USER SELECTED DESTINATION, SUCH AS THE DISPLAY. IF THIS OPTION IS DESIRED, TYPE 'YES' OR 'Y' & 'CR'. A REQUEST WILL THEN MADE FOR THE ADDRESS OF THIS DESTINATION. DATA SWITCHES '0-3' ARE USED TO SELECT THE A/D CHANNEL TO BE CONVERTED. SETTING DATA SW13 WILL INHIBIT THE CONVERSION DATA PRINTOUT. ALL DATA SWITCHES MAY BE SET OR RESET AT ANY TIME.

CHANNEL SELECTION IS AS FOLLOWS:

DATA SW'S '0-1' SELECT 'INT. SYNC' ON CH.'S 0,1,2 OR 3
DATA SW'S '2' & '0-1' SELECT 'EXT SYNC' ON CH. 'S 0,1,2 OR 3
DATA SW '3' SELECTS 'INT SYNC' CONVERSION ON ALL '4' CH.'S
DATA SW'S '2&3' SELECT 'EXT. SYNC' CONVERSION ON ALL '4' CH.'S

12.8. M7383G, A/D GAIN ACCURACY TEST

THIS TEST IS USED TO TEST THE GAIN ACCURACY OF THE A/D. FIVE SPECIFIC VOLTAGES AT A GAIN OF "1" ARE REQUESTED BY THE PROGRAM. WHEN THE VOLTAGE AND GAIN HAVE BEEN SUPPLIED, TYPE 'CR'. A SERIES OF ONE HUNDRED CONVERSIONS ARE THEN TAKEN AND AVERAGED. THIS AVERAGE IS THEN TESTED TO BE WITHIN '+ OR -' ONE COUNT FROM THE TRUE VOLTAGE VALUE FOR THAT SPECIFIED SETTING. IF IT IS NOT, THE LOW, AVERAGE AND HIGH VALUES OBTAINED ON THAT PARTICULAR GROUP OF CONVERSIONS ARE TYPED OUT. THE PROGRAM WILL THEN TAKE ANOTHER SERIES OF CONVERSIONS AND WILL CONTINUE DOING SO, UNTIL THE CORRECT VALUE IS RECEIVED. AT THAT POINT THE PROGRAM WILL REQUEST A NEW SETTING. DATA SWITCH '13' CAN BE SET TO INHIBIT THE ERROR DATA PRINTOUT.

12.9. M7383R, A/D REPEATIBILITY TEST

THIS TEST TAKES A SERIES OF ONE HUNDRED CONVERSIONS ON A USER SELECTED CHANNEL. THE CONVERSIONS ARE AVERAGED AND THEN DISPLAYED IN A GRAPH FORMAT SHOWING THE REPEATIBILITY CHARACTERISITICS OF THE A/D. AFTER ACCEPTING THE MODULE ADDRESS, THE PROGRAM TYPES "REMOTE DST.?". THIS IS A OPTION WHICH ENABLES THE USER TO SEND THE COMPUTED A/D GRAPH TO A USER SELECTED DESTINATION. IF THIS OPTION IS DESIRED, TYPE 'YES' OR 'Y' & 'CR'. A REQUEST WILL THEN BE MADE FOR THE ADDRESS OF THE DESTINATION. WHEN STARTED, THE TEST REQUESTS A CHANNEL AND V.S.F (VERTICAL SCALE FACTOR). THE V.S.F. IS THE NUMBER OF CONVERSIONS, OF THE HUNDRED, TO BE AVERAGED TOGETHER TO REPRESENT ONE POINT ON THE GRAPH. THE V.S.F. CAN BE ANY NUMBER EVENLY DIVIDED INTO ONE HUNDRED. EACH POINT (REPRESENTEND AS AN ASTRICK) IS PLOTTED IN ITS RELATIONSHIP TO THE OVERALL AVERAGE OF THE HUNDRED CONVERSIONS. THE FOLLOWING IS AN EXAMPLE OF WHAT A GRAPH PRINTOUT MIGHT LOOK LIKE USING A V.S.F. OF 10; 10 POINTS, EACH REPRESENTING THE AVERAGE OF '10' CONVERSIONS.

EXAMPLE:

```
VSF? 10
CH.? 1

-          *
-          *
-          *
-          *
-          *
-          *
-          *
-          *
-          *
-          *

 ++++++++++ ++++++++++  (SCALE=1MV/DIV)
 -141    -150     -159
```

THE THREE NUMBERS AT THE BOTTOM OF THE SCALE (RIGHT TO LEFT) REPRESENT: THE LOWEST VALUE, THE OVERALL AVERAGE AND THE HIGHEST VALUE READ OF THE ONE HUNDRED CONVERSIONS. SINCE THE GRAPH ONLY SHOWS COUNTS '+ & -' 9 COUNTS FROM THE AVERAGE, AN OVERRANGE 'HI & LO' PRINTOUT WOULD RESULT IF ANY COUNTS FALL OUT OF THE 9 COUNT RANGE.

12.10. M7384A, D/A ADDRESSING TEST

THIS TEST STARTS BY ADDRESSING THE DIA MODULE USING MODES '8 & 9'. THE USER IS THEN REQUESTED TO SCOPE THE SIGNALS PROG 'L & H'. FIVE SPECIFIC VOLTAGE ARE THEN TRANSMITTED FROM THE D/A ON EACH CHANNEL. AFTER EACH VOLTAGE IS TRANSMITTED, A MESSAGE IS TYPED TELLING THE USER THE VOLTAGE AND CHANNEL. THE LAST SUBTEST CHECKS THE RECOVERY OF THE D/A. THIS IS DONE BY CONTINOUSLY ADDRESSING THE DAC IN MODE 3 (BOTH CHANNELS). THE PROGRAM THEN ALTERNATLY OUTPUTS '0' VOLTS AND '9.5' VOLTS. THIS ENABLES A SQUARE WAVE OUTPUT FROM THE D/A. THE USER IS REQUESTED TO SCOPE BOTH CHANNEL OUTPUTS AND CHECK FOR A 5 U SECOND. RISE TIME.

THE PROGRA' WILL INDEFINITELY HANG IN THIS SUBTEST UNTIL RESTARTED OR EXITED.

12.11. M7384E, D/A EXERCISER TEST

THIS TEST ENABLES ANY USER SELECTED VALUE TO BE TRANSMITTED FROM THE D/A. WHEN SELECTED, THE TEST REQUESTS FOR TWO, THREE DIGIT VALUES (SEPARATED VIA COMMA'S) TO BE TYPED IN. THE FIRST VALUE IS THE ONLY ONE TRANSMITTED WHEN RUNNING ONE CHANNEL. IF BOTH CHANNELS ARE SELECTED, THE FIRST VALUE WILL BE TRANSMITTED ON

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                                CHANNEL  '0'  (X DAC) AND THE SECOND VALUE WILL BE TRANSMITTED ON
                                CHANNEL '1' (Y DAC). THE CHANNELS ARE SELECTED BY  DATA  SWITCHES
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'0 & 1' AND CAN BE SET AND RESET AT ANYTIME. SETTING DATA SWITCH '0' WILL SELECT CHANNEL '0'. SETTING DATA SWITCH '1' WILL SELECT CHANNEL 1 AND SETTING BOTH '0 & 1' WILL SELECT BOTH CHANNELS.

TYPING A '↑R' WILL ENABLE FOR A NEW SET OF DAC VALUES TO BE ACCEPTED.

12.12. M7385A, SERIAL I/O ADDRESS TEST

THIS TEST CHECKS BOTH THE SOURCE AND DESTINATION PARTS OF THE SERIAL I/O. BY USING A SPECIAL WRAPPING CABLE, THE DESTINATION OUTPUTS TO THE SOURCE INPUT.

BEFORE TESTING, ALL 'ACTIVE' RECEIVER JUMPERS MUST BE INSERTED AND THE 'D' & 'L' 'MR' JUMPERS MUST BE OUT.

THIS TEST CHECKS ONLY THE 'EIA' OUTPUT OF THE MODULE. REFER TO THE M7385T TEST (12.14) FOR TESTING THE "TTY" OUTPUT LOGIC.

IT SHOULD BE NOTED THAT WHEN THIS TEST IS RUN USING THE SERIAL I/O INPUT OPTION, THAT ONLY SUBTESTS "1,5 & 10" ARE EXECUTED. THIS MEANS THE TESTING ISN'T TESTED AS IT IS WHEN USING THE DF11 INTERFACE.

IT SHOULD ALSO BE NOTED THAT WHEN THE SERIAL INPUT OPTION IS USED, SUBTEST 5 RETURNS ONE HUNDRED AND TWENTY EIGHT CHARACTERS (128) TO THE DL11 RECEIVER INSTEAD OF "64". THE FIRST "64" CHARACTERS OF THE BUFFER ARE RETURNED DIRECTLY FROM THE DESTINATION OF THE SERIAL INPUT MODULE. THE SECOND "64" CHARACTERS ARE THE CHARACTERS THAT WERE ACTUALLY BUFFERED IN THE "FIFO" OF THE MODULE UNDER TEST.

12.13. M7385I, SERIAL I/O INTERFACE MODULE TEST

THIS TEST IS INTENDED TO VERIFY THAT THE SERIAL I/O MODULE USED AS THE PDP-11 INTERFACE IS FUNCTIONING CORRECTLY. THIS IS DONE BY REMOVING THE M7380 CONTROL MODULE (THUS ELIMINATING ONE UNKNOWN) AND JUMPERING THE 'T & R' BUSES (F1D1 TO F1V2) TOGETHER. THE MODULE MUST HAVE THE 'D' JUMPER OUT AND THE 'L' JUMPER IN SO THAT IT IS INITIALIZED ON POWER UP. A PROGRAM IS THEN SENT TO ADDRESS THE DESTINATION PORTION OF THE MODULE. WHEN THIS TEST HAS BEEN RUN SUCESSFULLY, THE CONTROL MODULE CAN BE RE-INSERTED AND VERIFIED BY RUNNING THE M7380A TEST (12.1).D

12.14. M7385T, SERIAL I/O TTL TEST

THIS TEST VERIFIES THAT THE TTL I/O SECTION OF THE SERIAL I/O

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716                             MODULE  IS FUNCTIONING CORRECTLY.  IT REQUIRES THAT A TELEPRINTER
717                             BE CABLED TO THE MATIN LOCK OF THE SERIAL I/O. THIS COULD BE  THE
```

CONSOLE PRINTER ONCE THE TEST IS SELECTED. IF THE CONSOLE PRINTER IS USED, THE PROGRAM SHOULD BE HALTED BEFORE DISCONNECTING THE PRINTER AND THEN RE-STARTED AT THE 'TTLTST'* ADDRESS. ALL CHARACTERS THEN TRANSMITTED WILL BE RECEIVED BY THE SERIAL SOURCE AND WRAPPED AROUND (BY THE CONTROL MODULE OR COMPUTER IF THE DF11 IS USED) TO THE DESTINATION. HERE THE CHARACTER WILL BE TRANSMITTED BACK TO THE TELEPRINTER AND PRINTED. EFFECTIVELY AS FOR AS THE USER IS CONCERNED, THIS TEST ACTS LIKE A KEYBOARD ECHO TEST.

12.15. M7386A, KEYBOARD/DISPLAY MODULE ADDRESS TEST

IN ORDER TO RUN THIS TEST, THE "W1" JUMPER MUST BE OUT. THE FIRST SUBTEST ADDRESSES THE KEYBOARD AND CHECKS FOR THE FORCED RETURN OF THE "EOT".

THE SECOND SUBTEST RUNS IN A CONTINUOUS LOOP ADDRESSING BOTH THE KEYBOARD & DISPLAY. WHEN THE USER STRIKES "KEY REQUEST", THE KEYBOARD BECOMES BUS MASTER. ALL DATA THEN TRANSMITTED FROM THE KEYBOARD IS SENT TO THE DISPLAY (IF AVAILABLE). THIS DATA IS ALSO RECEIVED BY THE PDP-11 AND PRINTED.

IF "EOT" IS STRUCK, THE KEYBOARD RELEASES THE BUS AND THE PROGRAM IS AGAIN LOOPED UNTIL THE NEXT "KEY REQUEST".

IF "STX" IS STRUCK AND THE SERIAL INPUT OPTION IS BEING USED, THE MESSAGE "RE-INITIALIZE THE PDM70" IS PRINTED. THE PROGRAM THEN ENTERS THE "WAIT MODE" AND UPON RECEIVING A "CR", WILL BEGIN RE-CYCLING THE SUBTEST.

IF "ETX" IS STRUCK, THIS SUBTEST IS EXITED, AND THE NEXT SUBTEST IS ENTERED. UPON ENTERING THE NEXT SUBTEST, THE MESSAGE "ENTERING THE DISPLAY TEST, RE-INITIALIZE THE PDM70" IS PRINTED. THE PROGRAM THEN ENTERS THE "WAIT MODE" AND WAITS FOR "CR". UPON RECEIPT OF THE "CR" THE SUBTEST STARTS DISPLAYING THE ENTIRE CHARACTER SET, ON CHARACTER AT A TIME ACROSS THE ENTIRE SCREEN. AFTER EACH CHARACTER IS DISPLAYED, A SOFTWARE DELAY IS EXECUTED. THIS DELAY ENABLES THE USER TO VIEW THE LINE WBEFORE THE NEXT CHARACTER LINE IS DISPLAYED. AFTER THE ENTIRE CHARACTER SET HAS BEEN DISPLAYED, THE TEST ENTIRE TEST PROGRAM IS RESTARTED.

12.16. M7387A, PROM HARDWARE READ-IN MODULE

THIS PROGRAM MAY BE SELECTED AS A SEPERATE MODULE TEST, ALTHOUGH IT IS RUN AS PART OF THE M7380 CONTROL MODULE TEST. REFER TO PART 1 OF SECTION 12.1 FOR A COMPLETE TEST DESCRIPTION.

```
                                ---------------
                                * REFERENCE THE LISTING FOR THE ADDRESS OF THIS 'TAG'.
```

12.17. M7388A, CHARACTER I/O MODULE ADDRESS (IN-HOUSE) TEST

THIS TEST REQUIRES A SPECIAL WRAP-AROUND MODULE (AVAILABLE ONLY IN HOUSE) TO RUN THIS TEST. FOR FIELD TESTING THIS MODULE REFER TO THE M7388F (SECTION 12.18).

THE TEST USES THE SAME TEST PROGRAM AS THE SERIAL I/O MODULE (REFER TO SECTION 12.12). TO RUN THIS TEST, JUMPERS 'SO & SI' MUST BE IN AND THE 'D' & 'L' JUMPERS MUST BE OUT.

12.18 M7388F, CHARACTER I/O MODULE ADDRESS (FIELD) TEST.

THIS PROGRAM IS DESIGNED TO COMMUNICATE WITH THE FIELD SERVICE TESTER. THE FIRST SUBTEST ADDRESS THE MODULE IN MODE 'O' AND CHECKS FOR THE FORCED 'EOT'. THE NEXT SUBTEST ADDRESS THE MODULE IN MODE '1' AND CHECKS THAT NO 'EOT' IS RETURNED. A REQUEST IS THEN MADE FOR THE USER TO INPUT DATA (VIA THE TESTER) TO THE MODULE. AS EACH CHARACTER IS RECEIVED, IT IS ECHOED TO PRINTER. THE PROGRAM WILL HANG IN THIS SUBTEST UNTIL 'EOT' IS RECIEVED, ENABLING IT TO ENTER THE NEXT SUBTEST. THE NEXT SUBTEST IS A 'FIFO' STORAGE TEST. IT REQUESTS FOR THE USER TO INPUT DATA (UP TO 63 CHARACTERS) AND AN 'EOT'. AFTER ALL THE DATA HAS BEEN TRANSMITTED, TYPE 'CR'. THE MODULE (SOURCE) IS THEN ADDRESSED IN MODE 'O' ENABLING THE 'FIFO' DATA TO BE READ AND PRINTED.

THE NEXT SUBTEST LOADS "16", "4" CHARACTER DATA PATTERNS (A TOTAL OF 64 CHAR.'S) INTO THE DESTINATION 'FIFO'. THE USER IS THEN REQUESTED TO STROKE OUT THESE "64" CHARACTERS AND VERIFY THEM. THE "4" CHARACTERS PATTERN IS: ALL 1'S, ALLO'S, ALTERNATE "1'S & O'S" AND REVERSED ALTERNATE "1'S & O'S".

THE LAST SUBTEST ADDRESSES THE MODULE USING ALL THE WRONG MODULE ADDRESSES AND CHECKS THAT THE SOURCE ISN'T ENABLED. THIS SUBTEST IS NOT EXECUTED WHEN USING THE SERIAL INPUT OPTION.

12.19 M7377A, REMOTE SERIAL I/O TEST

THIS PROGRAM TESTS THE M7377 MODULE USING THE PDP-11 VIA THE DL-11 AS THE DESTINATION INPUT AND SOURCE OUTPUT.

THE FIRST SUBTEST ADDRESSES THE SOURCE PORTION OF THE MODULE AND CHECKS FOR FORCED RETURN OF EOT.

THE SECOND SUBTEST TRANSMITS A RANDOM BUFFER AND CHECKS THAT IT IS RETURNED CORRECTLY.

IN THE NEXT SUBTEST A 2ND RANDOM BUFFER IS TRANSMITTED AND THE VARIABLE TERMINATOR OPTION IS CHECKED.

```
832                             NEXT, THE  SOURCE  IS  THEN  ADDRESSED  USING  THE  WRONG  MODULE
833                             ADDRESSES AND CHECKED TO MAKE SURE IT DOESN'T BECOME ENABLED.
```

ETX AND STX ARE THEN USED TO VERIFY THAT ETX WILL CLEAR THE SOURCE AND STX WILL CLEAR THE DESTINATION.

A MANUAL INTERVENTION SUBTEST THEN REQUESTS THAT THE OPERATOR RESET THE MODULE ADDRESS TO '17'. DATA IS TRANSMITTED AND THE RECEIVED DATA IS VERIFIED.

THE LAST SUBTEST CHECKS THE TIMEOUT AND REMOTE TIMEOUT ABILITY OF THE MODULE. A NON-EXISTENT SOURCE IS ADDRESSED AND THE MODULE IS CHECKED TO SEE IF IT TIME-OUT CORRECTLY.

12.20 M7378A, FOUNDATION MODULE TEST

THIS TEST SETS THE SERIAL I/O UP AS A SOURCE AND THE FOUNDATION MODULE AS A DESTINATION. A RANDOM BUFFER IS TRANSMITTED TO THE FOUNDATION MODULE VIA THE SERIAL I/O. THEN THE FOUNDATION MODULE IS ADDRESSED AS THE SOURCE AND THE SERIAL I/O IS ADDRESSED AS THE DESTINATION. THE DATA SHOULD BE RETURNED VIA THE "WRAP-AROUND" CABLE FROM THE FOUNDATION MODULE TO THE SERIAL I/O.

IT SHOULD BE NOTED THAT THE PDM-70 MUST BE LOADED WITH THE FOLLOWING PROGRAM TO RUN THIS TEST:

STX, DC1, 8, SOH, 1, DC3, ETX

THE NEXT SUBTESTS VERIFY THAT ADDRESS '17' WILL RETURN DATA CORRECTLY, THAT THE WRONG ADDRESSES WILL NOT RETURN DATA, AND THAT THE CUSTOMER DEFINED MODE FLIP FLOP WORKS CORRECTLY.

13.0 USER AID ROUTINES

13.1. SUBX

THIS ROUTINE ENABLES THE USER TO RUN ANY SELECTED MODULE ADDRESS SUBTEST WITHOUT RUNNING THE ENTIRE PROGRAM. WHEN 'SUBX' IS SELECTED IT ASKS FOR THE 'MEMORY ADDRESS' OF THE SUBTEST TO BE EXECUTED. THIS IS TO BE THE ADDRESS OF THE 'SCOPE' ARGUMENT BEGINNING THAT SUBTEST. IF A 'SUBX' ADDRESS HAD PREVIOUSLY BEEN SET UP, THE USER CAN SIMPLY TYPE 'CR' AND THE PREVIOUSLY SELECTED TEST WILL BE RE-ENTERED.

13.2. RECBUF

THIS ROUTINE ENABLES THE USER TO EXAMINE THE CONTENTS OF THE DL11'S RECEIVER BUFFER. WHEN SELECTED, THIS ROUTINE PRINTS THE

```
890                             CONTENTS OF THE BUFFER IN THE ORDER  IT  WAS  RECEIVED.   IF  THE
891                             BUFFER IS EMPTY, A MESSAGE IS TYPED TO THAT EFFECT.
```

IT SHOULD BE NOTED THAT ALL DATA RECEIVED FROM THE PDM70 IS STORED IN THIS BUFFER.

13.3. TRNBUF

THIS ROUTINE ENABLES THE USER TO EXAMINE THE DATA TRANSMITTED VIA THE DL11 TO THE PDM70. THE 'RECBUF' & 'TRNBUF' ROUTINES ARE ESPECIALLY USEFUL IN TRACKING DOWN A DATA FAILURE. BY COMPARING THE TWO BUFFERS, THE USER CAN SEE EXACTLY WHERE THE FAILURE OCCURRED AND PICK OUT ANY DESIRED DATA PATTERNS.

13.4. SEND

THIS ROUTINE ENABLES THE USER TO SEND HIS OWN PROGRAM TO THE PMD70. WHEN 'SEND' IS SELECTED AN ASTERISK IS PRINTED TO INDICATE THAT THE ROUTINE IS READY TO ACCEPT INPUT. AS EACH CHARACTER IS RECEIVED IT IS ECHOED BACK TO THE TELEPRINTER AND TRANSMITTED TO THE PDM70.

THIS ROUTINE IS RUN WITH THE DL11 RECEIVER ENABLED. THIS MEANS THAT THE USER CAN USE THE 'RECBUF' ROUTINE TO EXAMINE FOR ANY DATA RETURNED BY HIS PROGRAM.

13.5. RUN

THIS ROUTINE IS USED IN CONJUNCTION WITH THE SEND ROUTINE. WHEN 'RUN' IS SELECTED, IT WILL RE-TRANSMIT THE USER'S 'SEND' PROGRAM. IF THE SERIAL INPUT OPTION IS BEING USED, THE 'SEND' PROGRAM IS TRANSMITTED AND THEN THE PROGRAM ENTERS THE 'WAIT' MODE. IF THE SERIAL INPUT OPTION IS NOT BEING USED, THE SEND PROGRAM IS CONTINUOUSLY TRANSMITTED. IN THIS CASE, THE CONSOLE SWITCHES CAN BE USED TO INCORPORATE A DELAY TIME BEFORE THE PROGRAM IS RE-TRANSMITTED. NO PROGRAM DELAY IS ISSUED WITH ALL DATA SWITCHES DOWN. ALL DATA SWITCHES UP (EXCEPT 11 & 12)* REPRESENT A MAXIMUM PROGRAM DELAY. THE USERS SEND PROGRAM CAN BE EXAMINED AT ANYTIME BY USING THE 'TRNBUF' ROUTINE.

'CONTROL C' WHICH IS NORMALLY USED TO RETURN TO THE MONITOR IS ECHOED AND TRANSMITTED AS AN 'ETX'. SO IN THE SEND ROUTINE, 'CONTROL E' IS USED TO ESCAPE AND RETURN TO THE MONITOR.

---

* REFER TO CONSOLE SWITCH SETTINGS (SECTION 6.) FOR SPECIFIC SWITCH

948 FUNCTIONS.

```
                                        %
                                        .TITLE PDM70 DIAGNOSTIC TEST
                                        .ENABLE ABS
                                        .ENABLE AMA
                                ;MAINDEC-11-DZPMA-A-D
                                ;COPYRIGHT JANUARY 7,1974
                                ;REVISED:          SEPTEMBER 20,1974
                                ;DIGITAL EQUIPMENT CORP. MAYNARD MASS. 01754
                                ;PROGRAMMER: EARL L. BOUSE
                                ;                MIKE MITCHELL
                                ;
                                ;SWITCH REGISTER DEFINITIONS AND FUNCTIONS:

  100000                        SW15=100000             ;=1, CONTINUE ON ERROR
  040000                        SW14=40000              ;=1, LOOP ON CURRENT TEST
  020000                        SW13=20000              ;=1, SUPPRESS ERROR TYPEOUT
  010000                        SW12=10000              ;=1, SINGLE STEP DL11 OUTPUT DATA.
  004000                        SW11=4000               ;=1, TRANSMIT SAME CHARACTER.
  002000                        SW10=2000               ;=1, INHIBIT MANUAL INTERVENTION
  001000                        SW09=1000               ;=1, INHIBIT TRANSMITTER DELAY
  000400                        SW08=400
  000200                        SW07=200
  000100                        SW06=100
  000040                        SW05=40
  000020                        SW04=20
  000010                        SW03=10
  000004                        SW02=4

                                ;REGISTER DEFINITIONS

  000000                        R0=%0
  000001                        R1=%1
  000002                        R2=%2
  000003                        R3=%3
  000004                        R4=%4
  000005                        R5=%5
  000006                        SP=%6
  000007                        PC=%7

                                ;INSTRUCTIONS DEFINITIONS

  005746                        PUSH.SP=5746
  005726                        POP1SP=5726
  024646                        PUSH2SP=24646
  022626                        POP2SP=22626
  000240                        NOP=240
  000002                        X=2
  000002                        Y=2
```

```
                        .SBTTL ******** NOTES *********

                        ;NOTES:
                        ;
                        ;PDM-70 MUST BE CLEARED BEFORE RUNNING ANY TEST.
                        ;
                        ;ON POWERUP, THE FIFO IS GENERALLY CLEARED (UNLESS "N" MODULE IS  PRESENT).
                        ;IF, DURING THE COURSE OF RUNNING THIS DIAGNOSTIC, IT BECOMES
                        ;NECCESSARY TO RESTART A SUBTEST (FOR EXAMPLE, AFTER ENCOUNTERING AN ERROR),
                        ;THE PDM70 FIFI SHOULD BE CLEARED OUT TO INSURE THAT GARBAGE WILL
                        ;NOT ACCIDENTLY BE LEFT IN THE FIFO WHICH WOULD SUBSEQUENTLY
                        ;GIVE AN ERRONOUS DATA ERROR.


                        ;MODULE SETUP:
                        ;*********************************************************
                        ; MODULE UNDER TEST  *M7379(CLOCK)  *  M7379 (CLOCK) *
                        ;*********************************************************
                        ;                   *M973 (CABLE)  * M598 (COUPLER) *
                        ;                   ***********************************




                        ;SYSTEM TEST SETUP (USING SERIAL I/O)

                        ;*********************************************************
                        ;MODULE UNDER TEST   * M7379 (CLOCK) * M7379          *
                        ;*********************************************************
                        ;                   *M7380 (CONTROL MODULE)          *
                        ;                   ***********************************


                        ;***********************
                        ; SERIAL I/O CABLE    *
                        ;***********************

                        ;NOTE: JUMPER "L" SHOULD BE IN TO ALLOW POWER UP TO ACCESS THE CONTROL MODULE.
```

```
1038                                    ;LOAD TRAP ADDRESSES '0-1000' WITH THE 'IOT' TRAP
1039            000000                          .=0
1040                                    .REPT   200
1041                                            .+2
1042                                            4
1043                                    .ENDR
1044            000020                          .=20
1045  000020    020220                          ERTRAP                  ;ERROR TRAP REPORTER ROUTINE.
1046  000022    000340                          340
1047  000024    022454                          PWRFAL                  ;POWER FAIL HANDLER
1048  000026    000340                          340
1049            000030                          .=30
1050  000030    001200                          EMTSRV                  ;EMT TRAP, EMT DISPATCH SERVICE
1051  000032    000340                          340
1052            000060                          .=60
1053  000060    014522                          XTTYIN                  ;TELEPRINTER KEYBOARD ROUTINE
1054  000062    000340                          340
1055            000200                          .=200
1056  000200    000137  001376                  JMP     MONITR          ;PROGRAM KEYBOARD MONITOR ROUTINE.
1057
1058                                    .SBTTL EMT TRAP EQUIVALENCE TABLE
1059
1060            104000          PRCNTR=EMT                              ;SUBROUTINE TO PRINT CONTROL CHARACTER IN R1
1061            104001          SCOPE=EMT+1                             ;LOGIC TEST SCOPE SUBROUTINE
1062            104002          SAVREG=EMT+2                            ;SUBROUTINE TO SAVE 'R0-R5' ON STACK
1063            104003          GETREG=EMT+3                            ;SUBROUTINE TO GET 'R0-R5' FROM STACK
1064            104004          DELAY=EMT+4                             ;SUBROUTINE TO WAIT FOR DL11 RECVR.
1065            104005          RECVR0=EMT+5                            ;SUBROUTINE TO SET UP THE DL11 0'S RECEIVER.
1066            104006          LDCHR0=EMT+6                            ;SUBROUTINE TO TRANSMIT A SINGLE CHAR. VIA DL '0'
1067            104007          LDPGM0=EMT+7                            ;SUBROUTINE TO TRANSMIT THE DATA IN CALL+2 VIA DL '0'
1068            104010          TYPEIT=EMT+10                           ;SUBROUTINE TO PRINT CHARACTER IN 'R1'
1069            104011          RANDOM=EMT+11                           ;SUBROUTINE TO CREATE A RANDOM DATA BUFFER.
1070            104012          PRINT=EMT+12                            ;SUBROUTINE TO PRINT ASCII MESSAGES.
1071            104013          TTYIN=EMT+13                            ;SUBROUTINE TO INPUT VIA KEYBOARD
1072            104014          PRTOCT=EMT+14                           ;SUBROUTINE TO PRINT A 6 DIGIT OCTAL NO.
1073            104015          ASEMBL=EMT+15                           ;SUBROUTINE TO ASSEMLE CHARACTERS INTO OCTAL VALUE
1074            104016          SPACE=EMT+16                            ;SUBROUTINE TO PRINT SPACES
1075            104017          TSTTKS=EMT+17                           ;SUBROUTINE TO TEST FOR KEYBOARD FLAGS
1076            104020          DELAYL=EMT+20                           ;SUBROUTINE TO SETUP A LONG DISPLAY DELAY
1077            104021          NULL=EMT+21                             ;SUBROUTINE TO TRANSMIT A NULL PRINTER CHAR.
1078            104022          MODERR=EMT+22                           ;SUBROUTINE TO REPORT MODULE ERRORS.
1079            104023          NULL1=EMT+23                            ;SUBROUTINE TO TRANSMIT 12 NULL CHAR.'S.
1080            104024          DESTIN=EMT+24                           ;SUBROUTINE TO SETUP DESTINATION MODULE.
1081            104025          SOURCE=EMT+25                           ;SUBROUTINE TO SETUP A SOURCE MODULE
1082            104026          ADDRES=EMT+26                           ;SUBROUTINE TO REQUEST & SAVE MODULE ADDRESS
1083            104027          ADCNVT=EMT+27                           ;SUBROUTINE TO TAKE & STORE A/D CONVERSIONS
1084            104030          BCDBIN=EMT+30                           ;SUBROUTINE TO CONVERT 'BCD' TO BINARY
1085            104031          AVERAG=EMT+31                           ;SUBROUTINE TO AVERAGE 'N' NUMBERS
1086            104032          CHANEL=EMT+32                           ;SUBROUTINE TO REQUEST & STORE A/D CHANNEL
1087            104033          BINDEC=EMT+33                           ;SUBROUTINE TO CONVERT BINARY TO DEC.
1088            104034          WAITGN=EMT+34                           ;SUBROUTINE TO TEST GAIN ACCURACY
1089            104035          SETUP=EMT+35                            ;SUBROUTINE TO SETUP THE '↑R' RESTART ADDR.
1090            104036          NODLAY=EMT+36                           ;SUBROUTINE TO INHIBIT TRANSMITTER DELAY
1091            104037          PRTRBF=EMT+37                           ;SUBROUTINE TO PRINT CONTENTS OF RECVR BUFFER
```

```
                                ;*****************************************************************************
                                .SBTTL EMT DISPATCH SERVICE ROUTINE
                                ;ARGUMENT OF EMT IS EXTRACTED AND USED AS OFFSET TO OBTAIN POINTER
                                ;TO THE SELECTED SUBROUTINE.
                                ;*****************************************************************************

                        001200                  .=1200
001200  011646          EMTSRV: MOV     (SP),-(SP)      ;GET PC FOR TO RETURN
001202  162716  000002          SUB     #2,(SP)         ;PC OF EMT
001206  017616  000000          MOV     @(SP),(SP)      ;GET EMT
001212  005716                  TST     (SP)            ;IS EMT VALID?
001214  001001                  BNE     EMTOK
001216  000000                  HALT                    ;INVALID EMT
001220  006316          EMTOK:  ASL     (SP)            ;MULTIPLY EMT ARG BY '2'
001222  042716  177001          BIC     #177001,(SP)    ;CLEAR UNWANTED BITS
001226  062716  001240          ADD     #EMTTAB,(SP)    ;POINTER TO SUBROUTINE ADDRESS
001232  017616  000000          MOV     @(SP),(SP)      ;SUBROUTINE ADDRESS
001236  000136                  JMP     @(SP)+          ;GO TO SUBROUTINE
                                ;EMT DISPATCH TABLE

001240  021152          EMTTAB: XPRCNT                  ;SUBROUTINE TO PRINT CONTROL CHAR. IN R1.
001242  020416                  XSCOPE                  ;MODULE TEST SCOPE LOOP ROUTINE
001244  022554                  XSAVRG                  ;SUBROUTINE TO SAVE 'R1-R5' ON STACK
001246  022630                  XGETRG                  ;SUBROUTINE TO RETRIEVE 'R1-R5' FROM STACK
001250  021666                  XDLAYL                  ;SUBROUTINE TO WAIT FOR DATA FROM DL11 RECEIVER
001252  015716                  XRECRO                  ;SUBROUTINE TO SET UP DL 0'S RECEIVER.
001254  017070                  XLDCHR                  ;SUBROUTINE TO TRANSMIT A SINGLE CHAR
001256  017106                  XLDADD                  ;SUBROUTINE TO TRANSMIT DATA FROM ADDRESS IN CALL+2.
001260  021114                  XTYPIT                  ;SUBROUTINE TO PRINT CHARACTER IN 'R1'
001262  020552                  XRANGN                  ;SUBROUTINE TO CREATE A RANDOM DATA BUFFER.
001264  021410                  XPRINT                  ;SUBROUTINE TO PRINT ASCII MESSAGES.
001266  014522                  XTTYIN                  ;SUBROUTINE TO INPUT VAI KEYBOARD.
001270  021550                  XOCTPR                  ;SUBROUTINE TO PRINT A '6' DIGIT OCTAL NO.
001272  022704                  XASEMB                  ;SUBROUTINE TO ASSEMBLE A ONE WORD NO.
001274  021010                  XSPACE                  ;SUBROUTINE TO TYPE SPACES
001276  021040                  TKSFLG                  ;SUBROUTINE TO TEST FOR KEYBOARD FLAG.
001300  021666                  XDLAYL                  ;SUBROUTINE TO SET UP A LONG DELAY.
001302  021330                  XNULL                   ;SUBROUTINE TO ISSUE NULL CHARACTERS AFTER R[illegible]''.
001304  020320                  XERMES                  ;SUBROUTINE TO REPORT MODULE ERRORS
001306  021340                  XNULL1                  ;SUBROUTINE TO TRANSPORT '12' NULL CHAR.'S
001310  016752                  XDSTIN                  ;SUBROUTINE TO SET UP A DESTINATION MODULE
001312  016732                  XSOURCE                 ;SUBROUTINE TO SET UP A SOURCE MODULE
001314  020154                  XADRES                  ;SUBROUTINE TO REQUEST & SAVE MODULE ADDRESS
001316  006566                  XADCNT                  ;SUBROUTINE TO TAKE & STORE A/D CONVERSIONS
001320  022162                  XBCDBIN                 ;SUBROUTINE TO CONVERT 'BCD' TO BINARY
001322  015470                  XAVRAGE                 ;SUBROUTINE TO AVERAGE 'N' NUMBERS
001324  020272                  XCHANEL                 ;SUBROUTINE TO REQUEST & STORE A/D CHANNEL.
001326  022326                  XBINDEC                 ;SUBROUTINE TO CONVERT BINARY TO DECIMALS.
001330  006372                  XWATGN                  ;SUBROUTINE TO TEST GAIN ACCURACY.
001332  021052                  XSETUP                  ;SUBROUTINE TO SETUP THE '↑R' RESTART ADDR.
001334  021320                  XNODLY                  ;SUBROUTINE TO INHIBIT TRANSMITTED DELAY
001336  022006                  XPRTRB                  ;SUBROUTINE TO PRINT CONTENTS OF RECVR. BUFFER
```

```
1144                                    .SBTTL REGISTER ADDRESSES
1145
1146  001340  177776                    PSW:    177776          ;ADDRESS OF PROCESSOR STATUS REG.
1147  001342  177560                    TKS:    177560          ;ADDRESS OF KEYBOARD STATUS REG.
1148  001344  177562                    TKB:    177562          ;   "      "       "     BUFFER  "
1149  001346  177564                    TPS:    177564          ;   "      "  PRINTER STATUS REG.
1150  001350  177566                    TPB:    177566          ;   "      "  PRINTER BUFFER REG.
1151  001352  177570                    SWR:    177570          ;   "      "  SWITCH REG.
1152  001354  177571                    SWR0:   177571          ;   "      "      "        "  HIGH BYTE
1153
1154                                    ;DL11 REGISTER ADDRESSES
1155
1156  001356  175610                    RCSR0:  175610          ;ADDRESS OF UNIT 0'S DL11 REC. CSR
1157  001360  175612                    RBUF0:  175612          ;ADDRESS OF UNIT 0'S DL11 REC. BUFFER
1158  001362  175614                    XCSR0:  175614          ;ADDRESS OF UNIT 0'S TRANS. CSR
1159  001364  175616                    XBUF0:  175616          ;ADDRESS OF UNIT 0'S DL11 TRANS. BUFFER
1160  001366  000300                    RINT0:  300             ;ADDRESS OF UNIT 0'S REC. VECTOR
1161  001370  000302                    RLVL0:  302
1162
1163  001372  000304                    XINT0:  304             ;ADDRESS OF UNIT 0'S DL11 TRANS. VECTOR
1164  001374  000306                    XLVL0:  306             ;ADDRESS OF UNIT 1'S DL11 TRANS. VECTOR
1165
1166                                    .SBTTL DEFINITIONS OF THE 'PDM-70' CONTROL CHARACTERS.
1167
1168          000021                    DC1=021                 ;ENABLE SOURCE
1169          000022                    DC2=022                 ;ENABLE DESTINATION
1170          000023                    DC3=023                 ;GO
1171          000024                    DC4=024                 ;DO NOT RECIRCULATE
1172          000003                    ETX=003                 ;END OF TEXT
1173          000002                    STX=002                 ;START OF TEXT
1174          000026                    SYN=026                 ;SYNCHRONIZE (DELAY)
1175          000001                    SOH=001                 ;START OF HEADER
1176          000017                    SI=017                  ;SHIFT IN.
1177          000004                    EOT=004                 ;END OF TRANSMISSION
1178          000005                    ENQ=005                 ;ENQUIRY.
1179
1180                                    ;*****************************************************************************
1181                                    .SBTTL KEYBOARD MONITOR
1182                                    ;*****************************************************************************
1183
1184  001376  012777  000340  177734  MONITR: MOV     #340,@PSW       ;SET PROC. PRIO. TO '7'
1185  001404  012706  001000                  MOV     #1000,SP        ;SET UP STACK
1186  001410  104021                          NULL
1187  001412  000005                          RESET
1188  001414  104021                          NULL
1189  001416  005037  031612                  CLR     DLYSWH          ;CLR SOFTWARE SW.
1190  001422  005037  031570                  CLR     PRTSWH          ;CLR SOFTWARE SW.
1191  001426  005037  031616                  CLR     SENDSW          ;CLR SOFTWARE SW.
1192  001432  005737  031566                  TST     MTRSWH          ;PROGRAM BEEN INITIALIZED?
1193  001436  001110                          BNE     MONTR5          ;YES
1194  001440  005237  031566                  INC     MTRSWH          ;NO
1195  001444  104012                          PRINT
1196  001446  023017                          TITLE                   ;PRINT PROGRAM HEADER
```

```
 1197  001450  005777  177676          MONTRO: TST     @SWR            ;ARE ANY SW'S SET?
 1198  001454  001404                          BEQ     .+12            ;NO, CONTINUE
 1199  001456  104012                          PRINT                   ;YES, REQUEST THEM CLR'D
 1200  001460  026311                          MES59
 1201  001462  104013                          TTYIN                   ;WAIT
 1202  001464  000771                          BR      MONTRO          ;RE-CHECK SEE IF I WAS CHEATED.
 1203
 1204                                  ;*************************************************************************
 1205                                  ;MONITOR RESTART ADDRESS STARTS HERE
 1206                                  ;*************************************************************************
 1207
 1208  001466  005037  031600          MONTR1: CLR     SIOSWH
 1209  001472  104012                          PRINT
 1210  001474  023466                          MESO                    ;TEXT 'IS INPUT VIA SERIAL I/O?
 1211  001476  104013                          TTYIN                   ;WAIT FOR INPUT
 1212  001500  122737  000131  015116          CMPB    #131,INBUF      ;WAS 'Y' TYPED?
 1213  001506  001031                          BNE     MONT1A          ;NO, SETUP DL11 INPUT
 1214  001510  104026                          ADDRESS                 ;REQUEST SERIAL I/O ADDRESS
 1215  001512  110037  002164                  MOVB    R0,IADRS0       ;SET UP ALL ADRESSES WHERE
 1216  001516  110037  002170                  MOVB    R0,IADRS1       ;SERIAL INTERFACE IS USED.
 1217  001522  110037  002174                  MOVB    R0,IADRS2
 1218  001526  110037  002200                  MOVB    R0,IADRS3
 1219  001532  110037  003062                  MOVB    R0,IADRS4
 1220  001536  110037  003066                  MOVB    R0,IADRS5
 1221  001542  110037  003074                  MOVB    R0,IADRS6
 1222  001546  110037  017327                  MOVB    R0,IADRS7
 1223  001552  110037  017423                  MOVB    R0,IADRS8
 1224  001556  110037  016770                  MOVB    R0,IADRS9
 1225  001562  110037  011045                  MOVB    R0,IADR10
 1226  001566  005237  031600                  INC     SIOSWH          ;YES, SET SW.
 1227  001572  104012                  MONT1A: PRINT
 1228  001574  026546                          MES63                   ;REQUEST DL11 ADDRESS & VECTOR
 1229  001576  104015                          ASEMBL                  ;WAIT AND DECODE
 1230  001600  005700                          TST     R0              ;WAS AN ADDRESS ENTERED?
 1231  001602  001416                          BEQ     MONTR3          ;NO, USE STANDARD ADDRESS.
 1232  001604  012702  001356                  MOV     #RCSR0,R2       ;SET UP TO LOAD ADDRESS
 1233  001610  012703  000004          MONTR2: MOV     #4,R3
 1234  001614  010022                          MOV     R0,(R2)+
 1235  001616  062700  000002                  ADD     #2,R0           ;ADD '2' TO THE ADDRESS
 1236  001622  005303                          DEC     R3
 1237  001624  001373                          BNE     .-10
 1238  001626  022702  001376                  CMP     #XLVL0+2,R2     ;LOADED VECTOR ADDRESSES?
 1239  001632  001402                          BEQ     MONTR3          ;YES, EXIT
 1240  001634  010400                          MOV     R4,R0
 1241  001636  000764                          BR      MONTR2
 1242  001640  012777  016526  177520  MONTR3: MOV     #RECVER,@RINTO  ;SET UP RECEIVER SERVICE ADDRESS
 1243                                                                  ;RINTO=DL-11 VECTOR (300)
 1244  001646  012777  000200  177514          MOV     #200,@RLVL0     ;BR LEVEL '4'
 1245  001654  104012                  MONTR4: PRINT
 1246  001656  023106                          HEADER                  ;PRINT TEST PROTOCOL
 1247  001660  012737  001466  031572  MONTR5: MOV     #MONTR1,RVECTR  ;SET UP THE 'RESTART' ADDR, POINTER
 1248  001666  104012                          PRINT
 1249  001670  031354                          DOT                     ;PRINT DOT TO INDICATE READY
```

```
1250                                    ;*************************************************************************
1251                                    ;THIS SUBROUTINE DECODES THE USER'S INPUT AND EXECUTES THE SELECTED TEST
1252                                    ;*************************************************************************
1253
1254  001672  005037  015116   DECODE: CLR     INBUF
1255  001676  104013                   TTYIN                   ;CALL KEYBOARD ROUTINE
1256  001700  022737  000103  015116   CMP     #103,INBUF      ;WAS 'C' TYPED TO CONTINUE LAST TEST?
1257  001706  001005                   BNE     DECOD1          ;NO, DECODE INPUT
1258  001710  005737  031672           TST     RESTRT          ;YES, HAS A RESTART ADDR. BEEN SET UP?
1259  001714  001451                   BEQ     NMATCH          ;NO, ILLEGAL ENTRY.
1260  001716  000177  027750           JMP     @RESTRT         ;YES, RESTART LAST TEST
1261  001722  012701  023166   DECOD1: MOV     #TSTLST,R1      ;SET UP MESSAGE ADDR. POINTER
1262  001726  005004                   CLR     R4              ;OFFSET REG.
1263  001730  012702  015116   RECYCL: MOV     #INBUF,R2       ;SET UP TTY BUFFER POINTER
1264  001734  122711  000045           CMPB    #45,(R1)
1265  001740  001403                   BEQ     .+10
1266  001742  122711  000040           CMPB    #40,(R1)        ;CHAR. = TO 'SPACE'
1267  001746  001002                   BNE     .+6             ;NO
1268  001750  105721                   TSTB    (R1)+           ;YES, SKIP CHAR.
1269  001752  000766                   BR      RECYCL
1270  001754  122122           MATCH:  CMPB    (R1)+,(R2)+     ;COMPARE BUFFERS
1271  001756  001020                   BNE     FLUSH           ;NOT EQUAL, SET UP NEXT WORD
1272  001760  122711  000054           CMPB    #54,(R1)
1273  001764  001373                   BNE     MATCH           ;NO, COMPARE NEXT CHAR.
1274  001766  006304                   ASL     R4              ;SET UP OFFSET
1275  001770  005726                   POP1SP
1276  001772  016437  002046  031672   MOV     TSTABL(R4),RESTRT       ;SET UP A RESTART ADDRESS
1277  002000  016437  002046  031574   MOV     TSTABL(R4),AVECTR
1278  002006  062737  000004  031574   ADD     #4,AVECTR       ;SET UP TO RE-ADDRESS MODULE
1279  002014  000174  002046           JMP     @TSTABL(R4)     ;EXECUTE SELECTED TEST.
1280  002020  005204           FLUSH:  INC     R4              ;INCREMENT OFFSET CNTR.
1281  002022  122711  000100           CMPB    #100,(R1)       ;TEST FOR '@'
1282  002026  001404                   BEQ     NMATCH          ;YES, END OF MESSAGE.
1283  002030  122721  000054           CMPB    #54,(R1)+       ;CHAR = COMMA?
1284  002034  001735                   BEQ     RECYCLE         ;YES, COMPARE NEXT WORD.
1285  002036  000771                   BR      FLUSH+2         ;NO, KEEP GOING.
1286
1287  002040  104012           NMATCH: PRINT
1288  002042  031350                   QMARK                   ;ILLEGAL ENTRY, TYPE '?'
1289  002044  000712                   BR      DECODE          ;GET NEW INPUT.
1290
```

```
1291                                    ;*************************************************************************
1292                                    ;TABLE FOR TESTS SELECTABLE VIA KEYBOARD
1293                                    ;*************************************************************************
1294
1295  002046  002130            TSTABL: M7380A          ;CONTROL MODULE TEST
1296  002050  003374                    M7381A          ;BCD INPUT MODULE ADDRESS TEST
1297  002052  004232                    M7381E          ;BCD INPUT MODULE EXERCISER TEST
1298  002054  004324                    M7382A          ;BCD OUTPUT MODULE ADDRESSING TEST
1299  002056  004520                    BCDIO           ;BCD INPUT/OUTPUT EXERCISER TEST
1300  002060  004726                    M7383A          ;A/D MODULE ADDRESS TEST
1301  002062  005316                    M7383C          ;A/D MODULE CALIBRATION TEST
1302  002064  005412                    M7383R          ;A/D REPEATIBILITY TEST
1303  002066  006254                    M7383G          ;A/D GAIN ACCURACY TEST
1304  002070  006762                    M7384A          ;D/A MODULE ADDRESS TEST
1305  002072  007676                    M7384E          ;D/A OUTPUT MODULE EXERCISER TEST
1306  002074  010016                    M7385A          ;SERIAL INPUT/OUTPUT MODULE ADDRESS TEST
1307  002076  011026                    M7385I          ;SERIAL I/O INTERFACE TEST
1308  002100  011236                    M7385T          ;SERIAL INPUT/OUTPUT TTL TEST
1309  002102  011352                    M7386A          ;KEYBOARD/DISPLAY MODULE ADDRESS TEST
1310  002104  003212                    M7387A          ;HARDWARE READ-IN MODULE TEST
1311  002106  011702                    M7388A          ;CHARACTER I/O (IN-HOUSE) MODULE ADDRESS TEST
1312  002110  011714                    M7388F          ;CHARACTER I/O (FIELD) MODULE ADDRESS TEST
1313  002112  012222                    M7377A          ;REMOTE SERIAL  MODULE TEST
1314  002114  013476                    M7378A          ;FOUNDATION MODULE TEST
1315  002116  020716                    SUBX            ;SUBTEST SELECTOR ROUTINE
1316  002120  021764                    RECBUF          ;ROUTINE TO PRINT CONTENTS OF DL RECV BUFFER
1317  002122  021772                    TRNBUF          ;ROUTINE TO PRINT CONTENTS OF DL TRNS BUFFER
1318  002124  022024                    SEND            ;ROUTINE TO TRANSMIT CHAR.'S FROM TTY
1319  002126  022120                    RUN             ;ROUTINE TO LOAD & RUN THE SEND PROGRAM
```

```
                                ;*****************************************************************************
                                .SBTTL M7380 CONTROL MODULE TEST.
                                ;THIS TEST COMPLETELY EXERCISES THE PDM-70 'CONTROL MODULE' USING THE
                                ;PDP-11 AS THE MASTER 'SOURCE/DESTINATION' MODULE.  THE TEST TAKES THE
                                ;MODULE THRU THE INITIALIZATION, PROGRAM, ADDRESS AND DATA MODES RESPECTIVELY.
                                ;*****************************************************************************

002130  104012                M7380A: PRINT
002132  023533                        MES1                    ;TEXT 'CONTROL MODULE TEST'
002134  000240                        NOP
002136  005037  031670                CLR     LOPSWH
002142  104035                        SETUP                   ;SET UP TEST PARAMETERS.
002144  005037  031612                CLR     DLYSWH          ;ENABLE TRANSMITTER DELAYS

                                ;*****************************************************************************
                                ;LOAD '2' PROGRAMS INTO THE CONTROLS 'FIFO' AND CHECK THAT
                                ;THE CONTROL MODULE ENTERS THE ADDRESS MODE.
                                ;*****************************************************************************

002150  000240                        NOP
002152  000240                        NOP
002154  104007                        LDPGMD                  ;LOAD THE FOLLOWING PROGRAM.
002156  002162                        PRGM1-1
002160  000412                        BR      TAGB
002162     002                  .BYTE   STX
002163     021          PRGM1:  .BYTE   DC1
002164     075          IADRS0: .BYTE   75
002165     001                  .BYTE   SOH
002166     061                  .BYTE   61
002167     022                  .BYTE   DC2                     ;ALERT DESTINATION
002170     075          IADRS1: .BYTE   75
002171     023                  .BYTE   DC3
002172     024          PRGM2:  .BYTE   DC4                     ;START OF 2ND PROGRAM
002173     021                  .BYTE   DC1
002174     075          IADRS2: .BYTE   75
002175     001                  .BYTE   SOH
002176     061                  .BYTE   61
002177     022                  .BYTE   DC2
002200     075          IADRS3: .BYTE   75
002201     061                  .BYTE   61
002202     063                  .BYTE   63
002203     023                  .BYTE   DC3
002204     003          END2:   .BYTE   ETX
002206                          .EVEN

002206  005737  031600        TAGB:   TST     SIOSWH          ;SERIAL I/O INPUT?
002212  001020                        BNE     TAGOB1          ;YES, JUST LOOK FOR DATA
002214  012701  002163                MOV     #PRGM1,R1       ;NO, VERIFY 1ST PROGRAM
002220  005737  031670                TST     LOPSWH          ;LOOPING FROM LAST TEST?
002224  001401                        BEQ     .+4             ;NO, DON'T LOOK FOR 'STX'
002226  005301                        DEC     R1              ;YES, SET UP TO LOOK FOR 'STX'
002230  005237  031670                INC     LOPSWH
```

```
1372  002234  122221                CMP1:   CMPB    (R2)+,(R1)+     ;COMPARE RECV'D/TRANSMITTED DATA
1373  002236  001403                        BEQ     .+10
1374  002240  104022                        MODERR                  ;RECV'D/TRANS ADDRESS DATA DIFFERENT
1375  002242  030137                        ERR2
1376  002244  000412                        BR      CT2             ;EXIT ON ERROR.
1377  002246  122701  002172              CMPB    #PRGM2,R1       ;CHK'D ALL DATA?
1378  002252  001370                        BNE     CMP1            ;NO
1379
1380                                ;AT THIS POINT THE MODULE SHOULD BE IN THE 'DATA MODE'
1381                                ;THIS NEXT SUBTEST SENDS THE CHAR. 'A' AND CHECKS
1382                                ;THAT IT IS RETURNED AS DATA.
1383
1384  002254  104006                TAGOB1: LDCHRO
1385  002256  000101                        'A                      ;SEND  CHAR. 'A'
1386  002260  122722  000101              CMPB    #'A,(R2)+       ;WAS 'A' RETURNED?
1387  002264  001402                        BEQ     CT2             ;YES
1388  002266  104022                        MODERR                  ;MODULE DIDN'T ENTER DATA MODE
1389  002270  031033                        ERR19
1390
1391                                ;*****************************************************************
1392                                ;THE CONTROL MODULE SHOULD NOW BE IN THE 'DATA MODE'.  THE FOLLOWING
1393                                ;SUBTEST CREATES A RANDOM '500' WORD DATA BUFFER AND TRANSFERS IT TO THE
1394                                ;CONTROL MODULE.  THIS DATA IS VERIFIED WHEN IT IS RECEIVED BACK FROM THE
1395                                ;CONTROL MODULE.
1396                                ;*****************************************************************
1397
1398  002272  104001  000002        CT2:    SCOPE,2                 ;TEST 2
1399  002276  104011                        RANDOM                  ;CREATE A RANDOM DATA BUFFER
1400  002300  104007                        LDPGMO                  ;TRANSMIT DATA FROM FOLLOWING ADDRESS.
1401  002302  017450                        TRNBFO
1402  002304  012701  017450              MOV     #TRNBFO,R1
1403  002310  122221                CMP2:   CMPB    (R2)+,(R1)+     ;REVC'D & TRANS DATA EQUAL?
1404  002312  001403                        BEQ     .+10            ;YES
1405  002314  104022                        MODERR                  ;RECV'D DATA DOESN'T EQUAL TRANS DATA
1406  002316  030174                        ERR3
1407  002320  000411                        BR      CT3
1408  002322  005737  016006              TST     PARITY          ;PARITY ERROR FLAG SET?
1409  002326  001403                        BEQ     CT3A            ;NO, DATA GOOD
1410  002330  104022                        MODERR                  ;YES, PARITY ERROR ON LAST TRANSFER
1411  002332  030345                        ERR7
1412  002334  000403                        BR      .+10
1413  002336  022701  020152        CT3A:   CMP     #TRNEND,R1      ;CHK'D WHOLE BUFFER?
1414                                                                ;CORRECTED 7/1/74.
1415  002342  001362                        BNE     CMP2
```

```
1416
1417                                    ;*************************************************************************
1418                                    ;THIS SUBTEST ISSUES AN 'EOT' CHARACTER AND CHECKS THAT THE CONTROL
1419                                    ;MODULE RE-ENTERS THE ADDRESS MODE AND THAT THE SECOND PROGRAM LOADED IN
1420                                    ;THE 1ST SUBTEST GETS READ OUT.
1421                                    ;*************************************************************************
1422
1423  002344  104001  000003           CT3:    SCOPE,3                 ;TEST 3
1424  002350  104006                            LDCHRO
1425  002352  000004                            EOT                     ;TRANSMIT THE 'EOT' CHAR.
1426  002354  012701  002172                    MOV     #PRGM2,R1
1427  002360  122722  000004                    CMPB    #EOT,(R2)+      ;CHK THAT 'EOT' WAS RETURNED
1428  002364  001403                            BEQ     .+10
1429  002366  104022                            MODERR
1430  002370  030251                            ERR5                    ;EOT CHAR WASN'T RETURNED
1431  002372  000422                            BR      CT4     ;EXIT ON ERROR
1432  002374  005737  031600                    TST     SIOSWH          ;SERIAL I/O INPUT?
1433  002400  001010                            BNE     TAGOA           ;YES, JUST VERIFY DATA
1434  002402  122221                    CMP3:   CMPB    (R2)+,(R1)+     ;COMPARE DATA OF THE SECOND PROGRAM
1435  002404  001403                            BEQ     .+10
1436  002406  104022                            MODERR                  ;ADDRESS ERROR IN 2ND PROGRAM
1437  002410  030212                            ERR4
1438  002412  000412                            BR      CT4
1439  002414  122701  002204                    CMPB    #END2,R1        ;DONE
1440  002420  001370                            BNE     CMP3            ;NO
1441
1442                                    ;SEND A CHAR. TO VERIFY THE 2ND PROGRAM IS
1443                                    ;IN THE DATA MODE
1444
1445  002422  104006                    TAGOA:  LDCHRO
1446  002424  000101                            'A
1447  002426  122722  000101                    CMPB    #'A,(R2)+       ;WAS THE 'A' RECV'D?
1448  002432  001402                            BEQ     CT4             ;YES
1449  002434  104022                            MODERR                  ;2ND PROGRAM DIDN'T ENTER DATA MODE
1450  002436  030767                            ERR18
```

```
1451
1452                                    ;*************************************************************************
1453                                    ;ISSUE ANOTHER 'EOT' TO TEST THAT THE ADDRESS MODE OF THE 1ST PROGRAM IS
1454                                    ;RECIRCULATED BACK OUT OF THE 'FIFO'.
1455                                    ;*************************************************************************
1456
1457  002440  104001  000004   CT4:    SCOPE,4                 ;TEST 4
1458  002444  104006                   LDCHRO
1459  002446  000004                   EOT                     ;'EOT' SHOULD RE-ADDRESS 1ST PROGRAM
1460  002450  105722                   TSTB    (R2)+           ;ADD '1' TO BUFFER POINTER
1461  002452  005737  031600           TST     SIOSWH          ;SERIAL I/O INPUT?
1462  002456  001012                   BNE     TAGOC           ;YES, JUST CHECK DATA
1463  002460  012701  002163           MOV     #PRGM1,R1
1464  002464  122122           CMP4:   CMPB    (R1)+,(R2)+
1465  002466  001403                   BEQ     .+10
1466  002470  104022                   MODERR                  ;1ST PROGRAM DIDN'T RECIRCULATE
1467  002472  030302                   ERR6
1468  002474  001012                   BNE     CT5
1469  002476  022701  002172           CMP     #PRGM2,R1
1470  002502  001370                   BNE     CMP4
1471
1472                                    ;SEND A CHAR. TO VERIFY THAT THE 1ST PROGRAM ENTERED THE DATA MODE
1473
1474  002504  104006           TAGOC:  LDCHRO
1475  002506  000101                   'A
1476  002510  122722  000101           CMPB    #'A,(R2)+       ;WAS CHAR RETURNED?
1477  002514  001402                   BEQ     CT5             ;YES
1478  002516  104022                   MODERR                  ;1ST PROGRAM DIDN'T RE-ENTER DATA MODE
1479  002520  030302                   ERR6
```

```
                                ;*************************************************************************
                                ;THIS SUBTEST ISSUES ANOTHER 'EOT' CHARACTER.  THIS SHOULD ENABLE THE
                                ;ADDRESS OF THE 1ST PROGRAM TO BE OUTPUT SINCE THE SECOND PROGRAM
                                ;CONTAINED A 'DC4' AND SHOULD HAVE BEEN FLUSHED.
                                ;*************************************************************************

002522  104001  000005        CT5:    SCOPE,5                 ;TEST 5
002526  104006                        LDCHRO
002530  000004                        EOT                     ;'EOT' SHOULD ENABLE ADDRESS MODE
002532  122722  000004                CMPB    #EOT,(R2)+      ;CHECK THAT 'EOT' WAS RETURNED
002536  001403                        BEQ     .+10
002540  104022                        MODERR                  ;'EOT' CHAR. WASN'T RETURNED
002542  030251                        ERR5
002544  000424                        BR      CT6             ;EXIT ON ERROR
002546  005737  031600                TST     SIOSWH          ;SERIAL I/O INPUT?
002552  001012                        BNE     TAGOD           ;YES,
002554  012701  002163                MOV     #PRGM1,R1
002560  122122                CMP5:   CMPB    (R1)+,(R2)+     ;CHECK RECV'D ADDR. AGAINST PROGRAM 1.
002562  001403                        BEQ     .+10
002564  104022                        MODERR                  ;PROGRAM DIDN'T RECIRCULATE PROPERLY
002566  030302                        ERR6
002570  000412                        BR      CT6
002572  122701  002172                CMPB    #PRGM2,R1
002576  001370                        BNE     CMP5
002600  104006                TAGOD:  LDCHRO
002602  000101                        'A
002604  122722  000101                CMPB    #'A,(R2)+
002610  001402                        BEQ     .+6
002612  104022                        MODERR
002614  030302                        ERR6
```

```
1511                                    ;**********************************************************************
1512                                    ;THIS TEST CHECKS THAT ALL '64' LOCATIONS OF THE CONTROLS 'FIFO' CAN
1513                                    ;BE ACCESSED.  THIS IS DONE BY LOADING ONE '64' CHARACTER PROGRAM IN
1514                                    ;THE 'FIFO'.  IN THIS PROGRAM, '56' CHARACTERS ARE RANDOM LITERAL
1515                                    ;CHARACTERS ENTERED UNDER AN 'SI' COMMAND.
1516                                    ;**********************************************************************
1517
1518  002616  104001  000006      CT6:  SCOPE,6                     ;TEST 6
1519  002622  104011                   RANDOM                      ;CREATE A RANDOM DATA BUFFER
1520  002624  012700  017450           MOV     #TRNBFO,R0          ;SET UP TO LOAD AN ADDRESS ON THE DATA
1521  002630  112720  000002           MOVB    #STX,(R0)+          ;ENTER ADDRESS MODE
1522  002634  112720  000021           MOVB    #DC1,(R0)+          ;ALERT SOURCE IF SERIAL I/O IS OUT THERE.
1523  002640  113720  002164           MOVB    IADRS0,(R0)+        ;ADDRESS INPUTTED VIA USER
1524  002644  112720  000001           MOVB    #SOH,(R0)+          ;MODE '1'; WAIT FOR DATA
1525  002650  112720  000061           MOVB    #61,(R0)+
1526  002654  112720  000022           MOVB    #DC2,(R0)+          ;ALERT DESTINATION FOR SERIAL I/O
1527  002660  113720  002164           MOVB    IADRS0,(R0)+        ;ADDRESS INPUTTED VIA USER
1528  002664  112720  000017           MOVB    #SI,(R0)+           ;SEND '55' LITERAL CHARACTERS
1529  002670  112737  000023  017547   MOVB    #DC3,TRNBFO+77      ;LOAD THE '64' CHAR.
1530  002676  112737  000003  017550   MOVB    #ETX,TRNBFO+100     ;TERMINATE THE PROGRAM
1531
1532  002704  104007                   LDPGMO                      ;SEND THE PROGRAM
1533  002706  017450                   TRNBFO
1534  002710  104004                   DELAY                       ;WAIT FOR DATA TO RETURN
1535  002712  105722                   TSTB    (R2)+               ;WAS ANY DATA RETURNED?
1536  002714  001003                   BNE     .+10                ;YES
1537  002716  104022                   MODERR                      ;CONTROL MODULE DIDN'T RETURN ANY DATA
1538  002720  030137                   ERR2
1539  002722  000417                   BR      CT7                 ;EXIT ON ERROR
1540  002724  012701  017450           MOV     #TRNBFO,R1          ;SET UP TO VERIFY DATA
1541  002730  005737  031600           TST     SIOSWH              ;USING SERIAL I/O?
1542  002734  001402                   BEQ     .+6                 ;NO, VERIFY ADDRESS AS WELL AS DATA
1543  002736  062701  000010           ADD     #10,R1              ;YES, MOVE POINTER TO VERIFY DATA ONLY
1544  002742  122122            CMP6:  CMPB    (R1)+,(R2)+
1545  002744  001403                   BEQ     .+10
1546  002746  104022                   MODERR                      ;DATA ERROR
1547  002750  030174                   ERR3
1548  002752  000403                   BR      CT7                 ;EXIT ON ERROR
1549  002754  022701  017547           CMP     #TRNBFO+77.,        ;DONE?
1550  002760  001370                   BNE     CMP6                ;NO
```

```
1551
1552                                    ;*************************************************************************
1553                                    ;AT THIS POINT THE PROGRAM, ADDRESS AND DATA MODES HAVE BEEN TESTED.
1554                                    ;THIS SUBTEST ISSUES ANOTHER 'STX' CHARACTER TO GET THE CONTROL MODULE
1555                                    ;BACK INTO THE PROGRAM MODE.
1556                                    ;*************************************************************************
1557
1558  002762  104001  000007   CT7:     SCOPE,7                 ;TEST 7
1559  002766  104006                    LDCHRO
1560  002770  000002                    STX                     ;ISSUE 'STX' TO RE-ENTER PROGRAM MODE
1561  002772  122722  000002           CMPB    #STX,(R2)+
1562  002776  001402                    BEQ     .+6
1563  003000  104022                    MODERR                  ;THE 'STX' CHARACTER WASN'T RETURNED
1564  003002  030106                    ERR1
1565
1566                                    ;*************************************************************************
1567                                    ;THIS SUBTESTS TESTS THE DELAY TIMES OF THE 'SYN' CHARACTER. ALL THE
1568                                    ;DELAY TIMES OF '1-9' ARE TESTED IN ORDER. THE TEST MAKES '2' CHECKS
1569                                    ;ON EACH TIME. FIRST IS THAT THE DELAY ISN'T TOO SHORT AND SECOND THAT
1570                                    ;THE DELAY ISN'T TOO LONG. THIS TEST IS PREFORMED BY LOADING
1571                                    ;'9' SEPARATE PROGRAMS AND STORING THEM IN THE CONTROL FIFO.
1572                                    ;*************************************************************************
1573
1574  003004  104001  000010   CT10:    SCOPE,10                        ;TEST 10
1575  003010  104036                    NODLAY                  ;INHIBIT TRANSMITTER DELAY
1576  003012  012701  000001           MOV     #1,R1           ;SET UP DELAY TIMES (1-9).
1577  003016  012702  000002           MOV     #2,R2           ;SHORT TIME DELAY COUNT.
1578  003022  012703  000061           MOV     #61,R3          ;START DELAY WITH '1'.
1579
1580  003026  104005            TAGD:   RECVRO                  ;ENABLE THE DL11 RECVR
1581  003030  005077  176304           CLR     @PSW            ;ENABLE RECVR INTERRUPTS
1582  003034  005004                    CLR     R4              ;CONTAINS THE ACTUAL DELAYS COUNTED
1583  003036  110337  003071           MOVB    R3,SYNTIM       ;SET UP DELAY TIME FOR THIS LOOP
1584  003042  110337  030434           MOVB    R3,ERR9+16      ;PRINT DELAY TIME ON ERROR
1585  003046  110337  030471           MOVB    R3,ERR10+16
1586  003052  104007                    LDPGMO                  ;LOAD THE FOLLOWING PROGRAM
1587  003054  003060                    .+4
1588  003056  000411                    BR      TAGF            ;GO HERE WHEN LOADED
1589  003060     002                    .BYTE   STX
1590  003061     021                    .BYTE   DC1
1591  003062     075            IADRS4: .BYTE   75              ;MODIFIED BY USER
1592  003063     001                    .BYTE   SOH             ;MODE '0' AUTO 'EOT'
1593  003064     060                    .BYTE   60
1594  003065     022                    .BYTE   DC2
1595  003066     075            IADRS5: .BYTE   75              ;MODIFIED BY USER
1596  003067     017                    .BYTE   SI              ;ENABLE DESTINATION
1597  003070     026                    .BYTE   SYN
1598  003071     061            SYNTIM: .BYTE   61              ;LOCATION MODIFIED ON EACH PASS.
1599  003072     023                    .BYTE   DC3
1600  003073     021                    .BYTE   DC1
1601  003074     075            IADRS6: .BYTE   75              ;MODIFIED BY USER
1602  003075     001                    .BYTE   SOH
1603  003076     061                    .BYTE   61
1604  003077     023                    .BYTE   DC3
1605  003100     003                    .BYTE   ETX
1606          003102                    .EVEN
```

```
1607
1608  003102  104023                  TAGF:   NULL1                   ;1 SEC. TTY DELAY.
1609  003104  005204                          INC     R4              ;INCREMENT DELAY COUNTER
1610  003106  020401                          CMP     R4,R1           ;WAITED LONG ENOUGH?
1611  003110  001410                          BEQ     TAGC            ;YES, 'EOT' SHOULD BE BACK.
1612  003112  020402                          CMP     R4,R2           ;CHECK FOR FAST RETURN?
1613  003114  002372                          BGE     TAGF            ;NO, EXECUTE NEXT DELAY
1614  003116  005737  016012                  TST     RECEOT          ;BACK?
1615  003122  001767                          BEQ     TAGF            ;NO, STILL OK
1616  003124  104022                          MODERR                  ;'SYN' DELAY TOO SHORT
1617  003126  030416                          ERR9                    ;** CHECK 'W2' JUMPER IN?
1618  003130  000416                          BR      TAGI+2          ;EXIT ON ERROR
1619
1620  003132  104023                  TAGG:   NULL1                   ;GIVE IT AN EXTRA SEC.
1621  003134  005737  016012                  TST     RECEOT          ;SHOULD BE BACK HERE.
1622  003140  001003                          BNE     TAGH            ;HOORAY IT IS.
1623  003142  104022                          MODERR                  ;'SYN' DELAY TOO LONG
1624  003144  030453                          ERR10                   ;** CHECK 'W2' JUMPER IN?
1625  003146  000407                          BR      TAGI+2
1626
1627  003150  005201                  TAGH:   INC     R1
1628  003152  022701  000012                  CMP     #12,R1          ;TEST ALL TI  G?
1629  003156  001403                          BEQ     TAGI+2          ;YES, EXIT
1630  003160  005202                          INC     R2              ;NO, SET UP TO TEST NEXT TIME
1631  003162  005203                          INC     R3              ;SET UP NEW 'SYN' COUNT
1632                                                                  ;ENABLE NEXT PROGRAM
1633  003164  000720                  TAGI:   BR      TAGD            ;LOAD THE NEW TIME DELAY F   RAM
1634  003166  012777  000340  176144          MOV     #340,@PSW
1635  003174  032777  002000  176150          BIT     #SW10,@SWR      ;IS 'SW10' SET
1636  003202  001464                          BEQ     CT12            ;NO, INHIBIT TESTING M7387
```

```
1637
1638                            ;*****************************************************************************
1639                            .SBTTL M7387 READ-IN MODULE TEST
1640                            ;THIS TEST IS RUN IN CONJUNCTION WITH THE M7380 CONTROL TEST. IT
1641                            ;REQUESTS THE USER TO INSET THE M7387 READER MODULE AND THEN
1642                            ;HIT THE RESET BUTTON. THIS WILL ENABLE THE PROM DIAGNOSTIC PROGRAM TO
1643                            ;BE CALLED OUT. THIS PROGRAM IS THEN VERIFIED AND THE MESSAGE 'PROM OK'
1644                            ;IS TYPED.
1645                            ;*****************************************************************************
1646
1647  003204  104001  000011   CT11:   SCOPE,11                    ;TEST 11
1648  003210  000401                   BR      .+4
1649  003212  104035            M7387A: SETUP                       ;ENTERED HERE IS M7387A IS TYPED
1650  003214  104012                   PRINT
1651  003216  026571                   MES64                       ;TEXT 'INSERT M7387 MODULE".
1652  003220  104005                   RECVR0                      ;ENABLE DL11
1653  003222  005077  176112           CLR     @PSW                ;ENABLE INTERRUPTS
1654  003226  005712                   TST     (R2)
1655  003230  001776                   BEQ     .-2                 ;NO, WAIT
1656  003232  104004                   DELAY                       ;WAIT FOR DATA
1657  003234  012777  000340  176076   MOV     #340,@PSW           ;INHIBIT FURTHER INTERRUPTS
1658  003242  012701  003304           MOV     #PROMS,R1
1659  003246  122122            CMP11:  CMPB    (R1)+,(R2)+         ;DATA OK?
1660  003250  001403                   BEQ     .+10                ;YES
1661  003252  104022                   MODERR                      ;PROM DATA ERROR
1662  003254  030174                   ERR3
1663  003256  000436                   BR      CT12                ;EXIT ON ERROR
1664
1665  003260  022701  003353           CMP     #PROMD,R1           ;CHECKED ALL DATA?
1666  003264  001370                   BNE     CMP11               ;NO
1667  003266  104012                   PRINT                       ;YES
1668  003270  026657                   MES65                       ;TEXT 'PROM OK'
1669  003272  104013                   TTYIN                       ;WAIT FOR 'CR' TO CONTINUE.
1670  003274  012737  000001  031670   MOV     #1,LOPSWH
1671  003302  000424                   BR      CT12
1672
1673                            ;FOLLOWING IS THE DATA WHICH SHOULD BE READ FROM PROM
1674
1675  003304      015           PROMS:  .BYTE   15
1676  003305      012                   .BYTE   12
1677  003306      115                   .BYTE   'M
1678  003307      067                   .BYTE   67
1679  003310      063                   .BYTE   63
1680  003311      070                   .BYTE   70
1681  003312      067                   .BYTE   67
1682  003313      040                   .BYTE   40
1683  003314      120                   .BYTE   'P
1684  003315      122                   .BYTE   'R
1685  003316      117                   .BYTE   'O
1686  003317      115                   .BYTE   'M
1687  003320      040                   .BYTE   40
1688  003321      122                   .BYTE   'R
1689  003322      105                   .BYTE   'E
1690  003323      101                   .BYTE   'A
1691  003324      104                   .BYTE   'D
1692  003325      055                   .BYTE   55
```

```
1693   003326   111                          .BYTE   'I
1694   003327   116                          .BYTE   'N
1695   003330   040                          .BYTE   40
1696   003331   124                          .BYTE   'T
1697   003332   105                          .BYTE   'E
1698   003333   123                          .BYTE   'S
1699   003334   124                          .BYTE   'T
1700   003335   015                          .BYTE   15
1701   003336   012                          .BYTE   12
1702   003337   060                          .BYTE   60
1703   003340   061                          .BYTE   61
1704   003341   062                          .BYTE   62
1705   003342   063                          .BYTE   63
1706   003343   064                          .BYTE   64
1707   003344   065                          .BYTE   65
1708   003345   066                          .BYTE   66
1709   003346   067                          .BYTE   67
1710   003347   070                          .BYTE   70
1711   003350   071                          .BYTE   71
1712   003351   015                          .BYTE   15
1713   003352   012                          .BYTE   12
1714   003353   000                  PROMD:  .BYTE   0
1715
1716                                         .EVEN
1717
1718
1719                                 ;*******************************************************************************
1720                                 ;TEST COMPLETE
1721                                 ;*******************************************************************************
1722
1723   003354   104001   000012      CT12:   SCOPE,12                        ;TEST 12
1724   003360   104012                       PRINT
1725   003362   023727                       MES7                    ;TEXT 'TEST COMPLETE'
1726   003364   005237   031670              INC     LOPSWH          ;SET SW. TO LOOP PROGRAM
1727   003370   000137   002142              JMP     M7380A+12       ;RESTART PROGRAM
```

```
                                ;*****************************************************************************
                                .SBTTL M7381 BCD INPUT MODULE ADDRESS TEST
                                ;*****************************************************************************

003374  104012                  M7381A: PRINT
003376  024724                          MES29
003400  104026                          ADDRESS                 ;GET MODULE ADDRESS
003402  104012                  BCDT0:  PRINT                   ;TEST 'SET SW'S ALL ON
003404  024774                          MES31
003406  025015                          MES31A
003410  104013                          TTYIN                   ;WAIT FOR SET UP
003412  104035                          SETUP                   ;SETUP TEST PARAMETERS

                                ;*****************************************************************************
                                ;THIS SUBTEST ADDRESSES THE MODULE IN MODE '0' AND CHECKS THAT THE
                                ;MODULE ADDRESS, MODE AND CORRECT NUMBER OF DIGITS ARE RETURNED.
                                ;*****************************************************************************

003414  000240                  BCDT1:  NOP
003416  000240                          NOP
003420  112737  000060  017017          MOVB    #60,SOH1        ;SET UP MODE '0'
003426  004737  017006                  JSR     PC,@#ADRSRC     ;ADDRESS THE MODULE
003432  005737  016012                  TST     RECEOT          ;WAS 'EOT' RETURNED?
003436  001003                          BNE     .+10            ;YES, VERIFY DATA
003440  104022                          MODERR                  ;NO, MODULE DIDN'T ENTER DATA MODE.
003442  030507                          ERR11
003444  000432                          BR      BCDT2
003446  123722  031602                  CMPB    MODADR,(R2)+    ;RECEIVE CORRECT ADDRESS?
003452  001403                          BEQ     .+10            ;YES
003454  104022                          MODERR                  ;RECEIVED WRONG MODULE ADDRESS
003456  030174                          ERR3
003460  000424                          BR      BCDT2
003462  122722  000060                  CMPB    #60,(R2)+       ;RECEIVE CORRECT MODE?
003466  001403                          BEQ     .+10            ;YES
003470  104022                          MODERR                  ;MODULE WAS ADDRESSED IN MODE '0'
003472  030174                          ERR3
003474  000416                          BR      BCDT2
003476  122722  000077          CMP2A:  CMPB    #77,(R2)+       ;SHOULD READ ALL 1'S WITH INPUTS OPEN
003502  001403                          BEQ     .+10
003504  104022                          MODERR                  ;DATA ERROR, SHOULD READ ALL 1'S
003506  030174                          ERR3                    ;WITH THE INPUTS OPEN.
003510  000410                          BR      BCDT2
003512  022702  016034                  CMP     #RECBF0+12,R2   ;DONE?
003516  001367                          BNE     CMP2A           ;NO
003520  122722  000004                  CMPB    #EOT,(R2)+      ;WERE CORRECT NUMBER OF CHAR.'S RECEIVED?
003524  001402                          BEQ     .+6             ;YES
003526  104022                          MODERR                  ;DIDN'T RECEIVE ALL DATA CHAR.'S
003530  030174                          ERR3
```

```
1776
1777                                    ;*************************************************************************
1778                                    ;THIS SUBTEST ADDRESSES THE MODULE FOR MODE '1' (EXT. SYNC) AND CHECKS
1779                                    ;THAT ONLY AN 'EOT' AND ONLY AN 'EOT' IS RECEIVED BACK.
1780                                    ;*************************************************************************
1781
1782  003532  104001                BCDT2:  SCOPE
1783  003534  000002                        2
1784  003536  112737  000061  017017        MOVB    #61,SOH1        ;SET UP MODE '1' 'EXT SYNC'
1785  003544  004737  017006                JSR     PC,@#ADRSRC     ;ADDRESS THE MODULE
1786  003550  122722  000004                CMPB    #EOT,(R2)+      ;WAS 'EOT' RETURNED?
1787  003554  001402                        BEQ     .+6             ;YES
1788  003556  104022                        MODERR                  ;'EXT SYNC' DIDN'T RETURN AN 'EOT'
1789  003560  030251                        ERR5
1790
1791                                    ;*************************************************************************
1792                                    ;THIS SUBTEST ADDRESSES THE MODULE IN MODE '2' AND CHECKS THAT ONLY
1793                                    ;DATA IS RECIEVED FROM THE MODULE.
1794                                    ;*************************************************************************
1795
1796  003562  104001                BCDT3:  SCOPE
1797  003564  000003                        3
1798  003566  112737  000062  017017        MOVB    #62,SOH1        ;SET UP MODE '2'
1799  003574  004737  017006                JSR     PC,@#ADRSRC     ;ADDRESS THE MODULE
1800  003600  122737  000004  016032        CMPB    #EOT,RECBF0+10  ;IS 'EOT' IN CORRECT PLACE
1801  003606  001402                        BEQ     .+6             ;YES
1802  003610  104022                        MODERR                  ;ONLY DATA SHOULD BE TRANSMITTED IN MODE '2'
1803  003612  030174                        ERR3
1804                                    ;*************************************************************************
1805                                    ;THIS SUBTEST ADDRESSES THE MODULE FOR MODE '3' (EXT. SYNC) AND CHECKS
1806                                    ;THAT ONLY AN 'EOT' AND ONLY 'EOT' IS RECEIVED BACK.
1807                                    ;*************************************************************************
1808
1809  003614  104001                BCDT4:  SCOPE
1810  003616  000004                        4
1811  003620  112737  000063  017017        MOVB    #63,SOH1        ;SET UP MODE '3'
1812  003626  004737  017006                JSR     PC,ADRSRC       ;ADDRESS MODULE
1813  003632  122722  000004                CMPB    #EOT,(R2)+      ;WAS 'EOT' RETURNED?
1814  003636  001402                        BEQ     .+6             ;YES
1815  003640  104022                        MODERR                  ;EXTERNAL &SYNC' DIDN'T RETURN AN 'EOT'
1816  003642  030174                        ERR3
1817
```

```
                                ;*************************************************************************
                                ;THIS SUBTEST ADDRESSES THE MODULE USING ALL THE WRONG
                                ;MODULE ADDRESSES AND TESTS THAT THE MODULE ISN'T ENABLED.
                                ;*************************************************************************

003644  104001          BCDT5:  SCOPE
003646  000005                  5
003650  004737  005066          JSR     PC,@#ADRSIT     ;SUBROUTINE TO ADDRESS MODULE

                                ;*************************************************************************
                                ;THIS SUBTEST REQUESTS THAT THE CUSTOMER SWITCHES BE RE-SET TO ALL ON
                                ;AND THE INPUTS GROUNDED.  THE PROGRAM THEN CHECKS THAT ALL 0'S
                                ;ARE READ FROM THE MODULE.
                                ;NOTE: IF DATA SW10 IS NOT SET, THE FOLOWING SUBTESTS ARE SKIPPED.
                                ;*************************************************************************

003654  104001          BCDT6:  SCOPE
003656  000006                  6
003660  032777  002000  175464  BIT     #SW10,@SWR      ;SW SET?
003666  001515                  BEQ     BCDT11          ;NO, SKIP MANUAL TESTS.
003670  104012                  PRINT
003672  024774                  MES31
003674  025125                  MES31D
003676  104013                  TTYIN                   ;WAIT FOR 'CR'
003700  012737  003700  020550  MOV     #.,RETURN       ;RE-SET SCOPE LOOP POINTER
003706  104005                  RECVR0
003710  112737  000062  017017  MOVB    #62,SOH1        ;SET UP MODE '2'
003716  004737  017006          JSR     PC,@#ADRSRC     ;ADDRESS THE MODULE
003722  122722  000060  CMP2B:  CMPB    #60,(R2)+
003726  001403                  BEQ     .+10
003730  104022                  MODERR                  ;DATA SHOULD TO ALL 0'S WITH
003732  030174                  ERR3                    ;THE INPUTS GROUNDED
003734  000403                  BR      BCDT7           ;EXIT ON ERROR
003736  022702  016032          CMP     #RECBF0+10,R2   ;DONE?
003742  001367                  BNE     CMP2B           ;NO

                                ;*************************************************************************
                                ;THIS SUBTEST REQUESTS THAT THE CUSTOMER SWITCHES BE SET TO ALL OFF AND
                                ;CHECKS THAT ONLY THE ADDRESS, MODE AND 'EOT' ARE RETURNED.
                                ;NOTE: IF DATA SW10 IS SET THE FOLLOWING TESTS ARE SKIPPED.
                                ;*************************************************************************

003744  104001          BCDT7:  SCOPE
003746  000007                  7
003750  104012                  PRINT
003752  024007                  MES10                   ;TEXT 'RESET MODULE TO ADDR. '17'.'
003754  104012                  PRINT
003756  024774                  MES31                   ;SET CUST. SW.'S TO '0'
003760  025154                  MES31E
003762  104013                  TTYIN                   ;WAIT FOR 'CR'.
003764  112737  000077  031602  MOVB    #77,MODADR      ;SET UP NEW MODULE ADDRESS.
003772  112737  000077  017015  MOVB    #77,SRCADR
004000  012737  004000  020550  MOV     #.,RETURN       ;RE-SET SCOPE LOOP POINTER
```

```
1874  004006  104005                    RECVR0                          ;ENABLE THE DL11 RECVR.
1875  004010  112737  000060  017017    MOVB    #60,SOH1                ;SET UP MODE '0'
1876  004016  004737  017006            JSR     PC,@#ADRSRC             ;ADDRESS THE MODULE
1877  004022  005712                    TST     (R2)                    ;WAS ANY DATA RETURNED?
1878  004024  001003                    BNE     .+10                    ;YES
1879  004026  104022                    MODERR                          ;DIDN'T ENTER DATA MODE
1880  004030  030507                    ERR11
1881  004032  000406                    BR      BCDT10                  ;EXIT ON ERROR
1882  004034  122737  000004  016024    CMPB    #EOT,RECBF0+2           ;EOT SHOULD BE 3RD CHAR. BACK
1883  004042  001402                    BEQ     .+6                     ;OK, IT IS
1884  004044  104022                    MODERR                          ;DATA WASN'T INHIBITED
1885  004046  030174                    ERR3
1886
1887                          ;*************************************************************************
1888                          ;THIS SUBTEST REQUESTS THAT THE CUSTOMER SWITCHES BE SET TO ALTERNATE
1889                          ;ON & OFF AND CHECKS THAT ONE '4' CHARACTERS ARE RETURNED.
1890                          ;*************************************************************************
1891
1892  004050  104001          BCDT10: SCOPE
1893  004052  000010                  10
1894  004054  104012                  PRINT
1895  004056  024774                  MES31
1896  004060  025074                  MES31C
1897  004062  104013                  TTYIN                           ;WAIT FOR 'CR'
1898  004064  012737  004064  020550  MOV     #.,RETURN               ;RE-SET THE SCOPE LOOP POINTER
1899  004072  104005                  RECVR0
1900  004074  112737  000062  017017  MOVB    #62,SOH1                ;SET UP MODE '2'
1901  004102  004737  017006          JSR     PC,@#ADRSRC             ;ADDRESS THE MODULE
1902  004106  022737  000004  016026  CMP     #EOT,RECBF0+4           ;WHERE ONLY '4' CHAR.'S RETURNED
1903  004114  001402                  BEQ     .+6                     ;YES
1904  004116  104022                  MODERR                          ;ONLY '4' CHAR.'S SHOULD BE RETURNED
1905  004120  030174                  ERR3
```

```
                                ;*************************************************************************
                                ;THIS SUBTEST TESTS THE DEVICE FLAG IN MODE '1'.  A REQUEST IS MADE
                                ;FOR AN EXTERNAL SIGNAL TO BE SUPPLIED.  THE 'BCD' INPUT MODULE
                                ;IS THEN ADDRESSED AND CHECKS THAT DATA WAS RETURNED.
                                ;*************************************************************************

004122  104001          BCDT11: SCOPE
004124  000011                  11
004126  104012                  PRINT
004130  026345                  MES60                   ;TEXT 'SUPPLY AN EXTERNAL SYNC.
004132  104013                  TTYIN                   ;WAIT FOR 'CR'
004134  112737  000061  017017  MOVB    #61,SOH1        ;SELECT MODE '1' ;WAIT FOR DEVICE FLAG.
004142  004737  017006          JSR     PC,@#ADRSRC     ;ADDRESS THE MODULE
004146  105737  016023          TSTB    RECBF0+1        ;WAS ANY DATA RETURNED?
004152  001002                  BNE     BCDT12          ;YES, CHECK FORMAT
004154  104022                  MODERR                  ;NO DATA RETURNED WITH EXT. SYNC.
004156  031101                  ERR20

                                ;*************************************************************************
                                ;THIS SUBTEST TEST THE DEVICE FLAG IN MODE '3'.  A REQUEST IS MADE
                                ;FOR AN EXTERNAL SIGNAL TO BE SUPPLIED.  THE 'BCD' INPUT MODULE IS
                                ;THEN ADDRESSED AND CHECKED THAT DATA WAS RETURNED.
                                ;*************************************************************************

004160  104001          BCDT12: SCOPE
004162  000012                  12
004164  104012                  PRINT
004166  026345                  MES60                   ;TEXT 'SUPPLY AN EXTERNAL SYNC.'
004170  104013                  TTYIN                   ;WAIT FOR 'CR'
004172  112737  000063  017017  MOVB    #63,SOH1        ;SELECT MODE 3 WAIT FOR DEVICE FLAG
004200  004737  017006          JSR     PC,ADRSRC       ;ADDRESS THE MODULE
004204  105737  016023          TSTB    RECBF0+1        ;WAS ANY DATA RETURNED?
004210  001002                  BNE     BCDT13          ;YES, VERIFY FORMAT
004212  104022                  MODERR                  ;NO DATA RETURNED WITH EXT. SYNC.
004214  031101                  ERR20
```

```
                                ;*****************************************************************************
                                ;TEST COMPLETE
                                ;*****************************************************************************

004216  104001          BCDT13: SCOPE
004220  000013                  13
004222  104012                  PRINT
004224  023727                  MES7                    ;TEST COMPLETE
004226  000137  003402          JMP     BCDT0

                                ;*****************************************************************************
                                .SBTTL M7381 BCD INPUT EXERCISER TEST
                                ;THIS TEST REQUESTS THE MODULE ADDRESS AND THEN CONTINUOUSLY
                                ;ADDRESSES THE MODULE USING DATA SWITCHES '0 & 1' TO SELECT THE MODE.
                                ;THE RECEIVED DATA IS THEN PRINTED ON THE TELETYPE.
                                ;*****************************************************************************

004232  104012          M7381E: PRINT
004234  025165                  MES32
004236  104026                  ADDRESS                 ;GET MODULE ADDRESS
004240  104035                  SETUP                   ;SETUP THE '↑R' ADDRESS
004242  004737  021374          JSR     PC,TTYENB       ;ENABLE INTERRUPTS

004246  104012          M381E1: PRINT
004250  031500                  CRLF
004252  117700  175074  M381E2: MOVB    @SWR,R0         ;GET MODE FROM SW.'S
004256  142700  000374          BICB    #374,R0         ;CLR UN-WANTED BITS
004262  110037  017017          MOVB    R0,SOH1         ;SET UP THE MODE
004266  152737  000060  017017  BISB    #60,SOH1
004274  104005                  RECVR0                  ;ENABLE THE DL11 RECVR.
004276  004737  017006          JSR     PC,@#ADRSRC     ;ADDRESS THE MODULE
004302  105737  016012          TSTB    RECEOT          ;HAS 'EOT' RETURNED?
004306  001775                  BEQ     .-4             ;NO, WAIT IT OUT
004310  032777  020000  175034  BIT     #SW13,@SWR      ;INHIBIT PRINTOUT?
004316  001355                  BNE     M381E2          ;YES,
004320  104037                  PRTRBF                  ;PRINT RECVR. DATA
004322  000753                  BR      M381E2
```

```
                                ;*****************************************************************************
                                .SBTTL M7382 BCD OUTPUT MODULE ADDRESS TEST
                                ;*****************************************************************************

004324  104012                M7382A: PRINT
004326  025217                        MES33
004330  104026                        ADDRESS                 ;GET THE MODULE ADDRESS
004332  104035                        SETUP                   ;SET UP TEST PARAMETERS

                                ;*****************************************************************************
                                ;THIS TEST ADDRESSED THE BCD OUTPUT MODULE AND TRANSMITS '8' DIGITS
                                ;OF DATA AS '77'.  THIS SHOULD CAUSE ALL THE OUTPUT LINES TO BE HIGH
                                ;*****************************************************************************

004334  000240                OBCDT1: NOP
004336  000240                        NOP
004340  004737  017022                JSR     PC,@#ADRDST     ;ADDRESS DESTINATION

004344  104007                        LDPGMO                  ;TRANSMIT THE FOLLOWING DATA
004346  004352                        .+4
004350  000405                        BR      TAG3A
004352     077                        .BYTE   77              ;1ST DIGIT
004353     077                        .BYTE   77
004354     077                        .BYTE   77
004355     077                        .BYTE   77
004356     077                        .BYTE   77
004357     077                        .BYTE   77
004360     077                        .BYTE   77
004361     077                        .BYTE   77              ;LAST DIGIT
004362     004                        .BYTE   EOT
        004364                        .EVEN

004364  104012                TAG3A:  PRINT                   ;TEXT 'EXAMINE OUTPUT
004366  025250                        MES34
004370  025303                        MES35                   ;CHECK FOR ALL LOGIC 1'S
004372  104013                        TTYIN                   ;WAIT FOR CHECK
```

```
                                        ;*************************************************************************
                                        ;THIS SUBTEST SHOULD CAUSE ALTERNATE 'HI & LO 'S' TO BE SEEN ON THE OUTPUT
                                        ;*************************************************************************
004374  104001                  OBCDT2: SCOPE
004376  000002                          2
004400  004737  017022                  JSR     PC,@#ADRDST     ;ADDRESS DESTINATION
004404  104007                          LDPGMO                  ;TRANSMIT THE FOLLOWING DATA
004406  004412                          .+4
004410  000405                          BR      TAG3B
004412     065                          .BYTE   65              ;1ST DIGIT
004413     065                          .BYTE   65
004414     065                          .BYTE   65
004415     065                          .BYTE   65
004416     065                          .BYTE   65
004417     065                          .BYTE   65
004420     065                          .BYTE   65
004421     065                          .BYTE   65              ;LAST DIGIT
004422     004                          .BYTE   EOT
004424                                  .EVEN
004424  104012                  TAG3B:  PRINT
004426  025260                          MES34
004430  025555                          MES40B
004432  104013                          TTYIN                   ;WAIT FOR CHECK
                                        ;*************************************************************************
                                        ;THIS SUBTEST SHOULD CAUSE ALTERNATE 'HI & LO'S' TO BE SEEN ON THE OUTPUT
                                        ;IN REVERSE OF THOSE IN THE PREVIOUS SUBTEST.
                                        ;*************************************************************************
004434  104001                  OBCDT3: SCOPE
004436  000003                          3
004440  004737  017022                  JSR     PC,@#ADRDST     ;ADDRESS DESTINATION
004444  104007                          LDPGMO                  ;TRANSMIT THE FOLLOWING DATA
004446  004452                          .+4
004450  000405                          BR      TAG3C
004452     072                          .BYTE   72
004453     072                          .BYTE   72
004454     072                          .BYTE   72
004455     072                          .BYTE   72
004456     072                          .BYTE   72
004457     072                          .BYTE   72
004460     072                          .BYTE   72
004461     072                          .BYTE   72
004462     004                          .BYTE   EOT
004464                                  .EVEN
004464  104012                  TAG3C:  PRINT
004466  025250                          MES34
004470  025322                          MES37
004472  025555                          MES40B
004474  104013                          TTYIN                   ;WAIT FOR CHECK
```

```
                                        ;*************************************************************************
                                        ;THIS SUBTEST CONTINUOUSLY ADDRESSES THE MODULE ENABLING THE USER TO SCOPE
                                        ;FOR THE SIGNAL 'OUTPUT DONE 'H & L'.
                                        ;*************************************************************************

004476  104001                  OBCDT4: SCOPE
004500  000004                          4
004502  104012                          PRINT
004504  025334                          MES38                   ;TEXT SCOPE FOR OUTPUT DONE
004506  004737  017022            TAG3D: JSR     PC,@#ADRDST      ;ADDRESS DESTINATION

004512  104006                          LDCHRO
004514  000004                          EOT
004516  000773                          BR      TAG3D           ;CYCLE UNTIL RESTARTED


                                        .SBTTL BCD I/O TEST
                                        ;*************************************************************************
                                        ;BCD INPUT/OUTPUT EXERCISER TEST
                                        ;THIS TEST USES BOTH THE BCD 'INPUT&OUTPUT' MODULES.  AN INCREMENTING
                                        ;'BCD' COUNT IS SENT TO THE OUTPUT MODULE AND WRAPPED AROUND VIA A
                                        ;SPECIAL CABLE TO THE INPUT MODULE.  THE DATA RECEIVED FROM THE INPUT MODULE
                                        ;IS THEN VERIFIED AGAINST THE TRANSMITTED DATA.  THE INPUT MODULE CAN
                                        ;BE SETUP TO USE EITHER INTERNAL OR EXTERNAL SYNC.  IF EXTERNAL SYNC IS
                                        ;SELECTED, THIS SIGNAL IS SUPPLIED FROM THE SIGNAL ON THE BCD OUTPUT
                                        ;MODULE KNOWN AS OUTPUT DATA H.
                                        ;*************************************************************************

004520  104012                  BCDIO:  PRINT
004522  025634                          MES43                   ;TEXT 'BCD I/O TEST'
004524  104026                          ADDRESS                 ;GET THE MODULE ADDRESS
004526  104012                          PRINT
004530  025607                          MES42                   ;TEXT 'INT OR EXT SYNC.?'
004532  104013                          TTYIN                   ;WAIT FOR INPUT
004534  122737  000111  015116          CMPB    #111,INBUF      ;'I' FOR INTERNAL?
004542  001404                          BEQ     .+12            ;YES, SET UP FOR INT. SYNC.
004544  112737  000061  017017          MOVB    #61,SOH1        ;NO, SET UP FOR ENT. SYNC.
004552  000403                          BR      .+10
004554  112737  000060  017017          MOVB    #60,SOH1
004562  104035                          SETUP                   ;SET UP TEST PARAMETERS
```

```
2109
2110                    ;**********************************************************************
2111                    ;THIS SUBTEST OUTPUTS A DATA PATTERN OF '60-77' TO EACH 'BCD' OUTPUT,
2112                    ;ONE AT A TIME.  THIS PATTERN IS THEN READ BACK BY THE BCD INPUT
2113                    ;MODULE AND COMPARED AGAINST THE OUTPUTTED DATA.  THIS TEST WILL VERIFY
2114                    ;THAT EACH OUTPUT LINE CAN BE ADDRESSED AND THAT NO TWO OUTPUTS ARE
2115                    ;SHORTED TOGETHER.
2116                    ;**********************************************************************
2117  004564  000240    BCDI01: NOP
2118  004566  000240            NOP
2119  004570  012700  004624    MOV     #DATA1,R0       ;SET UP DATA TABLE TO TRANSMIT ALL 0'S.
2120  004574  112720  000060    MOVB    #60,(R0)+
2121  004600  022700  004634    CMP     #DATA2,R0       ;DONE?
2122  004604  001373            BNE     .-10            ;NO
2123  004606  012701  004624    MOV     #DATA1,R1       ;SET UP DATA POINTER
2124
2125  004612  004737  017022    TAG4A:  JSR     PC,@#ADRDST     ;ADDRESS DESTINATION
2126  004616  104007            LDPGMD                  ;TRANSMIT DATA
2127  004620  004624            .+4
2128  004622  000405            BR      TAG4B           ;GO HERE WHEN DONE
2129  004624  000060    DATA1:  .BYTE   60
2130  004625  000060            .BYTE   60
2131  004626  000060            .BYTE   60
2132  004627  000060            .BYTE   60
2133  004630  000060            .BYTE   60
2134  004631  000060            .BYTE   60
2135  004632  000060            .BYTE   6
2136  004633  000060            .BYTE   6
2137  004634  000004    DATA2:  .BYTE   EOT
2138          004636            .EVEN
2139
2140  004636  104005    TAG4B:  RECVRD                  ;ENABLE THE DL11 RECVR.
2141  004640  004737  017006    JSR     PC,@#ADRSRC     ;ADDRESS BCD INPUT
2142  004644  104004            DELAY                   ;GIVE 'EM TIME TO READ THE DATA.
2143  004646  012702  004624    MOV     #DATA1,R2       ;SET UP TO VERIFY DATA
2144  004652  012703  016024    MOV     #RECBF0+2,R3
2145  004656  122223    TAG4C:  CMPB    (R2)+,(R3)+     ;DATA EQUAL?
2146  004660  001403            BEQ     .+10            ;YES
2147  004662  104022            MODERR                  ;INPUT DATA DOESN'T EQUAL DATA OUTPUT
2148  004664  030174            ERR3
2149  004666  000414            BR      TAG4E+2         ;EXIT ON ERROR
2150  004670  022702  004634    CMP     #DATA2,R2       ;DONE?
2151  004674  001370            BNE     TAG4C           ;NO, COMPARE NEXT BYTE
2152
2153  004676  105211    TAG4D:  INCB    (R1)            ;UPDATE DATA PATTERN
2154  004700  122711  000100    CMPB    #100,(R1)       ;DONE ALL CODES FOR THIS OUTPUT?
2155  004704  001342            BNE     TAG4A           ;NO, TRANSMIT NEXT PATTERN
2156  004706  112721  000060    MOVB    #60,(R1)+       ;YES, RESET IT TO '60'.
2157  005   022701  004634    CMP     #DATA2,R1       ;DONE WITH TEST?
2158  004   001367    TAG4E:  BNE     TAG4D           ;NO, START NEXT OUTPUT TEST
2159  004720  104012            PRINT
2160  004722  023727            MES7                    ;TEST COMPLETE
2161  004724  000717            BR      BCDI01          ;RESTART TEST
```

```
                                ;*************************************************************
                                .SBTTL M7383 A/D INPUT MODULE ADDRESS TEST
                                ;THIS TEST IS USED TO VERIFY THAT THE A/D MODULE CA    ADDRESS
                                ;AND THAT IT WILL RETURN DATA ON COMPLETION OF A CONVERSION.
                                ;*************************************************************

004726  104012                  M7383A: PRINT
004730  024055                          MES11                   ;TEXT 'A/D ADDRESSING TEST.'
004732  104026                          ADDRESS                 ;GET MODULE ADDRESS
004734  104035                  ADT0:   SETUP                   ;SET UP TEST PARAMETERS

                                ;*************************************************************
                                ;THE FOLLOWING SUBTEST ADDRESSES THE A/D MODULE AND   IFIES THAT
                                ;DATA AND 'EOT' ARE RETURNED BY THE MODULE
                                ;*************************************************************

004736  000240                  ADT1:   NOP
004740  000240                          NOP
004742  112737  000063  017017          MOVB    #63,SOH1        ;PROGRAM CH.'3'
004750  004737  017006                  JSR     PC,@#ADRSRC     ;ADDRESS MODULE

004754  000240                  TAG2A:  NOP
004756  105737  016023                  TSTB    RECBF0+1        ;DATA RETURNED?
004762  001003                          BNE     .+10            ;YES
004764  104022                          MODERR                  ;MODULE DIDN'T ENTER DATA MODE
004766  030507                          ERR11
004770  000414                          BR      ADT2            ;EXIT ON ERROR
004772  005737  016012                  TST     RECEOT          ;WAS 'EOT' RETURNED?
004776  001003                          BNE     .+10            ;YES
005000  104022                          MODERR                  ;MODULE DIDN'T RETURN 'EOT'
005002  030251                          ERR5
005004  000406                          BR      ADT2            ;EXIT ON ERROR
005006  122737  000004  016032          CMPB    #EOT,RECBF0+10  ;CORRECT NO. OF CHAR.'S RETURNED?
005014  001402                          BEQ     .+6             ;YES
005016  104022                          MODERR                  ;DIDN'T RECV. CORRECT NO. OF CHAR.'S.
005020  030174                          ERR3

                                ;*************************************************************
                                ;THIS SUBTEST ADDRESSES THE A/D MODULE USING MODE '8' AND TESTS
                                ;THAT THE CORRECT NUMBER OF CHARACTER ARE RECEIVED BACK.
                                ;*************************************************************

005022  104001                  ADT2:   SCOPE
005024  000002                          2
005026  112737  000070  017017          MOVB    #70,SOH1        ;PROGRAM MODE '8'
005034  004737  017006                  JSR     PC,@#ADRSRC     ;ADDRESS MODULE

005040  122737  000004  016062  TAG2B:  CMPB    #EOT,RECBF0+40  ;'EOT' SHOULD BE RETURNED HERE
005046  001402                          BEQ     .+6             ;OK
005050  104022                          MODERR                  ;MODULE DIDN'T RETURN '4' CH.'S OF DATA
005052  030174                          ERR3
```

```
2213
2214                            ;*************************************************************************
2215                            ;THIS SUBTEST ADDRESSES THE 'A/D' USING THE WRONG MODULE ADDRESSES
2216                            ;AND TESTS THAT THE MODULE ISN'T ENABLED.
2217                            ;*************************************************************************
2218
2219  005054  104001           ADT3:   SCOPE
2220  005056  000003                   3
2221  005060  004737  005066           JSR     PC,@#ADRSIT
2222  005064  000437                   BR      ADT4
2223
2224  005066  005737  031600   ADRSIT: TST     SIOSWH          ;USING THE SERIAL INPUT?
2225  005072  0[illegible]              BNE     TAG2H           ;YES, INHIBIT RUNNING THIS TEST.
2226  005074  [illegible]  000060  005123  MOVB    #60,ADCHX1      ;SET UP 1ST ADDRESS TO BE TESTED
2227  005102  [illegible]  031602  005123  TAG2C:  CMPB    MODADR,ADCHX1   ;EQUAL TO SELECTED ADDR.?
2228  005110  001416                   BEQ     TAG2F           ;YES, SELECT NEXT. ADDR.
2229  005112  104005                   RECVRQ
2230  005114  104025                   SOURCE
2231  005116  005122                   .+4
2232  005120  000403                   BR      TAG2G
2233
2234  005122     021           ADCHX1: .BYTE   DC1             ;ALERT MODULE
2235  005123     060                   .BYTE   60              ;ADDRESS MODIFIED FROM '60-77'
2236  005124     001                   .BYTE   SOH
2237  005125     060                   .BYTE   60
2238  005126     023                   .BYTE   DC3             ;ENABLE MODULE
2239  005127     000                   .BYTE   0
2240
2241  005130  005712           TAG2G:  TST     (R2)            ;WAS ANY DATA RETURNED
2242  005132  001405                   BEQ     TAG2F           ;NO
2243  005134  113737  005123  030634   MOVB    ADCHX1,ERR13A
2244  005142  104022                   MODERR                  ;MODULE WAS ENABLE WITH ILLEGAL ADDR.
2245  005144  030572                   ERR13
2246
2247  005146  105237  005123  TAG2F:  INCB    ADCHX1          ;UPDATE MODULE ADDRESS
2248  005152  122737  000100  005123   CMPB    #100,ADCHX1     ;DONE?
2249  005160  001350                   BNE     TAG2C           ;NO
2250  005162  000207           TAG2H:  RTS     PC
```

```
2251                                    ;*************************************************************************
2252                                    ;THIS SUBTEST CHECKS THAT THE A/D MODULE WILL WORK UNDER EXTERNAL SYNC.
2253                                    ;THE MODULE IS ADDRESSED AND THEN A REQUEST IS MADE FOR AN EXTERNAL
2254                                    ;SYNC SIGNAL TO BE SUPPLIED.
2255                                    ;*************************************************************************
2256
2257  005164  104001                ADT4:   SCOPE
2258  005166  000004                        4
2259  005170  032777  002000  174154        BIT     #SW10,@SWR      ;SW. '10' SET?
2260  005176  001443                        BEQ     ADT5+4          ;NO, INHIBIT THIS TEST
2261  005200  104012                        PRINT
2262  005202  024007                        MES10                   ;TEXT 'RESET MODULE ADDR.
2263  005204  104013                        TTYIN                   ;WAIT FOR SETUP
2264  005206  012737  005206  020550        MOV     #.,RETURN       ;RESET SCOPE LOOP POINTER
2265  005214  112737  000077  017015        MOVB    #77,SRCADR      ;SET UP ADDRESS '17'
2266  005222  104005                        RECVRO                  ;ENABLE THE DL11 RECEIVER
2267  005224  112737  000064  017017        MOVB    #64,SOH1        ;EXT SYNC; CHANNEL '0'
2268  005232  004737  017006                JSR     PC,@#ADRSRC     ;ADDRESS MODULE
2269  005236  005712                        TST     (R2)            ;MAKE SURE NO DATA WAS RETURNED
2270  005240  001403                        BEQ     .+10
2271  005242  104022                        MODERR                  ;EXT SYNC CONVERSION TOOK PLACE
2272  005244  031143                        ERR21                   ;WITH NO EXT. SYNC SUPPLIED.
2273  005246  000415                        BR      ADT5            ;EXIT ON ERROR
2274  005250  104012                        PRINT
2275  005252  026345                        MES60                   ;TEXT 'SUPPLY EXT. SYNC SIGNAL'.
2276  005254  005077  174060                CLR     @PSW            ;ENABLE DL11 INTERRUPTS
2277  005260  000001                        WAIT
2278  005262  012777  000340  174050        MOV     #340,@PSW       ;SET PROC. PRIOR. @7
2279  005270  104004                        DELAY                   ;WAIT FOR DATA
2280  005272  005712                        TST     (R2)            ;WAS A DATA RETURNED
2281  005274  001002                        BNE     .+6             ;YES
2282  005276  104022                        MODERR                  ;NO DATA WAS RETURNED WITH
2283  005300  031101                        ERR20                   ;EXTERNAL SYNC.
2284
2285                                    ;*************************************************************************
2286                                    ;TEST COMPLETE
2287                                    ;*************************************************************************
2288
2289  005302  104001                ADT5:   SCOPE
2290  005304  000005                        5
2291  005306  104012                        PRINT
2292  005310  023727                        MES7                    ;TEXT 'TEST COMPLETE'
2293  005312  000137  004734                JMP     ADT0            ;RE-START TEST.
```

```
2294                                    ;*****************************************************************************
2295                                    .SBTTL M7383 A/D CALIBRATION ROUTINE
2296                                    ;THIS ROUTINE TAKES CONTINUOUS CONVERSION USING DATA SW'S '0-4'IN OCTAL
2297                                    ;WEIGHT TO SELECT THE CHANNEL TO BE CONVERTED AND THEN PRINTS THE CONVERTED VALUE
2298                                    ;
2299                                    ;CHANNEL SELECTION IS AS FOLLOWS:
2300                                    ;
2301                                    ;DATA SW'S '0-1' SELECT 'INT. SYNC' ON CH.'S 0,1,2 OR 3
2302                                    ;DATA SW' '2' & '0-1' SELECT 'EXT SYNC' ON CH.'S 0,1,2 OR 3
2303                                    ;DATA SW '3' ONLY SELECTS 'INT SYNC' CONVERSION ON ALL '4' CH.'S
2304                                    ;DATA SW'S '2&3' SELECT 'EXT. SYNC' CONVERSION ON ALL '4' CH.'S
2305                                    ;*****************************************************************************
2306
2307  005316  104012                  M7383C: PRINT
2308  005320  024102                          MES12                  ;TEXT 'A/D CALIBRATION ROUTINE'
2309  005322  104026                          ADDRESS                ;GET MODULE ADDRESS
2310  005324  004737  021216                 JSR     PC,REMOTE      ;CHECK FOR REMOTE DESTINATION
2311  005330  104035                          SETUP                  ;SET UP THE 'tR' RESTART ADDRESS
2312  005332  012701  000001                 MOV     #1,R1          ;SET UP FOR '1' CONVERSION
2313  005336  104036                          NODLAY                 ;SET TRANS. DELAY INHIBIT SW.
2314  005340  104012                  CALBT1: PRINT
2315  005342  031500                          CRLF
2316  005344  117703  174002          CALBT2: MOVB    @SWR,R3        ;GET CHANNEL
2317  005350  14270?  000300                  BICB    #300,R3        ;CLR UN-WANTED BITS
2318  005354  15270_  000060                  BISB    #60,R3         ;CONVERT TO ASCII
2319  005360  110337  017017                 MOVB    R3,SOH1        ;SET UP TO CONVERT CH.
2320  005364  104027                          ADCNVT                 ;CONVERT
2321  005366  032777  020000  173756         BIT     #SW13,@SWR     ;INHIBIT TYPEOUT?
2322  005374  001363                          BNE     CALBT2         ;YES, TAKE NEXT CONVERSION
2323  005376  004737  021256                 JSR     PC,SETRMT      ;CHK FOR AND SET UP REMOTE DST.
2324
2325  005402  104037                          PRTRBF                 ;PRINT RECV'D DATA
2326  005404  004737  021300                 JSR     PC,CLRMOTE     ;CLEAR REMOTE DESTINATION
2327  005410  000755                          BR      CALBT2
```

```
2328                                    ;*****************************************************************
2329                                    .SBTTL M7383 A/D REPEATIBILITY TEST
2330                                    ;THIS TEST REQUESTS FOR A CHANNEL AND A V.S.F (VERTICAL SCALE FACTOR) TO
2331                                    ;BE INPUTTED FROM THE TELETYPE.  A SERIES OF '100' CONVERSIONS A THEN TAKEN,
2332                                    ;AVERAGED AND THEN THE RESULT IS DISPLAYED IN A HISTOGRAM FORMAT ON
2333                                    ;THE TELETYPE.
2334                                    ;*****************************************************************
2335
2336  005412  104012                M7383R: PRINT
2337  005414  024265                        MES15                   ;TEXT 'A/D REPEATIBILITY TEST'.
2338  005416  104026                        ADDRESS                 ;GET THE MODULE ADDRESS
2339  005420  004737  021216                JSR     PC,REMOTE       ;CHECK FOR REMOTE DESTINA.ION
2340  005424  104035                        SETUP                   ;SET UP RESTART ADDR. POINTER
2341  005426  104036                        NODLAY                  ;SET TRANS. DELAY INHIBIT SW.
2342  005430  104012                REPTOA: PRINT
2343  005432  024315                        MES16                   ;REQUEST 'VSF'
2344  005434  104013                        TTYIN
2345  005436  104030                        BCDBIN                  ;CONVERT INPUT TO BINARY
2346  005440  005737  022316                TST     BCDTAB          ;VSF=07
2347  005444  001771                        BEQ     REPTOA          ;YES, ILLEGAL ENTRY
2348  005446  013737  022316  031642        MOV     BCDTAB,KSTOR1   ;SAVE INPUT
2349  005454  005037  015700                CLR     HIDIVR
2350  005460  005037  015704                CLR     HIDIVD
2351  005464  013737  031642  015676        MOV     KSTOR1,LODIVR   ;SET UP TO DIVIDE 'VSF' TO GET NO. OF AVG.'S
2352  005472  012737  000144  015702        MOV     #100.,LODIVD
2353  005500  004737  015604                JSR     PC,DIVIDE
2354  005504  005737  015714                TST     REMAIN          ;IS NUMBER LEGAL?
2355  005510  001347                        BNE     REPTOA          ;NO, REQUEST NEW 'VSF'
2356  005512  013737  015710  031650        MOV     QUOENT,KSTOR4   ;YES, SAVE IT
2357  005520  013737  031642  031652        MOV     KSTOR1,KSTOR5
2358  005526  006337  031652                ASL     KSTOR5
2359  005532  104032                        CHANEL                  ;REQUEST CHANNEL.
2360  005534  012701  000144        REPTO:  MOV     #100.,R1        ;SET UP TO TAKE '100' CONVERSIONS
2361  005540  012702  017450                MOV     #TRNBFO,R2      ;SET UP TO SAVE CONVERTED VALUE
2362  005544  104027                REPT1:  ADCNVT                  ;TAKE 100 CONVERSION
2363  005546  104031                        AVERAGE                 ;AVERAGE THEM
2364  005550  012700  015706                MOV     #LOW,R0         ;SET UP TO SAVE VALUES
2365  005554  012703  031750                MOV     #AVGTAB,R3      ;SAVE AVERAGE HERE
2366  005560  012704  000003                MOV     #3,R4
2367  005564  012023                        MOV     (R0)+,(R3)+     ;SAVE AVG HIGH & LOW
2368  005566  005304                        DEC     R4              ;SAVED ALL VALUES
2369  005570  001375                        BNE     .-4             ;NO
2370  005572  013700  015710                MOV     QUOENT,R0       ;SET UP AVERAGE
2371  005576  062700  000011                ADD     #9.,R0          ;CALCULATE AVERAGE +9 VALUE
2372  005602  010037  031644                MOV     R0,KSTOR2       ;SAVE IT
2373  005606  162700  000022                SUB     #18.,R0         ;CALCULATE AVERAGE -9 VALUE
2374  005612  010037  031646                MOV     R0,KSTOR3       ;SAVE IT
2375  005616  013704  031650                MOV     KSTOR4,R4       ;SETUP TO AVERAGE OUT 'VSF'
2376  005622  013701  031642                MOV     KSTOR1,R1       ;SET UP TO TAKE 'X' AVERAGES
2377  005626  022701  000001                CMP     #1,R1           ;VSF =1?
2378  005632  001412                        BEQ     REPT3           ;YES, NO AVERAGING NEEDED
2379  005634  104031                REPT2:  AVERAGE                 ;DO IT
2380  005636  013723  015710                MOV     QUOENT,(R3)+    ;SAVE VALUE
2381  005642  063702  031652                ADD     KSTOR5,R2       ;SET BUFFER POINTER TO PICK UP NEXT GROUP
2382  005646  005304                        DEC     R4              ;DONE
2383  005650  001371                        BNE     REPT2           ;NO
```

```
2384  00565     2702  031756                MOV     #AVGTAB+6,R2    ;SET UP TO CATEGORIZE AVERAGES
2385  00565     0402                        BR      .+6
2386  00566  012702  017450        REPT3:  MOV     #TRNBFO,R2      ;FOR VSF OF '1' USE ACTUAL VALUES
2387  00564  012700  031674                MOV     #ORLOW,R0       ;SET UP TO CLR COUNT BUFFER
2388  00570  005020                        CLR     (R0)+           ;CLR BUFFER
2389  00572  022700  031750                CMP     #ORHIGH+2,R0    ;DONE?
2390  00576  001374                        BNE     .-6             ;NO
2391  00700  013700  031650                MOV     KSTOR4,R0       ;KSTOR4 CONTAINS VSF
2392  00704  010001                        MOV     R0,R1
2393  00706  021237  031644        REPT4:  CMP     (R2),KSTOR2     ;IS VALUE > AVG. +9?
2394  00712  003403                        BLE     .+10            ;NO
2395  00714  005237  031746                INC     ORHIGH          ;YES, VALUE OUT OF RANGE
2396  00720  000414                        BR      REPT5
2397  00722  021237  031646                CMP     (R2),KSTOR3     ;IS VALUE < AVG. -9?
2398  00726  002003                        BGE     .+10            ;YES
2399  00730  005237  031674                INC     ORLOW           ;NO, OUT OF RANGE
2400  00734  000406                        BR      REPT5
2401  00736  011203                        MOV     (R2),R3         ;GET VALUE TO WORK ON IT
2402  00740  163703  031646                SUB     KSTOR3,R3       ;OBTAIN OFFSET
2403  00744  006303                        ASL     R3
2404  00746  005263  031676                INC     MINUS9(R3)      ;INCREMENT CNTR
2405  00752  005722        REPT5:  TST     (R2)+           ;INCREMENT POINTER
2406  00754  005300                        DEC     R0              ;DONE?
2407  00756  001353                        BNE     REPT4           ;NO
2408  00760  004737  021256                JSR     PC,SETRMT       ;CHK FOR AND SET UP REMOTE DST.
2409
2410                        ;*****************************************************************
2411                        ;AT THIS POINT THE AVERAGES HAVE BEEN TAKEN AND CATEGORIZED.  THE
2412                        ;NEXT SECTION DISPLAYS THE COUNTS IN A HISTOGRAM FORMAT.
2413                        ;*****************************************************************
2414
2415  00576  012702  031676        REPT6:  MOV     #MINUS9,R2      ;SET UP COUNT TABLE
2416  00770  005003                        CLR     R3
2417  00772  020122                        CMP     R1,(R2)+        ;SCAN TABLE FOR CURRENT COUNT
2418  00774  001407                        BEQ     REPT7           ;COUNT FOUND, PRINT IT
2419  00776  005203                        INC     R3
2420  00000  022702  031746        REPT6A: CMP     #ORHIGH,R2      ;SCANNED WHOLE TABLE?
2421  00004  001372                        BNE     REPT6+6         ;NO, CONTINUE
2422  00006  005301        REPT6B: DEC     R1              ;YES, CHECKED ALL COUNTS?
2423  00010  001365                        BNE     REPT6           ;NO, RE-SCAN TABLE
2424  00012  000422                        BR      REPT9           ;TYPE FINAL DATA
2425
2426  00014  104012        REPT7:  PRINT
2427  00016  031360                        DASH
2428  00020  010337  021036        REPT8:  MOV     R3,SPACEX       ;ANY SPACES TO BE TYPED?
2429  00024  001401                        BEQ     .+4             ;NO, PRINT ASTRICK
2430  00026  104016                        SPACE                   ;YES, PRINT SPACE
2431  00030  005342                        DEC     -(R2)           ;SUBTRACT '1' FROM COUNT
2432  00032  005722                        TST     (R2)+
2433  00034  104012                        PRINT
2434  00036  031346                        ASTRIC
2435  00040  005003                        CLR     R3
2436  00042  022702  031746        REPT8A: CMP     #ORHIGH,R2      ;DONE CURRENT SCAN?
2437  00046  001757                        BEQ     REPT6B          ;YES, EXIT
2438  00050  020122                        CMP     R1,(R2)+        ;NO, IS THIS COUNT EQUAL?
2439  00052  001762                        BEQ     REPT8           ;YES, PRINT IT
```

```
2440  006054  005203                        INC     R3              ;NO, INC. SPACE CNTR.
2441  006056  000771                        BR      REPT8A
2442  006060  113701  016024        REPT9:  MOVB    RECBFO+2,R1     ;SAVE GAIN SETTING
2443  006064  122701  000114                CMPB    #'L,R1          ;RUNNING WITH LOW GAIN?
2444  006070  001003                        BNE     .+10            ;NO
2445  006072  012737  031421  006134        MOV     #X1MV,REPT10
2446  006100  122701  000115                CMPB    #'M,R1          ;RUNNING WITH MEDIUN GAIN?
2447  006104  001003                        BNE     .+10            ;NO
2448  006106  012737  031425  006134        MOV     #X100UV,REPT10
2449  006114  122701  000110                CMPB    #'H,R1          ;RUNNING WITH HIGH GAIN
2450  006120  001003                        BNE     .+10            ;NO
2451  006122  012737  031433  006134        MOV     #X10UV,REPT10
2452  006130  104012                        PRINT
2453  006132  031363                        SCALE                   ;PRINT HORIZONTAL SCALE HEADER
2454  006134  000000            REPT10:     0
2455  006136  031440                        XDIV
2456  006140  004737  006216                JSR     PC,REPT13       ;PRINT SUMMARY
2457  006144  013705  031674        REPT11: MOV     ORLOW,R5
2458  006150  063705  031746                ADD     ORHIGH,R5       ;WERE ANY COUNTS OUT OF RANGE?
2459  006154  001412                        BEQ     REPT12          ;NO, RE-CYCLE TEST
2460  006156  104012                        PRINT
2461  006160  031451                        XLOW                    ;TEXT 'OR-LOW
2462  006162  013702  031674                MOV     ORLOW,R2
2463  006166  104033                        BINDEC                  ;PRINT COUNTS LOW
2464  006170  104012                        PRINT
2465  006172  031462                        XHIGH
2466  006174  013702  031746                MOV     ORHIGH,R2
2467  006200  104033                        BINDEC                  ;PRINT COUNTS 'HI'
2468  006202  104012            REPT12:     PRINT
2469  006204  031502                        CRLF2
2470  006206  004737  021300                JSR     PC,CLRMOTE      ;CLEAR REMOTE DESTINATION
2471  006212  000137  005534        RPT12A: JMP     REPTO
2472
2473  006216  012703  000003        REPT13: MOV     #3,R3           ;SET UP PRINT LO-HI & AVG. VALUES
2474  006222  012701  031750                MOV     #AVGTAB,R1      ;SET UP BUFFER POINTER
2475  006226  012102            REPT14:     MOV     (R1)+,R2        ;GET VALUE
2476  006230  004737  006730                JSR     PC,POSTIT       ;CONVERT & PRINT IT
2477  006234  005303                        DEC     R3
2478  006236  001001                        BNE     .+4
2479  006240  000207                        RTS     PC
2480  006242  012737  000002  021036        MOV     #2,SPACEX
2481  006250  104016                        SPACE
2482  006252  000765                        BR      REPT14
2483
```

```
                                ;*****************************************************************************
                                .SBTTL M7383 A/D GAIN ACCURACY TEST
                                ;THIS TEST REQUESTS OF A SERIES OF VOLTAGES A SPECIFIED GAIN SETTINGS
                                ;TO BE SUPPLIED TO THE 'A/D'.  A SERIES OF A HUNDRED CONVERSIONS ARE TAKEN
                                ;AT EACH OF THESE SETTINGS AND AVERAGED OUT.  THIS AVERAGE IS THEN TESTED
                                ;TO BE WRITTEN '+ OR -' A COUNT FROM THE TRUE VOLTAGE VALUE FOR THAT
                                ;SPECIFIED SETTING.
                                ;*****************************************************************************

006254  104012        M7383G: PRINT
006256  024332                MES18                   ;TEXT 'A/D GAIN TEST'
006260  104026                ADDRESS
006262  104035                SETUP                   ;SET UP RESTART ADDR. POINTER
006264  005037  031670        CLR     LOPSWH
006270  104032                CHANEL                  ;REQUEST & STORE CH. TO BE TESTED.

                                ;TEST '+1.990V' AT 'LOW' GAIN

006272  104012                PRINT
006274  024357                MES19                   ;TEXT 'SUPPLY +1.990V'
006276  104012                PRINT
006300  024405                MES20                   ;TEXT 'AT LOW GAIN
006302  104034                WAITGN
006304  000114                'L                      ;LOW GAIN
006306  007625                7625                    ;TRUE VOLTAGE VALUE + OFFSET

                                ;TEST -1.990V AT 'LOW' GAIN

006310  104012                PRINT
006312  024421                MES21                   ;SWITCH VOLTAGE NEG.
006314  104034                WAITGN
006316  000114                'L
006320  000011                11                      ;TRUE VOLTAGE VALUE + OFFSET

                                ;TEST +.1990V AT LOW GAIN

006322  104012                PRINT
006324  024505                MES24                   ;TEXT 'SUPPLY' +.1990V'
006326  024405                MES20                   :TEXT 'SUPPLY +.1990V'
006330  104034                WAITGN
006332  000114                'L                      ;GAIN MED.
006334  004226                4226
```

```
                                        ;TEST '-.1990V AT 'LOW' GAIN

006336  104012                                PRINT
006340  024421                                MES21                   ;TEXT 'SWITCH VOLTAGE NEG.'
006342  104034                                WAITGN
006344  000114                                'L
006346  003410                                3410

                                        ;TEXT '0.0V' AT LOW GAIN

006350  104012                                PRINT
006352  024563                                MES25                   ;TEXT 'SUPPLY +0.000V.'
006354  104034                                WAITGN
006356  000114                                'L
006360  003717                                3717
                                        ;*************************************************************************
                                        ;TEST COMPLETE
                                        ;*************************************************************************
006362  104012                                PRINT
006364  023727                                MES7                    ;TEST COMPLETE
006366  000735                                BR      M7383G+6        ;RE-START TEST
006370  000240                                NOP

                                        ;*************************************************************************
                                        .SBTTL M7383 A/D GAIN AVERAGING SUBROUTINE
                                        ;THIS SUBROUTINE WAITS FOR 'CR' THEN TAKES AND AVERAGES '100' A/D CONVERSIONS.
                                        ;THIS COMPUTED AVERAGE IS COMPARED AGAINST THE TRUE VOLTAGE VALUE FOR A
                                        ;SPECIFIED SETTING.  THE AVERAGE IS PRINTED OUT IF FOUND TO BE MORE THAN '+ OR -'
                                        ;1 COUNT FROM THE AVERAGE
                                        ;*************************************************************************

006372  017603  000000        XWATGN: MOV     @(SP),R3        ;PICK UP GAIN CODE FROM CALL +2
006376  062716  000002                ADD     #2,(SP)
006402  017604  000000                MOV     @(SP),R4        ;PICK UP TRUE VOLTAGE VALUE
006406  104013                WAITG1: TTYIN                   ;WAIT FOR 'CR' TO CONTINUE
006410  012701  000001                MOV     #1,R1
006414  104027                        ADCNVT
006416  120337  016024                CMPB    R3,RECBFO+2     ;IS GAIN CODE CORRECT?
006422  001403                        BEQ     .+10            ;YES
006424  104012                        PRINT                   ;NO, TELL HIM ABOUT IT
006426  024604                        MES26
006430  000766                        BR      WAITG1          ;WAIT FOR SETUP
006432  012701  000144                MOV     #100.,R1        ;SET UP TO TAKE '100' CONVERSIONS
```

```
2571  006436  012702  017450          WAITG2: MOV     #TRNBFO,R2      ;SAVE THEM HERE
2572  006442  104027                          ADCNVT                  ;TAKE THE CONVERSIONS
2573  006444  104031                          AVERAGE                 ;AVERAGE THEM
2574  006446  013702  015710                  MOV     QUOENT,R2
2575  006452  020402                          CMP     R4,R2           ;AVERAGE = TRUE VALUE?
2576  006454  001441                          BEQ     GANEXT          ;YES, EXIT
2577  006456  005204                          INC     R4
2578  006460  020402                          CMP     R4,R2           ;AVERAGE = TRUE VALUE +1?
2579  006462  001436                          BEQ     GANEXT          ;YES, EXIT
2580  006464  162704  000002                  SUB     #2,R4
2581  006470  020402                          CMP     R4,R2           ;AVERAGE = TRUE VALUE -1?
2582  006472  001432                          BEQ     GANEXT          ;YES, EXIT
2583  006474  032777  020000  172650  WAITG3: BIT     #SW13,@SWR      ;NO, PRINT INHIBIT SW. SET?
2584  006502  001355                          BNE     WAITG2          ;YES
2585  006504  032777  020000  172640          BIT     #SW13,@SWR      ;SW SET?
2586  006512  001351                          BNE     WAITG2          ;YES, INHIBIT ERROR TYPEOUT.
2587  006514  005737  031670                  TST     LOPSWH          ;NO, HAS ERROR HEADER BEEN TYPED?
2588  006520  001004                          BNE     .+12
2589  006522  005237  031670                  INC     LOPSWH
2590  006526  104012                          PRINT
2591  006530  024625                          MES27
2592  006532  104012                          PRINT
2593  006534  031500                          CRLF
2594  006536  104002                          SAVREG
2595  006540  012703  000003                  MOV     #3,R3
2596  006544  012701  015706                  MOV     #LOW,R1
2597  006550  004737  006226                  JSR     PC,REPT14
2598  006554  104003                          GETREG
2599  006556  000727                          BR      WAITG2
2600
2601  006560  062716  000002          GANEXT: ADD     #2,(SP)
2602  006564  000002                          RTI
2603
```

```
                                        ;*****************************************************************************
                                        .SBTTL A/D CONVERSION ROUTINE
                                        ;THIS ROUTINE TAKES AN A/D CONVERSION AND ENABLES
                                        ;DL D'S RECVR TO ACCEPT & STORE THE CONVERTED VALUE
                                        ;*****************************************************************************

006566  104002                  XADCNT: SAVREG                          ;SAVE REG.'S
006570  012705  017450                  MOV     #TRNBFO,R5              ;SAVE CONVERTED VALUES HERE
006574  005077  172540                  CLR     @PSW                    ;ENABLE RECEIVER INTERRUPTS
006600  104005                  ADCTO:  RECVRO                          ;ENABLE THE DL11 RECVR
006602  004737  017006                  JSR     PC,@#ADRSRC             ;ADDRESS MODULE

006606  005737  016012          ADCT1:  TST     RECEOT                  ;WAS 'EOT' RETURNED?
006612  001775                          BEQ     .-4                     ;NO, WAIT FOR CONVERT
006614  012703  016025                  MOV     #RECBFO+3,R3            ;SET UP ADDRESS TO PICK UP SIGN
006620  012704  016026                  MOV     #RECBFO+4,R4            ;SET UP ADDRESS TO PICK UP DATA
006624  005000                          CLR     R0
006626  012437  015116          ADCT2:  MOV     (R4)+,INBUF             ;SET UP NO. TO BE CONVERTED
006632  011437  015120                  MOV     (R4),INBUF+2
006636  012737  000004  031662          MOV     #4,CHRCNT
006644  104030                          BCDBIN                          ;CONVERT VALUE TO BINARY
006646  013715  022316                  MOV     BCDTAB,(R5)             ;SAVE IT
006652  122713  000053                  CMPB    #53,(R3)                ;VALUE POS.?
006656  001401                          BEQ     .+4                     ;YES, LEAVE AS IS
006660  005415                          NEG     (R5)                    ;NO,
006662  063725  031576                  ADD     OFFSET,(R5)+            ;ADD OFFSET
006666  132737  000010  017017          BITB    #10,$C                  ;CONVERTING ALL '4' CH.'S?
006674  001411                          BEQ     ADCT3                   ;NO, EXIT
006676  005200                          INC     R0
006700  022700  000004                  CMP     #4,R0                   ;SAVED ALL VALUES?
006704  001405                          BEQ     ADCT3                   ;YES, EXIT
006706  062703  000010                  ADD     #10,R3                  ;NO, PICK UP NEXT ADDRESSES
006712  062704  000006                  ADD     #6,R4
006716  000743                          BR      ADCT2
006720  005301                  ADCT3:  DEC     R1
006722  003326                          BGT     ADCTO                   ;TAKE NEXT CONVERSION
006724  104003                          GETREG
006726  000002                          RTI                             ;NO, EXIT

                                        ;*****************************************************************************
                                        ;SUBROUTINE TO CONVERT THE VALUE IN 'R2' BACK TO A 'TRUE' A/D VALUE
                                        ;AND PRINT IT IN DECIMAL AS EITHER '+ OR-'.
                                        ;*****************************************************************************

006730  104002                  POSTIT: SAVREG
006732  012701  000053                  MOV     #53,R1                  ;SET UP TO PRINT '+'
006736  163702  031576                  SUB     OFFSET,R2               ;SUBTRACT OFFSET TO OBTAIN REAL VALUE.
006742  100003                          BPL     .+10                    ;VALUE POS.?
006744  005402                          NEG     R2                      ;NO, COMPLIMENT IT
006746  012701  000055                  MOV     #55,R1                  ;NO, SET UP TO PRINT '-'
006752  104010                          TYPEIT
006754  104033                          BINDEC                          ;TYPE VALUE
006756  104003                          GETREG
006760  000207                          RTS     PC
```

```
                                        ;*****************************************************************************
                                        .SBTTL M7384 D/A ADDRESSING TEST
                                        ;*****************************************************************************

006762  104012                  M7384A: PRINT
006764  025706                          MES45                   ;TEXT 'D/A ADDRESSING TEST'
006766  104026                          ADDRESS                 ;GET THE MODULE ADDRESS
006770  104035                          SETUP                   ;SETUP TEST PARAMETERS

                                        ;*****************************************************************************
                                        ;THIS SUBTEST ADDRESSES THE D/A MODULE SENDS A CODE OF '70' (MODE 8)
                                        ;THIS SHOULD ENABLE THE SIGNAL 'PROG L' TO BE LOW UNTIL THE 2ND CHAR.
                                        ;IS SENT TO THE MODULE.
                                        ;*****************************************************************************

006772  000240                  DAT1:   NOP
006774  000240                          NOP
006776  004737  017022                  JSR     PC,@#ADRDST     ;ADDRESS THE MODULE
007002  104006                          LDCHRO
007004  000070                          70                      ;SEND THE CHAR. '8'
007006  104012                          PRINT
007010  025733                          MES46                   ;TEXT 'SCOPE FOR 'PROG L' HI'
007012  104013                          TTYIN                   ;WAIT FOR 'CR' TO CONTINUE
007014  104006                          LDCHRO                  ;SEND 'EOT'
007016  000004                          EOT
007020  104012                          PRINT
007022  025776                          MES47                   ;SCOPE FOR 'PROG L HI & FLOP L LO'
007024  104013                          TTYIN

                                        ;*************  ***************************************************************
                                        ;THIS SUBTES   ST ADDRESSES THE MODULE AND SENDS MODE '9' TO SET
                                        ;THE 'FLOP'    P.  THEN THE MODULE IS RE-ADDRESSED AND SENDS MODE '8'
                                        ;TO CLR THE 'FLOP' FLOP.
                                        ;*****************************************************************************

007026  104001                  DAT2:   SCOPE
007030  000002                          2
007032  004737  017022                  JSR     PC,ADRDST       ;ADDRESS MODULE
007036  104007                          LDPGMO
007040  007044                          .+4
007042  000401                          BR      .+4
007044     071                          .BYTE   71              ;SEND CHAR. '9'
007045     004                          .BYTE   EOT

007046  104012                          PRINT
007050  026043                          MES48                   ;SCOPE FOR 'FLOP L' HI'
007052  104013                          TTYIN

007054  004737  017022                  JSR     PC,@#ADRDST     ;RE-ADDRESS MODULE
007060  104007                          LDPGMO
007062  007066                          .+4
007064  000401                          BR      .+4
007066     070                          .BYTE   70              ;SEND CHAR. '8'
007067     004                          .BYTE   EOT

007070  104012                          PRINT
```

```
2714  007072  026072                          MES49                   ;SCOPE FOR 'FLOP L' LO
2715  007074  104013                          TTYIN
2716
2717                                  ;*************************************************************************
2718                                  ;THIS SUBTEST OUTPUTS 0.00 VOLTS TO CH. 'O'.
2719                                  ;*************************************************************************
2720
2721  007076  104001                DATST3: SCOPE
2722  007100  000003                        3
2723  007102  012737  030061  007666        MOV     #30061,DATA3    ;CH. 'O' 0 VOLTS
2724  007110  012737  030060  007670        MOV     #30060,DATA4
2725  007116  004737  007636                JSR     PC,DAOUT        ;SEND DATA
2726  007122  104012                        PRINT
2727  007124  026121                        MES50
2728  007126  026205                        MES52
2729  007130  104013                        TTYIN
2730
2731                                  ;*************************************************************************
2732                                  ;THIS SUBTEST OUTPUTS 1.11 VOLTS TO CH. 'O'.
2733                                  ;*************************************************************************
2734
2735  007132  104001                DATST4: SCOPE
2736  007134  000004                        4
2737  007136  012737  030461  007666        MOV     #30461,DATA3
2738  007144  012737  030461  007670        MOV     #30461,DATA4
2739  007152  004737  007636                JSR     PC,DAOUT
2740  007156  104012                        PRINT
2741  007160  026121                        MES50
2742  007162  026213                        MES53
2743  007164  104013                        TTYIN
2744
2745                                  ;*************************************************************************
2746                                  ;THIS SUBTEST OUTPUTS 2.22 VOLTS TO CH. 'O'.
2747                                  ;*************************************************************************
2748
2749  007166  104001                DATST5: SCOPE
2750  007170  000005                        5
2751  007172  012737  031061  007666        MOV     #31061,DATA3
2752  007200  012737  031062  007670        MOV     #31062,DATA4
2753  007206  004737  007636                JSR     PC,DAOUT
2754  007212  104012                        PRINT
2755  007214  026121                        MES50
2756  007216  026221                        MES54
2757  007220  104013                        TTYIN
```

```
2758
2759                                    ;*************************************************************************
2760                                    ;THIS SUBTEST OUTPUTS 4.44 VOLTS TO CH. '0'.
2761                                    ;*************************************************************************
2762
2763   007222  104001                   DATST6: SCOPE
2764   007224  000006                           6
2765   007226  012737  032061  007666           MOV     #32061,DATA3
2766   007234  012737  032064  007670           MOV     #32064,DATA4
2767   007242  004737  007636                   JSR     PC,DAOUT
2768   007246  104012                           PRINT
2769   007250  026121                           MESS0
2770   007252  026227                           MESS5
2771   007254  104013                           TTYIN
2772
2773                                    ;*************************************************************************
2774                                    ;THIS SUBTEST OUTPUTS 8.88 VOLTS TO CH. '0'.
2775                                    ;*************************************************************************
2776
2777   007256  104001                   DATST7: SCOPE
2778   007260  000007                           7
2779   007262  012737  034061  007666           MOV     #34061,DATA3
2780   007270  012737  034070  007670           MOV     #34070,DATA4
2781   007276  004737  007636                   JSR     PC,DAOUT
2782   007302  104012                           PRINT
2783   007304  026121                           MESS0
2784   007306  026235                           MESS6
2785   007310  104013                           TTYIN
2786
2787                                    ;*************************************************************************
2788                                    ;THIS SUBTEST OUTPUTS 0.00 VOLTS TO CH. '1'
2789                                    ;*************************************************************************
2790
2791   007312  104001                   DATS10: SCOPE
2792   007314  000010                           10
2793   007316  012737  030062  007666           MOV     #30062,DATA3
2794   007324  012737  030060  007670           MOV     #30060,DATA4
2795   007332  004737  007636                   JSR     PC,DAOUT
2796   007336  104012                           PRINT
2797   007340  026153                           MESS1
2798   007342  026205                           MESS2
2799   007344  104013                           TTYIN
```

```
2800
2801                                    ;*************************************************************************
2802                                    ;THIS SUBTEST OUTPUTS 1.11 VOLTS TO CH '1'.
2803                                    ;*************************************************************************
2804
2805  007346  104001                   DATS11: SCOPE
2806  007350  000011                           11
2807  007352  012737  030462  007666           MOV     #30462,DATA3
2808  007360  012737  030461  007670           MOV     #30461,DATA4
2809  007366  004737  007636                   JSR     PC,DAOUT
2810  007372  104012                           PRINT
2811  007374  026153                           MES51
2812  007376  026213                           MES53
2813  007400  104013                           TTYIN
2814
2815                                    ;*************************************************************************
2816                                    ;THIS SUBTEST OUTPUTS 2.22 VOLTS TO CH. '1'.
2817                                    ;*************************************************************************
2818
2819  007402  104001                   DATS12: SCOPE
2820  007404  000012                           12
2821  007406  012737  031062  007666           MOV     #31062,DATA3
2822  007414  012737  031062  007670           MOV     #31062,DATA4
2823  007422  004737  007636                   JSR     PC,DAOUT
2824  007426  104012                           PRINT
2825  007430  026153                           MES51
2826  007432  026221                           MES54
2827  007434  104013                           TTYIN
2828                                    ;*************************************************************************
2829                                    ;THIS SUBTEST OUTPUTS 4.44 VOLTS TO CH. '1'.
2830                                    ;*************************************************************************
2831
2832  007436  104001                   DATS13: SCOPE
2833  007440  000013                           13
2834  007442  012737  032062  007666           MOV     #32062,DATA3
2835  007450  012737  032064  007670           MOV     #32064,DATA4
2836  007456  004737  007636                   JSR     PC,DAOUT
2837  007462  104012                           PRINT
2838  007464  026153                           MES51
2839  007466  026227                           MES55
2840  007470  104013                           TTYIN
2841                                    ;*************************************************************************
2842                                    ;THIS SUBTEST OUTPUTS 8.88 VOLTS TO CH. '1'.
2843                                    ;*************************************************************************
2844
2845  007472  104001                   DATS14: SCOPE
2846  007474  000014                           14
2847  007476  012737  034062  007666           MOV     #34062,DATA3
2848  007504  012737  034070  007670           MOV     #34070,DATA4
2849  007512  004737  007636                   JSR     PC,DAOUT
2850  007516  104012                           PRINT
2851  007520  026153                           MES51
2852  007522  026235                           MES56
2853  007524  104013                           TTYIN
```

```
                                        ;*****************************************************************************
                                        ;THIS SUBTEST OUTPUTS 0.00 VOLTS TO CH. '0' & 9.5 VOLTS TO CH. '1' AND
                                        ;THEN THIS SUBTEST RUNS IN A CONTINOUS LOOP UNTIL EITHER
                                        ;'↑R' IS TYPED TO RESTART THE TEST OR '↑C' IS TYPED TO
                                        ;RETURN TO THE MONITOR.
                                        ;*****************************************************************************

007526  104001                  DMAS15: SCOPE
007530  000015                          15
007532  005037  031612                  CLR     DLYSWH          ;ENABLE TRANSFMITTER DELAY
007536  104012                          PRINT
007540  026376                          MES61
007542  012737  030063  007666  DAT15A: MOV     #30063,DATA3    ;MODE '3' CH. '0'
007550  012737  030060  007670          MOV     #30060,DATA4
007556  012737  032471  007672          MOV     #32471,DATA5    ;CH. '1'
007564  012737  002060  007674          MOV     #2060,DATA6     ;SEND 'EOT' WITH 'LSB'
007572  004737  007636                  JSR     PC,DAOUT

007576  012737  034463  007666          MOV     #34463,DATA3    ;MODE '3' CH. '0'
007604  012737  030065  007670          MOV     #30065,DATA4
007612  012737  030060  007672          MOV     #30060,DATA5    ;CH. '1'
007620  012737  002060  007674          MOV     #2060,DATA6     ;SEND 'EOT' WITH 'LSB'
007626  004737  007636                  JSR     PC,DAOUT
007632  000743                          BR      DAT15A
007634  000000                          HALT

                                        ;*****************************  *********************************************
                                        ;M7384 ADDRESS TEST COMPLETE
                                        ;*****************************************************************************

                                        ;*****************************************************************************
                                        ;ROUTINE TO OUTPUT A PRE-LOAD DATA VALUE TO THE D/A CONVERTER.
                                        ;*****************************************************************************

007636  122737  000063  007666  DAOUT:  CMPB    #63,DATA3       ;OUTPUTTING BOTH CH.'S?
007644  001403                          BEQ     .+10            ;YES
007646  112737  000004  007672          MOVB    #EOT,DATA5      ;NO, TERMINATE AFTER '3' CHAR.'S
007654  004737  017022                  JSR     PC,ADRDST       ;ADDRESS THE MODULE

007660  104007                          LDPGMO                  ;TRANSMIT THE DATA
007662  007666                          .+4
007664  000207                          RTS     PC

007666  000000                  DATA3:  0                       ;LOW BYTE=MODE, HI BYTE=MSB
007670  000000                  DATA4:  0                       ;HI BYTE=LSB
007672  000000                  DATA5:  0                       ;LO BYTE='EOT' OR 'MSB' OF CH. '2'
007674  000000                  DATA6:  0
```

```
2902
2903                                    ;*****************************************************************************
2904                                    .SBTTL M7384 D/A EXERCISER TEST
2905                                    ;THIS TEST ENABLES ANY VALUE THE USER TYPES IN ON THE TELEPRINTER TO BE
2906                                    ;OUTPUTTED FROM THE D/A. WHEN SELECTED, THE TEST REQUESTS FOR TWO THREE DIGIT VALUES
2907                                    ;(SEPARATED VIA COMMA'S) TO BE TYPED IN. THE FIRST VALUE IS THE ONLY ONE
2908                                    ;OUTPUTTED WHEN RUNNING ONLY ONE CHANNEL. IF BOTH CHANNELS ARE SELECTED
2909                                    ;THE FIRST VALUE WILL BE OUTPUTTED ON CHANNEL '0' (X DAC) AND THE
2910                                    ;SECOND VALUE WILL BE OUTPUTTED ON CHANNEL '1' (Y DAC). THE CHANNELS
2911                                    ;ARE SELECTED BY DATA SWITCHES '0 & 1' AND MAY BE SET AND RESET
2912                                    ;AT ANYTIME. SETTING DATA SWITCH '0' WILL SELECT CHANNEL '0', SETTING
2913                                    ;DATA SWITCH '1' WILL SELECT CHANNEL 1 AND SETTING BOTH '0 & 1' WILL
2914                                    ;ENABLE BOTH CHANNELS.
2915                                    ;*****************************************************************************
2916
2917  007676  104012                    M7384E: PRINT
2918  007700  026243                            MES57                   ;D/A EXERCISER TEST
2919  007702  104026                            ADDRESS                 ;GET AND SETUP MODULE ADDRESS
2920  007704  104035                            SETUP                   ;SET UP TEST PARAMETERS
2921  007706  104012                    TAG4F:  PRINT
2922  007710  026267                            MES58                   ;REQUEST THE D/A VALUES
2923  007712  104013                            TTYIN                   ;GET 'EM
2924  007714  022737  000007  031662            CMP     #7,CHRCNT       ;WERE '7' CHARACTERS INPUTTED?
2925  007722  001371                            BNE     TAG4F           ;NO, ASK 'EM AGAIN
2926  007724  012701  015116                    MOV     #INBUF,R1       ;SET UP TO SAVE THEM
2927  007730  012702  007667                    MOV     #DATA3+1,R2
2928  007734  112122                            MOVB    '1)+,(R2)+      ;SAVE 'MSB' OF CH. '0'
2929  007736  112122                            MOVB    1)+,(R2)+
2930  007740  112122                            MOVB    R1)+,(R2)+      ;SAVE 'LSB'
2931  007742  122721  000054                    CMPB    #54,(R1)+       ;DIGIT BETTER BE THE COMMA
2932  007746  001357                            BNE     TAG4F           ;NO, ILLEGAL INPUT
2933  007750  111103                            MOVB    (R1),R3         ;SAVE THE 'MSB' OF 2ND WORD
2934  007752  112122                            MOVB    (R1)+,(R2)+
2935  007754  112122                            MOVB    (R1)+,(R2)+
2936  007756  112122                            MOVB    (R1)+,(R2)+
2937  007760  112722  000004                    MOVB    #EOT,(R2)+      ;TERMINATE WITH 'EOT'
2938
2939  007764  012701  007666            TAG4G:  MOV     #DATA3,R1       ;SET UP SAVE SWITCHES
2940  007770  117711  171356                    MOVB    @SWR,(R1)
2941  007774  142711  000310                    BICB    #310,(R1)       ;CLR UNWANTED BITS
2942  010000  152711  000060                    BISB    #60,(R1)        ;MAKE NO. BCD
2943  010004  110337  007672                    MOVB    R3,DATA5        ;RESTORE 'MSB' OF CH. 2 EACH TIME
2944  010010  004737  007636                    JSR     PC,@#DAOUT      ;SEND THE DATA
2945  010014  000763                            BR      TAG4G
```

```
                                        .SBTTL M7385 (SERIAL) & M7388 (CHAR.) I/O ADDRESS TEST
                                        ;*************************************************************************
                                        ;THIS TEST EXERCISES THE 'M7385' MODULE USING THE PDP-11 VIA THE DL11
                                        ;AS THE DESTINATION INPUT AND THE SOURCE OUTPUT
                                        ;*************************************************************************

010016  104012                  M7385A: PRINT
010020  023620                          MES3                    ;TEXT 'M7385 MODULE TEST'.
010022  104026                          ADDRESS                 ;GET MODULE ADDRESS
010024  110037  010515          M385A1: MOVB    R0,STADR7
010030  110037  010521                  MOVB    R0,STADR8
010034  110037  010601                  MOVB    R0,STADR9
010040  110037  010605                  MOVB    R0,STAD10
010044  005037  031670                  CLR     LOPSWH
010050  104035                          SETUP                   ;SET UP TEST PARAMETERS.

                                        ;*************************************************************************
                                        ;THIS SUBTEST ADDRESSES THE 'SOURCE" PORTION OF THE MODULE USING
                                        ;MODE '0' AND TESTS FOR THE FORCED RETURN OF THE 'EOT'.
                                        ;*************************************************************************

010052  000240                  ST7385: NOP
010054  000240                          NOP
010056  112737  000060  017017          MOVB    #60,SOH1        ;SET UP MODE '0'
010064  004737  017006                  JSR     PC,ADRSRC       ;ADDRESS THE MODULE

010070  022712  000004                  CMP     #EOT,(R2)       ;WAS IT RETURNED?
010074  001402                          BEQ     .+6             ;YES
010076  104022                          MODERR                  ;'EOT' WASN'T FORCED OUT BY SOURCE
010100  030251                          ERR5
010102  005737  031600                  TST     SIOSWH          ;SERIAL INPUT
010106  001106                          BNE     SD5             ;YES, GO TO TEST '5.

                                        ;*************************************************************************
                                        ;THIS SUBTEST ADDRESSES THE SOURCE IN MODE '1' AND CHECKS THAT THE
                                        ;'EOT' ISN'T FORCED.
                                        ;*************************************************************************

010110  104001  000002          SD2:    SCOPE,2
010114  112737  000061  017017          MOVB    #61,SOH1        ;SET UP MODE '1'
010122  004737  017006                  JSR     PC,ADRSRC       ;ADDRESS MODULE

010126  005712                          TST     (R2)            ;WAS ANY DATA RETURNED?
010130  001402                          BEQ     SD3             ;NO-OK
010132  104022                          MODERR                  ;ILLEGAL DATA TRANSFER VIA SOURCE
010134  030372                          ERR8
```

```
                                ;*****************************************************************************
                                ;AT THIS POINT THE SOURCE MODULE IS ADDRESSED WAITING FOR DATA.
                                ;THIS SUBTEST ADDRESSES THE DESTINATION MODULE AND TRANSFERS DATA
                                ;TO THE SOURCE AND CHECKS THAT IT IS RETURNED.
                                ;*************************************************  ****************

010136  104001  000003        SD3:    SCOPE,3
010142  004737  017022                JSR     PC,ADRDST       ;ADDRESS DESTINATION
010146  005712                        TST     (R2)            ;HAS ANY DATA RETURNED?
010150  001403                        BEQ     .+10            ;NO, OK
010152  104022                        MODERR                  ;NO DATA HAS YET BEEN TRANSFERED
010154  030372                        ERR8
010156  000436                        BR      TAG1D+2         ;EXIT ON ERROR

010160  104011                        RANDOM                  ;CREATE A RANDOM DATA BUFFER
010162  012737  010162  020550        MOV     #.,RETURN       ;RE-SET SCOPE LOOP ADDR.
010170  104005                        RECVR0                  ;ENABLE DL 0'S RECVR
010172  104007                        LDPGM0                  ;TRANSFER '500' WORDS TO SOURCE VIA DEST.
010174  017450                        TRNBF0
010176  005737  016022                TST     RECBF0          ;WAS ANY DATA RECV'D?
010202  001003                        BNE     .+10            ;YES, VERIFY IT
010204  104022                        MODERR                  ;NO DATA WAS RECV'D BACK FROM SOURCE
010206  030507                        ERR11
010210  000421                        BR      TAG1D+2         ;EXIT ON ERROR
010212  005737  016006                TST     PARITY          ;WAS PARITY ERROR DETECTED?
010216  001402                        BEQ     .+6             ;NO, VERIFY DATA
010220  104022                        MODERR                  ;DATA PARITY ERROR
010222  030345                        ERR7
010224  012701  016022                MOV     #RECBF0,R1      ;SET UP TO COMPARE RECV'D DATA
010230  012702  017450                MOV     #TRNBF0,R2      ;AGAINST TRANSMITTED DATA
010234  022122                CMP1A:  CMP     (R1)+,(R2)+     ;DATA MATCH?
010236  001403                        BEQ     .+10            ;YES, CONTINUE
010240  104022                        MODERR                  ;RECEIVED DATA DOESN'T MATCH TRANSMITTED DATA
010242  030174                        ERR3
010244  000403                        BR      TAG1D+2
010246  022702  020152                CMP     #TRNEND,R2      ;DONE?
010252  001370                TAG1D:  BNE     CMP1A           ;NO
```

```
3031                                    ;*************************************************************************
3032                                    ;AT THIS POINT DATA HAS BEEN TRANSFERED TO THE DESTINATION AND
3033                                    ;RECEIVED BACK FROM THE SOURCE.  THIS SUBTEST TRANSFERS AN 'EOT' FOLLOWED
3034                                    ;BY DATA TO VERIFY THAT THE 'EOT' CLEARS THE SOURCE & DESTINATION.
3035                                    ;*************************************************************************
3036
3037  010254  104001  000004   SD4:     SCOPE,4
3038  010260  104006                    LDCHR0                  ;TRANSMIT 'EOT'
3039  010262  000004                    EOT
3040  010264  104007                    LDPGM0                  ;FOLLOW 'EOT' WITH SOME DATA
3041
3042  010266  010272                    .+4
3043  010270  000402                    BR      TAG1E
3044
3045  010272     101                    .BYTE   'A              ;SEND A COUPLE OF DATA CHAR.'S
3046  010273     102                    .BYTE   'B
3047  010274     000                    .BYTE   0               ;TERMINATE
3048          010276                    .EVEN
3049
3050  010276  005737  016012   TAG1E:  TST     RECEOT          ;WAS 'EOT' RECV'D?
3051  010302  001003                    BNE     .+10            ;YES
3052  010304  104022                    MODERR                  ;'EOT' WASN'T RETURNED
3053  010306  030251                    ERR5
3054  010310  000405                    BR      TAG1F+2         ;EXIT ON ERROR
3055
3056  010312  022712  000004           CMP     #EOT,(R2)       ;WAS 'EOT' ONLY CHAR. RETURNED?
3057  010316  001402                    BEQ     .+6             ;YES
3058  010320  104022                    MODERR                  ;ILLEGAL DATA TRANSFER
3059  010322  030372   TAG1F:  ERR8
```

```
3060
3061                                    ;*************************************************************************
3062                                    ;FIFO CHARACTER STORAGE TEST
3063                                    ;THIS SUBTEST ADDRESSES THE DESTINATION MODULE THEN TRANSMITTS
3064                                    ;'63' AND AN 'EOT'.  THE SOURCE MODULE IS THEN ADDRESSED
3065                                    ;AND IT SHOULD TRANSMIT THESE CHARACTERS BACK TO THE PDP-11.
3066                                    ;IT SHOULE BE NOTED THAT WHEN THIS TEST IS RUN USING THE
3067                                    ;SERIAL INPUT OPTION, ONE HUNDRED AND TWENTY-EIGHT (128)
3068                                    ;CHARACTERS WILL BE RETURNED TO THE DL11 RECEIVER.  THE FIRST
3069                                    ;'64' CHARATERS ARE RECEIVED BACK FROM THE SERIAL INPUT
3070                                    ;DESTINATION, AND THE SECOND '64' CHARACTERS ARE THE CHARACTERS
3071                                    ;THAT WERE ACUTALLY STORED IN THE 'FIFO' OF THE MODULE UNDER TEST.
3072                                    ;*************************************************************************
3073
3074  010324  104001  000005           SD5:    SCOPE,5
3075  010330  005077  171004                   CLR     @PSW            ;ENABLE INTERRUPTS
3076  010334  104011                           RANDOM                  ;CREATE A RANDOM DATA BUFFER
3077  010336  112737  000004  017547          MOVB    #EOT,TRNBFO+77  ;TERMINATE BUFFER AFTER '64' BYTES
3078  010344  005037  017550                   CLR     TRNBFO+100      ;TERMINATE BUFFER
3079  010350  004737  017022                   JSR     PC,ADRDST       ;ADDRESS DESTINATION MODULE
3080
3081  010354  104007                   TAG1H:  LDPGMO                  ;TRANSMIT DATA
3082  010356  017450                           TRNBFO
3083
3084  010360  112737  000060  017017   TAG1L:  MOVB    #60,SOH1        ;SET UP FOR MODE '0'
3085  010366  004737  017006                   JSR     PC,ADRSRC       ;ADDRESS SOURCE
3086  010372  005737  016012                   TST     RECEOT          ;RECEIVED ALL DATA BACK?
3087  010376  001775                           BEQ     .-4             ;NO, WAIT FOR 'EOT'
3088
3089  010400  012701  017450           CMP1C:  MOV     #TRNBFO,R1      ;TO TRANSMITTED DATA
3090  010404  122122                   CMP1B:  CMPB    (R1)+,(R2)+     ;DATA MATCH?
3091  010406  001403                           BEQ     .+10            ;YES
3092  010410  104022                           MODERR                  ;RECV'D DATA NOT EQUAL TO TRANS. DATA
3093  010412  030174                           ERR3
3094  010414  000420                           BR      SD6             ;EXIT ON ERROR
3095  010416  020127  017550                   CMP     R1,#TRNBFO+100  ;DONE?
3096  010422  001370                           BNE     CMP1B           ;NO
3097  010424  005737  031600                   TST     SIOSWH          ;USING THE SERIAL I/O INPUT?
3098  010430  001412                           BEQ     SD6             ;NO, CHECK ONLY '64' CHAR.'S
3099  010432  105737  017551                   TSTB    TRNBFO+101      ;YES, HAVE WE CHK'D '128' CHAR.'S?
3100  010436  001101                           BNE     SD10            ;YES, EXIT
3101  010440  105237  017551                   INCB    TRNBFO+101      ;NO, CHK NEXT '64' CHAR.'S FROM 'FIFO'
3102  010444  022737  000002  016012          CMP     #2,RECEOT       ;RECEIVED ALL DATA FROM FIFO?
3103  010452  001374                           BNE     .-6             ;NO, WAIT FOR 'EOT'
3104  010454  000751                           BR      CMP1C           ;DO IT.
```

```
                                        ;*************************************************************************
                                        ;THIS SUBTEST ADDRESSES THE 'SOURCE' USING THE WRONG MODULE ADDRESSES
                                        ;AND TESTS THAT THE SOURCE ISN'T ENABLED.
                                        ;*************************************************************************

010456  104001  000006          SD6:    SCOPE,6
010462  012777  000340  170650          MOV     #340,@PSW       ;INHIBIT INTERRUPTS
010470  005737  031600                  TST     SIOSWH          ;USING SERIAL INPUT OPTION?
010474  001062                          BNE     SD10            ;YES, SKIP THE NEXT TEST.
010476  004737  005066                  JSR     PC,@#ADRSIT

                                        ;*************************************************************
                                        ;THIS SUBTEST CHECKS THAT 'ETX' WILL CLEAR THE SOURCE AND THAT 'STX'
                                        ;WILL CLEAR THE DESTINATION
                                        ;*************************************************************

010502  104001  000007          SD7:    SCOPE,7
010506  104007                          LDPGM0                  ;ADDRESS MODULE
010510  010514                          .+4
010512  000404                          BR      TAG1K
010514     021                          .BYTE   DC1             ;ALERT SOURCE
010515     061          STADR7:         .BYTE   61
010516     001                          .BYTE   SOH
010517     061                          .BYTE   61              ;MODE '1'
010520     022                          .BYTE   DC2             ;ALERT DESTINATION
010521     061          STADR8:         .BYTE   61
010522     023                          .BYTE   DC3             ;ENABLE MODULE
010523     003                          .BYTE   ETX             ;CLR SOURCE

010524  104006          TAG1K:  LDCHR0                          ;SEND A DATA CHAR.
010526  000102                  'B

010530  122722  000003                  CMPB    #ETX,(R2)+      ;WAS 'ETX' RETURNED?
010534  001403                          BEQ     .+10            ;YES
010536  104022                          MODERR                  ;'ETX' WASN'T RETURNED
010540  030725                          ERR16
010542  000435                          BR      TAG1W           ;EXIT ON ERROR

010544  105722                          TSTB    (R2)+           ;WAS ANY OTHER DATA RECV'D?
010546  001403                          BEQ     .+10            ;NO-OK
010550  104022                          MODERR                  ;ETX DIDN'T CLR SOURCE
010552  030637                          ERR14
010554  000430                          BR      TAG1W           ;EXIT ON ERROR
```

```
3149                                    ;NOW CLR DESTINATION
3150
3151  010556  104007                            LDPGM0
3152  010560  010564                            .+4
3153  010562  000402                            BR      TAG1S
3154  010564     002                            .BYTE   STX             ;CLR DESTINATION
3155  010565     101                            .BYTE   'A              ;SEND SOME DATA
3156  010566     130                            .BYTE   'X
3157  010567     000                            .BYTE   0               ;TERMINATE
3158
3159                                    ;NOW RE-ADDRESS SOURCE & DESTINATION AND EXAMINE DATA
3160
3161  010570  104005                    TAG1S:  RECVR0
3162  010572  104007                            LDPGM0                  ;RE-ADDRESS SOURCE
3163  010574  010600                            .+4
3164  010576  000404                            BR      TAG1T
3165
3166  010600     021                            .BYTE   DC1             ;ALERT SOURCE
3167  010601     061                    STADR9: .BYTE   61
3168  010602     001                            .BYTE   SOH
3169  010603     061                            .BYTE   61              ;MODE '1'
3170  010604     022                            .BYTE   DC2             ;ALERT DESTINATION
3171  010605     061                    STAD10: .BYTE   61
3172  010606     023                            .BYTE   DC3             ;ENABLE MODULE
3173  010607     000                            .BYTE   0
3174
3175  010610  005737  016014            TAG1T:  TST     RECSTX          ;WAS 'STX' RETURNED?
3176  010614  001003                            BNE     .+10            ;YES
3177  010616  104022                            MODERR                  ;'STX' WASN'T RECV'D FROM DEST.
3178  010620  030106                            ERR1
3179  010622  000405                            BR      TAG1W           ;EXIT ON ERROR
3180
3181  010624  105737  016024                    TSTB    RECBF0+2        ;WAS 'STX' THE ONLY DATA RECV'D
3182  010630  001402                            BEQ     .+6             ;YES
3183  010632  104022                            MODERR                  ;'STX' DIDN'T CLR DEST.
3184  010634  030541                            ERR12
3185
3186                                    ;SEND AN 'EOT' TO CLR MODULE
3187
3188  010636  104006                    TAG1W:  LDCHR0
3189  010640  000004                            EOT                     ;CLR MODULE
```

```
                                        ;*****************************************************************************
                                        ;THIS SUBTEST REQUESTS THE OPERATOR TO RE-SET THE MODULE ADDRESS TO '17'.
                                        ;AND INSERT THE STRAP TO INHIBIT THE 'EOT' FROM BEING TRANSMITTED.
                                        ;IF DATA 'SW10' IS NOT SET THIS MANUAL INTERVENTION TEST IS SKIPPED.
                                        ;*****************************************************************************

010642  104001  000010          SD10:   SCOPE,10
010646  032777  002000  170476          BIT     #SW10,@SWR      ;SW10 SET?
010654  001456                        BEQ     TAG1P           ;NO, TYPE TEST COMPLETE
010656  104012                        PRINT
010660  024151                        MES14
010662  024007                        MES10                   ;TEXT 'RE-SET MODULE ADDRESS TO '17'.
010664  104013                        TTYIN                   ;WAIT FOR 'CR' TO CONTINUE

010666  012737  010666  020550  TAG1Q: MOV     #.,RETURN       ;RE-SET SCOPE LOOP ADDRESS POINTER
010674  112737  000077  031602        MOVB    #77,MODADR      ;SET UP FOR ADDR. '17'
010702  112737  000077  017015        MOVB    #77,SRCADR
010710  112737  000077  017065        MOVB    #77,DSTADR
010716  104005                        RECVR0                  ;ENABLE DL 0'S RECVR.
010720  004737  017022                JSR     PC,ADRDST       ;ADDRESS DEST. MODULE

010724  104007                TAG1R:  LDPGM0
010726  010732                        .+4
010730  000402                        BR      TAG1U
010732     101                        .BYTE   'A              ;SEND DATA
010733     102                        .BYTE   'B
010734     004                        .BYTE   EOT             ;TERMINATE
010736                                .EVEN
010736  104005                TAG1U:  RECVR0                  ;CLR & RESET BUFFER
010740  112737  000060  017017        MOVB    #60.SOH1        ;SET UP FOR MODE '0'
010746  004737  017006                JSR     PC,GRSRC        ;ADDRESS THE SOURCE

010752  022712  041101          TAG1Z:  CMP     #41101,(R2)     ;WAS THE 'A & B' RETURNED?
010756  001403                        BEQ     .+10            ;YES
010760  104022                        MODERR                  ;MODULE WASN'T ADDRESS W/ '17'
010762  030507                        ERR11
010764  000405                        BR      SD11            ;EXIT ON ERROR
010766  005737  016012                TST     RECEOT          ;WAS 'EOT' STRAPPED OUT?
010772  001402                        BEQ     .+6             ;YES
010774  104022                        MODERR                  ;'EOT' WASN'T STRAPPED OUT
010776  030671                        ERR15

                                        ;*****************************************************************************
                                        ;TEST COMPLETE
                                        ;*****************************************************************************

011000  104001  000011          SD11:   SCOPE,11
011004  104012                        PRINT
011006  024220                        MES14A                  ;TEXT 'REMOVE STAP'
011010  104026                        ADDRESS                 ;SET UP NEW MODULE ADDRESS
011012  104012                TAG1P:  PRINT
011014  023727                        MES7                    ;TEXT 'TEST COMPLETE'
011016  113700  031602                MOVB    MODADR,R0
011022  000137  010024                JMP     M385A1          ;RESTART TEST
```

```
 3244
 3245                                ;*************************************************************************
 3246                                .SBTTL M7385 SERIAL I/O INTERFACE TEST
 3247                                ;THIS TEST IS USED TO TEST THAT THE SERIAL I/O INTERFACE MODULE IS FUNCTIONING
 3248                                ;CORRECTLY. TO RUN THIS TEST THE 'L' JUMPER MUST BE INSERTED ON THE M7385
 3249                                ;SO AS TO BE INITIALIZED ON POWER UP.  REMOVE THE CONTROL MODULE AND
 3250                                ;TIE THE 'T&R' BUSES TOGETHER.
 3251                                ;*************************************************************************
 3252
 3253  011026  104012                M7385I: PRINT                   ;TEXT 'M7385 SERIAL INTERFACE TEST
 3254  011030  026714                        MES66
 3255  011032  104035                        SETUP
 3256
 3257                                ;*************************************************************************
 3258                                ;THIS TEST SIMPLY ADDRESSES THE DESTINATION PORTION OF THE MODULE WHICH
 3259                                ;WILL ENABLE A CLOSED LOOP FOR DATA BEING SENT TO THE SOURCE.
 3260                                ;*************************************************************************
 3261
 3262  011034  104011                TEST1:  RANDOM                  ;CREATE A RANDOM DATA BUFFER.
 3263  011036  104007                        LDPGMO                  ;ADDRESS DESTINATION
 3264  011040  011044                        .+4
 3265  011042  000402                        BR      TST1A
 3266  011044     022                 IADR10: .BYTE   DC2             ;ALERT THE DESTINATION
 3267  011045     060                         .BYTE   60              ;MODIFIED BY USER
 3268  011046     017                         .BYTE   SI              ;ENABLE DESTINATION
 3269  011047     000                         .BYTE   0               ;TERMINATE
 3270                                         .EVEN
 3271
 3272  011050  005712                TST1A:  TST     (R2)            ;HAS ANY DATA RETURNED?
 3273  011052  001403                        BEQ     .+10            ;NO, OK
 3274  011054  104022                        MODERR                  ;NO DATA HAS YET BEEN TRANSFERED
 3275  011056  030372                        ERR8
 3276  011060  000434                        BR      TEST2           ;EXIT ON ERROR
 3277
 3278  011062  104011                        RANDOM                  ;CREATE A RANDOM DATA BUFFER
 3279  011064  012737  01  4  020550        MOV     #.,RETURN       ;RE-SET SCOPE LOOP ADDR.
 3280  011072  104005                        RECVRO                  ;ENABLE DL 0'S RECVR
 3281  011074  104007                        LDPGMO                  ;TRANSFER '500' WORDS TO SOURCE VIA DEST.
 3282  011076  017450                        TRNBF0
 3283  011100  005712                        TST     (R2)            ;WAS ANY DATA RECV'D?
 3284  011102  001003                        BNE     .+10            ;YES, VERIFY IT
 3285  011104  104022                        MODERR                  ;NO DATA WAS RECV'D BACK FROM SOURCE
 3286  011106  030507                        ERR11
 3287  011110  000420                        BR      TEST2           ;EXIT ON ERROR
 3288  011112  005737  016006              TST     PARITY          ;WAS PARITY ERROR DETECTED?.
 3289  011116  001403                        BEQ     .+10            ;NO, VERIFY DATA
 3290  011120  104022                        MODERR                  ;DATA PARITY ERROR
 3291  011122  030345                        ERR7
 3292  011124  000412                        BR      TEST2
 3293  011126  012701  017450              MOV     #TRNBF0,R1      ;AGAINST TRANSMITTED DATA
```

```
3294  011132  022122                CMPT1A: CMP     (R1)+,(R2)+     ;DATA MATCH?
3295  011134  001403                        BEQ     .+10            ;YES, CONTINUE
3296  011136  104022                        MODERR                  ;RECEIVED DATA DOESN'T MATCH TRANSMITTED DATA
3297  011140  030174                        ERR3
3298  011142  000403                        BR      TEST2
3299  011144  022701  020152                CMP     #TRNEND,R1      ;DONE?
3300  011150  001370                        BNE     CMPT1A          ;NO
3301
3302                                ;*************************************************************************
3303                                ;AT THIS POINT DATA HAS BEEN TRANSFERED TO THE DESTINATION AND
3304                                ;RECEIVED BACK FROM THE SOURCE.  THIS SUBTEST TRANSFERS AN 'EOT' FOLLOWED
3305                                ;BY DATA TO VERIFY THAT THE 'EOT' CLEARS THE SOURCE & DESTINATION.
3306                                ;*************************************************************************
3307
3308  011152  104001                TEST2:  SCOPE
3309  011154  000002                        2
3310  011156  104006                        LDCHRO                  ;TRANSMIT 'EOT'
3311  011160  000004                        EOT
3312  011162  104007                        LDPGMO                  ;FOLLOW 'EOT' WITH SOME DATA
3313  011164  011170                        .+4
3314  011166  000402                        BR      TST2A
3315
3316  011170     101                        .BYTE   'A              ;SEND A COUPLE OF DATA CHAR.'S
3317  011171     102                        .BYTE   'B
3318  011172     000                        .BYTE   0               ;TERMINATE
3319        011174                          .EVEN
3320
3321  011174  005737  016012          TST2A:  TST     RECEOT          ;WAS 'EOT' RECV'D?
3322  011200  001003                        BNE     .+10            ;YES
3323  011202  104022                        MODERR                  ;'EOT' WASN'T RETURNED
3324  011204  030251                        ERR5
3325  011206  000405                        BR      TST2B+2         ;EXIT ON ERROR
3326
3327  011210  022712  000004                CMP     #EOT,(R2)       ;WAS 'EOT' ONLY C'     RETURNED?
3328  011214  001402                        BEQ     .+6             ;YES
3329  011216  104022                        MODERR                  ;ILLEGAL DATA TRANSFER
3330  011220  030372                TST2B:  ERR8
3331
3332                                ;*************************************************************************
3333                                ;TEST COMPLETE
3334                                ;*************************************************************************
3335
3336  011222  104001                TEST3:  SCOPE
3337  011224  000003                        3
3338  011226  104012                        PRINT
3339  011230  023727                        MES7                    ;TEXT 'TEST COMPLETE
3340  011232  000137  001376                JMP     MONITR          ;RETURN TO MONITOR
```

```
3341                                    ;*******************************************************************************
3342                                    .SBTTL M7385 TTL I/O TEST
3343                                    ;*******************************************************************************
3344
3345  011236  104012                    M7385T: PRINT
3346  011240  026530                            MES62                   ;TEXT 'TTL I/O TEST'
3347  011242  104026                            ADDRESS                 ;GET THE MODULE ADDRESS
3348  011244  110037  011305                    MOVB    R0,TTLAD1       ;SET UP MODULE ADDRESS
3349  011250  110037  011311                    MOVB    R0,TTLAD2
3350  011254  104035                            SETUP
3351
3352                                    ;*******************************************************************************
3353                                    ;THIS TEST VERIFIES THAT THE TTL I/O SECTION OF THE SERIAL I/O MODULE
3354                                    ;IS FUNCTIONING CORRECTLY.  IT REQUIRES FOR A TELEPRINTER TO BE CABLED TO
3355                                    ;THE MATON LOCK OF THE SERIAL I/O (THIS COULD BE THE CONSOLE PRINTER ONCE
3356                                    ;THE TEST IS SELECTED).  ALL CHARACTERS THEN INPUTTED WILL BE RECEIVED BY
3357                                    ;THE SERIAL SOURCE AND WRAPPED AROUND (BY THE CONTROL MODULE OR
3358                                    ;COMPUTER IF DF11 IS USED) TO THE DESTINATION.  HERE THE CHARACTER WILL BE
3359                                    ;TRANSMITTED BACK TO THE TELEPRINTER AND PRINTED.  EFFECTIVELY, AS FAR AS
3360                                    ;THE USER IS CONCERNED, THIS TEST ACTS LIKE A KEYBOARD ECHO TEST.
3361                                    ;*******************************************************************************
3362
3363  011260  012777  000340  170054    TTLTST: MOV     #340,@PSW
3364  011266  104005                            RECVR0                  ;ENABLE DL11 RECVR.
3365  011270  005077  170046                    CLR     @PSW
3366  011274  005237  031614                    INC     DSTSWH
3367  011300  104025                            SOURCE
3368  011302  011306                            .+4
3369  011304  000404                            BR      TAG7A           ;ADDRESS THE MODULE
3370  011306     021                            .BYTE   DC1
3371  011307     061                TTLAD1:     .BYTE   61              ;ADDRESS MODIFIED BY USER
3372  011310     001                            .BYTE   SOH             ;MODE 1, WAIT FOR DATA
3373  011311     061                            .BYTE   61
3374  011312     022                            .BYTE   DC2             ;ALERT DEST.
3375  011313     061                TTLAD2:     .BYTE   61              ;ADDRESS MODIFIED BY USER
3376  011314     023                            .BYTE   DC3
3377  011315     000                            .BYTE   0
3378                                            .EVEN
3379
3380  011316  005037  031614          TAG7A:  CLR     DSTSWH
3381  011322  105712                          TSTB    (R2)            ;DATA READY?
3382  011324  001776                          BEQ     .-2             ;NO
3383  011326  005737  031600                  TST     SIOSWH          ;USING SERIAL I/O
3384  011332  001004                          BNE     TAG7B+2         ;YES, TEST ONLY FOR EOT
3385  011334  111237  011342                  MOVB    (R2),TAG7B      ;NO, SET UP TO TRANSMIT CHAR.
3386  011340  104006                          LDCHR0
3387  011342  000000                  TAG7B:  0
3388  011344  122722  000004                  CMPB    #EOT,(R2)+      ;CHAR. = 'EOT'?
3389  011350  001743                          BEQ     TTLTST          ;YES, RE-ADDRESS MODULE
3390  011352  000761                          BR      TAG7A           ;NO, WAIT FOR NEXT CHAR.
3391
3392
```

```
3393
3394                                    ;*******************************************************************************
3395                                    .SBTTL M7386 KEYBOARD/DISPLAY MODULE ADDRESS TEST
3396                                    ;*************** *************************************************************
3397
3398  011352  104012                   M7386A: PRINT
3399  011354  025417                           MES39
3400  011356  104026                           ADDRESS                 ;GET THE MODULE ADDRESS
3401  011360  110037  011455                   MOVB    R0,KEYAD1       ;SET IT UP
3402  011364  110037  011457                   MOVB    R0,KEYAD2       ;SET UP TEST PARAMETERS
3403  011370  104035                   KEYT0:  SETUP
3404  011372  005037  031612                   CLR     DLYSWH          ;ENABLE TRANSMITTER DELAY
3405
3406                                    ;*******************************************************************************
3407                                    ;THIS SUBTEST ADDRESSES THE KEYBOARD MODULE AND CHECKS FOR THE
3408                                    ;AUTOMATIC RETURN OF AN 'EOT'.
3409                                    ;*******************************************************************************
3410
3411  011376  000240                   KEYT1:  NOP
3412  011400  000240                           NOP
3413  011402  004737  017006                   JSR     PC,ADRSRC       ;ADDRESS THE MODULE
3414  011406  022712  000004                   CMP     #EOT,(R2)       ;WAS 'EOT' RETURNED?
3415  011412  001402                           BEQ     KEYT2           ;YES
3416  011414  104022                           MODERR                  ;MODULE DIDN'T RETURN "EOT"
3417  011416  030251                           ERR5
3418
3419                                    ;********************************* *************************************
3420                                    ;THIS SUBTEST ADDRESSES BOTH THE KEYBOARD & THE DISPLAY.  THE DATA
3421                                    ;FROM THE KEYBOARD IS DISPLAYED AND ALSO PRINTED OUT ON THE TELETYPE.
3422                                    ;THE TELETYPE OUTPUT CAN BE ELIMINATED BY SETTING DATA SW13.
3423                                    ;*******************************************************************************
3424
3425  011420  104001                   KEYT2:  SCOPE
3426  011422  000002                           2
3427  011424  104036                           NODLAY                  ;INHIBIT TRANSMITTER DELAY
3428  011426  012777  000340  167704           MOV     #340,@PSW       ;SET PROC. PRIO @7.
3429  011434  005077  167700                   CLR     @PSW
3430  011440  104005                           RECVRO                  ;ENABLE DL11 RECEIVER
3431  011442  005237  031614                   INC     DSTSWH
3432  011446  104025                           SOURCE                  ;ADDRESS THE MODULE
3433  011450  011454                           .+4
3434  011452  000403                           BR      TAG6A
3435  011454      021                   .BYTE   DC1                     ;ALERT SOURCE
3436  011455      060           KEYAD1: .BYTE   60
3437  011456      022                   .BYTE   DC2                     ;ALERT DESTINATION
3438  011457      060           KEYAD2: .BYTE   60
3439  011460      023                   .BYTE   DC3                     ;ENABLE MODULE.
3440  011461      000                   .BYTE   0
3441                                    .EVEN
3442
3443  011462  005037  031614           TAG6A:  CLR     DSTSWH
3444  011466  105712                           TSTB    (R2)            ;DATA READY?
3445  011470  001776                           BEQ     .-2             ;NO, WAIT
3446  011472  005737  031600                   TST     SIOSWH          ;USING THE CONTROL MODULE?
3447  011476  001004                           BNE     TAG6B+2         ;YES
3448  011500  111237  011506                   MOVB    (R2),TAG6B      ;NO,SET UP TO SEND CHAR TO DISPLAY
```

```
3449  011504  104006                        LDCHRO
3450  011506  000000                TAG6B:  0
3451  011510  122712  000004                CMPB    #EOT,(R2)       ;REC. 'EOT'?
3452  011514  001744                        BEQ     KEYT2+6         ;YES, RE-ADDRESS MODULE
3453  011516  111201                        MOVB    (R2),R1         ;GET DATA
3454  011520  032777  020000  167624        BIT     #SW13,@SWR      ;INHIBIT PRINTOUT?
3455  011526  001002                        BNE     TAG6C           ;YES
3456  011530  004737  015222                JSR     PC,PDMSET       ;NO, TYPE IT
3457  011534  122712  000003        TAG6C:  CMPB    #ETX,(R2)       ;REC. AN 'EXT'?
3458  011540  001412                        BEQ     KEYT3           ;YES, RUN DISPLAY TEST
3459  011542  122722  000002                CMPB    #STX,(R2)+      ;REC. AN 'STX'?
3460  011546  001345                        BNE     TAG6A           ;NO, RE-ADDRESS MODULE
3461  011550  005737  031600                TST     SIOSWH          ;YES, USING SERIAL INPUT?
3462  011554  001742                        BEQ     TAG6A           ;NO, 'STX' IS LEGAL
3463  011556  104012                        PRINT
3464  011560  027164                        MES73A                  ;TEXT 'RE-INITIALIZE PDM70.'
3465  011562  104013                        TTYIN                   ;WAIT FOR SETUP
3466  011564  000720                        BR      KEYT2+6         ;RESTART TEST
3467
3468                          ;*************************************************************************
3469                          ;THIS SUBTEST IS ENTERED UPON RECEIPT OF AN 'ETX' FROM THE KEYBOARD
3470                          ;IN THE PREVIOUS SUBTEST.  THIS TEST THEN ADDRESSES THE DISPLAY
3471                          ;AND DISPLAYS THE ENTIRE DISPLAY CHARACTER SET ONE CHARACTER
3472                          ;AT A TIME.  EACH CHARACTER IS DISPLAYED ACROSS THE ENTIRE SCREEN
3473                          ;FOR APPROIMATLY ONE SECOND.
3474                          ;*************************************************************************
3475
3476  011566  104001                KEYT3:  SCOPE
3477  011570  000003                        3
3478  011572  104012                        PRINT
3479  011574  027131                        MES73                   ;TEXT "DISPLAY TEST"
3480  011576  104013                        TTYIN                   ;WAIT FOR 'CR'
3481  011600  104036                        NODLAY                  ;INHIBIT TRANSMITTER DELAY
3482  011602  012737  011602  020550        MOV     #.,RETURN       ;RESET SCOPE LOOP POINTER
3483  011610  012737  000040  011636        MOV     #40,TAG6D+2     ;START OFF WITH DISPLAYING SPACES.
3484  011616  104005                TAG6E:  RECVRO                  ;ENABLE DL11 RECVR.
3485  011620  004737  017022                JSR     PC,ADRDST       ;ADDRESS THE DESTINATION
3486  011624  012702  000040                MOV     #32.,R2         ;DISPLAY '32' CHAR./LINE
3487  011630  104006                        LDCHRO
3488  011632  000212                        212                     ;SEND 'LF' TO CLEAR SCREEN
3489  011634  104006                TAG6D:  LDCHRO
3490  011636  000040                        40                      ;MODIFIED TO CHAR. BEING DISPLAYED.
3491  011640  005302                        DEC     R2              ;DISPLAYED 32 CHAR.'S?
3492  011642  001374                        BNE     TAG6D           ;NO, LOAD NEXT CHAR.
3493  011644  104006                        LDCHRO                  ;YES
3494  011646  000004                        EOT                     ;CLEAR DESTINATION
3495  011650  104004                        DELAY                   ;DELAY SO USER CAN VIEW SCREEN
3496  011652  104004                        DELAY
3497  011654  005237  011636                INC     TAG6D+2         ;SETUP NEXT CHAR.
3498  011660  022737  000140  011636        CMP     #140,TAG6D+2    ;DISPLAYED ALL CHAR'S.?
3499  011666  001353                        BNE     TAG6E           ;NO,
```

```
3500
3501                                    ;*********************************************************** *********
3502                                    ;TEST COMPLETE
3503                                    ;*************************************************************************
3504
3505  011670  104001                    KEYT4:  SCOPE
3506  011672  000004                            4
3507  011674  104012                            PRINT
3508  011676  023727                            MES7                    ;TEXT "TEST COMPLETE"
3509  011700  000633                            BR      KEYTO
3510
3511                                    ;*************************************************************************
3512                                    ;SBTTL M7388 CHARACTER I/O MODULE ADDRESS (IN-HOUSE) TEST
3513                                    ;THIS TEST USES THE SAME TEST AS THE SERIAL I/O THE
3514                                    ;TEST HEADER IS TYPED HERE AND THEN THE PROGRAM GOES TO THE
3515                                    ;SERIAL I/O TESTS TO EXERCISE THE MODULE
3516                                    ;THIS IS DESIGNATED AS AN IN-HOUSE TEST SINCE A SPECIAL
3517                                    ;WRAP-A-ROUND MODULE IS REQUIRED TO RUN THE TEST.
3518                                    ;*************************************************************************
3519
3520  011702  104012                    M7388A: PRINT
3521  011704  025652                            MES44                   ;TEXT 'CHAR. I/O ADDRESS TEST'
3522  011706  027014                            MES69                   ;TEXT "(IN-HOUSE)"
3523  011710  000137  010022                    JMP     @#M7385A+4
3524
3525                                    ;*************************************************************************
3526                                    .SBTTL M7388F CHARACTER I/O MODULE ADDRESS (FIELD) TEST
3527                                    ;THIS TEST REQUIRES FOR THE FIELD SERVICE TESTER BE CONNECTED TO THE
3528                                    ;INPUT /OUTPUT OF THE CHARACTER I/O MODULE.  THE PROGRAM THEN SENDS
3529                                    ;SPECIFIC DATA AND THEN REQUESTS THE USER TO VERIFY (WITH HIS TESTER) THIS
3530                                    ;DATA.  THE PROGRAM ALSO REQUESTS THE USER TO INPUT DATA WHICH WILL
3531                                    ;IN TURN BE PRINTER ON THE CONSOLE DEVICE.
3532                                    ;*************************************************************************
3533
3534  011714  104012                    M7388F: PRINT
3535  011716  025652                            MES44                   ;TEXT 'CHARACTER I/O ADDRESS TEST'
3536  011720  027030                            MES70                   ;TEXT '(FIELD)'.
3537  011722  104026                            ADDRESS                 ;GET THE MODULE ADDRESS
3538  011724  104035                            SETUP                   ;SET UP TEST PARAMETERS
3539
3540                                    ;*************************************************************************
3541                                    ;THIS SUBTEST ADDRESSES THE SOURCE IN MODE '0' AND CHECKS FOR A
3542                                    ;FORCED 'EOT'.
3543                                    ;*************************************************************************
3544
3545  011726  000240                    CHART1: NOP
3546  011730  000240                            NOP
3547  011732  112737  000060  017017            MOVB    #60,SOH1        ;SET UP MODE '0'
3548  011740  004737  017006                    JSR     PC,ADRSRC       ;ADDRESS THE SOURCE
3549  011744  022712  000004                    CMP     #EOT,(R2)       ;WAS 'EOT' RETURNED?
3550  011750  001402                            BEQ     CHART2          ;YES
3551  011752  104022                            MODERR                  ;'EOT' WASN'T FORCED BY SOURCE
3552  011754  030251                            ERR5
```

```
3553
3554                                    ;*************************************************************************
3555                                    ;THIS SUBTEST ADDRESSES THE SOURCE IN MODE '1' AND CHECKS THAT THE
3556                                    ;'EOT' ISN'T FORCED.  IT THEN REQUESTS THE USER TO INPUT DATA TO THE MODULE.
3557                                    ;THE INPUTTED DATA WILL BE ECHOED TO THE PRINTER UNTIL AND 'EOT' IS RECEIVED.
3558                                    ;THIS WILL ENABLE THE PROGRAM TO CONTINUE ON TO THE NEXT SUBTEST.
3559                                    ;*************************************************************************
3560
3561  011756  104001                CHART2: SCOPE
3562  011760  000002                        2
3563  011762  112737  000061  017017        MOVB    #61,SOH1        ;SET UP FOR MODE '1'
3564  011770  004737  017006                JSR     PC,ADRSRC       ;ADDRESS THE SOURCE
3565  011774  005712                        TST     (R2)            ;WAS ANY DATA RETURNED?
3566  011776  001403                        BEQ     .+10            ;NO-OK
3567  012000  104022                        MODERR                  ;ILLEGAL DATA TRANSFER
3568  012002  030372                        ERR8
3569  012004  000405                        BR      TAG8A           ;PRINT THE RECEIVED DATA
3570  012006  004737  021374                JSR     PC,TTYENB       ;ENABLE INTERRUPTS
3571  012012  104012                        PRINT
3572  012014  027211                        MES74                   ;TEXT "ECHO TEST"
3573  012016  027041                        MES71                   ;TEXT" INPUT DATA, TERMINATE TEST W/EOT"
3574  012020  105712                TAG8A:  TSTB    (R2)            ;WAIT FOR DATA
3575  012022  001776                        BEQ     .-2
3576  012024  111201                        MOVB    (R2),R1
3577  012026  004737  015222                JSR     PC,PDMSET       ;PRINT IT
3578  012032  122722  000004                CMPB    #EOT,(R2)+      ;WAS 'EOT' RECEIVED?
3579  012036  001370                        BNE     TAG8A
3580
3581                                    ;*************************************************************************
3582                                    ;THIS IS A 'FIFO' STORAGE TEST.  IT REQUESTS THE USER TO INPUT DATA (UP TO 63)
3583                                    ;CHARACTERS) AND AN 'EOT'.  AFTER THE USER HAS INPUTTED ALL HIS DATA, TYPE 'CR'.
3584                                    ;THE TEST THEN ADDRESSES THE MODULE IN MODE '0' AND THEN PRINTS THE RECEIVED
3585                                    ;DATA WHICH WAS STORED IN THE SOURCE 'FIFO'.
3586                                    ;*************************************************************************
3587
3588  012040  104001                CHART3: SCOPE
3589  012042  000003                        3
3590  012044  104012                        PRINT
3591  012046  027225                        MES75                   ;TEXT "STORAGE TEST"
3592  012050  027041                        MES71                   ;TEXT" INPUT DATA & TERMINATE W/EOT"
3593  012052  005237  031616                INC     SENDSW          ;SET UP TO RETURN ON TTY INTERRUPT
3594  012056  004737  021374                JSR     PC,TTYENB       ;ENABLE INTERRUPTS
3595  012062  000001                        WAIT                    ;WAIT FOR RECVR. INTERRUPTS
3596  012064  000776                        BR      .-2             ;TTY INTERRUPTS RETURN .+2
3597  012066  005037  031616                CLR     SENDSW
3598  012072  112737  000060  017017        MOVB    #60,SOH1        ;SET UP FOR MODE '0'
3599  012100  004737  017006                JSR     PC,ADRSRC       ;ADDRESS THE MODULE
3600  012104  104037                        PRTRBF                  ;PRINT CONTENTS OF THE RECVR. BUFFER
```

```
3601
3602                                    ;*********************************************************************
3603                                    ;THIS SUBTEST LOAD '16','4' CHARACTER DATA PATTERNS (TOTAL OF 64 CHAR.'S)
3604                                    ;INTO THE DESTINATION 'FIFO'.  THE USER IS THEN REQUESTED TO STROBE OUT
3605                                    ;THESE '64' CHARACTERS AND VERIFY THEM.
3606                                    ;THE '4' CHARACTER PATTERN IS: ALL 1'S, ALL 0'S, ALTERNATE "1&0'S", AND
3607                                    ;REVERSED ALTERNATE "1&0'S".
3608                                    ;*********************************************************************
3609
3610  012106  104001                CHART4: SCOPE
3611  012110  000004                        4
3612  012112  012701  000016               MOV     #16,R1          ;SET UP THE CHARACTER PATTERN
3613  012116  012702  017450               MOV     #TRNBFO,R2      ;SAVE IT IN TRANSMITTER BUFFER
3614  012122  112722  000377        TAG88A: MOVB    #377,(R2)+      ;ALL 1'S
3615  012126  112722  000200               MOVB    #200,(R2)+      ;ALL 0'S
3616  012132  112722  000125               MOVB    #125,(R2)+      ;ALTERNATE "1&0'S"
3617  012136  112722  000252               MOVB    #252,(R2)+      ;REVERSED ALTERNATE "1&0'S"
3618  012142  005301                       DEC     R1              ;LOAD '16' PATTERN'S?
3619  012144  001366                       BNE     TAG88A          ;NO
3620  012146  012712  000004               MOV     #EOT,(R2)       ;TERMINATE W/EOT
3621  012152  012737  012152  020550       MOV     #.,RETURN       ;RESET SCOPE LOOP POINTER
3622  012160  004737  017022               JSR     PC,ADRDST       ;ADDRESS DESTINATION
3623  012164  104007                       LDPGMO                  ;TRANSMIT THE '64' CHARACTERS
3624  012166  017450                       TRNBFO
3625  012170  104012                       PRINT
3626  012172  027104                       MES72                   ;TEXT "EXAMINE '64' CHARACTERS
3627  012174  104013                       TTYIN                   ;WAIT FOR 'CR'
3628
3629                                    ;*********************************************************************
3630                                    ;THIS SUBTEST ADDRESSES THE 'SOURCE' USING ALL THE WRONG MODULE
3631                                    ;ADDRESSES AND CHECKS THAT THE SOURCE ISN'T ENABLED.
3632                                    ;*********************************************************************
3633
3634  012176  104001                CHART5: SCOPE
3635  012200  000005                        5
3636  012202  004737  005066               JSR     PC,ADRSIT       ;DO IT
3637
3638                                    ;*********************************************************************
3639                                    ;TEST COMPLETE
3640                                    ;*********************************************************************
3641
3642  012206  104001                CHART6: SCOPE
3643  012210  000006                        6
3644  012212  104012                       PRINT
3645  012214  023727                       MES7                    ;TEXT 'TEST COMPLETE"
3646  012216  000137  011724               JMP     M7388F+10
3647
3648                                    .SBTTL M7377A  REMOTE SERIAL I/O TEST
```

```
                                        ;
                                        ;*************************************************************************
                                        ;M7377A REMOTE SERIAL I/O TEST
                                        ;*************************************************************************



                                        ;*************************************************************************
                                        ;THIS TEST EXERCISES THE 'M7377' MODULE USING THE PDP-11 VIA THE DL11
                                        ;AS THE DESTINATION INPUT AND THE SOURCE OUTPUT
                                        ;*************************************************************************

012222  010012                          M7377A: PRINT                   ;TEXT "M7377A REMOTE SERIAL I/O TEST".
012224  007417                                  MES80                   ;
012226  000026                                  ADDRESS                 ;GET MODULE ADDRESS OF MODULE UNDER TEST
012230  110037  012715                  M7377B: MOVB    R0,STDR7
012234  110037  012737                          MOVB    R0,STDR8
012240  110037  012777                          MOVB    R0,STDR9
012244  110037  013002                          MOVB    R0,STDR10
012250  110037  013021                          MOVB    R0,STDR11
012254  110037  013301                          MOVB    R0,STDR12
012260  110037  013343                          MOVB    R0,STDR13
012264  110037  013411                          MOVB    R0,STDR14
012270  110037  013431                          MOVB    R0,STDR15
012274  104035                          M377A1: SETUP
012276  005037  031670                          CLR     LOPSWH

                                        ;*************************************************************************
                                        ;THIS SUBTEST ADDRESSES THE 'SOURCE" PORTION OF THE MODULE USING
                                        ;MODE '2' AND TESTS FOR THE FORCED RETURN OF THE 'EOT'.
                                        ;*************************************************************************

012302  104001  000001                  ST7377: SCOPE,1
012306  112737  000062  017017                  MOVB    #62,SOH1        ;SET UP MODE '2'
012314  004737  017006                          JSR     PC,ADRSRC       ;ADDRESS THE MODULE

012320  104004                                  DELAY
012322  022712  000004                          CMP     #EOT,(R2)       ;WAS IT RETURNED?
012326  001402                                  BEQ     SD4A            ;YES
012330  104022                                  MODERR                  ;'EOT' WASN'T FORCED OUT BY SOURCE
012332  030251                                  ERR5
```

```
3691
3692
3693  012334  104001  000002          SD4A:   SCOPE,2
3694                                  ;*************************************************************************
3695                                  ;FIFO CHARACTER STORAGE TEST
3696                                  ;THIS SUBTEST ADDRESSES THE DESTINATION MODULE THEN TRANSMITTS
3697                                  ;'63' AND AN 'EOT'.  THE SOURCE MODULE IS THEN ADDRESSED
3698                                  ;AND IT SHOULD TRANSMIT THESE CHARACTERS BACK TO THE PDP-11.
3699                                  ;IT SHOULE BE NOTED THAT WHEN THIS TEST IS RUN USING THE
3700                                  ;SERIAL INPUT OPTION, ONE HUNDRED AND TWENTY-EIGHT (128)
3701                                  ;CHARACTERS WILL BE RETURNED TO THE DL11 RECEIVER.  THE FIRST
3702                                  ;'64' CHARATERS ARE RECEIVED PACK FROM THE SERIAL INPUT
3703                                  ;DESTINATION, AND THE SECOND '64' CHARACTERS ARE THE CHARACTERS
3704                                  ;THAT WERE ACTUALLY STORED IN THE FIFO OF THE MODULE UNDER TESR.
3705                                  ;*************************************************************************
3706
3707
3708                                  ;NOTE: THE CONTENTS OF THE RECEIVER BUFFER ARE:
3709                                  ;LOCATIONS 1-62 (1-75 BASE 8) ARE XMITTD/RCVD CHARACTERS.
3710                                  ;LOC 63:        XMITTED/RCVD EOT (76 BASE 8)
3711                                  ;LOC 64:        (77 BASE 8)
3712                                  ;LOC 65:        TERMINATE IF=1,INITIALLLY SET TO 0 (2ND BUFFER SWITCH)
3713
3714
3715
3716
3717
3718  012340  005077  166774          S5:     CLR     @PSW            ;ENABLE INTERRUPTS
3719  012344  104011                  RANDOM                          ;CREATE A RANDOM DATA BUFFER
3720  012346  112737  000004  017547          MOVB    #EOT,TRNBF0+77  ;TERMINATE BUFFER AFTER '63' BYTES
3721  012354  005037  017550          CLR     TRNBF0+100      ;TERMINATE BUFFER
3722  012360  004737  017022          JSR     PC,ADRDST       ;ADDRESS DESTINATION MODULE
3723
3724  012364  104007          TG1H:   LDPGM0                  ;TRANSMIT DATA
3725  012366  017450                  TRNBF0
3726
3727  012370  112737  000062  017017  TG1L:   MOVB    #62,SOH1        ;SET UP FOR MODE '2'
3728  012376  104020                  DELAYL                  ;WAIT FOR THE DATA
3729  012400  104020                  DELAYL
3730  012402  104020                  DELAYL
3731  012404  004737  017006          JSR     PC,ADRSRC       ;ADDRESS SOURCE
3732  012410  005737  016012          TST     RECEOT          ;RECEIVED ALL DATA BACK?
3733  012414  001775                  BEQ     .-4             ;NO, WAIT FOR 'EOT'
3734
3735                                  ;NOTE: HANGS HERE WAITING FOR EOT
3736
3737
3738  012416  012701  017450          CP1C:   MOV     #TRNBF0,R1      ;TO TRANSMITTED DATA
3739  012422  122122                  CP1B:   CMPB    (R1)+,(R2)+     ;DATA MATCH?
3740  012424  001403                  BEQ     .+10            ;YES
3741  012426  104022                  MODERR                  ;RECV'D DATA NOT EQUAL TO TRANS. DATA
3742  012430  030174                  ERR3
3743  012432  000420                  BR      S5B             ;EXIT ON ERROR
3744  012434  120127  017550          CMPB    R1,#TRNBF0+100  ;DONE?
3745  012440  001370                  BNE     CP1B            ;NO
3746  012442  005737  031600          TST     SIOSWH          ;USING THE SERIAL I/O INPUT?
```

```
 3747  012446  001412                        BEQ     S5B             ;NO, CHECK ONLY '63' CHAR.'S
 3748  012450  105737  017551                TSTB    TRNBFO+101      ;YES, HAVE WE CHK'D '128' CHAR.'S?
 3749  012454  001007                        BNE     S5B             ;YES, EXIT
 3750  012456  105237  017551                INCB    TRNBFO+101      ;NO, CHK NEXT '63' CHARACTERS FROM FIFO
 3751  012462  022737  000002  016012        CMP     #2,RECEOT       ;RECEIVED ALL DATA FROM FIFO?
 3752  012470  001374                        BNE     .-6             ;NO, WAIT FOR 'EOT'
 3753  012472  000751                        BR      CP1C            ;DO IT.
 3754
```

```
 3755  012474  005737  031600          S5B:    TST     SIOSWH          ;USING SERIAL I/O? (SYSTEM TEST)?
 3756  012500  001402                          BEQ     SD5A            ;YES, SKIP THE FOLLOWING TEST.
 3757  012502  000137  013456                  JMP     TAG1PD
```

```
                                ;*****************************************************************************
                                ;THIS TEST CHECKS VARIABLE TERMINATORS BY REQUESTING
                                ;THAT THE MODULE BE CHANGED TO MODE 2 AND CHECKING THAT
                                ;THE VARIABLE TERMINATOR EVOKES
                                ;A TRANSFER.

                                ;62 CHARACTERS +DEFINED VARIABLE TERMINATOR ARE XMITTED
                                ;TO THE MODULE.

                                ;THIS  ADDRESSES THE DESTINATION MODULE THEN TRANSMITTS
                                ;62  CHARACTERS FOLLOWED BY THE CUSTOMER SELECTED TERMINATOR.
                                ;THE SOURCE MODULE IS THEN ADDRESSED
                                ;AND IT SHOULD TRANSMIT THESE CHARACTERS BACK TO THE PDP-11.
                                ;IT SHOULE BE NOTED THAT WHEN THIS TEST IS RUN USING THE
                                ;SERIAL INPUT OPTION, ONE HUNDRED AND TWENTY-EIGHT (128)
                                ;CHARACTERS WILL BE RETURNED TO THE DL11 RECEIVER.  THE FIRST
                                ;'64' CHARACTERS ARE RECEIVED BACK FROM THE SEPIAL INPUT
                                ;DESTINATION, AND THE SECOND '64' CHARACTERS ARE THE CHARACTERS
                                ;THAT WERE ACTUALLY STORED IN THE 'FIFO' OF THE MODULE UNDER TEST.
                                ;*****************************************************************************
                                ;
                                ;THIS TEST CAN ONLY BE CHECKED IF WE ARE NOT USING THE SERIAL I/O MODULE
                                ;FROM THE PDP-11 TO THE PDM-70.



                                ;THE REMOTE SERIAL I/O MODULE HAS 4 MODES:
                                ;
                                ;MODE:                          FUNCTION:

                                ;0                              CLEAR ALL MODE FUNCTIONS
                                ;1                              TIME-OUT MODE
                                ;2                              VARIABLE TERMINATOR MODE
                                ;4                              REMOTE POWER CLEAR
                                ;7                              ENABLE ALL FUNCTIONS

                                ;IMPORTANT:  NOTE THAT THIS SUBTEST WILL "HANG" IF EOT IS NOT RETURNED


                                ;NOTE THAT THE REMOTE SERIAL I/O ALWAYS RESPONDS TO 'EOT'
                                ;IN  ALL MODES, BUT ONLY RESPONDS TO VARIABLES IN MODE 2.


003807  012506  104012          SD5A:   PRINT                   ;TEXT 'SELECT 12 (LF) ON SWITCH V (CR)'.
003810  012510  027460                  MES81
003811  012512  104013                  TTYIN                   ;WAIT FOR CR.
003812  012514  104001  000003          SCOPE,3
003813  012520  112737  000062  017017  MOVB    #62,SOH1
003814                                  ;USE MODE 2
003815  012526  005077  166606          CLR     @PSW            ;ENABLE INTERRUPTS
```

```
3814  012532  104011                        RANDOM                          ;CREATE A RANDOM DATA BUFFER
3815  012534  005037  017546                CLR     TRNBFO+76                       ;CLR HIGH BYTE.
3816  012540  012737  002012  017546        MOV     #2012,TRNBFO+76         ;VARIABLE TERMINATOR=LINEFEED.
3817                                                                          ;EOT AFTER LF GETS STRAPPED OUT.
3818                                                                          ;INTO THE LOW BYTE.
3819                                  ;NOTE THAT AN EOT WILL BE RETURNED AFTER THE LINEFEED...
3820  012546  005037  017550                CLR     TRNBFO+100              ;TERMINATE BUFFER
3821
3822  012552  004737  017022                JSR     PC,ADRDST               ;ADDRESS DESTINATION MODULE
3823
3824  012556  104007                TAG1HA: LDPGMO                          ;TRANSMIT DATA
3825  012560  017450                        TRNBFO
3826
3827  012562  004737  017006        TAG1LA: JSR     PC,ADRSRC               ;ADDRESS SOURCE
3828  012566  005737  016012                TST     RECEOT                  ;RECEIVED ALL DATA BACK?
3829  012572  001775                        BEQ     .-4                     ;NO, WAIT FOR 'EOT'
3830
3831                                  ;NOTE: HANGS HERE WAITNG FOR AN EOT....
3832
3833
3834
3835                                  ;DATA PLUS AN EOT SHOULD BE RETURNED.
3836
3837  012574  012701  017450        CMP1CA: MOV     #TRNBFO,R1              ;TO TRANSMITTED DATA
3838  012600  122122                CMP1BA: CMPB    (R1)+,(R2)+             ;DATA MATCH?
3839  012602  001403                        BEQ     CMP1DA                  ;YES
3840  012604  104022                        MODERR                          ;RECV'D DATA NOT EQUAL TO TRANS. DATA
3841  012606  030174                        ERR3
3842  012610  000420                        BR      SD6A                    ;EXIT ON ERROR
3843  012612  020127  017546        CMP1DA: CMP     R1,#TRNBFO+76           ;DONE?
3844
3845                                  ;NOTE: DON'T TRY TO COMPARE THE 'EOT'....
3846  012616  001370                        BNE     CMP1BA                  ;NO
3847  012620  005737  031600                TST     SIOSWH                  ;USING THE SERIAL I/O INPUT?
3848  012624  001412                        BEQ     SD6A                    ;NO, CHECK ONLY '64' CHAR.'S
3849  012626  105737  017551                TSTB    TRNBFO+101              ;YES, HAVE WE CHK'D '128' CHAR.'S?
3850  012632  001010                        BNE     SD6B                    ;YES, EXIT
3851  012634  105237  017551                INCB    TRNBFO+101              ;NO, CHK NEXT '64' CHAR.'S FROM 'FIFO'
3852  012640  022737  000002  016012        CMP     #2,RECEOT               ;RECEIVED ALL DATA FROM FIFO?
3853  012646  001374                        BNE     .-6                     ;NO, WAIT FOR 'EOT'
3854  012650  000751                        BR      CMP1CA                  ;DO IT.
3855  012652  000240                SD6A:   NOP
3856
3857
3858
```

```
                                        ;*************************************************************************
                                        ;THIS SUBTEST ADDRESSES THE 'SOURCE' USING THE WRONG MODULE ADDRESSES
                                        ;AND TESTS THAT THE SOURCE ISN'T ENABLED.
                                        ;*************************************************************************

012654  104001  000004          SD6B:   SCOPE,4
012660  012777  000340  166452          MOV     #340,@PSW       ;INHIBIT INTERRUPTS
012666  005737  031600                  TST     SIOSWH          ;USING SERIAL INPUT OPTION?
012672  001074                          BNE     SD10A           ;YES, SKIP THE NEXT TEST.
012674  004737  005066                  JSR     PC,@#ADR

                                        ;*****************************************************************
                                        ;THIS SUBTEST CHECKS THAT 'ETX' WILL CLEAR THE SOURCE AND THAT 'STX'
                                        ;WILL CLEAR THE DESTINATION
                                        ;*****************************************************************

012700  104001  000005          SD7A:   SCOPE,5
012704  104005                          RECVR0
012706  104007                          LDPGM0                  ;ADDRESS MODULE
012710  012714                          .+4
012712  000402                          BR      TG1KA
012714     022                  STDR7:  .BYTE   DC2             ;ALERT DESTIN
012715     067                          .BYTE   67              ;SEND THE ETX TO CLEAR THE SOURCE.
012716     023                          .BYTE   DC3
012717     003                          .BYTE   ETX
                                                                ;SEND THE "B" AS DATA.
012720  104007                  TG1KA:  LDPGM0
012722  012726                          .+4
012724  000401                          BR      TG1LA
012726     102                          .BYTE   'B
012727     004                          .BYTE   EOT
                                                                ;THIS EOT SHOULD CLEAR THE DESTINATION.
012730  104007                  TG1LA:  LDPGM0
012732  012736                          .+4
012734  000402                          BR      TAG1KA
012736     021                          .BYTE   DC1             ;ALERT SOURCE
012737     067                  STDR8:  .BYTE   67
012740     023                          .BYTE   DC3             ;ENABLE MODULE TO RECEIVE ANY DATA.
012741     000                          .BYTE   0
                                        .EVEN
                                                                ;ONLY "ETX" SHOULD BE RETURNED.

012742  122722  000003          TAG1KA: CMPB    #ETX,(R2)+      ;WAS 'ETX' RETURNED?
012746  001403                          BEQ     .+10            ;YES
012750  104022                          MODERR                  ;'ETX' WASN'T RETURNED
012752  030725                          ERR16
012754  000443                          BR      SD10A           ;EXIT ON ERROR

012756  105722                          TSTB    (R2)+           ;WAS ANY OTHER DATA RECV'D?
012760  001403                          BEQ     .+10            ;NO-OK
012762  104022                          MODERR                  ;ETX DIDN'T CLR SOURCE
012764  030637                          ERR14
012766  000436                          BR      SD10A           ;EXIT ON ERROR
```

```
3912
3913                                    ;REMEMBER TO CLEAR THE 'B' AND 'EOT ' THAT ARE IN THE BUFFER.
3914
3915  012770  104007                    TAG1SA: LDPGMO
3916  012772  012776                            .+4
3917  012774  000405                            BR TAG1SB
3918  012776     021                            .BYTE   DC1             ;SEND THE 'B' & 'EOT' OUT OF FIFO.
3919  012777     061                    STDR9:  .BYTE   61
3920  013000     023                            .BYTE   DC3
3921  013001     022                            .BYTE   DC2
3922                                                                    ;NOW RE-ENABLE THE DESTINATION.
3923  013002     061                    STDR10: .BYTE   61
3924  013003     023                            .BYTE   DC3
3925  013004     002                            .BYTE   STX
3926  013005     101                            .BYTE   'A
3927  013006     130                            .BYTE   'X
3928  013007     000                            .BYTE   0
3929                                            .EVEN
3930                                    ;NOW RE-ADDRESS SOURCE & DESTINATION AND EXAMINE DATA
3931
3932  013010  104005                    TAG1SB: RECVRO
3933  013012  104007                            LDPGMO                  ;RE-ADDRESS SOURCE
3934  013014  013020                            .+4
3935  013016  000402                            BR      TAG1TA
3936
3937  013020     021                            .BYTE   DC1             ;ALERT SOURCE
3938  013021     061                    STDR11: .BYTE   61
3939  013022     023                            .BYTE   DC3
3940  013023     000                            .BYTE   0
3941                                            .EVEN
3942
3943  013024  005737  016014            TAG1TA: TST     RECSTX          ;WAS 'S    RETURNED?
3944  013030  001003                            BNE     .+10            ;YES
3945  013032  104022                            MODERR                  ;'STX' WASN'T RECV'D FROM DES .
3946  013034  030106                            ERR1
3947  013036  000405                            BR      TAG1WA          ;EXIT ON ERROR
3948
3949
3950                                    ;SKIP OVER EOT HERE AND LOOK FOR AN "X".
3951                                    ;SINCE NO DATA SHOULD HAVE BEEN RETURNED, IT SHOULD BE 0.
3952                                    ;IF NON-ZERO ,THEN WE HAVE AN ERROR.
3953
3954
3955  013040  105737  016024                    TSTB    RECBF0+2        ;WAS 'STX' THE ONLY DATA RECV'D
3956  013044  001402                            BEQ     .+6             ;YES
3957  013046  104022                            MODERR                  ;'STX' DIDN'T CLR DEST.
3958  013050  030541                            ERR12
3959
3960                                    ;SEND AN 'EOT' TO CLR MODULE
3961
3962  013052  105737  016026            TAG1WA: TSTB    RECBF0+4        ;LOOK FOR THE "X" HERE...
3963  013056  001402                            BEQ     SD10A           ;BRANCH IF NO ERRORS.
3964  013060  104022                            MODERR
3965  013062  030541                            ERR12
```

```
3966                                    ;*************************************************************************
3967                                    ;THIS SUBTEST REQUESTS THE OPERATOR TO RE-SET THE MODULE ADDRESS TO '17'.
3968                                    ;IF DATA 'SW10' IS NOT SET THIS MANUAL INTERVENTION TEST IS SKIPPED.
3969                                    ;*************************************************************************
3970
3971  013064  104001  000006           SD10A:  SCOPE,6
3972  013070  032777  002000  166254           BIT     #SW10,@SWR      ;SW10 SET?
3973  013076  001166                          BNE     TAG1PC          ;YES, TYPE TEST COMPLETE
3974  013100  104012                          PRINT
3975  013102  024007                          MES10                   ;TEXT 'RE-SET MODULE ADDRESS TO '17'.
3976  013104  104013                          TTYIN                   ;WAIT FOR 'CR' TO CONTINUE
3977
3978  013106  012737  013106  020550   TAG10A: MOV     #.,RETURN       ;RE-SET SCOPE LOOP ADDRESS POINTER
3979  013114  112737  000077  031602           MOVB    #77,MODADR      ;SET UP FOR ADDR. '17'
3980  013122  112737  000077  017015           MOVB    #77,SRCADR
3981  013130  112737  000077  017065           MOVB    #77,DSTADR
3982  013136  104005                          RECVR0                  ;ENABLE DL 0'S RECVR.
3983  013140  004737  017022                  JSR     PC,ADRDST       ;ADDRESS DEST. MODULE
3984
3985  013144  104007           TAG1RA: LDPGM0                          ;SEND SOME DATA
3986  013146  013152                   .+4
3987  013150  000402                   BR      TAG1UA
3988  013152     101                   .BYTE   'A                      ;SEND DATA
3989  013153     102                   .BYTE   'B
3990  013154     004                   .BYTE   EOT                     ;TERMINATE
3991          013156                   .EVEN
3992  013156  104005           TAG1UA: RECVR0                          ;CLR & RESET BUFFER
3993                                                                   ;FOR THE NEXT TEST.
3994  013160  004737  017006          JSR     PC,ADRSRC               ;ADDRESS THE SOURCE
3995  013164  104004                  DELAY
3996  013166  022712  041101   TAG1ZA: CMP     #41101,(R2)             ;WAS THE 'A & B' RETURNED?
3997  013172  001403                  BEQ     .+10                    ;YES
3998  013174  104022                  MODERR                          ;MODULE WASN'T ENABLED WITH ADDRESS '17'
3999  013176  030507                  ERR11
4000  013200  000405                  BR      SD11A                   ;EXIT ON ERROR
4001  013202  005737  016012          TST     RECEOT                  ;WAS 'EOT' STRAPPED OUT?
4002  013206  001002                  BNE     .+6                     ;NO.
4003
4004  013210  104022                  MODERR                          ;'EOT' WAS STRAPPED OUT
4005  013212  030671                  ERR15
4006  013214  104012           SD11A: PRINT                           ;TEXT 'RESET MODULE ADDRESS<CR>'
4007  013216  030053                  MES88
4008  013220  113737  012715  031602          MOVB    STDR7,MODADR    ;RE-STUFF THE ORIGINAL ADDRESSES.
4009  013226  113737  012715  017015          MOVB    STDR7,SRCADR
4010  013234  113737  012715  017065          MOVB    STDR7,DSTADR
4011
4012
4013
4014                                    ;*************************************************************************
4015                                    ; THIS SUBTEST CHECKS MODE 1 FOR TIMEOUT
4016                                    ;*************************************************************************
4017
4018  013242  104001  000007           SCOPE,7
4019  013246  104035                   SETUP
4020
4021  013250  104012                   PRINT                   ;TEXT SET CLOCK 3  ON CLOCK MODULE TO 100 MILLISEC
```

```
 4022  013252  027643                          MES84                   ;TEXT SET SWITCH 1 OF P TO ON.
 4023  013254  027727                          MES85
 4024  013256  104013                          TTYIN
 4025  013260  112737  000061  017017          MOVB #61,SOH1           ;SET UP MODE 1
 4026  013266  004737  017006                  JSR PC,ADRSRC
 4027  013272  104007                          LDPGMO                  ;NOW CHECK THE TIME-OUT CLEAR.
 4028  013274  013300                          .+4
 4029  013276  000403                          BR      TG1PA
 4030  013300     022                          .BYTE   DC2
 4031  013301     061                STDR12:   .BYTE   61
 4032  013302     023                          .BYTE   DC3
 4033  013303     130                          .BYTE   'X
 4034  013304     101                          .BYTE   'A
 4035  013305     004                          .BYTE   EOT
 4036
 4037
 4038                                ;ADDRESS SOURCE USING MODE 3
 4039
 4040
 4041
 4042                                ;ADDRESS NON-EXISTENT SOURCE (240=SPACE).
 4043                                ;VIA THIS PROGRAM: DC1,240,DC3
 4044
 4045  013306  112737  000240  017015  TG1PA:  MOVB    #240,SRCADR     ;SET SPACE=ADDRESS TO BE ADDRESSED.
 4046  013314  004737  017006                  JSR     PC,ADRSRC       ;ADDRESS THE SOURCE MODULE.
 4047  013320  012737  177763  031626          MOV     #-15,COUNT
 4048  013326  104005                          RECVRD
 4049
 4050                                ;WAIT  FOR APPROXIMATELY 15 SECONDS...
 4051
 4052
 4053  013330  004737  014276                  JSR     PC,CNTLOP
 4054
 4055  013334  104007                          LDPGMO
 4056  013336  013342                          .+4
 4057  013340  000402                          BR      TG1PB
 4058  013342     021                          .BYTE   DC1
 4059  013343     061                STDR13:   .BYTE   61
 4060  013344     023                          .BYTE   DC3
 4061  013345     000                          .BYTE   0
 4062  013346  105722                TG1PB:    TSTB    (R2)+           ;SKIP OVER THE EOT.
 4063  013350  105722                          TSTB    (R2)+           ;LOOK AT THE BYTE.
 4064
 4065  013352  001403                          BEQ     TG1PC           ;OK,NO DATA RETURNED.
 4066  013354  104022                          MODERR                  ;CLEAR LEFT GARBAGE IN MODULE FIFO.
 4067  013356  031301                          ERR24
 4068
 4069                                ;NOW CHECK THE REMOTE CLEAR FUNCTION.
 4070
 4071  013360  104005                          RECVRD
 4072  013362  112737  000064  017017  TG1PC:  MOVB    #64,SOH1        ;LEAVE IN MODE 4.
 4073  013370  113737  012715  017015          MOVB    STDR7,SRCADR
 4074  013376  004737  017006                  JSR     PC,ADRSRC       ;ADDRESS THE SOURCE
 4075
 4076                                ;DON'T DELAY THIS TIME.
 4077
```

```
4078  013402  104007                    LDPGM0                  ;RETURNS FIRST EOT
4079
4080  013404  013410                    .+4
4081  013406  000405                    BR      TG1PE
4082  013410     022                    .BYTE   DC2                     ;ALERT DESTINATION.
4083  013411     061            STDR14:.BYTE    61
4084  013412     023                    .BYTE   DC3
4085  013413     130                    .BYTE   'X                      ;SEND SOME DATA.
4086  013414     101                    .BYTE   'A
4087  013415     005                    .BYTE   ENQ                     ;SEND ENQ TO DESTINATION.
4088                                                                    ;ENQ SHOULD CLEAR OUT THE DESTINATION.
4089  013416     000                    .BYTE   0
4090        013420                      .EVEN
4091  013420  104020                    DELAYL
4092
4093  013422  104007            TG1PE:  LDPGM0
4094  013424  013430                    .+4
4095  013426  000402                    BR      TG1PF
4096  013430     021                    .BYTE   DC1
4097  013431     061            STDR15: .BYTE   61                      ;ALERT THE SOURCE.
4098  013432     023                    .BYTE   DC3
4099                                                                    ;2ND EOT RETURNED HERE
4100  013433     000                    .BYTE   0
4101                                    .EVEN
4102  013434  005722            TG1PF:  TST     (R2)+                   ;TWO EOT'S ARE EXPECTED BACK.
4103
4104  013436  005722                    TST     (R2)+                   ;SKIP OVER THE EOT'S.
4105  013440  005722                    TST     (R2)+                   ;AND LOOK TO SEE IF ANY DATA WAS RETURNED.
4106                                                                    ;IF DATA CAME BACK, THEN REMOTE CLEAR
4107                                                                    ;DIDN'T WORK.
4108
4109  013442  001402                    BEQ     TG1PG                   ;REMOTE CLEARED WORKED ?
4110  013444  104022                    MODERR
4111  013446  031225                    ERR23                           ;NO, IT DIDN'T
4112                                                                    ;REMOTE CLEAR LEFT GARBAGE IN FIFO.
4113  013450  104001  000010    TG1PG:  SCOPE,8.                        ;YES, REMOTE CLEAR WORKED.
4114                            ;*****************************************************************
4115                            ;TEST COMPLETE
4116                            ;*****************************************************************
4117
4118  013454  104026            TAG1PC: ADDRESS                 ;SET UP NEW MODULE ADDRESS
4119  013456  113700  031602    TAG1PD: MOVB    MODADR,R0       ;RESET THE ADDRESS.
4120  013462  104012                    PRINT
4121  013464  023727                    MES7                    ;TEXT 'TEST COMPLETE'
4122  013466  000137  012230            JMP     M7377B          ;RESTART TEST
4123                            .SBTTL M7378A FOUNDATION MODULE TEST
4124
```

```
                                ;*****************************************************************************
                                ;M7378 FOUNDATION MODULE TEST
                                ;*****************************************************************************



                                ;THIS TEST SETS THE SERIAL I/O UP AS A SOURCE AND THE FOUNDATION
                                ; MODULE AS THE DESTINATION . A RANDOM(PSEUDO) BUFFER
                                ; IS CREATED AND TRANSMITTED FROM SERIAL I/O TO THE FOUNDATION
                                ; MODULE.  THEN THE FOUNDATION MODULE IS ADDRESSED AS THE SOURCE
                                ; AND THE SERIAL I/O IS ADDRESSED AS THE DESTINATION.  BECAUSE
                                ; OF THE 'WRAP-AROUND' CABLE, THE DATA IS RETURNED
                                ; FROM FOUNDATION MODULE TO SERIAL I/O.

                                ;

                                ;IF THE SERIAL I/O IS BEING USED, A TOTAL OF 128 CHARACTERS
                                ;RATHER THAN 64 CHARACTERS WILL BE RETURNED.

                                ;THE TEST THEN CHECKS TO MAKE SURE THAT ADDRESS 17
                                ; WILL ALSO RETURN THE DATA.

013472  000000                  FLAB7:  .WORD 0                 ;THIS LOC IS USED TO RESTORE
                                                                ;THE CONTENTS OF ADDRESS
                                                                ;WHEN LOOPING.

013474  000000                  FOUNSW: .WORD   0
013476  104012                  M7378A: PRINT
013500  027263                          MES77                   ;TEXT "FOUNDATION
                                                                ;MODULE TEST".
013502  005037  013474          FLO:    CLR     FOUNSW                  ;CLEAR OUT OUR SUBTEST SWITCH.
013506  104035                  FLOP:   SETUP                   ;GET THE MODULE ADDRESS.
013510  104026                          ADDRESS                 ;PUT ADDRESS INTO R0.

013512  110037  013472                  MOVB    R0,FLAB7        ;SAVE THE ADDRESS IN FLAB7.
013516  113700  013472          FLOPB:  MOVB    FLAB7,R0
                                                                ;MODIFY THE FOUNDATION ADDRESS
                                                                ;IN THE PDM-70 PROGRAMS.
013522  004737  014464                  JSR PC,FSTUF
013526  113737  016770  013652          MOVB    IADRS9,IADR11   ;SET UP SER I/O ADDR.
013534  113737  016770  013636          MOVB    IADRS9,IADR12
013542  113737  016770  013655          MOVB    IADRS9,IADR14
013550  113737  016770  013642          MOVB    IADRS9,IADR13

                                ;
                                ;
                                ;*****************************************************************************
                                ;THIS SUBTEST XMITS A RANDOM BUFFER TO THE FOUNDATION MODULE.
                                ;*****************************************************************************
                                ;
                                ;NOTE THAT FOUNSW=0 HERE.
                                ;
013556  104001  000001                  SCOPE,1
013562  113737  013472  013646          MOVB    FLAB7,FLAB1     ;MODIFY THE FOUNDATION ADDRESS IN PROG.
013570  005077  165544                  CLR     @PSW            ;ENABLE INTERRUPTS
013574  104011                          RANDOM                  ;GENERATE RANDOM BUFFER
```

```
 4181  013576  112737  000004  017547          MOVB    #EOT,TRNBF0+77  ;TERMINATE AFTER 64 BYTES.
 4182  013604  005037  017550                  CLR     TRNBF0+100      ;END OF BUFFER.
 4183  013610  104005                          RECVR0
 4184
 4185  013612  112737  000060  017017          MOVB    #60,SOH1        ;MODE X
 4186  013620  005737  031600          FOUNDL: TST     SIOSWH          ;USING THE SERIAL I/O?
 4187  013624  001417                          BEQ     FNORM           ;NO, SO BRANCH TO NORMAL LOAD.
 4188  013626  104007                          LDPGM0                  ;ELSE USE PADDED PROGRAM.
 4189  013630  013634                          .+4
 4190  013632  000421                          BR      FDATA           ;XMIT THE DATA NEXT.
 4191  013634     002          FPROG:  .BYTE   STX
 4192  013635     021                  .BYTE   DC1
 4193  013636     075          IADR12: .BYTE   75                      ;SERIAL I/O SRC.
 4194  013637     001                  .BYTE   SOH
 4195  013640     061                  .BYTE   61
 4196  013641     022                  .BYTE   DC2
 4197  013642     075          IADR13: .BYTE   75
 4198  013643     075          FLAB2:  .BYTE   75                      ;FOUNDATION MODULE
 4199  013644     023                  .BYTE   DC3
 4200  013645     021                  .BYTE   DC1                     ;ADDRESS FOUNDATION AS SRC.
 4201  013646     075          FLAB1:  .BYTE   75
 4202  013647     001                  .BYTE   SOH
 4203  013650     060                  .BYTE   60
 4204  013651     022                  .BYTE   DC2
 4205
 4206                          ;ADDRESS THE SERIAL I/O AS DESTINATION.
 4207
 4208  013652     075          IADR11: .BYTE   75
 4209  013653     023                  .BYTE   DC3
 4210  013654     021                  .BYTE   DC1
 4211  013655     075          IADR14: .BYTE   75
 4212  013656     001                  .BYTE   SOH
 4213  013657     061                  .BYTE   61
 4214  013660     023                  .BYTE   DC3
 4215  013661     003                  .BYTE   ETX
 4216  013662     000                  .BYTE   0
 4217          013664                  .EVEN
 4218  013664  104007          FNORM:  LDPGM0
 4219  013666  013672                  .+4
 4220  013670  000402                  BR      FDATA
 4221  013672     022          FLAB3A: .BYTE   DC2
 4222  013673     075          FLAB3:  .BYTE   75                      ;FOUNDATION MODULE.
 4223  013674     023                  .BYTE   DC3                     ;AS DESTINATION
 4224  013675     000                  .BYTE   0
 4225                                  .EVEN
 4226  013676  104007          FDATA:  LDPGM0
 4227  013700  017450                  TRNBF0                          ;XMIT THE DATA.
 4228  013702  005737  031600          TST     SIOSWH
 4229  013706  001005                  BNE     FTST                    ;;BRANCH IF USING SER I/O.
 4230
 4231  013710  104007                  LDPGM0
 4232  013712  013716                  .+4
 4233  013714  000402                  BR      FTST                    ;FOUNDATION AS SOURCE.
 4234  013716     021          FLAB5A: .BYTE   DC1
 4235  013717     071          FLAB5:  .BYTE   71
 4236  013720     023                  .BYTE   DC3
```

```
 4237  013721  000                          .BYTE   0
 4238                                       .EVEN
 4239
 4240
 4241                               ;DELAY AND CHECK TO MAKE SURE THAT AN EOT HAS BEEN RETURNED.
 4242
 4243
 4244  013722  104020               FTST:   DELAYL
 4245  013724  104004                       DELAY                   ;GIVE IT TIME TO RETURN.
 4246  013726  005737  016012               TST     RECEOT          ;LOOK FOR AN EOT.
 4247  013732  001002                       BNE     FND1C           ;YES, EOT WAS RETURNED.
 4248  013734  104022                       MODERR                  ;'EOT' NOT RETURNED.
 4249  013736  030251                       ERR5
 4250
 4251
 4252
 4253
 4254                               ;NOW CHECK THE DATA IN THE RECEIVER AND TRANSMITER BUFFERS.
 4255                               ;LOOK FOR MATCHES.
 4256
 4257  013740  012701  017450       FND1C:  MOV     #TRNBF0,R1      ;XMITTED DATA.
 4258  013744  122122               FND1B:  CMPB    (R1)+,(R2)+     ;DATA MATCH?
 4259  013746  001403                       BEQ FND1D               ;YES.
 4260  013750  104022                       MODERR                  ;ELSE ERROR
 4261  013752  030174                       ERR3                    ;XMITTED DATA NOT = RECVD DATA.
 4262  013754  000420                       BR      FOUND2          ;NON-FATAL ERROR.
 4263
 4264
 4265                               ;NOW CHECK TO SEE IF WE SHOULD LOOK FOR 64 CHARACTERS OR 128
 4266                               ;CHARACTERS. IF WE ARE USING THE SERIAL I/O WE WILL
 4267                               ;HAVE 128 CHARACTERS RETURNED (INCLUDIND TWO 'EOTS').
 4268
 4269                               ;NOTE THAT THE LOW BYTE OF TRNBF0+100
 4270                               ;SERVES AS A BUFFER TERMINATOR AND THAT THE
 4271                               ;HIGH BYTE SERVES AS A SWITCH. IF THE HIGH BYTE IS SET, THEN
 4272                               ;WE HAVE CHECKED ALL 128 CHARACTERS.
 4273
 4274
 4275
 4276  013756  020127  017550       FND1D:  CMP     R1,#TRNBF0+100  ;DONE?
 4277  013762  001370                       BNE     FND1B           ;NOT DONE YET.
 4278  013764  005737  031600               TST     SIOSWH          ;USING THE SERIAL I/O?
 4279  013770  001412                       BEQ     FOUND2          ;NO, CK ONLY 64 CHARS
 4280  013772  105737  017551               TSTB    TRNBF0+101      ;CHECKED 128 CHARS?
 4281  013776  001007                       BNE     FOUND2          ;YES, EXIT.
 4282  014000  105237  017551               INCB    TRNBF0+101      ;NO, CK NEXT 64 CHARS FROM FIFO.
 4283  014004  022737  000002  016012       CMP     #2,RECEOT       ;EOT RECVD YET?
 4284  014012  001374                       BNE     .-6             ;NO, WAIT FOR IT.
 4285  014014  000751                       BR      FND1C           ;GO CHECK THE DATA FROM FIFO.
 4286
 4287
 4288                               ;IF THE 'FOUNSW' IS SET , THEN WE ARE EXECUTING
 4289                               ;THE 'ADDRESS 17' SUBTEST AND WE SHOULD SKIP OVER THE
 4290                               ;FOLLOWING SECTION. SET MEANS=-1.
 4291
 4292
```

```
 4293  014016  005737  013474          FOUND2: TST     FOUNSW          ;LOOK AT THE SOFTWARE SWITCH.
 4294  014022  003035                          BGT     FOUND5          ;IF SWITCH=+1, THEN
 4295                                                                  ;WE ARE IN SUBTEST 3.
 4296  014024  100423                          BMI     FOUND3          ;SW=-1 MEANS WE HAVE
 4297                                                                  ;JUST FINISHED SUBTEST 2.
 4298                                                                  ;ELSE FALL THROUGH TO SUBTEST 2.
 4299                                                                          ;(SWITCH=0).
 4300  014026  005737  031600                  TST     SIOSWH
 4301  014032  001067                          BNE     FOUND6
 4302  014034  000240                          NOP
 4303  014036  000240                          NOP
```

```
 4304                                   ;*************************************************************************
 4305                                   ;THIS SUBTEST USES ADDRESS '17' AND XMITS A RANDOM BUFFER.
 4306                                   ;*************************************************************************
 4307
 4308                                   ;NOTE: FOUNSW=-1 HERE.
 4309
 4310  014040  104001  000002                  SCOPE,2                  ;****SUBTEST 2
 4311
 4312  014044  104012                           PRINT
 4313  014046  024007                           MES10                    ;TEXT RESET MODULE ADDRESS TO '17'.
 4314  014050  104013                           TTYIN                    ;WAIT FOR CR
 4315  014052  112700  000077                   MOVB    #77,R0           ;REPLACE THE FOUNDATION ADDRESS WITH 17.
 4316  014056  004737  014464                   JSR PC,FSTUF
 4317                                  ;SET THE SWITCH SO THAT WE WON'T ENTER THIS AGAIN.
 4318
 4319  014062  012737  177777  013474           MOV     #-1,FOUNSW       ;-1 MEANS WE ARE IN THIS TEST.
 4320  014070  000137  013620                   JMP     FOUNDL           ;SEND 2 CHARACTERS AND
 4321                                                                    ;CHECK TO MAKE SURE THAT ADDRESS 17
 4322                                                                    ;WILL RETURN THEM.
 4323
 4324
```

```
4325                                    ;*************************************************************************
4326                                    ;THIS SUBTEST USES THE WRONG ADDRESSES AND CHECK TO MAKE
4327                                    ;SURE THAT THE MODULE IS NOT ENABLED.
4328                                    ;*************************************************************************
4329
4330  014074  005737  031600           FOUND3: TST     SIOSWH                  ;SKIP THIS SUBTEST IF WE ARE USING SERIAL I/O.
4331  014100  001402                           BEQ     FND3A                   ;SIO NOT IN USE.
4332  014102  000137  013502                   JMP     FLO                     ;ELSE LOOP TO BEGINNING OF MODULE TEST.
4333
4334                                    ;ADDRESS THE MODULE WITH ADDRESSES  0-16.
4335                                    ;ASSUME PRESENT ADDRESS SELECTED TO BE 17.
4336
4337
4338  014106  104001  000003           FND3A:  SCOPE,3                         ;****SUBTEST 3
4339  014112  004737  005066                   JSR     PC,ADRSIT                       ;MULTIPLE
4340                                                                    ;ADDRESS TEST.
4341                                                                    ;(DESTINATION)
4342
4343
```

```
                                        ;*****************************************************************
                                        ;               ROUTINE TO CHECK CUSTOMER DEFINED
                                        ;               MODE FLIP FLOP (SUB-PROGRAM).
                                        ;*****************************************************************
014116  104001  000005        FOUND5: SCOPE,5                 ;****SUBTEST 5
014122  104012                        PRINT
014124  027325                        MES78                   ;TEXT
                                                                ;PUT SCOPE PROBE
                                                                ;ON PIN 78(CR).

014126  027361                        MES79                   ;'USE ↑E TO EXIT
014130  104013                        TTYIN                   ;WAIT FOR CR
                                ;
014132  012737  014212  014210        MOV     #FOUND6,EVECTOR
                                ;OUTPUT THE FOLLOWING PROGRAM.
                                ;THIS PROGRAM WILL LOOP ENDLESSLY
                                ;UNTIL A '↑E' IS INPUTTED VIA TTY.
                                ;THE APPROXIMATE SIGNAL TO BE SCOPED WILL
                                ;BE 1 MILLISEC @ 9600 BAUD.
                                ;
                                ;SW 14=SET TO SCOPE.
                                ;SW 11 =SET TO
                                ;
014140  005737  031600        FND5:   TST     @IOSWH          ;USING THE SERIAL I/O?
014144  001013                        BNE     FND5B           ;YES, SO USE PADDED PROGRAM.
                                                                ;ELSE, USE THE FOLLOWING:

                                ;LOAD THIS PROGRAM IF MODULE TEST
                        FND5A:  LDPGMD                          ;LOAD THE PROGRAM
014146  104007                  .+4
014150  014154                  BR      FND5C                   ;GO HERE WHEN DONE
014152  000402                  .BYTE   DC2
014154  000022          FLAB6:  .BYTE   77                      ;FOUNDATION AS DESTIN.
014155  000077                  .BYTE   DC3
014156  000023                  .BYTE   EOT                     ;SEND THE EOT
014157  000004

014160  104007          FND5C:  LDPGMD
014162  014166                  .+4
014164  000770                  BR      FND5A
014166  000021                  .BYTE   DC1
014167  000077          FLAB4:  .BYTE   77
014170  000001                  .BYTE   SOH
014171  000003                  .BYTE   DC3
014172  000000                  .BYTE   0
        000014.                 .EVEN

                                ;USE THIS PROGRAM IF SYSTEM TEST
014174  104007          FND5B:  LDPGMD                          ;LOAD THE FOLLOWING PROGRAM.
                                                                ;(SERIAL I/O IN USE).

014176  013634                  FPROG
014200  104006                  LDCHRC                          ;SEND AN EOT
014202  000004                  EOT
014204  000137  014174          JMP     FND5B
```

```
 4400
 4401  014210  000000                EVECTOR:        .WORD   0       ;ADDRESS TO GET ME OUT OF  .IFINI   LOOPS.
```

```
                                        ;*****************************************************************
                                        ;                    TEST COMPLETE
                                        ;*****************************************************************

014212  104001  000006          FOUND6: SCOPE,6

014216  104012                          PRINT
014220  023727                          MES7                    ;TEXT 'TEST COMPLETE'
014222  000137  013502                  JMP     FLO             ;LOOP THE TEST.

                                        .SBTTL  SUBROUTINES
```

```
                                        ;*****************************************************  ******
                                        ;                    SUBROUTINE SENDAX
                                        ;*****************************************************
                                        ;
                                        ;SUBROUTINE TO LOAD AND SEND THE CHARACTERS
                                        ;"A" AND "X"
                                        ;
                                        ;
014226  104007                          SENDAX: LDPGMD
014230  014234                                  .+4
014232  000420                                  BR      SNDAX1          ;GO HERE WHEN DONE.
014234     101                          BYTEA:  .BYTE   'A
014235     130                          BYTEX:  .BYTE   'X
014236     004                                  .BYTE   EOT
014237     000                                  .BYTE   0
                                                .EVEN
                                        ;**********SUBROUTINE SENDPG**********
                                        ;SUBROUTINE TO SEND A PROGRAM.
                                        ;(USED FOR DEBUGGING PURPOSES.)
014240  104007                          SENDPG: LDPGMD
014242  014246                                  .+4
014244  000413                                  BR      SNDAX1
014246     002                                  .BYTE   STX
014247     021                                  .BYTE   DC1
014250     060                                  .BYTE   60
014251     001                                  .BYTE   SOH
014252     061                                  .BYTE   61
014253     022                                  .BYTE   DC2
014254     060                                  .BYTE   60
014255     023                                  .BYTE   DC3
014256     021                                  .BYTE   DC1
014257     060                                  .BYTE   60
014260     022                                  .BYTE   DC2
014261     060                                  .BYTE   60
014262     023                                  .BYTE   DC3
014263     021                                  .BYTE   DC1
014264     060                                  .BYTE   60
014265     001                                  .BYTE   SOH
014266     060                                  .BYTE   60
014267     000                                  .BYTE   0
014270     000                                  .BYTE   0
014271     000                                  .BYTE   0
014272     000                                  .BYTE   0
014274                                          .EVEN
014274  000207                          SNDAX1: RTS     PC              ;RETURN
                                        ;**********SUBROUTINE CNTLOP**********
                                        ;SUBROUTINE TO PROVIDE AN "X" SECOND WAIT.
                                        ;ENTERS WITH COUNT EQUAL TO THE COMPLEMENT OF THE NUMBER
                                        ;OF SECONDS DESIRED TO WAIT.
```

```
                                ;*****************************************************************************
                                ;ROUTINE TO ADDRESS A MODULE USING ALL OF THE WRONG ADDRESSES
                                ;AND CHECK TO MAKE SURE THAT DATA ISN'T RETURNED.
                                ;*****************************************************************************


                                ;THIS ROUTINE IS DESIGNED FOR THE FOUNDATION MODULE
                                ;BUT WILL WORK FOR OTHER MODULES.
014310  112737  000060  017065  MATD:   MOVB    #60,DSTADR      ;SET UP 1ST ADDRESS
                                                                ;TO BE TESTED.
014316  113700  017065          ADSLOP: MOVB    DSTADR,R0
014322  004737  014464                  JSR     PC,FSTUF        ;STUFF MODULE ADDRESS.
014326  005027  016024                  CLR     #RECBF0+2       ;CLEAR 1ST LOC.
014332  123737  031602  017065          CMPB    MODADR,DSTADR   ;EQUAL TO SELECTED ADDRESS?
014340  001434                          BEQ     ADSNXT          ;YES, SELECT NEXT ADDR.
014342  005737  031600                  TST     SIOSWH          ;SERIAL I/O IN USE?
014346  001403                          BEQ     ADSLP1          ;NOPE

014350  104007                          LDPGMO
014352  013634                          FPROG                   ;USE PADDED SERIAL PROGRAM.

014354  000410                          BR      ADSLP2
014356  104007                  ADSLP1: LDPGMO
014360  013716                          FLAB5A
                                ;ADDRESS THE FOUNDATION MODULE AS A SOURCE (NON-SERIAL I/O).
014362  104007                          LDPGMO
014364  014370                          .+4
014366  000403                          BR      ADSLP2
014370     021                  FLAB17: .BYTE   DC1
014371     060                          .BYTE   60
014372     001                          .BYTE   SOH
014373     060                          .BYTE   60
014374     023                          .BYTE   DC3
        014376                          .EVEN

014376  004737  014226          ADSLP2: JSR     PC,SENDAX       ;SEND 2 CHARS.
014402  104005                          RECVR0                  ;ENABLE DL-11 RCVR.
014404  104004                          DELAY


                                ;CHECK THE DATA TO SEE IF IT IS A,B,EOT.
                                ;SINCE OTHER MODULES MAY INDEED BE IN THE SYSTEM, OTHER
                                ;THAN THE FOUNDATION MOD, THEY COULD POSSIBLY XMIT DATA WHEN
                                ;ADDRESSED.

014406  123722  000101                  CMPB    'A,(R2)+        ;WAS AN "A" RETURNED?
014412  001007                          BNE     ADSNXT          ;NOPE.
014414  123722  000102                  CMPB    'B,(R2)+                ;B?
014420  001004                          BNE     ADSNXT          ;NOT A B.
```

```
4526  014422  122722  000004              CMPB    #EOT,(R2)+      ;EOT?
4527  014426  001001                      BNE     ADSNXT
4528
4529                                  ;ONLY THE STRING A,B,EOT CAN MAKE IT TO HERE.
4530
4531  014430  000407                      BR      ADSER1
4532                                                              ;THAT STRING SHOULD NOT  HAVE
4533                                                              ;BEEN RECEIVED.
4534
4535  014432  105237  017065      ADSNXT: INCB    DSTADR          ;UPDATE MODULE ADDRESS.
4536  014436  122737  000077  017065    CMPB    #77,DSTADR      ;DONE?
4537  014444  001324                      BNE     ADSLOP          ;NO.
4538  014446  000207                      RTS     PC              ;YES.
4539  014450  113737  017065  030634  ADSER1: MOVB    DSTADR,ERR13A
4540  014456  104022                      MODERR                  ;MODULE ENABLED
4541  014460  030572                      ERR13                   ;WITH ILLEGAL
4542                                                              ;ADDRESS.
4543  014462  000763                      BR      ADSNXT
```

```
 4544
 4545
 4546                                   ;*************************************************************************
 4547                                   ;ROUTINE TO STUFF THE ADDRESS IN R0 INTO THE PADDED SERIAL
 4548                                   ;I/O PROGRAM AND UN-PADDED PROGRAM.
 4549                                   ;*************************************************************************
 4550
 4551
 4552  014464  110037  013646  FSTUF:  MOVB    R0,FLAB1
 4553  014470  110037  013643          MOVB    R0,FLAB2
 4554  014474  110037  013673          MOVB    R0,FLAB3
 4555  014500  110037  014167          MOVB    R0,FLAB4
 4556  014504  110037  013717          MOVB    R0,FLAB5
 4557  014510  110037  014155          MOVB    R0,FLAB6
 4558  014514  110037  013472          MOVB    R0,FLAB7
 4559  014520  000207                   RTS PC                          ;RETURN.
 4560
```

```
4561
4562                                    ;*************************************************************************
4563                                    ;KEYBOARD SERVICE ROUTINE.  CHARACTERS ARE ACCEPTED FROM THE KEYBOARD,
4564                                    ;TESTED FOR DIFFERENT FUNCTIONS AND SAVED IN A BUFFER.
4565                                    ;*************************************************************************
4566
4567  014522  104002                XTTYIN: SAVREG                  ;SAVE REGISTERS
4568  014524  005037  031604                CLR     REPTSW          ;CLR SOFTWARE SW.
4569  014530  005037  031662                CLR     CHRCNT          ;CHARACTER COUNTER
4570  014534  005037  031664                CLR     RUBSWH          ;RUBOUT SW.
4571  014540  012704  015116                MOV     #INBUF,R4       ;SET UP BUFFER POINTER
4572  014544  105777  164572        INPUTA: TSTB    @TKS            ;CHARACTER READY?
4573  014550  100375                        BPL     INPUTA          ;NO, WAIT
4574  014552  117701  164566                MOVB    @TKB,R1         ;YES, SAVE IT
4575  014556  142701  000200                BICB    #200,R1         ;STRIPE OFF PARITY BIT
4576  014562  105701                        TSTB    R1              ;WAS 'HERE IS' TYPED?
4577  014564  001757                        BEQ     XTTYIN+2        ;YES, IGNORE IT
4578  014566  005737  031616                TST     SENDSW          ;INTERRUPTED FROM SEND ROUTINE
4579  014572  001407                        BEQ     INPUTC          ;NO
4580  014574  005737  031570                TST     PRTSWH          ;INTERRUPT FROM PRINT?
4581  014600  001066                        BNE     EXTTY           ;YES, IGNORE IT
4582  014602  110114                        MOVB    R1,(R4)         ;NO, SAVE CHAR.
4583  014604  062716  000002                ADD     #2,(SP)         ;YES, RETURN CALL +4
4584  014610  000462                        BR      EXTTY           ;EXIT
4585  014612  120127  000060        INPUTC: CMPB    R1,#60          ;SPECIAL CHARACTER
4586  014616  100426                        BMI     SPCHR1          ;YES, TEST IT
4587  014620  122701  000132                CMPB    #132,R1         ;SPECIAL CHARACTER
4588  014624  100423                        BMI     SPCHR1          ;YES, TEST IT
4589  014626  005737  031570                TST     PRTSWH          ;INTERRUPTED FROM PRINT ROUTINE?
4590  014632  001051                        BNE     EXTTY           ;YES, IGNORE IT
4591  014634  005737  031664        INPUTB: TST     RUBSWH          ;RUBOUT SW. SET?
4592  014640  001404                        BEQ     .+12            ;NO, NORMAL ECHO.
4593  014642  005037  031664                CLR     RUBSWH          ;YES, CLR IT.
4594  014646  104012                        PRINT
4595  014650  031474                        SLASH                   ;PRINT '\' TO TERMINATE RUBOUT MODE
4596  014652  110124                        MOVB    R1,(R4)+        ;SAVE CHARACTER
4597  014654  005237  031662                INC     CHRCNT
4598  014660  022737  000102  031662        CMP     #66.,CHRCNT     ;BUFFER FULL?
4599  014666  100510                        BMI     TYPEQM          ;YES, TYPE '?'
4600  014670  104010                ECHO:   TYPEIT                  ;NO, ECHO CHAR.
4601  014672  000724                        BR      INPUTA          ;WAIT FOR NEXT CHAR.
```

```
 4602
 4603                                   ;SUBROUTINE ENTERED TO TEST FOR SPECIAL CHARACTERS
 4604
 4605  014674  005737  031570  SPCHR1: TST     PRTSWH          ;INTERRUPTED FROM PRINT ROUTINE?
 4606  014700  001036                  BNE     CNTRLC          ;YES, CHECK FOR '↑C'
 4607  014702  122701  000177          CMPB    #177,R1         ;CHAR. = RUBOUT?
 4608  014706  001016                  BNE     SPCHR3          ;NO
 4609  014710  005737  031662          TST     CHRCNT          ;YES, IS IT VALID?
 4610  014714  001713                  BEQ     INPUTA          ;NO, IGNORE IT
 4611  014716  005337  031662          DEC     CHRCNT          ;YES, DECREMENT COUNTER
 4612  014722  005737  031664          TST     RUBSWH          ;IN 'RUBOUT' MODE?
 4613  014726  001002                  BNE     .+6             ;YES, JUST ECHO BACK CHAR.
 4614  014730  104012                  PRINT
 4615  014732  031474                  SLASH                   ;PRINT '\' TO INDICATE RUBOUT
 4616  014734  114401                  MOVB    -(R4),R1        ;GET LAST CHAR.
 4617  014736  005237  031664          INC     RUBSWH          ;SET 'RUBOUT' MODE
 4618  014742  000752                  BR      ECHO
 4619  014744  122701  000015  SPCHR3: CMPB    #15,R1          ;CHAR. = 'CR' !
 4620  014750  001004                  BNE     SPCHR5          ;NO
 4621  014752  104012                  PRINT
 4622  014754  031500                  CRLF                    ;YES, PRINT 'CR-LF'
 4623
 4624  014756  104003  EXTTY:  GETREG                          ;RESTORE REGISTERS
 4625  014760  000002                  RTI                     ;EXIT
 4626  014762  122701  000040  SPCHR5: CMPB    #40,R1          ;CHAR. = SPACE?
 4627  014766  001740                  BEQ     ECHO            ;YES, ECHO BUT DON'T SAVE IT
 4628  014770  122701  000054          CMPB    #54,R1          ;CHAR = 'COMMA'?
 4629  014774  001717                  BEQ     INPUTB          ;YES, SAVE IT
 4630  014776  104000  CNTRLC: PRCNTR
 4631  015000  122701  000003          CMPB    #3,R1           ;CHAR. = '↑C'
 4632  015004  001002                  BNE     CNTRLA          ;NO CHECK FOR '↑A'
 4633  015006  000137  001376          JMP     MONITR          ;RETURN TO MONITOR
 4634  015012  122701  000001  CNTRLA: CMPB    #1,R1           ;CHAR. = '↑A' ?
 4635  015016  001004                  BNE     CNTRLR          ;NO, CHECK FOR '↑R'
 4636  015020  012706  001000          MOV     #1000,SP        ;RESET STACK POINTER
 4637  015024  000177  014544          JMP     @AVECTR         ;GO TO THE RESTART ADDRESS
 4638  015030  122701  000022  CNTRLR: CMPB    #22,R1          ;CHAR. = '↑R'
 4639  015034  001006                  BNE     CNTRLE          ;NO, TEST FOR '↑E'
 4640  015036  104012                  PRINT
 4641  015040  031500                  CRLF
 4642  015042  012706  001000          MOV     #1000,SP        ;RESET STACK POINTER
 4643  015046  000177  014520          JMP     @RVECTR         ;GO TO RESTART ADDRESS
 4644  015052  122701  000005  CNTRLE: CMPB    #5,R1           ;CHAR.='↑E'?
 4645  015056  001003                  BNE     CNTRLO          ;NO,TEST FOR '↑O'.
 4646  015060  104005                  RECVRD                  ;CLEAR OUT THE BUFFER.
 4647  015062  000177  177122          JMP     @EVECTOR        ;CONTINUE ON TO NEXT SUBTEST.
 4648  015066  005737  031570  CNTRLO: TST     PRTSWH          ;INTERRUPTED IN FROM PRINT ROUTINE?
 4649  015072  001406                  BEQ     TYPEQM          ;NO, ILLEGAL ENTRY
 4650  015074  122701  000017          CMPB    #17,R1          ;CHAR. = '↑O'?
 4651  015100  001326                  BNE     EXTTY           ;NO, IGNORE IT
 4652  015102  005137  031620          COM     OPRTSW          ;YES, SET/RESET PRINT INHIBIT SW.
 4653  015106  000723                  BR      EXTTY           ;EXIT
 4654  015110  104012  TYPEQM: PRINT
 4655  015112  031350                  QMARK
 4656  015114  000603                  BR      XTTYIN+2
 4657  015116  000000  INBUF:  0
```

```
 4658          015222                          .=.+66.
 4659
```

```
 4660
 4661  015222  122701  000021          ;SUBROUTINE TO CHECK FOR AND PRINT PDP-70 CONTROL CHAR.'S
 4662  015226  004737  015436  PDMSET: CMPB    #DC1,R1         ;YES, CHAR = 21?
 4663  015232  031505                  JSR     PC,PDMPRT       ;PRINT PDM CNTRL CHAR.
 4664  015234  122701  000022          MESDC1                  ;TEXT 'DC1'
 4665  015240  004737  015436          CMPB    #DC2,R1         ;CHAR = 22?
 4666  015244  031512                  JSR     PC,PDMPRT       ;PRINT PDM CNTRL CHAR.
 4667  015246  122701  000023          MESDC2                  ;TEXT 'DC2'
 4668  015252  004737  015436          CMPB    #DC3,R1         ;CHAR. = 23?
 4669  015256  031517                  JSR     PC,PDMPRT       ;PRINT PDM CNTRL CHAR.
 4670  015260  122701  000024          MESDC3                  ;TEST 'DC3'
 4671  015264  004737  015436          CMPB    #DC4,R1         ;CHAR. = 24?
 4672  015270  031524                  JSR     PC,PDMPRT       ;PRINT PDM CNTRL CHAR.
 4673  015272  122701  000002          MESDC4
 4674  015276  004737  015436          CMPB    #STX,R1
 4675  015302  031531                  JSR     PC,PDMPRT       ;PRINT PDM CNTRL CHAR.
 4676  015304  122701  000026          MESSTX
 4677  015310  004737  015436          CMPB    #SYN,R1
 4678  015314  031536                  JSR     PC,PDMPRT       ;PRINT PDM CNTRL CHAR.
 4679  015316  122701  000001          MESSYN
 4680  015322  004737  015436          CMPB    #SOH,R1
 4681  015326  031543                  JSR     PC,PDMPRT       ;PRINT PDM CNTRL CHAR.
 4682  015330  122701  000017          MESSOH
 4683  015334  004737  015436          CMPB    #SI,R1
 4684  015340  031550                  JSR     PC,PDMPRT       ;PRINT PDM CNTRL CHAR.
 4685  015342  122701  000004          MESSI
 4686  015346  004737  015436          CMPB    #EOT,R1
 4687  015352  031554                  JSR     PC,PDMPRT       ;PRINT PDM CNTRL CHAR.
 4688  015354  122701  000003          MESEOT
 4689  015360  004737  015436          CMPB    #ETX,R1
 4690  015364  031561                  JSR     PC,PDMPRT       ;PRINT PDM CNTRL CHAR.
 4691  015366  132701  000140          MESETX
 4692  015372  001417                  BITB    #140,R1         ;IS CHAR. PRINTABLE?
 4693  015374  104010                  BEQ     PDMST1          ;NO, PRINT AS CONTROL CHAR.
 4694  015376  005737  031616          TYPEIT                  ;YES, TYPE IT
 4695  015402  001006                  TST     SENDSW
 4696  015404  005237  031610          BNE     PDMST0
 4697  015410  023727  031610  000110  INC     FORMT1
 4698  015416  002406                  CMP     FORMT1,#72.
 4699  015420  104012          PDMST0: BLT     PDMST2
 4700  015422  031500                  PRINT
 4701  015424  005037  031610          CRLF
 4702  015430  000401                  CLR     FORMT1
 4703  015432  104000          PDMST1: BR      .+4
 4704  015434  000207          PDMST2: PRCNTR                  ;PRINT AS CONTROL CHAR.
 4705  015436  001011          PDMPRT: RTS     PC
 4706  015440  017637  000000  015450  BNE     PEXT2           ;CHAR. MATCH?
 4707  015446  104012                  MOV     @(SP),XPDMES    ;YES, GET ADDRESS OF MESSAGE
 4708  015450  000000          XPDMES: PRINT
 4709  015452  005037  031610          0
 4710  015456  005726                  CLR     FORMT1          ;RE-SET 'CR/LF' FORMAT SW.
 4711  015460  000207                  POP1SP                  ;CLEAN UP STACK
 4712  015462  062716  000002  PEXT2:  RTS     PC              ;EXIT
 4713  015466  000207                  ADD     #2,(SP)         ;CHECK NEXT WORD
                                        RTS     PC
```

```
 4714                                   ;*****************************************************************
 4715                                   ;COMPUTE THE RESULT OF 'X' CONVERSIONS AS HIGH,LOW AND AVERAGE
 4716                                   ;THE ROUTINE IS ENTERED WITH THE NUMBER OF CONVERSIONS TO BE TAKEN IN 'R1'
 4717                                   ;AND WITH 'R2' CONTAINING THE ADDRESS OF THE DATA TO BE AVERAGED.
 4718                                   ;*****************************************************************
 4719
 4720  015470  104002                  XAVRAGE:SAVREG                  ;SAVE REGISTERS
 4721  015472  005037  015704                  CLR     HIDIVD          ;CLR HI-ORDER DIVIDEND
 4722  015476  005037  015702                  CLR     LODIVD          ;CLR LO-ORDER DIVIDEND
 4723  015502  005037  015712                  CLR     HIGH            ;HIGH
 4724  015506  005037  015706                  CLR     LOW             ;& LOW
 4725  015512  010137  015676                  MOV     R1,LODIVR       ;SET UP DIVISOR FOR DIVIDE
 4726  015516  012204                  GETDAT: MOV     (R2)+,R4        ;GET VALUE
 4727  015520  005737  015712                  TST     HIGH
 4728  015524  001403                          BEQ     .+10
 4729  015526  020437  015712                  CMP     R4,HIGH         ;IS NEW NO. GREATER THAN OLD NO.?
 4730  015532  003402                          BLE     TSTLO           ;NO, TEST IF LESS THAN
 4731  015534  010437  015712                  MOV     R4,HIGH         ;YES, SAVE NEW HIGH
 4732  015540  005737  015706          TSTLO:  TST     LOW
 4733  015544  001403                          BEQ     .+10
 4734  015546  020437  015706                  CMP     R4,LOW          ;NEW NO LESS THAN OLD NO.?
 4735  015552  003002                          BGT     .+6             ;NO
 4736  015554  010437  015706                  MOV     R4,LOW          ;YES, SAVE NEW LOW
 4737  015560  060437  015702                  ADD     R4,LODIVD       ;ADD VALUE TO LOW-ORDER DIVIDEND
 4738  015564  005537  015704                  ADC     HIDIVD          ;ADD CARRY TO HI-ORDER DIVIDEND
 4739  015570  005301                          DEC     R1              ;DONE?
 4740  015572  001351                          BNE     GETDAT          ;NO
 4741  015574  004737  015604          AVGDAT: JSR     PC,DIVIDE       ;PREFORM DIVIDE
 4742  015600  104003                          GETREG                  ;YES, RESTORE REG.'S
 4743  015602  000002                          RTI                     ;EXIT
```

```
4744                                    ;*****************************************************************
4745                                    ;DOUBLE PERCISION DIVIDE SUBROUTINE
4746                                    ;THIS ROUTINE IS ENTERED THIS WITH THE DIVISOR AND DIVIDENT PRE-LOADER
4747                                    ;INTO THE ROUTINE.
4748                                    ;*****************************************************************
4749
4750  015604  104002                DIVIDE: SAVREG                  ;SAVE REG.'S
4751  015606  013701  015676                MOV     LODIVR,R1       ;GET LOW ORDER DIVISOR
4752  015612  013702  015700                MOV     HIDIVR,R2       ;GET HIGH ORDER DIVISOR
4753  015616  013703  015702                MOV     LODIVD,R3       ;GET LOW ORDER DIVIDEND
4754  015622  013704  015704                MOV     HIDIVD,R4       ;GET HIGH ORDER DIVIDEND
4755  015626  005005                        CLR     R5              ;USE 'R5' TO STORE QUOTIENT
4756  015630  160103                DIVDIT: SUB     R1,R3           ;SUBTRACT L-O DIVISOR FROM DIVIDEND
4757  015632  005604                        SBC     R4              ;SUB CARRY FROM HI-ORDER DIVIDEND
4758  015634  160204                        SUB     R2,R4           ;SUBTRACT HI-ORDER DIVISOR
4759  015636  005704                        TST     R4              ;SUBTRACTION SUCCESSFUL?
4760  015640  100402                        BMI     .+6             ;NO, EXIT
4761  015642  005205                        INC     R5              ;YES, INCREMENT QUOTIENT
4762  015644  000771                        BR      DIVDIT          ;PREFORM NEXT SUBTRACTION
4763  015646  060103                        ADD     R1,R3           ;ADD BACK OVERFLOW
4764  015650  010337  015714                MOV     R3,REMAIN       ;SAVE AS REMAINDER
4765  015654  006201                        ASR     R1
4766  015656  001403                        BEQ     .+10
4767  015660  020103                        CMP     R1,R3           ;IS REMAINED > THAN HALF DIVISOR?
4768  015662  101001                        BHI     .+4             ;NO
4769  015664  005205                        INC     R5              ;YES, ADD '1' TO QUOIENT
4770  015666  010537  015710                MOV     R5,QUOENT       ;SAVE QUOIENT
4771  015672  104003                        GETREG                  ;RESTORE REGISTER
4772  015674  000207                        RTS     PC              ;EXIT
4773  015676  000000              LODIVR: 0
4774  015700  000000              HIDIVR: 0
4775  015702  000000              LODIVD: 0
4776  015704  000000              HIDIVD: 0
4777  015706  000000              LOW:    0
4778  015710  000000              QUOENT: 0
4779  015712  000000              HIGH:   0
4780  015714  000000              REMAIN: 0
4781
```

```
                                        ;*****************************************************************************
                                        ;DL11 RECEIVER INITIALIZATION ROUTINE.
                                        ;THIS ROUTINE SETS UP A RECEIVER BUFFER WHERE DATA IS STORED AS IT COMES
                                        ;IN FROM THE DL11 RECEIVER.
                                        ;*****************************************************************************

016716  012700  016022          XRECRO: MOV     #RECBFO,R0
016722  010037  016020                  MOV     R0,RECVPT
016726  005020                          CLR     (R0)+           ;CLR 1ST '20' LOCATIONS OF BUFFER
016730  022700  016062                  CMP     #RECBFO+40,R0
016734  001374                          BNE     .-6
016736  005037  016006                  CLR     PARITY
016742  005037  016012                  CLR     RECEOT
016746  005037  016022                  CLR     RECBFO
016752  005037  016010                  CLR     RECDC3
016756  005037  016014                  CLR     RECSTX
016762  005037  016016                  CLR     RECETX
016766  005777  163366                  TST     @RBUFO          ;CLR RECVR. FLAGS
016772  052777  000100  163356          BIS     #100,@RCSRO     ;ENABLE THE INTERRUPT
017000  012702  016022                  MOV     #RECBFO,R2      ;SET UP BUFFER POINTER
017004  000002                          RTI
017006  000000          PARITY: 0
017010  000000          RECDC3: 0
017012  000000          RECEOT: 0
017014  000000          RECSTX: 0
017016  000000          RECETX: 0
017020  016022          RECVPT: RECBFO
017022  000000          RECBFO: 0
        016524                  .=.+500
016524  000000          RECEND: 0
```

```
 4814
 4815                                   ;*****************************************************************************
 4816                                   .SBTTL DL11 RECEIVER SUBROUTINE.
 4817                                   ;ROUTINE IS ENTERED ON DL11 RECEIVER INTERRUPTS WHERE THE CHARACTER IS
 4818                                   ;READ & SAVED IN A BUFFER.
 4819                                   ;*****************************************************************************
 4820
 4821  016526  010146                  RECVER: MOV     R' -(SP)        ;SAVE REG'S 'R1&R2' ON STACK
 4822  016530  010246                          MOV     -(SP)
 4823  016532  013701  016020                  MOV     PT,R1           ;SET UP BUFFER POINTER
 4824  016536  017702  162616                  MOV     UFO,R2          ;READ & SAVE CHAR.
 4825  016542  110221                          MOVB    R2,(R1)+        ;SAVE CHAR. IN BUFFER
 4826  016544  105011                          CLRB    1)              ;TERMINATE BUFFER W/ NULL CHAR.
 4827  016546  012737  023561  016724          MOV     ES2,ERRMES      ;NO, SET UP 1ST ERROR MESSAGE
 4828  016554  020127  016524                  CMP     1,#RECEND       ;RECEIVER BUFFER FULL?
 4829  016560  003054                          BGT     RECERR          ;YES PRINT BUFFER FULL MESSAGE
 4830  016562  005702                          TST     R2              ;WAS RECVR. ERROR DETECTED?
 4831  016564  100013                          BPL     RECVR1          ;NO
 4832  016566  012737  023652  016724          MOV     #MES4,ERRMES    ;SETUP 2ND ERROR MESSAGE
 4833  016574  032702  040000                  BIT     #40000,R2       ;OVERRUN FLAG SET?
 4834  016600  001044                          BNE     RECERR          ;YES, PRINT OVERRUN ERROR MESSAGE
 4835  016602  032702  010000                  BIT     #10000,R2       ;PARITY BIT SET?
 4836  016606  001402                          BEQ     .+6             ;NO, OK
 4837  016610  005237  016006                  INC     PARITY          ;YES, SET PARITY ERROR FLAG
 4838  016614  122702  000004          RECVR1: CMPB    #EOT,R2         ;CHAR. =EOT?
 4839  016620  001003                          BNE     .+10            ;NO
 4840  016622  005237  016012                  INC     RECEOT
 4841  016626  000424                          BR      RECEXT
 4842  016630  005737  031600                  TST     SIOSWH          ;USING SERIAL INPUT OPTION?
 4843  016634  001021                          BNE     RECEXT          ;YES, EXIT
 4844  016636  122702  000023                  CMPB    #DC3,R2         ;CHAR. =DC3?
 4845  016642  001003                          BNE     .+10            ;NO
 4846  016644  005237  016010                  INC     RECDC3          ;YES, SET FLAG
 4847  016650  000413                          BR      RECEXT
 4848  016652  122702  000002                  CMPB    #STX,R2         ;CHAR. = STX?
 4849  016656  001003                          BNE     .+10            ;NO
 4850  016660  005237  016014                  INC     RECSTX          ;YES, SET FLAG.
 4851  016664  000405                          BR      RECEXT
 4852  016666  122702  000003                  CMPB    #ETX,R2         ;CHAR. = ETX?
 4853  016672  001002                          BNE     .+6             ;NO
 4854  016674  005237  016016                  INC     RECETX          ;YES, SET FLAG
 4855  016700  010137  016020          RECEXT: MOV     R1,RECVPT
 4856  016704  012602                          MOV     (SP)+,R2
 4857  016706  012601                          MOV     (SP)+,R1
 4858  016710  000002                          RTI
 4859  016712  005077  162440          RECERR: CLR     @RCSR0          ;DISABLE FURTHER INTERRUPTS
 4860  016716  005037  031616                  CLR     SENDSW
 4861  016722  104012                          PRINT
 4862  016724  023561                  ERRMES: MES2                    ;MODIFIED DEPENDING ON TYPE OF ERROR
 4863  016726  000137  001376                  JMP     MONITR          ;RETURN TO MONITOR ON RECVR. ERRORS
```

```
 4864
 4865                           ;*************************************************************************
 4866                           ;IF THE CONTROL MODULE IS BEING USED THIS ROUTINE PADS THE DATA
 4867                           ;BEING TRANSMITTED SO THAT THE DESTINATION PORTION OF THE
 4868                           ;SERIAL I/O MODULE GETS ADDRESSED.
 4869                           ;*************************************************************  ********
 4870
 4871  016732  005737  031600  XSOURC: TST     SIOSWH          ;SERIAL I/O INPUT?
 4872  016736  001463                  BEQ     XLDADD          ;NO, NORMAL LOAD
 4873  016740  104006                  LDCHRO                  ;YES, SEND 'STX' TO ENTER ADDRESS MODE
 4874  016742  000002                  STX
 4875  016744  005237  031622          INC     TERMSW
 4876  016750  000456                  BR      XLDADD
 4877
 4878                           ;*************************************************************************
 4879                           ;IF THE CONTROL MODULE IS BEING USED THIS ROUTINE PADS THE DATA
 4880                           ;BEING TRANSMITTED SO THAT THE SOURCE PORTION OF THE SERIAL I/O
 4881                           ;MODULE GETS ADDRESSED.
 4882                           ;*************************************************************************
 4883
 4884  016752  005737  031600  XDSTIN: TST     SIOSWH          ;SERIAL I/O INPUT?
 4885  016756  001453                  BEQ     XLDADD          ;NO, NORMAL LOAD
 4886  016760      007                 LDPGMO                  ;ADD, ADD CODE TO ADDRESS SOURCE
 4887  016762      006                 .+4
 4888  016764      003                 BR      XDSTG1
 4889  016766      002                 .BYTE   STX             ;CLEAR FIFO
 4890  016767      021                 .BYTE   DC1             ;ALERT SOURCE
 4891  016770      075         IADRS9: .BYTE   75              ;MODIFIED BY USER
 4892  016771      001                 .BYTE   SOH             ;SET UP MODE '1'; WAIT
 4893  016772      061                 .BYTE   61
 4894  016773      000                 .BYTE   0
 4895
 4896  016774  005237  031622  XDSTG1: INC     TERMSW
 4897  017000  005237  031614          INC     DSTSWH
 4898  017004  000440                  BR      XLDADD
```

```
                                ;*****************************************************************
                                ;SUBROUTINE TO ADDRESS ANY SOURCE MODULE
                                ;*****************************************************************

017006  104025          ADDSRC: SOURCE                  ;ADDRESS AS SOURCE
017010  017014                  .+4
017012  000207                  RTS     PC
017014     021                  .BYTE   DC1             ;ALERT MODULE
017015     060          SRCADR: .BYTE   60              ;ADDRESS MODIFIED BY USER
017016     001                  .BYTE   SOH
017017     060          SOH1:   .BYTE   60              ;ADDRESS MODIFIED BY ME
017020     023                  .BYTE   DC3
017021     000                  .BYTE   0
                                .EVEN

                                ;*****************************************************************
                                ;SUBROUTINE TO ADDRESS ANY DESTINATION MODULE
                                ;*****************************************************************

017022  005737  031600  ADRDST: TST     SIOSWH          ;USING SERIAL I/O?
017026  001004                  BNE     .+12            ;NO.
017030  122737  000023  017066  CMPB    #DC3,DSTADR+1   ;YES, USING 'DC3'?
017036  001404                  BEQ     .+12            ;YES, LOAD 'SI'
017040  112737  000023  017066  MOVB    #DC3,DSTADR+1   ;NO, LOAD DC3
017046  000403                  BR      .+10
017050  112737  000017  017066  MOVB    #SI,DSTADR+1
017056  104024                  DESTIN                  ;ADDRESS DESTINATION
017060  017064                  .+4
017062  000207                  RTS     PC
017064     022                  .BYTE   DC2             ;ALERT MODULE
017065     060          DSTADR: .BYTE   60              ;ADDRESS MODIFIED BY USER
017066     023                  .BYTE   DC3
017067     000                  .BYTE   0
                                .EVEN

                                ;*****************************************************************
                                ;SUBROUTINE TO TRANSMIT A SINGLE CHARACTER VIA THE DL11.
                                ;*****************************************************************

017070  005237  017444  XLDCHR: INC     SNGCHR          ;SET SOFTWARE FLAG
017074  011637  017446          MOV     (SP),TRANPT     ;SET UP ADDRESS OF CHAR. TO BE TRANSMITTED
017100  062716  000002  XLD1:   ADD     #2,(SP)         ;SET UP STACK TO EXIT
017104  000404                  BR      TRNSMT

                                ;*****************************************************************
                                ;SUBROUTINE TO SETUP AN ADDRESS FROM WHICH DATA IS TO BE TRANSMITTED VIA
                                ;THE DL11.
                                ;*****************************************************************

017106  017637  000000  017446  XLDADD: MOV     @(SP),TRANPT    ;SETUP ADDRESS OF DATA TO BE TRANSFERRED
017114  000771                  BR      XLD1
```

```
                                ;*****************************************************************************
                                .SBTTL DL11 TRANSMITTER ROUTINE
                                ;THIS ROUTINE IS ENTERED WITH THE ADDRESS OF THE CHARACTER OR CHARACTERS
                                ;TO BE TRANSMITTED IN ADDRESS 'TRANPT'.  CHARACTERS ARE TRANSMITTED UNTIL
                                ;EITHER AND 'EOT', 'EXT' OR A NULL CHARACTER IS TRANSMITTED.  IF 'SW11'
                                ;IS SET, THE SAME CHARACTER IS TRANSMITTED EVERY TIME.  IF 'SW12' IS SET,
                                ;THE PROGRAM WAITS FOR A 'CR' TO BE TYPED BEFORE THE CHARACTER IS TRANS-
                                ;MITTED.  AS IT IS TRANSMITTED, IT IS ALSO PRINTED.
                                ;*****************************************************************************

017116  104002                  TRNSMT: SAVREG
017120  005077  162214                  CLR     @PSW            ;SET PROC. PRIO. TO '0'
017124  013701  017446                  MOV     TRANPT,R1       ;SET UP TRANSMITTER BUFFER POINTER.
017130  032777  010000  162214  TRAN0:  BIT     #SW12,@SWR      ;SINGLE STEP TRANSFER?
017136  001406                          BEQ     TRAN1           ;NO,
017140  005237  031662                  INC     CHRCNT          ;YES, SET TTY SOFTWARE FLAG
017144  000001                          WAIT                    ;WAIT FOR 'CR'
017146  005737  031662                  TST     CHRCNT          ;WAS THE INTERRUPT FROM TTY?
017152  001374                          BNE     .-6             ;NO, WAIT AGAIN
017154  032777  004000  162170  TRAN1:  BIT     #SW11,@SWR      ;TRANSMIT SAME CHAR.?
017162  001401                          BEQ     .+4             ;NO
017164  105741                          TSTB    -(R1)           ;YES, BACK UP POINTER
017166  105711                          TSTB    (R1)            ;DONE?
017170  001446                          BEQ     TRAN4           ;YES, EXIT
017172  122711  000004                  CMPB    #EOT,(R1)
017176  001443                          BEQ     TRAN4
017200  122711  000023                  CMPB    #DC3,(R1)
017204  001453                          BEQ     TRAN5
017206  105711                  TRAN3:  TSTB    (R1)            ;TERMINATOR CHAR.?
017210  001422                          BEQ     TRNEXT          ;YES, EXIT
017212  032777  010000  162132          BIT     #SW12,@SWR      ;TRNSMITTING SINGLE STEP?
017220  001103                          BNE     TRAN6           ;YES, PRINT CHAR. TO BE TRANSMITTED
017222  105777  162134          TRAN7:  TSTB    @XCSR0          ;WAIT FOR READY
017226  100375                          BPL     .-4
017230  111177  162130                  MOVB    (R1),@XBUF0     ;TRANSMIT CHAR.
017234  005737  017444                  TST     SNGCHR          ;SINGLE CHAR. TRANSFER?
017240  001006                          BNE     TRNEXT          ;YES, EXIT
017242  122711  000004          TRAN2:  CMPB    #EOT,(R1)       ;TRANSMITTED LAST CHAR.?
017246  001403                          BEQ     TRNEXT          ;YES, EXIT
017250  122721  000003                  CMPB    #ETX,(R1)+
017254  001325                          BNE     TRAN0           ;NO, TRANSMIT NEXT CHAR.
017256  005037  017444          TRNEXT: CLR     SNGCHR
017262  032777  001000  162062          BIT     #SW09,@SWR      ;IS DATA 'SW9' SET?
017270  001004                          BNE     .+12            ;YES, INHIBIT DELAY
017272  005737  031612                  TST     DLYSWH          ;ISSUE DELAY?
017276  001001                          BNE     .+4             ;NO, SKIP IT
017300  104004                          DELAY                   ;DELAY BEFORE EXITING
017302  104003                          GETREG                  ;RESTORE REG.'S
017304  000002                          RTI                     ;EXIT
```

```
5002  017306  005737  031622          TRAN4:  TST     TERMSW          ;ADDRESS SERIAL I/O?
5003  017312  001735                  BEQ     TRAN3           ;NO
5004  017314  005037  031622          CLR     TERMSW
5005  017320  104007                  TRAN4A: LDPGMO                  ;YES, ADD CODE TO ADDRESS SOURCE
5006  017322  017326                          .+4
5007  017324  000754                  BR      TRNEXT
5008  017326     021                  .BYTE   DC1             ;ALERT SOURCE
5009  017327     075                  IADRS7: .BYTE   75              ;MODIFIED BY USER
5010  017330     001                  .BYTE   SOH
5011  017331     061                  .BYTE   61
5012  017332     023                  .BYTE   DC3             ;ENABLE IT
5013  017333     003                  .BYTE   ETX
5014
5015  017334  005737  031622          TRAN5:  TST     TERMSW          ;SOURCE INPUT SW. SET?
5016  017340  001722                  BEQ     TRAN3           ;NO, NORMAL TRANSMIT
5017  017342  005037  031622          CLR     TERMSW          ;YES, ADDRESS DESTINATION
5018  017346  005737  031614          TST     DSTSWH          ;CURRENTLY ADDR. A DST. MODULE?
5019  017352  001413                  BEQ     TRAN5C          ;NO, SEND 'DC2'  TO ALERT DST.
5020  017354  005737  031604          TST     REPTSW          ;YES,USING REMOTE DST.?
5021  017360  001404                  BEQ     TRAN5B          ;NO
5022  017362  012737  017424  017416  TRAN5A: MOV     #TRAN5G,TRAN5E  ;YES, DON'T ENABLE MY DST.
5023  017370  000407                  BR      TRAN5D
5024  017372  012737  017423  017416  TRAN5B: MOV     #IADRS8,TRAN5E  ;YES, SEND ONLY THE ADDR.
5025  017400  000403                  BR      TRAN5D
5026  017402  012737  017422  017416  TRAN5C: MOV     #TRAN5F,TRAN5E  ;SEND 'DC2'
5027  017410  005037  031614          TRAN5D: CLR     DSTSWH
5028  017414  104007                          LDPGMO
5029  017416  017422                  TRAN5E: .+4
5030  017420  000402                  BR      .+6
5031  017422     022                  TRAN5F: .BYTE   DC2             ;ALERT DEST.
5032  017423     075                  IADRS8: .BYTE   75              ;MODIFIED BY USER
5033  017424     023                  TRAN5G: .BYTE   DC3
5034  017425     000                  .BYTE   0
5035  017426  000734                  BR      TRAN4A
5036
5037  017430  104002                  TRAN6:  SAVREG
5038  017432  111101                  MOVB    (R1),R1
5039  017434  004737  015222          JSR     PC,PDMSET
5040  017440  104003                  GETREG
5041  017442  000667                  BR      TRAN7
5042  017444  000000                  SNGCHR: 0
5043  017446  017450                  TRANPT: TRNBF0
5044  017450  000000                  TRNBF0: 0
5045  020152                          .=.+500
5046  020152  000000                  TRNEND: 0
```

```
5047                                    ;*************************************************************
5048                                    ;ROUTINE TO REQUEST & SAVE MODULE ADDRESS TO BE USED FOR TESTING
5049                                    ;*************************************************************
5050
5051  020154  104012                   XADRES: PRINT
5052  020156  024754                           MES30                   ;TEXT 'MODULE ADDR.?'
5053  020160  104015                           ASEMBL                  ;WAIT & DECODE INPUT
5054  020162  152700  000060                   BISB    #60,R0          ;CONVERT TO ASCII
5055  020166  005737  031600                   TST     SIOSWH          ;SERIAL INPUT?
5056  020172  001403                           BEQ     .+10            ;NO, ALLOW ANY ADDRESS
5057  020174  123700  002164                   CMPB    IADRS0,R0       ;YES, CHECK AGAINST SERIAL I/O
5058  020200  001765                           BEQ     XADRES          ;SAME, REQUEST IT AGAIN
5059  020202  110037  031602                   MOVB    R0,MODADR
5060  020206  110037  017015                   MOVB    R0,SRCADR       ;SET UP SOURCE ADDR.
5061  020212  110037  017065                   MOVB    R0,DSTADR       ;SET UP PARAMETERS ADDR.
5062  020216  000002                           RTI                     ;YES, EXIT
5063
5064                                    ;*************************************************************
5065                                    ;SUBROUTINE ENTERED ON AN ILLEGAL TRAP. THE ROUTINE REPORTS WHERE IT
5066                                    ;TRAPPED 'FROM' AND WHERE IT TRAP 'TO'.
5067                                    ;*************************************************************
5068
5069  020220  011637  031624           ERTRAP: MOV     (SP),TOPC       ;SAVE LOCATION WHERE IT TRAPPED 'TO'
5070  020224  022626                           POP2SP
5071  020226  011637  031630                   MOV     (SP),FROMPC     ;SAVE WHERE IT TRAPPED FROM.
5072  020232  104012                           PRINT
5073  020234  023676                           MES5                    ;TEXT 'ILLEGAL TRAP TO'
5074  020236  162737  000004  031624         SUB     #4,TOPC
5075  020244  104014                           PRTOCT
5076  020246  031624                           TOPC                    ;TYPE 'PC' TRAPPED TO
5077  020250  104012                           PRINT
5078  020252  023720                           MES6                    ;TEXT 'FROM'
5079  020254  162737  000002  031630         SUB     #2,FROMPC
5080  020262  104014                           PRTOCT
5081  020264  031630                           FROMPC                  ;TYPE WHERE IT TRAPPED FROM
5082  020266  000137  001376                   JMP     MONITR          ;RETURN TO MONITOR
5083
5084                                    ;*************************************************************
5085                                    ;SUBROUTINE TO REQUEST A/D CHANNEL FROM TELETYPE
5086                                    ;*************************************************************
5087
5088  020272  104012                   XCHANEL:PRINT
5089  020274  024324                           MES17                   ;TEXT 'CH.?'
5090  020276  104013                           TTYIN                   ;WAIT FOR INPUT
5091  020300  122737  000064  015116           CMPB    #64,INBUF       ;LEGAL CH.
5092  020306  003771                           BLE     XCHANEL         ;NO, REQUEST NEW CH.
5093  020310  113737  015116  017017         MOVB    INBUF,SOH1      ;YES, SETUP CH.
5094  020316  000002                           RTI                     ;EXIT
```

```
5095
5096                                    ;*************************************************************************
5097                                    ;MODULE ERROR REPORT ROUTINE.
5098                                    ;THIS ROUTINE IS ENTERED WHEN A MODULE ERROR IS DETECTED.  IT PRINTS THE
5099                                    ;FAILING TEST NUMBER, THE MEMORY ADDRESS (MA) WHERE ERROR OCCURRED AND
5100                                    ;AN ERROR MESSAGE OBTAINED IN THE ERROR CALL+2
5101                                    ;*************************************************************************
5102
5103  020320  042777  000100  161030  XERMES: BIC     #100,@RCSR0     ;CLEAR RECVR. INTERRUPT ENABLES.
5104  020326  011637  031646           MOV     (SP),KSTOR3     ;SAVE 'PC'
5105  020332  017637  000000  020376   MOV     @(SP),MESADR    ;SAVE MESSAGE ADDRESS
5106  020340  062716  000002          ADD     #2,(SP)         ;SET UP STACK TO EXIT
5107  020344  032777  020000  161000   BIT     #SW13,@SWR      ;PRINT ERROR MESSAGE?
5108  020352  001012                   BNE     ERREXT          ;NO, EXIT
5109  020354  104014                   PRTOCT                  ;YES
5110  020356  031654                   TSTNUM                  ;PRINT FAILING TEST NO.
5111  020360  104016                   SPACE
5112  020362  162737  000002  031646   SUB     #2,KSTOR3
5113  020370  104014                   PRTOCT
5114  020372  031646                   KSTOR3                  ;PRINT 'MA' WHERE ERROR OCCURRED
5115  020374  104012                   PRINT
5116  020376  000000           MESADR: 0                       ;PRINT ERROR MESSAGE
5117
5118  020400  005777  160746   ERREXT: TST     @SWR            ;HALT ON ERROR
5119  020404  100403                   BMI     .+10            ;NO
5120  020406  004737  021374           JSR     PC, TTYENB
5121  020412  000001                   WAIT                    ;WAIT FOR 'CR' TO CONTINUE
5122  020414  000002                   RTI
5123
5124                                    ;*************************************************************************
5125                                    ;SCOPE AND/OR ITERATION LOOP FOR EACH LOGIC TEST
5126                                    ;*************************************************************************
5127
5128  020416  104017           XSCOPE: TSTTKS                  ;CHECK FOR KEYBOARD FLAG
5129  020420  104005                   RECVR0                  ;ENABLE DL11 RECEIVER
5130  020422  032777  040000  160722   BIT     #40000,@SWR     ;TEST SW-14 FOR SCOPE
5131  020430  001012                   BNE     SCOPEB          ;YES, SCOPE
5132  020432  032777  004000  160712   BIT     #4000,@SWR      ;NO-TEST SW-11 FOR ITERATION
5133  020440  001013                   BNE     SCOPEG          ;INHIBIT ITERATION
5134  020442  023737  020546  020544   CMP     SCOPEF,ICOUNT   ;COMPARE CURRENT COUNT TO MAX NUMBER
5135  020450  100007                   BPL     SCOPEG          ;EXIT-DONE
5136  020452  005237  020546           INC     SCOPEF          ;INCREMENT COUNT
5137  020456  022606           SCOPEB: CMP     (6)+,SP         ;REPOSITION STACK
5138  020460  012677  160654           MOV     (6)+,@PSW       ;RESTORE PREVIOUS PROCESSOR STATUS
5139  020464  000177  000060           JMP     @RETURN         ;REPEAT TEST
5140  020470  005037  020546   SCOPEG: CLR     SCOPEF          ;CLEAR COUNT
5141  020474  011601                   MOV     @SP,R1          ;SAVE TEST NO.
5142  020476  011137  031654           MOV     (R1),TSTNUM
5143  020502  062716  000002           ADD     #2,(SP)
5144  020506  017701  160640           MOV     @SWR,R1         ;READ SW'S
5145  020512  042701  177700           BIC     #177700,R1      ;CLR UNWANTED BITS
5146  020516  020137  031654           CMP     R1,TSTNUM       ;HALT ON THIS TEST
5147  020522  001005                   BNE     .+14            ;NO
5148  020524  104012                   PRINT                   ;YES
5149  020526  024130                   MES13                   ;TEXT 'BREAK AT SCOPE X'
5150  020530  104014                   PRTOCT
```

```
5151  020532  031654                          TSTNUM
5152  020534  104013                          TTYIN                   ;WAIT FOR 'CR' TO CONTINUE
5153  020536  011637  020550                  MOV     @SP,RETURN      ;SAVE SCOPE RETURN POINTER
5154  020542  000002                          RTI                     ;RETURN INLINE-NEXT TEST
5155  020544  000000                ICOUNT: 0                         ;ITERATION COUNT
5156  020546  000000                SCOPEF: 0                         ;COUNT LOCATION FOR ITERATION LOOP
5157  020550  000000                RETURN: 0
5158
5159
5160
5161                                ;*************************************************************************
5162                                ;RANDOM NUMBER SUBROUTINE
5163                                ;THIS ROUTINE CREATES A RANDOM NUMBER, MASKS IT TO EIGHT BITS AND SAVES
5164                                ;IT IN THE TRANSMITTER BUFFER AREA.
5165                                ;*************************************************************************
5166
5167  020552  012701  017450        XRANGN: MOV     #TRNBFO,R1
5168  020556  063737  020712  020710        ADD     RANB,RANA
5169  020564  063737  020714  020710        ADD     RANC,RANA
5170  020572  006137  020710               ROL     RANA
5171  020576  063737  020710  020712        ADD     RANA,RANB
5172  020604  063737  020714  020712        ADD     RANC,RANB
5173  020612  006137  020712               ROL     RANB
5174  020616  063737  020710  020714        ADD     RANA,RANC
5175  020624  063737  020712  020714        ADD     RANB,RANC
5176  020632  006137  020714               ROL     RANC
5177  020636  013711  020714               MOV     RANC,(R1)       ;SAVE NUMBER
5178  020642  042711  100200               BIC     #100200,(R1)    ;STRIPE NO. TO 7 BIT ASCII
5179  020646  032711  060000               BIT     #60000,(R1)     ;IS BIT 5 OR 6 HIGH BYTE SET
5180  020652  001002                       BNE     .+6             ;YES, LEAVE AS IS
5181  020654  052711  040000               BIS     #40000,(R1)     ;NO, FORCE BIT 6.
5182  020660  032711  000140               BIT     #140,(R1)       ;IS BIT 5 OR 6 OF LOW BYT SET
5183  020664  001002                       BNE     .+6             ;YES, LEAVE AS IS
5184  020666  052711  000040               BIS     #40,(R1)        ;NO, FORCE BIT '5'
5185  020672  005721                       TST     (R1)+
5186  020674  022701  020152               CMP     #TRNEND,R1      ;DONE
5187  020700  001326                       BNE     XRANGN+4
5188  020702  005037  020152               CLR     TRNEND          ;TERMINATE BUFFER.
5189  020706  000002                       RTI
5190  020710  072701              RANA:    072701
5191  020712  126543              RANB:    126543
5192  020714  101234              RANC:    101234
5193
```

```
5194                                    ;*************************************************************************
5195                                    ;ROUTINE TO LOOP THRU A SINGLE LOGIC SUBTEST.  ENTERED FROM THE 'MONITOR'
5196                                    ;VIA SELECTING TEST '?'.
5197                                    ;*************************************************************************
5198
5199  020716  104012                    SUBX:   PRINT
5200  020720  023750                            MES8                    ;TEXT 'TEST ADDR.? '
5201  020722  104015                            ASEMBL                  ;YES, GET ADDR. FROM TTY.
5202  020724  005700                            TST     R0              ;WAS AN ADDRESS ENTERED?
5203  020726  001006                            BNE     SUBX1           ;YES, LOAD IT
5204  020730  005737  031642                    TST     KSTOR1          ;NO, WAS ONE PREVIOUSLY SET UP?
5205  020734  001016                            BNE     XLOOP           ;YES, RUN OLD ADDRESS
5206  020736  104012                            PRINT                   ;NO, ILLEGAL ENTRY
5207  020740  031350                            QMARK
5208  020742  000766                            BR      SUBX+2          ;ASK FOR NEW ADDRESS
5209  020744  010037  031642            SUBX1:  MOV     R0,KSTOR1       ;SAVE ADDRESS
5210  020750  062737  000002  031642            ADD     #2,KSTOR1       ;ADD '2' TO POINT TO INSTRUCTION AFTER SCOPE
5211  020756  017737  010660  031654            MOV     @KSTOR1,TSTNUM  ;LOAD TEST NO.
5212  020764  062737  000002  031642            ADD     #2,KSTOR1
5213  020772  005037  020546            XLOOP:  CLR     SCOPEF          ;KEEP COUNT AT ZERO
5214  020776  012737  020772  020550            MOV     #XLOOP,RETURN   ;LOAD SCOPE LOOP RETURN POINTER
5215  021004  000177  010632                    JMP     @KSTOR1         ;JUMP TO TEST
5216
5217                                    ;*************************************************************************
5218                                    ;SUBROUTINE TO ISSUE N SPACES
5219                                    ;N IS ONE PLUS VALUE CONTAINED IN SPACEX
5220                                    ;SPACEX IS CLEARED WITHIN THE SUBROUTINE, SO THAT A CALL ON
5221                                    ;SPACE WITHOUT LOADING SPACEX ISSUES ONLY ONE SPACE
5222                                    ;*************************************************************************
5223
5224  021010  104002            XSPACE: SAVREG                          ;SAVE REG'S
5225  021012  112701  000240            MOVB    #240,R1
5226  021016  104010                    TYPEIT                          ;OUTPUT A SPACE
5227  021020  005337  021036            DEC     SPACEX                  ;DECREMENT COUNT
5228  021024  003372                    BGT     XSPACE+2                ;LOOP IF NOT DONE
5229  021026  005037  021036            CLR     SPACEX                  ;RESET COUNT TO ZERO
5230  021032  104003                    GETREG                          ;RESTORE REG'S
5231  021034  000002                    RTI                             ;RETURN
5232  021036  000000            SPACEX: 0
5233
5234                                    ;*************************************************************************
5235                                    ;SUBROUTINE TO TEST FOR THE KEYBOARD FLAG BEING SET
5236                                    ;*************************************************************************
5237
5238  021040  105777  160276    TKSFLG: TSTB    @TKS                    ;FLAG SET?
5239  021044  100001                    BPL     .+4                     ;NO, EXIT
5240  021046  104013                    TTYIN                           ;YES,INQUIRE
5241  021050  000002                    RTI
```

```
5242
5243                                    ;*************************************************************************
5244                                    ;SUBROUTINE TO SETUP PARAMETERS FOR THE MODULE PROGRAM TESTS.
5245                                    ;*************************************************************************
5246
5247  021052  011637  020550           XSETUP: MOV     (SP),RETURN     ;SET UP THE 'SCOPE' RETURN ADDRESS.
5248  021056  011637  031572                   MOV     (SP),RVECTR
5249  021062  162737  000002  031572           SUB     #2,RVECTR       ;SET UP THE RESTART ADDRESS
5250  021070  013737  031572  031672           MOV     RVECTR,RESTRT   ;AND THE 'C' POINTER
5251  021076  005037  020544                   CLR     ICOUNT
5252  021102  012737  000001  031654           MOV     #1,TSTNUM       ;SET UP TEST '1'
5253  021110  104005                           RECVR0                  ;ENABLE DL11 RECEIVER
5254  021112  000002                           RTI
5255
5256                                    ;*************************************************************************
5257                                    ;SUBROUTINE TO PRINT CHARACTER IN 'R1'
5258                                    ;*************************************************************************
5259
5260  021114  004737  021374           XTYPIT: JSR     PC,TTYENB       ;ENABLE INTERRUPTS
5261  021120  105777  160222                   TSTB    @TPS            ;PRINTER READY
5262  021124  100375                           BPL     .-4             ;NO
5263  021126  005737  031604                   TST     REPTSW          ;REMOTE DST.?
5264  021132  001404                           BEQ     XTYPE2          ;NO
5265  021134  110137  021142                   MOVB    R1,XTYPE1       ;YES, SET UP TO TRANSMIT CHAR.
5266  021140  104006                           LDCHR0
5267  021142  000004           XTYPE1: EOT
5268  021144  110177  160200   XTYPE2: MOVB    R1,@TPB         ;PRINT CHAR.
5269  021150  000002                           RTI
5270
5271                                    ;*************************************************************************
5272                                    ;SUBROUTINE TO PRINT THE CONTROL CHARACTER IN 'R1'.
5273                                    ;*************************************************************************
5274
5275  021152  122701  000012           XPRCNT: CMPB    #12,R1          ;CHAR = LF?
5276  021156  001413                           BEQ     XPRCT1          ;YES
5277  021160  122701  000015                   CMPB    #15,R1          ;CHAR. = 'CR'?
5278  021164  001410                           BEQ     XPRCT1
5279  021166  013746  031570                   MOV     PRTSWH,-(SP)    ;SAVE SW. STATUS
5280  021172  104012                           PRINT
5281  021174  031476                           UPAROW
5282  021176  012637  031570                   MOV     (SP)+,PRTSWH
5283  021202  052701  000100                   BIS     #100,R1         ;MAKE CHAR. PRINTABLE
5284  021206  104010           XPRCT1: TYPEIT
5285  021210  042701  000100                   BIC     #100,R1         ;RESTORE ORGINAL VALUE
5286  021214  000002                           RTI
```

```
5287
5288                                    ;*****************************************************************************
5289                                    ;SUBROUTINE TO CHECK FOR AND SET UP A REMOTE DESTINATION MODULE.
5290                                    ;*****************************************************************************
5291
5292  021216  110005                REMOTE: MOVB    R0,R5           ;TEMPORARILY SAVE MODULE ADDRESS
5293  021220  005037  031606                CLR     KSTORD          ;CLR SOFTWARE SW.
5294  021224  104012                        PRINT
5295  021226  026747                        MES67                   ;TEXT "REMOTE DEST.?"
5296  021230  104013                        TTYIN                   ;WAIT FOR INPUT
5297  021232  122737  000131  015116        CMPB    #'Y,INBUF       ;WAS YES TYPED?
5298  021240  001003                        BNE     .+10            ;NO
5299  021242  104026                        ADDRESS                 ;YES, REQUEST IT'S ADDRESS
5300  021244  010037  031606                MOV     R0,KSTORD       ;SAVE IT, THIS ALSO SETS SOFTWARE SW.
5301  021250  110537  017015                MOVB    R5,SRCADR       ;SET UP A/D SOURCE ADDR.
5302  021254  000207                        RTS     PC              ;RETURN
5303
5304  021256  013737  031606  031604  SETRMT: MOV     KSTORD,REPTSW   ;SET UP THE REMOTE DESTINATION SW.
5305  021264  005737  031604                TST     REPTSW          ;USING REMOTE DEST.?
5306  021270  001402                        BEQ     .+6             ;NO, EXIT
5307  021272  004737  017022                JSR     PC,ADRDST       ;YES, ADDRESS IT
5308  021276  000207                        RTS     PC
5309
5310
5311  021300  005737  031604          CLRMOT: TST     REPTSW          ;OUTPUTTING TO THE DEMOTE DST.?
5312  021304  001402                        BEQ     .+6             ;NO, EXIT
5313  021306  104006                        LDCHRD                  ;YES, SEND 'EOT' TO CLR MODULE
5314  021310  000004                        EOT
5315  021312  005037  031604                CLR     REPTSW
5316  021316  000207                        RTS     PC              ;RETURN
5317
5318  021320  012737  000001  031612  XNODLY: MOV     #1,DLYSWH       ;SET THE TRANS. DELAY INHIBIT SW.
5319  021326  000002                        RTI
5320                                    ;*****************************************************************************
5321                                    ;SUBROUTINE TO TRANSMIT A 'NULL' CHAR. TO THE PRINTER.
5322                                    ;*****************************************************************************
5323
5324  021330  012737  000002  021036  XNULL:  MOV     #2,SPACEX
5325  021336  000405                        BR      XNULL2
5326  021340  005077  157774          XNULL1: CLR     @PSW
5327  021344  012737  000011  021036        MOV     #11,SPACEX
5328  021352  105777  157770          XNULL2: TSTB    @TPS
5329  021356  100375                        BPL     .-4
5330  021360  005077  157764                CLR     @TPB            ;TRANSMIT A NULL CHAR.
5331  021364  005337  021036                DEC     SPACEX
5332  021370  001370                        BNE     XNULL2
5333  021372  000002                        RTI
```

```
5334
5335                                    ;*****************************************************************************
5336                                    ;SUBROUTINE ENABLE KEYBOARD INTERRUPTS.
5337                                    ;*****************************************************************************
5338
5339  021374  012777  000100  157740  TTYENB: MOV     #100,@TKS       ;YES, ENABLE TTY INTERRUPTS
5340  021402  005077  157732                 CLR     @PSW
5341  021406  000207                          RTS     PC
5342
5343                                    ;*****************************************************************************
5344                                    ;MESSAGE PRINT ROUTINE, ENTERED VIA EMT DISPATCH HANDLER.
5345                                    ;ROUTINE PICKS UP CONTENTS OF THE 'PC' AND USES THIS AS
5346                                    ;THE ADDRESS OF MESSAGE TO BE TYPED.
5347                                    ;← IS NEXT MESSAGE SWITCH
5348                                    ;% IS CRLF SWITCH
5349                                    ;@ IS END OF MESSAGE SWITCH
5350                                    ;*****************************************************************************
5351
5352  021410  104002                  XPRINT: SAVREG                  ;SAVE REGISTERS ON STACK
5353  021412  005037  031620                  CLR     OPRTSW
5354  021416  005237  031570                  INC     PRTSWH
5355  021422  004737  021374                  JSR     PC,TTYENB       ;ENABLE TTY INTERRUPTS
5356  021426  017602  000000          TYPER3: MOV     @(SP),R2        ;GET THE MESSAGE ADDRESS FROM STACK
5357  021432  062716  000002                  ADD     #2,(SP)         ;SET UP STACK TO EXIT
5358  021436  112201                  TYPERA: MOVB    (R2)+,R1        ;GET CHAR.
5359  021440  005701                          TST     R1              ;=NULL CHAR.?
5360  021442  001414                          BEQ     PRTEXT          ;YES, EXIT
5361  021444  122701  000004                  CMPB    #4,R1           ;TEST FOR 'EOT'
5362  021450  001003                          BNE     .+10            ;NOT EOT
5363  021452  104012                          PRINT                   ;YES, PRINT 'EOT'
5364  021454  031554                          MESEOT
5365  021456  000406                          BR      PRTEXT          ;EXIT
5366  021460  122701  000137                  CMPB    #137,R1         ;TEST FOR '←'
5367  021464  001760                          BEQ     TYPER3          ;YES PICK UP NEXT MESSAGE ADDRESS.
5368  021466  122701  000100                  CMPB    #100,R1         ;TEST FOR '@'
5369  021472  001006                          BNE     TYPER1          ;BRANCH IF NO EQUAL
5370  021474  005037  031570          PRTEXT: CLR     PRTSWH
5371  021500  005037  031620                  CLR     OPRTSW
5372  021504  104003                          GETREG                  ;RESTORE REGISTERS FROM STACK.
5373  021506  000002                          RTI                     ;OTHERWISE EXIT
5374  021510  005737  031620          TYPER1: TST     OPRTSW          ;INHIBIT TYPEOUT?
5375  021514  001350                          BNE     TYPERA          ;YES, SCAN DATA
5376  021516  122701  000045                  CMPB    #45,R1          ;TEST FOR '%'
5377  021522  001402                          BEQ     TYPECL          ;IF = TYPE 'CR-LF'
5378  021524  104010                  TYPER2: TYPEIT                  ;OUTPUT CHAR.
5379  021526  000743                          BR      TYPERA
5380  021530  012701  000015          TYPECL: MOV     #15,R1          ;TYPE 'CR'
5381  021534  104010                          TYPEIT
5382  021536  104010                          TYPEIT
5383  021540  012701  000012                  MOV     #12,R1
5384  021544  104010                          TYPEIT                  ;INCREMENT BUFFER
5385  021546  000733                          BR      TYPERA
```

```
5386                                    ;*************************************************************************
5387                                    ;SUBROUTINE TO TYPEOUT A '6' DIGIT OCTAL NO. THE 'PC' CONTAINS
5388                                    ;THE ADDRESS OF 'WORD' TO BE TYPED
5389                                    ;*************************************************************************
5390
5391  021550  004737  021374       XOCTPR: JSR     PC,TTYENB       ;ENABLE TTY INTERRUPTS
5392  021554  104002                       SAVREG                  ;SAVE REGISTERS ON STACK
5393  021556  017601  000000               MOV     @(SP),R1        ;THE ADDRESS OF WORD TO BE TYPED
5394  021562  062716  000002               ADD     #2.(SP)         ;SET UP STACK TO EXIT
5395  021566  012703  000006               MOV     #6,R3
5396  021572  012737  000376  021654       MOV     #376,MASK       ;MASK FOR FIRST BIT
5397  021600  000401                       BR      .+4
5398  021602  006111              MOVEIT:  ROL     (R1)
5399  021604  006111                       ROL     (R1)
5400  021606  006111                       ROL     (R1)
5401  021610  111102                       MOVB    (R1),R2
5402  021612  143702  021654               BICB    MASK,R2
5403  021616  052702  000260               BIS     #260,R2
5404  021622  132777  000200  157516       BITB    #200,@TPS
5405  021630  100374                       BPL     .-6
5406  021632  110277  157512               MOVB    R2,@TPB         ;PRINT CHAR.
5407  021636  012737  000370  021654       MOV     #370,MASK       ;MASK FOR NEXT '5' DIGITS
5408  021644  005303                       DEC     R3
5409  021646  001355                       BNE     MOVEIT
5410  021650  104003                       GETREG                  ;RESTORE REGISTERS FROM STACK.
5411  021652  000002                       RTI
5412  021654  000376              MASK:    376
5413
5414                                    ;*************************************************************************
5415                                    ;SUBROUTINE TO SET UP AN APPROXIMATE '1' SECOND DELAY.
5416                                    ;*************************************************************************
5417
5418  021656  012737  161000  031660  XDELAY: MOV     #161000,TEMP2           ;SET UP SHORT DELAY
5419  021664  000402                       BR      .+6
5420  021666  005037  031660       XDLAYL: CLR     TEMP2                   ;SET UP LONG DELAY
5421  021672  004737  021374               JSR     PC,TTYENB               ;ENABLE TTY INTERRUPTS
5422  021676  012737  177777  031656       MOV     #-1,TEMP1
5423  021704  005237  031660       XDLAY3: INC     TEMP2
5424  021710  001375                       BNE     XDLAY3
5425  021712  005237  031656               INC     TEMP1
5426  021716  001372                       BNE     XDLAY3
5427  021720  000002              XDLAY2:  RTI
5428
```

```
5429                            ;*****************************************************************************
5430                            ;SUBROUTINE TO PRINT THE DATA IN THE DL11 RECEIVER & TRANSMITTER BUFFER.
5431                            ;*****************************************************************************
5432
5433  021722  104012           PRTBF1: PRINT
5434  021724  031500                   CRLF
5435  021726  005712           PRTBF2: TST     (R2)            ;BUFFER EMPTY?
5436  021730  001003                   BNE     .+10            ;NO, PRINT IT
5437  021732  104012                   PRINT                   ;YES
5438  021734  023766                   MES9                    ;TEXT 'BUFFER EMPTY'
5439  021736  000411                   BR      PRT1B           ;EXIT
5440  021740  004737  021374           JSR     PC,TTYENB       ;ENABLE INTR.'S.
5441  021744  005037  031610           CLR     FORMT1          ;'CR/LF' FORMAT SW.
5442  021750  112201           PRT1A:  MOVB    (R2)+,R1        ;GET CHARACTER
5443  021752  004737  015222           JSR     PC,PDMSET       ;PRINT CHAR.
5444  021756  105712                   TSTB    (R2)            ;DONE?
5445  021760  001373                   BNE     PRT1A
5446  021762  000207           PRT1B:  RTS     PC              ;RETURN
5447
5448                            ;*****************************************************************************
5449                            ;SUBROUTINE TO PRINT THE CONTENTS OF THE DL11 RECVR. BUFFER.
5450                            ;*****************************************************************************
5451
5452  021764  012702  016022   RECBUF: MOV     #RECBF0,R2      ;SET UP BUFFER POINTER
5453  021770  000402                   BR      TRNBUF+4
5454
5455                            ;*****************************************************************************
5456                            ;SUBROUTINE TO PRINT THE CONTENTS OF THE DL11 TRANSMITTER BUFFER
5457                            ;*****************************************************************************
5458
5459  021772  012702  017450   TRNBUF: MOV     #TRNBF0,R2      ;SET UP BUFFER POINTER
5460  021776  004737  021722           JSR     PC,PRTBF1
5461  022002  000137  001376           JMP     MONITR          ;RETURN TO MONITOR.
5462
5463                            ;*****************************************************************************
5464                            ;SUBROUTINE, ENTERED AS A SUBROUTINE, TO PRINT CONTENTS OF THE DL11
5465                            ;RECEIVER BUFFER.
5466                            ;*****************************************************************************
5467
5468  022006  104002           XPRTRB: SAVREG                  ;SAVE REG'S
5469  022010  012702  016022           MOV     #RECBF0,R2      ;SETUP BUFFER POINTER
5470  022014  004737  021726           JSR     PC,PRTBF2
5471  022020  104003                   GETREG                  ;RESTORE REG.'S
5472  022022  000002                   RTI
```

```
                                .SBTTL SEND ROUTINE
                                ;*****************************************************************
                                ;THIS ROUTINE ACCEPTS CHARACTERS FROM THE TELETYPE AND TRANSMITS THEM
                                ;TO THE DL11.  THIS ROUTINE USES '↑E' TO ESCAPE BACK TO THE MONITOR.
                                ;CONTROL C (↑C) IS ECHOED AND SENT AS AN 'EXT':
                                ;*****************************************************************

022024  104035          SEND:   SETUP                   ;SETUP RESTART ADDRESS
022026  104012                  PRINT
022030  031346                  ASTRIC
022032  104036                  NODLAY                  ;INHIBIT TRANSMITTER DELAY
022034  005237  031616          INC     SENDSW          ;SET SOFTWARE SW.
022040  104005                  RECVRO                  ;ENABLE DL 0'S RECVR
022042  012702  017450          MOV     #TRNBFO,R2      ;SET UP BUFFER TO SAVE CHAR.S
022046  004737  021374          JSR     PC,TTYENB       ;ENABLE TTY INTERRUPTS
022052  000001          SEND1:  WAIT                    ;WAIT FOR KEYBOARD & RECEIVER INTERRUPTS
022054  000776                  BR      .-2             ;KEYBOARD INTERRUPTS RETURN .+2
022056  113701  015116          MOVB    INBUF,R1        ;GET CHAR.
022062  122701  000005          CMPB    #5,R1           ;CHAR. = '↑E' ?
022066  001003                  BNE     .+10            ;NO
022070  104000                  PRCNTR                  ;YES, TYPE IT
022072  000137  001376          JMP     MONITR          ;EXIT
022076  110112                  MOVB    R1,(R2)         ;SAVE CHAR.
022100  112237  022114          MOVB    (R2)+,SEND2
022104  105012                  CLRB    (R2)            ;LOAD '0' TO TERMINATE BUFFER
022106  004737  015222          JSR     PC,PDMSET       ;PRINT CHAR.
022112  104006                  LDCHRO                  ;TRANSMIT CHAR.
022114  000000          SEND2:  0
022116  000755                  BR      SEND1

                                .SBTTL RUN ROUTINE
                                ;*****************************************************************
                                ;THIS ROUTINE IS USED TO LOAD AND RUN TRANSMIT THE USERS SEND
                                ;IN PROGRAM.  DATA SW.'S '0-15' CAN BE USED TO SET UP
                                ;A LOOP DELAY.  IF THIS SERIAL I/O OPTION INPUT IS BEING USED,
                                ;THE USERS PROGRAM ISN'T LOOPED, IT IS JUST LOADED AND RUN.
                                ;*****************************************************************

022120  104012          RUN:    PRINT
022122  031346                  ASTRIC
022124  104036                  NODLAY                  ;INHIBIT TRANS. DELAY
022126  005077  157206          CLR     @PSW            ;ENABLE RECVR INTERRUPTS
022132  104005                  RECVRO                  ;ENABLE DL RECVR
022134  104007                  LDPGMO                  ;LOAD THE USERS PROGAM FROM
022136  017450                  TRNBFO                  ;THE TRANSMITTER BUFFER
022140  005737  031600          TST     SIOSWH          ;SERIAL I/O INPUT?
022144  001375                  BNE     .-4             ;YES, STAY HERE
022146  017701  157200          MOV     @SWR,R1         ;LOAD THE SW.'S TO SET DELAY
022152  005101                  COM     R1
022154  005201                  INC     R1
022156  001762                  BEQ     RUN+4
022160  000775                  BR      .-4
```

```
5525
5526                                    .SBTTL SUBROUTINES
5527                                    ;*****************************************************************
5528                                    ;SUBROUTINE WILL CONVERT 'N' BCD WORDS (SEPARATED VIA COMMA'S)
5529                                    ;WHICH WERE STORED IN A TABLE VIA 'TTYIN' TO OCTAL AND STORE THEM.
5530                                    ;*****************************************************************
5531
5532  022162  104002                    XBCDBIN:SAVREG                  ;SAVE REG.'S
5533  022164  012704  015116                    MOV     #INBUF,R4       ;SETUP ASCII STORAGE TABLE
5534  022170  012703  022316                    MOV     #BCDTAB,R3      ;TABLE FOR STORAGE OF CONVERTED WORDS
5535  022174  005037  022320                    CLR     BCDTAB+2
5536  022200  005005                    BCDBN1: CLR     R5
5537  022202  005001                            CLR     R1              ;REG. TO STORE RUNNING TOTAL
5538  022204  005002                            CLR     R2              ;TEMP. STORAGE FOR 'R1'
5539  022206  005737  031662            BCDBN2: TST     CHRCNT          ;END OF DATA?
5540  022212  003426                            BLE     BCDEND          ;YES, EXIT
5541  022214  005337  031662                    DEC     CHRCNT          ;DECREMENT CHARACTER COUNTER
5542  022220  122714  000054                    CMPB    #54,(R4)        ;IS CHARACTER = TO ','?
5543  022224  001421                            BEQ     BCDEND          ;YES, DECODE NEW WORD
5544  022226  121427  000060                    CMPB    (R4),#60
5545  022232  002425                            BLT     BCDERR          ;TEST FOR LEGAL NO.
5546  022234  121427  000071                    CMPB    (R4),#71
5547  022240  003022                            BGT     BCDERR
5548  022242  142714  000360                    BICB    #360,(R4)       ;STRIPE NO. TO BCD
5549  022246  112405                            MOVB    (R4)+,R5        ;SAVE NO. IN R0.
5550  022250  010102                            MOV     R1,R2           ;SAVE CURRENT TOTAL
5551  022252  006301                            ASL     R1              ;NX2
5552  022254  006301                            ASL     R1              ;NX4
5553  022256  006301                            ASL     R1              ;NX8
5554  022260  060201                            ADD     R2,R1           ;NX9
5555  022262  060201                            ADD     R2,R1           ;NX10
5556  022264  060501                            ADD     R5,R1           ;N+NEW NO.
5557  022266  000747                            BR      BCDBN2
5558  022270  105724                    BCDEND: TSTB    (R4)+           ;UPDATE BUFFER
5559  022272  010123                            MOV     R1,(R3)+        ;SAVE CONVERTED VALUE & SETUP TO SAVE NEXT
5560  022274  005737  031662                    TST     CHRCNT          ;FINISHED?
5561  022300  001337                            BNE     BCDBN1          ;NO, CONVERT NEXT WORD
5562  022302  104003                            GETREG
5563  022304  000002                            RTI                     ;YES, EXIT
5564  022306  104012                    BCDERR: PRINT
5565  022310  026765                            MES68                   ;TEXT 'ILLEGAL DECIMAL NO.'
5566  022312  000137  001376                    JMP     MONITR          ;RETURN TO THE MONITOR
5567  022316  000000                    BCDTAB: 0                       ;OCTAL STORAGE TABLE
5568  022320  000000                            0
5569  022322  000000                            0
5570  022324  000000                            0
```

F11


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5571                                    ;*************************************************************************
5572                                    ;PRINT DECIMAL VALUE IN R2
5573                                    ;*************************************************************************
5574
5575  022326  004737  021374           XBINDEC:JSR     PC,TTYENB
5576  022332  104002                           SAVREG
5577  022334  012703  177774                   MOV     #-4,R3
5578  022340  012704  022444                   MOV     #DECPNT+2,R4
5579  022344  012737  000260  022440           MOV     #260,ZERO
5580  022352  012701  177777           TYPT1:  MOV     #-1,R1
5581  022356  005201                   TYPT2:  INC     R1
5582  022360  161402                           SUB     (R4),R2
5583  022362  100375                           BPL     TYPT2
5584  022364  062402                           ADD     (R4)+,R2
5585  022366  004737  022402                   JSR     PC,DECOUT
5586  022372  005203                           INC     R3
5587  022374  001366                           BNE     TYPT1
5588  022376  104003                           GETREG
5589  022400  000002                           RTI
5590  022402  005701                   DECOUT: TST     R1
5591  022404  001006                           BNE     DEC1
5592  022406  022703  177777                   CMP     #-1,R3
5593  022412  001403                           BEQ     DEC1
5594  022414  013701  022440                   MOV     ZERO,R1
5595  022420  000405                           BR      DEC2
5596  022422  012737  000260  022440   DEC1:   MOV     #260,ZERO
5597  022430  052701  000260                   BIS     #260,R1
5598  022434  104010                   DEC2:   TYPEIT
5599  022436  000207                           RTS     PC
5600  022440  000240                   ZERO:   240
5601  022442  022444                   DECPNT: .+2
5602  022444  001750                           1000.
5603  022446  000144                           100.
5604  022450  000012                           10.
5605  022452  000001                           1.
5606
```

```
5607
5608                                    ;*****************************************************************************
5609                                    ;POWER FAIL HANDLER
5610                                    ;*****************************************************************************
5611
5612  022454  010046                    PWRFAL: MOV     R0,-(SP)
5613  022456  010146                            MOV     R1,-(SP)
5614  022460  010246                            MOV     R2,-(SP)
5615  022462  010346                            MOV     R3,-(SP)
5616  022464  010446                            MOV     R4,-(SP)
5617  022466  010546                            MOV     R5,-(SP)
5618  022470  013746  000024                    MOV     24,-(SP)
5619  022474  010637  031656                    MOV     SP,TEMP1
5620  022500  012737  022510  000024            MOV     #PWRUP,@#24
5621  022506  000000                            HALT
5622  022510  012777  000340  156622  PWRUP:    MOV     #340,@PSW
5623  022516  013706  031656                    MOV     TEMP1,SP
5624  022522  012637  000024                    MOV     (SP)+,@#24
5625  022526  012605                            MOV     (SP)+,R5
5626  022530  012604                            MOV     (SP)+,R4
5627  022532  012603                            MOV     (SP)+,R3
5628  022534  012602                            MOV     (SP)+,R2
5629  022536  012601                            MOV     (SP)+,R1
5630  022540  012600                            MOV     (SP)+,R0
5631  022542  104021                            NULL                    ;POWER UP DELAY
5632  022544  104012                            PRINT
5633  022546  024652                            MES28
5634  022550  000137  001376                    JMP     MONITR
5635
5636                                    ;*****************************************************************************
5637                                    ;SUBROUTINE TO SAVE 'R1-R5' ON STACK
5638                                    ;*****************************************************************************
5639
5640  022554  012637  031632            XSAVRG: MOV     (SP)+,SAVEPC
5641  022560  012637  031634                    MOV     (SP)+,SAVPSW
5642  022564  012637  031636                    MOV     (SP)+,SAV2PC
5643  022570  012637  031640                    MOV     (SP)+,SAV2SW
5644  022574  010146                            MOV     R1,-(SP)
5645  022576  010246                            MOV     R2,-(SP)
5646  022600  010346                            MOV     R3,-(SP)
5647  022602  010446                            MOV     R4,-(SP)
5648  022604  010546                            MOV     R5,-(SP)
5649  022606  013746  031640                    MOV     SAV2SW,-(SP)
5650  022612  013746  031636                    MOV     SAV2PC,-(SP)
5651  022616  013746  031634                    MOV     SAVPSW,-(SP)
5652  022622  013746  031632                    MOV     SAVEPC,-(SP)
5653  022626  000002                            RTI
```

```
5654                                    ;*****************************************************************************
5655                                    ;SUBROUTINE TO RESTORE 'R1-R5' FROM THE STACK
5656                                    ;*****************************************************************************
5657
5658  022630  012637  031632   XGETRG: MOV     (SP)+,SAVEPC
5659  022634  012637  031634           MOV     (SP)+,SAVPSW
5660  022640  012637  031636           MOV     (SP)+,SAV2PC
5661  022644  012637  031640           MOV     (SP)+,SAV2SW
5662  022650  012605                   MOV     (SP)+,R5
5663  022652  012604                   MOV     (SP)+,R4
5664  022654  012603                   MOV     (SP)+,R3
5665  022656  012602                   MOV     (SP)+,R2
5666  022660  012601                   MOV     (SP)+,R1
5667  022662  013746  031640           MOV     SAV2SW,-(SP)
5668  022666  013746  031636           MOV     SAV2PC,-(SP)
5669  022672  013746  031634           MOV     SAVPSW,-(SP)
5670  022676  013746  031632           MOV     SAVEPC,-(SP)
5671  022702  000002                   RTI
5672                                    ;*****************************************************************************
5673                                    ;SUBROUTINE TO WAIT FOR AND ASSEMBLE CHARACTERS INPUT
5674                                    ;FROM THE KEYBOARD INTO OCTAL NUMBERS.
5675                                    ;*****************************************************************************
5676
5677  022704  104013           XASEMB: TTYIN                   ;GET CHAR.'S FROM KEYBOARD
5678  022706  005000                   CLR     R0
5679  022710  005737  031662           TST     CHRCNT          ;ANY CHARACTERS ENTERED
5680  022714  001001                   BNE     .+4             ;YES
5681  022716  000002                   RTI                     ;NO, EXIT
5682  022720  012701  015116           MOV     #INBUF,R1       ;SET UP CHAR. BUFFER POINTER
5683  022724  004737  022760           JSR     PC,STRIPN       ;STRIPE NO.
5684  022730  010400           XASEM1: MOV     R4,R0           ;RETURNS HERE IF ONLY '1' NO.
5685  022732  000002                   RTI
5686
5687  022734  105721           WORD2:  TSTB    (R1)+           ;ADVANCE POINTER PAST COMMA
5688  022736  006204                   ASR     R4
5689  022740  006204                   ASR     R4
5690  022742  006204                   ASR     R4
5691  022744  005337  031662           DEC     CHRCNT          ;DEC. CHAR. CNTR.
5692  022750  001767                   BEQ     XASEM1          ;COMMA LAST CHAR.?
5693  022752  010400                   MOV     R4,R0           ;NO, SAVE 1ST NO.
5694  022754  062716  000002           ADD     #2,(SP)         ;SET UP STACK TO EXIT
5695  022760  005004           STRIPN: CLR     R4
5696  022762  122711  000054           CMPB    #54,(R1)        ;CHAR. = COMMA?
5697  022766  001762                   BEQ     WORD2           ;YES, SAVE 1ST NO.
5698  022770  142711  000370           BICB    #370,(R1)       ;NO, STRIPE NO. TO OCTAL
5699  022774  152104                   BISB    (R1)+,R4
5700  022776  005337  031662           DEC     CHRCNT          ;FINISHED?
5701  023002  003001                   BGT     .+4             ;NO
5702  023004  000207                   RTS     PC              ;YES, EXIT
5703  023006  006304                   ASL     R4
5704  023010  006304                   ASL     R4
5705  023012  006304                   ASL     R4
5706  023014  000762                   BR      STRIPN+2
```

```
5707                                    ;*****************************************************************
5708                                    .SBTTL MESSAGES
5709                                    ;*****************************************************************
5710  023016    000                     .BYTE
5711  023017    045  050045  046504     TITLE:  .ASCII  ;%%PDM70 DIAGNOSTIC TEST 1/7/74. MAINDEC-11-DZPMA-A-PB @;
5712  023024  030067  042040  040511
5713  023032  047107  051517  044524
5714  023040  020103  042524  052123
5715  023046  030440  033457  033457
5716  023054  027064  046440  044501
5717  023062  042116  041505  030455
5718  023070  026461  055104  046520
5719  023076  026501  026501  041120
5720  023104  040040
5721
5722  023106  052045  050131  020105     HEADER: .ASCII  ;%TYPE IN THE FOLLOWING TO RUN THE DESIRED TEST:%;
5723  023114  047111  052040  042510
5724  023122  043040  046117  047514
5725  023130  044527  043516  052040
5726  023136  020117  052522  020116
5727  023144  044124  020105  042504
5728  023152  044523  042522  020104
5729  023160  042524  052123  022472
5730
5731  023166  033515  034063  040460     TSTLST: .ASCII  ;M7380A, M7381A, M7381E, M7382A, BCDIO, M7383A, M7383C, M7383R, M7383G,
5732  023174  020054  033515  034063
5733  023202  040461  020054  033515
5734  023210  034063  042461  020054
5735  023216  033515  034063  040462
5736  023224  020054  041502  044504
5737  023232  026117  046440  031467
5738  023240  031470  026101  046440
5739  023246  031467  031470  026103
5740  023254  046440  031467  031470
5741  023262  026122  046440  031467
5742  023270  031470  026107    040
5743  023275    045  033515  034063             .ASCII  ;%M7384A, M7384E, M7385A, M7385I, M7385T, M7386A, M7387A, M7388A, ;
5744  023302  040464  020054  033515
5745  023310  034063  042464  020054
5746  023316  033515  034063  040465
5747  023324  020054  033515  034063
5748  023332  044465  020054  033515
5749  023340  034063  052065  020054
5750  023346  033515  034063  040466
5751  023354  020054  033515  034063
5752  023362  040467  020054  033515
5753  023370  034063  040470  020054
5754  023376  033515  034063  043070             .ASCII  ;M7388F,%M7377A,M7378A, SUBX, RECBUF, TRNBUF, SEND, RUN,@;
5755  023404  022454  033515  033463
5756  023412  040467  046454  031467
5757  023420  034067  026101  051440
5758  023426  041125  026130  051040
5759  023434  041505  052502  026106
5760  023442  052040  047122  052502
5761  023450  026106  051440  047105
5762  023456  026104  051040  047125
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 5763  023464  040054
 5764
 5765
 5766
 5767
 5768  023466  052445  044523  043516  MES0:   .ASCII  ;%USING SERIAL I/O INTERFACE OPTION? @;
 5769  023474  051440  051105  040511
 5770  023502  020114  027511  020117
 5771  023510  047111  042524  043122
 5772  023516  041501  020105  050117
 5773  023524  044524  047117  020077
 5774  023532     100
 5775
 5776
 5777  023533     103  047117  051124  MES1:   .ASCII  ;CONTROL MODULE TEST.%@;
 5778  023540  046117  046440  042117
 5779  023546  046125  020105  042524
 5780  023554  052123  022456     100
 5781
 5782
 5783  023561     045  046104  030461  MES2:   .ASCII  ;%DL11 RECVR. BUFFER OVERFLOW.%@;
 5784  023566  051040  041505  051126
 5785  023574  020056  052502  043106
 5786  023602  051105  047440  042526
 5787  023610  043122  047514  027127
 5788  023616  040045
 5789
 5790  023620  042523  044522  046101  MES3:   .ASCII  ;SERIAL I/O ADDRESS TEST.%@;
 5791  023626  044440  047457  040440
 5792  023634  042104  042522  051523
 5793  023642  052040  051505  027124
 5794  023650  040045
 5795  023652  046104  030461  047440  MES4:   .ASCII  ;DL11 OVERRUN ERROR.@;
 5796  023660  042526  051122  047125
 5797  023666  042440  051122  051117
 5798  023674  040056
 5799
 5800  023676  044445  046114  043505  MES5:   .ASCII  ;%ILLEGAL TRAP TO @;
 5801  023704  046101  052040  040522
 5802  023712  020120  047524  040040
 5803
 5804  023720  043040  047522  020115  MES6:   .ASCII  ; FROM @;
 5805  023726     100
 5806
 5807  023727     045  042524  052123  MES7:   .ASCII  ;%TEST COMPLETE.%@;
 5808  023734  041440  046517  046120
 5809  023742  052105  027105  040045
 5810
 5811  023750  052045  051505  020124  MES8:   .ASCII  ;%TEST ADDR.? @;
 5812  023756  042101  051104  037456
 5813  023764  040040
 5814
 5815  023766  052502  043106  051105  MES9:   .ASCII  ;BUFFER IS EMPTY.@;
 5816  023774  044440  020123  046505
 5817  024002  052120  027131     100
 5818  024007     045  042522  051455  MES10:  .ASCII  ;%RE-SET MODULE ADDR. TO '17'(OCTAL). @;
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 5819  024014  052105  046440  042117
 5820  024022  046125  020105  042101
 5821  024030  051104  020056  047524
 5822  024036  023440  033461  024047
 5823  024044  041517  040524  024514
 5824  024052  020056     100
 5825  024055     101  042057  040440  MES11:  .ASCII  ;A/D ADDRESSING TEST.@;
 5826  024062  042104  042522  051523
 5827  024070  047111  020107  042524
 5828  024076  052123  040056
 5829  024102  027501  020104  040503  MES12:  .ASCII  ;A/D CALIBRATION TEST.@;
 5830  024110  044514  051102  052101
 5831  024116  047511  020116  042524
 5832  024124  052123  040056
 5833  024130  041045  042522  045501  MES13:  .ASCII  ;%BREAK AT SCOPE @;
 5834  024136  040440  020124  041523
 5835  024144  050117  020105     100
 5836  024151     045  047111  042523  MES14:  .ASCII  ;%INSERT D JUMPER TO INHIBIT 'EOT' AND ←;
 5837  024156  052122  042040  045040
 5838  024164  046525  042520  020122
 5839  024172  047524  044440  044116
 5840  024200  041111  052111  023440
 5841  024206  047505  023524  040440
 5842  024214  042116  057440
 5843  024220  051045  046505  053117  MES14A: .ASCII  ;%REMOVE JUMPER, CLR MODULE AND ENTER@;
 5844  024226  020105  052512  050115
 5845  024234  051105  020054  046103
 5846  024242  020122  047515  052504
 5847  024250  042514  040440  042116
 5848  024256  042440  052116  051105
 5849  024264     100
 5850  024265     101  042057  051040  MES15:  .ASCII  ;A/D REPEATIBILITY TEST.@;
 5851  024272  050105  040505  044524
 5852  024300  044502  044514  054524
 5853  024306  052040  051505  027124
 5854  024314     100
 5855  024315     045  051526  037506  MES16:  .ASCII  ;%VSF? @;
 5856  024322  040040
 5857  024324  044103  037456  040040  MES17:  .ASCII  ;CH.? @;
 5858
 5859  024332  040507  047111  040440  MES18:  .ASCII  ;GAIN ACCURACY TEST.%@;
 5860  024340  041503  051125  041501
 5861  024346  020131  042524  052123
 5862  024354  022456     100
 5863
 5864  024357     045  052523  050120  MES19:  .ASCII  ;%SUPPLY +1.990V WITH @;
 5865  024364  054514  025440  027061
 5866  024372  034471  053060  053440
 5867  024400  052111  020110     100
 5868
 5869  024405     107  044501  020116  MES20:  .ASCII  ;GAIN 'LOW'.@;
 5870  024412  046047  053517  027047
 5871  024420     100
 5872
 5873  024421     123  044527  041524  MES21:  .ASCII  ;SWITCH VOLTAGE NEGATIVE.@;
 5874  024426  020110  047526  052114
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5875  024434  043501  020105  042516
5876  024442  040507  044524  042526
5877  024450  040056
5878
5879  024452  040507  047111  023440  MES22:  .ASCII  ;GAIN 'MEDIUM'.@;
5880  024460  042515  044504  046525
5881  024466  027047     100
5882
5883  024471     107  044501  020116  MES23:  .ASCII  ;GAIN 'HIGH'@;
5884  024476  044047  043511  023510
5885  024504     100
5886
5887  024505     045  052523  050120  MES24:  .ASCII  ;%SUPPLY +,1990V WITH ←;
5888  024512  054514  025440  030456
5889  024520  034471  053060  053440
5890  024526  052111  020110     137
5891
5892  024533     045  052523  050120  MES24A: .ASCII  ;%SUPPLY +0.01990V WITH ←;
5893  024540  054514  025440  027060
5894  024546  030460  034471  053060
5895  024554  053440  052111  020110
5896  024562     137
5897  024563     045  052523  050120  MES25:  .ASCII  ;%SUPPLY +0.000V.@;
5898  024570  054514  025440  027060
5899  024576  030060  053060  040056
5900
5901  024604  044445  041516  051117  MES26:  .ASCII  ;%INCORRECT GAIN!@;
5902  024612  042522  052103  043440
5903  024620  044501  020516     100
5904
5905  024625     045  020040  047514  MES27:  .ASCII  ;%  LOW    AVG   HIGH@;
5906  024632  020127  020040  040440
5907  024640  043526  020040  044040
5908  024646  043511  040110
5909  024652  051045  041505  053117  MES28:  .ASCII  ;%RECOVERED FROM POWER FAILURE - BY GOLLY!@;
5910  024660  051105  042105  043040
5911  024666  047522  020115  047520
5912  024674  042527  020122  040506
5913  024702  046111  051125  020105
5914  024710  020055  054502  043440
5915  024716  046117  054514  040041
5916
5917  024724  041502  020104  047111  MES29:  .ASCII  ;BCD INPUT ADDRESS TEST.@;
5918  024732  052520  020124  042101
5919  024740  051104  051505  020123
5920  024746  042524  052123  040056
5921
5922  024754  046445  042117  046125  MES30:  .ASCII  ;%MODULE ADDR.? @;
5923  024762  020105  042101  051104
5924  024770  037456  040040
5925  024774  042523  020124  052503  MES31:  .ASCII  ;SET CUST. SW.'S ←;
5926  025002  052123  020056  053523
5927  025010  023456  020123     137
5928  025015     101  046114  047440  MES31A: .ASCII  ;ALL ON WITH INPUTS HI.@;
5929  025022  020116  044527  044124
5930  025030  044440  050116  052125
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 5931  025036  020123  044510  040056
 5932  025044  046101  020114  043117  MES31B: .ASCII  ;ALL OFF WITH INPUTS HI.@;
 5933  025052  020106  044527  044124
 5934  025060  044440  050116  052125
 5935  025066  020123  044510  040056
 5936  025074  047524  040440  052114  MES31C: .ASCII  ;TO ALTERNATE ON & OFF'S.@;
 5937  025102  051105  040516  042524
 5938  025110  047440  020116  020046
 5939  025116  043117  023506  027123
 5940  025124     100
 5941  025125     101  046114  047440  MES31D: .ASCII  ;ALL ON WITH INPUTS LO.@;
 5942  025132  020116  044527  044124
 5943  025140  044440  050116  052125
 5944  025146  020123  047514  040056
 5945  025154  046101  020114  043117  MES31E: .ASCII  ;ALL OFF.@;
 5946  025162  027106     100
 5947  025165     102  042103  044440  MES32:  .ASCII  ;BCD INPUT EXERCISER TEST.@;
 5948  025172  050116  052125  042440
 5949  025200  042530  041522  051511
 5950  025206  051105  052040  051505
 5951  025214  027124     100
 5952  025217     102  042103  047440  MES33:  .ASCII  ;BCD OUTPUT ADDRESS TEST.@;
 5953  025224  052125  052520  020124
 5954  025232  042101  051104  051505
 5955  025240  020123  042524  052123
 5956  025246  040056
 5957  025250  042445  040530  044515  MES34:  .ASCII  ;%EXAMINE OUTPUT LINES FOR ←;
 5958  025256  042516  047440  052125
 5959  025264  052520  020124  044514
 5960  025272  042516  020123  047506
 5961  025300  020122     137
 5962  025303     101  046114  046040  MES35:  .ASCII  ;ALL LOGIC 1'S.@;
 5963  025310  043517  041511  030440
 5964  025316  051447  040056
 5965  025322  042522  042526  051522  MES37:  .ASCII  ;REVERSED ←;
 5966  025330  042105  057440
 5967  025334  051445  047503  042520  MES38:  .ASCII  ;%SCOPE FOR 'OUTPUT DONE H&L' (TYPE ↑R TO RESTART).@;
 5968  025342  043040  051117  023440
 5969  025350  052517  050124  052125
 5970  025356  042040  047117  020105
 5971  025364  023110  023514  024040
 5972  025372  054524  042520  057040
 5973  025400  020122  047524  051040
 5974  025406  051505  040524  052122
 5975  025414  027051     100
 5976  025417      45  042513  041131  MES39:  .ASCII  ;%KEYBOARD/DISPLAY MODULE ADDRESS TEST.@;
 5977  025424  040517  042122  042057
 5978  025432  051511  046120  054501
 5979  025440  046440  042117  046125
 5980  025446  020105  042101  051104
 5981  025454  051505  020123  042524
 5982  025462  052123  040056
 5983  025466  023461  020123  047101  MES40:  .ASCII  ;1'S AND LEAVE THE INPUTS OPEN.@;
 5984  025474  020104  042514  053101
 5985  025502  020105  044124  020105
 5986  025510  047111  052520  051524
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 5987  025516  047440  042520  027116
 5988  025524     100
 5989  025525     061  051447  040440  MES40A: .ASCII  ;1'S AND GND ALL INPUTS.@;
 5990  025532  042116  043440  042116
 5991  025540  040440  046114  044440
 5992  025546  050116  052125  027123
 5993  025554     100
 5994  025555     101  052114  051105  MES40B: .ASCII  ;ALTERNATE 1'S & 0'S.@;
 5995  025562  040516  042524  030440
 5996  025570  051447  023040  030040
 5997  025576  051447  040056
 5998  025602  023460  027123     100  MES41:  .ASCII  ;0'S.@;
 5999  025607     111  052116  020056  MES42:  .ASCII  ;INT. OR EXT. SYNC.? @;
 6000  025614  051117  042440  052130
 6001  025622  020056  054523  041516
 6002  025630  037456  040040
 6003  025634  041502  020104  027511  MES43:  .ASCII  ;BCD I/O TEST.@;
 6004  025642  020117  042524  052123
 6005  025650  040056
 6006  025652  044103  051101  041501  MES44:  .ASCII  ;CHARACTER I/O ADDRESS TEST← ;
 6007  025660  042524  020122  027511
 6008  025666  020117  042101  051104
 6009  025674  051505  020123  042524
 6010  025702  052123  020137
 6011  025706  027504  020101  042101  MES45:  .ASCII  ;D/A ADDRESSING TEST.@;
 6012  025714  051104  051505  044523
 6013  025722  043516  052040  051505
 6014  025730  027124     100
 6015  025733     045  041523  050117  MES46:  .ASCII  ;%SCOPE FOR 'PROG L' & 'FLOP L' LO.@;
 6016  025740  020105  047506  020122
 6017  025746  050047  047522  020107
 6018  025754  023514  023040  023440
 6019  025762  046106  050117  046040
 6020  025770  020047  047514  040056
 6021  025776  041523  050117  020105  MES47:  .ASCII  ;SCOPE FOR 'PROG L' HI & 'FLOP L' LO.@;
 6022  026004  047506  020122  050047
 6023  026012  047522  020107  023514
 6024  026020  044040  020111  020046
 6025  026026  043047  047514  020120
 6026  026034  023514  046040  027117
 6027  026042     100
 6028  026043     123  047503  042520  MES48:  .ASCII  ;SCOPE FOR 'FLOP L' HI.@;
 6029  026050  043040  051117  023440
 6030  026056  046106  050117  046040
 6031  026064  020047  044510  040056
 6032  026072  041523  050117  020105  MES49:  .ASCII  ;SCOPE FOR 'FLOP L' LO.@;
 6033  026100  047506  020122  043047
 6034  026106  047514  020120  023514
 6035  026114  046040  027117     100
 6036  026121     103  042510  045503  MES50:  .ASCII  ;CHECK CH. '0' OUTPUT FOR ←;
 6037  026126  041440  027110  023440
 6038  026134  023460  047440  052125
 6039  026142  052520  020124  047506
 6040  026150  020122     137
 6041  026153     103  042510  045503  MES51:  .ASCII  ;CHECK CH. '1' OUTPUT FOR ←;
 6042  026160  041440  027110  023440
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 6043  026166  023461  047440  052125
 6044  026174  052520  020124  047506
 6045  026202  020122     137
 6046  026205     060  030056  053060  MES52:  .ASCII  ;0.00V@;
 6047  026212     100
 6048  026213     061  030456  053061  MES53:  .ASCII  ;1.11V@;
 6049  026220     100
 6050  026221     062  031056  053062  MES54:  .ASCII  ;2.22V@;
 6051  026226     100
 6052  026227     064  032056  053064  MES55:  .ASCII  ;4.44V@;
 6053  026234     100
 6054  026235     070  034056  053070  MES56:  .ASCII  ;8.88V@;
 6055  026242     100
 6056  026243     104  040457  042440  MES57:  .ASCII  ;D/A EXERCISER TEST.@;
 6057  026250  042530  041522  051511
 6058  026256  051105  052040  051505
 6059  026264  027124     100
 6060  026267     104  040457  053040  MES58:  .ASCII  ;D/A VALUES(X,Y)? @;
 6061  026274  046101  042525  024123
 6062  026302  026130  024531  020077
 6063  026310     100
 6064  026311     045  042523  020124  MES59:  .ASCII  ;%SET ALL DATA SW.'S TO '0'.@;
 6065  026316  046101  020114  040504
 6066  026324  040524  051440  027127
 6067  026332  051447  052040  020117
 6068  026340  030047  027047     100
 6069  026345     123  050125  046120  MES60:  .ASCII  ;SUPPLY AN EXTERNAL SYNC.@;
 6070  026352  020131  047101  042440
 6071  026360  052130  051105  040516
 6072  026366  020114  054523  041516
 6073  026374  040056
 6074  026376  041523  050117  020105  MES61:  .ASCII  ;SCOPE FOR THE SIGNAL 'DATA READY, AND CHECK %;
 6075  026404  047506  020122  044124
 6076  026412  020105  044523  047107
 6077  026420  046101  023440  040504
 6078  026426  040524  051040  040505
 6079  026434  054504  020054  047101
 6080  026442  020104  044103  041505
 6081  026450  020113     045
 6082  026453     103  027110  051447          .ASCII  ;CH.'S '0 & 1' OUTPUTS FOR 5 USEC RISE TIMES.@;
 6083  026460  023440  020060  020046
 6084  026466  023461  047440  052125
 6085  026474  052520  051524  043040
 6086  026502  051117  032440  052440
 6087  026510  042523  020103  044522
 6088  026516  042523  052040  046511
 6089  026524  051505  040056
 6090  026530  052124  020114  0275 .  MES62:  .ASCII  ;TTL I/O TEST%@;
 6091  026536  020117  042524  05  23
 6092  026544  040045
 6093  026546  046104  030461  040440  MES63:  .ASCII  ;DL11 ADRS., VEC.? @;
 6094  026554  051104  027123  020054
 6095  026562  042526  027103  020077
 6096  026570     100
 6097  026571     111  051516  051105  MES64:  .ASCII  ;INSERT THE M7387 READ-IN MODULE & INITIALIZE SYSTEM.%@;
 6098  026576  020124  044124  020105
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 6099  026604  033515  034063  020067
 6100  026612  042522  042101  044455
 6101  026620  020116  047515  052504
 6102  026626  042514  023040  044440
 6103  026634  044516  044524  046101
 6104  026642  055111  020105  054523
 6105  026650  052123  046505  022456
 6106  026656     100
 6107  026657     042  051120  046517  MES65:  .ASCII  ;"PROM OK" REMOVE THE M7387.%@;
 6108  026664  047440  021113  051040
 6109  026672  046505  053117  020105
 6110  026700  044124  020105  033515
 6111  026706  034063  027067  040045
 6112  026714  042523  044522  046101  MES66:  .ASCII  ·SERIAL I/O INTERFACE TEST%@;
 6113  026722  044440  047457  044440
 6114  026730  052116  051105  040506
 6115  026736  042503  052040  051505
 6116  026744  022524     100
 6117  026747     122  046505  052117  MES67:  .ASCII  ;REMOTE DST.? @;
 6118  026754  020105  051504  027124
 6119  026762  020077     100
 6120
 6121  026765     111  046114  043505  MES68:  .ASCII  ;ILLEGAL DECIMAL NO. ??@;
 6122  026772  046101  042040  041505
 6123  027000  042511  046101  047040
 6124  027006  [illegible]7  037440  040077
 6125
 6126  027014  044450  026516  047510  MES69:  .ASCII  ;(IN-HOUSE).@;
 6127  027022  051[illegible]25  024505  040056
 6128
 6129  027030  [illegible]050  042511  042114  MES70:  .ASCII  ;(FIELD).@;
 6130  027036  027051     100
 6131
 6132  027041     111  050116  052125  MES71:  .ASCII  ;INPUT DATA, TERMINATE TEST W/EOT.%@;
 6133  027046  042040  052101  026101
 6134  027054  052040  051105  044515
 6135  027062  040516  042524  052040
 6136  027070  051505  020124  027527
 6137  027076  047505  027124  040045
 6138
 6139  027104  054105  046501  047111  MES72:  .ASCII  ;EXAMINE 'FIFO' DATA.@;
 6140  027112  020105  043047  043111
 6141  027120  023517  042040  052101
 6142  027126  027101     100
 6143  027131     105  052116  051105  MES73:  .ASCII  ;ENTERING THE DISPLAY TEST, ;
 6144  027136  047111  020107  044124
 6145  027144  020105  044504  050123
 6146  027152  040514  020131  042524
 6147  027160  052123  020054
 6148  027164  042522  044455  [illegible]4516  MES73A: .ASCII  ;RE-INITIALIZE PDM70.@;
 6149  027172  044524  046101  055111
 6150  027200  020105  042120  033515
 6151  027206  027060     100
 6152  027211     105  044103  020117  MES74:  .ASCII  ;ECHO TEST, ←;
 6153  027216  042524  052123  020054
 6154  027224     137
```

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6155  027225    123  047524  040522  MES75:  .ASCII  ;STORAGE TEST ←;
6156  027232 042507  052040  051505
6157  027240 020124     137
6158  027243    122  051505  052105  MES76:  .ASCII  ;RESET ADDRESS %@;
6159  027250 040440  042104  042522
6160  027256 051523  022440     100
6161  027263    115  031467  034067  MES77:  .ASCII  ;M7378A  FOUNDATION MODULE TEST. %@;
6162  027270 020101  043040  052517
6163  027276 042116  052101  047511
6164  027304 020116  047515  052504
6165  027312 042514  052040  051505
6166  027320 027124  022440     100
6167  027325    120  052125  051440  MES78:  .ASCII  ;PUT SCOPE PROBE ON PIN 78 .←;
6168  027332 047503  042520  050040
6169  027340 047522  042502  047440
6170  027346 020116  044520  020116
6171  027354 034067  027040     137
6172  027361    125  042523  057040  MES79:  .ASCII  ;USE ↑E TO EXIT FROM SUBTEST. @;
6173  027366 020105  047524  042440
6174  027374 044530  020124  051106
6175  027402 046517  051440  041125
6176  027410 042524  052123  020056
6177  027416    100
6178  027417    115  031467  033467  MES80:  .ASCII  ;M7377A REMOTE SERIAL I/O TEST. %@;
6179  027424 020101  042522  047515
6180  027432 042524  051440  051105
6181  027440 040511  020114  027511
6182  027446 020117  042524  052123
6183  027454 020056  040045
6184  027460 051440  046105  041505  MES81:  .ASCII  ; SELECT D12 (LINEFEED) SWITCH 'V'(VARIABLE TERMINATOR).<CR>@;
6185  027466 020124  030460  020062
6186  027474 046050  047111  043105
6187  027502 042505  024504  051440
6188  027510 044527  041524  020110
6189  027516 053047  024047  040526
6190  027524 044522  041101  042514
6191  027532 052040  051105  044515
6192  027540 040516  047524  024522
6193  027546 036056  051103  040076
6194  027554 044510  020124  040503  MES82:  .ASCII  ;HIT CARRIAGE RETURN TO CONTINUE.%%@;
6195  027562 051122  040511  042507
6196  027570 051040  052105  051125
6197  027576 020116  047524  041440
6198  027604 047117  044524  052516
6199  027612 027105  022445     100
6200  027617    122  051505  052105  MES83:  .ASCII  ;RESET MODE SWITCH.%@;
6201  027624 046440  042117  020105
6202  027632 053523  052111  044103
6203  027640 022456     100
6204  027643    123  052105  041440  MES84:  .ASCII  ;SET CLOCK 3 ON CLOCK MODULE TO 100 MILLI SECONDS.%%←;
6205  027650 047514  045503  031440
6206  027656 047440  020116  046103
6207  027664 041517  020113  047515
6208  027672 052504  042514  052040
6209  027700 020117  030061  020060
6210  027706 044515  046114  020111
```

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6211  027714  042523  047503  042116
6212  027722  027123  022445     137
6213  027727     045  020045  042523  MES85:  .ASCII  ;%% SET SWITCH  1 OF SWITCH P TO ON. %@;
6214  027734  020124  053523  052111
6215  027742  044103  020040  020061
6216  027750  043117  051440  044527
6217  027756  041524  020110  020120
6218  027764  047524  047440  027116
6219  027772  022440     100
6220  027775     045  020045  052123  MES86:  .ASCII  ;%% STRAP OUT EOT<CR>%@;
6221  030002  040522  020120  052517
6222  030010  020124  047505  036124
6223  030016  051103  022476     100
6224  030023     045  051045  046505  MES87:  .ASCII  ;%%REMOVE EOT JUMPER<CR>@;
6225  030030  053117  020105  047505
6226  030036  020124  052512  050115
6227  030044  051105  041474  037122
6228  030052     100
6229  030053     122  051505  052105  MES88:  .ASCII  ;RESET MODULE ADDRESS <CR>%@;
6230  030060  046440  042117  046125
6231  030066  020105  042101  051104
6232  030074  051505  020123  041474
6233  030102  037122  040045
6234  030106  023440  052123  023530  ERR1:   .ASCII  ; 'STX' WASN'T RETURNED.%@;
6235  030114  053440  051501  023516
6236  030122  020124  042522  052524
6237  030130  047122  042105  022456
6238  030136     100
6239
6240  030137     040  044504  047104  ERR2:   .ASCII  ; DIDN'T ENTER ADDRESS MODE.%@;
6241  030144  052047  042440  052116
6242  030152  051105  040440  042104
6243  030160  042522  051523  046440
6244  030166  042117  027105  040045
6245
6246  030174  042040  052101  020101  ERR3:   .ASCII  ; DATA ERROR.%@;
6247  030202  051105  047522  027122
6248  030210  040045
6249  030212  040440  042104  042522  ERR4:   .ASCII  ; ADDRESS ERROR IN 2ND PROGRAM%@;
6250  030220  051523  042440  051122
6251  030226  051117  044440  020116
6252  030234  047062  020104  051120
6253  030242  043517  040522  022515
6254  030250     100
6255
6256  030251     040  042447  052117  ERR5:   .ASCII  ; 'EOT' WASN'T RETURNED.%@;
6257  030256  020047  040527  047123
6258  030264  052047  051040  052105
6259  030272  051125  042516  027104
6260  030300  040045
6261
6262  030302  030440  052123  050040  ERR6:   .ASCII  ; 1ST PROGRAM WASN'T RECIRCULATED.%@;
6263  030310  047522  051107  046501
6264  030316  053440  051501  023516
6265  030324  020124  042522  044503
6266  030332  041522  046125  052101
```

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 6267  030340  042105  022456     100
 6268
 6269  030345     040  040504  040524  ERR7:   .ASCII  ; DATA PARITY ERROR.%@;
 6270  030352  050040  051101  052111
 6271  030360  020131  051105  047522
 6272  030366  027122  040045
 6273
 6274  030372  044440  046114  043505  ERR8:   .ASCII  ; ILLEGAL DATA XFER%@;
 6275  030400  046101  042040  052101
 6276  030406  020101  043130  051105
 6277  030414  040045
 6278  030416  023440  054523  023516  ERR9:   .ASCII  ; 'SYN' DELAY 'X' TOO SHORT.%@;
 6279  030424  042040  046105  054501
 6280  030432  023440  023530  052040
 6281  030440  047517  051440  047510
 6282  030446  052122  022456     100
 6283
 6284  030453     040  051447  047131  ERR10:  .ASCII  ; 'SYN' DELAY 'X' TOO LONG.%@;
 6285  030460  020047  042504  040514
 6286  030466  020131  054047  020047
 6287  030474  047524  020117  047514
 6288  030502  043516  022456     100
 6289
 6290  030507     040  044504  047104  ERR11:  .ASCII  ; DIDN'T ENTER DATA MODE.%@;
 6291  030514  052047  042440  052116
 6292  030522  051105  042040  052101
 6293  030530  020101  047515  042504
 6294  030536  022456     100
 6295  030541     040  051447  054124  ERR12:  .ASCII  ; 'STX' DIDN'T CLR DEST.%@;
 6296  030546  020047  044504  047104
 6297  030554  052047  041440  051114
 6298  030562  042040  051505  027124
 6299  030570  040045
 6300  030572  040440  046440  042117  ERR13:  .ASCII  ; A MODULE WAS ENABLED WITH ADDR. ';
 6301  030600  046125  020105  040527
 6302  030606  020123  047105  041101
 6303  030614  042514  020104  044527
 6304  030622  044124  040440  042104
 6305  030630  027122  023440
 6306  030634  023440     100          ERR13A: .ASCII  ; '@;
 6307  030637     040  052105  020130  ERR14:  .ASCII  ; ETX DIDN'T CLR SOURCE, %@;
 6308  030644  044504  047104  052047
 6309  030652  041440  051114  051440
 6310  030660  052517  041522  026105
 6311  030666  022440     100
 6312  030671     040  047505  020124  ERR15:  .ASCII  ; EOT WASN'T STRAPPED OUT. %@;
 6313  030676  040527  047123  052047
 6314  030704  051440  051124  050101
 6315  030712  042520  020104  052517
 6316  030720  027124  022440     100
 6317  030725     040  052105  020130  ERR16:  .ASCII  ; ETX WASN'T RETURNED.@;
 6318  030732  040527  047123  052047
 6319  030740  051040  052105  051125
 6320  030746  042516  027104     100
 6321
 6322  030753     040  042523  044522  ERR17:  .ASCII  ; SERIAL I/O←;
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 6323  030760  046101  044440  047457
 6324  030766     137
 6325
 6326  030767     040  047062  020104  ERR18:  .ASCII  ; 2ND PROGRAM DIDN'T ENTER DATA MODE@;
 6327  030774  051120  043517  040522
 6328  031002  020115  044504  047104
 6329  031010  052047  042440  052116
 6330  031016  051105  042040  052101
 6331  031024  020101  047515  042504
 6332  031032     100
 6333
 6334  031033     040  047103  051124  ERR19:  .ASCII  ; CNTRL MODULE DIDN'T ENTER DATA MODE.@;
 6335  031040  020114  047515  052504
 6336  031046  042514  042040  042111
 6337  031054  023516  020124  047105
 6338  031062  042524  020122  040504
 6339  031070  040524  046440  042117
 6340  031076  027105     100
 6341  031101     040  047516  042040  ERR20:  .ASCII  ; NO DATA RETURNED WITH EXT. SYNC.@;
 6342  031106  052101  020101  042522
 6343  031114  052524  047122  042105
 6344  031122  053440  052111  020110
 6345  031130  054105  027124  051440
 6346  031136  047131  027103     100
 6347  031143     045  046111  042514  ERR21:  .ASCII  ;%ILLEGAL EXTERNAL CONVERSION.@;
 6348  031150  040507  020114  054105
 6349  031156  042524  047122  046101
 6350  031164  041440  047117  042526
 6351  031172  051522  047511  027116
 6352  031200     100
 6353  031201     040  040504  040524  ERR22:  .ASCII  ; DATA FORMAT ERROR.@;
 6354  031206  043040  051117  040515
 6355  031214  020124  051105  047522
 6356  031222  027122     100
 6357  031225     122  046505  052117  ERR23:  .ASCII  ;REMOTE  CLEAR LEFT GARBAGE IN MODULE FIFO%%@;
 6358  031232  020105  041440  042514
 6359  031240  051101  046040  043105
 6360  031246  020124  040507  041122
 6361  031254  043501  020105  047111
 6362  031262  046440  042117  046125
 6363  031270  020105  044506  047506
 6364  031276  022445     100
 6365  031301     103  042514  051101  ERR24:  .ASCII  ;CLEAR LEFT GARBAGE IN MODULE FIFO.%%@;
 6366  031306  046040  043105  020124
 6367  031314  040507  041122  043501
 6368  031322  020105  047111  046440
 6369  031330  042117  046125  020105
 6370  031336  044506  047506  022456
 6371  031344  040045
 6372  031346  040052                  ASTRIC: .ASCII  ;*@;
 6373
 6374  031350  022477  040056           QMARK:  .ASCII  ;?%.@;
 6375
 6376  031354  022445  040056           DOT:    .ASCII  ;%%.@;
 6377
 6378  031360  026445     100           DASH:   .ASCII  ;%-@;
```

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6379
6380  031363    045  025440  025453  SCALE:  .ASCII  ;% +++++++++ +++++++++ (SCALE=←;
6381  031370  025453  025453  025453
6382  031376  025440  025453  025453
6383  031404  025453  025453  024040
6384  031412  041523  046101  036505
6385  031420    137
6386  031421    061  053115    137  X1MV:   .ASCII  ;1MV←;
6387  031425    061  030060  053125  X100UV: .ASCII  ;100UV←;
6388  031432    137
6389  031433    061  052460  057526  X10UV:  .ASCII  ;10UV←;
6390  031440  042057  053111  022451  XDIV:   .ASCII  ;/DIV)%% @;
6391  031446  020045    100
6392
6393  031451    045  051117  047514  XLOW:   .ASCII  ;%ORLOW  @;
6394  031456  020127  040040
6395  031462  047445  044122  043511  XHIGH:  .ASCII  ;%ORHIGH @;
6396  031470  020110    100
6397  031473    100           END:    .ASCII  ;@;
6398
6399  031474  040134           SLASH:  .ASCII  ;\@;
6400
6401  031476  040136           UPAROW: .ASCII  ;↑@;
6402
6403  031500  040045           CRLF:   .ASCII  ;%@;
6404
6405  031502  022445    100    CRLF2:  .ASCII  ;%%@;
6406
6407  031505    104  030503  040045  MESDC1: .ASCII  ;DC1%@;
6408
6409  031512  041504  022462    100  MESDC2: .ASCII  ;DC2%@;
6410
6411  031517    104  031503  040045  MESDC3: .ASCII  ;DC3%@;
6412
6413  031524  041504  022464    100  MESDC4: .ASCII  ;DC4%@;
6414
6415  031531    123  054124  040045  MESSTX: .ASCII  ;STX%@;
6416
6417  031536  054523  022516    100  MESSYN: .ASCII  ;SYN%@;
6418
6419  031543    123  044117  040045  MESSOH: .ASCII  ;SOH%@;
6420
6421  031550  044523  040045        MESSI:  .ASCII  ;SI%@;
6422
6423  031554  047505  022524    100  MESEOT: .ASCII  ;EOT%@;
6424
6425  031561    105  054124  040045  MESETX: .ASCII  ;ETX%@;
```

```
                                ;*****************************************************************************
                                .SBTTL SOFTWARE 'SWITCH' ADDRESSES
                                ;*****************************************************************************
                                        .EVEN
031566  000000                MTRSWH: 0
031570  000000                PRTSWH: 0
031572  001466                RVECTR: MONTR1                  ;CONTAINS THE 'CNTRL R' RESTART ADDRESS
031574  001466                AVECTR: MONTR1                  ;CONTAINS THE 'CNTRL A' RESTART ADDRESS
031576  003717                OFFSET: 1999.                   ;A/D OFFSET
031600  000000                SIOSWH: 0                       ;SERIAL I/O SWITCH, SET IF SERIAL INPUT USED
031602  000000                MODADR: 0                       ;STORAGE OF CURRENT MODULE ADDRESS
031604  000000                REPTSW: 0
031606  000000                KSTORO: 0
031610  000000                FORMT1: 0
031612  000000                DLYSWH: 0
031614  000000                DSTSWH: 0
031616  000000                SENDSW: 0
031620  000000                OPRTSW: 0
031622  000000                TERMSW: 0
031624  000000                TOPC:   0
031626  000000                COUNT:  .WORD   0               ;TEMPORARY COUNTER(REMOTE SER I/O).
031630  000000                FROMPC: 0
031632  000000                SAVEPC: 0
031634  000000                SAVPSW: 0
031636  000000                SAV2PC: 0
031640  000000                SAV2SW: 0
031642  000000                KSTOR1: 0
031644  000000                KSTOR2: 0
031646  000000                KSTOR3: 0
031650  000000                KSTOR4: 0
031652  000000                KSTOR5: 0
031654  000000                TSTNUM: 0
031656  000000                TEMP1:  0
031660  000000                TEMP2:  0
031662  000000                CHRCNT: 0
031664  000000                RUBSWH: 0
031666  000000                PRGSWH: 0
031670  000000                LOPSWH: 0
031672  000000                RESTRT: 0
031674  000000                ORLOW:  0
031676  000000                MINUS9: 0
        031746                        .=.+46
031746  000000                ORHIGH: 0

031750  000000                AVGTAB: 0
        032262                        .=.+200.
        001376                        .END    MONITR
```

```
ADCHX1  005123          2226*   2227    2235#   2243    2247*   2248
ADCNVT= 104027          1083#   2320    2362    2564    2572
ADCT0   006600          2613#   2639
ADCT1   006606          2616#
ADCT2   006626          2621#   2637
ADCT3   006720          2631    2634    2638#
ADDRES= 104026          1082#   1214    1734    1961    1985    2099    2170    2309    2338    2496    2664    2919    2955
                        3239    3347    3400    3537    3663    4118    4157    5299
ADRDST  017022          1995    2022    2048    2077    2125    2675    2695    2706    2892    3001    3079    3209    3485
                        3622    3722    3822    3983    4920#   5307
ADRSIT  005066          1826    2221    2224#   3115    3636    3869    4339
ADRSRC  017006          1749    1785    1799    1812    1847    1876    1901    1918    1937    1972    2141    2181    2207
                        2268    2614    2971    2987    3085    3220    3413    3548    3564    3599    3683    3731    3827
                        3994    4026    4046    4074    4905#
ADSER1  014450          4531    4539#
ADSLOP  014316          4487#   4537
ADSLP1  014356          4493    4499#
ADSLP2  014376          4498    4504    4512#
ADSNXT  014432          4491    4523    4525    4527    4535#   4543
ADT0    004734          2171#   2293
ADT1    004736          2178#
ADT2    005022          2188    2193    2204#
ADT3    005054          2219#
ADT4    005164          2222    2257#
ADT5    005302          2260    2273    2289#
ASEMBL= 104015          1073#   1229    5053    5201
ASTRIC  031346          2434    5482    5512    6372#
AVECTR  031574          1277*   1278*   4637    6434#
AVERAG= 104031          1085#   2363    2379    2573
AVGDAT  015574          4741#
AVGTAB  031750          2365    2384    2474    6471#
BCDBIN= 104030          1084#   2345    2624
BCDBN1  022200          5536#   5561
BCDBN2  022206          5539#   5557
BCDEND  022270          5540    5543    5558#
BCDERR  022306          5545    5547    5564#
BCDIO   004520          1299    2097#
BCDIO1  004564          2117#   2161
BCDTAB  022316          2346    2348    2625    5534    5535*   5567#
BCDT0   003402          1735#   1950
BCDT1   003414          1746#
BCDT10  004050          1881    1892#
BCDT11  004122          1839    1912#
BCDT12  004160          1920    1931#
BCDT13  004216          1939    1946#
BCDT2   003532          1754    1759    1764    1769    1782#
BCDT3   003562          1796#
BCDT4   003614          1809#
BCDT5   003644          1824#
BCDT6   003654          1836#
BCDT7   003744          1852    1863#
BINDEC= 104033          1087#   2463    2467    2655
BYTEA   014234          4425#
BYTEX   014235          4426#
CALBT1  005340          2314#
CALBT2  005344          2316#   2322    2327
```

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CHANEL= 104032          1086#   2359    2499
CHART1  011726          3545#
CHART2  011756          3550    3561#
CHART3  012040          3588#
CHART4  012106          3610#
CHART5  012176          3634#
CHART6  012206          3642#
CHRCNT  031662          2623*   2924    4569*   4597*   4598    4609    4611*   4968*   4970    5539    5541*   5560    5679
                        5691*   5700*   6461#
CLRMOT  021300          2326    2470    5311#
CMPT1A  011132          3294#   3300
CMP1    002234          1372#   1378
CMP1A   010234          3024#   3030
CMP1B   010404          3090#   3096
CMP1BA  012600          3838#   3846
CMP1C   010400          3089#   3104
CMP1CA  012574          3837#   3854
CMP1DA  012612          3839    3843#
CMP11   003246          1659#   1666
CMP2    002310          1403#   1415
CMP2A   003476          1765#   1771
CMP2B   003722          1848#   1854
CMP3    002402          1434#   1440
CMP4    002464          1464#   1470
CMP5    002560          1498#   1504
CMP6    002742          1544#   1550
CNTLOP  014276          4053    4471#   4473
CNTRLA  015012          4632    4634#
CNTRLC  014776          4606    4630#
CNTRLE  015052          4639    4644#
CNTRLO  015066          4645    4648#
CNTRLR  015030          4635    4638#
COUNT   031626          4047*   4472*   6447#
CP1B    012422          3739#   3745
CP1C    012416          3738#   3753
CRLF    031500          1966    2315    2593    4622    4641    4700    5434    6403#
CRLF2   031502          2469    6405#
CT10    003004          1574#
CT11    003204          1647#
CT12    003354          1636    1663    1671    1723#
CT2     002272          1376    1387    1398#
CT3     002344          1407    1423#
CT3A    002336          1409    1413#
CT4     002440          1431    1438    1448    1457#
CT5     002522          1468    1477    1487#
CT6     002616          1494    1502    1518#
CT7     002762          1539    1548    1558#
DAOUT   007636          2725    2739    2753    2767    2781    2795    2809    2823    2836    2849    2871    2877    2889#
                        2944
DASH    031360          2427    6378#
DATA1   004624          2119    2123    2129#   2143
DATA2   004634          2121    2137#   2150    2157
DATA3   007666          2723*   2737*   2751*   2765*   2779*   2793*   2807*   2821*   2834*   2847*   2867*   2873*   2889
                        2898#   2927    2939
DATA4   007670          2724*   2738*   2752*   2766*   2780*   2794*   2808*   2822*   2835*   2848*   2868*   2874*   2899#
DATA5   007672          2869*   2875*   2891*   2900#   2943*
```

```
DATA6   007674          2870*   2876*   2901#
DATST3  007076          2721#
DATST4  007132          2735#
DATST5  007166          2749#
DATST6  007222          2763#
DATST7  007256          2777#
DATS10  007312          2791#
DATS11  007346          2805#
DATS12  007402          2819#
DATS13  007436          2832#
DATS14  007472          2845#
DATS15  007526          2862#
DAT1    006772          2673#
DAT15A  007542          2867#   2878
DAT2    007026          2693#
DC1   = 000021          1168#   1345    1353    1522    1590    1600    2234    3126    3166    3370    3435    3894    3918
                        3937    4058    4096    4192    4200    4210    4234    4385    4441    4448    4453    4505    4661
                        4890    4908    5008
DC2   = 000022          1169#   1349    1357    1526    1594    3130    3170    3266    3374    3437    3880    3921    4030
                        4082    4196    4204    4221    4376    4445    4450    4664    4930    5031
DC3   = 000023          1170#   1351    1361    1529    1599    1604    2238    3132    3172    3376    3439    3882    3896
                        3920    3924    3939    4032    4060    4084    4098    4199    4209    4214    4223    4236    4378
                        4388    4447    4452    4509    4667    4844    4912    4922    4924    4932    4979    5012    5033
DC4   = 000024          1171#   1352    4670
DECODE  001672          1254#   1289
DECOD1  001722          1257    1261#
DECOUT  022402          5585    5590#
DECPNT  022442          5578    5601#
DEC1    022422          5591    5593    5596#
DEC2    022434          5595    5598#
DELAY = 104004          1064#   1534    1656    2142    2279    3495    3496    3685    3995    4245    4514    4999
DELAYL= 104020          1076#   3728    3729    3730    4091    4244
DESTIN= 104024          1080#   4927
DIVDIT  015630          4756#   4762
DIVIDE  015604          2353    4741    4750#
DLYSWH  031612          1189*   1332*   2864*   3404*   4997    5318*   6441#
DOT     031354          1249    6376#
DSTADR  017065          3207*   3981*   4010*   4485*   4487    4490    4535*   4536    4539    4922    4924*   4926*   4931#
                        5061*
DSTSWH  031614          3366*   3380*   3431*   3443*   4897*   5018    5027*   6442#
ECHO    014670          4600#   4618    4627
EMTOK   001220          1103    1105#
EMTSRV  001200          1050    1099#
EMTTAB  001240          1107    1112#
END     031473          6397#
END2    002204          1362#   1439
ENQ   = 000005          1178#   4087
EOT   = 000004          1177#   1425    1427    1459    1489    1490    1772    1786    1800    1813    1882    1902    2008
                        2034    2061    2080    2137    2194    2209    2682    2700    2711    2891    2937    2973    3039
                        3056    3077    3189    3216    3311    3327    3388    3414    3451    3494    3549    3578    3620
                        3686    3720    3889    3990    4035    4181    4379    4398    4427    4526    4685    4839    4977
                        4990    5267    5314
ERREXT  020400          5108    5118#
ERRMES  016724          4827*   4832*   4862#
ERR1    030106          1564    3178    3946    6234#
ERR10   030453          1585*   1624    6284#
```

```
ERR11   030507          1753    1880    2187    3016    3225    3286    3999    6290#
ERR12   030541          3184    3958    3965    6295#
ERR13   030572          2245    4541    6300#
ERR13A  030634          2243*   4539*   6306#
ERR14   030637          3147    3910    6307#
ERR15   030671          3230    4005    6312#
ERR16   030725          3141    3904    6317#
ERR17   030753          6322#
ERR18   030767          1450    6326#
ERR19   031033          1389    6334#
ERR2    030137          1375    1538    6240#
ERR20   031101          1922    1941    2283    6341#
ERR21   031143          2272    6347#
ERR22   031201          6353#
ERR23   031225          4111    6357#
ERR24   031301          4067    6365#
ERR3    030174          1406    1547    1662    1758    1763    1768    1775    1803    1816    1851    1885    1905    2148
                        2197    2212    3027    3093    3297    3742    3841    4261    6246#
ERR4    030212          1437    6249#
ERR5    030251          1430    1493    1789    2192    2976    3053    3324    3417    3552    3689    4249    6256#
ERR6    030302          1467    1479    1501    1510    6262#
ERR7    030345          1411    3021    3291    6269#
ERR8    030372          2992    3005    3059    3275    3330    3568    6274#
ERR9    030416          1584*   1617    6278#
ERTRAP  020220          1045    5069#
ETX   = 000003          1172#   1362    1530    1605    3133    3138    3457    3883    3901    4215    4688    4852    4992
                        5013
EVECTO  014210          4357*   4401#   4647
EXTTY   014756          4581    4584    4590    4624#   4651    4653
FDATA   013676          4190    4220    4226#
FLAB1   013646          4178*   4201#   4552*
FLAB17  014371          4506#
FLAB2   013643          4198#   4553*
FLAB3   013673          4222#   4554*
FLAB3A  013672          4221#
FLAB4   014167          4386#   4555*
FLAB5   013717          4235#   4556*
FLAB5A  013716          4234#   4500
FLAB6   014155          4377#   4557*
FLAB7   013472          4147#   4159*   4160    4178    4558*
FLO     013502          4155#   4332    4411
FLOP    013506          4156#
FLOPB   013516          4160#
FLUSH   002020          1271    1280#   1285
FND1B   013744          4258#   4277
FND1C   013740          4247    4257#   4285
FND1D   013756          4259    4276#
FND3A   014106          4331    4338#
FND5    014140          4367#
FND5A   014146          4373#   4384
FND5B   014174          4368    4393#   4399
FND5C   014160          4375    4382#
FNORM   013664          4187    4218#
FORMT1  031610          4696*   4697    4701*   4709*   5441*   6440#
FOUNDL  013620          4186#   4320
FOUND2  014016          4262    4279    4281    4293#
```

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FOUND3  014074          4296    4330#
FOUND5  014116          4294    4348#
FOUND6  014212          4301    4357    4407#
FOUNSW  013474          4151#   4155*   4293    4319*
FPROG   013634          4191#   4396    4496
FROMPC  031630          5071*   5079*   5081    6448#
FSTUF   014464          4163    4316    4488    4552#
FTST    013722          4229    4233    4244#
GANEXT  006560          2576    2579    2582    2601#
GETDAT  015516          4726#   4740
GETREG= 104003          1063#   2598    2640    2656    4624    4742    4771    5000    5040    5230    5372    5410    5471
                        5562    5588
HEADER  023106          1246    5722#
HIDIVD  015704          2350*   4721*   4738*   4754    4776#
HIDIVR  015700          2349*   4752    4774#
HIGH    015712          4723*   4727    4729    4731*   4779#
IADRS0  002164          1215*   1346#   1523    1527    5057
IADRS1  002170          1216*   1350#
IADRS2  002174          1217*   1354#
IADRS3  002200          1218*   1358#
IADRS4  003062          1219*   1591#
IADRS5  003066          1220*   1595#
IADRS6  003074          1221*   1601#
IADRS7  017327          1222*   5009#
IADRS8  017423          1223*   5024    5032#
IADRS9  016770          1224*   4164    4165    4166    4167    4891#
IADR10  011045          1225*   3267#
IADR11  013652          4164*   4208#
IADR12  013636          4165*   4193#
IADR13  013642          4167*   4197#
IADR14  013655          4166*   4211#
ICOUNT  020544          5134    5155#   5251*
INBUF   015116          1212    1254*   1256    1263    2103    2621*   2622*   2926    4571    4657#   5091    5093    5297
                        5490    5533    5682
INPUTA  014544          4572#   4573    4601    4610
INPUTB  014634          4591#   4629
INPUTC  014612          4579    4585#
KEYAD1  011455          3401*   3436#
KEYAD2  011457          3402*   3438#
KEYTO   011370          3403#   3509
KEYT1   011376          3411#
KEYT2   011420          3415    3425#   3452    3466
KEYT3   011566          3458    3476#
KEYT4   011670          3505#
KSTOR0  031606          5293*   5300*   5304    6439#
KSTOR1  031642          2348*   2351    2357    2376    5204    5209*   5210*   5211    5212*   5215    6453#
KSTOR2  031644          2372*   2393    6454#
KSTOR3  031646          2374*   2397    2402    5104*   5112*   5114    6455#
KSTOR4  031650          2356*   2375    2391    6456#
KSTOR5  031652          2357*   2358*   2381    6457#
LDCHR0= 104006          1066#   1384    1424    1445    1458    1474    1488    1505    1559    2079    2676    2681    3038
                        3135    3188    3310    3386    3449    3487    3489    3493    4397    4873    5266    5313    5499
LDPGM0= 104007          1067#   1341    1400    1532    1586    1997    2023    2050    2126    2696    2707    2894    3011
                        3040    3081    3123    3151    3162    3211    3263    3281    3312    3623    3724    3824    3877
                        3885    3891    3915    3933    3985    4027    4055    4078    4093    4188    4218    4226    4231
                        4373    4382    4393    4422    4437    4495    4499    4502    4886    5005    5028    5516
```

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LODIVD  015702          2352*  4722*  4737*  4753   4775#
LODIVR  015676          2351*  4725*  4751   4773#
LOPSWH  031670          1330*  1368   1371*  1670*  1726*  2498*  2587   2589*  2960*  3674*  6464#
LOW     015706          2364   2596   4724*  4732   4734   4736*  4777#
MASK    021654          5396*  5402   5407*  5412#
MATCH   001754          1270#  1273
MATD    014310          4485#
MESADR  020376          5105*  5116#
MESDC1  031505          4663   6407#
MESDC2  031512          4666   6409#
MESDC3  031517          4669   6411#
MESDC4  031524          4672   6413#
MESEOT  031554          4687   5364   6423#
MESETX  031561          4690   6425#
MESSI   031550          4684   6421#
MESSOH  031543          4681   6419#
MESSTX  031531          4675   6415#
MESSYN  031536          4678   6417#
MESO    023466          1210   5768#
MES1    023533          1328   5777#
MES10   024007          1866   2262   3201   3975   4313   5818#
MES11   024055          2169   5825#
MES12   024102          2308   5829#
MES13   024130          5149   5833#
MES14   024151          3200   5836#
MES14A  024220          3238   5843#
MES15   024265          2337   5850#
MES16   024315          2343   5855#
MES17   024324          5089   5857#
MES18   024332          2495   5859#
MES19   024357          2504   5864#
MES2    023561          4827   4862   5783#
MES20   024405          2506   2523   5869#
MES21   024421          2514   2531   5873#
MES22   024452          5879#
MES23   024471          5883#
MES24   024505          2522   5887#
MES24A  024533          5892#
MES25   024563          2539   5897#
MES26   024604          2568   5901#
MES27   024625          2591   5905#
MES28   024652          5633   5909#
MES29   024724          1733   5917#
MES3    023620          2954   5790#
MES30   024754          5052   5922#
MES31   024774          1736   1841   1868   1895   5925#
MES31A  025015          1737   5928#
MES31B  025044          5932#
MES31C  025074          1896   5936#
MES31D  025125          1842   5941#
MES31E  025154          1869   5945#
MES32   025165          1960   5947#
MES33   025217          1984   5952#
MES34   025250          2012   2038   2064   5957#
MES35   025303          2013   5962#
MES37   025322          2065   5965#
```

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MES38   025334          2076    5967#
MES39   025417          3399    5976#
MES4    023652          4832    5795#
MES40   025466          5983#
MES40A  025525          5989#
MES40B  025555          2039    2066    5994#
MES41   025602          5993#
MES42   025607          2101    5999#
MES43   025634          2098    6003#
MES44   025652          3521    3535    6006#
MES45   025706          2663    6011#
MES46   025733          2679    6015#
MES47   025776          2684    6021#
MES48   026043          2703    6028#
MES49   026072          2714    6032#
MES5    023676          5073    5800#
MES50   026121          2727    2741    2755    2769    2783    6036#
MES51   026153          2797    2811    2825    2838    2851    6041#
MES52   026205          2728    2798    6046#
MES53   026213          2742    2812    6048#
MES54   026221          2756    2826    6050#
MES55   026227          2770    2839    6052#
MES56   026235          2784    2852    6054#
MES57   026243          2918    6056#
MES58   026267          2922    6060#
MES59   026311          1200    6064#
MES6    023720          5078    5804#
MES60   026345          1915    1934    2275    6069#
MES61   026376          2866    6074#
MES62   026530          3346    6090#
MES63   026546          1228    6093#
MES64   026571          1651    6097#
MES65   026657          1668    6107#
MES66   026714          3254    6112#
MES67   026747          5295    6117#
MES68   026765          5565    6121#
MES69   027014          3522    6126#
MES7    023727          1725    1949    2160    2292    2547    3241    3339    3508    3645    4121    4410    5807#
MES70   027030          3536    6129#
MES71   027041          3573    3592    6132#
MES72   027104          3626    6139#
MES73   027131          3479    6143#
MES73A  027164          3464    6148#
MES74   027211          3572    6152#
MES75   027225          3591    6155#
MES76   027243          6158#
MES77   027263          4153    6161#
MES78   027325          4350    6167#
MES79   027361          4354    6172#
MES8    023750          5200    5811#
MES80   027417          3662    6178#
MES81   027460          3808    6184#
MES82   027554          6194#
MES83   027617          6200#
MES84   027643          4022    6204#
MES85   027727          4023    6213#
```

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MES86   027775          6220#
MES87   030023          6224#
MES88   030053          4007    6229#
MES9    023766          5438    5815#
MINUS9  031676          2404*   2415    6467#
MODADR  031602          1755    1871*   2227    3205*   3242    3979*   4008*   4119    4490    5C59*   6437#
MODERR= 104022          1078#   1374    1388    1405    1410    1429    1436    1449    1466    1478    1492    1500    1509
                        1537    1546    1563    1616    1623    1661    1752    1757    1762    1767    1774    1788    1802
                        1815    1850    1879    1884    1904    1921    1940    2147    2186    2191    2196    2211    2244
                        2271    2282    2975    2991    3004    3015    3020    3026    3052    3058    3092    3140    3146
                        3177    3183    3224    3229    3274    3285    3290    3296    3323    3329    3416    3551    3567
                        3688    3741    3840    3903    3909    3945    3957    3964    3998    4004    4066    4110    4248
                        4260    4540
MONITR  001376          1056    1184#   3340    4633    4863    5082    5461    5494    5566    5634    6473
MONTR0  001450          1197#   1202
MONTR1  001466          1208#   1247    6433    6434
MONTR2  001610          1233#   1241
MONTR3  001640          1231    1239    1242#
MONTR4  001654          1245#
MONTR5  001660          1193    1247#
MONT1A  001572          1213    1227#
MOVEIT  021602          5398#   5409
MTRSWH  031566          1192    1194*   6431#
M377A1  012274          3673#
M381E1  004246          1965#
M381E2  004252          1967#   1976    1978
M385A1  010024          2956#   3243
M7377A  012222          1313    3661#
M7377B  012230          3664#   4122
M7378A  013476          1314    4152#
M7380A  002130          1295    1327#   1727
M7381A  003374          1296    1732#
M7381E  004232          1297    1959#
M7382A  004324          1298    1983#
M7383A  004726          1300    2168#
M7383C  005316          1301    2307#
M7383G  006254          1303    2494#   2548
M7383R  005412          1302    2336#
M7384A  006762          1304    2662#
M7384E  007676          1305    2917#
M7385A  010016          1306    2953#   3523
M7385I  011026          1307    3253#
M7385T  011236          1308    3345#
M7386A  011352          1309    3398#
M7387A  003212          1310    1649#
M7388A  011702          1311    3520#
M7388F  011714          1312    3534#   3646
NMATCH  002040          1259    1282    1287#
NODLAY= 104036          1090#   1575    2313    2341    3427    3481    5483    5513
NOP   = 000240           994#
NULL  = 104021          1077#   1186    1188    5631
NULL1 = 104023          1079#   1608    1620    4471
OBCDT1  004334          1993#
OBCDT2  004374          2020#
OBCDT3  004434          2046#
OBCDT4  004476          2073#
```

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OFFSET  031576          2629    2650    6435#
OPRTSW  031620          4652*   5353*   5371*   5374    6444#
ORHIGH  031746          2389    2395*   2420    2436    2458    2466    6469#
ORLOW   031674          2387    2399*   2457    2462    6466#
PARITY  016006          1408    3018    3288    4794*   4804#   4837*
PC    =%000007           986#   1749*   1785*   1799*   1812*   1826*   1847*   1876*   1901*   1918*   1937*   1963*   1972*
                        1995*   2022*   2048*   2077*   2125*   2141*   2181*   2207*   2221*   2250*   2268*   2310*   2323*
                        2326*   2339*   2353*   2408*   2456*   2470*   2476*   2479*   2597*   2614*   2657*   2675*   2695*
                        2706*   2725*   2739*   2753*   2767*   2781*   2795*   2809*   2823*   2836*   2849*   2871*   2877*
                        2892*   2896*   2944*   2971*   2987*   3001*   3079*   3085*   3115*   3209*   3220*   3413*   3456*
                        3485*   3548*   3564*   3570*   3577*   3594*   3599*   3622*   3636*   3683*   3722*   3731*   3822*
                        3827*   3869*   3983*   3994*   4026*   4046*   4053*   4074*   4163*   4316*   4339*   4462*   4474*
                        4488*   4512*   4538*   4559*   4662*   4665*   4668*   4671*   4674*   4677*   4680*   4683*   4686*
                        4689*   4704*   4711*   4713*   4741*   4772*   4907*   4929*   5039*   5120*   5260*   5302*   5307*
                        5308*   5316*   5341*   5355*   5391*   5421*   5440*   5443*   5446*   5460*   5470*   5487*   5498*
                        5575*   5585*   5599*   5683*   5702*
PDMPRT  015436          4662    4665    4668    4671    4674    4677    4680    4683    4686    4689    4705#
PDMSET  015222          3456    3577    4661#   5039    5443    5498
PDMST0  015420          4695    4699#
PDMST1  015432          4692    4703#
PDMST2  015434          4698    4704#
PEXT2   015462          4705    4712#
POP1SP= 005726           991#   1275    4710
POP2SP= 022626           993#   5070
POSTIT  006730          2476    2648#
PRCNTR= 104000          1060#   4630    4703    5493
PRGM1   002163          1342    1345#   1367    1463    1497
PRGM2   002172          1352#   1377    1426    1469    1503
PRGSWH  031666          6463#
PRINT = 104012          1070#   1195    1199    1209    1227    1245    1248    1287    1327    1650    1667    1724    1732
                        1735    1840    1865    1867    1894    1914    1933    1948    1959    1965    1983    2011    2037
                        2063    2075    2097    2100    2159    2168    2261    2274    2291    2307    2314    2336    2342
                        2426    2433    2452    2460    2464    2468    2494    2503    2505    2513    2521    2530    2538
                        2546    2567    2590    2592    2662    2678    2683    2702    2713    2726    2740    2754    2768
                        2782    2796    2810    2824    2837    2850    2865    2917    2921    2953    3199    3237    3240
                        3253    3338    3345    3398    3463    3478    3507    3520    3534    3571    3590    3625    3644
                        3661    3807    3974    4006    4021    4120    4152    4312    4349    4409    4594    4614    4621
                        4640    4654    4699    4707    4861    5051    5072    5077    5088    5115    5148    5199    5206
                        5280    5294    5363    5433    5437    5481    5511    5564    5632
PROMD   003353          1665    1714#
PROMS   003304          1658    1675#
PRTBF1  021722          5433#   5460
PRTBF2  021726          5435#   5470
PRTEXT  021474          5360    5365    5370#
PRTOCT= 104014          1072#   5075    5080    5109    5113    5150
PRTRBF= 104037          1091#   1977    2325    3600
PRTSWH  031570          1190*   4580    4589    4605    4648    5279    5282*   5354*   5370*   6432#
PRT1A   021750          5442#   5445
PRT1B   021762          5439    5446#
PSW     001340          1146#   1184*   1581*   1634*   1653*   1657*   2276*   2278*   2612*   3075*   3112*   3363*   3365*
                        3428*   3429*   3718*   3813*   3866*   4179*   4964*   5138*   5326*   5340*   5514*   5622*
PUSH1S= 005746           990#
PUSH2S= 024646           992#
PWRFAL  022454          1047    5612#
PWRUP   022510          5620    5622#
QMARK   031350          1288    4655    5207    6374#
```

```
QUOENT  015710          2356    2370    2380    2574    4770*   4778#
RANA    020710          5168*   5169*   5170*   5171    5174    5190#
RANB    020712          5168    5171*   5172*   5173*   5175    5191#
RANC    020714          5169    5172    5174*   5175*   5176*   5177    5192#
RANDOM= 104011          1069#   1399    1519    3008    3076    3262    3278    3719    3814    4180
RBUFO   001360          1157#   4800    4824
RCSRO   001356          1156#   1232    4801*   4859*   5103*
RECBFO  016022          1770    1800    1853    1882    1902    1919    1938    2144    2184    2194    2209    2442    2565
                        2618    2619    3013    3022    3181    3955    3962    4489*   4789    4792    4796*   4802    4809
                        4810#   5452    5469
RECBUF  021764          1316    5452#
RECDC3  016010          4797*   4805#   4846*
RECEND  016524          4812#   4828
RECEOT  016012          1614    1621    1750    1973    2189    2616    3050    3086    3102    3227    3321    3732    3751
                        3828    3852    4001    4246    4283    4795*   4806#   4840*
RECERR  016712          4829    4834    4859#
RECETX  016016          4799*   4808#   4854*
RECEXT  016700          4841    4843    4847    4851    4855#
RECSTX  016014          3175    3943    4798*   4807#   4850*
RECVER  016526          1242    4821#
RECVPT  016020          4790*   4809#   4823    4855*
RECVRO= 104005          1065#   1580    1652    1845    1874    1899    1971    2140    2229    2266    2613    3010    3161
                        3208    3218    3280    3364    3430    3484    3876    3932    3982    3992    4048    4071    4183
                        4513    4646    5129    5253    5485    5515
RECVR1  016614          4831    4838#
RECYCL  001730          1263#   1269    1284
REMAIN  015714          2354    4764*   4780#
REMOTE  021216          2310    2339    5292#
REPTSW  031604          4568*   5020    5263    5304*   5305    5311    5315*   6438#
REPTO   005534          2360#   2471
REPTOA  005430          2342#   2347    2355
REPT1   005544          2362#
REPT10  006134          2445*   2448*   2451*   2454#
REPT11  006144          2457#
REPT12  006202          2459    2468#
REPT13  006216          2456    2473#
REPT14  006226          2475#   2482    2597
REPT2   005634          2379#   2383
REPT3   005660          2378    2386#
REPT4   005706          2393#   2407
REPT5   005752          2396    2400    2405#
REPT6   005764          2415#   2421    2423
REPT6A  006000          2420#
REPT6B  006006          2422#   2437
REPT7   006014          2418    2426#
REPT8   006020          2428#   2439
REPT8A  006042          2436#   2441
REPT9   006060          2424    2442#
RESTRT  031672          1258    1260    1276*   5250*   6465#
RETURN  020550          1844*   1873*   1898*   2264*   3009*   3204*   3279*   3482*   3621*   3978*   5139    5153*   5157#
                        5214*   5247*
RINTO   001366          1160#   1242*
RLVLO   001370          1161#   1244*
RPT12A  006212          2471#
RUBSWH  031664          4570*   4591    4593*   4612    4617*   6462#
RUN     022120          1319    5511#   5523
```

```
RVECTR  031572   1247*  4643   5248*  5249*  5250   6433#
R0     =%000000   979#  1215   1216   1217   1218   1219   1220   1221   1222   1223   1224   1225   1230
                 1234   1235*  1240*  1520*  1521*  1522*  1523*  1524*  1525*  1526*  1527*  1528*  1967*
                 1968*  1969   2119*  2120*  2121   2364*  2367   2370*  2371*  2372   2373*  2374   2387*
                 2388*  2389   2391*  2392   2406*  2620*  2632*  2633   2956   2957   2958   2959   3242*
                 3348   3349   3401   3402   3664   3665   3666   3667   3668   3669   3670   3671   3672
                 4119*  4159   4160*  4315*  4487*  4552   4553   4554   4555   4556   4557   4558   4789*
                 4790   4791*  4792   5054*  5057   5059   5060   5061   5202   5209   5292   5300   5612
                 5630*  5678*  5684*  5693*
R1     =%000001   980#  1261*  1264   1266   1268   1270   1272   1281   1283   1367*  1370*  1372   1377
                 1402*  1403   1413   1426*  1434   1439   1463*  1464   1469   1497*  1498   1503   1540*
                 1543*  1544   1549   1576*  1610   1627*  1628   1658*  1659   1665   2123*  2153*  2154
                 2156*  2157   2312*  2360*  2376*  2377   2392*  2417   2422*  2438   2442*  2443   2446
                 2449   2474*  2475   2563*  2570*  2596*  2638*  2649*  2653*  2926*  2928   2929   2930
                 2931   2933   2934   2935   2936   2939*  2940*  2941*  2942*  3022*  3024   3089*  3090
                 3095   3293*  3294   3299   3453*  3576*  3612*  3618*  3738*  3739   3744   3837*  3838
                 3843   4257*  4258   4276   4574*  4575*  4576   4582   4585   4587   4596   4607   4616*
                 4619   4626   4628   4631   4634   4638   4644   4650   4661   4664   4667   4670   4673
                 4676   4679   4682   4685   4688   4691   4725   4739*  4751*  4756   4763   4765*  4767
                 4821   4823*  4825*  4826*  4828   4855   4857*  4965*  4974   4975   4977   4979   4981
                 4987   4990   4992   5038*  5141*  5142   5144*  5145*  5146   5167*  5177*  5178*  5179
                 5181*  5182   5184*  5185   5186   5225*  5265   5268   5275   5277   5283*  5285*  5358*
                 5359   5361   5366   5368   5376   5380*  5383*  5393*  5398*  5399*  5400*  5401   5442*
                 5490*  5491   5495   5520*  5521*  5522*  5537*  5550   5551*  5552*  5553*  5554*  5555*
                 5556*  5559   5580*  5581*  5590   5594*  5597*  5613   5629*  5644   5666*  5682*  5687
                 5696   5698*  5699
R2     =%000002   981#  1232*  1234*  1238   1263*  1270   1372   1386   1403   1427   1434   1447   1460
                 1464   1476   1490   1498   1507   1535   1544   1561   1577*  1612   1630*  1654   1659
                 1755   1760   1765   1770   1772   1786   1813   1848   1853   1877   2143*  2145   2150
                 2241   2269   2280   2361*  2381*  2384*  2386*  2393   2397   2401   2405   2415*  2417
                 2420   2431*  2432   2436   2438   2462*  2466*  2475*  2571*  2574*  2575   2578   2581
                 2650*  2652*  2927*  2928*  2929*  2930*  2934*  2935*  2936*  2937*  2973   2989   3002
                 3023*  3024   3029   3056   3090   3138   3144   3222   3272   3283   3294   3327   3381
                 3385   3388   3414   3444   3448   3451   3453   3457   3459   3486*  3491*  3549   3565
                 3574   3576   3578   3613*  3614*  3615*  3616*  3617*  3620*  3686   3739   3838   3901
                 3907   3996   4062   4063   4102   4104   4105   4258   4522   4524   4526   4726   4752*
                 4758   4802*  4822   4824*  4825   4830   4833   4835   4838   4844   4848   4852   4856*
                 5356*  5358   5401*  5402*  5403*  5406   5435   5442   5444   5452*  5459*  5469*  5486*
                 5495*  5496   5497*  5538*  5550*  5554   5555   5582*  5584*  5614   5628*  5645   5665*
R3     =%000003   982#  1233*  1236*  1578*  1583   1584   1585   1631*  2144*  2145   2316*  2317*  2318*
                 2319   2365*  2367*  2380*  2401*  2402*  2403*  2404*  2416*  2419*  2428   2435*  2440*
                 2473*  2477*  2559*  2565   2595*  2618*  2626   2635*  2933*  2943   4753*  4756*  4763*
                 4764   4767   5395*  5408*  5534*  5559*  5577*  5586*  5592   5615   5627*  5646   5664*
R4     =%000004   983#  1240   1262*  1274*  1276   1277   1279   1280*  1582*  1609*  1610   1612   2366*
                 2368*  2375*  2382*  2561*  2575   2577*  2578   2580*  2581   2619*  2621   2622   2636*
                 4571*  4582*  4596*  4616   4726*  4729   4731   4734   4736   4737   4754*  4757*  4758*
                 4759   5533*  5542   5544   5546   5548*  5549   5558   5578*  5582   5584   5616   5626*
                 5647   5663*  5684   5688*  5689*  5690*  5693   5695*  5699*  5703*  5704*  5705*
R5     =%000005   984#  2457*  2458*  2611*  2625*  2628*  2629*  4755*  4761*  4769*  4770   5292*  5301
                 5536*  5549*  5556   5617   5625*  5648   5662*
SAVEPC  031632   5640*  5652   5658*  5670   6449#
SAVPSW  031634   5641*  5651   5659*  5669   6450#
SAVREG= 104002   1062#  2594   2610   2648   4567   4720   4750   4963   5037   5224   5352   5392   5468
                 5532   5576
SAV2PC  031636   5642*  5650   5660*  5668   6451#
SAV2SW  031640   5643*  5649   5661*  5667   6452#
```

```
SCALE   031363          2453    6380#
SCOPE = 104001          1061#   1398    1423    1457    1487    1518    1558    1574    1647    1723    1782    1796    1809
                        1824    1836    1863    1892    1912    1931    1946    2020    2046    2073    2204    2219    2257
                        2289    2693    2721    2735    2749    2763    2777    2791    2805    2819    2832    2845    2862
                        2985    3000    3037    3074    3111    3122    3196    3236    3308    3336    3425    3476    3505
                        3561    3588    3610    3634    3642    3681    3693    3810    3865    3875    3971    4018    4113
                        4177    4310    4338    4348    4407
SCOPEB  020456          5131    5137#
SCOPEF  020546          5134    5136*   5140*   5156#   5213*
SCOPEG  020470          5133    5135    5140#
SD10    010642          3100    3114    3196#
SD10A   013064          3868    3905    3911    3963    3971#
SD11    011000          3226    3236#
SD11A   013214          4000    4006#
SD2     010110          2985#
SD3     010136          2990    3000#
SD4     010254          3037#
SD4A    012334          3687    3693#
SD5     010324          2978    3074#
SD5A    012506          3756    3807#
SD6     010456          3094    3098    3111#
SD6A    012652          3842    3848    3855#
SD6B    012654          3850    3865#
SD7     010502          3122#
SD7A    012700          3875#
SEND    022024          1318    5480#
SENDAX  014226          4422#   4512
SENDPG  014240          4437#
SENDSW  031616          1191*   3593*   3597*   4578    4694    4860*   5484*   6443#
SEND1   022052          5488#   5501
SEND2   022114          5496*   5500#
SETRMT  021256          2323    2408    5304#
SETUP = 104035          1089#   1331    1649    1739    1962    1986    2108    2171    2311    2340    2497    2665    2920
                        2961    3255    3350    3403    3538    3673    4019    4156    5480
SI    = 000017          1176#   1528    1596    3268    4682    4926
SIOSWH  031600          1208*   1226*   1365    1432    1461    1495    1541    2224    2977    3097    3113    3383    3446
                        3461    3746    3755    3847    3867    4186    4228    4278    4300    4330    4367    4492    4842
                        4871    4884    4920    5055    5518    6436#
SLASH   031474          4595    4615    6399#
SNDAX1  014274          4424    4439    4462#
SNGCHR  017444          4940*   4988    4994*   5042#
SOH   = 000001          1175#   1347    1355    1524    1592    1602    2236    3128    3168    3372    4194    4202    4212
                        4387    4443    4455    4507    4679    4892    4910    5010
SOH1    017017          1748*   1784*   1798*   1811*   1846*   1875*   1900*   1917*   1936*   1969*   1970*   2105*   2107*
                        2180*   2206*   2267*   2319*   2630    2970*   2986*   3084*   3219*   3547*   3563*   3598*   3682*
                        3727*   3811*   4025*   4072*   4185*   4911#   5093*
SOURCE= 104025          1081#   2230    3367    3432    4905
SP    =%000006           985#   1099*   1100*   1101*   1102    1105*   1106*   1107*   1108*   1109    1185*   2559    2560*
                        2561    2601*   4583*   4636*   4642*   4706    4712*   4821*   4822*   4856    4857    4941    4942*
                        4950    5069    5071    5104    5105    5106*   5137    5141    5143*   5153    5247    5248    5279*
                        5282    5356    5357*   5393    5394*   5612*   5613*   5614*   5615*   5616*   5617*   5618*   5619
                        5623*   5624    5625    5626    5627    5628    5629    5630    5640    5641    5642    5643    5644*
                        5645*   5646*   5647*   5648*   5649*   5650*   5651*   5652*   5658    5659    5660    5661    5662
                        5663    5664    5665    5666    5667*   5668*   5669*   5670*   5694*
SPACE = 104016          1074#   2430    2481    5111
SPACEX  021036          2428*   2480*   5227*   5229*   5232#   5324*   5327*   5331*
```

```
SPCHR1  014674          4586    4588    4605#
SPCHR3  014744          4608    4619#
SPCHR5  014762          4620    4626#
SRCADR  017015          1872*   2265*   3206*   3980*   4009*   4045*   4073*   4909#   5060*   5301*
STADR7  010515          2956*   3127#
STADR8  010521          2957*   3131#
STADR9  010601          2958*   3167#
STAD10  010605          2959*   3171#
STDR10  013002          3667*   3923#
STDR11  013021          3668*   3938#
STDR12  013301          3669*   4031#
STDR13  013343          3670*   4059#
STDR14  013411          3671*   4083#
STDR15  013431          3672*   4097#
STDR7   012715          3664*   3881#   4008    4009    4010    4073
STDR8   012737          3665*   3895#
STDR9   012777          3666*   3919#
STRIPN  022760          5683    5695#   5706
STX   = 000002          1173#   1344    1521    1560    1561    1589    3154    3459    3925    4191    4440    4673    4848
                        4874    4889
ST7377  012302          3681#
ST7385  010052          2968#
SUBX    020716          1315    5199#   5208
SUBX1   020744          5203    5209#
SWR     001352          1151#   1197    1635    1838    1967    1975    2259    2316    2321    2583    2585    2940    3197
                        3454    3972    4966    4972    4983    4995    5107    5118    5130    5132    5144    5520
SWR0    001354          1152#
SW02  = 000004           975#
SW03  = 000010           974#
SW04  = 000020           973#
SW05  = 000040           972#
SW06  = 000100           971#
SW07  = 000200           970#
SW08  = 000400           969#
SW09  = 001000           968#   4995
SW10  = 002000           967#   1635    1838    2259    3197    3972
SW11  = 004000           966#   4972
SW12  = 010000           965#   4966    4983
SW13  = 020000           964#   1975    2321    2583    2585    3454    5107
SW14  = 040000           963#
SW15  = 100000           962#
SYN   = 000026          1174#   1597    4676
SYNTIM  003071          1583*   1598#
S5      012340          3718#
S5B     012474          3743    3747    3749    3755#
TAGB    002206          1343    1365#
TAGD    003026          1580#   1633
TAGF    003102          1588    1608#   1613    1615
TAGG    003132          1611    1620#
TAGH    003150          1622    1627#
TAGI    003164          1618    1625    1629    1633#
TAGILA  012562          3827#
TAGOA   002422          1433    1445#
TAGOB1  002254          1366    1384#
TAGOC   002504          1462    1474#
TAGOD   002600          1496    1505#
```

```
TAG1D   010252          3006    3017    3028    3030#
TAG1E   010276          3043    3050#
TAG1F   010322          3054    3059#
TAG1H   010354          3081#
TAG1HA  012556          3824#
TAG1K   010524          3125    3135#
TAG1KA  012742          3893    3901#
TAG1L   010360          3084#
TAG1P   011012          3198    3240#
TAG1PC  013454          3973    4118#
TAG1PD  013456          3757    4119#
TAG1Q   010666          3204#
TAG1QA  013106          3978#
TAG1R   010724          3211#
TAG1RA  013144          3985#
TAG1S   010570          3153    3161#
TAG1SA  012770          3915#
TAG1SB  013010          3917    3932#
TAG1T   010610          3164    3175#
TAG1TA  013024          3935    3943#
TAG1U   010736          3213    3218#
TAG1UA  013156          3987    3992#
TAG1W   010636          3142    3148    3179    3188#
TAG1WA  013052          3947    3962#
TAG1Z   010752          3222#
TAG1ZA  013166          3996#
TAG2A   004754          2183#
TAG2B   005040          2209#
TAG2C   005102          2227#   2249
TAG2F   005146          2228    2242    2247#
TAG2G   005130          2232    2241#
TAG2H   005162          2225    2250#
TAG3A   004364          1999    2011#
TAG3B   004424          2025    2037#
TAG3C   004464          2052    2063#
TAG3D   004506          2077#   2081
TAG4A   004612          2125#   2155
TAG4B   004636          2128    2140#
TAG4C   004656          2145#   2151
TAG4D   004676          2153#   2158
TAG4E   004716          2149    2158#
TAG4F   007706          2921#   2925    2932
TAG4G   007764          2939#   2945
TAG6A   011462          3434    3443#   3460    3462
TAG6B   011506          3447    3448*   3450#
TAG6C   011534          3455    3457#
TAG6D   011634          3483*   3489#   3492    3497*   3498
TAG6E   011616          3484#   3499
TAG7A   011314          3369    3380#   3390
TAG7B   011340          3384    3385*   3387#
TAGBA   012020          3569    3574#   3579
TAGBBA  012122          3614#   3619
TEMP1   031656          5422*   5425*   5619*   5623    6459#
TEMP2   031660          5418*   5420*   5423*   6460#
TERMSW  031622          4875*   4896*   5002    5004*   5015    5017*   6445#
TEST1   011034          3262#
```

DZPMAB.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
TEST2   011152          3276    3287    3292    3298    3308#
TEST3   011222          3336#
TG1H    012364          3724#
TG1KA   012720          3879    3885#
TG1L    012370          3727#
TG1LA   012730          3887    3891#
TG1PA   013306          4029    4045#
TG1PB   013346          4057    4062#
TG1PC   013362          4065    4072#
TG1PE   013422          4081    4093#
TG1PF   013434          4095    4102#
TG1PG   013450          4109    4113#
TITLE   023017          1196    5711#
TKB     001344          1148#   4574
TKS     001342          1147#   4572    5238    5339*
TKSFLG  021040          1127    5238#
TOPC    031624          5069*   5074*   5076    6446#
TPB     001350          1150#   5268*   5330*   5406*
TPS     001346          1149#   5261    5328    5404
TRANPT  017446          4941*   4950*   4965    5043#
TRAN0   017130          4966#   4993
TRAN1   017154          4967    4972#
TRAN2   017242          4990#
TRAN3   017206          4981#   5003    5016
TRAN4   017306          4976    4978    5002#
TRAN4A  017320          5005#   5035
TRAN5   017334          4980    5015#
TRAN5A  017362          5022#
TRAN5B  017372          5021    5024#
TRAN5C  017402          5019    5026#
TRAN5D  017410          5023    5025    5027#
TRAN5E  017416          5022*   5024*   5026*   5029#
TRAN5F  017422          5026    5031#
TRAN5G  017424          5022    5033#
TRAN6   017430          4984    5037#
TRAN7   017222          4985#   5041
TRNBFO  017450          1401    1402    1520    1529*   1530*   1533    1540    1549    2361    2386    2571    2611    3012
                        3023    3077*   3078*   3082    3089    3095    3099    3101*   3282    3293    3613    3624    3720*
                        3721*   3725    3738    3744    3748    3750*   3815*   3816*   3820*   3825    3837    3843    3849
                        3851*   4181*   4182*   4227    4257    4276    4280    4282*   5043    5044#   5167    5459    5486
                        5517
TRNBUF  021772          1317    5453    5459#
TRNEND  020152          1413    3029    3299    5046#   5186    5188*
TRNEXT  017256          4982    4989    4991    4994#   5007
TRNSMT  017116          4943    4963#
TSTABL  002046          1276    1277    1279    1295#
TSTLO   015540          4730    4732#
TSTLST  023166          1261    5731#
TSTNUM  031654          5110    5142*   5146    5151    5211*   5252*   6458#
TSTTKS= 104017          1075#   5128
TST1A   011050          3265    3272#
TST2A   011174          3314    3321#
TST2B   011220          3325    3330#
TTLAD1  011305          3348*   3371#
TTLAD2  011311          3349*   3375#
TTLTST  011256          3363#   3389
```

```
TTYENB  021374          1963    3570    3594    5120    5260    5339#   5355    5391    5421    5440    5487    5575
TTYIN = 104013          1071#   1201    1211    1255    1669    1738    1843    1870    1897    1916    1935    2014    2040
                        2067    2102    2263    2344    2562    2680    2685    2704    2715    2729    2743    2757    2771
                        2785    2799    2813    2827    2840    2853    2923    3202    3465    3480    3627    3809    3976
                        4024    4314    4355    5090    5152    5240    5296    5677
TYPECL  021530          5377    5380#
TYPEIT= 104010          1068#   2654    4600    4693    5226    5284    5378    5381    5382    5384    5598
TYPEQM  015110          4599    4649    4654#
TYPERA  021436          5358#   5375    5379    5385
TYPER1  021510          5369    5374#
TYPER2  021524          5378#
TYPER3  021426          5356#   5367
TYPT1   022352          5580#   5587
TYPT2   022356          5581#   5583
UPAROW  031476          5281    6401#
WAITGN= 104034          1088#   2507    2515    2524    2532    2540
WAITG1  006406          2562#   2569
WAITG2  006436          2571#   2584    2586    2599
WAITG3  006474          2583#
WORD2   022734          5687#   5697
X     = 000013           995#   1398    1399#   1423    1424#   1457    1458#   1487    1488#   1518    1519#   1558    1559#
                        1574    1575#   1647    1648#   1723    1724#
XADCNT  006566          1135    2610#
XADRES  020154          1134    5051#   5058
XASEMB  022704          1125    5677#
XASEM1  022730          5684#   5692
XAVRAG  015470          1137    4720#
XBCDBI  022162          1136    5532#
XBINDE  022326          1139    5575#
XBUFO   001364          1159#   4987*
XCHANE  020272          1138    5088#   5092
XCSRO   001362          1158#   4985
XDELAY  021656          5418#
XDIV    031440          2455    6390#
XDLAYL  021666          1116    1128    5420#
XDLAY2  021720          5427#
XDLAY3  021704          5423#   5424    5426
XDSTG1  016774          4888    4896#
XDSTIN  016752          1132    4884#
XERMES  020320          1130    5103#
XGETRG  022630          1115    5658#
XHIGH   031462          2465    6395#
XINTO   001372          1163#
XLDADD  017106          1119    4872    4876    4885    4898    4950#
XLDCHR  017070          1118    4940#
XLD1    017100          4942#   4951
XLOOP   020772          5205    5213#   5214
XLOW    031451          2461    6393#
XLVLO   001374          1164#   1238
XNODLY  021320          1142    5318#
XNULL   021330          1129    5324#
XNULL1  021340          1131    5326#
XNULL2  021352          5325    5328#   5332
XOCTPR  021550          1124    5391#
XPDMES  015450          4706*   4708#
XPRCNT  021152          1112    5275#
```

```
XPRCT1  021206          5276    5278    5284#
XPRINT  021410          1122    5352#
XPRTRB  022006          1143    5468#
XRANGN  020552          1121    5167#   5187
XRECRO  015716          1117    4789#
XSAVRG  022554          1114    5640#
XSCOPE  020416          1113    5128#
XSETUP  021052          1141    5247#
XSOURC  016732          1133    4871#
XSPACE  021010          1126    5224#   5228
XTTYIN  014522          1053    1123    4567#   4577    4656
XTYPE1  021142          5265*   5267#
XTYPE2  021144          5264    5268#
XTYPIT  021114          1120    5260#
XWATGN  006372          1140    2559#
X1MV    031421          2445    6386#
X10UV   031433          2451    6389#
X100UV  031425          2448    6387#
Y       =  000002        996#
ZERO    022440          5579*   5594    5596*   5600#
.       =  032262       1039#   1044#   1049#   1052#   1055#   1098#   1198    1237    1265    1267    1363#   1369    1373
                        1404    1412    1428    1435    1465    1491    1499    1508    1536    1542    1545    1562    1587
                        1606#   1648    1655    1660    1751    1756    1761    1766    1773    1787    1801    1814    1844
                        1849    1873    1878    1883    1898    1903    1974    1998    2009#   2024    2035#   2051    2062#
                        2104    2106    2122    2127    2138#   2146    2185    2190    2195    2210    2231    2264    2270
                        2281    2369    2385    2390    2394    2398    2429    2444    2447    2450    2478    2566    2588
                        2617    2627    2651    2697    2698    2708    2709    2890    2895    2974    3003    3009    3014
                        3019    3025    3042    3048#   3051    3057    3087    3091    3103    3124    3139    3145    3152
                        3163    3176    3182    3204    3212    3217#   3223    3228    3264    3273    3279    3284    3289
                        3295    3313    3319#   3322    3328    3368    3382    3433    3445    3482    3566    3575    3596
                        3621    3733    3740    3752    3829    3853    3878    3886    3892    3902    3908    3916    3934
                        3944    3956    3978    3986    3991#   3997    4002    4028    4056    4080    4090#   4094    4189
                        4217#   4219    4232    4284    4374    4383    4390#   4423    4438    4461#   4503    4510#   4592
                        4613    4658#   4702    4728    4733    4735    4760    4766    4768    4793    4811#   4836    4839
                        4845    4849    4853    4887    4906    4921    4923    4925    4928    4971    4973    4986    4996
                        4998    5006    5029    5030    5045#   5056    5119    5147    5180    5183    5239    5262    5298
                        5306    5312    5329    5362    5397    5405    5419    5436    5489    5492    5519    5524    5601
                        5680    5701    6468#   6472#
```

N13


```
CTX     1058#  1398  1423  1457  1487  1518  1558  1574  1647  1723
SIO     1058#
TA      1058#
TS      1057#  1398  1423  1457  1487  1518  1558  1574  1647  1723
```

DZPMAB.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
ADC     4738
ADD     1107  1235  1278  1543  2371  2381  2458  2560  2601  2629  2635  2636  4583  4712  4737
        4763  4942  5106  5143  5168  5169  5171  5172  5174  5175  5210  5212  5357  5394  5554
        5555  5556  5584  5694
ASL     1105  1274  2358  2403  5551  5552  5553  5703  5704  5705
ASR     4765  5688  5689  5690
BEQ     1198  1231  1239  1259  1265  1282  1284  1369  1373  1387  1404  1409  1428  1435  1448
        1465  1477  1491  1499  1508  1542  1545  1562  1611  1615  1629  1636  1655  1660  1756
        1761  1766  1773  1787  1801  1814  1839  1849  1883  1903  1974  2104  2146  2195  2210
        2220  2242  2260  2270  2347  2378  2418  2429  2437  2439  2459  2566  2576  2579  2582
        2617  2627  2631  2634  2890  2974  2990  3003  3019  3025  3057  3087  3091  3098  3139
        3145  3182  3198  3223  3228  3273  3289  3295  3328  3382  3389  3415  3445  3452  3458
        3462  3550  3566  3575  3687  3733  3740  3747  3756  3829  3839  3848  3902  3908  3966
        3963  3997  4065  4109  4187  4259  4279  4331  4491  4493  4577  4579  4592  4610  4627
        4629  4649  4692  4728  4733  4766  4836  4872  4885  4923  4967  4973  4976  4978  4980
        4982  4991  5003  5016  5019  5021  5056  5058  5264  5276  5278  5306  5312  5360  5367
        5377  5523  5543  5593  5692  5697
BGE     1613  2398
BGT     2639  4294  4735  4829  5228  5547  5701
BHI     4768
BIC     1106  5103  5145  5178  5285
BICB    1968  2317  2941  4575  5402  5548  5698
BIS     4801  5181  5184  5283  5403  5597
BISB    1970  2318  2942  5054  5699
BIT     1635  1838  1975  2259  2321  2583  2585  3197  3454  3972  4833  4835  4966  4972  4983
        4995  5107  5130  5132  5179  5182
BITB    2630  4691  5404
BLE     2394  4730  5092  5540
BLT     4698  5545
BMI     4296  4586  4588  4599  4760  5119
BNE     1103  1193  1213  1237  1257  1267  1271  1273  1366  1378  1415  1433  1440  1452  1463
        1470  1496  1504  1536  1550  1622  1666  1751  1771  1854  1878  1920  1939  1976  2122
        2151  2155  2158  2185  2190  2225  2249  2281  2322  2355  2369  2383  2390  2407  2421
        2423  2444  2447  2450  2478  2584  2586  2588  2925  2932  2978  3014  3030  3051  3096
        3100  3103  3114  3176  3284  3300  3322  3384  3447  3455  3460  3492  3499  3579  3619
        3745  3749  3752  3846  3850  3853  3868  3944  3973  4002  4229  4247  4277  4281  4284
        4301  4368  4473  4523  4525  4527  4537  4581  4590  4606  4608  4613  4620  4632  4635
        4639  4645  4651  4695  4705  4740  4793  4834  4839  4843  4845  4849  4853  4921  4971
        4984  4989  4993  4996  4998  5108  5131  5133  5147  5180  5183  5187  5203  5205  5298
        5332  5362  5369  5375  5409  5424  5426  5436  5445  5492  5519  5561  5587  5591  5680
BPL     2651  4573  4831  4986  5135  5239  5262  5329  5405  5583
BR      1202  1241  1269  1285  1289  1343  1376  1407  1412  1431  1438  1494  1502  1539  1548
        1588  1618  1625  1633  1648  1663  1671  1754  1759  1764  1769  1852  1881  1978  1989
        2025  2052  2081  2106  2128  2149  2161  2188  2193  2222  2232  2273  2327  2385  2396
        2400  2424  2441  2482  2548  2569  2599  2637  2698  2709  2878  2945  3006  3028  3028
        3043  3054  3094  3104  3125  3142  3148  3153  3164  3179  3213  3255  3265  3276  3287
        3292  3298  3314  3325  3369  3390  3434  3466  3509  3569  3596  3742  3753  3842  3854
        3879  3887  3894  3905  3911  3917  3935  3947  3987  4000  4029  4057  4081  4095  4190
        4220  4233  4235  4285  4375  4384  4424  4439  4498  4504  4531  4543  4584  4601  4618
        4653  4656  4702  4762  4841  4847  4851  4876  4888  4898  4925  4943  4951  5007  5023
        5025  5030  5035  5041  5208  5325  5365  5379  5385  5397  5419  5439  5453  5489  5501
        5524  5557  5595  5706
CLR     1189  1190  1191  1208  1254  1262  1330  1332  1581  1582  1653  2276  2349  2350  2388
        2416  2435  2498  2612  2620  2964  2960  3075  3078  3365  3380  3404  3429  3443  3597
        3674  3718  3721  3813  3815  3820  4155  4179  4182  4489  4568  4569  4570  4593  4701
        4709  4721  4722  4723  4724  4755  4791  4794  4795  4796  4797  4798  4799  4859  4860
```

DZPMA8.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
        4964  4994  5004  5017  5027  5140  5188  5213  5229  5251  5293  5315  5326  5330  5340
        5353  5370  5371  5420  5441  5514  5535  5536  5537  5538  5678  5695
CLRB    4826  5497
CMP     1238  1256  1413  1469  1549  1610  1612  1628  1665  1770  1853  1902  2121  2150  2157
        2377  2389  2393  2397  2417  2420  2436  2438  2575  2578  2581  2633  2924  2973  3024
        3029  3056  3095  3102  3222  3294  3299  3327  3414  3498  3549  3696  3751  3843  3852
        3996  4276  4283  4598  4697  4729  4734  4767  4792  4828  5134  5137  5146  5186  5592
CMPB    1212  1264  1266  1270  1272  1281  1283  1372  1377  1386  1403  1427  1434  1439  1447
        1464  1476  1490  1498  1503  1507  1544  1561  1659  1755  1760  1765  1772  1786  1800
        1813  1848  1882  2103  2145  2154  2194  2209  2227  2248  2443  2446  2449  2565  2626
        2889  2931  3090  3138  3388  3451  3457  3459  3578  3739  3744  3838  3901  4258  4490
        4522  4524  4526  4536  4585  4587  4607  4619  4626  4628  4631  4634  4638  4644  4650
        4661  4664  4667  4670  4673  4676  4679  4682  4685  4688  4838  4844  4848  4852  4922
        4977  4979  4990  4992  5057  5091  5275  5277  5297  5361  5366  5368  5376  5491  5542
        5544  5546  5696
COM     4652  5521
DEC     1236  1370  2368  2382  2406  2422  2431  2477  2638  3491  3618  4611  4739  5227  5331
        5408  5541  5691  5700
EMT     1060  1061  1062  1063  1064  1065  1066  1067  1068  1069  1070  1071  1072  1073  1074
        1075  1076  1077  1078  1079  1080  1081  1082  1083  1084  1085  1086  1087  1088  1089
        1090  1091
HALT    1104  2879  5621
INC     1194  1226  1280  1371  1609  1627  1630  1631  1726  2395  2399  2404  2419  2440  2577
        2589  2632  3366  3431  3497  3593  4472  4597  4617  4696  4761  4769  4837  4840  4846
        4950  4854  4875  4896  4897  4940  4968  5136  5354  5423  5425  5484  5522  5581  5586
INCB    2153  2247  3101  3750  3851  4282  4535
JMP     1056  1109  1260  1279  1727  1950  2293  2471  3243  3340  3523  3646  3757  4122  4320
        4332  4399  4411  4633  4637  4643  4647  4863  5082  5139  5215  5461  5494  5566  5634
JSR     1749  1785  1799  1812  1826  1847  1876  1901  1918  1937  1963  1972  1995  2022  2048
        2077  2125  2141  2181  2207  2221  2268  2310  2323  2326  2349  2353  2408  2456  2470
        2476  2597  2614  2675  2695  2706  2725  2739  2753  2767  2781  2795  2809  2823  2836
        2849  2871  2877  2892  2944  2971  2987  3001  3079  3085  3115  3209  3220  3413  3456
        3485  3548  3564  3570  3577  3594  3599  3622  3636  3683  3722  3731  3822  3827  3869
        3983  3994  4026  4046  4053  4074  4163  4316  4339  4488  4512  4662  4665  4668  4671
        4674  4677  4680  4683  4686  4689  4741  5039  5120  5260  5307  5355  5391  5421  5440
        5443  5460  5470  5487  5498  5575  5585  5683
MOV     1099  1101  1108  1184  1185  1232  1233  1234  1240  1242  1244  1247  1261  1263  1276
        1277  1357  1402  1426  1463  1497  1520  1540  1576  1577  1578  1634  1657  1658  1670
        1844  1873  1898  2119  2123  2143  2144  2264  2278  2312  2348  2351  2352  2356  2357
        2360  2361  2364  2365  2366  2367  2370  2372  2374  2375  2376  2380  2384  2386  2387
        2391  2392  2401  2415  2428  2445  2448  2451  2457  2462  2466  2473  2474  2475  2480
        2559  2561  2563  2570  2571  2574  2595  2596  2611  2618  2619  2621  2622  2623  2625
        2649  2653  2723  2724  2737  2738  2751  2752  2765  2766  2779  2780  2793  2794  2807
        2808  2821  2822  2834  2835  2847  2848  2867  2868  2869  2870  2873  2874  2875  2876
        2926  2927  2939  3009  3022  3023  3089  3112  3204  3279  3293  3363  3428  3482  3483
        3486  3612  3613  3620  3621  3738  3816  3837  3866  3978  4047  4257  4319  4357  4571
        4636  4642  4706  4725  4726  4731  4736  4751  4752  4753  4754  4764  4770  4789  4790
        4802  4821  4822  4823  4824  4827  4832  4855  4856  4857  4941  4950  4965  5022  5024
        5026  5069  5071  5104  5105  5138  5141  5142  5144  5153  5167  5177  5209  5211  5214
        5247  5248  5250  5252  5279  5282  5300  5304  5318  5324  5327  5339  5356  5380  5383
        5393  5395  5396  5407  5418  5422  5452  5459  5469  5486  5520  5533  5534  5550  5559
        5577  5578  5579  5580  5594  5596  5612  5613  5614  5615  5616  5617  5618  5619  5620
        5622  5623  5624  5625  5626  5627  5628  5629  5630  5640  5641  5642  5643  5644  5645
        5646  5647  5648  5649  5650  5651  5652  5658  5659  5660  5661  5662  5663  5664  5665
        5666  5667  5668  5669  5670  5682  5684  5693
MOVB    1215  1216  1217  1218  1219  1220  1221  1222  1223  1224  1225  1521  1522  1523  1524
```

DZPMAB.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
        1525  1526  1527  1528  1529  1530  1583  1584  1585  1748  1784  1798  1811  1846  1871
        1872  1875  1900  1917  1936  1967  1969  2105  2107  2120  2156  2180  2206  2226  2243
        2265  2267  2316  2319  2442  2891  2928  2929  2930  2933  2934  2935  2936  2937  2940
        2943  2956  2957  2958  2959  2970  2986  3077  3084  3205  3206  3207  3219  3242  3348
        3349  3385  3401  3402  3448  3453  3547  3563  3576  3598  3614  3615  3616  3617  3664
        3665  3666  3667  3668  3669  3670  3671  3672  3682  3720  3727  3611  3979  3980  3981
        4008  4009  4010  4025  4045  4072  4073  4119  4159  4160  4164  4165  4166  4167  4178
        4181  4185  4315  4485  4487  4539  4552  4553  4554  4555  4556  4557  4558  4574  4582
        4596  4616  4825  4924  4926  4987  5038  5059  5060  5061  5093  5225  5265  5268  5292
        5301  5358  5401  5406  5442  5490  5495  5496  5549
NEG     2628  2652
NOP     1329  1339  1340  1746  1747  1993  1994  2117  2118  2178  2179  2183  2549  2673  2674
        2968  2969  3411  3412  3545  3546  3855  4302  4303
RESET   1187
ROL     5170  5173  5176  5398  5399  5400
RTI     2602  2641  4625  4743  4803  4858  5001  5062  5094  5122  5154  5189  5231  5241  5254
        5269  5286  5319  5333  5373  5411  5427  5472  5563  5589  5653  5671  5681  5685
RTS     2250  2479  2657  2896  4462  4474  4538  4559  4704  4711  4713  4772  4907  4929  5302
        5308  5316  5341  5446  5599  5702
SBC     4757
SUB     1100  2373  2402  2580  2650  4756  4758  5074  5079  5112  5249  5582
TST     1102  1192  1197  1230  1258  1365  1368  1408  1432  1461  1495  1541  1614  1621  1654
        1750  1877  2189  2224  2241  2269  2280  2346  2354  2405  2432  2587  2616  2977  2989
        3002  3013  3018  3050  3086  3097  3113  3175  3227  3272  3283  3288  3321  3383  3446
        3461  3565  3732  3746  3755  3828  3847  3867  3943  4001  4102  4104  4105  4186  4229
        4246  4278  4293  4300  4330  4367  4492  4578  4580  4589  4591  4605  4609  4612  4648
        4694  4727  4732  4759  4800  4830  4842  4871  4884  4920  4970  4988  4997  5002  5015
        5018  5020  5055  5118  5185  5202  5204  5263  5305  5311  5359  5374  5435  5518  5539
        5560  5590  5679
TSTB    1268  1460  1535  1919  1938  1973  2184  3099  3144  3181  3381  3444  3574  3748  3849
        3907  3955  3962  4062  4063  4280  4572  4576  4974  4975  4981  4985  5238  5261  5328
        5444  5558  5687
WAIT    2277  3595  4969  5121  5488
.ASCII  5711  5722  5731  5743  5754  5768  5777  5783  5790  5795  5800  5804  5807  5811  5815
        5818  5825  5829  5833  5836  5843  5850  5855  5857  5859  5864  5869  5873  5879  5883
        5887  5892  5897  5901  5905  5909  5917  5922  5925  5928  5932  5936  5941  5945  5947
        5952  5957  5962  5965  5967  5976  5983  5989  5994  5998  5999  6003  6006  6011  6015
        6021  6028  6032  6036  6041  6046  6048  6050  6052  6054  6056  6060  6064  6069  6074
        6082  6090  6093  6097  6107  6112  6117  6121  6126  6129  6132  6139  6143  6148  6152
        6155  6158  6161  6167  6172  6178  6184  6194  6200  6204  6213  6220  6224  6229  6234
        6240  6246  6249  6256  6262  6269  6274  6278  6284  6290  6295  6300  6306  6307  6312
        6317  6322  6326  6334  6341  6347  6353  6357  6365  6372  6374  6376  6378  6380  6386
        6387  6389  6390  6393  6395  6397  6399  6401  6403  6405  6407  6409  6411  6413  6415
        6417  6419  6421  6423  6425
.BYTE   1344  1345  1346  1347  1348  1349  1350  1351  1352  1353  1354  1355  1356  1357  1358
        1359  1360  1361  1362  1589  1590  1591  1592  1593  1594  1595  1596  1597  1598  1599
        1600  1601  1602  1603  1604  1605  1675  1676  1677  1678  1679  1680  1681  1682  1683
        1684  1685  1686  1687  1688  1689  1690  1691  1692  1693  1694  1695  1696  1697  1698
        1699  1700  1701  1702  1703  1704  1705  1706  1707  1708  1709  1710  1711  1712  1713
        1714  2000  2001  2002  2003  2004  2005  2006  2007  2008  2026  2027  2028  2029  2030
        2031  2032  2033  2034  2053  2054  2055  2056  2057  2058  2059  2060  2061  2129  2130
        2131  2132  2133  2134  2135  2136  2137  2234  2235  2236  2237  2238  2239  2699  2700
        2710  2711  3045  3046  3047  3126  3127  3128  3129  3130  3131  3132  3133  3154  3155
        3156  3157  3166  3167  3168  3169  3170  3171  3172  3173  3214  3215  3216  3266  3267
        3268  3269  3316  3317  3318  3370  3371  3372  3373  3374  3375  3376  3377  3435  3436
        3437  3438  3439  3440  3880  3881  3882  3883  3888  3889  3894  3895  3896  3897  3918
```

```
PDM70 DIAGNOSTIC TEST   MACY11 27(732)  10-SEP-76  11:56  PAGE 176
DZPMAB.P11      CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

            3919    3920    3921    3923    3924    3925    3926    3927    3928    3937    3938    3939    3940    3988    3989
            3990    4030    4031    4032    4033    4034    4035    4058    4059    4060    4061    4082    4083    4084    4085
            4086    4087    4089    4096    4097    4098    4100    4191    4192    4193    4194    4195    4196    4197    4198
            4199    4200    4201    4202    4203    4204    4208    4209    4210    4211    4212    4213    4214    4215    4216
            4221    4222    4223    4224    4234    4235    4236    4237    4376    4377    4378    4379    4385    4386    4387
            4388    4389    4425    4426    4427    4428    4440    4441    4442    4443    4444    4445    4446    4447    4448
            4449    4450    4451    4452    4453    4454    4455    4456    4457    4458    4459    4460    4505    4506    4507
            4508    4509    4889    4890    4891    4892    4893    4894    4908    4909    4910    4911    4912    4913    4930
            4931    4932    4933    5008    5009    5010    5011    5012    5013    5031    5032    5033    5034    5710
.ENABL       951     952
.END        6473
.EVEN       1363    1606    1716    2009    2035    2062    2138    3048    3217    3270    3319    3378    3441    3898    3929
            3941    3991    4090    4101    4217    4225    4238    4390    4430    4461    4510    4914    4934    6430
.LIST       1057    1399    1424    1458    1488    1519    1559    1575    1648    1724
.MACRO      1057    1058
.NLIST      1057    1399    1424    1458    1488    1519    1559    1575    1648    1724
.REM           1
.REPT       1040
.SBTTL       997    1058    1093    1144    1166    1181    1321    1639    1729    1953    1980    2085    2163    2295    2329
            2486    2552    2605    2659    2904    2947    3246    3342    3395    3526    3648    4123    4413    4816    4954
            5473    5503    5526    5708    6428
.TITLE       950
.WORD       4147    4151    4401    6447


 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 *DZPMAB,DZPMAB.SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DZPMAB.P11
 RUN-TIME:  18 40 8 SECONDS
 RUN-TIME RATIO: 108/67=1.6
 CORE USED:  15K  (29 PAGES)
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F14

Spooler runtime 22 Seconds, 92 KCS, 617 disk reads, 4 disk writes, 173 pages

[redacted] Date 19-Oct-76 13:[redacted]51 Mueller IPC-0 [redacted] [163] [redacted]