

# DC14

TEST DC14-E/11  
MD-14-DCDCA-B

EP-DCDCA-B-DL-B  
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B01

EOF1DZDRBESBQ411

00010000

770720

PDP10 411

72HOR1DCDCABSEQ

00010000

770720

IDENTIFICATION

PRODUCE CODE: MAINDEC-14-DCDCA-B-D  
PRODUCT NAME: TEST DC-14E/11  
DATE CREATED: MAY 1977  
MAINTENANCE: DIAGNOSTIC ENGINEERING  
AUTHOR: D. DEKNIS

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## 1. ABSTRACT

THE PURPOSE OF THIS PROGRAM IS TO TEST AND DIAGNOSE THE OPERATION OF THE SERIAL LINE INTERFACE WHICH CONNECTS A PDP-11 AND INDUSTRIAL 14 CONTROLLERS. THERE ARE THREE PORTIONS TO THE TEST: THE FIRST PORTION CHECKS THE BASIC OPERATION OF THE MASTER CONTROL BOARD AND THE SEPARATE CHANNEL MODULES (ONE AT A TIME) WITH THE OUTPUTS OF THE TRANSMITTERS CONNECTED TO THE INPUTS OF THE RECEIVERS, RESPECTIVELY (CLOSED LOOP TESTS); THE SECOND PORTION CHECKS THE BASIC OPERATION OF THE SYSTEM WITH INDUSTRIAL 14 ATTACHED (EACH CHANNEL IS TESTED ONE AT A TIME); THE THIRD PORTION CHECKS SIMULTANEOUS OPERATION OF ALL CHANNELS WITH NO INDUSTRIAL 14 ATTACHED AND THE OUTPUTS OF THE TRANSMITTERS CONNECTED TO THE INPUTS OF THE RECEIVERS, RESPECTIVELY.

## 2. REQUIREMENTS

## 2.1 EQUIPMENT

PDP-11

DC-14 MASTER CONTROL MODULE (M8334)

AT LEAST 1 DC-14 CHANNEL MODULE (M8333)

INDUSTRIAL 14 CONTROLLER(S)

WITH M7481 HIGH SPEED SERIAL INTERFACE

## 2.2 THE PROGRAM OCCUPIES ALL OF 4K WORDS OF PDP-11 MEMORY

## 2.3 PRELIMINARY PROGRAMS

ALL INDUSTRIAL 14 CONTROLLERS SHOULD BE ABLE TO RUN TEST  
143/B

## 3.0 LOADING PROCEDURE

## 3.1 METHOD

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED

## 4. STARTING PROCEDURE

## 4.1 CONTROL SWITCH SETTINGS

THE FOLLOWING IS A TABLE OF SWITCH REGISTER SETTINGS AND  
THEIR OPERATION UPON THE PROGRAM:

SR	SET AS	ACTION
15	1	SCOPE LOOP
	0	DON'T LOOP
14	1	DON'T HALT ON ERROR
	0	HALT ON ERROR
13	1	DON'T PRINT ERRORS
	0	PRINT ERRORS
12	1	LOOP ON THIS CHANNEL
	0	DON'T LOOP
11	1	REPEAT ALL TESTS (PART 1 OR 2)
	0	DON'T REPEAT
10	1	RUN LONG CLOCK TEST (24 HOURS)

RUN SHORT CLOCK TEST (2 MINUTES) 001

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8  
7  
6  
5  
4  
3  
2  
1  
0

0  
1  
0  
1  
0  
1  
0  
1  
0  
1  
0  
1  
0

3 SET TO HIGHEST AVAILABLE CHANNEL NUMBER (OCTAL) INDICATES TO THE PROGRAM THE HIGHEST AVAILABLE CHANNEL FOR TESTING

NOTE: SR15 HAS PRECEDENCE OVER SR14 AND SR13  
SR11 REPEATS ALL TESTS IN PART 1 EXCEPT CLOCK TEST

4.2 STARTING ADDRESSES

4.2.1 START THE PROGRAM AT LOCATION 000200 TO RUN THE CLOSED LOOP (NO INDUSTRIAL 14) UNIQUE CHANNEL TESTS (PART 1)

4.2.2 START THE PROGRAM AT LOCATION 000204 TO RUN THE OPEN LOOP (WITH INDUSTRIAL 14) UNIQUE CHANNEL TESTS (PART 2)

4.2.3 START THE PROGRAM AT LOCATION 000210 TO RUN THE CLOSED LOOP (NO INDUSTRIAL 14) SIMULTANEOUS CHANNEL TESTS (PART 3)

4.3 PROGRAM AND/OR OPERATOR ACTION

4.3.1 ASSURE THAT THE MASTER CONTROL MODULE AND THE INDIVIDUAL CHANNEL MODULES ARE SECURELY INSERTED INTO THE PDP-11 AND HAVE TOP-EDGE CONNECTORS JOINING THEM ALL TOGETHER. ALSO MAKE SURE THAT THE ROTARY SWITCHES ARE SET TO UNIQUE CONSECUTIVE NUMBERS, ON EACH CHANNEL BOARD, STARTING WITH 0 (NEXT TO MASTER CONTROL MODULE) THEN 1 (NEXT TO 0), ETC.

4.3.2 IF A INDUSTRIAL 14 IS TO BE CONNECTED TO EACH CHANNEL, ASSURE THAT THE INDIVIDUAL CABLES ARE FIRMLY ATTACHED TO THE INDUSTRIAL 14(S) AND THE CHANNEL MODULE(S), AND THAT ALL MODULE(S) ARE PRESENT AND SECURE IN THE INDUSTRIAL 14(S).

4.3.3 IF NO INDUSTRIAL 14'S ARE TO BE CONNECTED, CONNECT THE OUTPUT OF THE INDIVIDUAL CHANNEL TRANSMITTERS TO THEIR RESPECTIVE RECEIVERS EITHER AT THE MODULE OR AT THE END OF THE CABLES, WHICHEVER IS DESIRED.

4.3.4 POWER UP THE PDP-11 AND THE INDUSTRIAL 14(S)

4.3.5 LOAD THE ABSOLUTE PROGRAM INTO THE PDP-11 USING THE ABSOLUTE LOADER (NORMAL MODE).

4.3.6 SET THE APPROPRIATE STARTING ADDRESS (SEE 4.2 ABOVE) INTO THE SEITCH REGISTERS AND DEPRESS "LOAD ADDRESS"

4.3.7 SET THE SWITCH REGISTER PER 4.1 (ABOVE) (BE SURE TO SET HIGHEST AVAILABLE CHANNEL NUMBER (OCTAL) IN SR3 TO 0 IF MORE THAN 1 CHANNEL IS TO BE TESTED). DEPRESS "START"

4.3.8 PROGRAM WILL NOW RUN TO COMPLETION (IF APPROPRIATE)  
(ASSUMING NO ERRORS). SEE 8.2

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

(SEE 4.1 ABOVE)

5.2 SUBROUTINE ABSTRACTS

(NONE)

5.3 PROGRAM AND/OR OPERATOR ACTION

(SEE 4.3 ABOVE)

6. ERRORS

6.1 ERROR HALTS AND DESCRIPTION

MOST OF THE ERROR HALTS IN THE PROGRAM ARE PRECEDED BY  
ERROR TYPEOUTS. HOWEVER, IF IN DOUBT ABOUT THE CAUSE OF  
THE ERROR HALT, CONSULT THE LISTING (AND THE STACK POINTER).

6.2 ERROR RECOVERY

TO SCOPE AN ERROR CONDITION AFTER AN ERROR HALT, SET THE  
SWITCH REGISTER PER 4.1 AND DEPRESS "CONTINUE"

6.3 ERROR MESSAGES

THE ERROR MESSAGES OUTPUT BY THE PROGRAM WILL GENERALLY  
CONTAIN: A DESCRIPTION OF THE TEST BEING PERFORMED; THE  
CHANNEL FAILING; THE SPECIFIC ERROR CONDITION; AND, IF  
APPROPRIATE, THE CORRECT AND FAILING DATA WORDS.

7. RESTRICTIONS

7.1 STARTING RESTRICTIONS

NONE IF PROCEDURE IN 4.3 (ABOVE) IS FOLLOWED.

7.2 OPERATING RESTRICTIONS

NONE IF PROCEDURE IN 4.3 (ABOVE) IS FOLLOWED.

8. MISCELLANEOUS

8.1 EXECUTION TIME

THE EXECUTION TIME OF THE INDIVIDUAL CHANNEL TESTS (FIRST  
AND SECOND PORTIONS OF THE PROGRAM) IS DEPENDENT UPON  
HOW MANY CHANNELS ARE BEING TESTED AND IF SHORT CLOCK  
TEST OR LONG CLOCK TEST HAS BEEN SELECTED (IN THE FIRST  
PART ONLY). THE SIMULTANEOUS TEST DOES NOT END, BUT WILL  
RUN UNTIL STOPPED BY THE OPERATOR OR AN ERROR OCCURS. IN  
PARTS 1 AND 2, THE BELL ON THE TELEPRINTER WILL RING  
ONCE AFTER TESTING EACH CHANNEL AND ONCE WHEN ALL CHANNELS  
HAVE BEEN TESTED.

8.2 PROGRAM COMPLETION ADDRESSES

8.2.1 THE CLOSED LOOP UNIQUE CHANNEL TESTS WILL STOP AT 004460

WHEN THE SHORT CLOCK TEST IS COMPLETE. DEPRESSING "CONTINUE" WILL REPEAT THE CLOCK TEST ONLY.

- 8.2.2 THE OPEN LOOP UNIQUE CHANNEL TESTS WILL STOP AT 010626 AFTER ALL TESTS HAVE RUN. DEPRESSING "CONTINUE" WILL REPEAT ALL TESTS.
- 8.2.3 THE CLOSED LOOP SIMULTANEOUS CHANNEL TESTS DO NOT STOP, EXCEPT FOR ERRORS. THIS TEST SHOULD BE RUN FOR AT LEAST FIVE MINUTES TO CONFIRM THE PROPER OPERATION OF THE HARDWARE.
- 9.0 PROGRAM DESCRIPTION
- 9.1 CLOSED LOOP UNIQUE CHANNEL TESTS
- 9.1.1 TEST01 (SA=000532) LOAD AND READ SCRS CHANNEL SELECT
- THIS TEST CHECKS THE ABILITY TO LOAD INTO AND READ OUT OF THE CHANNEL SELECTION BITS OF THE SCRS REGISTER. THE COMPLEMENT OF THE DATA WORD, AND THEN THE DATA WORD ITSELF IS LOADED INTO THE SCRS, THEN THE SCRS IS READ TO CHECK ITS CONTENTS.
- 9.1.2 TEST02 (SA=000642) LOAD AND READ SCTS CHANNEL SELECT
- THIS TEST CHECKS THE ABILITY TO LOAD INTO AND READ OUT OF THE CHANNEL SELECTION BITS OF THE SCTS REGISTER. THE COMPLEMENT OF THE DATA WORD, AND THEN THE DATA WORD ITSELF IS LOADED INTO THE SCTS, THEN THE SCTS IS READ TO CHECK ITS CONTENTS.
- 9.1.3 TEST03 (SA=000752) LOAD AND READ INTERRUPT ENABLES
- THIS TEST CHECKS THE ABILITY TO LOAD INTO AND READ OUT THE INTERRUPT ENABLE/DISABLE BITS VIA THE SCRS. FIRST 0 IS STORED IN ALL INTERRUPT ENABLE/DISABLE BITS, THEN 1 IS STORED IN THE CURRENT CHANNEL ERROR ENABLE/DISABLE BIT, AND THEN READ BACK AND CHECKED; THIS IS REPEATED FOR THE FLAG ENABLE BIT. THEN 1 IS STORED IN ALL INTERRUPT ENABLE/DISABLE BITS, THEN 0 IS STORED IN THE CURRENT CHANNEL ERROR ENABLE/DISABLE BIT; AND THEN READ BACK AND CHECKED; THIS IS REPEATED FOR THE FLAG ENABLE BIT.
- 9.1.4 TEST04 (SA=001350) INTERRUPTS DISABLED AFTER "RESET"
- THIS TEST CHECKS THE ABILITY TO DISABLE THE CURRENT CHANNEL INTERRUPTS VIA THE PDP-11 "RESET" INSTRUCTION. THE CURRENT CHANNEL INTERRUPTS ARE ENABLED, THEN A "RESET" INSTRUCTION IS ISSUED AND THE BITS ARE THEN CHECKED TO ASSURE THE INTERRUPTS ARE THEN DISABLED.
- 9.1.5 TEST05 (SA=001444) LOAD AND READ SCTS BITS 0 AND 1
- THIS TEST CHECKS THE ABILITY TO LOAD AND READ BITS 0 AND 1 OF THE SCTS REGISTER. A COUNT PATTERN IS LOADED INTO, THEN READ

OUT OF BITS 0 AND 1 OF THE SCTS REGISTER, ONE NUMBER AT A TIME.

9.1.6 TEST06 (SA=001536) TRANSMISSION AND RECEPTION (NON-INTERRUPT)

THIS TEST CHECKS THE TRANSMISSION AND RECEPTION OF DATA WORDS USING A NON-INTERRUPT TYPE OF ENVIRONMENT. A DATA WORD IS TRANSMITTED USING TRANSMISSION MODE 2. THEN THE "TRANSMISSION DONE FLAG" AND "RECEIVER ACTIVE FLAG" ARE CHECKED FOR PROPER OPERATION. THEN THE PROPER CURRENT CHANNEL STATUS IS CHECKED USING THE SCRS REGISTER; THE THE PROPER RETURN DATA WORD IS CHECKED USING THE SCD REGISTER. THIS IS REPEATED FOR 4096 DATA WORDS. THIS WHOLE TEST IS REPEATED FOR TRANSMISSION MODE 3.

9.1.7 TEST07 (SA=002226) TRANSMISSION AND RECEPTION (INTERRUPT)

THIS TEST CHECKS THE TRANSMISSION AND RECEPTION OF DATA WORDS USING A INTERRUPT TYPE OF ENVIRONMENT. A DATA WORD IS TRANSMITTED USING TRANSMISSION MODE 2. THEN THE "TRANSMISSION DONE FLAG" AND "RECEIVER ACTIVE FLAG" ARE CHECKED FOR PROPER OPERATION. AFTER AN INTERRUPT OCCURS, THE PROPER CHANNEL STATUS IS CHECKED USING THE ICRS REGISTER; THEN THE PROPER RETURN DATA WORD IS CHECKED USING THE ICD REGISTER. THIS IS REPEATED FOR 4096 DATA WORDS. THIS WHOLE TEST IS REPEATED FOR TRANSMISSION MODE 3.

9.1.8 TEST08 (SA=003120) RUN FLIP/FLOP

THIS TEST CHECKS THE "RUN FLIP/FLOP". AN "0200" IS ISSUED USING TRANSMISSION MODE 1. AFTER AN INTERRUPT OCCURS, THE PROPER CHANNEL STATUS IS CHECKED FOR RUN TO BE 0 USING THE ICRS REGISTER. AFTER A SUITABLE DELAY, RUN IS AGAIN CHECKED TO HAVE RETURNED TO THE "1" STATE.

9.1.9 TEST09 (SA=003410) WORD LOST FLIP/FLOP

THIS TEST CHECKS THE "WORD LOST FLIP/FLOP". THE "OUTPUT FLAG" IS SET TWICE BY TWO TRANSMISSIONS TO THE INDUSTRIAL 14 WITHOUT CLEARING THE "OUTPUT FLAG" BETWEEN THEM. AFTER AN INTERRUPT OCCURS, THE PROPER CHANNEL STATUS IS CHECKED FOR "WORD LOST" TO BE SET USING THE ICRS REGISTER.

9.1.19 TEST10 (SA=003726) REAL TIME CLOCK

THIS TEST CHECKS THE REAL TIME CLOCK TO FUNCTION PROPERLY. FIRST THE CLOCK BUFFERS ARE CLEARED BY A "CLR 2LTS", THEN LTS IS CHECKED TO READ NON-ZERO. THEN THE "CLR 2LTS" IS CHECKED TO CLEAR THE CLOCK COUNTER. THEN THE CLOCK IS MONITORED TO CHECK PROPER COUNTING FOR A PERIOD OF EITHER TWO MINUTES (SR10=0) OR INDEFINITE (SR10=1). IF THE TWO MINUTE TEST IS BEING

RUN, THE PROGRAM OUTPUTS "M" ON THE TELETYPE AT THE END OF TWO MINUTES. IF THE LONG TEST IS BEING RUN, THE PROGRAM OUTPUTS "D" ON THE TELETYPE AT THE END OF 24 HOURS.

## 9.2 OPEN UNIQUE CHANNEL TESTS

### 9.2.1 TEST 20 (SA=004622) TEST OF 14 INSTRUCTION DECODING

THIS TEST VERIFIES THAT ALL ONE, TWO AND THREE WORD INSTRUCTIONS ARE PROPERLY DECODED BY THE DC-14E. ALL FLAGS ARE CHECKED AND TIMED TO MAKE SURE THAT THEY FUNCTION PROPERLY.

### 9.2.2 TEST 21 (SA=006676) TEST OF OUTPUT REGISTER

THIS TEST CHECKS THE OUTPUT REGISTER FOR PROPER FUNCTIONING (THAT NO OUTPUT REGISTER INSTRUCTIONS ARE LOST). THE 14 MEMORY IS LOADED WITH A SHORT PROGRAM COMPRISED OF TRANSFER PC TO OUTPUT AND TD INSTRUCTIONS. THIS PROGRAM IS ALLOWED TO RUN AND THE OUTPUT REGISTER IS MONITORED TO CHECK THAT ALL TRANSFERS TO THE OUTPUT REGISTER ARE EXECUTED IN ORDER.

THE PROGRAM WRITTEN IN THE 14 MEMORY IS THE FOLLOWING:

PC	CONTENTS	PC	CONTENTS
0000	0046 (PC OUT)	0006	0046 (PC OUT)
0001	0046 (PC OUT)	0007	0046 (PC OUT)
0002	0136 (TD)	0010	0046 (PC OUT)
0003	1000 (ADDR)	0011	0136 (TD)
0004	0136 (TD)	0012	1002 (ADDR.)
0005	1001 (ADDR.)	0013	0004 (CLR PC)

THE BUFFER FROM READING THE OUTPUT REGISTER SHOULD CONTAIN:

0001 (PC)  
 0002 (PC)  
 1000 (TD RESULT)  
 1001 (TD RESULT)  
 0007 (PC)  
 0010 (PC)  
 0011 (TD RESULT)

### 9.2.3 TEST 22 (SA=007216) MEMORY TEST

A MEMORY TEST IS PERFORMED ON THE 14 TO CHECK THAT THE DC-14E CAN PASS ALL BITS PROPERLY, AND THAT ALL MA AND MD LINES WORK CORRECTLY. THE MEMORY TEST PERFORMED IS THE ADDRESS COMPLIMENT TEST.

### 9.2.4 TEST 22Z (SA=007470) CDF TEST

THE DATA FIELD OPERATION IS CHECKED IN THIS TEST TO FUNCTION PROPERLY. A 2525 IS WRITTEN IN FIELD 0, AND A 5252 IS WRITTEN IN FIELD (14/35). USING THE DATA FIELD THEY ARE READ BACK TO VERIFY THAT THE DC-14 CAN ADDRESS BOTH FIELDS CORRECTLY.

### 9.2.5 TEST23 (SA=010064) TURN INDUSTRIAL TRANSMITTER OFF AND ON

THIS TEST CHECKS THAT "0300" TURNS OFF THE TRANSMITTER AT THE INDUSTRIAL AND KILLS "RUN", AND THAT "0200" TURNS THE TRANSMITTER BACK



ON: BOTH INSTRUCTIONS ARE EXECUTED USING TRANSMISSION MODE 1. FIRST "0300" IS TRANSMITTED TO THE INDUSTRIAL 14 USING TRANSMISSION MODE 1. AFTER THE INSTRUCTION IS EXECUTED BY THE INDUSTRIAL 14, "RUN" IS CHECKED TO BE OFF AND NO INSTRUCTIONS CAN BE EXECUTED BY THE INDUSTRIAL 14. THE "0200" IS TRANSMITTED TO THE PDP-14 USING TRANSMISSION MODE 3. AFTER THE INSTRUCTION IS EXECUTED BY THE PDP-14, "RUN" IS CHECKED (AFTER A SUITABLE DELAY) TO BE ON AND INSTRUCTIONS CAN BE EXECUTED BY THE PDP-14 AGAIN.

9.3 CLOSED LOOP SIMULTANEOUS CHANNEL TESTS

9.3.1 TEST30 (SA=010710) CONSECUTIVE INTERRUPTS

THIS TEST CHECKS THAT SIMULTANEOUS INTERRUPT REQUESTS FROM MULTIPLE CHANNELS OCCUR IN CONSECUTIVE NUMERICAL ORDER. FIRST, ALL CHANNELS HAVE THEIR "EXTERNAL FLAG" SET. THEN, AFTER AN INTERRUPT OCCURS, THE ICRS REGISTER IS READ: IT SHOULD READ BACK AN INTERRUPT REQUEST FROM CHANNEL 0. SUCCESSIVE READING OF THE ICRS REGISTER SHOULD READ BACK REQUESTS FROM SUCCESSIVE CHANNELS (1,2,3, ETC) UNTIL ALL REQUESTS ARE READ BACK. IF THE CHANNEL NUMBERS ARE NOT SEQUENTIAL, AN ERROR HAS OCCURRED.

9.3.2 TEST31 (SA=011164) MULTIPLE CHANNEL EXERCISER

THIS TEST SIMULTANEOUSLY EXERCISES ALL CHANNELS. A SPECIFIC PROGRAM IS RUN BY ALL INDUSTRIAL 14'S AND CHECKS ARE PERFORMED IN A BACKGROUND JOB SO THAT "TRANSMISSION DONE" AND "RECEIVER ACTIVE" ARE ALWAYS THE SAME. INFORMATION IS SENT TO THE INDUSTRIAL 14'S USING A NON-INTERRUPT ENVIRONMENT. THE PROGRAMS "EXECUTED" BY THE PDP-14'S IS AS FOLLOWS.

DATA WORD	EXPECTED STATUS	EXPECTED DATA WORD	TRANSMIT MODE
000060 (EEM)	EXT FLG	-----	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
000024 (JMP)	EXT FLG	-----	
000046 (ADDRESS)	EXT FLG	-----	
000046 (TRR PC,OT)	EXT OUT FLG	000046	
160000 (TXD D)	EXT, OUT FLG	160000	
170000 (TYD D)	EXT, OUT FLG	170000	
000124 (JMS)	EXT FLG	-----	
000046 (ADDRESS)	EXT FLG	-----	
000046 (TRR PC,OT)	EXT, OUT FLG	000046	
000022 (TRM)	EXT FLG	-----	
050125 (WORD)	EXT, OUT FLG	050125	
000022 (TRM)	EXT FLG	-----	
120252 (WORD)	EXT, OUT FLG	120252	
100226 (TRM)	EXT FLG	-----	
170377 (WORD)	EXT, OUT FLG	170377	

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        .TITLE PDP-11 DC-14E DIAGNOSTIC MD-14-DCDCA-B
        .ENABLE ABS
        .ENABLE AMA
;DC14 DIAGNOSTIC FOR THE PDP-11 (SLI-11)
;TRAP HANDLERS
        .=0
        .REPT 40
        .+2
        HALT ;TRAPPED TO PREVIOUS ADDRESS
        .ENDR
        .=200
        JMP BEGIN1 ;CLOSED LOOP UNIQUE CHANNEL TESTS
        JMP BEGIN2 ;OPEN LOOP UNIQUE CHANNEL TESTS
        JMP BEGIN3 ;CLOSE LOOP SIMULTANEOUS CHANNEL TESTS
;SOME GENERAL PURPOSE REGISTER DEFINITIONS
        R0=%0
        R1=%1
        R2=%2
        R3=%3
        R4=%4
        R5=%5
        R6=%6
        R7=%7
        CHANEL=R0
        GOOD=R1
        IN=R2
        TEMP=R3
        CNTR=R4
        AC=R5
        SP=R6
        PC=R7
;SWITCH REGISTER BITS
        SCOPE=10000 ;SCOPE LOOP (SR15=1)
        NOHLT=40000 ;DON'T HALT ON ERROR (SR14=1)
        NOPRNT=20000 ;DON'T PRINT ON ERROR (SR13=1)
        HOLDCH=10000 ;LOOP ON THIS CHANNEL (SR12=1)
        REPEAT=4000 ;REPEAT ALL TESTS (PART1 OR 2) (SR11=1)
        LCLK=2000 ;RUN LONG CLOCK TEST (SR10=1)
        MMODE=1000 ;MAINTENANCE MODE (NO OUTPUT FROM MODULE) (SR9=1)
        ;HIGHEST AVAILABLE CHANNEL (SR 3 TO 0)
;INSTRUCTIONS
        NOP=000240
;SOME GENERAL PURPOSE POINTERS
;PRINTER POINTERS
        OUTCSR: 177564 ;CSR FOR TTY OUT
        OUTDBR: 177566 ;DBR FOR TTY OUT
    
```

```

000000
000040
000200
000137 000500
000204 000137 004604
000210 000137 010704
    
```

```

000000
000001
000002
000003
000004
000005
000006
000007
000000
000001
000002
000003
000004
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000007
    
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100000
040000
020000
010000
004000
002000
001000
    
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000214 177564
000216 177566
    
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57          ;SWITCH REGISTER POINTER
58 000220 177570 SWR: 177570
59
60          ;PROCESSOR STATUS POINTER
61 000222 177776 PS: 177776
62
63          ;DC-14 POINTERS
64
65 000224 177360 ICRS: 177360 ; INTERRUPT CHANNEL RECEIVER STATUS
66 000226 177362 ICTS: 177362 ; NO USED
67 000230 177364 SCRS: 177364 ; SELECTED CHANNEL RECEIVER STATUS
68 000232 177366 SCTS: 177366 ; SELECTED CHANNEL TRANSMITTER STATUS
69 000234 177370 ICD: 177370 ; INTERRUPT CHANNEL DATA
70 000236 177372 SCD: 177372 ; SELECTED CHANNEL DATA
71 000240 177374 LTS: 177374 ; LAPSED TIME SECONDS
72 000242 177376 LTH: 177376 ; LAPSED TIME HOURS
73 000244 000170 DC14TV: 170 ; DC14 TRAP VECTOR (ADDRESS WORD)
74 000246 000172 172 ; (STATUS WORD)
75
76          ;SOME DC-14 LEFT HALVES
77 000250 177361 ICRS1: 177361
78 000252 177363 ICTS1: 177363
79 000254 177365 SCRS1: 177365
80 000256 177367 SCTS1: 177367
81 000260 177375 LTS1: 177375
82 000262 177377 LTH1: 177377
83
84          ;TEMP STORAGE AND VARIABLE CONSTANTS
85 000264 177760 DELAY: -20 ; DELAY BETWEEN TRANSMISSION AND RECEPTION
86 000266 000000 TENTHS: 0
87 000267 000267 SECOND=TENTHS+1
88 000270 000000 MINUTE: 0
89 000271 000271 HOUR=MINUTE+1
90 000272 000000 HICKL: 0
91 000274 000000 LOCLK: 0
92 000276 000000 STATIO: 0
93 000300 177000 DELY1: -1000
94 000302 000000 HEAD1: 0
95 000304 000000 HEAD2: 0
96
97          ;BEGINNING OF PROGRAM WHICH TESTS CHANNELS CLOSED LOOP (UNIQUELY)
98          ;=500
99 000500 010706 BEGIN1: MOV PC,SP ; SET UP STACK POINTER
100 000502 005746 TST -(SP) ; TO JUST BEFORE BEGINNING OF PROGRAM
101 000504 004737 013274 JSR PC,NOCACH ; IF AN 11/70 CENTRAL PROCESSOR,
102 ; DISABLE CACHE MEMORY.
103 000510 017737 177504 000276 MOV @SWR,STATIO ; SET UP STATION COUNT
104 000516 042737 177760 000276 BIC #177760,STATIO ; TO 1'S COMP
105 000524 005137 000276 COM STATIO ; OF SWR 3 TO 0
106 000530 005000 CLR CHANEL ; CLEAR CHANNEL NUMBER
107 000532 005077 177464 TEST00: CLR @PS ; GO TO PROCESSOR LEVEL 0
108
109          ;TEST THE LOADING AND READING OF THE SCRS CHANNEL SELECT BITS (11 TO 8)
110
111 000536 012737 013456 000302 TEST01: MOV #MESS1,HEAD1 ; SET UP HEADERS
112 000544 012737 013342 000304 MOV #MESS6,HEAD2

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113 000552 012704 177760
114 000556 010403
115 000560 005103
116 000562 142703 000360
117 000566 110377 177462
118 000572 010401
119 000574 042701 177760
120 000600 110177 177450
121 000604 117702 177444
122 000610 004737 012576
123 000614 000771
124 000616 042702 177760
125 000622 020102
126 000624 001402
127 000626 004737 012312
128 000632 004737 012576
129 000636 000760
130 000640 005204
131 000642 001345
132 000644 000240
133
134
135
136 000646 012737 013516 000302
137 000654 012737 013342 000304
138 000662 012704 177760
139 000666 010403
140 000670 005103
141 000672 142703 000360
142 000676 110377 177354
143 000702 010401
144 000704 042701 177760
145 000710 110177 177342
146 000714 117702 177336
147 000720 004737 012576
148 000724 000771
149 000726 042702 177760
150 000732 020102
151 000734 001402
152 000736 004737 012312
153 000742 004737 012576
154 000746 000760
155 000750 005204
156 000752 001345
157 000754 000240
158
159
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161
162 000756 012737 013556 000302
163 000764 012737 013342 000304
164 000772 012704 177760
165 000776 010403
166 001000 042703 177760
167 001004 000303
168 001006 010377 177216

TEST1B: MOV # -20, CNTR
MOV CNTR, TEMP
COM TEMP
BICB #360, TEMP
MOV #360, TEMP
MOV #177760, TEMP
MOV CNTR, GOOD
BIC #177760, GOOD
TEST1A: MOVB GOOD, JSCRS1
MOVB JSCRS1, IN
JSR PC, LOOP0
BR TEST1A
BIC #177760, IN
CMP GOOD, IN
BEQ .+6
JSR PC, ERROR1
JSR PC, LOOP0
BR TEST1A
INC CNTR
BNE TEST1B
NOP

;LOAD COMPLEMENT OF DATA WORD
;LOAD REAL DATA WORD
;READ DATA WORD BACK
;LOOP?
;YES
;CLEAR SUPERFLUOUS BITS
;COMPARE GOOD AND UNKNOWN DATA
;OK?
;NO, ERROR
;LOOP?
;YES
;INCREMENT DATA WORD, DONE?
;NO, LOOP

;TEST THE LOADING AND READING OF THE SCTS CHANNEL SELECT BITS (11 TO 8)

TEST02: MOV #MESS2, HEAD1
MOV #MESS69, HEAD2
TEST2B: MOV # -20, CNTR
MOV CNTR, TEMP
COM TEMP
BICB #360, TEMP
MOV #360, TEMP
MOV #177760, TEMP
MOV CNTR, GOOD
BIC #177760, GOOD
TEST2A: MOVB GOOD, JSCRS1
MOVB JSCRS1, IN
JSR PC, LOOP0
BR TEST2A
BIC #177760, IN
CMP GOOD, IN
BEQ .+6
JSR PC, ERROR1
JSR PC, LOOP0
BR TEST2A
INC CNTR
BNE TEST2B
NOP

;SET UP HEADERS
;LOAD COMPLEMENT OF DATA WORD
;LOAD REAL DATA WORD
;READ DATA WORD BACK
;LOOP?
;YES
;CLEAR SUPERFLUOUS BITS
;COMPARE GOOD AND UNKNOWN DATA
;OK?
;NO, ERROR
;LOOP?
;YES
;INCREMENT DATA WORD, DONE?
;NO, LOOP

;TEST THE LOADING AND READING OF THE INTERRUPT ENABLE BITS OF THE
;CHANNEL SET IN "CHANEL" VIA SCRS

TEST03: MOV #MESS3, HEAD1
MOV #MESS69, HEAD2
T03L1: MOV # -20, CNTR
MOV CNTR, TEMP
BIC #177760, TEMP
SWAB TEMP
MOV TEMP, JSCRS

;SET UP HEADERS
;TRY TO STORE 0 IN ALL INTERRUPT ENABLE BITS
    
```

169	001012	005204		INC	CNTR	
170	001014	001370		BNE	T03L1	
171	001016	010001		TEST3A: MOV	CHANEL, GOOD	; MOVE CURRENT CHANNEL NUMBER INTO GOOD
172	001020	062701	000020	ADD	#20, GOOD	; COMBINE IN "ERROR INTERRUPT ENABLE" BIT
173	001024	010177	177200	MOV	GOOD, %SCRS	; LOAD INTO SCRS
174	001030	017702	177174	MOV	%SCRS, IN	; READ DATA BACK
175	001034	004737	012576	JSR	PC, LOOP0	; LOOP?
176	001040	000766		BR	TEST3A	; YES
177	001042	042702	170317	BIC	#170317, IN	; MASK OFF SUPERFLUOUS BITS
178	001046	020102		CMP	GOOD, IN	; COMPARE GOOD AND UNKNOWN DATA
179	001050	001402		BEQ	+6	; OK (ERROR INTERRUPT ENABLE SET)?
180	001052	004737	012312	JSR	PC, ERROR1	; NO, ERROR
181	001056	004737	012576	JSR	PC, LOOP0	; LOOP?
182	001062	000755		BR	TEST3A	; YES
183	001064	012704	177760	MOV	#-20, CNTR	
184	001070	010403		T03L2: MOV	CNTR, TEMP	; TRY TO STORE 0 IN ALL INTERRUPT ENABLE BITS
185	001072	042703	177760	BIC	#177760, TEMP	
186	001076	000303		SWAB	TEMP	
187	001100	010377	177124	MOV	TEMP, %SCRS	
188	001104	005204		INC	CNTR	
189	001106	001370		BNE	T03L2	
190	001110	010001		TEST3B: MOV	CHANEL, GOOD	; MOVE CURRENT CHANNEL NUMBER
191	001112	062701	000040	ADD	#40, GOOD	; COMBINE IN "FLAG INTERRUPT ENABLE" BIT
192	001116	010177	177106	MOV	GOOD, %SCRS	; LOAD INTO SCRS
193	001122	017702	177102	MOV	%SCRS, IN	; READ DATA BACK
194	001126	004737	012576	JSR	PC, LOOP0	; LOOP?
195	001132	000766		BR	TEST3B	; YES
196	001134	042702	170317	BIC	#170317, IN	; MASK OFF SUPERFLUOUS BITS
197	001140	020102		CMP	GOOD, IN	; COMPARE GOOD AND UNKNOWN DATA
198	001142	001402		BEQ	+6	; OK (FLAG INTERRUPT ENABLE SET)?
199	001144	004737	012312	JSR	PC, ERROR1	; NO, ERROR
200	001150	004737	012576	JSR	PC, LOOP0	; LOOP?
201	001154	000755		BR	TEST3B	; YES
202	001156	012704	177760	MOV	#-20, CNTR	
203	001162	010403		T03L3: MOV	CNTR, TEMP	; TRY TO STORE 1 IN ALL INTERRUPT ENABLE BITS
204	001164	042703	177760	BIC	#177760, TEMP	
205	001170	000303		SWAB	TEMP	
206	001172	062703	000060	ADD	#60, TEMP	
207	001176	010377	177026	MOV	TEMP, %SCRS	
208	001202	005204		INC	CNTR	
209	001204	001366		BNE	T03L3	
210						
211	001206	010001		TEST3C: MOV	CHANEL, GOOD	; MOVE CURRENT CHANNEL NUMBER
212	001210	062701	000040	ADD	#40, GOOD	; COMBINE IN "FLAG INTERRUPT ENABLE" BIT
213	001214	010177	177010	MOV	GOOD, %SCRS	; LOAD INTO SCRS
214	001220	017702	177004	MOV	%SCRS, IN	; READ DATA BACK
215	001224	004737	012576	JSR	PC, LOOP0	; LOOP?
216	001230	000766		BR	TEST3C	; YES
217	001232	042702	170317	BIC	#170317, IN	; MASK OFF SUPERFLUOUS BITS
218	001236	020102		CMP	GOOD, IN	; COMPARE GOOD AND UNKNOWN DATA
219	001240	001402		BEQ	+6	; OK (ERROR INTERRUPT ENABLE CLEAR)?
220	001242	004737	012312	JSR	PC, ERROR1	; NO, ERROR
221	001246	004737	012576	JSR	PC, LOOP0	; LOOP?
222	001252	000755		BR	TEST3C	; YES
223	001254	012704	177760	MOV	#-20, CNTR	
224	001260	010403		T03L4: MOV	CNTR, TEMP	; TRY TO STORE 1 IN ALL INTERRUPT ENABLE BITS

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225 001262 042703 017776          BIC      #17776,TEMP
226 001266 000303          SWAB    TEMP
227 001270 062703 000060          ADD     #60,TEMP
228 001274 010377 176730          MOV     TEMP,@SCRS
229 001300 005204          INC     CNTR
230 001302 001366          BNE    T03L4
231 001304 010001          TEST3D: MOV    CHANEL,GOOD      ;MOVE CURRENT CHANNEL NUMBER
232 001306 062701 000020          ADD     #20,GOOD      ;COMBINE IN "ERROR INTERRUPT ENABLE" BIT
233 001312 010177 176712          MOV     GOOD,@SCRS    ;LOAD INTO SCRS
234 001316 017702 176706          MOV     @SCRS,IN      ;READ DATA BACK
235 001322 004737 012576          JSR     PC,LOOP0      ;LOOP?
236 001326 000766          BR     TEST3D         ;YES
237 001330 042702 170317          BIC     #170317,IN    ;MASK OFF SUPERFLUOUS BITS
238 001334 020102          CMP     GOOD,IN      ;COMPARE GOOD AND UNKNOWN DATA
239 001336 001402          BEQ     +6
240 001340 004737 012312          JSR     PC,ERROR1    ;NO,ERROR
241 001344 004737 012576          JSR     PC,LOOP0     ;LOOP?
242 001350 000755          BR     TEST3D        ;YES
243 001352 000240          NOP
244
245          ;TEST INTERRUPT ENABLE BITS AFTER A RESET INSTRUCTION
246
247 001354 012737 013623 000302 TEST04: MOV     #MESS4,HEAD1    ;SET UP HEADERS
248 001362 012737 013342 000304 TEST04: MOV     #MESS69,HEAD2
249 001370 010003          TEST4A: MOV    CHANEL,TEMP    ;MOVE CHANNEL NUMBER
250 001372 062703 000000          ADD     #0,TEMP      ;ADD IN FLAG AND ERROR INTERRUPT ENABLES
251 001376 010377 176626          MOV     TEMP,@SCRS   ;LOAD SCRS
252 001402 000005          RESET
253 001404 004737 012576          JSR     PC,LOOP0     ;LOOP?
254 001410 000767          BR     TEST4A        ;YES
255 001412 017702 176612          MOV     @SCRS,IN     ;READ SCRS
256 001416 042702 170317          BIC     #170317,IN   ;CLEAR SUPERFLUOUS BITS
257 001422 010001          MOV     CHANEL,GOOD  ;SET UP GOOD
258 001424 062701 000060          ADD     #60,GOOD
259 001430 020102          CMP     GOOD,IN      ;COMPARE GOOD AND UNKNOWN DATA
260 001432 001402          BEQ     +6           ;OK(INTERRUPTS DISABLED)?
261 001434 004737 012312          JSR     PC,ERROR1    ;NO,ERROR
262 001440 004737 012576          JSR     PC,LOOP0     ;LOOP?
263 001444 000751          BR     TEST4A        ;YES
264 001446 000240          NOP
265
266          ;TEST THE ABILITY TO LOAD AND READ BITS 1 AND 0 OF SCTS
267
268
269 001450 012737 013670 000302 TEST05: MOV     #MESS5,HEAD1    ;SET UP HEADERS
270 001456 012737 013342 000304 TEST05: MOV     #MESS69,HEAD2
271 001464 012704 177774          MOV     #-4,CNTR     ;SET UP LOOP COUNTER
272 001470 010001          TEST5A: MOV    CHANEL,GOOD    ;MOVE CHANNEL NUMBER
273 001472 010177 176534          MOV     GOOD,@SCTS   ;MOVE DATA TO SCTS
274 001476 017702 176530          MOV     @SCTS,IN     ;READ DATA BACK
275 001502 004737 012576          JSR     PC,LOOP0     ;LOOP?
276 001506 000771          BR     TEST5A        ;YES
277 001510 042702 170374          BIC     #170374,IN   ;CLEAR SUPERFLUOUS BITS
278 001514 020102          CMP     GOOD,IN      ;COMPARE GOOD AND UNKNOWN DATA
279 001516 001402          BEQ     +6           ;OK?
280 001520 004737 012312          JSR     PC,ERROR1    ;NO,ERROR
    
```

281	001524	004737	012576		JSR	PC, LOOP0		; LOOP?
282	001530	000760			BR	TEST5A		; YES
283	001532	005201			INC	GOOD		; INCREMENT TRANSMITTED WORD
284	001534	005204			INC	CNTR		; DONE?
285	001536	001355			BNE	TEST5A		; NO, LOOP
286	001540	000240			NOP			
287								
288								
289								
290								
291	001542	012737	013736	000302	TEST06:	MOV #MESS6, HEAD1		; SET UP HEADER
292	001550	005004			CLR	CNTR		; ZERO DATA
293	001552	010003			MOV	CHANEL, TEMP		; SET UP CHANNEL SELECTION
294	001554	062703	000060		ADD	#60, TEMP		
295	001560	010377	176444		MOV	TEMP, %SCRS		
296	001564	010003			MOV	CHANEL, TEMP		; SET UP CHANNEL SELECTION
297	001566	062703	000002		ADD	#2, TEMP		
298	001572	032777	001000	176420	BIT	#MODE, %SWR		
299	001600	001402			BEQ	.+6		; MAINTENANCE MODE?
300	001602	062703	000004		ADD	#4, TEMP		; YES, ADD IN MAINTENANCE MODE BIT
301	001606	010377	176420		MOV	TEMP, %SCTS		; LOAD SCTS
302	001612	010477	176420		TEST68:	MOV CNTR, %SCD		; TRANSMIT TO INDUSTRIAL-14
303	001616	012737	014020	000304	MOV	#MESS6F, HEAD2		
304	001624	032777	000200	176400	BIT	#200, %SCTS		; IS TRANSMITTER DONE SET?
305	001632	001402			BEQ	.+6		; NO, OK
306	001634	004737	012434		JSR	PC, ERROR2		; YES, ERROR
307	001640	012737	014072	000304	MOV	#MESS6G, HEAD2		
308	001646	013703	000264		MOV	DELAY, TEMP		
309	001652	032777	000001	176350	BIT	#1, %SCRS		; RECEIVER ACTIVE?
310	001660	001004			BNE	.+12		; YES, OK
311	001662	005203			INC	TEMP		; NO, DONE TESTING
312	001664	001372			BNE	.-12		; NO, LOOP
313	001666	004737	012434		JSR	PC, ERROR2		; YES, ERROR
314	001672	012737	014141	000304	MOV	#MESS6H, HEAD2		
315	001700	032777	000200	176324	BIT	#200, %SCTS		; WAIT FOR TRANSMISSION DONE
316	001706	001774			BEQ	.-6		
317	001710	013703	000264		MOV	DELAY, TEMP		; DELAY A WHILE
318	001714	005203			INC	TEMP		
319	001716	001376			BNE	.-2		
320	001720	017702	176304		MOV	%SCRS, IN		
321	001724	010001			MOV	CHANEL, GOOD		; MOVE CHANNEL NUMBER
322	001726	062701	000260		ADD	#260, GOOD		; COMBINE IN EXTERNAL FLAG, INTERRUPT DISABLES
323	001732	020102			CMP	GOOD, IN		; COMPARE GOOD AND UNKNOWN STATUS
324	001734	001402			BEQ	.+6		; OK (EXTERNAL FLAG SET)?
325	001736	004737	012312		JSR	PC, ERROR1		; NO, ERROR
326	001742	012737	014166	000304	MOV	#MESS6J, HEAD2		
327	001750	017702	176262		MOV	%SCD, IN		; GET CHANNEL DATA
328	001754	010401			MOV	CNTR, GOOD		
329	001756	020102			CMP	GOOD, IN		; COMPARE GOOD AND UNKNOWN DATA
330	001760	001402			BEQ	.+6		; OK?
331	001762	004737	012312		JSR	PC, ERROR1		; NO, ERROR
332	001766	004737	012576		JSR	PC, LOOP0		; LOOP?
333	001772	000707			BR	TEST68		; YES
334	001774	105204			INCB	CNTR		; INCREMENT DATA
335	001776	001305			BNE	TEST68		; NOT ZERO, LOOP
336	002000	062704	010000		ADD	#10000, CNTR		; INCREMENT DATA MORE

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337 002004 001302          BNE TEST6B          ;NOT DONE, LOOP
338 002006 010003          MOV CHANEL,TEMP    ;SET UP CHANNEL SELECTION
339 002010 062703 000003   ADD #3,TEMP
340 002014 032777 001000 176176 BIT #MODE,ASWR
341 002022 001402          BEQ .+6
342 002024 062703 000004   ADD #4,TEMP
343 002030 010377 176176   MOV TEMP,ASCTS
344
345 002034 010477 176176   TEST6C: MOV CNTR,ASCD ;TRANSMIT TO INDUSTRIAL-14
346 002040 012737 014020 000304 MOV #MESS6K,HEAD2
347 002046 032777 000200 176156 BIT #200,ASCTS ;IS TRANSMITTER DONE SET?
348 002054 001402          BEQ .+6 ;NO,OK
349 002056 004737 012434   JSR PC,ERROR2 ;YES, ERROR
350 002062 012737 014072 000304 MOV #MESS6L,HEAD2
351 002070 013703 000264   MOV DELAY,TEMP
352 002074 032777 000001 176126 BIT #1,ASCRS ;RECEIVER ACTIVE?
353 002102 001004          BNE .+12 ;YES, OK
354 002104 005203          INC TEMP ;NO, DONE TESTING?
355 002106 001372          BNE .-12 ;NO, LOOP
356 002110 004737 012434   JSR PC,ERROR2 ;YES,ERROR
357 002114 012737 014141 000304 MOV #MESS6M,HEAD2
358 002122 032777 000200 176102 BIT #200,ASCTS ;WAIT FOR TRANSMISSION DONE
359 002130 001774          BEQ .-6
360 002132 013703 000264   MOV DELAY,TEMP ;DELAY A WHILE
361 002136 005203          INC TEMP
362 002140 001376          BNE .-2
363 002142 017702 176062   MOV ASCRS,IN ;GET CHANNEL STATUS
364 002146 010001          MOV CHANEL,GOOD ;MOVE CHANNEL NUMBER
365 002150 062701 000360   ADD #360,GOOD ;COMBINE IN EXTERNAL AND OUTPUT FLAGS, INTERRUPT DISABLE
366 002154 020102          CMP GOOD,IN ;COMPARE GOOD AND UNKNOWN STATUS
367 002156 001402          BEQ .+6 ;OK(EXTERNAL AND OUTPUT FLAGS SET)?
368 002160 004737 012312   JSR PC,ERROR1 ;NO,ERROR
369 002164 012737 014166 000304 MOV #MESS6P,HEAD2
370 002172 017702 176040   MOV ASCD,IN ;GET CHANNEL DATA
371 002176 010401          MOV CNTR,GOOD
372 002200 020102          CMP GOOD,IN ;COMPARE GOOD AND UNKNOWN DATA
373 002202 001402          BEQ .+6 ;OK?
374 002204 004737 012312   JSR PC,ERROR1 ;NO,ERROR
375 002210 004737 012576   JSR PC,LOOP0 ;LOOP
376 002214 000707          BR TEST6C ;YES
377 002216 105204          TST6L1: INCB CNTR ;INCREMENT DATA
378 002220 001305          BNE TEST6C ;NOT ZERO, LOOP
379 002222 062704 010000   ADD #10000,CNTR ;INCREMENT DATA MORE
380 002226 001302          BNE TEST6C ;NOT DONE, LOOP
381 002230 000240          NOP
382
383 ;CHECK THE TRANSMISSION AND RECEPTION OF DATA WORDS USING AN INTERRUPT
384 ;TYPE OF ENVIRONMENT
385
386 002232 012704 177760   TEST07: MOV #-20,CNTR ;DISABLE ALL INTERRUPTS
387 002236 010403          T07L1: MOV CNTR,TEMP
388 002240 042703 177760   BIC #177760,TEMP
389 002244 000303          SWAB TEMP
390 002246 062703 000060   ADD #60,TEMP
391 002252 010377 175752   MOV TEMP,ASCRS
392 002256 005204          INC CNTR
    
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393	002260	001366				BNE	T07L1	
394	002262	000005				RESET		
395	002264	012737	014211	000302		MOV	#MESS7, HEAD1	;SET UP HEADER
396	002272	010003				MOV	CHANNEL, TEMP	;SET UP CHANNEL FOR INTERRUPT
397	002274	062703	000000			ADD	#0, TEMP	
398								
399	002300	010377	175724			MOV	TEMP, #SCRS	
400	002304	010003				MOV	CHANNEL, TEMP	;SELECT CURRENT CHANNEL AND TRANSMISSION MODE 2
401	002306	062703	000002			ADD	#2, TEMP	
402	002312	032777	001000	175700		BIT	#MODE, #SWR	
403	002320	001402				BEQ	.+6	
404	002322	062703	000004			ADD	#4, TEMP	
405								
406	002326	010377	175700			MOV	TEMP, #SCTS	
407	002332	012777	002502	175704		MOV	#TST7R2, #DC14TV	;SET UP TRAP VECTOR
408	002340	012777	000340	175700		MOV	#340, #DC14TV+2	;SET UP TRAP PROCESSOR STATUS
409	002346	012777	000340	175646	TEST7B:	MOV	#340, #PS	;RAISE TO LEVEL 7
410	002354	010477	175656			MOV	CNTR, #SCD	;TRANSMIT TO INDUSTRIAL-14
411	002360	012737	014020	000304		MOV	#MESS7F, HEAD2	
412	002366	032777	000200	175636		BIT	#200, #SCTS	;IS TRANSMIT DONE SET?
413	002374	001402				BEQ	.+6	;NO, OK
414	002376	004737	012434			JSR	PC, ERROR2	;YES, ERROR
415	002402	012737	014072	000304		MOV	#MESS7G, HEAD2	
416	002410	013703	000264			MOV	DELAY, TEMP	
417	002414	032777	000001	175606		BIT	#1, #SCRS	;RECEIVER ACTIVE?
418	002422	001004				BNE	+12	;YES, OK
419	002424	005203				INC	TEMP	;NO, DONE TESTING?
420	002426	001372				BNE	.-12	;NO, LOOP
421	002430	004737	012434			JSR	PC, ERROR2	;YES, ERROR
422	002434	012737	014272	000304		MOV	#MESS7H, HEAD2	
423	002442	032777	000200	175562		BIT	#200, #SCTS	;WAIT FOR TRANSMISSION DONE
424	002450	001774				BEQ	.-6	
425	002452	005077	175544			CLR	#PS	;LOWER TO LEVEL 0
426	002456	013703	000264			MOV	DELAY, TEMP	;WAIT FOR INTERRUPT
427	002462	005203				INC	TEMP	
428	002464	001376				BNE	.-2	
429	002466	012777	000340	175526		MOV	#340, #PS	;SORRY, TOO LATE, GO BACK TO LEVEL 7
430	002474	004737	012434			JSR	PC, ERROR2	
431	002500	024646				CMP	-(SP), -(SP)	
432								
433	002502	012737	014141	000304	TST7R2:	MOV	#MESS7I, HEAD2	;TRAP RETURNS HERE
434	002510	022626				CMP	(SP)+, (SP)+	;ADD 4 TO SP
435	002512	017702	175506			MOV	#ICRS, IN	;GET INTERRUPTING CHANNEL STATUS
436	002516	010001				MOV	CHANNEL, GOOD	;COMPUTE EXPECTED STATUS
437	002520	062701	000200			ADD	#200, GOOD	;EXTERNAL FLAG
438	002524	020102				CMP	GOOD, IN	;COMPARE GOOD AND UNKNOWN STATUS
439	002526	001402				BEQ	.+6	;OK?
440	002530	004737	012312			JSR	PC, ERROR1	;NO, ERROR
441	002534	012737	014166	000304		MOV	#MESS7J, HEAD2	
442	002542	017702	175466			MOV	#ICD, IN	;GET INTERRUPTING CHANNEL DATA
443	002546	010401				MOV	CNTR, GOOD	
444	002550	020102				CMP	GOOD, IN	;COMPARE GOOD AND UNKNOWN DATA
445	002552	001402				BEQ	.+6	;OK?
446	002554	004737	012312			JSR	PC, ERROR1	;NO, ERROR
447	002560	004737	012576			JSR	PC, LOOP0	;LOOP?
448	002564	000670				BR	TEST7B	;YES

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449 002566 105204          INCB  CNTR          ; INCREMENT DATA
450 002570 001266          BNE  TEST7B      ; NOT ZERO, LOOP
451 002572 062704 010000  ADD  #10000, CNTR ; INCREMENT DATA SOMEMORE
452 002576 001263          BNE  TEST7B      ; NOT ZERO, LOOP
453 002600 010003          MOV  CHANEL, TEMP ; SELECT CURRENT CHANNEL AND TRANSMISSIONS MODE 3
454 002602 062703 000003  ADD  #3, TEMP
455 002606 032777 001000 175404 BIT  #MODE, #SWR
456 002614 001402          BEQ  .+6
457 002616 062703 000004  ADD  #4, TEMP
458 002622 010377 175404  MOV  TEMP, #SCTS
459 002626 012777 003004 175410  MOV  #TST7R3, #DC14TV ; SET UP TRAP VECTOR
460 002634 012777 000340 175404  MOV  #340, #DC14TV+2 ; SET UP TRAP PROCESSOR STATUS
461 002642 012777 000340 175352  TEST7C: MOV  #340, #PS      ; RAISE TO LEVEL 7
462 002650 022704 000200          CMP  #200, CNTR
463
464 002654 001505          BEQ  TST7L1
465 002656 010477 175354  MOV  CNTR, #SCD      ; TRANSMIT TO INDUSTRIAL-14
466 002662 012737 014020 000304  MOV  #MESS7K, HEAD2
467 002670 032777 000200 175334  BIT  #200, #SCTS      ; IS TRANSMIT DONE SET?
468 002676 001402          BEQ  .+6              ; NO, OK
469 002700 004737 012434  JSR  PC, ERROR2      ; YES, ERROR
470 002704 012737 014072 000304  MOV  #MESS7L, HEAD2
471 002712 013703 000264  MOV  DELAY, TEMP
472 002716 032777 000001 175304  BIT  #1, #SCRS      ; RECEIVER ACTIVE?
473 002724 001004          BNE  .+12            ; YES, OK
474 002726 005203          INC  TEMP            ; NO, DONE TESTING?
475 002730 001372          BNE  .-12            ; NO, LOOP
476 002732 004737 012434  JSR  PC, ERROR2      ; YES, ERROR
477 002736 012737 014272 000304  MOV  #MESS7M, HEAD2
478 002744 032777 000200 175260  BIT  #200, #SCTS      ; WAIT FOR TRANSMISSION DONE
479 002752 001774          BEQ  .-6
480 002754 005077 175242  CLR  #PS              ; LOWER TO LEVEL 0
481 002760 013703 000264  MOV  DELAY, TEMP      ; WAIT FOR INTERRUPT
482 002764 005203          INC  TEMP
483 002766 001376          BNE  .-2
484 002770 012777 000340 175224  MOV  #340, #PS      ; SORRY, TOO LATE, GO BACK TO LEVEL 7
485 002776 004737 012434  JSR  PC, ERROR2
486 003002 024646          CMP  -(#SP), -(#SP)
487
488 003004 012737 014141 000304  TST7R3: MOV  #MESS7N, HEAD2 ; TRAP RETURNS HERE
489 003012 022626          CMP  (SP)+, (SP)+   ; ADD 4 TO SP
490 003014 017702 175204  MOV  #ICRS, IN        ; GET INTERRUPTING CHANNEL STATUS
491 003020 010001          MOV  CHANEL, GOOD    ; COMPUTE EXPECTED STATUS
492 003022 062701 000300  ADD  #300, GOOD      ; EXTERNAL AND OUTPUT FLAGS
493 003026 020102          CMP  GOOD, IN        ; COMPARE GOOD AND UNKNOWN STATUS
494 003030 001402          BEQ  .+6              ; OK?
495 003032 004737 012312  JSR  PC, ERROR1      ; NO, ERROR
496 003036 012737 014166 000304  MOV  #MESS7P, HEAD2 ; GET INTERRUPTING CHANNEL DATA
497 003044 017702 175164  MOV  #ICD, IN
498 003050 010401          MOV  CNTR, GOOD
499 003052 020102          CMP  GOOD, IN        ; COMPARE GOOD AND UNKNOWN DATA
500 003054 001402          BEQ  .+6              ; OK?
501 003056 004737 012312  JSR  PC, ERROR1      ; NO, ERROR
502 003062 004737 012576  JSR  PC, LOOP0       ; LOOP?
503 003066 000665          BR   TEST7C          ; YES
504 003070 105204          TST7L1: INCB  CNTR ; INCREMENT DATA

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505	003072	001263			BNE	TEST7C		;NOT ZERO, LOOP
506	003074	062704	010000		ADD	#10000,CNTR		;INCREMENT DATA SOMEMORE
507	003100	001260			BNE	TEST7C		;NOT ZERO, LOOP
508	003102	013777	000244	175134	MOV	DC14TV, @DC14TV		;SET UP FOR NO MORE INTERRUPTS
509	003110	062777	000002	175126	ADD	#2, @DC14TV		
510	003116	005077	175124		CLR	@DC14TV+2		
511	003122	000240			NOP			
512								

```

513
514 ;CHECK THE RUN FLIP/FLOP AFTER EXECUTING 0200 IN MODE (3) OF THE INDUSTRIAL-14
515 ;AND ITS ERROR INTERRUPT IN THE PDP-11
516
517 003124 012737 014320 000302 TEST08: MOV #MESS8,HEAD1 ;SET UP HEADER
518 003132 010003 MOV CHANEL,TEMP ;SET UP SCRS WITH ERROR INTERRUPTS ENABLED
519 003134 062703 000040 ADD #40,TEMP
520 003140 010377 175064 MOV TEMP,SCRS
521 003144 010003 MOV CHANEL,TEMP
522 003146 062703 000001 ADD #1,TEMP
523 003152 032777 001000 175040 BIT #MODE,SWR
524 003160 001402 BEQ .+6
525 003162 062703 000004 ADD #4,TEMP
526 003166 010377 175040 MOV TEMP,SCTS ;SET UP SCTS FOR TRANSMISSION MODE 3
527 003172 012737 014351 000304 MOV #MESS8A,HEAD2
528 003200 012777 003274 175036 MOV #TSTR1,DC14TV ;SET UP TRAP VECTOR
529 003206 012777 000340 175032 MOV #340,DC14TV+2 ;SET UP TRAP PROCESSOR STATUS
530 003214 012777 000340 175000 MOV #340,SPS ;RAISE TO LEVEL 7
531 003222 005077 175010 CLR SCD
532 003226 012777 000200 175002 MOV #200,SCD ;TRY TO CAUSE INDUSTRIAL-14 TO EXECUTE A NOP
533 003234 032777 000200 174770 BIT #200,SCTS ;WAIT FOR TRANSMIT DONE
534 003242 001774 BEQ .-6
535 003244 005077 174752 CLR SPS ;LOWER TO LEVEL 0
536 003250 013703 000264 MOV DELAY,TEMP ;WAIT FOR INTERRUPT
537 003254 005203 INC TEMP
538 003256 001376 BNE .-2
539 003260 012777 000340 174734 MOV #340,SPS ;SORRY, TOO LATE, GO BACK TO LEVEL 7
540 003266 004737 012434 JSR PC,ERROR2
541 003272 024646 CMP -(SP),-(SP)
542 003274 012737 014403 000304 TSTR1: MOV #MESS8B,HEAD2 ;TRAP RETURNS HERE
543 003302 022626 CMP (SP)+,(SP)+ ;ADD 4 TO SP
544 003304 013777 000244 174732 MOV DC14TV,DC14TV ;SET UP FOR NO MORE INTERRUPTS
545 003312 062777 000002 174724 ADD #2,DC14TV
546 003320 005077 174722 CLR DC14TV+2
547 003324 017702 174674 MOV JICRS,IN ;READ CHANNEL STATUS
548 003330 010001 MOV CHANEL,GOOD ;COMPUTE EXPECTED STATUS
549 003332 062701 140040 ADD #140040,GOOD ;ERROR, RUN=0 BITS, FLAG INTERRUPT DISABLED
550 003336 020102 CMP GOOD,IN ;COMPARE GOOD AND UNKNOWN STATUS
551 003340 001402 BEQ .+6 ;OK?
552 003342 004737 012312 JSR PC,ERROR1 ;NO, ERROR
553 003346 012737 014457 000304 MOV #MESS8C,HEAD2
554 003354 005004 CLR CNTR ;WAIT A WHILE
555 003356 005204 INC CNTR
556 003360 001376 BNE .-2
557 003362 005204 INC CNTR
558 003364 001376 BNE .-2
559 003366 017702 174636 MOV SCRS,IN ;READ SCRS
560 003372 010001 MOV CHANEL,GOOD ;COMPUTE EXPECTED STATUS
561 003374 062701 000040 ADD #40,GOOD
562 003400 020102 CMP GOOD,IN ;COMPARE GOOD AND UNKNOWN STATUS
563 003402 001402 BEQ .+6 ;OK?
564 003404 004737 012312 JSR PC,ERROR1 ;NO, ERROR
565 003410 004737 012576 JSR PC,LOOP0 ;LOOP?
566 003414 000643 BR TEST08 ;YES
567 003416 000240 NOP
568

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569 ;TAPE 2
570 ;CHECK THE "WORD LOST" FLIP/FLOP BY ISSUING 2 TRANSFER WORDS
571 ;WITHOUT ACKNOWLEDGING THE FIRST
572
573 003420 012737 014535 000302 TEST09: MOV #MESS9,HEAD1 ;SET UP HEADER
574 003426 010003 MOV CHANNEL,TEMP ;SETUP SCRS WITH NO INTERRUPTS ENABLED
575 003430 062703 000060 ADD #60,TEMP
576 003434 010377 174570 MOV TEMP,ASCRES
577 003440 010003 MOV CHANNEL,TEMP
578 003442 062703 000003 ADD #3,TEMP
579 003446 032777 001000 174544 BIT #MODE,ASWR
580 003454 001402 BEQ .+6
581 003456 062703 000004 ADD #4,TEMP
582 003462 010377 174544 MOV TEMP,ASCTS ;SET UP SCTS FOR TRANSMISSION MODE 3
583 003466 005077 174544 CLR ASCD ;TRANSMIT A 0 TO THE INDUSTRIAL-14
584 003472 032777 000200 174532 BIT #200,ASCTS ;WAIT FOR TRANSMISSION DONE
585 003500 001774 BEQ .-6
586 003502 012777 003604 174534 MOV #TST9R1,DC14TV ;SET UP TRAP VECTOR
587 003510 012777 000340 174530 MOV #340,DC14TV+2 ;SET UP TRAP PROCESSOR STATUS
588 003516 012777 000340 174476 MOV #340,APS ;RAISE TO LEVEL 7
589 003524 042777 000020 174476 BIC #20,ASCRES ;ENABLE ERROR INTERRUPT
590 003532 005077 174500 CLR ASCD ;TRANSMIT A SECOND WORD
591 003536 012737 014650 000304 MOV #MESS9B,HEAD2
592 003544 032777 000200 174460 BIT #200,ASCTS ;WAIT FOR SECOND TRANSMIT DONE
593 003552 001774 BEQ .-6
594 003554 005077 174442 CLR APS ;LOWER TO LEVEL 0
595 003560 013703 000264 MOV DELAY,TEMP ;DELAY A WHILE
596 003564 005203 INC TEMP
597 003566 001376 BNE .-2
598 003570 012777 000340 174424 MOV #340,APS ;SORRY, TOO LATE, GO BACK TO LEVEL 7
599 003576 004737 012434 JSR PC,ERROR2
600 003602 024646 CMP -(SP),-(SP)
601 003604 012737 014571 000304 TST9R1: MOV #MESS9A,HEAD2 ;TRAP RETURNS HERE
602 003612 022626 CMP (SP)+,(SP)+ ;ADD 4 TO SP
603 003614 013777 000244 174422 MOV DC14TV,DC14TV ;SET UP FOR NO MORE INTERRUPTS
604 003622 062777 000002 174414 ADD #2,DC14TV
605 003630 005077 174412 CLR DC14TV+2
606 003634 017702 174364 MOV ASCRES,IN ;READ SCRS
607 003640 010001 MOV CHANNEL,GOOD ;COMPUTE EXPECTED RESULT
608 003642 062701 110340 ADD #110340,GOOD ;ERROR, WORD LOST, OUTPUT FLAG, FLAG INTERRUPTS DISABLED
609 003646 020102 CMP GOOD,IN ;COMPARE GOOD AND UNKNOWN STATUS WORDS
610 003650 001402 BEQ .+6 ;OK?
611 003652 004737 012312 JSR PC,ERROR1 ;NO ERROR
612 003656 004737 012576 JSR PC,LOOP0 ;LOOP?
613 003662 000656 BR TEST09 ;YES
614 003664 000240 NOP
615 003666 004737 012472 JSR PC,BELL ;RING BELL AFTER CHANNEL DONE
616 003672 004737 012614 JSR PC,LOOP1 ;LOOP THIS CHANNEL?
617 003676 000137 000532 JMP TEST00 ;YES
618 003702 062700 000400 ADD #400,CHANNEL ;NO, BUMP CHANNEL NUMBER
619 003706 005237 000276 INC STATIO ;DONE ALL CHANNELS?
620 003712 001402 BEQ .+6 ;YES
621 003714 000137 000532 JMP TEST00 ;NO, LOOP
622 003720 004737 012472 JSR PC,BELL ;RING BELL AFTER ALL CHANNELS
623 003724 004737 012632 JSR PC,LOOP2 ;REPEAT ALL TESTS?
624 003730 000137 000500 JMP BEGIN1 ;YES, GO BACK, DON'T DO CLOCK

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625 003734 005000          CLR          CHANEL          ;ZERO CHANNEL NUMBER, DO CLOCK
626
627          ;CHECK THE REAL TIME CLOCK TO FUNCTION PROPERLY
628
629 003736 012737 014704 000302 TEST10: MOV      #MESS10,HEAD1 ;SET UP HEADERS
630 003744 012737 014736 000304      MOV      #MES10A,HEAD2
631 003752 005077 174262          CLR          ALTS          ;CLEAR CLOCK INITIALLY
632 003756 005777 174256          TST10A: TST     ALTS          ;WAIT FOR A NON-ZERO SECONDS READING
633 003762 001005          BNE     TST10B
634 003764 013703 000264          MOV      DELAY,TEMP ;DELAY A WHILE
635 003770 005203          INC     TEMP
636 003772 001376          BNE     .-2
637 003774 000770          BR      TST10A          ;TRY AGAIN
638 003776 005077 174235          TST10B: CLR     ALTS          ;CLEAR CLOCK AGAIN
639 004002 005777 174232          TST     ALTS          ;ZERO THIS TIME?
640 004006 001407          BEQ     TST10C          ;YES, OK
641 004010 005077 174224          CLR     ALTS          ;NO, CLEAR CLOCK
642 004014 005777 174220          TST     ALTS          ;TRY AGAIN
643 004020 001402          BEQ     .+6            ;OK?
644 004022 004737 012434          JSR     PC_ERROR2      ;NO, ERROR
645 004026 005037 000266          TST10C: CLR     TENTHS
646 004032 005037 000270          CLR     MINUTE
647 004036 017737 174176 000274 T10L1: MOV     ALTS,LOCLK ;READ CLOCK COUNTERS
648 004044 017737 174172 000272      MOV     ALTH,HICLK
649 004052 113702 000274          MOV     LOCLK,IN ;MOVE TENTHS TO IN
650 004056 123702 000266          CMP     TENTHS,IN ;DID CLOCK COUNT TENTHS OF SECONDS?
651 004062 001002          BNE     .+6
652 004064 000137 004476          JMP     T10L2          ;NO, CHECK FOR NO RIPPLE OF CARRIES
653 004070 105237 000266          INCB   TENTHS          ;YES, BUMP TENTHS
654 004074 122737 000012 000266      CMP     #12, TENTHS ;DID TENTHS COUNT OVERFLOW?
655 004102 001002          BNE     .+6
656 004104 105037 000266          CLRB   TENTHS          ;NO
657 004110 012737 015004 000304      MOV     #MES10B,HEAD2 ;YES, CLEAR TENTHS
658 004116 113701 000266          MOV     TENTHS,GOOD
659 004122 120102          CMP     GOOD,IN ;COMPARE EXPECTED AND UNKNOWN DATA
660 004124 001402          BEQ     .+6
661 004126 004737 012312          JSR     PC_ERROR1      ;OK?
662 004132 105737 000266          TST     TENTHS          ;NO, ERROR
663 004136 001157          BNE     T10L2          ;DID TENTHS OVERFLOW?
664 004140 113702 000275          MOV     LOCLK+1,IN ;NO, CHECK FOR NO RIPPLE OF CARRIES
665 004144 012737 015044 000304      MOV     #MES10C,HEAD2 ;YES, MOVE SECONDS TO IN
666 004152 123702 000267          CMP     SECOND,IN ;DID SECONDS CLOCK CHANGE?
667 004156 001002          BNE     .+6
668 004160 004737 012434          JSR     PC_ERROR2      ;YES, OK
669 004164 105237 000267          INCB   SECOND          ;NO, ERROR
670 004170 122737 000074 000267      CMP     #74, SECOND ;YES, BUMP SECONDS
671 004176 001002          BNE     .+6
672 004200 105037 000267          CLRB   SECOND          ;DID SECONDS COUNT OVERFLOW?
673 004204 012737 015074 000304      MOV     #MES10D,HEAD2 ;NO
674 004212 113701 000267          MOV     SECOND,GOOD ;YES, CLEAR SECONDS
675
676 004216 120102          CMP     GOOD,IN ;COMPARE EXPECTED AND UNKNOWN DATA
677 004220 001402          BEQ     .+6
678 004222 004737 012312          JSR     PC_ERROR1      ;OK?
679 004226 105737 000267          TST     SECOND          ;NO, ERROR
680 004232 001134          BNE     T10L3          ;DID SECONDS OVERFLOW?
        ;NO, CHECK FOR NO RIPPLE OF CARRIES
    
```

681	004234	113702	000272		MOV	H1CLK, IN	; MOVE MINUTES TO IN
682	004240	012737	015122	000304	MOV	#MES10E, HEAD2	
683	004246	123702	000270		CMPB	MINUTE, IN	; DID MINUTES CLOCK CHANGE?
684	004252	001002			BNE	+6	; YES, OK
685	004254	004737	012434		JSR	PC, ERROR2	; NO, ERROR
686	004260	105237	000270		INCB	MINUTE	; YES, BUMP MINUTES
687	004264	122737	000074	000270	CMPB	#74, MINUTE	; DID MINUTES COUNT OVERFLOW?
688	004272	001002			BNE	+6	; NO
689	004274	105037	000270		CLRB	MINUTE	; YES, CLEAR MINUTES
690	004300	012737	015152	000304	MOV	#MES10F, HEAD2	
691	004306	113701	000270		MOV	MINUTE, GOOD	
692	004312	120102			CMPB	GOOD, IN	; COMPARE EXPECTED AND UNKNOWN DATA
693	004314	001402			BEQ	+6	; OK?
694	004316	004737	012312		JSR	PC, ERROR1	; NO, ERROR
695	004322	032777	002000	173670	BIT	#LCLK, JSR	; LONG OR SHORT TEST?
696	004330	001446			BEQ	T10L1A	; SHORT
697	004332	105737	000270		TSTB	MINUTE	; DID MINUTES OVERFLOW?
698	004336	001105			BNE	T10L4	; NO, CHECK FOR NO RIPPLE OF CARRIES
699	004340	113702	000273		MOV	H1CLK+1, IN	; MOVE HOURS TO IN
700	004344	012737	015200	000304	MOV	#MES10G, HEAD2	
701	004352	123702	000271		CMPB	HOUR, IN	; DID HOURS CLOCK CHANGE
702	004356	001002			BNE	+6	; YES, OK
703	004360	004737	012434		JSR	PC, ERROR2	; NO, ERROR
704	004364	105237	000271		INCB	HOUR	; YES, BUMP HOURS
705	004370	122737	000030	000271	CMPB	#30, HOUR	; DID HOURS COUNT OVERFLOW?
706	004376	001002			BNE	+6	; NO
707	004400	105037	000271		CLRB	HOUR	; YES, CLEAR HOUR
708	004404	012737	015226	000304	MOV	#MES10H, HEAD2	
709	004412	113701	000271		MOV	HOUR, GOOD	
710	004416	120102			CMPB	GOOD, IN	; COMPARE EXPECTED AND UNKNOWN DATA
711	004420	001402			BEQ	+6	; OK?
712	004422	004737	012312		JSR	PC, ERROR1	; NO, ERROR
713	004426	105737	000271		TSTB	HOUR	; DID HOURS CLOCK OVERFLOW?
714	004432	001201			BNE	T10L1	; NO, GO BACK FOR NEXT CLOCK TICK
715	004434	012777	000104	173554	MOV	#104, JOUTDBR	; YES, PRINT "D" (FOR DAY)
716	004442	000137	004036		JMP	T10L1	; GO BACK FOR NEXT CLOCK TICK
717							
718	004446	122737	000002	000270	T10L1A: CMPB	#2, MINUTE	; 2 MINUTES COMPLETE?
719	004454	003402			BLE	+6	
720	004456	000137	004036		JMP	T10L1	; NO, GO BACK FOR NEXT CLOCK TICK
721	004462	012777	000115	173526	MOV	#115, JOUTDBR	; YES, PRINT "M" (FOR MINUTE)
722	004470	000000			HALT		; STOP
723	004472	000137	003736		JMP	TEST10	; LOOP
724	004476	113702	000275		T10L2: MOV	LOCLK+1, IN	; EXTRACT SECONDS
725	004502	113701	000267		MOV	SECOND, GOOD	
726	004506	012737	015252	000304	MOV	#MES10I, HEAD2	
727	004514	120102			CMPB	GOOD, IN	; DID SECONDS CLOCK CHANGE?
728	004516	001402			BEQ	+6	; NO, OK
729	004520	004737	012434		JSR	PC, ERROR2	; YES, ERROR
730	004524	113702	000272		T10L3: MOV	H1CLK, IN	; EXTRACT MINUTES
731	004530	113701	000270		MOV	MINUTE, GOOD	
732	004534	012737	015300	000304	MOV	#MES10J, HEAD2	
733	004542	120102			CMPB	GOOD, IN	; DID MINUTES CLOCK CHANGE?
734	004544	001402			BEQ	+6	; NO, OK
735	004546	004737	012434		JSR	PC, ERROR2	; YES, ERROR
736	004552	113702	000273		T10L4: MOV	H1CLK+1, IN	; EXTRACT HOURS

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737 004556 113701 000271          MOV      HOUR,GOOD
738 004562 012737 015326 000304    MOV      #MES1OK,HEAD2
739 004570 120102          CMPB     GOOD,IN          ;DID HOURS CLOCK CHANGE?
740 004572 001402          BEQ      +6              ;NO, OK
741 004574 004737 012434          JSR      PC,ERROR2      ;YES, ERROR
742 004600 000137 004036          JMP      T10L1          ;GO GET NEXT CLOCK TICK
743
744                                     ;TESTS WITH INDUSTRIAL-14 ATTACHED
745
746 004604 012706 000500          BEGIN2: MOV     #BEGIN1,SP ;SET UP STACK POINTER
747 004610 004737 013274          JSR      PC,NOCACH     ;IF AN 11/70 CENTRAL PROCESSOR,
748                                     ;DISABLE CACHE MEMORY.
749 004614 017737 173400 000276    MOV      JSWR,STATIO   ;SET UP STATION COUNT
750 004622 042737 177760 000276    BIC      #177760,STATIO ;TO 1'S COMP
751 004630 005137 000276          COM      STATIO        ;OF SWR 3 TO 0
752 004634 005000          CLR      CHANEL        ;CLEAR CHANNEL NUMBER
753
754                                     ;TEST OF INSTRUCTION DECODING
755                                     ;ALL INSTRUCTIONS ARE TRANSMITTED AND CHECKED FOR
756                                     ;PROPER DECODING AS ONE, TWO OR THREE WORD INST.
757
758 004636 010003          TEST20: MOV     CHANEL,TEMP ;SET OP SCRS
759 004640 062703 000060          ADD      #60,TEMP      ;WITH NO INTERRUPTS
760 004644 010377 173360          MOV      TEMP,%SCRS    ;ENABLED
761 004650 010003          MOV      CHANEL,TEMP
762 004652 062703 000003          ADD      #3,TEMP      ;SELECT CHANNEL AND GNI
763 004656 010377 173350          MOV      TEMP,%SCTS
764 004662 012703 000060          MOV      #060,TEMP
765 004666 004737 013110          JSR      PC,EXECQT
766
767                                     ;EXECUTE ONE WORD INSTRUCTIONS USING MODE 2; LDE
768
769
770
771 004672 012737 016104 000302          MOV      #MESSA,HEAD1 ;SET ERROR HEADINGS
772 004700 012737 016127 000304          MOV      #MES1,HEAD2
773 004706 012737 000037 006246          MOV      #37,ONCNT    ;GET LIST LENGTH
774 004714 012704 006570          MOV      #ONEWRD,CNTR ;GET LIST START
775 004720 105077 173306          CLR      %SCTS
776 004724 062777 000002 173300          ADD      #2,%SCTS     ;SET MODE 2; LDE
777 004732 011477 173300          TST20A: MOV     (CNTR),%SCD ;GET INSTRUCTION
778 004736 012737 000001 013270          MOV      #1,EXECNT    ;SET TIMEOUT
779 004744 032777 000200 173256          1$: BIT      #200,%SCRS ;EXTERNAL FLAG?
780 004752 001005          BNE     2$            ;YES
781 004754 005237 013270          INC     EXECNT        ;INC TIMEOUT
782 004760 001371          BNE     1$            ;CHECK AGAIN
783 004762 004737 006216          JSR     PC,ERROR4    ;ERROR, NO EXT FLAG
784 004766 013737 000264 013270          2$: MOV      DELAY,EXECNT ;GET TIMEOUT
785 004774 032777 000200 173230          4$: BIT      #200,%SCTS ;TRANSMISSION DONE?
786 005002 001005          BNE     3$            ;YES
787 005004 005237 013270          INC     EXECNT        ;NO, INC TIMEOUT
788 005010 001371          BNE     4$            ;CHECK AGAIN
789 005012 004737 006216          JSR     PC,ERROR4    ;TRANSMISSION NOT DONE
790 005016 017702 173206          3$: MOV      %SCRS,IN  ;CHECK FOR LOOP
791 005022 004737 012576          JSR     PC,LOOPD     ;LOOP
792 005026 000741          BR      TST20A

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793 005030 062704 000002          ADD      #2,CNTR          ;INC FOR NEXT INSTRUCTION
794 005034 005337 006246          DEC      ONCNT          ;DONE WITH LIST
795 005040 001334                   BNE      TST20A         ;NO, BRANCH FOR NEXT INST
796
797                                     ;: TEST ONE WORD INSTRUCTIONS - GNI (MODE 3)
798
799 005042 012737 000037 006246          MOV      #37,ONCNT
800 005050 012704 006570                   MOV      #ONEWRD,CNTR  ;SET UP TEST
801 005054 105077 173152                   CLR      #3,SCRS
802 005060 062777 000003 173144          ADD      #3,SCRS
803 005066 011477 173144          TST20B: MOV      (CNTR),SCD ;SET MODE 3 - GNI
804 005072 012737 000000 013270          MOV      #0,EXECNT    ;GET INST
805 005100 032777 000200 173122 1$:      BIT      #200,SCRS    ;SET TIMEOUT
806 005106 001005                   BNE      2$           ;EXTERNAL FLAG SET?
807 005110 005237 013270                   INC      EXECNT       ;YES
808 005114 001371                   BNE      1$           ;INC TIMEOUT
809 005116 004737 006216                   JSR      PC,ERROR4    ;CHECK AGAIN
810 005122 013737 000264 013270 2$:      MOV      DELAY,EXECNT ;ERROR, EXTERNAL FLAG
811 005130 032777 000200 173074 4$:      BIT      #200,SCRS    ;SET DELAY
812 005136 001005                   BNE      3$           ;TRANSMISSION DONE?
813 005140 005237 013270                   INC      EXECNT       ;YES
814 005144 001371                   BNE      4$           ;INC DELAY
815 005146 004737 006216                   JSR      PC,ERROR4    ;CHECK AGAIN
816 005152 017702 173052                   MOV      SCRS,IN      ;ERROR, TRANS NOT DONE
817 005156 004737 012576                   JSR      PC,LOOP0
818 005162 000741                   BR       TST20B
819 005164 062704 000002          ADD      #2,CNTR
820 005170 005337 006246          DEC      ONCNT
821 005174 001334                   BNE      TST20B
822
823                                     ;: TWO WORD INSTRUCTIONS - MODE 2 (LDE)
824
825
826
827 005176 012737 000006 006246          MOV      #6,ONCNT     ;SET UP TEST
828 005204 012704 006666                   MOV      #TWOWD,CNTR
829 005210 105077 173016                   CLR      #2,SCRS
830 005214 062777 000002 173010          ADD      #2,SCRS
831 005222 011477 173010          TST20C: MOV      (CNTR),SCD ;SET MODE 2 LDE
832 005226 013737 000264 013270          MOV      DELAY,EXECNT ;SEND FIRST WORD
833 005234 032777 000200 172766 7$:      BIT      #200,SCRS    ;SET TIMEOUT
834 005242 001402                   BEQ      2$           ;CHECK FOR PREMATURE EXT FLG
835 005244 004737 006216                   JSR      PC,ERROR4    ;NO
836 005250 032777 000200 172754 2$:      BIT      #200,SCRS    ;PREMATURE EXT FLG
837 005256 001005                   BNE      3$           ;YES
838 005260 005237 013270                   INC      EXECNT       ;INC TIMEOUT
839 005264 001363                   BNE      7$           ;CHECK AGAIN
840 005266 004737 006216                   JSR      PC,ERROR4    ;ERROR, TRANS TIMEOUT
841 005272 012777 000000 172736 3$:      MOV      #0,SCD      ;SEND SECOND WORD
842 005300 012737 000000 013270          MOV      #0,EXECNT    ;SET TIME OUT
843 005306 032777 000200 172714 5$:      BIT      #200,SCRS    ;CHECK FOR EXT FLG
844 005314 001005                   BNE      6$           ;FLAG SET
845 005316 005237 013270                   INC      EXECNT       ;INC TIMEOUT
846 005322 001371                   BNE      5$           ;CHECK AGAIN
847 005324 004737 006216                   JSR      PC,ERROR4    ;ERROR, NO EXT FLAG
848 005330 017702 172674 6$:      MOV      SCRS,IN

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849 005334 004737 012576          JSR    PC,LOOP0          ;LOOP?
850 005340 000730          BR     TST20C           ;LOOP
851 005342 062704 000002          ADD    #6,CNTR         ;UP DATE FOR NEXT INST
852 005346 005337 006246          DEC    ONCNT           ;DONE W/ LIST
853 005352 001323          BNE    TST20C          ;NO
854
855
856          ;TWO WORD INSTRUCTIONS - MODE 3 (GNI)
857
858
859 005354 012737 000006 006246          MOV    #6,ONCNT        ;SET UP TEST
860 005362 012704 006666          MOV    #TWOWD,CNTR    ;
861 005366 105077 172640          CLR    #SCTS          ;
862 005372 062777 000003 172632          ADD    #3,#SCTS        ;SET MODE 3 - GNI
863 005400 011477 172632          TST20D: MOV    (CNTR),#SCD ;GET 1ST WORD
864 005404 013737 000264 013270          MOV    DELAY,EXECNT   ;SET TIMEOUT
865 005412 032777 000200 172610 7$: BIT    #200,#SCRS     ;EXT FLAG SET
866 005420 001402          BEQ    2$             ;NO
867 005422 004737 006216          JSR    PC,ERROR4      ;ERROR, PREMATURE FLAG
868 005426 032777 000200 172576 2$: BIT    #200,#SCTS     ;
869 005434 001005          BNE    3$             ;YES
870 005436 005237 013270          INC    EXECNT         ;NO, INC TIMEOUT
871 005442 001363          BNE    7$             ;CHECK BACK
872 005444 004737 006216          JSR    PC,ERROR4      ;ERROR, TRANS DONE FLAG NOT SET
873 005450 012777 000000 172560 3$: MOV    #0,#SCD        ;SECOND WORD
874 005456 012737 000000 013270          MOV    #0,EXECNT     ;SET TIMEOUT
875 005464 032777 000200 172536 5$: BIT    #200,#SCRS     ;EXTERNAL FLAG?
876 005472 001005          BNE    6$             ;YES
877 005474 005237 013270          INC    EXECNT         ;NO, INC TIMEOUT
878 005500 001371          BNE    5$             ;NO, CHECK AGAIN
879 005502 004737 006216          JSR    PC,ERROR4      ;ERROR, NO EXT FLAG
880 005506 017702 172516          6$: MOV    #SCRS,IN   ;
881 005512 004737 012576          JSR    PC,LOOP0      ;LOOP?
882 005516 000730          BR     TST20D         ;LOOP
883 005520 062704 000002          ADD    #2,CNTR        ;NEXT INST
884 005524 005337 006246          DEC    ONCNT         ;DONE W/ LIST?
885 005530 001323          BNE    TST20D        ;NO
886
887
888          ;TEST 3 WORD INSTRUCTION - MODE 2 - LDE
889
890
891 005532 012737 000004 006246          MOV    #4,ONCNT        ;SET UP TEST
892 005540 012704 006702          MOV    #THREWD,CNTR   ;
893 005544 105077 172462          CLR    #SCTS          ;
894 005550 062777 000002 172454          ADD    #2,#SCTS        ;MODE 2 - LDE
895 005556 011477 172454          TST20F: MOV    (CNTR),#SCD ;FIRST WORD
896 005562 013737 000264 013270          MOV    DELAY,EXECNT   ;
897 005570 032777 000200 172432 9$: BIT    #200,#SCRS     ;CHECK FOR PREMATURE EXT FLG
898 005576 001402          BEQ    2$             ;
899 005600 004737 006216          JSR    PC,ERROR4      ;PREMATURE EXT FLAG
900 005604 032777 000200 172420 2$: BIT    #200,#SCTS     ;
901 005612 001005          BNE    3$             ;YES
902 005614 005237 013270          INC    EXECNT         ;INC TIMEOUT
903 005620 001363          BNE    9$             ;CHECK AGAIN
904 005622 004737 006216          JSR    PC,ERROR4      ;TRANS FLAG NOT SET

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905	005626	012777	000000	172402	3\$:	MOV	#0, @SCD	; SECOND WORD
906	005634	013737	000264	013270		MOV	DELAY, EXECNT	; SET TIMEOUT
907	005642	032777	000200	172360	8\$:	BIT	#200, @SCRS	; PREMATURE EXT FLAG?
908	005650	001402				BEQ	4\$	; NO
909	005652	004737	006216			JSR	PC, ERROR4	; PREMATURE FLAG
910	005656	032777	000200	172346	4\$:	BIT	#200, @SCTS	
911	005664	001005				BNE	5\$	; YES
912	005666	005237	013270			INC	EXECNT	; NO
913	005672	001363				BNE	8\$	
914	005674	004737	006216			JSR	PC, ERROR4	; TRANS NOT SET
915	005700	012777	000000	172330	5\$:	MOV	#0, @SCD	; THIRD WORD
916	005706	012737	000000	013270		MOV	#0, EXECNT	; SET TIMEOUT
917	005714	032777	000200	172306	6\$:	BIT	#200, @SCRS	; EXT FLAG SET?
918	005722	001005				BNE	7\$	; YES
919	005724	005237	013270			INC	EXECNT	; NO
920	005730	001371				BNE	6\$	
921	005732	004737	006216			JSR	PC, ERROR4	; ERROR, NO EXT FLAG
922	005736	017702	172266		7\$:	MOV	@SCRS, IN	
923	005742	004737	012576			JSR	PC, LOOP0	; LOOP?
924	005746	000703				BR	TST20F	; LOOP
925	005750	062704	000002			ADD	#2, CNTR	
926	005754	005337	006246			DEC	ONCNT	
927	005760	001276				BNE	TST20F	
928								
929								
930								
931								
932								
933	005762	012737	000004	006246		MOV	#4, ONCNT	; SET UP TEST
934	005770	012704	006702			MOV	#THREWD, CNTR	
935	005774	105077	172232			CLRB	@SCTS	
936	006000	062777	000003	172224		ADD	#3, @SCTS	; GNI
937	006006	011477	172224		TST20G:	MOV	(CNTR), @SCD	; INST
938	006012	013737	000264	013270		MOV	DELAY, EXECNT	; SET TIMEOUT
939	006020	032777	000200	172202	9\$:	BIT	#200, @SCRS	; PREMATURE FLAG?
940	006026	001402				BEQ	2\$	; NO
941	006030	004737	006216			JSR	PC, ERROR4	; PREMATURE FLAG
942	006034	032777	000200	172170	2\$:	BIT	#200, @SCTS	
943	006042	001005				BNE	3\$	; YES
944	006044	005237	013270			INC	EXECNT	; INC TIMEOUT
945	006050	001363				BNE	9\$	
946	006052	004737	006216			JSR	PC, ERROR4	; TIMEOUT - TRANS NOT DONE
947	006056	012777	000000	172152	3\$:	MOV	#0, @SCD	; SECOND WORD
948	006064	013737	000264	013270		MOV	DELAY, EXECNT	
949	006072	032777	000200	172130	8\$:	BIT	#200, @SCRS	; PREMATURE FLAG?
950	006100	001402				BEQ	4\$	; NO
951	006102	004737	006216			JSR	PC, ERROR4	; PREMATURE FLAG
952	006106	032777	000200	172116	4\$:	BIT	#200, @SCTS	
953	006114	001005				BNE	5\$	; YES
954	006116	005237	013270			INC	EXECNT	
955	006122	001363				BNE	8\$	
956	006124	004737	006216			JSR	PC, ERROR4	; ERROR, TRANSMISSION NOT DONE
957	006130	012777	000000	172100	5\$:	MOV	#0, @SCD	; THIRD WORD
958	006136	012737	000000	013270		MOV	#0, EXECNT	
959	006144	032777	000200	172056	6\$:	BIT	#200, @SCRS	; EXT FLAG SET?
960	006152	001005				BNE	7\$	; YES

961	006154	005237	013270	INC	EXECNT	
962	006160	001371		BNE	68	
963	006162	004737	006216	JSR	PC_ERROR4	;EXT FLAG NOT SET
964	006166	017702	172036	75: MOV	3SCRS, IN	
965	006172	004737	012576	JSR	PC_LOOP0	;LOOP?
966	006176	000703		BR	TST20G	;LOOP
967	006200	062704	000002	ADD	#2, CNTR	
968	006204	005337	006246	DEC	ONCNT	
969	006210	001276		BNE	TST20G	
970	006212	000137	006712	JMP	TEST21	
971						
972						
973						
974						
975						
976	006216	004737	006534	ERROR4: JSR	PC_FORM	;GET INST INTO "IN"
977	006222	011601		MOV	(SP), GOOD	;SET PC OF ERROR
978	006224	162701	000004	SUB	#4, GOOD	
979	006230	005237	006532	INC	ER4FLP	;SET ERROR FLOP
980	006234	004737	012312	JSR	PC_ERROR1	;ERROR
981	006240	005037	006532	CLR	ER4FLP	;CLEAR ERROR FLOP
982	006244	000207		RTS	PC	
983						
984	006246	000000		ONCNT:	0	
985	006250	000000		ONCNT1:	0	
986	006252	177776		WRITE:	-2	
987	006254	000022			000022	
988	006256	000000			000000	
989	006260	000001		OUTLST:	000001	
990	006262	000002			000002	
991	006264	020000			020000	
992	006266	020001			020001	
993	006270	000007			000007	
994	006272	000010			000010	
995	006274	000011			000011	
996	006276	020002			020002	
997						
998	006300	000046		MEMLST:	000046	
999	006302	000046			000046	
1000	006304	000136			000136	
1001	006306	020000			020000	
1002	006310	000136			000136	
1003	006312	020001			020001	
1004	006314	000046			000046	
1005	006316	000046			000046	
1006	006320	000046			000046	
1007	006322	000136			000136	
1008	006324	020002			020002	
1009	006326	000004			000004	
1010						
1011						
1012						
1013	006330	012337	006504	MEEXEC:	MOV (TEMP)+, CNT	;GET INSTRUCTION LENGTH
1014	006334	012377	171676	25: MOV	(TEMP)+, 3SCD	;SEND WORD
1015	006340	005237	006504	INC	CNT	
1016	006344	001405		BEQ	15	

1017	006346	032777	000200	171656	3\$:	BIT	#200, 2SCTS
1018	006354	001367				BNE	2\$
1019	006356	000773				BR	3\$
1020	006360	000137	013114		1\$:	JMP	EXEQT+4
1021					:		
1022					:		
1023					:		
1024	006364	000000			OUTBUF:	0	
1025							
1026							
1027		006504					. =OUTBUF+120
1028							
1029							
1030	006504	000000			CNT:	0	
1031	006506	000000			CORSIZ:	0	
1032	006510	177776			JUMP:	-2	
1033	006512	000024				0024	
1034	006514	000000				0000	
1035	006516	177776			RDMEM:	-2	
1036	006520	000026				0026	
1037	006522	000000				0000	
1038	006524	177776			STATWD:	-2	
1039	006526	000036				0036	
1040	006530	170377				170377	
1041	006532	000000			ER4FLP:	0	
1042							
1043	006534	011405			FORM:	MOV	(CNTR), AC
1044	006536	042705	177400		FORM1:	BIC	#177400, AC
1045	006542	010502				MOV	AC, IN
1046	006544	011405				MOV	(CNTR), AC
1047	006546	042705	007777			BIC	#7777, AC
1048	006552	000241				CLC	
1049	006554	006005				ROR	AC
1050	006556	006005				ROR	AC
1051	006560	006005				ROR	AC
1052	006562	006005				ROR	AC
1053	006564	060502				ADD	AC, IN
1054	006566	000207				RTS	PC
1055							
1056					:		
1057					:		
1058					:		
1059	006570	000000			ONEWRD:	000000	
1060	006572	000002				000002	
1061	006574	000010				000010	
1062	006576	000004				000004	
1063	006600	000005				000005	
1064	006602	000006				000006	
1065	006604	000014				000014	
1066	006606	000015				000015	
1067	006610	000016				000016	
1068	006612	000046				000046	
1069	006614	000056				000056	
1070	006616	000054				000054	
1071	006620	000045				000045	
1072	006622	020000				020000	

1073	006624	040000	040000
1074	006626	060000	060000
1075	006630	100000	100000
1076	006632	120000	120000
1077	006634	140000	140000
1078	006636	160000	160000
1079	006640	050000	050000
1080	006642	000020	000020
1081	006644	000030	000030
1082	006646	000130	000130
1083	006650	000140	000140
1084	006652	000150	000150
1085	006654	000160	000160
1086	006656	000170	000170
1087	006660	010300	010300
1088	006662	010200	010200
1089	006664	000060	000060
1090			
1091			
1092	006666	000024	000024
1093	006670	000025	000025
1094	006672	000026	000026
1095	006674	000022	000022
1096	006676	000036	000036
1097	006700	000136	000136
1098			
1099			
1100	006702	000023	000023
1101	006704	000033	000033
1102	006706	000133	000133
1103	006710	000123	000123

;  
TWOWD:

;  
THREWD:

; TEST TO CHECK THAT OUTPUT REGISTER OF DC-14E FUNCTIONS  
; PROPERLY IN THAT IT WILL ACCEPT ALL 14/30, 14/35  
; OUTPUT REGISTER INSTRUCTIONS IN PROPER ORDER

1109	006712	012737	016143	000302	TEST21:	MOV	#MESSB, HEAD1	
1110	006720	012737	016171	000304		MOV	#MES2, HEAD2	
1111	006726	105077	171300			CLRB	2SCTS	
1112	006732	062777	000001	171272		ADD	#1, 2SCTS	; MODE 1
1113	006740	012777	000200	171270		MOV	#200, 2SCD	; START TRANSMISSION
1114	006746	032777	040000	171254	1\$:	BIT	#40000, 2SCRS	; RUN
1115	006754	001374				BNE	1\$	; NO, CHECK AGAIN
1116	006756	105077	171250			CLRB	2SCTS	
1117	006762	062777	000003	171242		ADD	#3, 2SCTS	; MODE 3
1118	006770	012703	000060			MOV	#60, TEMP	; ENTER EXTERNAL MODE
1119	006774	004737	013110			JSR	PC, EXEQT	
1120	007000	012737	000014	006246		MOV	#14, ONCNT	; SET UP TABLE LENGTH
1121	007006	012703	000004			MOV	#4, TEMP	; CLEAR PC
1122	007012	004737	013110			JSR	PC, EXEQT	
1123	007016	012704	006300			MOV	#MEMLST, CNTR	
1124	007022	012437	006256		2\$:	MOV	(CNTR)+, WRITE+4	
1125	007026	012703	006252			MOV	#WRITE, TEMP	
1126	007032	004737	006330			JSR	PC, MEXEC	; WRITE
1127	007036	012703	000010			MOV	#10, TEMP	; SKIP
1128	007042	004737	013110			JSR	PC, EXEQT	

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1129 007046 005337 006246          DEC      ONCNT
1130 007052 001363          BNE      2$
1131                                     ;
1132                                     ; NOW LET 14 RUN, MONITOR OUTPUT REGISTER
1133                                     ;
1134
1135 007054 012703 000004          MOV      #4, TEMP
1136 007060 004737 013110          JSR      PC, EXECQ
1137 007064 012704 000050          MOV      #50, CNTR
1138 007070 017701 171142          MOV      #SCD, GOOD
1139 007074 012701 006364          MOV      #OUTBUF, GOOD
1140 007100 012703 000040          MOV      #40, TEMP          ; LEAVE EXTERNAL MODE
1141 007104 004737 013110          JSR      PC, EXECQ
1142 007110 032777 000100 171112 3$: BIT      #100, #SCRS          ; OUTPUT REG FLAG SET?
1143 007116 001774          BEQ      3$                  ; NO
1144 007120 017721 171112          MOV      #SCD, (GOOD)+      ; MOV OUTREG INTO BUFFER
1145 007124 005304          DEC      CNTR
1146 007126 001370          BNE      3$
1147
1148                                     ;
1149                                     ; TABLE FULL NOW VERIFY IT'S CORRECTNESS
1150                                     ;
1151
1152 007130 012737 000005 006246          MOV      #5, ONCNT
1153 007136 012704 006364          MOV      #OUTBUF, CNTR
1154 007142 012737 000010 006250 6$: MOV      #10, ONCNT1
1155 007150 012703 006260          MOV      #OUTLST, TEMP
1156 007154 012301          MOV      (TEMP)+, GOOD
1157 007156 012402          MOV      (CNTR)+, IN
1158 007160 020102          CMP      GOOD, IN
1159 007162 001010          BNE      8$
1160 007164 005337 006250 9$: DEC      ONCNT1
1161 007170 001371          BNE      7$
1162 007172 005337 006246          DEC      ONCNT
1163 007176 001361          BNE      6$
1164 007200 000137 007232          JMP      TEST22
1165 007204 005237 006532 8$: INC      ER4FLP
1166 007210 004737 012312          JSR      PC, ERROR1
1167 007214 005037 000302          CLR      HEAD1
1168 007220 005037 000304          CLR      HEAD2
1169 007224 005037 006532          CLR      ER4FLP
1170 007230 000755          BR       9$
1171
    
```

```

1172
1173
1174      ; MEMORY TEST - ADDRESS COMPLIMENT TEST
1175      ;
1176
1177      007232 105077 170774      TEST22: CLRB      @SCTS
1178      007236 062777 000003 170766      ADD      #3, @SCTS      ;MODE 3
1179      007244 012703 000060      MOV      #60, TEMP      ;ENTER EXTERNAL MODE
1180      007250 004737 013110      JSR      PC, EXEQT
1181      007254 012703 000004      MOV      #4, TEMP      ;CLR PC
1182      007260 004737 013110      JSR      PC, EXEQT
1183      007264 005001      CLR      GOOD
1184      007266 010102      15:      MOV      GOOD, IN
1185      007270 005102      COM      IN      ;COMPLIMENT
1186      007272 004737 010050      JSR      PC, MK1218      ;GET IN DC-14 FORMAT
1187      007276 010437 006256      MOV      CNTR, WRITE+4      ;MOVE IT TO WRITE ROUTINE
1188      007302 012703 006252      MOV      #WRITE, TEMP
1189      007306 004737 006330      JSR      PC, MEXEC      ;WRITE
1190      007312 012703 000010      MOV      #10, TEMP
1191      007316 004737 013110      JSR      PC, EXEQT      ;SKIP
1192      007322 005201      INC      GOOD
1193      007324 022701 010000      CMP      #10000, GOOD      ;DONE?
1194      007330 001356      BNE      15
1195
1196      ; WRITE DONE - VERIFY
1197      ;
1198
1199
1200      007332 012737 016236 000302      MOV      #MEMMES, HEAD1
1201      007340 012737 016265 000304      MOV      #MS3, HEAD2
1202      007346 005237 006532      INC      ER4FLP
1203      007352 012703 010200      MOV      #10200, TEMP
1204      007356 004737 013110      JSR      PC, EXEQT      ;CDF 0
1205      007362 005001      CLR      GOOD
1206      007364 010102      25:      MOV      GOOD, IN
1207      007366 004737 010050      JSR      PC, MK1218
1208      007372 010437 006522      MOV      CNTR, RDMEM+4
1209      007376 012703 006516      MOV      #RDMEM, TEMP
1210      007402 004737 006330      JSR      PC, MEXEC
1211      007406 012704 013050      MOV      #0TEMP, CNTR
1212      007412 017714 170620      MOV      @SCD, (CNTR)
1213      007416 004737 006534      JSR      PC, FORM
1214      007422 010205      MOV      IN, AC
1215      007424 005105      COM      AC
1216      007426 042705 170000      BIC      #170000, AC
1217      007432 020501      CMP      AC, GOOD
1218      007434 001014      BNE      45
1219      007436 005201      65:      INC      GOOD
1220      007440 022701 001000      CMP      #1000, GOOD
1221      007444 001347      BNE      25
1222      007446 005037 006532      CLR      ER4FLP
1223      007452 004737 012576      JSR      PC, LOOP0
1224      007456 000401      BR      55
1225      007460 000411      BR      TST22
1226      007462 000137 007232      55:      JMP      TEST22
1227
    
```



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1228 007466 004737 012312      4$: JSR PC,ERROR1
1229 007472 005037 000302      CLR HEAD1
1230 007476 005037 000304      CLR HEAD2
1231 007502 000755      BR BS
1232
1233
1234      ;TEST CDF FLOP
1235
1236
1237 007504 012703 006524      TST22Z: MOV #STATWD,TEMP
1238 007510 005037 000302      CLR HEAD1
1239 007514 004737 006330      JSR PC,MEXEC ;STATUS WORD
1240 007520 005037 006506      CLR CORSIZ
1241 007524 017702 170506      MOV #SCD,IN
1242 007530 032702 020000      BIT #20000,IN ;BIT 2 SET 4K/8K
1243 007534 001402      BEQ 2$
1244 007536 005237 006506      INC CORSIZ ;4K/8K
1245 007542 012703 000004      2$: MOV #4,TEMP
1246 007546 004737 013110      JSR PC,EXEQT
1247 007552 012737 050125 006256      MOV #050125,WRITE+4 ;WRITE 2525 IN FLD 0
1248 007560 012703 006252      MOV #WRITE,TEMP
1249 007564 004737 006330      JSR PC,MEXEC
1250 007570 005737 006506      TST CORSIZ ;8K?
1251 007574 001417      BEQ 3$ ;NO
1252 007576 012703 000030      MOV #30,TEMP
1253 007602 004737 013110      JSR PC,EXEQT
1254 007606 012703 006510      MOV #JUMP,TEMP
1255 007612 004737 006330      JSR PC,MEXEC
1256 007616 012737 120252 006256      MOV #120252,WRITE+4 ;WRITE 5252 IN FLD1
1257 007624 012703 006252      MOV #WRITE,TEMP
1258 007630 004737 006330      JSR PC,MEXEC
1259
1260 007634 012703 000004      3$: MOV #4,TEMP
1261 007640 004737 013110      JSR PC,EXEQT
1262 007644 005037 006522      CLR RDMEM+4
1263 007650 012703 010200      MOV #10200,TEMP
1264 007654 004737 013110      JSR PC,EXEQT
1265 007660 012703 006516      MOV #RDMEM,TEMP
1266 007664 004737 006330      JSR PC,MEXEC
1267 007670 022777 050125 170340      CMP #50125,#SCD ;FLD0, EXP 2525
1268 007676 001402      BEQ +6
1269 007700 000137 010020      JMP TST22A ;ERROR
1270 007704 012703 010300      TST22D: MOV #10300,TEMP
1271 007710 004737 013110      JSR PC,EXEQT
1272 007714 012703 006516      MOV #RDMEM,TEMP
1273 007720 004737 006330      JSR PC,MEXEC
1274 007724 005005      CLR AC
1275 007726 005737 006506      TST CORSIZ ;4K/8K
1276 007732 001402      BEQ 6$ ;8K; EXP. 5252
1277 007734 012705 120252      MOV #120252,AC ;4K; EXP. 0000
1278 007740 020577 170272      6$: CMP AC,#SCD
1279 007744 001402      BEQ +6
1280 007746 000137 010034      JMP TST22B
1281 007752 004737 012576      TST22C: JSR PC,LOOP0
1282 007756 000401      BR +4
1283 007760 000402      BR +6

```

```

1284 007762 000137 007504      JMP      TST22Z
1285 007766 012703 000004      MOV      #4,TEMP
1286 007772 004737 013110      JSR      PC,EXEQT
1287 007776 012737 000140      MOV      #140,WRITE+4
1288 010004 012703 006252      MOV      #WRITE,TEMP
1289 010010 004737 006330      JSR      PC,MEXEC
1290 010014 000137 010100      JMP      TEST23
1291
1292 010020 012737 016206 000304 TST22A: MOV      #MSCDF0,HEAD2
1293 010026 004737 012434      JSR      PC,ERROR2
1294 010032 000724      BR
1295
1296 010034 012737 016222 000304 TST22B: MOV      #MSCDF1,HEAD2
1297 010042 004737 012434      JSR      PC,ERROR2
1298 010046 000741      BR      TST22C
1299
1300 010050 010204      MK1218: MOV      IN,CNTR
1301 010052 042704 177400      BIC      #177400,CNTR
1302 010056 042702 170377      BIC      #170377,IN
1303 010062 000241      CLC
1304 010064 006102      ROL      IN
1305 010066 006102      ROL      IN
1306 010070 006102      ROL      IN
1307 010072 006102      ROL      IN
1308 010074 060204      ADD      IN,CNTR
1309 010076 000207      RTS      PC
1310
1311      ;TEST 0300 TO TURN OFF THE TRANSMITTER AT THE INDUSTRIAL-14 AND
1312      ;KILL RUN; 0200 TO TURN THE TRANSMITTER BACK ON, ALL USING MODE 1
1313 010100 012737 015352 000302 TEST23: MOV      #MESS23,HEAD1
1314 010106 010003      MOV      CHANEL,TEMP
1315 010110 062703 000060      ADD      #60,TEMP
1316 010114 010377 170110      MOV      TEMP,2SCRS
1317 010120 010003      MOV      CHANEL,TEMP
1318 010122 062703 000003      ADD      #3,TEMP
1319 010126 010377 170100      MOV      TEMP,2SCTS
1320 010132 012703 000060      MOV      #60,TEMP
1321 010136 004737 013110      JSR      PC,EXEQT
1322 010142 017702 170062      MOV      2SCRS,IN
1323 010146 105077 170060      CLR      2SCTS
1324 010152 062777 000001 170052      ADD      #1,2SCTS
1325 010160 032777 000001 170042 TST23A: BIT      #1,2SCRS
1326 010166 001374      BNE      TST23A
1327 010170 012777 000300 170040      MOV      #300,2SCD
1328 010176 032777 000200 170026      BIT      #200,2SCTS
1329 010204 001774      BEQ      #-6
1330 010206 032777 000001 170014      BIT      #1,2SCRS
1331 010214 001774      BEQ      #-6
1332 010216 032777 000001 170004      BIT      #1,2SCRS
1333 010224 001374      BNE      #-6
1334 010226 012737 015405 000304      MOV      #MES23A,HEAD2
1335 010234 032777 040000 167766      BIT      #40000,2SCRS
1336 010242 001002      BNE      +6
1337 010244 004737 012434      JSR      PC,ERROR2
1338 010250 005004      CLR      CNTR
1339 010252 012737 014141 000304      MOV      #MES23C,HEAD2
;SET UP SCRS
;WITH NO INTERRUPTS
;ENABLED
;MODE 3
;SET UP MODE 1
;MAKE SURE RECEIVER IS NOT ACTIVE
;EXECUTE 0300
;WAIT FOR TRANSMISSION DONE
;WAIT FOR RECEIVER ACTIVE TO COME
;AND GO
;IS RUN CLEARED?
;YES, OK
;NO, ERROR
;SET UP CNTR
    
```

1340	010260	010001			MOV	CHANEL GOOD	; COMPUTE GOOD STATUS	
1341	010262	062701	140060		ADD	#140060, GOOD	; ERROR FLAG, RUN=0, INTERRUPTS DISABLED	
1342	010266	017702	167736	T23L1:	MOV	2SCRS, IN	; GET CURRENT STATUS	
1343	010272	020102			CMP	GOOD, IN	; COMPARE GOOD AND UNKNOWN STATUS	
1344	010274	001402			BEQ	.+6	; OK?	
1345	010276	004737	012312		JSR	PC_ERROR1	; NO, ERROR	
1346	010302	005204			INC	CNTR	; DONE ENOUGH TIMES?	
1347	010304	001370			BNE	T23L1	; NO, LOOP	
1348	010306	105077	167720		CLRB	2SCTS		
1349	010312	062777	000003	167712	ADD	#3, 2SCTS	; SET MODE 3	
1350	010320	012777	160000	167710	MOV	#160000, 2SCD	; ATTEMPT TO EXECUTE A "TYP 0"	
1351	010326	032777	000200	167676	BIT	#200, 2SCTS	; WAIT FOR TRANSMISSION DONE	
1352	010334	012704	000000		MOV	#0, CNTR	; SET UP CNTR	
1353	010340	012737	015431	000304	MOV	#MES23D, HEAD2		
1354	010346	032737	000001	000230	T23L2:	BIT	#1, SCRS	; IS RECEIVER ACTIVE SET?
1355	010354	001402			BEQ	.+6	; NO, OK	
1356	010356	004737	012434		JSR	PC_ERROR2	; YES, ERROR	
1357	010362	005204			INC	CNTR	; DONE ENOUGH TIMES?	
1358	010364	001370			BNE	T23L2	; NO, LOOP	
1359	010366	012737	015475	000304	MOV	#MES23E, HEAD2		
1360	010374	032777	040000	167626	BIT	#40000, 2SCRS	; IS THE 14 RUNNING?	
1361	010402	001002			BNE	.+6	; NO, OK	
1362	010404	004737	012434		JSR	PC_ERROR2	; YES, ERROR	
1363	010410	105077	167616		CLRB	2SCTS		
1364	010414	062777	000001	167610	ADD	#1, 2SCTS	; SET MODE 1	
1365	010422	012777	000200	167606	MOV	#200, 2SCD	; EXECUTE 0200	
1366	010430	032777	000200	167574	BIT	#200, 2SCTS	; WAIT FOR TRANSMIT DONE	
1367	010436	001774			BEQ	.-6		
1368	010440	012737	015516	000304	MOV	#MES23F, HEAD2		
1369	010444	032777	040000	167554	BIT	#40000, 2SCRS	; IS THE 14 RUNNING?	
1370	010450	001002			BNE	.+6	; NO, OK	
1371	010456	004737	012434		JSR	PC_ERROR2	; YES, ERROR	
1372	010462	012737	014141	000304	MOV	#MES23G, HEAD2		
1373	010470	012704	000000		MOV	#0, CNTR		
1374	010474	005204			INC	CNTR		
1375	010476	001376			BNE	.-2		
1376	010500	005204			INC	CNTR	; WAIT A WHILE	
1377	010502	001376			BNE	.-2		
1378	010504	017702	167520		MOV	2SCRS, IN	; GET CHANNEL STATUS	
1379								
1380	010510	010001			MOV	CHANEL GOOD	; COMPUTE EXPECTED STATUS (RUN=1, RECEIVER ACTIVE=0)	
1381	010512	062701	000060		ADD	#60, GOOD	; (INTERRUPTS DISABLED)	
1382	010516	020102			CMP	GOOD, IN	; OK?	
1383	010520	001402			BEQ	.+6	; YES	
1384	010522	004737	012312		JSR	PC_ERROR1	; NO, ERROR	
1385	010526	012737	015555	000304	MOV	#MES23H, HEAD2		
1386	010534	105077	167472		CLRB	2SCTS		
1387	010540	062777	000003	167464	ADD	#3, 2SCTS	; SET MODE 3	
1388	010546	012777	160000	167462	MOV	#160000, 2SCD	; EXECUTE A "TYP 0"	
1389	010554	032777	000200	167450	BIT	#200, 2SCTS	; WAIT FOR TRANSMIT DONE	
1390	010562	001774			BEQ	.-6		
1391	010564	005004			CLR	CNTR		
1392	010566	032777	000001	167434	T23L3:	BIT	#1, 2SCRS	; RECEIVER ACTIVE SET?
1393	010574	001004			BNE	T23L4	; YES, OK	
1394	010576	005204			INC	CNTR	; DONE TESTING	
1395	010600	001372			BNE	T23L3	; NO, LOOP	

```

1396 010602 004737 012434      JSR      PC_ERROR2      ; YES ERROR
1397 010606 105777 167416      T23L4: TSTB             ; WAIT FOR
1398 010612 100375                BPL      T23L4           ; EXTERNAL FLAG
1399 010614 004737 012576      JSR      PC_LOOP0       ; LOOP?
1400 010620 000401                BR       .+4             ; YES
1401 010622 000402                BR       .+6             ; NO
1402 010624 000137 010160      JMP      TST23A         ; LOOP
1403 010630 004737 012472      JSR      PC_BELL        ; RING BELL AFTER CHANNEL DONE
1404 010634 004737 012614      JSR      PC_LOOP1       ; LOOP ON THIS CHANNEL?
1405 010640 000137 004636      JMP      TEST20         ; YES
1406 010644 062700 000400      ADD     #400, CHANEL    ; NO, INCREMENT CHANNEL
1407 010650 005237 000276      INC     STATIO          ; DONE ALL CHANNELS?
1408 010654 001402                BEQ     .+6             ; YES
1409 010656 000137 004636      JMP      TEST20         ; NO, LOOP
1410 010662 004737 012472      JSR      PC_BELL        ; RING BELL AFTER ALL CHANNELS
1411 010666 004737 012632      JSR      PC_LOOP2       ; REPEAT ALL TESTS
1412 010672 000137 004604      JMP      BEGIN2         ; YES
1413 010676 000000                HALT                    ; NO
1414 010700 000137 004604      JMP      BEGIN2         ; GO BACK

```

:TAPE 3  
;MULTIPLE CHANEL SIMULTANEOUS CLOSED LOOP TESTS

;ROUTINE TO CHECK SIMULTANEOUS INTERRUPTS  
;FROM MULTIPLE CHANNELS  
;TO OCCUR IN CONSECUTIVE NUMERICAL ORDER

```

1423 010704 012706 000500      BEGIN3: MOV     #BEGIN1, SP ; SET UP STACK POINTER
1424 010710 017737 167304 000266  MOV     @SWR, TENTHS     ; SET UP STATION COUNT
1425 010716 042737 177760 000266  BIC     #177760, TENTHS  ; TO 1'S COMP
1426 010724 005137 000266                COM     TENTHS           ; OF SWR 3 TO 0
1427 010730 012737 015636 000302  TEST30: MOV     #MESS30, HEAD1
1428 010736 012777 000340 167256  MOV     #340, @PS        ; RAISE TO LEVEL 7
1429 010744 005000                TST30A: CLR     CHANEL    ; ZERO CHANNEL NUMBER
1430 010746 013737 000266 000276  MOV     TENTHS, STATIO   ; SET UP LOOP COUNT
1431 010754 010003                TST30B: MOV     CHANEL, TEMP
1432 010756 062703 000000                ADD     #0, TEMP
1433 010762 010377 167242                MOV     TEMP, @SCRS     ; SET UP SCRS
1434 010766 010003                MOV     CHANEL, TEMP
1435 010770 062703 000002                ADD     #2, TEMP
1436 010774 032777 001000 167216  BIT     #MODE, @SWR
1437 011002 001402                BEQ     .+6
1438 011004 062703 000004                ADD     #4, TEMP
1439 011010 010377 167216                MOV     TEMP, @SCTS     ; SET UP SCTS FOR MODE 2
1440 011014 005077 167216                CLR     @SCD            ; XMIT TO PDP-14
1441 011020 032777 000200 167204  BIT     #200, @SCTS     ; WAIT FOR TRANSMIT DONE
1442 011026 001774                BEQ     .-6
1443 011030 062700 000400                ADD     #400, CHANEL    ; INCREMENT CHANNEL NUMBER
1444 011034 105237 000276                INCB   STATIO          ; DONE ALL CHANNELS?
1445 011040 001345                BNE    TST30B          ; NO
1446 011042 005004                CLR     CNTR
1447 011044 005204                INC     CNTR            ; WAIT A LITTLE WHILE
1448 011046 001376                BNE    .-2
1449 011050 013737 000266 000276  MOV     TENTHS, STATIO  ; SET UP STATION COUNTER
1450 011056 005000                CLR     CHANEL          ; ZERO CHANNEL NUMBER
1451 011060 012737 015666 000304  MOV     #MES30A, HEAD2

```

K03

```

1452 011066 012777 011110 167150      MOV      #TST30C, @DC14TV ;SET UP TRAP VECTOR
1453 011074 012777 000340 167144      MOV      #340, @DC14TV+2
1454 011102 005077 167114      CLR      @PS ;LOWER TO LEVEL 0
1455 011106 000001      WAIT ;WAIT FOR INTERRUPT
1456 011110 022626      TST30C: CMP      (SP)+, (SP)+ ;ADD 4 TO SP
1457 011112 012777 000340 167102      MOV      #340, @PS
1458 011120 013777 000244 167116      MOV      @DC14TV, @DC14TV ;SETUP FOR NO MORE INTERRUPTS
1459 011126 062777 000002 167110      ADD      #2, @DC14TV
1460 011134 005077 167106      CLR      @DC14TV+2
1461 011140 017702 167060      TST30D: MOV      @ICRS, IN ;GET INTERRUPTING CHANNEL STATUS
1462 011144 010001      MOV      @CHANEL, GOOD ;COMPUTE EXPECTED RESULTS
1463 011146 062701 000200      ADD      #200, @GOOD ;EXTERNAL FLAG, FLAG AND INTERRUPT ENABLES
1464 011152 020102      CMP      @GOOD, IN ;COMPARE GOOD AND UNKNOWN STATUS
1465 011154 001402      BEQ      +6 ;OK?
1466 011156 004737 012312      JSR      PC, ERROR1 ;NO, ERROR
1467 011162 062700 000400      ADD      #400, @CHANEL ;INCREMENT CHANNEL NUMBER
1468 011166 005237 000276      INC      @STATIO ;DONE ALL CHANNELS?
1469 011172 001362      BNE      TST30D ;NO, LOOP
1470 011174 004737 012576      JSR      PC, LOOP0 ;LOOP
1471 011200 000661      BR       TST30A ;YES
1472 011202 000240      NOP
1473
1474 ;MULTIPLE CHANNEL EXERCISER
1475
1476 ;THIS PORTION STARTS THE BALL ROLLING
1477
1478 011204 012737 015717 000302 TEST31: MOV      #MESS31, HEAD1
1479 011212 017737 167002 000266      MOV      @SWR, @TENTHS ;SET UP STATION COUNT
1480 011220 042737 177760 000266      BIC      #177760, @TENTHS ;TO 1'S COMP
1481 011226 005137 000266      COM      @TENTHS ;OF SWR 3 TO 0
1482 011232 013737 000266 000276      MOV      @TENTHS, @STATIO
1483 011240 005000      CLR      @CHANEL
1484 011242 004737 011546      TST31A: JSR      PC, SETUP ;SET UP TABLE POINTERS
1485 011246 012777 012120 000352      MOV      #@CHARTB, @CHRPNT ;SETUP CHRPNT DATA
1486 011254 004737 011630      JSR      PC, XMIT ;SET UP TABLED DATA, TRANSMIT TO STATION
1487 011260 062700 000400      ADD      #400, @CHANEL ;INCREMENT CHANNEL NUMBER
1488 011264 005237 000276      INC      @STATIO ;DONE ALL CHANNELS?
1489 011270 001364      BNE      TST31A ;NO, LOOP
1490 011272 005000      CLR      @CHANEL
1491 011274 013737 000266 000276      MOV      @TENTHS, @STATIO
1492 011302 005137 000276      COM      @STATIO
1493
1494 ;THIS PORTION IS THE BACKGROUND ROUTINE
1495
1496 011306 010077 166720      TST31B: MOV      @CHANEL, @SCTS ;SELECT CURRENT STATION
1497 011312 012737 015752 000304      MOV      #MES31A, HEAD2
1498 011320 013704 000300      MOV      @DELY1, @CNTR
1499 011324 032777 000200 166700      BIT      #200, @SCTS ;TRANSMIT DONE FLAG SET?
1500 011332 001022      BNE      TST31F ;YES
1501 011334 032777 000001 166666      TST31C: BIT      #1, @SCRS ;IS RECEIVER ACTIVE?
1502 011342 001004      BNE      TST31D ;YES, OK
1503 011344 005204      INC      @CNTR ;NO, DONE TESTING?
1504 011346 001372      BNE      TST31C ;NO, LOOP
1505 011350 004737 012434      JSR      PC, ERROR2 ;YES, ERROR
1506 011354 010003      TST31D: MOV      @CHANEL, @TEMP
1507 011356 000303      SWAB      @TEMP

```

```

1508 011360 020337 00027E          CMP      TEMP,STATIO      ;DONE ALL CHANNELS?
1509 011364 001403          BEQ      TST31E          ;YES
1510 011366 062700 000400          ADD      #400,CHANEL      ;NO, INCREMENT CHANNEL NUMBER
1511 011372 000745          BR       TST31B          ;GO, BACK
1512 011374 005000          TST31E: CLR      CHANEL      ;DONE ALL CHANNELS, ZERO CHANNEL NUMBER
1513 011376 000743          BR       TST31B          ;GO BACK
1514 011400 012737 016025 000304 TST31F: MOV      #MES31B,HEAD2 ;HERE IF TRANSMISSION DONE IS SET
1515 011406 017702 166616 TST31G: MOV      @SCRS,IN
1516 011412 032702 000001          BIT      #1,IN          ;RECEIVER STILL ACTIVE?
1517 011416 001404          BEQ      TST31H          ;NO, OK, CHECK STATUS
1518 011420 005204          INC      CNTR          ;YES, DONE TESTING?
1519 011422 001371          BNE      TST31G          ;NO, GO BACK
1520 011424 004737 012434          JSR      PC,ERROR2      ;YES, ERROR
    
```

; THIS PORTION CONTINUALLY SENDS DATA TO THE PDP-14'S  
 ; USING THE NON-INTERRUPT ENVIRONMENT IN THE 11 TO RECEIVE DATA

```

1525 011430 012737 014141 000304 TST31H: MOV      #MES31C,HEAD2
1526 011436 004737 011546          JSR      PC,SETUP      ;SET UP PARAMETERS
1527 011442 017701 000154          MOV      @STATUS,GOOD    ;COMPUTE EXPECTED STATUS
1528 011446 060001          ADD      CHANEL,GOOD
1529 011450 020102          CMP      GOOD,IN        ;COMPARE GOOD AND UNKNOWN STATUS
1530 011452 001402          BEQ      +6            ;OK?
1531 011454 004737 012312          JSR      PC,ERROR1      ;NO, ERROR
1532 011460 032702 000100          BIT      #100,IN        ;WAS OUTPUT FLAG SET?
1533 011464 001413          BEQ      TST31I          ;NO
1534 011466 017702 166544          MOV      @SCD,IN        ;YES, GET DATA WORD
1535 011472 017701 000126          MOV      @DATUM,GOOD    ;COMPUTE EXPECTED DATA WORD
1536 011476 012737 014166 000304 TST31I: MOV      #MES31D,HEAD2
1537 011504 020102          CMP      GOOD,IN        ;COMPARE GOOD AND UNKNOWN DATA
1538 011506 001402          BEQ      +6            ;OK?
1539 011510 004737 012312          JSR      PC,ERROR1      ;NO, ERROR
1540 011514 062777 000010 000104 TST31I: ADD      #10,@CHRPNT ;BUMP CHARACTER POINTER TO NEXT ENTRY
1541 011522 022777 012310 000076          CMP      #END,@CHRPNT   ;END OF TABLE?
1542 011530 001003          BNE      +10           ;NO
1543 011532 012777 012120 000066          MOV      #CHARTB,@CHRPNT ;YES, RESET POINTER DATA
1544 011540 004737 011630          JSR      PC,XMIT        ;SET UP TABLED DATA, TRANSMIT TO STATION
1545 011544 000703          BR       TST31D
    
```

; SUBROUTINE TO SET UP TABLE POINTERS  
 ; CALLED BY JSR PC,SETUP

```

1550 011546 010003          SETUP: MOV      CHANEL,TEMP ;COMPUTE TABLE ENTRY
1551 011550 000303          SWAB     TEMP
1552 011552 006103          ROL      TEMP          ;(CHANNEL NUMBER X 10)
1553 011554 006103          ROL      TEMP
1554 011556 006103          ROL      TEMP
1555 011560 042703 000007          BIC      #7,TEMP
1556 011564 062703 011720          ADD      #TABLE,TEMP    ;(+ TABLE)
1557 011570 010337 011620          MOV      TEMP,CHAR
1558 011574 005723          TST     (TEMP)+
1559 011576 010337 011622          MOV      TEMP,STATUS
1560 011602 005723          TST     (TEMP)+
1561 011604 010337 011624          MOV      TEMP,DATUM
1562 011610 005723          TST     (TEMP)+
1563 011612 010337 011626          MOV      TEMP,CHRPNT
    
```

```

1564 011616 000207          RTS      PC          ;EXIT
1565 011620 000000          CHAR:    0
1566 011622 000000          STATUS:  0
1567 011624 000000          DATUM:   0
1568 011626 000000          CHRPN1:  0
1569
1570          ;SUBROUTINE TO TRANSMIT TO A STATION AFTER SETTING UP NEW DATA
1571          ;CALLED BY JSR PC,XMIT
1572
1573 011630 017703 177772      XMIT:    MOV      @CHRPN1,TEMP      ;SET UP:
1574 011634 012377 177760      MOV      (TEMP)+,@CHAR      ;NEW CHARACTER
1575 011640 012377 177756      MOV      (TEMP)+,@STATUS    ;NEW STATUS
1576 011644 012377 177754      MOV      (TEMP)+,@DATUM    ;NEW DATA
1577 011650 011305              MOV      @TEMP,AC           ;NEW TRANSMIT MODE
1578 011652 010003              MOV      CHANNEL,TEMP      ;SET UP CHANNEL FOR NO RECEIVER INTERRUPTS
1579 011654 062703 000060      ADD      #60,TEMP
1580 011660 010377 166344      MOV      TEMP,@SCRS
1581 011664 010003              MOV      CHANNEL,TEMP
1582 011666 032777 001000 166324  BIT      #MODE,@SWR
1583 011674 001402              BEQ      .+6
1584 011676 062703 000004      ADD      #4,TEMP
1585 011702 060503              ADD      AC,TEMP
1586 011704 010377 166322      MOV      TEMP,@SCTS        ;SET UP TRANSMITTER FOR PROPER MODE
1587 011710 017777 177704 166320  MOV      @CHAR,@SCD        ;TRANSMIT TO PDP-14
1588 011716 000207          RTS      PC          ;EXIT
1589
1590          011720          TABLE=.
1591          012120          .=.+200
1592
1593
1594          ;TABLE OF CHARACTERS,STATUS WORDS, DATA WORDS AND TRANSMIT MODE
1595
1596 012120 000060      CHARTB: 000060      ;CHARACTER - EEM
1597 012122 000260      260          ;STATUS - EXT
1598 012124 000000      0          ;DATA WORD
1599 012126 000002      2          ;TRANSMIT MODE
1600 012130 000024      000024      ;C - JMP
1601 012132 000260      260          ;S - EXT
1602 012134 000000      0          ;D
1603 012136 000002      2          ;T.M.
1604 012140 000046      46          ;C - ADDR
1605 012142 000260      260          ;S - EXT
1606 012144 000000      0          ;D
1607 012146 000002      2          ;T.M.
1608 012150 000046      46          ;C - TRR PC,OT
1609 012152 000360      360          ;S - EXT, OUT
1610 012154 000046      46          ;D
1611 012156 000003      3          ;T.M.
1612 012160 160000      160000      ;C - TXD 0
1613 012162 000360      360          ;S - EXT, OUT
1614 012164 160000      160000      ;D
1615 012166 000003      3          ;T.M.
1616 012170 170000      170000      ;C - TYD 0
1617
1618 012172 000360      360          ;S - EXT, OUT
1619 012174 170000      170000      ;D

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1620 012176 000003  
1621 012200 000124  
1622 012202 000260  
1623 012204 000000  
1624 012206 000002  
1625 012210 000046  
1626 012212 000260  
1627 012214 000000  
1628 012216 000002  
1629 012220 000046  
1630 012222 000360  
1631 012224 000046  
1632 012226 000003  
1633 012230 000022  
1634 012232 000260  
1635 012234 000000  
1636 012236 000002  
1637 012240 050125  
1638 012242 000360  
1639 012244 050125  
1640 012246 000003  
1641 012250 100226  
1642 012252 000260  
1643 012254 000000  
1644 012256 000002  
1645 012260 120252  
1646 012262 000360  
1647 012264 120252  
1648 012266 000003  
1649 012270 100226  
1650 012272 000260  
1651 012274 000000  
1652 012276 000002  
1653 012300 170377  
1654 012302 000360  
1655 012304 170377  
1656 012306 000003  
1657 012310 000000

3  
000124  
260  
0  
2  
00046  
260  
0  
2  
46  
360  
46  
3  
000022  
260  
0  
2  
050125  
360  
050125  
3  
100226  
260  
0  
2  
120252  
360  
120252  
3  
100226  
260  
0  
2  
170377  
360  
170377  
3  
0

:T.M.  
:C - JMS  
:S - EXT  
:D  
:T.M.  
:C - ADDR  
:S - EXT  
:D  
:T.M.  
:C - TRRPC,OT  
:S - EXT,OUT  
:D  
:T.M.  
:C - TRM  
:S - EXT  
:D  
:T.M.  
:C - WORD  
:S - EXT, OUT  
:D  
:T.M.  
:C - TRM  
:S - EXT  
:D  
:T.M.  
:C - WORD  
:S - EXT,OUT  
:D  
:T.M.  
:C - TRM  
:S - EXT  
:D  
:T.M.  
:C - WORD  
:S - EXT,OUT  
:D  
:T.M.

END:

;ERROR HANDLER - DATA ERROR WITH TYPE OUT OF CONTENTS OF "GOOD" AND "IN"  
;CALLED BY JSR PC,ERROR1

1661  
1662 012312 004737 012576  
1663 012316 000207  
1664 012320 032777 020000 165672  
1665 012326 001034  
1666 012330 004737 012504  
1667 012334 005737 000304  
1668 012340 001413  
1669 012342 005737 006532  
1670 012346 001010  
1671 012350 005037 000304  
1672 012354 012705 013343  
1673 012360 004737 012650  
1674 012364 004737 013066  
1675 012370 010105

ERROR1: JSR PC,LOOPD ;SCOPE LOOP?  
RTS R7 ;YES  
BIT #NOPRNT,JSWR ;SUPPRESS TYPEOUT?  
BNE ERR1B ;YES  
JSR PC,HEDTYP ;TYPE OUT HEADER  
TST HEAD2 ;OUTPUT FORMAT?  
BEQ ERR1A ;NO  
TST ER4FLP  
BNE ERR1A  
CLR HEAD2  
MOV #FORMES,AC ;YES, OUTPUT FORMAT MESSAGE  
JSR PC,MESSAGE  
JSR PC,CRLF  
ERR1A: MOV GOOD,AC ;OUTPUT GOOD DATA IN OCTAL



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1676 012372 004737 012676      JSR    PC,OPRINT
1677 012376 012705 000040      MOV    #40,AC          ;SPACE
1678 012402 004737 013052      JSR    PC,TYPE
1679 012406 010205                MOV    IN,AC          ;OUTPUT BAD DATA IN OCTAL
1680 012410 004737 012676      JSR    PC,OPRINT
1681 012414 004737 013066      JSR    PC,CRLF
1682 012420 032777 040000 165572  ERR1B: BIT    #NOHLT,ASWR    ;HALT ON ERROR?
1683 012426 001001                BNE    .+4            ;NO
1684 012430 000000                ER1HLT: HALT
1685 012432 000207                RTS     R7            ;EXIT
1686
1687
1688                ;ERROR HANDLER - NO DATA ERROR, STATEMENTS ONLY
1689                ;CALLED BY JSR PC,ERROR2
1690
1691 012434 004737 012576      ERROR2: JSR    PC,LOOP0    ;SCOPE LOOP?
1692 012440 000207                RTS     R7            ;YES
1693 012442 032777 020000 165550      BIT    #NOPRINT,ASWR    ;SUPPRESS TYPEOUT?
1694 012450 001002                BNE    ERR2A          ;YES
1695 012452 004737 012504      JSR    PC,HEDTYP        ;TYPE OUT HEADER
1696 012456 032777 040000 165534  ERR2A: BIT    #NOHLT,ASWR    ;HALT ON ERROR?
1697 012464 001001                BNE    .+4            ;NO
1698 012466 000000                ER2HLT: HALT
1699 012470 000207                RTS     R7            ;EXIT
1700
1701                ;SUBROUTINE TO RING BELL ON TTY
1702                ;CALLED BY JSR PC, BELL
1703
1704 012472 012705 000007      BELL:  MOV    #7,AC      ;MOVE BELL CODE TO AC
1705 012476 004737 013052      JSR    PC,TYPE          ;PRINT IT (DING!)
1706 012502 000207                RTS     PC              ;EXIT
1707
1708                ;SUBROUTINE TO TYPE OUT HEADERS
1709                ;CALLED BY JSR PC,HEDTYP WITH MESSAGE ADDRESSES IN HEAD1 AND HEAD2
1710
1711 012504 004737 013066      HEDTYP: JSR    PC,CRLF
1712 012510 013705 000302      MOV    HEAD1,AC        ;HEAD1 ALREADY PRINTED?
1713 012514 001420                BEQ    HED1            ;YES, TRY HEAD2
1714 012516 004737 012650      JSR    PC,MESSAGE      ;NO, PRINT IT
1715 012522 004737 013066      JSR    PC,CRLF
1716 012526 005037 000302      CLR    HEAD1
1717 012532 012705 013332      MOV    #CHMESS,AC      ;PRINT "CHANNEL"
1718 012536 004737 012650      JSR    PC,MESSAGE
1719 012542 010005                MOV    CHANEL,AC      ;PRINT CHANNEL NUMBER
1720 012544 000305                SWAB   AC
1721 012546 004737 012676      JSR    PC,OPRINT
1722 012552 004737 013066      JSR    PC,CRLF
1723 012556 013705 000304      HED1:  MOV    HEAD2,AC    ;HEAD2 ALREADY PRINTED?
1724 012562 001404                BEQ    HEDX            ;YES, EXIT
1725 012564 004737 012650      JSR    PC,MESSAGE      ;NO, PRINT IT
1726 012570 004737 013066      JSR    PC,CRLF
1727 012574 000207                HEDX:  RTS     PC        ;EXIT
1728
1729                ;SCOPE LOOP TEST SUBROUTINE - EXIT TO CALL+2 IF SCOPE LOOP, CALL+4 IF NOT
1730                ;CALLED BY JSR PC,LOOP0
1731

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1732 012576 032777 100000 165414 LOOP0: BIT    #SCOPE, @SWR    ;SCOPE SWITCH SET?
1733 012604 001002          BNE    .+6          ;YES, DON'T BUMP RETURN ADDRESS
1734 012606 062716 000002          ADD    #2, @JSP      ;NO, BUMP RETURN ADDRESS
1735 012612 000207          RTS     PC           ;EXIT
1736
1737          ;LOOP ON CURRENT CHANNEL TEST SUBROUTINE - EXIT TO CALL+2 IF LOOP, CALL+6 IF NOT
1738          ;CALLED BY      JSR     PC, LOOP1
1739
1740 012614 032777 010000 165376 LOOP1: BIT    #HOLDCH, @SWR  ;HOLD CHANNEL SWITCH SET?
1741 012622 001002          BNE    .+6          ;YES, DON'T BUMP RETURN ADDRESS
1742 012624 062716 000004          ADD    #4, @JSP      ;NO, BUMP RETURN ADDRESS
1743 012630 000207          RTS     PC           ;EXIT
1744
1745          ;REPEAT ALL TESTS TEST SUBROUTINE - EXIT TO CALL+2 OF REPEAT, CALL+6 IF NOT
1746          ;CALLED BY      JSR     PC, LOOP2
1747
1748 012632 032777 004000 165360 LOOP2: BIT    #REPEAT, @SWR  ;REPEAT SWITCH SET?
1749 012640 001002          BNE    .+6          ;YES, DON'T BUMP RETURN ADDRESS
1750 012642 062716 000004          ADD    #4, @JSP      ;NO, BUMP RETURN ADDRESS
1751 012646 000207          RTS     PC           ;EXIT
1752
1753          ;SUBROUTINE TO TYPE OUT MESSAGE WHOSE ADDRESS IS IN AC
1754          ;CALLED BY      JSR     PC, MESSAGE
1755 012650 010337 013050 MESSAGE: MOV    TEMP, @TEMP
1756 012654 010503          MOV    AC, TEMP
1757
1758          MLOOP: MOV    (TEMP)+, AC    ;MOVE CHARACTER INTO AC
1759 012660 001003          BNE    1$          ;ZERO (DONE)?
1760 012662 013703 013050          MOV    @TEMP, TEMP
1761 012666 000207          RTS     PC           ;YES, EXIT
1762 012670 004737 013052 1$: JSR     PC, TYPE    ;NO, TYPE OUT CHARACTER
1763 012674 000770          BR     MLOOP        ;LOOP
1764
1765          ;SUBROUTINE TO TYPE OUT THE DONTENTS OF AC IN OCTAL
1766          ;CALLED BY      JSR     PC, OPRNT
1767
1768 012676 012737 177773 013044 OPRINT: MOV    #-5, OCNT    ;SET UP COUNTER FOR 5 CHARACTERS
1769 012704 012737 013036 013046 MOV    #OTAB+4, OPNT    ;SET UP POINTER FOR CHARACTER STORE, BACKWARDS
1770 012712 010537 013050 OLOOP1: MOV    AC, @TEMP    ;SAVE AC
1771 012716 042705 000370 BIC    #370, AC        ;CLEAR ALL BUT BITS 2-0
1772 012722 062705 000060 ADD    #60, AC         ;ADD IN ASCII CODE
1773 012726 110577 000114 MOV    AC, @OPNT      ;STORE IN TABLE
1774 012732 005337 013046 DEC    OPNT           ;DECREMENT POINTER
1775 012736 013705 013050 MOV    @TEMP, AC     ;RESTORE AC
1776 012742 006005 ROR    AC             ;MOVE 3 PLATE RIGHT
1777 012744 006005 ROR    AC
1778 012746 006005 ROR    AC
1779 012750 005237 013044 INC    OCNT           ;INCREMENT COUNTER, DONE?
1780 012754 001356 BNE    OLOOP1        ;NO, LOOP
1781 012756 042705 000376 BIC    #376, AC       ;YES, MASK OFF TO BIT 0
1782 012762 062705 000060 ADD    #60, AC         ;ADD IN ASCII CODE
1783 012766 004737 013052 JSR    PC, TYPE       ;TYPE CHARACTER
1784 012772 012737 177773 013044 MOV    #-5, OCNT    ;SET UP COUNTER FOR 5 CHARACTERS
1785 013000 012737 013032 013046 MOV    #OTAB, OPNT   ;SET UP POINTER FOR CHARACTER PICKUP, FORWARD
1786 013006 117705 000034 OLOOP2: MOV    @OPNT, AC ;GET CHARACTER
1787 013012 004737 013052 JSR    PC, TYPE       ;TYPE CHARACTER

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1788 013016 005237 013046      INC      OPNT      ; INCREMENT POINTER
1789 013022 005237 013044      INC      OCNT      ; INCREMENT COUNTER, DONE?
1790 013026 001367              BNE      OLOOP2   ; NO LOOP
1791 013030 000207              RTS      PC        ; YES, EXIT
1792 013032 000000      OTAB:    0         ; CHARACTER TABLE
1793 013034 000000              0
1794 013036 000000              0
1795 013040 000000              0
1796 013042 000000              0
1797 013044 000000      OCNT:    0         ; COUNTER
1798 013046 000000      OPNT:    0         ; POINTER
1799 013050 000000      OTEMP:  0         ; TEMP STORAGE
1800
1801      ; SUBROUTINE TO PRINT THE CONTENTS OF AC
1802      ; CALLED BY JSR PC,TYPE
1803
1804 013052 010577 165140      TYPE:    MOV      AC, @OUTDBR
1805 013056 105777 165132      TSTB    @OUTCSR
1806 013062 100375              BPL      -4
1807 013064 000207              RTS      PC
1808
1809      ; SUBROUTINE TO PRINT A CR-LF COMBINATION
1810      ; CALLED BY JSR PC,CRLF
1811
1812 013066 012705 000015      CRLF:   MOV      #15, AC
1813 013072 004737 013052      JSR     PC,TYPE
1814 013076 012705 000012      MOV     #12, AC
1815 013102 004737 013052      JSR     PC,TYPE
1816 013106 000207              RTS      PC
1817
1818      ; SUBROUTINE TO EXECUTE AN INSTRUCTION IN THE INDUSTRIAL-14
1819      ; MODE OF TRANSMISSION HAS ALREADY BEEN SET IN SCTS
1820      ; WORD TO BE SENT TO INDUSTRIAL-14 IS IN "TEMP"
1821      ; EXIT AFTER "EXTERNAL FLAG" WITH CURRENT CHANNEL STATUS IN "IN"
1822
1823 013110 010377 165122      EXECQ:  MOV      TEMP, @SCD      ; TRANSMIT WORD TO PDP-14
1824 013114 012737 000000      MOV     #0, EXECNT             ; SET UP WAIT PERIOD
1825 013122 017702 165102      EXECQ1: MOV     @SCRS, IN        ; GET CURRENT CHANNEL STATUS
1826 013126 032702 040000      BIT     #40000, IN            ; DOES RUN=0
1827 013132 001032              BNE     RUNERR
1828 013134 032702 000200      BIT     #200, IN              ; IS EXTERNAL FLAG SET?
1829 013140 001054              BNE     EXECQ2                 ; YES, CHECK RECEIVER ACTIVE
1830 013142 005237 013270      INC     EXECNT                 ; NO, DONE TESTING?
1831 013146 001365              BNE     EXECQ1                 ; NO LOOP
1832 013150 004737 013066      HUNGER: JSR     PC, CRLF         ; YES, CRLF
1833 013154 012705 013332      MOV     #CHANNEL, AC          ; PRINT "CHANNEL"
1834 013160 004737 012650      JSR     PC, MESSAGE
1835 013164 010005              MOV     CHANNEL, AC           ; PRINT CHANNEL NUMBER
1836 013166 000305              SWAB   AC
1837 013170 004737 012676      JSR     PC, OPRINT
1838 013174 004737 013066      JSR     PC, CRLF
1839 013200 012705 013356      MOV     #HUNMES, AC           ; PRINT "INDUSTRIAL-14 HUNG"
1840 013204 004737 012650      JSR     PC, MESSAGE
1841 013210 004737 013066      JSR     PC, CRLF
1842
1843 013214 000000      HUNHLT: HALT                  ; UNCONDITIONAL HALT

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E04

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1844 013216 000207
1845 013220 004737 013066
1846 013224 012705 013332
1847 013230 004737 012650
1848 013234 010005
1849 013236 000305
1850 013240 004737 012676
1851 013244 004737 013066
1852 013250 012705 013366
1853 013254 004737 012650
1854 013260 004737 013066
1855 013264 000000
1856 013266 000207
1857 013270 000000
1858 013272 000207
1859
1860
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1862
1863
1864
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1866
1867 013274 013746 000004
1868 013300 012737 013322 000004
1869 013306 005737 177746
1870
1871
1872
1873 013312 012737 000014 177746
1874
1875 013320 000401
1876 013322 022626
1877 013324 012637 000004
1878 013330 000207
1879

;SUBROUTINE TO SIZE FOR AN 11/70 CENTRAL PROCESSOR
; IF IT IS AN 11/70 CPU, CACHE WILL BE DISABLED.
; IF NOT AN 11/70 CPU, NO ACTION WILL BE PERFORMED.
;
; CALLED BY JSR PC,NOCACH
; NO ARGUMENTS ARE PASSED
;
NOCACH: MOV 2#4,-(SP) ;SAVE ERROR VECTOR
MOV 2#1,2#4 ;SET UP ERROR VECTOR
TST 2#177746 ;TRY TO REFERENCE THE 11/70'S MEMORY
;CONTROL REGISTER. IF THE PROCESSOR
;IS NOT AN 11/70, A TIME-OUT TRAP WILL
;OCCUR.
MOV 2#14,2#177746 ;NO TIME-OUT OCCURED AND THE 11/70'S
;HIGH-SPEED CACHE MEMORY WILL BE DISABLED
BR 2$ ;BRANCH IF NO TIME-OUT
1$: CMP (SP)+,(SP)+ ;ADJUST STACK POINTER
2$: MOV (SP)+,2#4 ;RESTORE ERROR VECTOR
RTS PC ;RETURN TO CALLER
;EXIT
;STOPPED RUNNING
;PRINT "CHANNEL"
;PRINT CHANNEL NUMBER
;PRINT "INDUSTRIAL-14 STOPPED"
;UNCONDITIONAL HALT
;EXIT
EXECNT: 0
EXEQT2: RTS PC
RUNERR: JSR PC,CRLF
MOV 2#CHMESS,AC
JSR PC,MESSAGE
MOV CHANNEL,AC
SWAB AC
JSR PC,OPRINT
JSR PC,CRLF
MOV 2#RUNMES,AC
JSR PC,MESSAGE
JSR PC,CRLF
RUNHLT: HALT

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1880	013332	044103	047101	042516	CHMESS: .ASCII	"CHANNEL "
1881	013340	020114				
1882	013342	000			MESS69: .BYTE	0
1883	013343	107	047517	020104	FORMES: .ASCIZ	"GOOD BAD"
1884	013350	020040	040502	000104		
1885	013356	032061	044040	047125	HUNMES: .ASCIZ	"14 HUNG"
1886	013364	000107				
1887	013366	032061	051440	047524	RUNMES: .ASCIZ	"14 STOPPED"
1888	013374	050120	042105	000		
1889	013401	122	041505	044505	RECMES: .ASCIZ	"RECEIVER ACTIVE TOO LONG AFTER EXTERNAL FLAG"
1890	013406	042526	020122	041501		
1891	013414	044524	042526	052040		
1892	013422	047517	046040	047117		
1893	013430	020107	043101	042524		
1894	013436	020122	054105	042524		
1895	013444	047122	046101	043040		
1896	013452	040514	000107			
1897	013456	047514	042101	040440	MESS1: .ASCIZ	"LOAD AND READ SCRS BITS 11 TO 8"
1898	013464	042116	051040	040505		
1899	013472	020104	041523	051522		
1900	013500	041040	052111	020123		
1901	013506	030461	052040	020117		
1902	013514	000070				
1903	013516	047514	042101	040440	MESS2: .ASCIZ	"LOAD AND READ SCTS BITS 11 TO 8"
1904	013524	042116	051040	040505		
1905	013532	020104	041523	051524		
1906	013540	041040	052111	020123		
1907	013546	030461	052040	020117		
1908	013554	000070				
1909	013556	047514	042101	040440	MESS3: .ASCIZ	"LOAD AND READ SCRS INTERRUPT ENABLES"
1910	013564	042116	051040	040505		
1911	013572	020104	041523	051522		
1912	013600	044440	052116	051105		
1913	013606	052522	052120	042440		
1914	013614	040516	046102	051505		
1915	013622	000				
1916	013623	124	051505	020124	MESS4: .ASCIZ	"TEST INTERRUPT ENABLES AFTER 'RESET'"
1917	013630	047111	042524	051122		
1918	013636	050125	020124	047105		
1919	013644	041101	042514	020123		
1920	013652	043101	042524	020122		
1921	013660	051047	051505	052105		
1922	013666	000047				
1923	013670	047514	042101	040440	MESS5: .ASCIZ	"LOAD AND READ SCTS TRANSMIT MODE BITS"
1924	013676	042116	051040	040505		
1925	013704	020104	041523	051524		
1926	013712	052040	040522	051516		
1927	013720	044515	020124	047515		
1928	013726	042504	041040	052111		
1929	013734	000123				
1930	013736	051124	047101	046523	MESS6: .ASCIZ	"TRANSMIT AND RECEIVE IN NON-INTERRUPT ENVIRONMENT"
1931	013744	052111	040440	042116		
1932	013752	051040	041505	044505		
1933	013760	042526	044440	020116		
1934	013766	047516	026516	047111		
1935	013774	042524	051122	050125		

1936 014002 020124 047105 044526  
 1937 014010 047522 046516 047105  
 1938 014016 000124  
 1939 014020 051124 047101 046523  
 1940 014026 052111 042040 047117  
 1941 014034 020105 047516 020124  
 1942 014042 046103 040505 042522  
 1943 014050 020104 054502 052040  
 1944 014056 040522 051516 044515  
 1945 014064 051523 047511 000116  
 1946 014072 042522 042503 053111  
 1947 014100 051105 047040 052117  
 1948 014106 040440 052103 053111  
 1949 014114 020105 043101 042524  
 1950 014122 020122 051124 047101  
 1951 014130 046523 051511 044523  
 1952 014136 047117 000  
 1953 014141 103 040510 047116  
 1954 014146 046105 051440 040524  
 1955 014154 052524 020123 051105  
 1956 014162 047522 000122  
 1957 014166 044103 047101 042516  
 1958 014174 020114 040504 040524  
 1959 014202 042440 051122 051117  
 1960 014210 000  
 1961 014020  
 1962 014072  
 1963 014141  
 1964 014166  
 1965 014020  
 1966 014072  
 1967 014141  
 1968 014166  
 1969 014211 124 040522 051516  
 1970 014216 044515 020124 047101  
 1971 014224 020104 042522 042503  
 1972 014232 053111 020105 047111  
 1973 014240 040440 020116 047111  
 1974 014246 042524 051122 050125  
 1975 014254 020124 047105 044526  
 1976 014262 047522 046516 047105  
 1977 014270 000124  
 1978 014020  
 1979 014072  
 1980 014272 047516 044440 052116  
 1981 014300 051105 052522 052120  
 1982 014306 047440 041503 051125  
 1983 014314 042522 000104  
 1984 014141  
 1985 014166  
 1986 014020  
 1987 014072  
 1988 014272  
 1989 014141  
 1990 014166  
 1991 014020

MESS6A: .ASCIZ "TRANSMIT DONE NOT CLEARED BY TRANSMISSION"

MESS6B: .ASCIZ "RECEIVER NOT ACTIVE AFTER TRANSMISSION"

MESS6C: .ASCIZ "CHANNEL STATUS ERROR"

MESS6E: .ASCIZ "CHANNEL DATA ERROR"

MESS6F=MESS6A  
 MESS6G=MESS6B  
 MESS6H=MESS6C  
 MESS6J=MESS6E  
 MESS6K=MESS6A  
 MESS6L=MESS6B  
 MESS6M=MESS6C  
 MESS6P=MESS6E

MESS7: .ASCIZ "TRANSMIT AND RECEIVE IN AN INTERRUPT ENVIRONMENT"

MESS7A=MESS6A  
 MESS7B=MESS6B

MESS7C: .ASCIZ "NO INTERRUPT OCCURRED"

MESS7D=MESS6C  
 MESS7E=MESS6E  
 MESS7F=MESS6A  
 MESS7G=MESS6B  
 MESS7H=MESS7C  
 MESS7I=MESS6C  
 MESS7J=MESS6E  
 MESS7K=MESS6A

1992		014072			MESS7L=MESS6B
1993		014272			MESS7M=MESS7C
1994		014141			MESS7N=MESS6C
1995		014166			MESS7P=MESS6E
1996	014320	052522	020116	046106	MESS8: .ASCIZ "RUN FLIP/FLOP AND '0200'"
1997	014326	050111	043057	047514	
1998	014334	020120	047101	020104	
1999	014342	030047	030062	023460	
2000	014350	000			
2001	014351	116	020117	047111	MESS8A: .ASCIZ "NO INTERRUPT ON RUN ERROR"
2002	014356	042524	051122	050125	
2003	014364	020124	047117	051040	
2004	014372	047125	042440	051122	
2005	014400	051117	000		
2006	014403	103	040510	047116	MESS8B: .ASCIZ "CHANNEL STATUS ERROR AFTER EXECUTING '0200'"
2007	014410	046105	051440	040524	
2008	014416	052524	020123	051105	
2009	014424	047522	020122	043101	
2010	014432	042524	020122	054105	
2011	014440	041505	052125	047111	
2012	014446	020107	030047	030062	
2013	014454	023460	000		
2014	014457	103	040510	047116	MESS8C: .ASCIZ "CHANNEL STATUS ERROR AFTER DELAY AFTER '0200'"
2015	014464	046105	051440	040524	
2016	014472	052524	020123	051105	
2017	014500	047522	020122	043101	
2018	014506	042524	020122	042504	
2019	014514	040514	020131	043101	
2020	014522	042524	020122	030047	
2021	014530	030062	023460	000	
2022	014535	103	042510	045503	MESS9: .ASCIZ "CHECK 'WORD LOST' FLIP/FLOP"
2023	014542	023440	047527	042122	
2024	014550	046040	051517	023524	
2025	014556	043040	044514	027520	
2026	014564	046106	050117	000	
2027	014571	103	040510	047116	MESS9A: .ASCIZ "CHANNEL STATUS ERROR AFTER SECOND TRANSMISSION"
2028	014576	046105	051440	040524	
2029	014604	052524	020123	051105	
2030	014612	047522	020122	043101	
2031	014620	042524	020122	042523	
2032	014626	047503	042116	052040	
2033	014634	040522	051516	044515	
2034	014642	051523	047511	000116	
2035	014650	047516	044440	052116	MESS9B: .ASCIZ "NO INTERRUPT ON 'WORD LOST'"
2036	014656	051105	052522	052120	
2037	014664	047440	020116	053447	
2038	014672	051117	020104	047514	
2039	014700	052123	000047		
2040	014704	044103	041505	020113	MESS10: .ASCIZ "CHECK THE REAL TIME CLOCK"
2041	014712	044124	020105	042522	
2042	014720	046101	052040	046511	
2043	014726	020105	046103	041517	
2044	014734	000113			
2045	014736	046103	041517	020113	MES10A: .ASCIZ "CLOCK COUNTER NOT CLEARED BY DATA OUT"
2046	014744	047503	047125	042524	
2047	014752	020122	047516	020124	

2048	014760	046103	040505	042522	
2049	014766	020104	054502	042040	
2050	014774	052101	020101	052517	
2051	015002	000124			
2052					
2053	015004	042524	052116	051510	MES10B: .ASCIZ "TENTHS OF SECONDS COUNTER ERROR"
2054	015012	047440	020106	042523	
2055	015020	047503	042116	020123	
2056	015026	047503	047125	042524	
2057	015034	020122	051105	047522	
2058	015042	000122			
2059	015044	047516	051440	041505	MES10C: .ASCIZ "NO SECCNDS CLOCK CHANGE"
2060	015052	047117	051504	041440	
2061	015060	047514	045503	041440	
2062	015066	040510	043516	000105	
2063	015074	042523	047503	042116	MES10D: .ASCIZ "SECONDS COUNTER ERROR"
2064	015102	020123	047503	047125	
2065	015110	042524	020122	051105	
2066	015116	047522	000122		
2067	015122	047516	046440	047111	MES10E: .ASCIZ "NO MINUTES CLOCK CHANGE"
2068	015130	052125	051505	041440	
2069	015136	047514	045503	041440	
2070	015144	040510	043516	000105	
2071	015152	044515	052516	042524	MES10F: .ASCIZ "MINUTES COUNTER ERROR"
2072	015160	020123	047503	047125	
2073	015166	042524	020122	051105	
2074	015174	047522	000122		
2075	015200	047516	044040	052517	MES10G: .ASCIZ "NO HOURS CLOCK CHANGE"
2076	015206	051522	041440	047514	
2077	015214	045503	041440	040510	
2078	015222	043516	000105		
2079	015226	047510	051125	020123	MES10H: .ASCIZ "HOURS COUNTER ERROR"
2080	015234	047503	047125	042524	
2081	015242	020122	051105	047522	
2082	015250	000122			
2083	015252	042523	047503	042116	MES10I: .ASCIZ "SECONDS CLOCK CHANGED"
2084	015260	020123	046103	041517	
2085	015266	020113	044103	047101	
2086	015274	042507	000104		
2087	015300	044515	052516	042524	MES10J: .ASCIZ "MINUTES CLOCK CHANGED"
2088	015306	020123	046103	041517	
2089	015314	020113	044103	047101	
2090	015322	042507	000104		
2091	015326	047510	051125	020123	MES10K: .ASCIZ "HOURS CLOCK CHANGED"
2092	015334	046103	041517	020113	
2093	015342	044103	047101	042507	
2094	015350	000104			
2095		014141			MES20A=MESS6C
2096		014166			MES20B=MESS6E
2097		014141			MES20D=MESS6C
2098		014166			MES20E=MESS6E
2099		014141			MES21A=MESS6C
2100		014141			MES21B=MESS6C
2101		014141			MES21C=MESS6C
2102		014166			MES21D=MESS6E
2103		014141			MES21F=MESS6C



2104		014141				MES21G=MESS6C
2105		014141				MES21H=MESS6C
2106		014166				MES21I=MESS6C
2107		014141				MES22A=MESS6C
2108		014141				MES22C=MESS6C
2109	015352	031060	030060	040440	MES23: .ASCIZ	"0200 AND 0300 USING MODE 1"
2110	015360	042116	030040	030063		
2111	015366	020060	051525	047111		
2112	015374	020107	047515	042504		
2113	015402	030440	000			
2114	015405	061	020064	052522	MES23A: .ASCIZ	"14 RUN=1 AFTER 0300"
2115	015412	036516	020061	043101		
2116	015420	042524	020122	031460		
2117	015426	030060	000			
2118		014141				MES23C=MESS6C
2119	015431	067	030060	020060	MES23D: .ASCIZ	"7000 AFTER 0300 SET RECEIVER ACTIVE"
2120	015436	043101	042524	020122		
2121	015444	031460	030060	051440		
2122	015452	052105	051040	041505		
2123	015460	044505	042526	020122		
2124	015466	041501	044524	042526		
2125	015474	000				
2126	015475	122	047125	030475	MES23E: .ASCIZ	"RUN=1 AFTER 7000"
2127	015502	040440	052106	051105		
2128	015510	033440	030060	000060		
2129	015516	032061	051040	047125	MES23F: .ASCIZ	"14 RUNS IMMEDIATELY AFTER 0200"
2130	015524	020123	046511	042515		
2131	015532	044504	052101	046105		
2132	015540	020131	043101	042524		
2133	015546	020122	031060	030060		
2134	015554	000				
2135		014141				MES23G=MESS6C
2136	015555	067	030060	020060	MES23H: .ASCIZ	"7000 AFTER 0200 DELAY DIDN'T SET RECEIVER ACTIVE"
2137	015562	043101	042524	020122		
2138	015570	031060	030060	042040		
2139	015576	046105	054501	042040		
2140	015604	042111	023516	020124		
2141	015612	042523	020124	042522		
2142	015620	042503	053111	051105		
2143	015626	040440	052103	053111		
2144	015634	000105				
2145	015636	044523	052515	052114	MES23I: .ASCIZ	"SIMULTANEOUS INTERRUPTS"
2146	015644	047101	047505	051525		
2147	015652	044440	052116	051105		
2148	015660	052522	052120	000123		
2149	015666	047516	026516	042523	MES30A: .ASCIZ	"NON-SEQUENTIAL INTERRUPT"
2150	015674	052521	047105	044524		
2151	015702	046101	044440	052116		
2152	015710	051105	052522	052120		
2153	015716	000				
2154	015717	115	046125	044524	MES31: .ASCIZ	"MULTIPLE CHANNEL EXERCISER"
2155	015724	046120	020105	044103		
2156	015732	047101	042516	020114		
2157	015740	054105	051105	044503		
2158	015746	042523	000122			
2159	015752	047516	051040	041505	MES31A: .ASCIZ	"NO RECEIVER ACTIVE WITH TRANSMITTER ACTIVE"

K04

POP-11 DC-14E DIAGNOSTIC MD-14-DCDCA-B MACY11 30(1046) 12-JUL-77 10:07 PAGE 41  
DCDCAB.P11 02-MAY-77 09:12

2160	015760	044505	042526	020122	
2161	015766	041501	044524	042526	
2162	015774	053440	052111	020110	
2163	016002	051124	047101	046523	
2164	016010	052111	042524	020122	
2165	016016	041501	044524	042526	
2166	016024	000			
2167	016025	116	020117	042522	MES31B: .ASCIZ "NO RECEIVER INACTIVE WITH TRANSMITTER INACTIVE"
2168	016032	042503	053111	051105	
2169	016040	044440	040516	052103	
2170	016046	053111	020105	044527	
2171	016054	044124	052040	040522	
2172	016062	051516	044515	052124	
2173	016070	051105	044440	040516	
2174	016076	052103	053111	000105	
2175		014141			MES31C=MESS6C
2176		014166			MES31D=MESS6E
2177					
2178	016104	051124	047101	046523	MESSA: .ASCIZ "TRANSMISSION ERROR"
2179	016112	051511	044523	047117	
2180	016120	042440	051122	051117	
2181	016126	000			
2182	016127	120	020103	020040	MES1: .ASCIZ "PC INST"
2183	016134	020040	047111	052123	
2184	016142	000			
2185	016143	117	052125	052520	MESSB: .ASCIZ "OUTPUT REGISTER ERROR"
2186	016150	020124	042522	044507	
2187	016156	052123	051105	042440	
2188	016164	051122	051117	000	
2189	016171	105	050130	042047	MES2: .ASCIZ "EXP'D REC'D"
2190	016176	020040	042522	023503	
2191	016204	000104			
2192	016206	042103	020106	020060	MSCDF0: .ASCIZ "CDF 0 ERROR"
2193	016214	051105	047522	000122	
2194	016222	042103	020106	020061	MSCDF1: .ASCIZ "CDF 1 ERROR"
2195	016230	051105	047522	000122	
2196	016236	042515	047515	054522	MEMMES: .ASCIZ "MEMORY COMPLIMENT TEST"
2197	016244	041440	046517	046120	
2198	016252	046511	047105	020124	
2199	016260	042524	052123	000	
2200	016265	101	042104	020122	MS3: .ASCIZ "ADDR CONT"
2201	016272	020040	047503	052116	
2202	016300	000			
2203		000001			.END











TST300	011140	1461#	1469											
TST31A	011242	1484#	1489											
TST31B	011306	1496#	1511	1513										
TST31C	011334	1501#	1504											
TST31D	011354	1502	1506#	1545										
TST31E	011374	1509	1512#											
TST31F	011400	1500	1514#											
TST31G	011406	1515#	1519											
TST31H	011430	1517	1525#											
TST31I	011514	1533	1540#											
TST6L1	002216	377#												
TST7L1	003070	464	504#											
TST7R2	002502	407	433#											
TST7R3	003004	459	488#											
TST8R1	003274	528	542#											
TST9R1	003604	586	601#											
TW0WD	006666	828	860	1092#										
TYPE	013052	1678	1705	1762	1783	1787	1804#	1813	1815					
T03L1	000776	165#	170											
T03L2	001070	184#	189											
T03L3	001162	203#	209											
T03L4	001260	224#	230											
T07L1	002236	387#	393											
T10L1	004036	647#	714	716	720	742								
T10L1A	004446	696	718#											
T10L2	004476	652	663	724#										
T10L3	004524	680	730#											
T10L4	004552	698	736#											
T23L1	010266	1342#	1347											
T23L2	010346	1354#	1358											
T23L3	010566	1392#	1395											
T23L4	010606	1393	1397#	1398										
WRITE	006252	986#	1124#	1125	1187*	1188	1247*	1248	1256*	1257	1287*	1288		
XMIT	011630	1486	1544	1573#										
	= 016301	9#	14#	98#	126	151	179	198	219	239	260	279	299	305
		310	312	316	319	324	330	341	348	353	355	359	362	367
		373	403	413	418	420	424	428	439	445	456	468	473	475
		479	483	494	500	524	534	538	551	556	558	563	580	585
		593	597	610	620	636	643	651	655	660	667	671	677	684
		688	693	702	706	711	719	728	734	740	1027#	1268	1279	1282
		1283	1329	1331	1333	1336	1344	1355	1361	1367	1370	1375	1377	1383
		1390	1400	1401	1408	1437	1442	1448	1465	1530	1538	1542	1583	1590
		1591#	1683	1697	1733	1741	1749	1806						

. ABS. 016301 000

ERRORS DETECTED: 0

DSKZ:DCDCAB.BIN, DSKZ:DCDCAB.LST/CRF/SOL/NL:TOC=DSKZ:DCDCAB.P11  
RUN-TIME: 14.6 SECONDS  
RUN-TIME RATIO: 158/7=22.5  
CORE USED: 25K (49 PAGES)