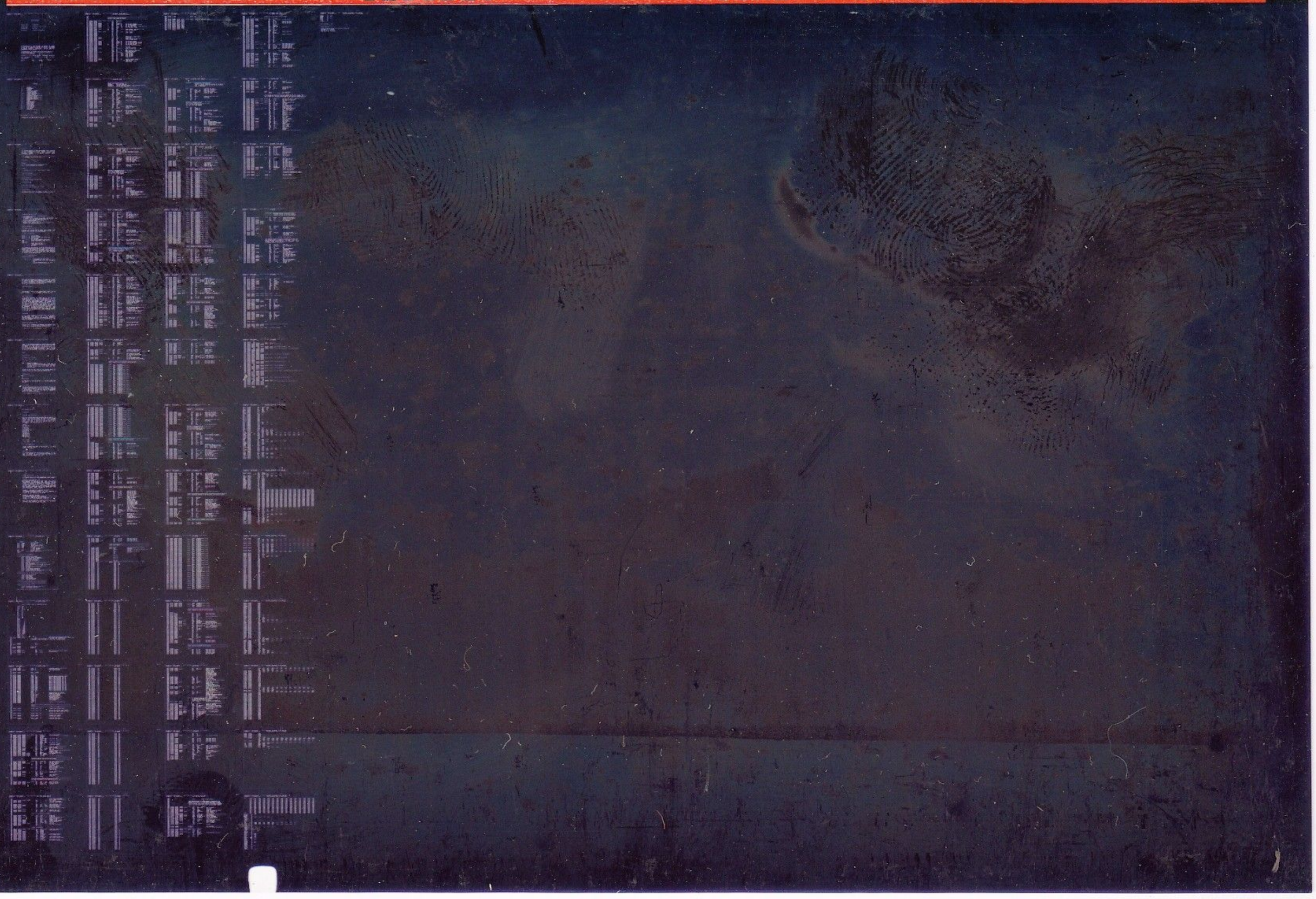
DJ11 EXER ONLINE DIAG AH-8509G-MC SEP 1982
CZDJBGO FICHE 1 OF 1
MADE IN USA



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.REM    !
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IDENTIFICATION

PRODUCT CODE:	AC-8507G-MC
PRODUCT NAME:	CZDJBG0 DJ11 EXER & ONLNE
PROGRAM DATE:	JUNE 1982
MAINTAINER:	DIAGNOSTIC ENGINEERING

CONTENTS

HISTORY

JUNE 1982 REV F TO REV G

INSERTED THE LINE 'MOV #0,@#PS' IN THE ROUTINE 'BEGIN'
TO INSURE THAT INTERUPTS WILL BE ALLOWED.

1. ABSTRACT

THIS PROGRAM CONSISTS OF THREE SUB-PROGRAMS WHICH EXRECISE THE DJ11 ASYNCRONOUS MULTIPLEXER. PROGRAM 1 IS AN OFF-LINE EXERCISER. PROGRAM 2 IS AN ON-LINE EXERCISER WHICH CONTINUOUSLY TRANSMITS THE LAST CHARACTER RECEIVED. PROGRAM 3 IS AN ECHO TEST.

NOTE: PROGRAM 1 WILL RUN ANY SILO ALARM LEVEL SETTING.
(FOR PROGRAM 2 AND 3 SEE SECTION 9.)

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 STANDARD COMPUTER WITH CONSOLE TELETYPE
UP TO 16 DJ11 ASYNCRONOUS MULTIPLEXERS.

2.2 STORAGE

THIS PROGRAM USES ALL OF 8K, EXCEPT ABSOLUTE LOADER.

2.3 PRELIMINARY PROGRAMS

CZDJA DJ11 LOGIC TESTS

3. LOADING PROCEDURE

USE STANDARD PROCEDURE FOR ABS TAPES.

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

SEE 5.1 (ALL DOWN FOR WORST CASE TESTING)

4.2 STARTING ADDRESS

THE PROGRAM SHOULD ALWAYS BE STARTED AT 200. IT MAY BE RESTARTED AT 1000 AFTER ALL PARAMETERS HAVE BEEN SELECTED.

4.3 PROGRAM AND OPERATOR ACTION

1) LOAD PROGRAM INTO MEMORY USING ABS LOADER.
2) LOAD ADDRESS 200.
3) IF HARDWARE SWITCH REGISTER IS AVAILABLE, SET SWITCHES (SEE SEC. 5.1), ALL DOWN FOR WORST CASE, PRESS START.
4) IF SWITCH-LESS PROCESSOR SIMPLY PRESS START.
5) ENTER THE PROGRAM NUMBER (1, 2, OR 3).
6) SELECT LINES IF SW<8> IS ON A 1.
7) PROGRAM 1 WILL LOOP AND BELL WILL RING ONCE EVERY PASS. "EOP" IS ALSO PRINTED ON EACH PASS.

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

AT SA 200, ALL SWITCHES DOWN IS WORST CASE TESTING. FOR PROGRAM 1 ONLY, THE BELL WILL RING AND EOP IS PRINTED UPON COMPLETION OF A PASS OF THE ENTIRE PROGRAM.

THE SWITCH SETTINGS ARE:

```
SW<15> = 1 ..... HALT ON ERROR
SW<13> = 1 ..... INHIBIT PRINTOUT
SW<12> = 1 ..... PRINT SILO ALARM LEVEL (PROG1 ONLY)
SW<10> = 1 ..... BELL ON ERROR
         0 ..... BELL ON PASS COMPLETE (PROG1 ONLY)
SW<9>  = 1 ..... INHIBIT MAINTENANCE (PROG1 ON-LINE)
SW<8>  = 1 ..... SELECT LINES FOR TEST (SEE 5.3)
PROG1 ONLY:
SW<2:0>= 0 ..... BINARY COUNT PATTERN
         1 ..... "THE QUICK SILVER GRAY FOX ... "
         2 ..... ALPHA-NUMERIC (40-177)
         3-7 ... NOT USED
```

THIS PROGRAM HAS BEEN MODIFIED TO RUN ON A PROCESSOR WITH OR WITHOUT A HARDWARE SWITCH REGISTER. WHEN FIRST EXECUTED THE PROGRAM TESTS THE EXISTENCE OF A HARDWARE SWITCH REGISTER. IF NOT FOUND A SOFTWARE SWITCH REGISTER LOCATION (SWREG=LOC. 176) IS DEFAULTED TO. IF THIS IS THE CASE, UPON EXECUTION THE CONTENTS OF THE SWREG ARE DUMPED IN OCTAL ON THE CONSOLE TTY AND ANY CHANGES ARE REQUESTED

(I.E.) SWR=XXXXXX NEW=

POSSIBLE RESPONSES ARE:

1.	<CR>	IF NO CHANGES ARE TO BE MADE.
2.	6 DIGITS 0-7	TO REPRESENT IN OCTAL THE NEW SWITCH REGISTER VALUE; LAST DIGIT FOLLOWED BY <CR>.
3.	^U	TO ALLOW REENTERING VALUE IF ERROR IS COMMITTED KEYING IN SWREG VALUE.

BUILT INTO THE PROGRAM IS THE ABILITY TO DYNAMICALLY CHANGE THE CONTENTS OF SWREG DURING PROGRAM EXECUTION. BY STRIKING ^G (CNTL G) ON CONSOLE TTY THE OPERATOR SETS A REQUEST FLAG TO CHANGE THE CONTENTS OF SWREG, WHICH IS PROCESSED IN KEY AREAS OF THE PROGRAM CODE (IE) ERROR ROUTINES, AFTER HALTS END OF PASS, AND OTHER APPLICABLE AREAS.

5.2 SUBROUTINE ABSTRACTS

5.2.1 HLT

THIS ROUTINE (CALLED BY AN EMT INSTRUCTION) PRINTS OUT AN ERROR MESSAGE (SEE 6.1). TO INHIBIT TYPEOUTS, PUT SW<13> ON A 1. TO RING THE BELL ON AN ERROR, PUT SW<10> ON A 1.

5.2.2 ALMCK (PROG1 ONLY)

IN THE NORMAL OPERATION THE "DONE" BIT IS SET AS EACH CHARACTER IS READ INTO THE FI/FO BUFFER(SILO). BUT THIS "DONE" CONDITION CAN BE DELAYED TO CAUSE DONE ON THE 5, 9, OR 17 CHARACTER. THIS IS DONE BY CUTTING ONE OF THE JUMPERS (W1,W2,W3) ON THE M7285 CONTROL BOARD. THE PROGRAM TESTS FOR THIS "SILO ALARM LEVEL" AND IF SW12 IS SET (1) IT WILL PRINT OUT THE LEVEL (IN OCTAL) AT WHICH EACH DJ11 IS WILL SET "DONE". THE SUBROUTINE ALSO ADJUSTS THE CHARACTER COUNTERS TO ENSURE THAT THE MAXIMUM NUMBER OF CHARACTERS TO BE TRANSFERED IS A MULTIPLE OF THE SILO ALARM LEVEL. THIS ENSURES THAT ALL DATA WILL BE READ OUT OF THE SILO. DONE WILL NOT SET IF THE NUMBER OF CHARACTERS IN THE FI/FO BUFFER IS LESS THAN THE SILO ALARM LEVEL. (NOTE CHARACTER PRESENT IS SET ON EACH CHARACTER IN THE BUFFER, REGARDLESS OF THE SILO ALARM LEVEL.)

5.2.3 TRAPCATCHER

A ".+2" - "HALT" SEQUENCE IS REPEATED FROM 0 - 56 TO DETECT ANY UNEXPECTED TRAPS AND A ".+2" - "IOT" SEQUENCE IS REPEATED FROM 60 - 776 TO DETECT ANY UNEXPECTED INTERRUPTS. THUS ANY UNEXPECTED TRAPS WILL HALT AT THE VECTOR + 2. ANY UNEXPECTED INTERRUPTS WILL RESULT IN AN ERROR MESSAGE AND "HALT" IN "IOTRAP".

5.3 PROGRAM AND OPERATOR ACTION

AFTER THE DEVICE PARAMETERS ARE REPORTED, THE PROGRAM TYPES "PROGRAM #: ", AT WHICH TIME THE OPERATOR ENTERS "1", "2", OR "3" DEPENDING ON THE SUB-PROGRAM HE WISHES TO RUN.

IF SW<8> IS ON A 1, THE PROGRAM WILL TYPE OUT " N SELECT

LINES =" THE OPERATOR RESPONDS BY TYPING IN AN OCTAL NUMBER REPRESENTING THE LINE(S) WHICH ARE TO BE TESTED FOR THAT DJ11.(INPUT A 1 FOR LINE 0,A 7 FOR LINES 0,1,AND 2, ETC. THE SAME AS IF YOU WERE DIRECTLY SETTING THE TCR OF THE DJ11.) IF MORE DJ11'S ARE ON THE SYSTEM THE N WILL INDICATE THE NEXT DJ11 AND THE PROMPT IS REISSUED. WHEN ALL LINES ARE SELECTED THE PROGRAM WILL RUN THE SELECTED SUBPROGRAM.

6. ERRORS

6.1 ERROR PRINTOUT

THE FORMAT IS AS FOLLOWS:

ADR (R1) (R2) (R3) (R4)

WHERE:

ADR = ADDRESS OF ERROR HLT
(RN) = CONTENTS OF GENERAL REGISTER 'N'. FROM NONE TO FOUR OF THESE MAY BE TYPED DEPENDING ON THE NUMBER FOLLOWING THE HLT; E.G., HLT+3 WOULD TYPE (R1) THRU (R3); HLT (BY ITSELF) WOULD STOP AFTER TYPING ADR AND DJADR.

TO FIND THE FAILING TEST, LOOK AT THE LISTING ABOVE THE ADDRESS TYPED. IN MOST CASES THE COMMENT BESIDE THE HLT TELLS WHAT WAS BEING CHECKED AND WHAT WAS EXPECTED.

6.2 ERROR RECOVERY

RESTART AT 200 OR 1000.

6.3 ERROR COUNTER

AN ERROR COUNT IS KEPT IN "ERRORS" . IT CAN BE CLEARED FROM THE CONSOLE, BY RESTARTING AT 200, OR BY RELOADING THE PROGRAM.

7. RESTRICTIONS

THIS PROGRAM REQUIRES THAT THE DEVICE ADDRESSES FOLLOW THE FLOATING ADDRESS CONVENTION (DJ11'S WILL BE FIRST, STARTING AT 160010, THEN THE DH11'S) AND THAT THE VECTOR ADDRESSES ALL BE CONTIGUOUS. IF THE FIRST DJ11 ADDRESS IS NONSTANDARD (OTHER THAN 160010) THEN LOC. 1270 MUST BE CHANGED TO CONTAIN THIS NONSTANDARD ADDRESS.

IF THIS PROGRAM IS RUN WITH A MONITOR, I.E. ACT11 OR DDP,

ONLY PROGRAM 1 IS RUN.

8. MISCELLANEOUS

8.1 EXECUTION TIME (PROG1 ONLY)

DUE TO THE VERIOUS BAUD RATES AVAILABLE AND THE ABILITY TO CHECK UP TO 16 DJ11'S AT ONCE, THE EXICUTION TIME CAN VARY ANYWHERE FROM 3 SECONDS TO NEARLY AN HOUR. THE FOLLOWING TYPICAL TIMES ARE FOR ONE DJ11 WITH ALL LINES AT THE SAME SPEED, 8 LEVEL CODE, 2 STOP BITS, AND NO PARITY ON A PDP-11/20 . FOR MULTIPLE DJ11'S, MULTIPLY THESE TIMES BY THE NUMBER OF UNITS SELECTED FOR TEST.

BAUD	APPROX RUN TIME
75	00:10:00
110	00:07:00
134.5	00:05:40
150	00:05:00
300	00:02:30
600	00:01:15
1200	00:00:40
1800	00:00:30
2400	00:00:20
4800	00:00:10
9600	00:00:05

8.2 STACK POINTER

STACK IS INITALLY SET TO 1200

8.3 PASS COUNT (PROG1 ONLY)

A 32 BIT (2 WORDS) PASS COUNT IS KEPT IN "PCNT". IT CAN BE CLEARED FROM THE CONSOLE, BY RESTARTING AT 200, OR BY RELOADING THE PROGRAM.

8.4 POWER FAIL

EACH PROGRAM CAN BE POWER FAILED WITH NO ERRORS. TO USE, START THE PROGRAM AS USUAL AND POWER DOWN THEN UP AT ANY TIME. THE ROUTINE SHOULD TYPE "POWER" AND RESTART THE PROGRAM WITH NO OTHER ERROR TYPEOUTS.

9. PROGRAM DESCRIPTION

THIS PROGRAM CONSISTS OF THREE SUB-PROGRAMS WHICH EXERCISE THE LOGIC OF UP TO 16 DJ11 ASYNCHRONOUS DATA MULTIPLEXERS.

PROGRAM 1: EXERCISER (OFF-LINE)
THIS PROGRAM EXERCISES UP TO 256 LINES (16 DJ11'S) SIMULTANEOUSLY IN MAINTENANCE MODE. THREE DIFFERENT DATA PATTERNS MAY BE SELECTED FROM THE SWITCH REGISTER. THE DATA PATTERN IS REPEATED A MINIMUM OF 16 TIMES FOR EACH PASS. THE PROGRAM SHOULD BE RUN FOR AT LEAST 2 PASSES WITH ALL SWITCHES DOWN. SW<9> ON A ONE DISABLES THE MAINTENANCE MODE, REQUIRING TURN-AROUND CARDS AT THE TERMINATION OF EACH LINE BEING TESTED. (NOTE: THE RECIEVER AND TRANSMIT LINES MUST BE JUMPERED FOR THE SAME SPEED.)

PROGRAM 2: CONTINUOUS ECHO EXERCISER (ON-LINE)
THIS PROGRAM CONTINUOUSLY TRANSMITS THE LAST CHARACTER IT RECEIVED ON THE RESPECTIVE LINE. A NULL (000) WILL "ECHO" 72 TIMES AND THEN TURN OFF THE TRANSMITTER.

PROGRAM 3: ECHO TEST (ON-LINE)
THIS PROGRAM TRANSMITS A HEADING (*ECHO TEST*) ON EACH LINE AND THEN ECHOS EVERYTHING THAT IT RECEIVES.
CAUTION: IF CHARACTERS ARE RECEIVED FASTER THAN THEY CAN BE TRANSMITTED, THE SOFTWARE BUFFERS MAY OVERFLOW.

NOTE: THE ON-LINE EXERCISERS (PROG2 AND PROG3) ARE OPERATOR DEPENDENT, AND THEREFORE DO NOT LOOP. I.E. NO PASSES. ACT11 AND DDP MONITORS WILL ONLY RUN PROG1.

!

```
;    SWITCH                    USE
;    ------                    ---------------------
SW15=   100000          ;HALT ON ERROR
SW14=   40000           ;NOT USED
SW13=   20000           ;INHIBIT ERROR TYPEOUTS
SW12=   10000           ;PRINT SILO ALARM LEVEL
SW11=   4000            ;NOT USED
SW10=   2000            ;0 - BELL ON PASS COMPLETE
                        ;1 - BELL ON ERROR
SW9=    1000            ;ON-LINE (PROG1)
SW8=    400             ;SELECT LINES (INITIALIZATION TIME ONLY)
;SW<0:2>          SELECT MESSAGE (PROG1 ONLY)
.REM!

DJ11 REGISTER BIT ASSIGNMENTS:

CONTROL STATUS REGISTER (CSR) XXXXX0
        BIT0    RECEIVER ENABLE (READ/WRITE)
        BIT1    HALF DUPLEX SELECT (READ/WRITE)
        BIT2    MAINTENANCE (READ/WRITE)
        BIT3    CLEAR MOS (WRITE ONLY)
        BIT4    CLEAR MOS FLAG (READ ONLY)
        BIT5    NOT USED
        BIT6    RECEIVER INTERUPT ENABLE (READ/WRITE)
        BIT7    DONE (READ ONLY)
        BIT8    MASTER TRANSMITTER SCAN ENABLE (READ/WRITE)
        BIT9    NOT USED
        BIT10   READ/WRITE BREAK REGISTER (READ/WRITE)
        BIT11   NOT USED
        BIT12   STATUS ENABLE (READ/WRITE)
        BIT13   FI/FO OVERRUN (READ ONLY)
        BIT14   MASTER TRANSMITTER INTERUPT ENABLE (READ/WRITE)
        BIT15   TRANSMITTER READY (READ ONLY)

RECEIVER BUFFER REGISTER (RBUF) XXXXX2 (READ ONLY)

        BIT0-7  RECEIVED CHARACTER
        BIT8-11 LINE NUMBER
        BIT12   PARITY ERROR
        BIT13   FRAMING ERROR
        BIT14   UART OVERRUN ERROR
        BIT15   CHARACTER PRESENT

TRANSMITTER CONTROL REGISTER (TCR) XXXXX4 (READ/WRITE)

        BIT0-15 STOP THE SCANNER ON CORRESPONDING LINE

TRANSMITTER BUFFER (TBUF) XXXXX6

        BIT0-7  TRANSMITTED CHARACTER (WRITE ONLY)
        BIT8-11 LINE NUMBER (READ ONLY)

BREAK CONTROL STATUS REGISTER (BCSR) XXXXX4 (BIT10 OF CSR SET) (READ/WRITE)
```

```
                    BIT0-15 TRNSMIT A BREAK ON CORRESPONDING LINE!

                    SCOPE=  TRAP
                    HLT=    EMT
                    TYPE=   IOT
                    PS=     177776
                    R0=     %0
                    R1=     %1
                    R2=     %2
                    R3=     %3
                    R4=     %4
                    R5=     %5
                    TTY=    %5
                    SP=     %6
                    PC=     %7
                    BELL=   7
                    BIT0=       1
                    BIT1=       2
                    BIT2=       4
                    BIT3=      10
                    BIT4=      20
                    BIT5=      40
                    BIT6=     100
                    BIT7=     200
                    BIT8=     400
                    BIT9=    1000
                    BIT10=   2000
                    BIT11=   4000
                    BIT12=  10000
                    BIT13=  20000
                    BIT14=  40000
                    BIT15= 100000
                    LEVEL7 = 340
                    OPEN =  0
                    STACK = 1200
491                 000000
492  000000  000000  000000          . =     0                       ;TRAP CATCHER IN LOCATIONS 0 THRU 776
493                                          0,0                     ;LOCATIONS 0 AND 2 CONTAIN "HALT" INSTRUCTIONS
494                                  ;LOCATIONS 4 THRU 56 CONTAIN ".+2" AND "HALT" IN EVERY VECTOR
495                                  ;LOCATIONS 60 THRU 776 CONTAIN ".+2" AND "IOT" IN EVERY VECTOR
496
497
498                 000046           . =     46
499  000046  014622                  $ENDAD
500
501                 000174           . =     174
502  000174  000000                 DISPREG:0
503  000176  000000                 SWREG:  0
504
505                 000200           . =     200
506  000200  000137  006312          JMP     BEGIN                   ;200 ALWAYS IS THE STARTING ADDRESS
507                 001000           . =     1000                    ;RESTART ADDRESS
508  001000  000137  007316          JMP     RESTAR
509
510                 001200           . =     1200
```

```
                                ICNT:    0                      ;ITERATION COUNT-LH, TEST NO.-RH
                                ERRORS:  0                      ;ERROR COUNT REGISTER
                                PCNT:    0,0                    ;PASS COUNT REGISTER

                                SWR:     177570
                                DISPLAY:177570

                                SAVIT:   0
                                TIMES:   20                     ;MINIMUM NUMBER OF MESSAGES (PROG1)
                                SVSW0:   OPEN                   ;MAP OF LINES SELECTED, DJ11 #0
                                SVSW1:   OPEN                   ;MAP OF LINES SELECTED, DJ11 #1
                                SVSW2:   OPEN                   ;MAP OF LINES SELECTED, DJ11 #2
                                SVSW3:   OPEN                   ;MAP OF LINES SELECTED, DJ11 #3
                                SVSW4:   OPEN                   ;MAP OF LINES SELECTED, DJ11 #4
                                SVSW5:   OPEN                   ;MAP OF LINES SELECTED, DJ11 #5
                                SVSW6:   OPEN                   ;MAP OF LINES SELECTED, DJ11 #6
                                SVSW7:   OPEN                   ;MAP OF LINES SELECTED, DJ11 #7
                                SVSW10:  OPEN                   ;MAP OF LINES SELECTED, DJ11 #10
                                SVSW11:  OPEN                   ;MAP OF LINES SELECTED, DJ11 #11
                                SVSW12:  OPEN                   ;MAP OF LINES SELECTED, DJ11 #12
                                SVSW13:  OPEN                   ;MAP OF LINES SELECTED, DJ11 #13
                                SVSW14:  OPEN                   ;MAP OF LINES SELECTED, DJ11 #14
                                SVSW15:  OPEN                   ;MAP OF LINES SELECTED, DJ11 #15
                                SVSW16:  OPEN                   ;MAP OF LINES SELECTED, DJ11 #16
                                SVSW17:  OPEN                   ;MAP OF LINES SELECTED, DJ11 #17
                                MARK:    0
                                BUFSIZ:  30                     ;RECEIVE BUFFER SIZE (PROG3)
                                UNITS:   1                      ;NUMBER OF UNITS ON THE SYSTEM
                                DEVADR:  160010                 ;FIRST DEVICE ADDRESS
                                VECADR:  300                    ;FIRST VECTOR ADDRESS
                                RCVLVL:  240                    ;RECEIVER BR LEVEL = 5
                                XMTLVL:  240                    ;TRANSMITTER BR LEVEL = 5
                                ISRFLG:  0                      ;INTR SVC RTN FLAG                    ::++F
                                ALMFLG:  0                      ;SILO ALARM LEVEL FLAG
                                TIMERA:  0                      ;TIME COUNTERS
                                TIMERB:  0
                                COUNT:   0                      ;VALUE OF THE SILO ALARM LEVEL
                                SUM:     0

                                ;*****************************************************************************
                                ;TABLES
                                ;*****************************************************************************

                                XMTTAB: .BLKW    400            ;TRANSMIT DATA POINTER TABLE

                                RCVTAB: .BLKW    400            ;RECEIVE DATA POINTER TABLE (PROG1)
                                                                ;RECEIVE DATA TABLE (PROG2 AND PROG3)

                                MAXTAB: .BLKW    400            ;POINTER FOR XMIT/RCV BFRS.           ::++F

                                XMTCNT: .BLKW    400            ;TRANSMIT DATA COUNTER
                                RCVCNT=XMTCNT+1                 ;RECEIVE DATA COUNTER

                                MASK:    .BLKW   400            ;CHARACTER MASK TABLE
                                CNTTAB=MASK+1                   ;ITERATION COUNT AND FLAGS
```

```
006312  012706  001200                 BEGIN:  MOV     #STACK, SP          ;SET UP STACK POINTER
006316  012737  000000  177776                 MOV     #0,@#PS             ;;ALLOW INTERUPTS          VRG-060382
006324  004737  016236                         JSR     PC,SUSWRR
006330  012700  000020                         MOV     #20,R0
006334  012720  015720                         MOV     #IOTRAP,(R0)+       ;IOT VECTOR (20)
006340  012720  000340                         MOV     #340,   (R0)+
006344  012720  015556                         MOV     #PDOWN$,(R0)+       ;POWER FAIL VECTOR (24)
006350  012720  000340                         MOV     #340,   (R0)+
006354  012720  014636                         MOV     #EMT$,  (R0)+       ;EMT VECTOR (30)
006360  012720  000340                         MOV     #340,   (R0)+
006364  005037  001202                         CLR     ERRORS              ;CLEAR ERROR COUNTER
006370  005037  001204                         CLR     PCNT                ;CLEAR PASS COUNTER
006374  005037  001206                         CLR     PCNT+2
006400  012700  000300                         MOV     #300,   R0          ;START OF FLOATING VECTOR AREA
006404  005720                         2$:     TST     (R0)+               ;UPDATE POINTER
006406  010060  177776                         MOV     R0,     -2(R0)      ;PUT ".+2" IN EACH VECTOR
006412  012720  000004                         MOV     #IOT,   (R0)+       ;AND "IOT"
006416  022700  001000                         CMP     #1000,  R0          ;CHECK FOR END OF FLOATING VECTOR AREA
006422  003370                                 BGT     2$                  ;BRANCH IF MORE
006424  005037  001300                         CLR     ALMFLG              ;CLEAR THE ALARM FLAG
006430  012737  000400  011240                 MOV     #256.,CNTNIT        ;SET MAXIMUM SIZE VALUES
006436  012737  000106  011244                 MOV     #70.,CNTNIT+4       ;FOR PROG #1
006444  012737  000106  011250                 MOV     #70.,CNTNIT+10
006452  012737  000001  001216                 MOV     #1,TIMES            ;SET FOR QV ON FIRST PASS

                                       ;***********************************************************************
                                       ;ROUTINE TO MAP ALL THE DJ11'S ON THE SYSTEM
                                       ;***********************************************************************

006460  013700  001266                 DJMAP:  MOV     DEVADR, R0          ;GET FIRST FLOATING ADDRESS
006464  012702  000001                         MOV     #1,     R2          ;COUNTER FOR DJ11'S
006470  012737  000002  000006                 MOV     #RTI,   @#6         ;RTI WHEN TIME-OUT
006476  005001                         5$:     CLR     R1                  ;SET UP COUNTER
006500  000261                         1$:     SEC                         ;SET CARRY
006502  005710                                 TST     (R0)                ;CHECK FOR A DEVICE
006504  103404                                 BCS     7$                  ;BRANCH IF NONE
006506  062700  000010                 6$:     ADD     #10,    R0          ;GO TO NEXT DEVICE ADDRESS
006512  005201                                 INC     R1                  ;COUNT DJ11'S
006514  000771                                 BR      1$                  ;LOOK FOR MORE

006516  005037  000006                 7$:     CLR     @#6                 ;RESTORE TIMEOUT VECTOR
006522  010137  001264                         MOV     R1,     UNITS       ;SAVE COUNT
006526  001005                                 BNE     GETVEC
006530  000004  016632                         TYPE,   MSG01               ;TYPE "NO DJ11'S!"
006534  000000                                 HALT                        ;FATAL ERROR
006536  000137  014550                         JMP     @#DONE              ;RESTART

                                       ;***********************************************************************
                                       ;ROUTINE TO DETERMINE VECTOR ADDRESSES OF DJ11'S
                                       ;***********************************************************************

006542  013746  000020                 GETVEC: MOV     @#20,   -(SP)       ;SAVE IOT VECTOR
006546  012737  006576  000020                 MOV     #1$,    @#20        ;RESET IOT VECTOR
006554  013701  001266                         MOV     DEVADR, R1          ;FIRST DJ ADDRESS
006560  012711  040400                         MOV     #40400, (R1)        ;SET CSR
```

```
                                                                ;BIT8= TRANS SCAN ENABLE
                                                                ;BIT14= TRANS INTERRUPT ENABLE
006564  012761  000001  000004          MOV     #1,     4(R1)   ;TCR, LINE 0
006572  000001                          WAIT                    ;WAIT FOR AN INTERRUPT
006574  000407                          BR      3$              ;CONTINUE AFTER INTERUPT

006576  011602                  1$:     MOV     (SP),   R2      ;SAVE VECTOR ADR. (+4)
006600  162716  000010                  SUB     #10,    (SP)    ;REPOSITION ADR TO RCV. VEC.
006604  011637  001270                  MOV     (SP),   VECADR  ;SAVE FIRST VECTOR
006610  022626                          CMP     (SP)+,  (SP)+   ;RESET STACK FROM IOT
006612  000002                          RTI                     ;RETURN FROM INITIAL INTERUPT

006614  012637  000020          3$:     MOV     (SP)+,  @#20    ;RESTORE IOT VECTOR
006620  005742                          TST     -(R2)           ;POINT TO XMT. VEC. +2
006622  013703  001264                  MOV     UNITS,  R3      ;SET UP UNIT COUNTER

                                ;CHECK THAT VECTORS ARE CONTIGUOUS

006626  005061  000004          2$:     CLR     4(R1)           ;CLEAR TCR
006632  005011                          CLR     (R1)            ;CLEAR CSR
006634  012712  000004                  MOV     #IOT,   (R2)    ;RESTORE IOT TO XMT. VEC.+2
006640  005303                          DEC     R3              ;CHECK FOR MORE DJ11'S
006642  001415                          BEQ     REPORT          ;BRANCH IF DONE
006644  062701  000010                  ADD     #10.    R1      ;UPDATE DJ ADR. POINTER
006650  062702  000010                  ADD     #10,    R2      ;UPDATE VECTOR POINTER
006654  012712  000002                  MOV     #RTI,   (R2)    ;RTI ON INTERRUPT
006660  012711  040400                  MOV     #40400, (R1)    ;SET CSR
006664  012761  000001  000004          MOV     #1,     4(R1)   ;TCR LINE 0
006672  000001                          WAIT                    ;WAIT FOR AN INTERRUPT
006674  000754                          BR      2$

                                ;REPORT CONFIGURATION

006676  032777  020000  172304  REPORT: BIT     #BIT13, @SWR    ;CHECK FOR INHIBIT TYPOUT
006704  001026                          BNE     GETLEN          ;SKIP REPORT IF SET
006706  000004  016453                  TYPE,   MSGMDN
006712  000004  016442                  TYPE,   RETURN
006716  000004  016514                  TYPE,   MSGADR
006722  013705  001266                  MOV     DEVADR,TTY      ;TYPE DEVADR IN OCTAL
006726  004737  015374                  JSR     PC,PRINTR       ;TYPE LEADING ZERO'S
006732  000004  016544                  TYPE,   MSGVEC
006736  013705  001270                  MOV     VECADR,TTY      ;TYPE VECADR IN OCTAL
006742  004737  015404                  JSR     PC,PRINTS       ;AND SUPRESS LEADING ZERO'S
006746  000004  016570                  TYPE,   MSGNUM
006752  013705  001264                  MOV     UNITS,TTY       ;TYPE UNITS IN OCTAL
006756  004737  015404                  JSR     PC,PRINTS       ;AND SUPRESS LEADING ZERO'S
```

```
                        ;*****************************************************************************
                        ;ROUTINE TO MAP CHARACTER LENGTHS
                        ;*****************************************************************************

006762 022737 000176 001210  GETLEN: CMP     #SWREG,SWR
006770 001002                        BNE     6$
006772 004737 016134                 JSR     PC,CNTLU
006776 013700 001264         6$:     MOV     UNITS, R0       ;SET UP UNIT COUNTER
007002 013701 001266                 MOV     DEVADR, R1      ;SET UP DEVICE ADDRESS POINTER
007006 012702 000001         1$:     MOV     #1,    R2       ;SET UP LINE MARKER
007012 012711 000415                 MOV     #415,  (R1)     ;RCV ENB, CMOS, MAINT., TRANS SCAN ENB
007016 032711 000020         10$:    BIT     #BIT4, (R1)     ;WAIT FOR MOS TO CLEAR
007022 001375                        BNE     10$
007024 010261 000004         2$:     MOV     R2,    4(R1)    ;TRANS CONTROL, ONE LINE AT A TIME
007030 005711                3$:     TST     (R1)            ;WAIT FOR TRANS READY
007032 100376                        BPL     3$
007034 012761 000377 000006          MOV     #377,  6(R1)    ;SEND A RUBOUT
007042 006302                        ASL     R2              ;SKIP 4 LINES
007044 006302                        ASL     R2
007046 006302                        ASL     R2
007050 006302                        ASL     R2
007052 103364                        BCC     2$              ;BRANCH BACK IF MORE LINES
007054 005061 000004                 CLR     4(R1)           ;CLEAR TCR
007060 062701 000010                 ADD     #10,   R1       ;UPDATE POINTER TO NEXT UNIT
007064 005300                        DEC     R0              ;CHECK FOR MORE UNITS
007066 001347                        BNE     1$
007070 013700 001264                 MOV     UNITS, R0       ;SET UP UNIT COUNTER
007074 013701 001266                 MOV     DEVADR, R1      ;SET UP DEVICE ADDRESS POINTER
007100 012702 005312                 MOV     #MASK, R2       ;SET UP CHAR LEN TABLE POINTER
007104 012703 000004         4$:     MOV     #4,    R3       ;SET UP CHAR COUNTER
007110 016104 000002         5$:     MOV     2(R1), R4       ;SAVE AND CHECK CHAR PRESENT
007114 100375                        BPL     5$
007116 010405                        MOV     R4,    R5       ;DUP DATA
007120 000305                        SWAB    R5              ;LINE # IN LOW BYTE
007122 042705 177760                 BIC     #177760,R5      ;CLEAR ALL BUT LINE #
007126 006305                        ASL     R5              ;*2
007130 060205                        ADD     R2,    R5       ;MAKE POINTER TO CHAR TABLE
007132 105104                        COMB    R4              ;MAKE DATA INTO MASK
007134 042704 177400                 BIC     #177400,R4      ;CLEAR UPPER BYTE
007140 010425                        MOV     R4,    (R5)+    ;SAVE THE MASK
007142 010425                        MOV     R4,    (R5)+    ;SAVE THE MASK
007144 010425                        MOV     R4,    (R5)+    ;SAVE THE MASK
007146 010425                        MOV     R4,    (R5)+    ;SAVE THE MASK
007150 005303                        DEC     R3              ;COUNT TO 4
007152 001356                        BNE     5$
007154 062701 000010                 ADD     #10,   R1       ;ADDRESS POINTER TO NEXT DJ
007160 062702 000040                 ADD     #40,   R2       ;CHAR LEN TABLE POINTER
007164 005300                        DEC     R0              ;COUNT UNITS
007166 001346                        BNE     4$              ;BRANCH BACK IF MORE
```

```
                                ;*****************************************************************************
                                ;SELECT THE PROGRAM TO BE RUN
                                ;PROGRAM 1:     OFF-LINE EXERCISER
                                ;PROGRAM 2:     ON-LINE EXERCISER (TRANSMIT LAST CHARACTER RECEIVED)
                                ;PROGRAM 3:     ON-LINE ECHO EXERCISER
                                ;*****************************************************************************

007170  005737  000042       SELPRO: TST     @#42            ;CHECK FOR ACT 11 OR DDP
007174  001040                       BNE     ALL             ;BRANCH IF MONITOR
007176  000004  016613               TYPE,   MSGPRG
007202  004537  015030               JSR     R5,     READIN  ;READ A NUMBER FROM THE CTY
007206  007340                       .WORD   PROGNO
007210  001367                       BNE     SELPRO
007212  032777  000400  171770       BIT     #BIT8,  @SWR    ;CHECK FOR SW<8>, SELECT LINES
007220  001426                       BEQ     ALL             ;BRANCH IF NOT
007222  005000                       CLR     R0              ;SET UP UNIT COUNTER, DISPLAY
007224  012701  001220               MOV     #SVSW0,R1       ;SET UP SWITCH TABLE POINTER
007230  000004  016442       SWITCH: TYPE,   RETURN
007234  000004  016417               TYPE,   MNUM
007240  010005                       MOV     R0,TTY          ;PRINT THE NUMBER OF THE DR11C
007242  004737  015404               JSR     PC,PRINTS
007246  000004  016422               TYPE,   MSGSEL          ;ASL FOR THE SELECTED LINES
007252  004537  015030               JSR     R5,READIN
007256  001214                       .WORD   SAVIT
007260  013721  001214               MOV     SAVIT,(R1)+
007264  005200                       INC     R0              ;COUNT UNITS
007266  020037  001264               CMP     R0,     UNITS   ;CHECK FOR MORE UNITS
007272  001356                       BNE     SWITCH          ;BRANCH IF MORE
007274  000410                       BR      RESTAR          ;GO DO IT

007276  013700  001264       ALL:    MOV     UNITS,  R0      ;SET UP UNIT COUNTER
007302  012701  001220               MOV     #SVSW0,R1       ;SET UP SWITCH TABLE POINTER
007306  012721  177777       1$:     MOV     #177777,(R1)+   ;SET ALL LINES
007312  005300                       DEC     R0              ;COUNT UNITS
007314  001374                       BNE     1$              ;BRANCH IF MORE
                                .SBTTL          RESTART POINT

007316  013700  007340       RESTAR: MOV     PROGNO, R0
007322  001722                       BEQ     SELPRO
007324  022700  000003               CMP     #3,     R0
007330  103717                       BLO     SELPRO
007332  006300                       ASL     R0
007334  000170  007340               JMP     @PROGAD (R0)

007340                          PROGNO:
007340  000001                  PROGAD: 1                       ;DEFAULT TO PROGRAM 1
007342  007350                          PROG1
007344  012012                          PROG2
007346  013216                          PROG3
```

```
                        ;*****************************************************************************
                        ;PROGRAM 1:     TRANSMIT AND RECEIVE ALL LINES SIMULTANEOUSLY
                        ;               OFF-LINE:  SW<9> = 0
                        ;               ON-LINE:   SW<9> = 1
                        ;               USES THE DATA TABLE SELECTED BY SW<2:0>
                        ;               EACH LINE REPEATS THE PATTERN AT LEAST 16 TIMES
                        ;               PER PASS.
                        ;*****************************************************************************

007350  000005          PROG1:  RESET                   ;CLEAR OUT THE WORLD
007352  005037  001276          CLR     ISRFLG          ;CLEAR INTR. SVC. RTN. FLAG.                    ;;+F
007356  012706  001200          MOV     #STACK, SP      ;RESET THE STACK POINTER
007362  052737  000340  177776  BIS     #340,@#PS       ;PROCESSOR TO LEVEL 7
007370  012701  001312          MOV     #XMTTAB,R1      ;FIRST TABLE POINTER
007374  012702  002000          MOV     #2000,R2        ;LENGTH OF TABLES (WORDS)                       ;;+F
007400  005021          1$:     CLR     (R1)+           ;CLEAR THE TABLE
007402  005302                  DEC     R2
007404  001375                  BNE     1$
007406  012702  000400          MOV     #400,R2         ;LENGTH OF MASK/COUNT TABLE
007412  005201          2$:     INC     R1              ;SKIP MASK
007414  105021                  CLRB    (R1)+           ;CLEAR COUNT
007416  005302                  DEC     R2
007420  001374                  BNE     2$

                        ;ROUTINE TO INITIALIZE ALL DJ11'S AND THEIR ISR'S:
                        ;SET UP ALL INTERRUPT VECTORS
                        ;SET UP DEVICE ADDRESSES IN LINKER ROUTINES
                        ;SET CSR'S EVERYTHING ENABLED
                        ;SET TCR'S, ALL LINES ENABLED

007422  005000          P1INIT: CLR     R0
007424  013701  001266          MOV     DEVADR, R1
007430  013702  001270          MOV     VECADR, R2
007434  012703  010400          MOV     #RISR0, R3
007440  010322          11$:    MOV     R3,     (R2)+   ;SET UP RECEIVER INTERUPT VECTOR
007442  013722  001272          MOV     RCVLVL, (R2)+
007446  022323                  CMP     (R3)+,  (R3)+   ;ADD 4 TO R3
007450  010113                  MOV     R1,     (R3)    ;ADDRESS OF CSR
007452  062723  000002          ADD     #2,     (R3)+   ;ADDRESS OF RBUF
007456  005723                  TST     (R3)+
007460  010322                  MOV     R3,     (R2)+   ;SET UP TRANSMITTER INTERUPT VECTOR
007462  013722  0012~4          MOV     XMTLVL, (R2)+
007466  022323                  CMP     (R3)+,  (R3)+
007470  010123                  MOV     R1,     (R3)+   ;ADDRESS OF CSR
007472  005011                  CLR     (R1)            ;CLEAR CSR
007474  052711  050510          BIS     #50510, (R1)    ;SET UP CSR
                                                        ;BIT3 = CLEAR MOS
                                                        ;BIT6 = RECEIVER INTERUPT ENABLE
                                                        ;BIT8 = TRANSMITTER SCAN ENABLE
                                                        ;BIT12 = STATUS ENABLE
                                                        ;BIT14 = TRANSMITTER INTERUPT ENABLE
007500  032711  000020  13$:    BIT     #BIT4,  (R1)    ;CHECK FOR MOS TO CLEAR
007504  001375                  BNE     13$
007506  005737  001300          TST     ALMFLG          ;HAS THE SILO ALARM LEVEL BEEN CHECKED?
007512  001002                  BNE     10$             ;YES
```

```
                                                ;NO,GO DO IT
                                10$:    ASL     R0              ;UNIT # * 2
                                        MOV     SVSW0(R0),4(R1) ;SET TCR BITS (CSR + 4)
                                        ASR     R0              ;RESTORE UNIT COUNTER
                                        MOV     #1,     MARK    ;SET UP MARKER
                                        MOV     @SWR,   R5      ;GET SWITCH SETTINGS
                                        BIC     #177770,R5      ;MASK MESSAGE #
                                        ASL     R5
                                        ASL     R5
                                        MOV     (R3)+,  R4      ;SET UP OFFSET TO TABLES
                                14$:    BIT     MARK,   4(R1)   ;CHECK FOR LINE SELECTED IN TCR
                                        BEQ     15$
                                        MOV     ADRNIT(5),XMTTAB(4)
                                        MOV     ADRNIT(5),RCVTAB(4)
                                        MOVB    CNTNIT(5),XMTCNT(4)
                                        MOVB    CNTNIT(5),RCVCNT(4)
                                15$:    TST     (R4)+           ;INC OFFSET TO NEXT LINE
                                        ASL     MARK
                                        BCC     14$
                                        BIT     #BIT9,  @SWR    ;CHECK FOR ON-LINE
                                        BNE     21$             ;BRANCH IF ON-LINE
                                        BIS     #14,    (R1)    ;SET THE MAINTENANCE BIT AND CLR MOS
                                20$:    BIT     #BIT4,(R1)      ;WAIT FOR MOS TO CLEAR
                                        BNE     20$
                                        BIS     #1,(R1)         ;TURN ON RCV ENABLE
                                12$:    ADD     #10,R1          ;POINT TO THE NEXT CSR
                                        INC     R0
                                        CMP     R0,     UNITS
                                        BNE     11$
                                        MOV     #1,ALMFLG       ;SET THE ALARM LEVEL FLAG
                                        BIC     #140,   @#PS    ;LOWER PROCESSOR PRIORITY
                                        BR      FORGND          ;GO DO IT

                                21$:    BIS     #1,(R1)         ;TURN ON RCV EN
                                22$:    TST     2(R1)           ;CLEAR JUNK OUT OF THE RBUF
                                        BMI     22$
                                        BR      12$

                                ;*******************************************************************************
                                ;PROG1  BACKGROUND PROGRAM TO MONITOR TABLES
                                ;*******************************************************************************
                                ; NOTE - PROGRAM MAY HANG IN A LOOP.
                                ; IF THIS HAPPENS, RUN DZDJA.

                                FORGND: MOV     #XMTCNT,R1
                                        MOV     #400,R2
                                21$:    TSTB    (R1)            ;CHECK FOR COUNT TABLE CLR
                                        BNE     21$             ;BRANCH IF NOT
                                        ADD     #2,R1           ;GO TO NEXT LINE ENTRY
                                        DEC     R2              ;COUNT LINES
                                        BNE     21$             ;BRANCH IF MORE LINES
                                        MOV     #RCVCNT,R1
                                        MOV     #400,R2
                                22$:    CMPB    (R1),COUNT      ;IS # OF CHAR LEFT IN RBUF LESS THAN
                                                                ;THE SILO ALARM LEVEL
                                        BGT     22$             ;IF NO WAIT FOR THEM
```

```
880  007764  062701  000002                    ADD     #2,R1           ;IF YES IGNORE THEM
881  007770  005302                            DEC     R2              ;COUNT LINES
882  007772  001371                            BNE     22$             ;BRANCH IF MORE LINES
883  007774  005337  001216                    DEC     TIMES           ;DO THIS AGAIN?
884  010000  001402                            BEQ     23$             ;NO, GET OUT
885  010002  000137  007350                    'MP     PROG1
886  010006  005737  001276            23$:    ST      ISRFLG          ;SEE IF FLAG IS ZERO                    ;;+F
887  010012  001002                            BNE     1$              ;IF NOT, BR                             ;;+F
888  010014  000004  016366                    TYPE,   TRNERR          ;IF YES, RCV DATA ERROR                 ;;+F
889  010020  012737  000020  001216    1$:     MOV     #20,TIMES       ;DO IT 16 TIMES THE NEXT TIME
890  010026  000137  014550                    JMP     @#DONE          ;SKIP ISR'S
891  010032  012761  000001  000004    ALMCK:  MOV     #1,4(R1)        ;SET LINE 0 IN THE TCR
892  010040  052711  000004                    BIS     #BIT2, (R1)     ;SET THE MAINT BIT
893  010044  052711  000001                    BIS     #1,(R1)         ;SET RCV EN AFTER MAINTENANCE BIT
894  010050  005037  001306                    CLR     COUNT
895  010054  005037  001310                    CLR     SUM
896  010060  005037  001302                    CLR     TIMERA
897  010064  012737  000200  001304    2$:     MOV     #200,TIMERB     ;SET UP TIME CONSTANTS
898  010072  005711                            TST     (R1)            ;WAIT FOR TRANSFER READY BIT
899  010074  100373                            BPL     2$
900  010076  112761  000377  000006            MOVB    #377,6(R1)      ;OUTPUT A CHAR TO TBUF
901  010104  005237  001306                    INC     COUNT           ;COUNT EACH CHAR
902  010110  105711                    1$:     TSTB    (R1)            ;CHECK FOR DONE IN THE CSR
903  010112  100405                            BMI     3$              ;IF SET GET  OUT OF THE LOOP
904  010114  004537  010344                    JSR     R5,TIME         ;GIVE DONE TIME TO SET
905  010120  000773                            BR      1$              ;RETURN TO TEST FOR DONE AGAIN
906  010122  000760                            BR      2$              ;RETURN TO OUTPUT ANOTHER CHAR
907  010124  000742                            BR      ALMCK           ;ERROR RETURN TRY AGAIN
908  010126  042711  000001            3$:     BIC     #BIT0,(R1)      ;TURN OFF RCV ENABLE
909  010132  052711  000010                    BIS     #BIT3,(R1)      ;CLEAR MOS
910  010136  022737  000001  001306            CMP     #1,COUNT        ;IF SILO LEVEL SET FOR 1 THEN GET OUT
911  010144  001437                            BEQ     4$
912  010146  063737  001306  001310    5$:     ADD     COUNT,SUM       ;GET THE LARGEST MULTIPLE OF THE
913  010154  023727  001310  000106            CMP     SUM,#70.        ;SILO ALARM LEVEL AND USE IT IN THE
914  010162  002771                            BLT     5$              ;THREE SIZE LOCATIONS
915  010164  001403                            BEQ     6$              ;IF EQUAL USE IT
916  010166  163737  001306  001310            SUB     COUNT,SUM       ;IF GREATER SUBTRACT ONE COUNT OFF
917  010174  013737  001310  011244    6$:     MOV     SUM,CNTNIT+4    ;AS CLOSE TO 70 AS POSSIBLE
918  010202  013737  001310  011250            MOV     SUM,CNTNIT+10
919  010210  063737  001306  001310    7$:     ADD     COUNT,SUM       ;CONTINUE TO A COUNT OF 256
920  010216  023727  001310  000377            CMP     SUM,#377
921  010224  002771                            BLT     7$
922  010226  163737  001306  001310            SUB     COUNT,SUM
923  010234  013737  001310  011240    10$:    MOV     SUM,CNTNIT      ;AS CLOSE TO 256 AS POSSIBLE
924  010242  000411                            BR      11$             ;ALL SET GET OUT
925  010244  012737  000377  011240    4$:     MOV     #377,CNTNIT     ;PUT SIZE TO MAX VALUE
926  010252  012737  000106  011244            MOV     #70.,CNTNIT+4
927  010260  012737  000106  011250            MOV     #70.,CNTNIT+10
928  010266  042711  000004            11$:    BIC     #BIT2,(R1)      ;TURN OFF THE MAINT BIT
929  010272  032711  000020            12$:    BIT     #BIT4,(R1)      ;WAIT FOR MOS TO CLEAR
930  010276  001375                            BNE     12$
931  010300  004737  016316                    JSR     PC,KBDINT       ;GET THE SWITCH REGISTER
932  010304  032777  010000  170676            BIT     #SW12,@SWR      ;PRINT ALARM LEVEL?
933  010312  001413                            BEQ     13$             ;NO
934  010314  000004  016741                    TYPE,   MALARM
935  010320  010105                            MOV     R1,TTY          ;YES, PRINT CSR FIRST
```

```
                                        JSR     PC,PRINTR
                                        TYPE,   MSGDAS
                                        MOV     COUNT,TTY       ;PRINT ALARM LEVEL
                                        JSR     PC,PRINTR
                                13$:    RTS     PC


                                TIME:   INCB    TIMERA          ;INCREMENT THROUGH ONE WORD
                                        BNE     1$              ;GO TEST FOR DONE AGAIN
                                        DEC     TIMERB          ;MAKE TIMERB LARGER IF FAST PROCESSOR
                                        BNE     1$
                                        CMP     COUNT,#22       ;HAVE OUTPUTTED 18 TIMES
                                        BNE     2$              ;NO, GO OUTPUT ANOTHER CHAR
                                        HLT+1                   ;YES,DONE DID NOT SET AFTER 18 OUTPUTS
                                                                ;R1 = CSR
                                        TST     (R5)+           ;SET R5 FOR ERROR RETURN
                                2$:     TST     (R5)+           ;SET R5 FOR NEXT OUTPUT RETURN
                                1$:     RTS     R5              ;RETURN FROM ABOVE OR RETEST DONE

                                ;*****************************************************************************
                                ;PROG1  LINKERS TO DJ11 INTERRUPT SERVICE ROUTINES
                                ;*****************************************************************************

                                RISR0:  JSR     R0,RCVISR
                                        .WORD   <160012+<0*10>>,<40*0>
                                XISR0:  JSR     R0,XMTISR
                                        .WORD   <160010+<0*10>>,<40*0>
                                RISR1:  JSR     R0,RCVISR
                                        .WORD   <160012+<1*10>>,<40*1>
                                XISR1:  JSR     R0,XMTISR
                                        .WORD   <160010+<1*10>>,<40*1>
                                RISR2:  JSR     R0,RCVISR
                                        .WORD   <160012+<2*10>>,<40*2>
                                XISR2:  JSR     R0,XMTISR
                                        .WORD   <160010+<2*10>>,<40*2>
                                RISR3:  JSR     R0,RCVISR
                                        .WORD   <160012+<3*10>>,<40*3>
                                XISR3:  JSR     R0,XMTISR
                                        .WORD   <160010+<3*10>>,<40*3>
                                RISR4:  JSR     R0,RCVISR
                                        .WORD   <160012+<4*10>>,<40*4>
                                XISR4:  JSR     R0,XMTISR
                                        .WORD   <160010+<4*10>>,<40*4>
                                RISR5:  JSR     R0,RCVISR
                                        .WORD   <160012+<5*10>>,<40*5>
                                XISR5:  JSR     R0,XMTISR
                                        .WORD   <160010+<5*10>>,<40*5>
                                RISR6:  JSR     R0,RCVISR
                                        .WORD   <160012+<6*10>>,<40*6>
                                XISR6:  JSR     R0,XMTISR
                                        .WORD   <160010+<6*10>>,<40*6>
                                RISR7:  JSR     R0,RCVISR
                                        .WORD   <160012+<7*10>>,<40*7>
                                XISR7:  JSR     R0,XMTISR
                                        .WORD   <160010+<7*10>>,<40*7>
```

```
                                RISR10: JSR     R0,RCVISR
                                        .WORD   <160012+<10*10>>,<40*10>
                                XISR10: JSR     R0,XMTISR
                                        .WORD   <160010+<10*10>>,<40*10>
                                RISR11: JSR     R0,RCVISR
                                        .WORD   <160012+<11*10>>,<40*11>
                                XISR11: JSR     R0,XMTISR
                                        .WORD   <160010+<11*10>>,<40*11>
                                RISR12: JSR     R0,RCVISR
                                        .WORD   <160012+<12*10>>,<40*12>
                                XISR12: JSR     R0,XMTISR
                                        .WORD   <160010+<12*10>>,<40*12>
                                RISR13: JSR     R0,RCVISR
                                        .WORD   <160012+<13*10>>,<40*13>
                                XISR13: JSR     R0,XMTISR
                                        .WORD   <160010+<13*10>>,<40*13>
                                RISR14: JSR     R0,RCVISR
                                        .WORD   <160012+<14*10>>,<40*14>
                                XISR14: JSR     R0,XMTISR
                                        .WORD   <160010+<14*10>>,<40*14>
                                RISR15: JSR     R0,RCVISR
                                        .WORD   <160012+<15*10>>,<40*15>
                                XISR15: JSR     R0,XMTISR
                                        .WORD   <160010+<15*10>>,<40*15>
                                RISR16: JSR     R0,RCVISR
                                        .WORD   <160012+<16*10>>,<40*16>
                                XISR16: JSR     R0,XMTISR
                                        .WORD   <160010+<16*10>>,<40*16>
                                RISR17: JSR     R0,RCVISR
                                        .WORD   <160012+<17*10>>,<40*17>
                                XISR17: JSR     R0,XMTISR
                                        .WORD   <160010+<17*10>>,<40*17>

                                ;*****************************************************************************
                                ;PROG1  TRANSMITTER INTERRUPT SERVICE ROUTINE
                                ;*****************************************************************************

011000                          XMTISR:
011000  010146                         MOV     R1,-(6)         ;PUSH R1 ON STACK
011002  010246                         MOV     R2,-(6)         ;PUSH R2 ON STACK
011004  012001                         MOV     (R0)+,R1
011006  005711                 1$:     TST     (R1)            ;CHECK FOR TRANS READY
011010  100035                         BPL     4$
011012  116102  000007                 MOVB    7(R1),R2        ;GET LINE NO.
011016  006302                         ASL     R2
011020  061002                         ADD     (R0),R2
011022  105762  004312                 TSTB    XMTCNT(2)       ;TST FOR ZERO
011026  001410                         BEQ     2$
011030  117261  001312  000006         MOVB    @XMTTAB(2),6(1) ;SEND A CHARACTER
011036  105362  004312                 DECB    XMTCNT(2)       ;COUNT CHARACTERS
011042  005262  001312                 INC     XMTTAB(2)       ;UPDATE TABLE POINTER
011046  000757                         BR      1$
011050  010346                 2$:     MOV     R3,-(SP)
011052  005062  001312                 CLR     XMTTAB(2)       ;CLEAR TABLE POINTER
011056  161002                         SUB     (R0),R2
011060  006202                         ASR     R2
```

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1048  011062  005003                    CLR     R3
1049  011064  000261                    SEC
1050  011066  006103              3$:   ROL     R3
1051  011070  005302                    DEC     R2
1052  011072  100375                    BPL     3$
1053  011074  040361  000004            BIC     R3,4(R1)        ;CLEAR TCR BIT FOR LINE
1054  011100  012603                    MOV     (SP)+,R3        ;RESTORE R3
1055  011102  000741                    BR      1$
1056  011104                        4$:
1057  011104  012602                    MOV     (6)+,R2         ;POP STACK INTO R2
1058  011106  012601                    MOV     (6)+,R1         ;POP STACK INTO R1
1059  011110  012600                    MOV     (6)+,R0         ;POP STACK INTO R0
1060  011112  000002                    RTI
1061
1062                                  ;*****************************************************************************
1063                                  ;PROG1  RECEIVER INTERRUPT SERVICE ROUTINE
1064                                  ;*****************************************************************************
1065
1066  011114                          RCVISR:
1067  011114  010146                    MOV     R1,-(6)         ;PUSH R1 ON STACK
1068  011116  010246                    MOV     R2,-(6)         ;PUSH R2 ON STACK
1069  011120  010346                    MOV     R3,-(6)         ;PUSH R3 ON STACK
1070  011122  010446                    MOV     R4,-(6)         ;PUSH R4 ON STACK
1071  011124  012001                    MOV     (R0)+,R1        ;GET RBUF ADDRESS
1072  011126  011102              1$:   MOV     (R1),R2         ;READ THE DATA
1073  011130  100032                    BPL     7$              ;BRANCH IF NO CHAR PRESENT
1074  011132  032702  070000            BIT     #70000,R2       ;CHECK FOR ERRORS
1075  011136  001403                    BEQ     2$              ;BRANCH IF OK
1076  011140  104002                    HLT+2                   ;RECEIVER ERROR
1077                                                            ;R1=RBUF ADDRESS
1078                                                            ;R2=CONTENTS OF RBUF
1079                                                            ;BIT12=PARITY ERROR
1080                                                            ;BIT13=FRAMING ERROR
1081                                                            ;BIT14=UART OVERRUN
1082  011142  042702  070000            BIC     #70000, R2      ;CLEAR ERROR BITS FOR SPEED
1083  011146  010204              2$:   MOV     R2,     R4      ;DUP THE RBUF
1084  011150  105004                    CLRB    R4              ;CLEAR THE DATA
1085  011152  000304                    SWAB    R4              ;LINE # TO LOW BYTE
1086  011154  106304                    ASLB    R4              ;LINE # * 2, ALSO CLR CHAR PRESENT
1087  011156  061004                    ADD     (R0),R4         ;ADD OFFSET
1088  011160  117403  002312            MOVB    @RCVTAB(R4),R3  ;GET EXPECTED DATA
1089  011164  046403  005312            BIC     MASK(4),R3      ;MASK CHARACTER LENGTH
1090  011170  120302                    CMPB    R3,R2
1091  011172  001403                    BEQ     3$              ;BRANCH IF OK
1092  011174  042703  177400            BIC     #177400,R3      ;MAKE SURE UPPER BYTE CLEAR
1093  011200  104003                    HLT+3                   ;DATA ERROR
1094                                                            ;R1=RBUF ADDRESS
1095                                                            ;R2=CONTENTS OF RBUF(DATA)
1096                                                            ;R3=EXPECTED DATA
1097  011202  105364  004313      3$:   DECB    RCVCNT(4)
1098  011206  001403                    BEQ     7$
1099  011210  005264  002312            INC     RCVTAB(4)       ;UPDATE TABLE POINTER
1100  011214  000744                    BR      1$              ;CONTINUE
1101  011216                        7$:
1102  011216  012604                    MOV     (6)+,R4         ;POP STACK INTO R4
1103  011220  012603                    MOV     (6)+,R3         ;POP STACK INTO R3
```

```
1104  011222  012602                        MOV     (6)+,R2         ;POP STACK INTO R2
1105  011224  012601                        MOV     (6)+,R1         ;POP STACK INTO R1
1106  011226  012600                        MOV     (6)+,R0         ;POP STACK INTO R0
1107  011230  005237  001276                INC     ISRFLG          ;STEP INT SVC RTN FLAG                    ;;++F
1108  011234  000002                        RTI
1109
1110                                  ;*****************************************************************************
1111                                  ;PROG1  DATA TABLES
1112                                  ;*****************************************************************************
1113
1114  011236  011302                  ADRNIT: BINARY                  ;SW<2:0>=0 BINARY COUNT PATTERN
1115  011240  000377                  CNTNIT: 377                     ;SIZE=256.
1116  011242  011702                          PHRASE                  ;SW<2:0>=1 "THE QUICK SILVER GRAY FOX..."
1117  011244  000106                          70.                     ;SIZE=70.
1118  011246  011274                          SIXBIT                  ;SW<2:0>=2 040 THRU 137
1119  011250  000106                          70.                     ;SIZE=70.
1120  011252  016776                          END
1121  011254  000001                          1
1122  011256  017376                          END+400
1123  011260  000001                          1
1124  011262  017776                          END+1000
1125  011264  000001                          1
1126  011266  020376                          END+1400
1127  011270  000001                          1
1128  011272  020776                          END+2000
1129  011274  005015  177777  177777  SIXBIT: .ASCII  <15><12><377><377><377><377>    ;CR-LF, FILLERS
1130  011302     040                  BINARY: .BYTE   40
1131  011303     041                          .BYTE   41
1132  011304     042                          .BYTE   42
1133  011305     043                          .BYTE   43
1134  011306     044                          .BYTE   44
1135  011307     045                          .BYTE   45
1136  011310     046                          .BYTE   46
1137  011311     047                          .BYTE   47
1138  011312     050                          .BYTE   50
1139  011313     051                          .BYTE   51
1140  011314     052                          .BYTE   52
1141  011315     053                          .BYTE   53
1142  011316     054                          .BYTE   54
1143  011317     055                          .BYTE   55
1144  011320     056                          .BYTE   56
1145  011321     057                          .BYTE   57
1146  011322     060                          .BYTE   60
1147  011323     061                          .BYTE   61
1148  011324     062                          .BYTE   62
1149  011325     063                          .BYTE   63
1150  011326     064                          .BYTE   64
1151  011327     065                          .BYTE   65
1152  011330     066                          .BYTE   66
1153  011331     067                          .BYTE   67
1154  011332     070                          .BYTE   70
1155  011333     071                          .BYTE   71
1156  011334     072                          .BYTE   72
1157  011335     073                          .BYTE   73
1158  011336     074                          .BYTE   74
1159  011337     075                          .BYTE   75
```

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1160  011340  076                     .BYTE   76
1161  011341  077                     .BYTE   77
1162  011342  100                     .BYTE   100
1163  011343  101                     .BYTE   101
1164  011344  102                     .BYTE   102
1165  011345  103                     .BYTE   103
1166  011346  104                     .BYTE   104
1167  011347  105                     .BYTE   105
1168  011350  106                     .BYTE   106
1169  011351  107                     .BYTE   107
1170  011352  110                     .BYTE   110
1171  011353  111                     .BYTE   111
1172  011354  112                     .BYTE   112
1173  011355  113                     .BYTE   113
1174  011356  114                     .BYTE   114
1175  011357  115                     .BYTE   115
1176  011360  116                     .BYTE   116
1177  011361  117                     .BYTE   117
1178  011362  120                     .BYTE   120
1179  011363  121                     .BYTE   121
1180  011364  122                     .BYTE   122
1181  011365  123                     .BYTE   123
1182  011366  124                     .BYTE   124
1183  011367  125                     .BYTE   125
1184  011370  126                     .BYTE   126
1185  011371  127                     .BYTE   127
1186  011372  130                     .BYTE   130
1187  011373  131                     .BYTE   131
1188  011374  132                     .BYTE   132
1189  011375  133                     .BYTE   133
1190  011376  134                     .BYTE   134
1191  011377  135                     .BYTE   135
1192  011400  136                     .BYTE   136
1193  011401  137                     .BYTE   137
1194  011402  140                     .BYTE   140
1195  011403  141                     .BYTE   141
1196  011404  142                     .BYTE   142
1197  011405  143                     .BYTE   143
1198  011406  144                     .BYTE   144
1199  011407  145                     .BYTE   145
1200  011410  146                     .BYTE   146
1201  011411  147                     .BYTE   147
1202  011412  150                     .BYTE   150
1203  011413  151                     .BYTE   151
1204  011414  152                     .BYTE   152
1205  011415  153                     .BYTE   153
1206  011416  154                     .BYTE   154
1207  011417  155                     .BYTE   155
1208  011420  156                     .BYTE   156
1209  011421  157                     .BYTE   157
1210  011422  160                     .BYTE   160
1211  011423  161                     .BYTE   161
1212  011424  162                     .BYTE   162
1213  011425  163                     .BYTE   163
1214  011426  164                     .BYTE   164
1215  011427  165                     .BYTE   165
```

```
1216  011430  166                    .BYTE   166
1217  011431  167                    .BYTE   167
1218  011432  170                    .BYTE   170
1219  011433  171                    .BYTE   171
1220  011434  172                    .BYTE   172
1221  011435  173                    .BYTE   173
1222  011436  174                    .BYTE   174
1223  011437  175                    .BYTE   175
1224  011440  176                    .BYTE   176
1225  011441  177                    .BYTE   177
1226  011442  200                    .BYTE   200
1227  011443  201                    .BYTE   201
1228  011444  202                    .BYTE   202
1229  011445  203                    .BYTE   203
1230  011446  204                    .BYTE   204
1231  011447  205                    .BYTE   205
1232  011450  206                    .BYTE   206
1233  011451  207                    .BYTE   207
1234  011452  210                    .BYTE   210
1235  011453  211                    .BYTE   211
1236  011454  212                    .BYTE   212
1237  011455  213                    .BYTE   213
1238  011456  214                    .BYTE   214
1239  011457  215                    .BYTE   215
1240  011460  216                    .BYTE   216
1241  011461  217                    .BYTE   217
1242  011462  220                    .BYTE   220
1243  011463  221                    .BYTE   221
1244  011464  222                    .BYTE   222
1245  011465  223                    .BYTE   223
1246  011466  224                    .BYTE   224
1247  011467  225                    .BYTE   225
1248  011470  226                    .BYTE   226
1249  011471  227                    .BYTE   227
1250  011472  230                    .BYTE   230
1251  011473  231                    .BYTE   231
1252  011474  232                    .BYTE   232
1253  011475  233                    .BYTE   233
1254  011476  234                    .BYTE   234
1255  011477  235                    .BYTE   235
1256  011500  236                    .BYTE   236
1257  011501  237                    .BYTE   237
1258  011502  240                    .BYTE   240
1259  011503  241                    .BYTE   241
1260  011504  242                    .BYTE   242
1261  011505  243                    .BYTE   243
1262  011506  244                    .BYTE   244
1263  011507  245                    .BYTE   245
1264  011510  246                    .BYTE   246
1265  011511  247                    .BYTE   247
1266  011512  250                    .BYTE   250
1267  011513  251                    .BYTE   251
1268  011514  252                    .BYTE   252
1269  011515  253                    .BYTE   253
1270  011516  254                    .BYTE   254
1271  011517  255                    .BYTE   255
```

```
 1272  011520      256                    .BYTE   256
 1273  011521      257                    .BYTE   257
 1274  011522      260                    .BYTE   260
 1275  011523      261                    .BYTE   261
 1276  011524      262                    .BYTE   262
 1277  011525      263                    .BYTE   263
 1278  011526      264                    .BYTE   264
 1279  011527      265                    .BYTE   265
 1280  011530      266                    .BYTE   266
 1281  011531      267                    .BYTE   267
 1282  011532      270                    .BYTE   270
 1283  011533      271                    .BYTE   271
 1284  011534      272                    .BYTE   272
 1285  011535      273                    .BYTE   273
 1286  011536      274                    .BYTE   274
 1287  011537      275                    .BYTE   275
 1288  011540      276                    .BYTE   276
 1289  011541      277                    .BYTE   277
 1290  011542      300                    .BYTE   300
 1291  011543      301                    .BYTE   301
 1292  011544      302                    .BYTE   302
 1293  011545      303                    .BYTE   303
 1294  011546      304                    .BYTE   304
 1295  011547      305                    .BYTE   305
 1296  011550      306                    .BYTE   306
 1297  011551      307                    .BYTE   307
 1298  011552      310                    .BYTE   310
 1299  011553      311                    .BYTE   311
 1300  011554      312                    .BYTE   312
 1301  011555      313                    .BYTE   313
 1302  011556      314                    .BYTE   314
 1303  011557      315                    .BYTE   315
 1304  011560      316                    .BYTE   316
 1305  011561      317                    .BYTE   317
 1306  011562      320                    .BYTE   320
 1307  011563      321                    .BYTE   321
 1308  011564      322                    .BYTE   322
 1309  011565      323                    .BYTE   323
 1310  011566      324                    .BYTE   324
 1311  011567      325                    .BYTE   325
 1312  011570      326                    .BYTE   326
 1313  011571      327                    .BYTE   327
 1314  011572      330                    .BYTE   330
 1315  011573      331                    .BYTE   331
 1316  011574      332                    .BYTE   332
 1317  011575      333                    .BYTE   333
 1318  011576      334                    .BYTE   334
 1319  011577      335                    .BYTE   335
 1320  011600      336                    .BYTE   336
 1321  011601      337                    .BYTE   337
 1322  011602      340                    .BYTE   340
 1323  011603      341                    .BYTE   341
 1324  011604      342                    .BYTE   342
 1325  011605      343                    .BYTE   343
 1326  011606      344                    .BYTE   344
 1327  011607      345                    .BYTE   345
```

```
 1328  011610  346                    .BYTE   346
 1329  011611  347                    .BYTE   347
 1330  011612  350                    .BYTE   350
 1331  011613  351                    .BYTE   351
 1332  011614  352                    .BYTE   352
 1333  011615  353                    .BYTE   353
 1334  011616  354                    .BYTE   354
 1335  011617  355                    .BYTE   355
 1336  011620  356                    .BYTE   356
 1337  011621  357                    .BYTE   357
 1338  011622  360                    .BYTE   360
 1339  011623  361                    .BYTE   361
 1340  011624  362                    .BYTE   362
 1341  011625  363                    .BYTE   363
 1342  011626  364                    .BYTE   364
 1343  011627  365                    .BYTE   365
 1344  011630  366                    .BYTE   366
 1345  011631  367                    .BYTE   367
 1346  011632  370                    .BYTE   370
 1347  011633  371                    .BYTE   371
 1348  011634  372                    .BYTE   372
 1349  011635  373                    .BYTE   373
 1350  011636  374                    .BYTE   374
 1351  011637  375                    .BYTE   375
 1352  011640  376                    .BYTE   376
 1353  011641  377                    .BYTE   377
 1354  011642  000                    .BYTE   0
 1355  011643  001                    .BYTE   1
 1356  011644  002                    .BYTE   2
 1357  011645  003                    .BYTE   3
 1358  011646  004                    .BYTE   4
 1359  011647  005                    .BYTE   5
 1360  011650  006                    .BYTE   6
 1361  011651  007                    .BYTE   7
 1362  011652  010                    .BYTE   10
 1363  011653  011                    .BYTE   11
 1364  011654  012                    .BYTE   12
 1365  011655  013                    .BYTE   13
 1366  011656  014                    .BYTE   14
 1367  011657  015                    .BYTE   15
 1368  011660  016                    .BYTE   16
 1369  011661  017                    .BYTE   17
 1370  011662  020                    .BYTE   20
 1371  011663  021                    .BYTE   21
 1372  011664  022                    .BYTE   22
 1373  011665  023                    .BYTE   23
 1374  011666  024                    .BYTE   24
 1375  011667  025                    .BYTE   25
 1376  011670  026                    .BYTE   26
 1377  011671  027                    .BYTE   27
 1378  011672  030                    .BYTE   30
 1379  011673  031                    .BYTE   31
 1380  011674  032                    .BYTE   32
 1381  011675  033                    .BYTE   33
 1382  011676  034                    .BYTE   34
 1383  011677  035                    .BYTE   35
```

```
1384  011700  036                                .BYTE   36
1385  011701  037                                .BYTE   37
1386
1387  011702  005015  177777  177777  PHRASE:   .ASCII  <15><12><377><377><377><377>
1388  011710  044124  020105  052521            .ASCIZ  "THE QUICK SILVER GRAY FOX JUMPED OVER 9,876,543,210.0 LAZY DOGS!"
1389  011716  041511  020113  044523
1390  011724  053114  051105  043440
1391  011732  040522  020131  047506
1392  011740  020130  052512  050115
1393  011746  042105  047440  042526
1394  011754  020122  026071  033470
1395  011762  026066  032065  026063
1396  011770  030462  027060  020060
1397  011776  040514  054532  042040
1398  012004  043517  020523     000
1399          012012                .EVEN
```

```
                        ;*****************************************************************************
                        ;PROGRAM 2:     ON-LINE MULTI-ECHO EXERCISER
                        ;               TRANSMITS THE LAST CHARACTER RECEIVED ON ITS RESPECTIVE
                        ;               LINE.  A CARRIAGE RETURN AND LINE FEED ARE INSERTED
                        ;               EVERY 72 CHARACTERS.
                        ;*****************************************************************************

012012  000005          PROG2:  RESET                   ;CLEAR OUT THE WORLD
012014  012706  001200          MOV     #STACK, SP      ;RESET THE STACK POINTER
012020  052737  000340  177776  BIS     #340,   @#PS    ;PROCESSOR TO LEVEL 7
012026  012701  001312          MOV     #XMTTAB,R1      ;FIRST TABLE POINTER
012032  012702  002000          MOV     #2000,  R2      ;LENGTH OF TABLES (WORDS)                ;;++F
012036  005021          1$:     CLR     (R1)+           ;CLEAR THE TABLE
012040  005302                  DEC     R2
012042  001375                  BNE     1$
012044  012702  000400          MOV     #400,R2         ;LENGTH OF MASK/COUNT TABLE
012050  005201          2$:     INC     R1              ;SKIP MASK
012052  105021                  CLRB    (R1)+           ;CLEAR COUNT
012054  005302                  DEC     R2
012056  001374                  BNE     2$

                        ;ROUTINE TO INITIALIZE ALL DJ11'S AND THEIR ISR'S:
                        ;SET UP ALL INTERRUPT VECTORS
                        ;SET UP DEVICE ADDRESSES IN LINKER ROUTINES
                        ;SET CSR'S EVERYTHING ENABLED
                        ;SET TCR'S, ALL LINES ENABLED

012060  005000          P2INIT: CLR     R0
012062  013701  001266          MOV     DEVADR, R1
012066  013702  001270          MOV     VECADR, R2
012072  012703  012250          MOV     #R2SR0,R3
012076  010322          1$:     MOV     R3,     (R2)+   ;SET UP POINTER TO LINKERS
012100  013722  001272          MOV     RCVLVL, (R2)+   ;SET UP RECEIVER INTERUPT VECTOR
012104  022323                  CMP     (R3)+,  (R3)+
012106  010113                  MOV     R1,     (R3)    ;ADD 4 TO R3
012110  062723  000002          ADD     #2,     (R3)+   ;ADDRESS OF CSR
012114  005723                  TST     (R3)+           ;ADDRESS OF RBUF
012116  010322                  MOV     R3,     (R2)+
012120  013722  001274          MOV     XMTLVL, (R2)+   ;SET UP TRANSMITTER INTERUPT VECTOR
012124  022323                  CMP     (R3)+,  (R3)+
012126  010123                  MOV     R1,     (R3)+   ;ADDRESS OF CSR
012130  012721  050501          MOV     #50501, (R1)+   ;SET UP CSR
                                                        ;BIT0 = RECEIVER ENABLE
                                                        ;BIT6 = RECEIVER INTERUPT ENABLE
                                                        ;BIT8 = TRANSMITTER SCAN ENABLE
                                                        ;BIT12 = STATUS ENABLE
                                                        ;BIT14 = TRANSMITTER INTERUPT ENABLE
012134  005721                  TST     (R1)+
012136  006300                  ASL     R0              ;UNIT # * 2
012140  016011  001220          MOV     SVSW0(R0),(R1)  ;SET TCR BITS FOR SELECTED LINES
012144  006200                  ASR     R0              ;RESET UNIT COUNTER
012146  012737  000001  001260  MOV     #1,     MARK    ;SET UP MARKER
012154  012304                  MOV     (R3)+,  R4      ;SET UP OFFSET TO TABLES
012156  033711  001260  4$:     BIT     MARK,   (R1)    ;CHECK FOR LINE SELECTED
012162  001406                  BEQ     5$
```

```
1456  012164  012764  016647  001312          MOV     #M3GP2, XMTTAB(4) ;SET UP XMTR TABLE
1457  012172  012764  000045  004312          MOV     #45.    XMTCNT(4) ;SET UP COUNT
1458  012200  005724                  5$:     TST     (R4)+             ;INC OFFSET TO NEXT LINE
1459  012202  006337  001260                  ASL     MARK
1460  012206  103363                          BCC     4$
1461  012210  022121                          CMP     (R1)+,  (R1)+     ;ADD 4
1462  012212  005200                          INC     R0
1463  012214  020037  001264                  CMP     R0,     UNITS
1464  012220  001326                          BNE     1$
1465  012222  042737  000140  177776          BIC     #140,   @#PS      ;LOWER PROCESSOR PRIORITY
1466
1467                                  ;*****************************************************************************
1468                                  ;PROG2  FOREGROUND PROGRAM TO READ/WRITE MEMORY
1469                                  ;*****************************************************************************
1470
1471  012230  012700  020000          FORP2:  MOV     #20000,R0         ;TOP OF 4K BANK OF MEMORY
1472  012234  000241                          CLC
1473  012236  005540                  1$:     ADC     -(R0)             ;FAST READ/WRITE TO MEMORY
1474  012240  001376                          BNE     1$                ;RAPID REPEAT
1475  012242  005700                          TST     R0                ;CHECK FOR LOC 0
1476  012244  001374                          BNE     1$                ;BRANCH IF MORE MEMORY
1477  012246  000770                          BR      FORP2             ;LOOP FOR EVER!
1478
1479                                  ;*****************************************************************************
1480                                  ;PROG2 LINKERS TO DJ11 INTERRUPT SERVICE ROUTINES
1481                                  ;*****************************************************************************
1482
1483  012250  004037  013042          R2SR0:  JSR     R0,P2RISR
1484  012254  160012  000000                  .WORD   <160012+<0*10>>,<0*40>
1485  012260  004037  012650          X2SR0:  JSR     R0,P2XISR
1486  012264  160020  000000                  .WORD   <160020+<0*10>>,<0*40>
1487  012270  004037  013042          R2SR1:  JSR     R0,P2RISR
1488  012274  160022  000040                  .WORD   <160012+<1*10>>,<1*40>
1489  012300  004037  012650          X2SR1:  JSR     R0,P2XISR
1490  012304  160030  000040                  .WORD   <160020+<1*10>>,<1*40>
1491  012310  004037  013042          R2SR2:  JSR     R0,P2RISR
1492  012314  160032  000100                  .WORD   <160012+<2*10>>,<2*40>
1493  012320  004037  012650          X2SR2:  JSR     R0,P2XISR
1494  012324  160040  000100                  .WORD   <160020+<2*10>>,<2*40>
1495  012330  004037  013042          R2SR3:  JSR     R0,P2RISR
1496  012334  160042  000140                  .WORD   <160012+<3*10>>,<3*40>
1497  012340  004037  012650          X2SR3:  JSR     R0,P2XISR
1498  012344  160050  000140                  .WORD   <160020+<3*10>>,<3*40>
1499  012350  004037  013042          R2SR4:  JSR     R0,P2RISR
1500  012354  160052  000200                  .WORD   <160012+<4*10>>,<4*40>
1501  012360  004037  012650          X2SR4:  JSR     R0,P2XISR
1502  012364  160060  000200                  .WORD   <160020+<4*10>>,<4*40>
1503  012370  004037  013042          R2SR5:  JSR     R0,P2RISR
1504  012374  160062  000240                  .WORD   <160012+<5*10>>,<5*40>
1505  012400  004037  012650          X2SR5:  JSR     R0,P2XISR
1506  012404  160070  000240                  .WORD   <160020+<5*10>>,<5*40>
1507  012410  004037  013042          R2SR6:  JSR     R0,P2RISR
1508  012414  160072  000300                  .WORD   <160012+<6*10>>,<6*40>
1509  012420  004037  012650          X2SR6:  JSR     R0,P2XISR
1510  012424  160100  000300                  .WORD   <160020+<6*10>>,<6*40>
1511  012430  004037  013042          R2SR7:  JSR     R0,P2RISR
```

```
1512  012434  160102  000340                .WORD   <160012+<7*10>>,<7*40>
1513  012440  004037  012650        X2SR7:  JSR     R0,P2XISR
1514  012444  160110  000340                .WORD   <160020+<7*10>>,<7*40>
1515  012450  004037  013042        R2SR10: JSR     R0,P2RISR
1516  012454  160112  000400                .WORD   <160012+<10*10>>,<10*40>
1517  012460  004037  012650        X2SR10: JSR     R0,P2XISR
1518  012464  160120  000400                .WORD   <160020+<10*10>>,<10*40>
1519  012470  004037  013042        R2SR11: JSR     R0,P2RISR
1520  012474  160122  000440                .WORD   <160012+<11*10>>,<11*40>
1521  012500  004037  012650        X2SR11: JSR     R0,P2XISR
1522  012504  160130  000440                .WORD   <160020+<11*10>>,<11*40>
1523  012510  004037  013042        R2SR12: JSR     R0,P2RISR
1524  012514  160132  000500                .WORD   <160012+<12*10>>,<12*40>
1525  012520  004037  012650        X2SR12: JSR     R0,P2XISR
1526  012524  160140  000500                .WORD   <160020+<12*10>>,<12*40>
1527  012530  004037  013042        R2SR13: JSR     R0,P2RISR
1528  012534  160142  000540                .WORD   <160012+<13*10>>,<13*40>
1529  012540  004037  012650        X2SR13: JSR     R0,P2XISR
1530  012544  160150  000540                .WORD   <160020+<13*10>>,<13*40>
1531  012550  004037  013042        R2SR14: JSR     R0,P2RISR
1532  012554  160152  000600                .WORD   <160012+<14*10>>,<14*40>
1533  012560  004037  012650        X2SR14: JSR     R0,P2XISR
1534  012564  160160  000600                .WORD   <160020+<14*10>>,<14*40>
1535  012570  004037  013042        R2SR15: JSR     R0,P2RISR
1536  012574  160162  000640                .WORD   <160012+<15*10>>,<15*40>
1537  012600  004037  012650        X2SR15: JSR     R0,P2XISR
1538  012604  160170  000640                .WORD   <160020+<15*10>>,<15*40>
1539  012610  004037  013042        R2SR16: JSR     R0,P2RISR
1540  012614  160172  000700                .WORD   <160012+<16*10>>,<16*40>
1541  012620  004037  012650        X2SR16: JSR     R0,P2XISR
1542  012624  160200  000700                .WORD   <160020+<16*10>>,<16*40>
1543  012630  004037  013042        R2SR17: JSR     R0,P2RISR
1544  012634  160202  000740                .WORD   <160012+<17*10>>,<17*40>
1545  012640  004037  012650        X2SR17: JSR     R0,P2XISR
1546  012644  160210  000740                .WORD   <160020+<17*10>>,<17*40>
1547
1548                                ;*****************************************************************************
1549                                ;PROG2  TRANSMITTER INTERRUPT SERVICE ROUTINE
1550                                ;*****************************************************************************
1551
1552  012650                        P2XISR:
1553  012650  010146                       MOV     R1,-(6)         ;PUSH R1 ON STACK
1554  012652  010246                       MOV     R2,-(6)         ;PUSH R2 ON STACK
1555  012654  012001                       MOV     (R0)+,R1
1556  012656  005711                1$:    TST     (R1)            ;CHECK FOR TRANS READY
1557  012660  100064                       BPL     4$
1558  012662  116102  000007              MOVB    7(R1),R2        ;GET LINE NO.
1559  012666  006302                       ASL     R2
1560  012670  061002                       ADD     (R0),R2
1561  012672  105762  004312              TSTB    XMTCNT(2)       ;TST FOR ZERO
1562  012676  001413                       BEQ     2$              ;GET OUT
1563  012700  117261  001312  000006      MOVB    @XMTTAB(2),6(R1);SEND A CHARACTER
1564  012706  105362  004312              DECB    XMTCNT(2)       ;COUNT CHARACTERS
1565  012712  105762  005313              TSTB    CNTTAB(2)       ;CHECK FOR MESSAGE OR DATA
1566  012716  001357                       BNE     1$              ;BRANCH IF DATA
1567  012720  005262  001312              INC     XMTTAB(2)       ;UPDATE TABLE POINTER
```

```
1568  012724  000754                        BR      1$
1569  012726  105162  005313          2$:   COMB    CNTTAB(2)           ;CHANGE FLAG
1570  012732  001430                        BEQ     3$                  ;BRANCH IF WAS DATA
1571  012734  012762  002312  001312        MOV     #RCVTAB,XMTTAB(2)   ;SET UP POINTER TO RECEIVER TABLE
1572  012742  060262  001312                ADD     R2,     XMTTAB(2)   ;ADD OFFSET
1573  012746  112762  000110  004312        MOVB    #72.,   XMTCNT(2)   ;COUNT 72. CHARACTERS TO THE LINE
1574  012754  105762  002312                TSTB    RCVTAB(2)           ;CHECK FOR A BREAK
1575  012760  001336                        BNE     1$                  ;BRANCH IF REAL DATA
1576  012762  161002                        SUB     (R0),   R2          ;RECOVER LINE NUMBER
1577  012764  006202                        ASR     R2
1578  012766  005037  001260                CLR     MARK                ;SET UP MARKER
1579  012772  000261                        SEC
1580  012774  006137  001260          5$:   ROL     MARK                ;MOVE MARKER
1581  013000  005302                        DEC     R2                  ;COUNT LINES
1582  013002  100374                        BPL     5$                  ;BRANCH IF MORE
1583  013004  043761  001260  000004        BIC     MARK,   4(R1)       ;CLEAR TCR BIT
1584  013012  000721                        BR      1$                  ;CONTINUE
1585  013014  012762  016442  001312  3$:   MOV     #RETURN,XMTTAB(2)   ;TYPE CARRIAGE RETURN, LINE FEED
1586  013022  112762  000002  004312        MOVB    #2.,    XMTCNT(2)   ;COUNTER OF 2 CHARACTERS
1587  013030  000712                        BR      1$
1588  013032                          4$:
1589  013032  012602                        MOV     (6)+,R2             ;POP STACK INTO R2
1590  013034  012601                        MOV     (6)+,R1             ;POP STACK INTO R1
1591  013036  012600                        MOV     (6)+,R0             ;POP STACK INTO R0
1592  013040  000002                        RTI
1593
1594                          ;*****************************************************************************
1595                          ;PROG2  RECEIVER INTERRUPT SERVICE ROUTINE
1596                          ;*****************************************************************************
1597
1598  013042                  P2RISR:
1599  013042  010146                  MOV     R1,-(6)             ;PUSH R1 ON STACK
1600  013044  010246                  MOV     R2,-(6)             ;PUSH R2 ON STACK
1601  013046  010346                  MOV     R3,-(6)             ;PUSH R3 ON STACK
1602  013050  012001                  MOV     (R0)+,R1            ;GET RBUF ADDRESS
1603  013052  011102            1$:   MOV     (R1),R2             ;READ THE DATA
1604  013054  100053                  BPL     7$                  ;BRANCH IF NO CHAR PRESENT
1605  013056  032702  070000          BIT     #70000,R2           ;CHECK FOR ERRORS
1606  013062  001402                  BEQ     2$                  ;BRANCH IF OK
1607  013064  104002                  HLT+2                       ;RECEIVER ERROR
1608                                                              ;R1=RBUF ADDRESS
1609                                                              ;R2=CONTENTS OF RBUF
1610                                                              ;BIT12=PARITY ERROR
1611                                                              ;BIT13=FRAMING ERROR
1612                                                              ;BIT14=UART OVERRUN
1613  013066  000771                  BR      1$                  ;FORGET THE DATA
1614
1615  013070  010203            2$:   MOV     R2,     R3          ;DUP THE RBUF
1616  013072  105003                  CLRB    R3                  ;CLEAR THE DATA
1617  013074  000303                  SWAB    R3                  ;LINE # TO LOW BYTE
1618  013076  106303                  ASLB    R3                  ;LINE # * 2. ALSO CLR CHAR PRESENT
1619  013100  061003                  ADD     (R0),R3             ;ADD OFFSET
1620  013102  136302  005312          BITB    MASK(3),R2          ;CHECK CHARACTER LENGTH
1621  013106  001401                  BEQ     3$                  ;BRANCH IF OK
1622  013110  104002                  HLT+2                       ;CHARACTER LENGTH ERROR
1623                                                              ;R1=RBUF ADDRESS
```

```
1624
1625  013112  105763  002312          3$:   TSTB    RCVTAB(3)          ;R2=CONTENTS OF RBUF(DATA)
1626  013116  001017                        BNE     5$                 ;CHECK FOR BREAK
1627  013120  110263  002312                MOVB    R2,     RCVTAB(3)  ;BRANCH IF REAL DATA
1628  013124  161003                        SUB     (R0),   R3         ;SAVE THE DATA
1629  013126  006203                        ASR     R3                 ;RECOVER LINE NUMBER
1630  013130  005037  001260                CLR     MARK               ;SET UP MARKER
1631  013134  000261                        SEC
1632  013136  006137  001260          4$:   ROL     MARK               ;UPDATE MARKER
1633  013142  005303                        DEC     R3                 ;COUNT LINES
1634  013144  100374                        BPL     4$                 ;BRANCH IF MORE
1635  013146  053761  001260  000002        BIS     MARK,   2(R1)      ;SET TCR BIT
1636  013154  000736                        BR      1$                 ;CONTINUE
1637
1638  013156  110263  002312          5$:   MOVB    R2,     RCVTAB(3)  ;SAVE THE DATA
1639  013162  105163  005313                COMB    CNTTAB(3)          ;SET MESSAGE FLAG
1640  013166  012763  016442  001312        MOV     #RETURN,XMTTAB(3)  ;TYPE CARRIAGE RETURN, LINE FEED
1641  013174  112763  000002  004312        MOVB    #2,     XMTCNT(3)  ;MESSAGE LENGTH
1642  013202  000723                        BR      1$
1643  013204                          7$:
1644  013204  012603                        MOV     (6)+,R3            ;POP STACK INTO R3
1645  013206  012602                        MOV     (6)+,R2            ;POP STACK INTO R2
1646  013210  012601                        MOV     (6)+,R1            ;POP STACK INTO R1
1647  013212  012600                        MOV     (6)+,R0            ;POP STACK INTO R0
1648  013214  000002                        RTI
```

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                        ;*****************************************************************************
                        ;PROGRAM 3:     ECHO EXERCISER
                        ;*****************************************************************************

013216  000005          PROG3:  RESET                   ;CLEAR OUT THE WORLD
013220  012706  001200          MOV     #STACK, SP      ;RESET THE STACK POINTER
013224  052737  000340  177776  BIS     #340,   @#PS    ;PROCESSOR TO LEVEL 7
013232  012701  001312          MOV     #XMTTAB,R1      ;FIRST TABLE POINTER
013236  012702  002000          MOV     #2000.  R2      ;LENGTH OF TABLES (WORDS)
013242  005021                  1$:     CLR     (R1)+   ;CLEAR THE TABLE
013244  005302                  DEC     R2
013246  001375                  BNE     1$
013250  012702  000400          MOV     #400,R2         ;LENGTH OF MASK/COUNT TABLE
013254  005201                  2$:     INC     R1      ;SKIP MASK
013256  105021                  CLRB    (R1)+           ;CLEAR COUNT
013260  005302                  DEC     R2
013262  001374                  BNE     2$
013264  012705  016776          MOV     #END,   R5      ;SET UP BUFFER POINTER                  ;;++F

                        ;ROUTINE TO INITIALIZE ALL DJ11'S AND THEIR ISR'S:
                        ;SET UP ALL INTERRUPT VECTORS
                        ;SET UP DEVICE ADDRESSES IN LINKER ROUTINES
                        ;SET CSR'S EVERYTHING ENABLED
                        ;SET TCR'S, ALL LINES ENABLED

013270  005000          P3INIT: CLR     R0
013272  013701  001266          MOV     DEVADR, R1
013276  013702  001270          MOV     VECADR, R2
013302  012703  013570          MOV     #R3SR0,R3       ;SET UP POINTER TO LINKERS
013306  010322                  1$:     MOV     R3,     (R2)+   ;SET UP RECEIVER INTERUPT VECTOR
013310  013722  001272          MOV     RCVLVL, (R2)+
013314  022323                  CMP     (R3)+,  (R3)+   ;ADD 4 TO R3
013316  010113                  MOV     R1,     (R3)    ;ADDRESS OF CSR
013320  062723  000002          ADD     #2,     (R3)+   ;ADDRESS OF RBUF
013324  005723                  TST     (R3)+
013326  010322                  MOV     R3,     (R2)+   ;SET UP TRANSMITTER INTERUPT VECTOR
013330  013722  001274          MOV     XMTLVL, (R2)+
013334  022323                  CMP     (R3)+,  (R3)+
013336  010123                  MOV     R1,     (R3)+   ;ADDRESS OF CSR
013340  012721  050400          MOV     #50400, (R1)+   ;SET UP CSR, TRANSMITTER ONLY
                                                        ;BIT8 = TRANSMITTER SCAN ENABLE
                                                        ;BIT12 = STATUS ENABLE
                                                        ;BIT14 = TRANSMITTER INTERUPT ENABLE
013344  005721                  TST     (R1)+
013346  006300                  ASL     R0              ;UNIT # * 2
013350  016011  001220          MOV     SVSW0(R0),(R1)  ;SET TCR BITS FOR SELECTED LINES
013354  006200                  ASR     R0              ;RESET UNIT COUNTER
013356  012737  000001  001260  MOV     #1,     MARK    ;SET UP MARKER
013364  012304                  MOV     (R3)+,  R4      ;SET UP OFFSET TO TABLES
013366  010246                  MOV     R2,-(6)         ;PUSH R2 ON STACK
013370  010346                  MOV     R3,-(6)         ;PUSH R3 ON STACK
013372  033711  001260          2$:     BIT     MARK,   (R1)    ;CHECK FOR LINE SELECTED
013376  001420                  BEQ     6$
013400  010564  001312          MOV     R5, XMTTAB(4)   ;SET UP HEADER MESSAGE
013404  010564  002312          MOV     R5, RCVTAB(4)   ;SET UP RECEIVER TABLE
```

```
 1705  013410  013702  001262                  MOV     BUFSIZ, R2      ;SET UP COUNTER
 1706  013414  012703  016715                  MOV     #MSGP3, R3      ;SET UP MESSAGE POINTER
 1707  013420  112325                  3$:     MOVB    (R3)+,  (R5)+   ;MOVE MESSAGE INTO BUFFER
 1708  013422  001404                          BEQ     5$              ;BRANCH IF END OF MESSAGE
 1709  013424  005302                          DEC     R2              ;COUNT BUFFER SIZE
 1710  013426  001374                          BNE     3$              ;BRANCH IF MORE
 1711  013430  000403                          BR      6$              ;BRANCH IF DONE
 1712  013432  105025                  4$:     CLRB    (R5)+           ;CLEAR REST OF BUFFER
 1713  013434  005302                  5$:     DEC     R2              ;COUNT BUFFER SIZE
 1714  013436  001375                          BNE     4$              ;BRANCH IF MORE
 1715  013440  010564  003312          6$:     MOV     R5,MAXTAB(4)    ;SETUP BFR POINTER TABLE.                ;;+F
 1716  013444  005724                          TST     (R4)+           ;INC OFFSET TO NEXT LINE
 1717  013446  006337  001260                  ASL     MARK
 1718  013452  103347                          BCC     2$
 1719  013454  012603                          MOV     (6)+,R3         ;POP STACK INTO R3
 1720  013456  012602                          MOV     (6)+,R2         ;POP STACK INTO R2
 1721  013460  022121                          CMP     (R1)+,  (R1)+   ;ADD 4
 1722  013462  005200                          INC     R0
 1723  013464  020037  001264                  CMP     R0,     UNITS
 1724  013470  001306                          BNE     1$
 1725  013472  042737  000140  177776          BIC     #140,   @#PS    ;LOWER PROCESSOR PRIORITY
 1726
 1727                                  ;*****************************************************************************
 1728                                  ;PROG3  FOREGROUND PROGRAM TO START RECEIVERS, THEN EXERCISE MEMORY.
 1729                                  ;*****************************************************************************
 1730
 1731  013500  012701  001312          FORP3:  MOV     #XMTTAB,R1
 1732  013504  012702  000400                  MOV     #400,R2
 1733  013510  005711                  1$:     TST     (R1)            ;CHECK FOR XMTR TABLE CLR
 1734  013512  001376                          BNE     1$              ;BRANCH IF NOT
 1735  013514  062701  000002                  ADD     #2,R1           ;GO TO NEXT LINE ENTRY
 1736  013520  005302                          DEC     R2              ;COUNT LINES
 1737  013522  001372                          BNE     1$              ;BRANCH IF MORE LINES
 1738  013524  013700  001264                  MOV     UNITS,  R0      ;SET UP UNIT COUNTER
 1739  013530  013701  001266                  MOV     DEVADR, R1      ;AND DEVICE ADDRESS POINTER
 1740  013534  052711  000101          2$:     BIS     #101,   (R1)    ;SET RECEIVER ENABLES OF CSR
 1741                                                                  ;BIT0 = RECEIVER ENABLE
 1742                                                                  ;BIT6 = RCV INTERRUPT ENABLE
 1743  013540  062701  000010                  ADD     #10,    R1      ;UPDATE TO NEXT DJ11
 1744  013544  005300                          DEC     R0              ;COUNT DJ11'S
 1745  013546  001372                          BNE     2$
 1746  013550  012700  020000          MEMX3:  MOV     #20000,R0       ;TOP OF 4K BANK OF MEMORY
 1747  013554  000241                          CLC
 1748  013556  005540                  1$:     ADC     -(R0)           ;FAST READ/WRITE TO MEMORY
 1749  013560  001376                          BNE     1$              ;RAPID REPEAT
 1750  013562  005700                          TST     R0              ;CHECK FOR LOC 0
 1751  013564  001374                          BNE     1$              ;BRANCH IF MORE MEMORY
 1752  013566  000770                          BR      MEMX3           ;LOOP FOR EVER!
 1753
 1754                                  ;*****************************************************************************
 1755                                  ;PROG3  LINKERS TO DJ11 INTERRUPT SERVICE ROUTINES
 1756                                  ;*****************************************************************************
 1757
 1758  013570  004037  014320          R3SR0:  JSR     R0,P3RISR
 1759  013574  160012  000000                  .WORD   <160012+<0*10>>,<0*40>
 1760  013600  004037  014170          X3SR0:  JSR     R0,P3XISR
```

```
 1761  013604  160020  000000                .WORD   <160020+<0*10>>,<0*40>
 1762  013610  004037  014320        R3SR1:  JSR     R0,P3RISR
 1763  013614  160022  000040                .WORD   <160012+<1*10>>,<1*40>
 1764  013620  004037  014170        X3SR1:  JSR     R0,P3XISR
 1765  013624  160030  000040                .WORD   <160020+<1*10>>,<1*40>
 1766  013630  004037  014320        R3SR2:  JSR     R0,P3RISR
 1767  013634  160032  000100                .WORD   <160012+<2*10>>,<2*40>
 1768  013640  004037  014170        X3SR2:  JSR     R0,P3XISR
 1769  013644  160040  000100                .WORD   <160020+<2*10>>,<2*40>
 1770  013650  004037  014320        R3SR3:  JSR     R0,P3RISR
 1771  013654  160042  000140                .WORD   <160012+<3*10>>,<3*40>
 1772  013660  004037  014170        X3SR3:  JSR     R0,P3XISR
 1773  013664  160050  000140                .WORD   <160020+<3*10>>,<3*40>
 1774  013670  004037  014320        R3SR4:  JSR     R0,P3RISR
 1775  013674  160052  000200                .WORD   <160012+<4*10>>,<4*40>
 1776  013700  004037  014170        X3SR4:  JSR     R0,P3XISR
 1777  013704  160060  000200                .WORD   <160020+<4*10>>,<4*40>
 1778  013710  004037  014320        R3SR5:  JSR     R0,P3RISR
 1779  013714  160062  000240                .WORD   <160012+<5*10>>,<5*40>
 1780  013720  004037  014170        X3SR5:  JSR     R0,P3XISR
 1781  013724  160070  000240                .WORD   <160020+<5*10>>,<5*40>
 1782  013730  004037  014320        R3SR6:  JSR     R0,P3RISR
 1783  013734  160072  000300                .WORD   <160012+<6*10>>,<6*40>
 1784  013740  004037  014170        X3SR6:  JSR     R0,P3XISR
 1785  013744  160100  000300                .WORD   <160020+<6*10>>,<6*40>
 1786  013750  004037  014320        R3SR7:  JSR     R0,P3RISR
 1787  013754  160102  000340                .WORD   <160012+<7*10>>,<7*40>
 1788  013760  004037  014170        X3SR7:  JSR     R0,P3XISR
 1789  013764  160110  000340                .WORD   <160020+<7*10>>,<7*40>
 1790  013770  004037  014320        R3SR10: JSR     R0,P3RISR
 1791  013774  160112  000400                .WORD   <160012+<10*10>>,<10*40>
 1792  014000  004037  014170        X3SR10: JSR     R0,P3XISR
 1793  014004  160120  000400                .WORD   <160020+<10*10>>,<10*40>
 1794  014010  004037  014320        R3SR11: JSR     R0,P3RISR
 1795  014014  160122  000440                .WORD   <160012+<11*10>>,<11*40>
 1796  014020  004037  014170        X3SR11: JSR     R0,P3XISR
 1797  014024  160130  000440                .WORD   <160020+<11*10>>,<11*40>
 1798  014030  004037  014320        R3SR12: JSR     R0,P3RISR
 1799  014034  160132  000500                .WORD   <160012+<12*10>>,<12*40>
 1800  014040  004037  014170        X3SR12: JSR     R0,P3XISR
 1801  014044  160140  000500                .WORD   <160020+<12*10>>,<12*40>
 1802  014050  004037  014320        R3SR13: JSR     R0,P3RISR
 1803  014054  160142  000540                .WORD   <160012+<13*10>>,<13*40>
 1804  014060  004037  014170        X3SR13: JSR     R0,P3XISR
 1805  014064  160150  000540                .WORD   <160020+<13*10>>,<13*40>
 1806  014070  004037  014320        R3SR14: JSR     R0,P3RISR
 1807  014074  160152  000600                .WORD   <160012+<14*10>>,<14*40>
 1808  014100  004037  014170        X3SR14: JSR     R0,P3XISR
 1809  014104  160160  000600                .WORD   <160020+<14*10>>,<14*40>
 1810  014110  004037  014320        R3SR15: JSR     R0,P3RISR
 1811  014114  160162  000640                .WORD   <160012+<15*10>>,<15*40>
 1812  014120  004037  014170        X3SR15: JSR     R0,P3XISR
 1813  014124  160170  000640                .WORD   <160020+<15*10>>,<15*40>
 1814  014130  004037  014320        R3SR16: JSR     R0,P3RISR
 1815  014134  160172  000700                .WORD   <160012+<16*10>>,<16*40>
 1816  014140  004037  014170        X3SR16: JSR     R0,P3XISR
```

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1817  014144  160200  000700                .WORD   <160020+<16*10>>,<16*40>
1818  014150  004037  014320        R3SR17: JSR     R0,P3RISR
1819  014154  160202  000740                .WORD   <160012+<17*10>>,<17*40>
1820  014160  004037  014170        X3SR17: JSR     R0,P3XISR
1821  014164  160210  000740                .WORD   <160020+<17*10>>,<17*40>
1822
1823                                ;*****************************************************************************
1824                                ;PROG3  TRANSMITTER INTERRUPT SERVICE ROUTINE
1825                                ;*****************************************************************************
1826
1827  014170                        P3XISR:
1828  014170  010146                        MOV     R1,-(6)         ;PUSH R1 ON STACK
1829  014172  010246                        MOV     R2,-(6)         ;PUSH R2 ON STACK
1830  014174  012001                        MOV     (R0)+,R1
1831  014176  005711                1$:     TST     (R1)            ;CHECK FOR TRANS READY
1832  014200  100043                        BPL     4$
1833  014202  116102  000007               MOVB    7(R1),R2        ;GET LINE NO.
1834  014206  006302                        ASL     R2
1835  014210  061002                        ADD     (R0),R2
1836  014212  117261  001312  000006       MOVB    @XMTTAB(2),6(R1);SEND A CHARACTER
1837  014220  105072  001312               CLRB    @XMTTAB(2)      ;CLR TABLE AFTER USE
1838  014224  005262  001312               INC     XMTTAB(2)       ;UPDATE TABLE POINTER
1839  014230  026262  003312  001312       CMP     MAXTAB(2),XMTTAB(2) ;CHECK FOR END OF BUFFER                ;;++F
1840  014236  001003                        BNE     5$              ;BRANCH IF NOT
1841  014240  163762  001262  001312       SUB     BUFSIZ,XMTTAB(2)        ;RESET BUFFER POINTER               ;;++F
1842  014246  105772  001312        5$:     TSTB    @XMTTAB(2)      ;CHECK NEXT CHARACTER
1843  014252  001351                        BNE     1$              ;BRANCH IF MORE DATA
1844  014254  010346                2$:     MOV     R3,-(SP)
1845  014256  005062  001312               CLR     XMTTAB(2)       ;CLEAR TABLE POINTER
1846  014262  161002                        SUB     (R0),R2
1847  014264  006202                        ASR     R2
1848  014266  005003                        CLR     R3
1849  014270  000261                        SEC
1850  014272  006103                3$:     ROL     R3
1851  014274  005302                        DEC     R2
1852  014276  100375                        BPL     3$
1853  014300  040361  000004               BIC     R3,4(R1)        ;CLEAR TCR BIT FOR LINE
1854  014304  012603                        MOV     (SP)+,R3        ;RESTORE R3
1855  014306  000733                        BR      1$
1856  014310                        4$:
1857  014310  012602                        MOV     (6)+,R2         ;POP STACK INTO R2
1858  014312  012601                        MOV     (6)+,R1         ;POP STACK INTO R1
1859  014314  012600                        MOV     (6)+,R0         ;POP STACK INTO R0
1860  014316  000002                        RTI
1861
1862                                ;*****************************************************************************
1863                                ;PROG3  RECEIVER INTERRUPT SERVICE ROUTINE
1864                                ;*****************************************************************************
1865
1866  014320                        P3RISR:
1867  014320  010146                        MOV     R1,-(6)         ;PUSH R1 ON STACK
1868  014322  010246                        MOV     R2,-(6)         ;PUSH R2 ON STACK
1869  014324  010346                        MOV     R3,-(6)         ;PUSH R3 ON STACK
1870  014326  010446                        MOV     R4,-(6)         ;PUSH R4 ON STACK
1871  014330  012001                        MOV     (R0)+,R1        ;GET RBUF ADDRESS
1872  014332  011102                1$:     MOV     (R1),R2         ;READ THE DATA
```

```
1873  014334  100077                    BPL     8$              ;BRANCH IF NO CHAR PRESENT
1874  014336  032702  070000            BIT     #70000,R2       ;CHECK FOR ERRORS
1875  014342  001402                    BEQ     2$              ;BRANCH IF OK
1876  014344  104002                    HLT+2                   ;RECEIVER ERROR
1877                                                            ;R1=RBUF ADDRESS
1878                                                            ;R2=CONTENTS OF RBUF
1879                                                            ;BIT12=PARITY ERROR
1880                                                            ;BIT13=FRAMING ERROR
1881                                                            ;BIT14=UART OVERRUN
1882  014346  000771                    BR      1$              ;SKIP BAD DATA
1883  014350  010204            2$:     MOV     R2,     R4      ;DUP THE RBUF
1884  014352  105004                    CLRB    R4              ;CLEAR THE DATA
1885  014354  000304                    SWAB    R4              ;LINE # TO LOW BYTE
1886  014356  106304                    ASLB    R4              ;LINE # * 2, ALSO CLR CHAR PRESENT
1887  014360  061004                    ADD     (R0),R4         ;ADD OFFSET
1888  014362  136402  005312            BITB    MASK(4),R2      ;CHECK CHARACTER LENGTH
1889  014366  001401                    BEQ     3$              ;BRANCH IF OK
1890  014370  104002                    HLT+2                   ;CHARACTER LENGTH ERROR
1891                                                            ;R1=RBUF ADDRESS
1892                                                            ;R2=CONTENTS OF RBUF(DATA)
1893  014372  005764  002312    3$:     TST     RCVTAB(4)       ;CHECK FOR UNSELECTED LINE
1894  014376  001002                    BNE     4$              ;BRANCH IF OK
1895  014400  104002                    HLT+2                   ;RECEIVED DATA ON UNSELECTED LINE
1896                                                            ;R1 = RBUF ADDRESS
1897                                                            ;R2 = CONTENTS OF RBUF
1898  014402  000753                    BR      1$              ;IGNORE THE DATA
1899  014404  105774  002312    4$:     TSTB    @RCVTAB(4)      ;CHECK FOR DATA BUFFER FULL
1900  014410  001403                    BEQ     5$              ;BRANCH IF OK
1901  014412  104002                    HLT+2                   ;SOFTWARE DATA BUFFER OVERFLOW
1902                                                            ;POSSIBLE TRANSMITTER PROBLEM
1903                                                            ;R1 = RBUF ADDRESS
1904                                                            ;R2 = CONTENTS OF RBUF
1905                                ;NOTE:  IF THE ABOVE ERROR WAS DUE TO OVERLOAD, INCREASING THE CONTENTS
1906                                ;       OF "BUFSIZ" MAY RECTIFY THE PROBLEM.
1907                                ;       "BUFSIZ" MUST BE A MULTIPLE OF 2.
1908                                ;       INCREASING IT MAY CAUSE THE BUFFERS TO OVERFLOW 4K.
1909  014414  000137  013216            JMP     PROG3           ;RESTART ON THIS TYPE ERROR
1910
1911  014420  005764  001312    5$:     TST     XMTTAB(4)       ;CHECK FOR TRANSMITTER ACTIVE
1912  014424  001414                    BEQ     6$              ;BRANCH IF INACTIVE
1913  014426  110274  002312            MOVB    R2, @RCVTAB(4)  ;PUT THE DATA IN THE BUFFER
1914  014432  005264  002312            INC     RCVTAB(4)       ;UPDATE POINTER TO NEXT SPACE
1915  014436  026464  003312  002312    CMP     MAXTAB(4),RCVTAB(4) ;CHECK FOR END OF BUFFER                ;;++F
1916  014444  001332                    BNE     1$              ;BRANCH IF NOT
1917  014446  163764  001262  002312    SUB     BUFSIZ,RCVTAB(4) ;RESET BUFFER POINTER                      ;;++F
1918  014454  000726                    BR      1$
1919  014456  016464  003312  002312  6$:     MOV     MAXTAB(4),RCVTAB(4) ;RESET TABLE POINTER            ;;++F
1920  014464  163764  001262  002312    SUB     BUFSIZ,RCVTAB(4)        ;RESET BUFFER                   ;;++F
1921  014472  016464  002312  001312    MOV     RCVTAB(4),XMTTAB(4)
1922  014500  110274  002312            MOVB    R2, @RCVTAB(4)
1923  014504  005264  002312            INC     RCVTAB(4)       ;UPDATE POINTER TO NEXT SPACE
1924  014510  161004                    SUB     (R0),R4
1925  014512  006204                    ASR     R4
1926  014514  005003                    CLR     R3
1927  014516  000261                    SEC
1928  014520  006103            7$:     ROL     R3
```

```
1929  014522  005304                          DEC     R4
1930  014524  100375                          BPL     7$
1931  014526  050361  000002                  BIS     R3,2(R1)        ;SET TCR BIT FOR LINE
1932  014532  000677                          BR      1$
1933  014534                          8$:
1934  014534  012604                          MOV     (6)+,R4         ;POP STACK INTO R4
1935  014536  012603                          MOV     (6)+,R3         ;POP STACK INTO R3
1936  014540  012602                          MOV     (6)+,R2         ;POP STACK INTO R2
1937  014542  012601                          MOV     (6)+,R1         ;POP STACK INTO R1
1938  014544  012600                          MOV     (6)+,R0         ;POP STACK INTO R0
1939  014546  000002                          RTI
1940  014550                          DONE:
1941  014550  004737  016316                  JSR     PC,     KBDINT
1942  014554  062737  000001  001206          ADD     #1,PCNT+2       ;ADD 1 TO THE PASS COUNT
1943  014562  005537  001204                  ADC     PCNT            ;MAKE IT DOUBLE PREC.
1944  014566  000004  016411                  TYPE    ,MEOP           ;END OF PASS INDICATOR
1945  014572  032777  002000  164410          BIT     #SW10,@SWR      ;RING THE BELL?
1946  014600  001004                          BNE     4$              ;NO!
1947  014602  000004  000007                  TYPE    ,BELL           ;RING THE BELL
1948  014606  000004  000177                  TYPE    ,177            ;TYPE A FILLER FOR 11/05
1949  014612  013700  000042          4$:     MOV     @#42,R0         ;GET MONITOR ADDRESS
1950  014616  001405                          BEQ     3$              ;IF NONE
1951  014620  000005                          RESET                   ;RESET AND
1952          014622                          $ENDAD = .
1953  014622  004710                          JSR     7,(0)           ;GO TO MONITOR
1954  014624  000240                          NOP                     ;SAVE ROOM
1955  014626  000240                          NOP                     ;FOR
1956  014630  000240                          NOP                     ;ACT11
1957  014632  000137  007316          3$:     JMP     RESTAR          ;RETURN
1958
```

```
                        ;       $HLT            ERROR TYPEOUT HANDLER

                        ;THIS ROUTINE PRINTS OUT ERROR MESSAGES STARTING WITH THE
                        ;ADDRESS OF THE ''HLT''. IT ALSO COUNTS THE NUMBER OF ERRORS
                        ;AND HAS THE CAPABILITY OF LOOPING ON ERROR, BELL ON ERROR,
                        ;''HALT'' ON ERROR, AND INHIBIT TYPEOUTS. AN OPTIONAL ARGUEMENT
                        ;(HLT+3) WILL BE PLACED IN ''HLTCT$:'' FOR ADITIONAL TYPEOUTS.

014636 004737 016316    EMT$:   JSR     PC,     KBDINT
014642 032777 002000 164340     BIT     #SW10,@SWR      ;BELL ON ERROR?
014650 001402                   BEQ     1$              ;NO - SKIP
014652 000004 000007            TYPE    ,BELL           ;RING BELL
014656 005237 001202    1$:     INC     ERRORS          ;COUNT THE NUMBER OF ERRORS
014662 032777 020000 164320     BIT     #SW13,@SWR      ;SKIP TYPEOUT IF SET
014670 001026                   BNE     2$              ;SKIP TYPEOUTS
014672 000004 014676            TYPE    ,..+2           ;.ASCIZ <15><12>
014702 011637 014766            MOV     (6),HLTADR      ;PUT ADDRESS OF INSTRUCTION ON STACK
014706 162737 000002 014766     SUB     #2,HLTADR       ;FUDGE ADDRESS
014714 117737 000046 014764     MOVB    @HLTADR,HLTCT$  ;GET HLT ARGUEMENT
014722 013705 014766            MOV     HLTADR,TTY      ;TYPE HLTADR IN OCTAL
014726 004737 015374            JSR     PC,PRINTR       ;TYPE LEADING ZERO'S
014732 000004 014736            TYPE    ,..+2           ;.ASCIZ ''  ''
014742 004737 014770            JSR     PC,ERROR$       ;GO TO USER ERROR ROUTINE
014746 005777 164236    2$:     TST     @SWR            ;HALT ON ERROR
014752 100001                   BPL     .+4             ;SKIP IF CONTINUE
014754 000000                   HALT                    ;HALT ON ERROR!
014756 004737 016316            JSR     PC,KBDINT
014762 000002                   RTI                     ;RETURN

014764 000000           HLTCT$: 0                       ;HLT ARGUEMENT
014766 000000           HLTADR: 0                       ;LAST HLT INSTRUCTION EXECUTED

014770 042737 007700 015012 ERROR$: BIC     #7700,2$
014776 105337 014764    1$:     DECB    HLTCT$
015002 100411                   BMI     3$
015004 062737 000100 015012     ADD     #100,2$
015012 010005           2$:     MOV     %0,TTY          ;TYPE REGISTER X IN OCTAL
015014 004737 015374            JSR     %7,PRINTR
015020 000004 016450            TYPE,   SPACE
015024 000764                   BR      1$
015026 000207           3$:     RTS     PC
```

```
                        ;SUBROUTINE TO SAVE INPUT AS OCTAL NUMBER

015030  012737  000001  015322  READIN: MOV     #1,INHRE
015036  004737  015176            JSR     PC,     READ$   ;GO READ TTY UNTIL CR
015042  005037  015322            CLR     INHRE
015046  010146                    MOV     R1,-(6)         ;PUSH R1 ON STACK
015050  010246                    MOV     R2,-(6)         ;PUSH R2 ON STACK
015052  010346                    MOV     R3,-(6)         ;PUSH R3 ON STACK
015054  012501                    MOV     (R5)+,  R1
015056  012737  000020  016214    MOV     #20,CNT
015064  012702  015324            MOV     #INPUT,R2
015070  122712  000120            CMPB    #120,(R2)       ;CHECK FOR "P"
015074  001425                    BEQ     3$
015076  005011                    CLR     (R1)
015100  112203            1$:     MOVB    (R2)+,R3
015102  120327  000015            CMPB    R3,#15
015106  001420                    BEQ     3$              ;BRANCH WHEN DONE
015110  162703  000060            SUB     #60,R3
015114  032703  177770            BIT     #177770,R3
015120  001013                    BNE     3$              ;BRANCH IF BAD DATA
015122  006311                    ASL     (R1)
015124  103410                    BCS     2$
015126  006311                    ASL     (R1)
015130  103406                    BCS     2$
015132  006311                    ASL     (R1)
015134  103404                    BCS     2$
015136  050311                    BIS     R3,(R1)
015140  005337  016214            DEC     CNT
015144  000755                    BR      1$
015146  000244            2$:     CLZ                     ;MAKE SURE Z-BIT IS CLR
015150  013737  177776  015174    3$:     MOV     @#PS,   PSTEMP  ;SAVE CONDITION CODES
015156  012603                    MOV     (6)+,R3         ;POP STACK INTO R3
015160  012602                    MOV     (6)+,R2         ;POP STACK INTO R2
015162  012601                    MOV     (6)+,R1         ;POP STACK INTO R1
015164  013737  015174  177776    MOV     PSTEMP, @#PS    ;RESTORE CONDITION CODES
015172  000205                    RTS     R5

015174  000000            PSTEMP: 0               ;TEMPORARY STORAGE FOR PS

015176  010346            READ$:  MOV     R3,-(6)         ;SAVE R3
015200  012703  015324    1$:     MOV     #INPUT,R3       ;GET ADDRESS
015204  022703  015344    2$:     CMP     #INPUT+20,R3    ;BUFFER FULL?
015210  001415                    BEQ     4$              ;YES - TYPE "?"
015212  105737  177560            TSTB    @#177560        ;WAIT FOR
015216  100375                    BPL     .-4             ;A CHARACTER
015220  113713  177562            MOVB    @#177562,(3)    ;GET CHARACTER
015224  142713  000200            BICB    #200,(3)        ;GET RID OF JUNK
015230  122713  000177            CMPB    #177,(3)        ;IS IT A RUBOUT
015234  001403                    BEQ     4$              ;SKIP IF NOT
015236  122713  000025            CMPB    #25,(3)
015242  001006                    BNE     3$
015244                    4$:
015244  000004  015250            TYPE    ,.+2            ;.ASCIZ "?"<15><12>"= "
015256  000750                    BR      1$              ;ZAP THE BUFFER AND LOOP
015260  111337  016132    3$:     MOVB    (3),.TYPE       ;SET UP FOR TYPING
```

```
2057  015264  000004  016132                  TYPE    ,.TYPE          ;ECHO IT
2058  015270  122723  000015                  CMPB    #15,(3)+        ;CHECK FOR RETURN
2059  015274  001343                          BNE     2$              ;LOOP IF NOT RETURN
2060  015276  005737  015322                  TST     INHRE
2061  015302  001401                          BEQ     5$
2062  015304  000402                          BR      6$
2063  015306  105063  177777          5$:     CLRB    -1(3)           ;ZAP RETURN (THE 15)
2064  015312  000004  000012          6$:     TYPE    ,12             ;TYPE A LINE FEED
2065  015316  012603                          MOV     (6)+,R3         ;RESTORE R3
2066  015320  000207                          RTS     PC              ;RETURN
2067
2068  015322  000000                  INHRE:  0
2069  015324  000020                  INPUT:  .BLKW   20              ;TTY INPUT AREA
2070                                  ;       $OCTAL          OCTAL TYPEOUT ROUTINE
2071
2072                                  ;THIS ROUTINE IS USED TO TYPE AN OCTAL NUMBER ON THE TTY. IT WILL TYPE
2073                                  ;ALL 6 CHARACTERS, SUPPRESS LEADING ZEROES, TYPE AN 18 BIT ADDRESS, OR TYPE
2074                                  ;THE 16 BITS. IT IS CALLED VIA THE DUMP, SDUMP, DUMP18, OR BITYPE MACRO'S.
2075
2076  015364  012737  170101  015532  BITYP$: MOV     #170101,.PR     ;SET BIT FLAG ANS 16. CHARACTER COUNT
2077  015372  000411                          BR      .PTIT           ;NOW TYPE IT IN BIT FORM
2078  015374  112737  000001  015532  PRINTR: MOVB    #1,.PR          ;SET ZERO FILL SWITCH
2079  015402  000402                          BR      .+6             ;SKIP
2080  015404  005037  015532          PRINTS: CLR     .PR             ;SUPRESS LEADING ZERO'S
2081  015410  112737  177772  015533          MOVB    #-6,.PR+1       ;SET COUNT
2082  015416  010446                  .PTIT:  MOV     R4,-(6)         ;SAVE R4
2083  015420  012704  015534                  MOV     #.PR+2,R4       ;SET POINTER TO FIRST ASCII CHAR.
2084  015424  105014                          CLRB    (4)             ;CLEAR FIRST BYTE
2085  015426  000411                          BR      .PRF            ;ROTATE FIRST BIT
2086  015430  105014                  .PRL:   CLRB    (4)             ;CLEAR BYTE OF CHARACTER
2087  015432  032737  000100  015532          BIT     #100,.PR        ;BIT TYPING MODE?
2088  015440  001004                          BNE     .PRF            ;YES - SKIP 2 ROTATES
2089  015442  006105                          ROL     TTY             ;ROTATE BIT INTO C
2090  015444  106114                          ROLB    (4)             ;PACK IT
2091  015446  006105                          ROL     TTY             ;ROTATE BIT INTO C
2092  015450  106114                          ROLB    (4)             ;PACK IT
2093  015452  006105                  .PRF:   ROL     TTY             ;ROTATE BIT INTO C
2094  015454  106114                          ROLB    (4)             ;PACK IT
2095  015456  105714                          TSTB    (4)             ;IS IT ZERO?
2096  015460  001402                          BEQ     .+6             ;SKIP INC
2097  015462  105237  015532                  INCB    .PR             ;SET FILL SWITCH
2098  015466  105737  015532                  TSTB    .PR             ;CHECK FILL SWITCH
2099  015472  001402                          BEQ     .+6             ;SKIP BITSET
2100  015474  152724  000060                  BISB    #'0,(4)+        ;MAKE INTO ASCII CHAR
2101  015500  105237  015533                  INCB    .PR+1           ;INC COUNT
2102  015504  001351                          BNE     .PRL            ;REPEAT
2103  015506  022704  015534                  CMP     #.PR+2,R4       ;EMPTY BUFFER?
2104  015512  001002                          BNE     .+6             ;SKIP IF NOT
2105  015514  112724  000060                  MOVB    #'0,(4)+        ;LOAD 1 ZERO
2106  015520  105014                          CLRB    (4)             ;NULL TERMINATOR
2107  015522  000004  015534                  TYPE    ,.PR+2          ;TYPE IT
2108  015526  012604                          MOV     (6)+,R4         ;RESTORE R4
2109  015530  000207                          RTS     PC              ;RETURN
2110  015532  000012                  .PR:    .BLKW   12              ;COUNT, SWITCH, AND OUTPUT BUFFER
```

```
2111  015556  012777  015704  000126  PDOWN$: MOV     #ILLUP,@PUVEC$  ;SET FOR FAST UP
2112  015564  012777  000340  000122          MOV     #340,@PUVEC$+2  ;PRIO:7
2113  015572  010046                          MOV     R0,-(6)         ;PUSH R0 ON STACK
2114  015574  010146                          MOV     R1,-(6)         ;PUSH R1 ON STACK
2115  015576  010246                          MOV     R2,-(6)         ;PUSH R2 ON STACK
2116  015600  010346                          MOV     R3,-(6)         ;PUSH R3 ON STACK
2117  015602  010446                          MOV     R4,-(6)         ;PUSH R4 ON STACK
2118  015604  010546                          MOV     R5,-(6)         ;PUSH R5 ON STACK
2119  015606  010637  015710                  MOV     SP,..SAVR6      ;SAVE SP
2120  015612  012777  015622  000072          MOV     #PUP$,@PUVEC$   ;SET UP VECTOR
2121  015620  000000                          HALT                    ;WAIT FOR PF
2122
2123  015622  013706  015710          PUP$:   MOV     .SAVR6,SP       ;GET SP
2124  015626  005001                          CLR     R1              ;WAIT LOOP FOR THE TTY
2125  015630  005201                  1$:     INC     R1              ;WAIT FOR THE INC
2126  015632  001376                          BNE     1$              ;OF  WORD
2127  015634  012605                          MOV     (6)+,R5         ;POP STACK INTO R5
2128  015636  012604                          MOV     (6)+,R4         ;POP STACK INTO R4
2129  015640  012603                          MOV     (6)+,R3         ;POP STACK INTO R3
2130  015642  012602                          MOV     (6)+,R2         ;POP STACK INTO R2
2131  015644  012601                          MOV     (6)+,R1         ;POP STACK INTO R1
2132  015646  012600                          MOV     (6)+,R0         ;POP STACK INTO R0
2133  015650  012737  015556  000024          MOV     #PDOWN$,@#24    ;SET UP THE POWER DOWN VECTOR
2134  015656  012737  000340  000026          MOV     #340,@#26       ;PRIO:7
2135  015664  000004  015670                  TYPE    ,..+2           ;.ASCIZ <15><12>'POWER''
2136  015700  000137  007316                  JMP     RESTAR          ;JMP TO USER ADDRESS
2137
2138  015704  000000          ILLUP:  HALT                    ;THE POWER UP SEQUENCE WAS STARTED
2139  015706  000776                  BR      .-2             ; BEFORE THE POWER DOWN WAS COMPLETE
2140
2141  015710  000000          .SAVR6: 0                       ;PUT THE SP HERE
2142  015712  000024  000026  PUVEC$: 24,26                   ;POWER UP VECTOR
2143
2144
2145  015716  000002          YESRT:  RTI                     ;RETURN FROM TRACE TRAP
```

```
2146
2147
2148                                    ;*****************************************************************************
2149                                    ;IOT HANDLER - REENTERENT ROUTINE TO INDICATE A FALSE
2150                                    ;              INTERRUPT OR TRAP, OR TO TYPE A MESSAGE
2151                                    ;*****************************************************************************
2152  015720  022716  001000            IOTRAP: CMP     #1000,  (SP)    ;CHECK RETURN ADDRESS
2153  015724  002440                            BLT     IOT$            ;BRANCH IF TYPE COMMAND
2154  015726  162716  000004                    SUB     #4,     (SP)    ;GET VECTOR ADDRESS
2155  015732  000004  015736                    TYPE,   .+2             ;TYPE MESSAGE
2156  015736  005015  047125  054105            .ASCIZ  <15><12>''UNEXPECTED INTERUPT TO ''
2157  015744  042520  052103  042105
2158  015752  044440  052116  051105
2159  015760  050125  020124  047524
2160  015766  000040
2161  015770  012605                            MOV     (SP)+,TTY       ;TYPE (SP)+ IN OCTAL
2162  015772  004737  015404                    JSR     PC,PRINTS       ;AND SUPRESS LEADING ZERO'S
2163  015776  005726                            TST     (SP)+           ;POP STACK
2164  016000  000004  016004                    TYPE,   .+2             ;TYPE MESSAGE
2165  016004  043040  047522  020115            .ASCIZ  '' FROM ''
2166  016012     000
2167          016014                            .EVEN
2168  016014  011605                            MOV     (SP),TTY        ;TYPE (SP) IN OCTAL
2169  016016  004737  015404                    JSR     PC,PRINTS       ;AND SUPRESS LEADING ZERO'S
2170  016022  000000                            HALT                    ;FATAL ERROR
2171  016024  000002                            RTI                     ;CONTINUE IF DESIRED
2172
2173                                    ;       $TYPE           MESSAGE TYPEOUT ROUTINE
2174
2175                                    ;THIS ROUTINE IS USE TO TYPE ASCII MESSAGES ON THE TTY. THE
2176                                    ;CALL CAN BE IN ONE OF 3 FORMS: 1) ''TYPE ,ADR'' - TYPES THE
2177                                    ;MESSAGE STARTING IN LOCATION ''ADR:'' 2) ''TYPE ,CHAR'' - TYPES
2178                                    ;THE ASCII ''CHAR'', AND 3) 'PRINT <<15><12>'MESSAGE'> - TYPES
2179                                    ;THE MESSAGE WHICH IS INLINE ASCII.
2180
2181  016026  010546                    IOT$:   MOV     TTY,-(6)        ;SAVE TTY
2182  016030  017605  000002                    MOV     @2(6),TTY       ;GET ADDRESS TO BE TYPED
2183  016034  032705  177400                    BIT     #177400,TTY     ;IS IT A TYPEM?
2184  016040  001004                            BNE     1$              ;NO
2185  016042  010537  016132                    MOV     TTY,,TYPE       ;GET THE CHARACTER
2186  016046  012705  016132                    MOV     #.TYPE,TTY      ;FUDGE THE ADDRESS
2187  016052  105715                    1$:     TSTB    (TTY)           ;TERMINATOR?
2188  016054  001406                            BEQ     2$              ;GET OUT IF SO
2189  016056  112537  177566                    MOVB    (TTY)+,@#177566 ;LOAD AND TYPE THE CHARACTER
2190  016062  105737  177564                    TSTB    @#177564        ;IS THE PRINTER READY
2191  016066  100375                            BPL     .-4             ;WAIT UNTIL IT IS
2192  016070  000770                            BR      1$              ;GET THE NEXT CHARACTER
2193  016072  017646  000002            2$:     MOV     @2(6),-(6)      ;GET ADDRESS TO BE TYPED
2194  016076  062766  000002  000004            ADD     #2,4(6)         ;ADD 2 TO THE ADDRESS
2195  016104  022666  000002                    CMP     (6)+,2(6)       ;IS IT .+2?
2196  016110  001006                            BNE     3$              ;NO
2197  016112  062705  000002                    ADD     #2,TTY          ;ADD 2 TO THE ADDRESS
2198  016116  042705  000001                    BIC     #1,TTY          ;BACK UP TO AN EVEN BYTE
2199  016122  010566  000002                    MOV     TTY,2(6)        ;RESTORE ADDRESS
2200  016126  012605                    3$:     MOV     (6)+,TTY        ;RESTORE TTY
2201  016130  000002                            RTI                     ;RETURN
```

```
2202  016132  000000                    .TYPE:  0                               ;CHARACTER TYPE LOCATION
2203
2204  016134  022737  000176  001210    CNTLU:  CMP     #SWREG,SWR
2205  016142  001023                            BNE     1$
2206  016144  000004  016226                    TYPE    ,SWREQ
2207  016150  013705  000176                    MOV     SWREG,TTY               ;TYPE SWREG IN OCTAL
2208  016154  004737  015374                    JSR     PC,PRINTR               ;TYPE LEADING ZERO'S
2209  016160  000004  016216                    TYPE    ,NEWIS
2210  016164  004537  015030                    JSR     R5,READIN
2211  016170  016364                            .WORD   TMP1
2212  016172  001360                            BNE     CNTLU
2213  016174  022737  000020  016214            CMP     #20,CNT
2214  016202  001403                            BEQ     1$
2215  016204  013777  016364  162776            MOV     TMP1,@SWR
2216  016212  000207                    1$:     RTS     PC
2217
2218  016214  000000                    CNT:    0
2219
2220  016216  020040  042516  036527    NEWIS:  .ASCIZ  "  NEW= "
2221  016224  000040
2222  016226  005015  053523  036522    SWREQ:  .ASCIZ  <15><12>"SWR= "
2223  016234  000040
2224
2225
2226  016236  013746  000006            SUSWRR: MOV     6,-(SP)
2227  016242  013746  000004                    MOV     4,-(SP)
2228  016246  012737  016266  000004            MOV     #1$,4
2229  016254  022777  177777  162726            CMP     #-1,@SWR
2230  016262  001402                            BEQ     2$
2231  016264  000407                            BR      3$
2232  016266  022626                    1$:     CMP     (SP)+,(SP)+
2233  016270  012737  000176  001210    2$:     MOV     #SWREG,SWR
2234  016276  012737  000174  001212            MOV     #DISPREG,DISPLAY
2235  016304  012637  000004            3$:     MOV     (SP)+,4
2236  016310  012637  000006                    MOV     (SP)+,6
2237  016314  000207                            RTS     PC
2238
2239
2240  016316  022737  000176  001210    KBDINT: CMP     #SWREG,SWR
2241  016324  001016                            BNE     1$
2242  016326  005037  016364                    CLR     TMP1
2243  016332  113737  177562  016364            MOVB    177562,TMP1
2244  016340  142737  000200  016364            BICB    #200,TMP1
2245  016346  122737  000007  016364            CMPB    #7,TMP1
2246  016354  001002                            BNE     1$
2247  016356  004737  016134                    JSR     PC,CNTLU
2248  016362  000207                    1$:     RTS     PC
2249
2250  016364  000000                    TMP1:   0
2251
2252
2253  016366  005015  047516  042040    TRNERR: .ASCIZ <15><12>"NO DATA RECEIVED"                       ::++F
2254  016374  052101  020101  042522
2255  016402  042503  053111  042105
2256  016410      000
2257  016411      015 042412  050117    MEOP:   .ASCIZ <15><12>"EOP"
```

```
2258  016416      000
2259  016417      043  000040            MNUM:    .ASCIZ "# "
2260  016422  051440  046105  041505    MSGSEL:  .ASCIZ " SELECT LINE = "
2261  016430  020124  044514  042516
2262  016436  036440  000040
2263  016442  005015  177777  000377    RETURN:  .ASCIZ  <15><12><377><377><377>
2264  016450  020040     000            SPACE:   .ASCIZ  " "
2265  016453     015  177412  055103    MSGMDN:  .ASCIZ  <15><12><377>"CZDJB-G-0   DJ11 EXER & ONLNE"
2266  016460  045104  026502  026507
2267  016466  020060  020040  045104
2268  016474  030461  042440  042530
2269  016502  020122  020046  047117
2270  016510  047114  000105
2271  016514  005015  044506  051522    MSGADR:  .ASCIZ  <15><12>"FIRST DJ11 ADDRESS:  "
2272  016522  020124  045104  030461
2273  016530  040440  042104  042522
2274  016536  051523  020072  000040
2275  016544  005015  042526  052103    MSGVEC:  .ASCIZ  <15><12>"VECTOR ADDRESS:  "
2276  016552  051117  040440  042104
2277  016560  042522  051523  020072
2278  016566  000040
2279  016570  005015  047516  020056    MSGNUM:  .ASCIZ  <15><12>"NO. OF DJ11'S:  "
2280  016576  043117  042040  030512
2281  016604  023461  035123  020040
2282  016612     000
2283  016613     015  050012  047522    MSGPRG:  .ASCIZ  <15><12>"PROGRAM #:  "
2284  016620  051107  046501  021440
2285  016626  020072  000040
2286  016632  005015  047516  042040    MSG01:   .ASCIZ  <15><12>"NO DJ11'S!"
2287  016640  030512  023461  020523
2288  016646     000
2289  016647     015  050012  047522    MSGP2:   .ASCIZ  <15><12>"PROG2:  CONTINUOUS ECHO EXERCISER"<15><12>
2290  016654  031107  020072  041440
2291  016662  047117  044524  052516
2292  016670  052517  020123  041505
2293  016676  047510  042440  042530
2294  016704  041522  051511  051105
2295  016712  005015     000
2296  016715     015  025012  041505    MSGP3:   .ASCIZ  <15><12>"*ECHO TEST*"<15><12>
2297  016722  047510  052040  051505
2298  016730  025124  005015     000
2299  016735     040  020055     000    MSGDAS:  .ASCIZ  " - "
2300  016741     015  051412  046111    MALARM:  .ASCIZ <15><12>"SILO ALARM LEVEL FOR CSR"<15><12>
2301  016746  020117  046101  051101
2302  016754  020115  042514  042526
2303  016762  020114  047506  020122
2304  016770  051503  006522  000012
2305                                    .EVEN
2306  016776  000000                    END:     0
2307          000001                    .END
```

```
ADRNIT  011236            836     837    1114#
ALL     007276            727     733     749#
ALMCK   010032            824     891#    907
ALMFLG  001300            544#    586*    822     853*
BEGIN   006312            506     567#
BELL  = 000007            471#   1947    1971
BINARY  011302           1114    1130#
BITYP$  015364           2076#
BIT0  = 000001            472#    908
BIT1  = 000002            473#
BIT10 = 002000            482#
BIT11 = 004000            483#
BIT12 = 010000            484#
BIT13 = 020000            485#    655
BIT14 = 040000            486#
BIT15 = 100000            487#
BIT2  = 000004            474#    892     928
BIT3  = 000010            475#    909
BIT4  = 000020            476#    680     820     846     929
BIT5  = 000040            477#
BIT6  = 000100            478#
BIT7  = 000200            479#
BIT8  = 000400            480#    732
BIT9  = 001000            481#    843
BUFSIZ  001262            537#   1705    1841    1917    1920
CNT     016214           2011*   2029*   2213    2218#
CNTLU   016134            675    2204#   2212    2247
CNTNIT  011240            587*    588*    589*    838     839     917*    918*    923*    925*    926*    927*    1115#
CNTTAB= 005313            565#   1565    1569*   1639*
COUNT   001306            547#    877     894*    901*    910     912     916     919     922     938     948
DEVADR  001266            539#    596     620     660     677     696     800    1429    1676    1739
DISPLA  001212            516#   2234*
DISPRE  000174            502#   2234
DJMAP   006460            596#
DONE    014550            612     890    1940#
EMT$    014636            575    1968#
END     016776           1120    1122    1124    1126    1128    1667    2306#
ERRORS  001202            512#    577*   1972*   1989
ERROR$  014770           1982    1992#
FORGND  007722            855     868#
FORP2   012230           1471#   1477
FORP3   013500           1731#
GETLEN  006762            656     673#
GETVEC  006542            609     618#
HLT   = 104000            459#    950    1076    1093    1607    1622    1876    1890    1895    1901
HLTADR  014766           1976*   1977*   1978    1979    1990#
HLTCT$  014764           1978*   1989#   1993*
ICNT    001200            511#
ILLUP   015704           2111    2138#
INHRE   015322           2004*   2006*   2060    2068#
INPUT   015324           2012    2042    2043    2069#
IOTRAP  015720            571    2152#
IOT$    016026           2153    2181#
ISRFLG  001276            543#    779*    886    1107*
KBDINT  016316            931    1941    1968    1986    2240#
LEVEL7= 000340            488#
```

```
MALARM  016741   934  2300#
MARK    001260   536#  828*  834  841*  1452*  1454  1459*  1578*  1580*  1583  1630*  1632*  1635
                1697*  1701  1717*
MASK    005312   564#  565  697  1089  1620  1888
MAXTAB  003312   559#  1715*  1839  1915  1919
MEMX3   013550  1746#  1752
MEOP    016411  1944  2257#
MNUM    016417   737  2259#
MSGADR  016514   659  2271#
MSGDAS  016735   937  2299#
MSGMDN  016453   657  2265#
MSGNUM  016570   665  2279#
MSGPRG  016613   728  2283#
MSGP2   016647  1456  2289#
MSGP3   016715  1706  2296#
MSGSEL  016422   740  2260#
MSGVEC  016544   662  2275#
MSG01   016632   610  2286#
N     = 000040   399#  1131#  1132#  1133#  1134#  1135#  1136#  1137#  1138#  1139#  1140#  1141#  1142#
                1143#  1144#  1145#  1146#  1147#  1148#  1149#  1150#  1151#  1152#  1153#  1154#  1155#
                1156#  1157#  1158#  1159#  1160#  1161#  1162#  1163#  1164#  1165#  1166#  1167#  1168#
                1169#  1170#  1171#  1172#  1173#  1174#  1175#  1176#  1177#  1178#  1179#  1180#  1181#
                1182#  1183#  1184#  1185#  1186#  1187#  1188#  1189#  1190#  1191#  1192#  1193#  1194#
                1195#  1196#  1197#  1198#  1199#  1200#  1201#  1202#  1203#  1204#  1205#  1206#  1207#
                1208#  1209#  1210#  1211#  1212#  1213#  1214#  1215#  1216#  1217#  1218#  1219#  1220#
                1221#  1222#  1223#  1224#  1225#  1226#  1227#  1228#  1229#  1230#  1231#  1232#  1233#
                1234#  1235#  1236#  1237#  1238#  1239#  1240#  1241#  1242#  1243#  1244#  1245#  1246#
                1247#  1248#  1249#  1250#  1251#  1252#  1253#  1254#  1255#  1256#  1257#  1258#  1259#
                1260#  1261#  1262#  1263#  1264#  1265#  1266#  1267#  1268#  1269#  1270#  1271#  1272#
                1273#  1274#  1275#  1276#  1277#  1278#  1279#  1280#  1281#  1282#  1283#  1284#  1285#
                1286#  1287#  1288#  1289#  1290#  1291#  1292#  1293#  1294#  1295#  1296#  1297#  1298#
                1299#  1300#  1301#  1302#  1303#  1304#  1305#  1306#  1307#  1308#  1309#  1310#  1311#
                1312#  1313#  1314#  1315#  1316#  1317#  1318#  1319#  1320#  1321#  1322#  1323#  1324#
                1325#  1326#  1327#  1328#  1329#  1330#  1331#  1332#  1333#  1334#  1335#  1336#  1337#
                1338#  1339#  1340#  1341#  1342#  1343#  1344#  1345#  1346#  1347#  1348#  1349#  1350#
                1351#  1352#  1353#  1354#  1355#  1356#  1357#  1358#  1359#  1360#  1361#  1362#  1363#
                1364#  1365#  1366#  1367#  1368#  1369#  1370#  1371#  1372#  1373#  1374#  1375#  1376#
                1377#  1378#  1379#  1380#  1381#  1382#  1383#  1384#  1385#  1386#
NEWIS   016216  2209  2220#
OPEN  = 000000   489#  520  521  522  523  524  525  526  527  528  529  530  531
                532  533  534  535
PCNT    001204   513#  578*  579*  1942*  1943*  1959
PDOWN$  015556   573  2111#  2133
PHRASE  011702  1116  1387#
PRINTR  015374   661  936  939  1980  1997  2078#  2208
PRINTS  015404   664  667  739  2080#  2162  2169
PROGAD  007340   761  764#
PROGNO  007340   730  756  763#
PROG1   007350   765  778#  885
PROG2   012012   766  1408#
PROG3   013216   767  1654#  1909
PS    = 177776   461#  568*  781*  854*  1410*  1465*  1656*  1725*  2032  2036*
PSTEMP  015174  2032*  2036  2039#
PUP$    015622  2120  2123#
PUVEC$  015712  2111*  2112*  2120*  2142#
P1INIT  007422   799#
```

```
P2INIT  012060  1428#
P2RISR  013042  1483  1487  1491  1495  1499  1503  1507  1511  1515  1519  1523  1527  1531
                1535  1539  1543  1598#
P2XISR  012650  1485  1489  1493  1497  1501  1505  1509  1513  1517  1521  1525  1529  1533
                1537  1541  1545  1552#
P3INIT  013270  1675#
P3RISR  014320  1758  1762  1766  1770  1774  1778  1782  1786  1790  1794  1798  1802  1806
                1810  1814  1818  1866#
P3XISR  014170  1760  1764  1768  1772  1776  1780  1784  1788  1792  1796  1800  1804  1808
                1812  1816  1820  1827#
RCVCNT= 004313   562#  839*  875  1097*
RCVISR  011114   960  964  968  972  976  980  984  988  992  996  1000  1004  1008
                1012  1016  1020  1066#
RCVLVL  001272   541#  804  1433  1680
RCVTAB  002312   556#  837*  1088  1099*  1571  1574  1625  1627*  1638*  1704*  1893  1899  1913*
                1914*  1915  1917*  1919*  1920*  1921  1922*  1923*
READIN  015030   729  741  2004#  2210
READ$   015176  2005  2041#
REPORT  006676   644  655#
RESTAR  007316   508  747  756#  1957  2136
RETURN  016442   658  736  1585  1640  2263#
RISR0   010400   802  960#
RISR1   010420   964#
RISR10  010600   992#
RISR11  010620   996#
RISR12  010640  1000#
RISR13  010660  1004#
RISR14  010700  1008#
RISR15  010720  1012#
RISR16  010740  1016#
RISR17  010760  1020#
RISR2   010440   968#
RISR3   010460   972#
RISR4   010500   976#
RISR5   010520   980#
RISR6   010540   984#
RISR7   010560   988#
R2SR0   012250  1431  1483#
R2SR1   012270  1487#
R2SR10  012450  1515#
R2SR11  012470  1519#
R2SR12  012510  1523#
R2SR13  012530  1527#
R2SR14  012550  1531#
R2SR15  012570  1535#
R2SR16  012610  1539#
R2SR17  012630  1543#
R2SR2   012310  1491#
R2SR3   012330  1495#
R2SR4   012350  1499#
R2SR5   012370  1503#
R2SR6   012410  1507#
R2SR7   012430  1511#
R3SR0   013570  1678  1758#
R3SR1   013610  1762#
R3SR10  013770  1790#
```

```
R3SR11  014010          1794#
R3SR12  014030          1798#
R3SR13  014050          1802#
R3SR14  014070          1806#
R3SR15  014110          1810#
R3SR16  014130          1814#
R3SR17  014150          1818#
R3SR2   013630          1766#
R3SR3   013650          1770#
R3SR4   013670          1774#
R3SR5   013710          1778#
R3SR6   013730          1782#
R3SR7   013750          1786#
SAVIT   001214           518#   742    743
SCOPE = 104400           458#
SELPRO  007170           726#   731    757    759
SIXBIT  011274          1118   1129#
SPACE   016450          1998   2264#
STACK = 001200           490#   567    780   1409   1655
SUM     001310           548#   895*   912*   913    916*   917    918    919*   920    922*   923
SUSWRR  016236           569   2226#
SVSW0   001220           520#   735    750    826   1450   1695
SVSW1   001222           521#
SVSW10  001240           528#
SVSW11  001242           529#
SVSW12  001244           530#
SVSW13  001246           531#
SVSW14  001250           532#
SVSW15  001252           533#
SVSW16  001254           534#
SVSW17  001256           535#
SVSW2   001224           522#
SVSW3   001226           523#
SVSW4   001230           524#
SVSW5   001232           525#
SVSW6   001234           526#
SVSW7   001236           527#
SWITCH  007230           736#   746
SWR     001210           515#   655    673    732    829    843    932   1945   1969   1973   1983   2204   2215*
                        2229   2233*  2240
SWREG   000176           503#   673    2204   2207   2233   2240
SWREQ   016226          2206   2222#
SW10  = 002000           409#  1945   1968   1969
SW11  = 004000           408#
SW12  = 010000           407#   932
SW13  = 020000           406#  1973
SW14  = 040000           405#
SW15  = 100000           404#
SW8   = 000400           412#
SW9   = 001000           411#  1987
TIME    010344           904    944#
TIMERA  001302           545#   896*   944*
TIMERB  001304           546#   897*   946*
TIMES   001216           519#   590*   883*   889*
TMP1    016364          2211   2215   2242*  2243*  2244*  2245   2250#
TRNERR  016366           888   2253#
```

TYPE = 000004 460# 610 657 658 659 662 665 728 736 737 740 888 934
937 1944 1947 1948 1971 1975 1981 1998 2054 2057 2064 2107 2135
2155 2164 2206 2209

UNITS 001264 538# 608* 636 666 676 695 745 749 851 1463 1723 1738
VECADR 001270 540# 630* 663 801 1430 1677
XISR0 010410 962#
XISR1 010430 966#
XISR10 010610 994#
XISR11 010630 998#
XISR12 010650 1002#
XISR13 010670 1006#
XISR14 010710 1010#
XISR15 010730 1014#
XISR16 010750 1018#
XISR17 010770 1022#
XISR2 010450 970#
XISR3 010470 974#
XISR4 010510 978#
XISR5 010530 982#
XISR6 010550 986#
XISR7 010570 990#
XMTCNT 004312 561# 562 838* 868 1038 1041* 1457* 1561 1564* 1573* 1586* 1641*
XMTISR 011000 962 966 970 974 978 982 986 990 994 998 1002 1006 1010
1014 1018 1022 1029#
XMTLVL 001274 542# 810 1439 1686
XMTTAB 001312 554# 782 836* 1040 1042* 1045* 1411 1456* 1563 1567* 1571* 1572* 1585*
1640* 1657 1703* 1731 1836 1837* 1838* 1839 1841* 1842 1845* 1911 1921*
X2SR0 012260 1485#
X2SR1 012300 1489#
X2SR10 012460 1517#
X2SR11 012500 1521#
X2SR12 012520 1525#
X2SR13 012540 1529#
X2SR14 012560 1533#
X2SR15 012600 1537#
X2SR16 012620 1541#
X2SR17 012640 1545#
X2SR2 012320 1493#
X2SR3 012340 1497#
X2SR4 012360 1501#
X2SR5 012400 1505#
X2SR6 012420 1509#
X2SR7 012440 1513#
X3SR0 013600 1760#
X3SR1 013620 1764#
X3SR10 014000 1792#
X3SR11 014020 1796#
X3SR12 014040 1800#
X3SR13 014060 1804#
X3SR14 014100 1808#
X3SR15 014120 1812#
X3SR16 014140 1816#
X3SR17 014160 1820#
X3SR2 013640 1768#
X3SR3 013660 1772#
X3SR4 013700 1776#

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X3SR5    013720          1780#
X3SR6    013740          1784#
X3SR7    013760          1788#
YESRT    015716          2145#
$ENDAD=  014622           499   1952#
.      = 017000           491#   495   498#   501#   505#   507#   510#   554#   556#   559#   561#   564#  1399#
                         1952   1959  1975   1976#  1981   1982#  1984   1989   1990   2046   2054   2069#  2079
                         2096   2099  2104   2110#  2135   2139   2155   2164   2167#  2191
.BIT   = 132000           399#   404   405    406    407    408    409    410    411    412   1945   1968   1973
                         1987
.PR      015532          2076*  2078*  2080*  2081*  2083   2087   2097*  2098   2101*  2103   2107   2110#
.PRF     015452          2085   2088   2093#
.PRL     015430          2086#  2102
.PTIT    015416          2077   2082#
.SAVR6   015710          2119*  2123   2141#
.TYPE    016132          2056*  2057   2185*  2186   2202#
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BCP	1131#	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145
	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160
	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175
	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190
	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205
	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220
	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235
	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250
	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265
	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280
	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295
	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310
	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325
	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340
	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355
	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370
	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385
BITYPE	1#	488#													
BLKBLK	1#														
BUFHDR	1#														
DUMP	1#	488#	660	1979	2207										
DUMP18	1#														
FILBLK	1#														
LNKBLK	1#														
ODT11	1#														
ODT11X	1#														
POP	1#	488#	1056	1101	1588	1643	1719	1856	1933	2033	2127				
PRINT	1#	488#	1975	1981	2053	2135									
PUSH	1#	488#	1029	1066	1552	1598	1699	1827	1866	2007	2113				
SCOPE.	1#														
SCOP.	1#														
SDUMP	1#	488#	663	666	2161	2168									
TRACE	1#														
TRNBLK	1#														
TYPEM	1#														
WRITE	1#														
$CATCH	1#														
$CMTAG	1#														
$CNTL	1#	2203													
$END	1#	1940													
$EQUAT	1#	458													
$HLT	1#	1960													
$IOCAT	399#	491													
$IOT	399#														
$KBIN	1#	2239													
$KRAT	1#														
$LOADR	1#														
$OCTAL	1#	2070													
$POWER	1#	2111													
$RAND	1#														
$RAND4	1#														
$READ	1#	2041													
$SCOPE	1#														
$SETUP	1#														
$SRAT	1#														
$SWDOC	1#	401													

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$SWRRR      1#   2225
$TRAP       1#
$TYPE       1#   2173
$URAT       1#
.SCOP       1#
.SCOPE      1#


. ABS.  017000     000


 ERRORS DETECTED:  0

 CZDJBG,CZDJBG/SOL/CRF/NL:TOC=CZDJBG.MAC,CZDJBG.P11
 RUN-TIME: 5 7 .7 SECONDS
 RUN-TIME RATIO: 38/14=2.7
 CORE USED:  20K  (39 PAGES)
```