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LQPSE-F PDP11 DIAG  
CZLQPBO

AH-S329B-MC  
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MADE IN USA



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IDENTIFICATION

PRODUCT CODE: AC-S327B-MC  
PRODUCT NAME: CZLOP80 LOPSE-F PDP-11 DIAG  
PRODUCT DATE: JANUARY 1981  
MAINTAINER: DIAGNOSTIC ENGINEERING  
AUTHOR: GRANT F. SANDY

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## 1.0 GENERAL INFORMATION

### 1.1 PROGRAM ABSTRACT

THIS DIAGNOSTIC PROGRAM WILL BE USED PRIMARILY BY FIELD SERVICE PERSONNEL TO EXERCISE THE LQPSE-F LETTER QUALITY PRINTER WITH A SERIAL INTERFACE TO A PDP-11 CPU.

THIS PROGRAM WILL GENERATE SEVERAL PAGES OF PRINT ON THE LQPSE-F PRINTER, LABELLING (WHEN ABLE) EACH TEST PRINT PATTERN WITH THE TEST TITLE. THIS WILL AID THE USER IN THE DIAGNOSIS OF PRINTER FAILURES.

THE DIAGNOSTIC PROGRAM WILL HELP IDENTIFY FUNCTIONAL PROBLEMS WITH THE PRINTER CONNECTED TO A PDP-11 BY ANY OF FIVE SERIAL INTERFACE DEVICES.

THIS DIAGNOSTIC HAS BEEN WRITTEN FOR USE WITH THE DIAGNOSTIC RUNTIME SERVICES SOFTWARE (SUPERVISOR). THESE SERVICES PROVIDE THE INTERFACE TO THE OPERATOR AND TO THE SOFTWARE ENVIRONMENT. THIS PROGRAM CAN BE USED WITH XXDP+, ACT, APT, SLIDE AND PAPER TAPE. FOR A COMPLETE DESCRIPTION OF THE RUNTIME SERVICES, REFER TO THE XXDP+ USER'S MANUAL. THERE IS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES IN SECTION 2 OF THIS DOCUMENT.

### 1.2 SYSTEM REQUIREMENTS

THE MINIMUM HARDWARE CONFIGURATION FOR RUNNING THIS DIAGNOSTIC IS GIVEN HERE:



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- 1) A PDP-11 CPU WITH AT LEAST 16K WORDS OF MEMORY.
- 2) A CONSOLE TERMINAL.
- 3) LQPSE-F PRINTER.
- 4) ONE OF THE FOLLOWING INTERFACES:
  - A) DZ11.
  - B) DL11-W.
  - C) DLV11-J.
  - D) DLV11-F.
  - E) MXV11.

### 1.3 RELATED DOCUMENTS AND STANDARDS

- 1) XXDP+ USERS MANUAL - CHQUS.
- 2) PDP-11 DIAGNOSTIC SUPERVISOR PROGRAMMERS GUIDE:  
HOW TO WRITE TO THE SUPERVISOR.
- 3) DIAGNOSTIC ENGINEERING STANDARDS AND CONVENTIONS,  
PROGRAMMING PRACTICES.

### 1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

THE MINIMUM HARDWARE CONFIGURATION DETAILED IN SECTION 1.2 WITH THE EXCEPTION OF THE PRINTER IS ASSUMED TO BE FULLY OPERATIONAL BEFORE THIS DIAGNOSTIC IS RUN.

### 1.5 ASSUMPTIONS

## 2.0 OPERATING INSTRUCTIONS

THIS SECTION CONTAINS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES. FOR DETAILED INFORMATION, REFER TO THE XXDP+ USER'S MANUAL (CHQUS).

### 2.1 COMMANDS

THERE ARE ELEVEN LEGAL COMMANDS FOR THE DIAGNOSTIC RUNTIME SERVICES (SUPERVISOR). THIS SECTION LISTS THE COMMANDS AND GIVES A VERY BRIEF DESCRIPTION OF THEM. THE XXDP+ USER'S MANUAL HAS MORE DETAILS.

COMMAND	EFFECT
START	START THE DIAGNOSTIC FROM AN INITIAL STATE
RESTART	START THE DIAGNOSTIC WITHOUT INITIALIZING
CONTINUE	CONTINUE AT TEST THAT WAS INTERRUPTED (AFTER ^C)
PROCEED	CONTINUE FROM AN ERROR HALT
EXIT	RETURN TO XXDP+ MONITOR (XXDP+ OPERATION ONLY.)
ADD	ACTIVATE A UNIT FOR TESTING (ALL UNITS ARE CONSIDERED TO BE ACTIVE AT START TIME)
DROP	DEACTIVATE A UNIT
PRINT	PRINT STATISTICAL INFORMATION (IF IMPLEMENTED BY THE DIAGNOSTIC - SECTION 4.0)
DISPLAY	TYPE A LIST OF ALL DEVICE INFORMATION
FLAGS	TYPE THE STATE OF ALL FLAGS (SEE SECTION 2.3)
ZFLAGS	CLEAR ALL FLAGS (SEE SECTION 2.3)

A COMMAND CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS. SO

YOU MAY, FOR EXAMPLE, TYPE 'STA' INSTEAD OF 'START'.

## 2.2 SWITCHES

THERE ARE SEVERAL SWITCHES WHICH ARE USED TO MODIFY SUPERVISOR OPERATION. THESE SWITCHES ARE APPENDED TO THE LEGAL COMMANDS. ALL OF THE LEGAL SWITCHES ARE TABULATED BELOW WITH A BRIEF DESCRIPTION OF EACH. IN THE DESCRIPTIONS BELOW, A DECIMAL NUMBER IS DESIGNATED BY 'DDDD'.

SWITCH	EFFECT
/TESTS:LIST	EXECUTE ONLY THOSE TESTS SPECIFIED IN THE LIST. LIST IS A STRING OF TEST NUMBERS, FOR EXAMPLE - /TESTS:1:5:7-10. THIS LIST WILL CAUSE TESTS 1,5,7,8,9,10 TO BE RUN. ALL OTHER TESTS WILL NOT BE RUN.
/PASS:DDDD	EXECUTE DDDDD PASSES (DDDD = 1 TO 64000)
/FLAGS:FLGS	SET SPECIFIED FLAGS. FLAGS ARE DESCRIBED IN SECTION 2.3.
/EOP:DDDD	REPORT END OF PASS MESSAGE AFTER EVERY DDDDD PASSES ONLY. (DDDD = 1 TO 64000)
/UNITS:LIST	TEST/ADD/DROP ONLY THOSE UNITS SPECIFIED IN THE LIST. LIST EXAMPLE - /UNITS:0:5:10-12 USE UNITS 0,5,10,11,12 (UNIT NUMBERS = 0-63)

EXAMPLE OF SWITCH USAGE:

START/TESTS:1-5/PASS:1000/EOP:100

THE EFFECT OF THIS COMMAND WILL BE: 1) TESTS 1 THROUGH 5 WILL BE EXECUTED, 2) ALL UNITS WILL TESTED 1000 TIMES AND 3) THE END OF PASS MESSAGES WILL BE PRINTED AFTER EACH 100 PASSES ONLY. A SWITCH CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS. YOU MAY, FOR EXAMPLE, TYPE '/TES:1-5' INSTEAD OF '/TESTS:1-5'.

BELOW IS A TABLE THAT SPECIFIES WHICH SWITCHES CAN BE USED BY EACH COMMAND.

	TESTS	PASS	FLAGS	EOP	UNITS
START	X	X	X	X	X
RESTART	X	X	X	X	X
CONTINUE		X	X	X	
PROCEED			X		
DROP					X
ADD					X
PRINT					
DISPLAY					X
FLAGS					
ZFLAGS					
EXIT					

## 2.3 FLAGS

FLAGS ARE USED TO SET UP CERTAIN OPERATIONAL PARAMETERS SUCH AS LOOPING ON ERROR. ALL FLAGS ARE CLEARED AT STARTUP AND REMAIN

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233 CLEARED UNTIL EXPLICITLY SET USING THE FLAGS SWITCH. FLAGS  
 234 ARE ALSO CLEARED AFTER A START COMMAND UNLESS SET USING THE  
 235 FLAG SWITCH. THE ZFLAGS COMMAND MAY ALSO BE USED TO CLEAR  
 236 ALL FLAGS. WITH THE EXCEPTION OF THE START AND ZFLAGS COMMANDS,  
 237 NO COMMANDS AFFECT THE STATE OF THE FLAGS; THEY REMAIN SET OR  
 238 CLEARED AS SPECIFIED BY THE LAST FLAG SWITCH.  
 239

240 FLAG	EFFECT
241 -----	-----
242 H0L	HALT ON ERROR - CONTROL IS RETURNED TO RUNTIME SERVICES COMMAND MODE
243 LOE	LOOP ON ERROR (NOT SUPPORTED IN THIS DIAGNOSTIC)
244 IER*	INHIBIT ALL ERROR REPORTS
245 IBP*	INHIBIT ALL ERROR REPORTS EXCEPT FIRST LEVEL (FIRST LEVEL CONTAINS ERROR TYPE, NUMBER, PC, TEST AND UNIT)
246 IXR*	INHIBIT EXTENDED ERROR REPORTS (THOSE CALLED BY PRINTX MACRO'S)
247 PRI	DIRECT MESSAGES TO LINE PRINTER
248 PNT	PRINT TEST NUMBER AS TEST EXECUTES
249 BOE	'BELL' ON ERROR
250 UAM	UNATTENDED MODE (NO MANUAL INTERVENTION)
251 ISR	INHIBIT STATISTICAL REPORTS (DOES NOT APPLY TO DIAGNOSTICS WHICH DO NOT SUPPORT STATISTICAL REPORTING)
252 IDR	INHIBIT PROGRAM DROPPING OF UNITS
253 ADR	EXECUTE AUTODROP CODE
254 LOT	LOOP ON TEST
255 EVL	EXECUTE EVALUATION (ON DIAGNOSTICS WHICH HAVE EVALUATION SUPPORT)

256 \*ERROR MESSAGES ARE DESCRIBED IN SECTION 3.1  
 257

258 SEE THE XXDP+ USER'S MANUAL FOR MORE DETAILS ON FLAGS. YOU MAY  
 259 SPECIFY MORE THAN ONE FLAG WITH THE FLAG SWITCH. FOR EXAMPLE,  
 260 TO CAUSE THE PROGRAM TO LOOP ON ERROR, INHIBIT ERROR REPORTS  
 261 AND TYPE A 'BELL' ON ERROR, YOU MAY USE THE FOLLOWING STRING:  
 262

263 /FLAGS:IER:BOE  
 264

#### 265 2.4 HARDWARE QUESTIONS

266 WHEN A DIAGNOSTIC IS STARTED, THE RUNTIME SERVICES WILL PROMPT  
 267 THE USER FOR HARDWARE INFORMATION BY TYPING 'CHANGE HW (L) ?'  
 268 YOU MUST ANSWER 'Y' AFTER A START COMMAND UNLESS THE HARDWARE  
 269 INFORMATION HAS BEEN 'PRELOADED' USING THE SETUP UTILITY (SEE  
 270 CHAPTER 6 OF THE XXDP+ USER'S MANUAL). WHEN YOU ANSWER THIS  
 271 QUESTION WITH A 'Y', THE RUNTIME SERVICES WILL ASK FOR THE NUMBER  
 272 OF UNITS (IN DECIMAL). YOU WILL THEN BE ASKED THE FOLLOWING  
 273 QUESTIONS FOR EACH UNIT.  
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275 Q1: 'CHOOSE PAGE WIDTH FOR THE PRINTER  
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CHOOSE ONE: 1)80 CHARACTERS PER PRINTER LINE  
2)132 CHARACTERS PER PRINTER LINE  
(1,2) >>

Q2: "IF ALL DEFAULT VALUES FOR INTERFACE DESIRED, ENTER ^Z.  
IF DEFAULT DESIRED FOR A SINGLE INTERFACE CHARACTERISTIC  
DEPRESS <RETURN>.

'ENTER CONTROL STATUS REGISTER (CSR) ADDRESS.>>

Q3: 'PRINTER CONNECTED TO A SINGLE LINE INTERFACE?

Q3-A: 'ENTER INTERFACE CHANNEL NUMBER FOR THE PRINTER.  
(ASKED ONLY IF Q3 WAS ANSWERED BY A 'N')

## 2.5 SOFTWARE QUESTIONS

AFTER YOU HAVE ANSWERED THE HARDWARE QUESTIONS OR AFTER A RESTART OR CONTINUE COMMAND, THE RUNTIME SERVICES WILL ASK FOR SOFTWARE PARAMETERS. THESE PARAMETERS WILL GOVERN SOME DIAGNOSTIC SPECIFIC OPERATION MODES. YOU WILL BE PROMPTED BY "CHANGE SW (L) ?" IF YOU WISH TO CHANGE ANY PARAMETERS, ANSWER BY TYPING 'Y'. THE SOFTWARE QUESTIONS AND THE DEFAULT VALUES ARE DESCRIBED IN THE NEXT PARAGRAPH(S).

NONE

## 2.6 EXTENDED P-TABLE DIALOGUE

WHEN YOU ANSWER THE HARDWARE QUESTIONS, YOU ARE BUILDING ENTRIES IN A TABLE THAT DESCRIBES THE DEVICES UNDER TEST. THE SIMPLEST WAY TO BUILD THIS TABLE IS TO ANSWER ALL QUESTIONS FOR EACH UNIT TO BE TESTED. IF YOU HAVE A MULTIPLEXED DEVICE SUCH AS A MASS STORAGE CONTROLLER WITH SEVERAL DRIVES OR A COMMUNICATION DEVICE WITH SEVERAL LINES, THIS BECOMES TEDIOUS SINCE MOST OF THE ANSWERS ARE REPETITIOUS.

TO ILLUSTRATE A MORE EFFICIENT METHOD, SUPPOSE YOU ARE TESTING A FICTIONAL DEVICE, THE XY11. SUPPOSE THIS DEVICE CONSISTS OF A CONTROL MODULE WITH EIGHT UNITS (SUB-DEVICES) ATTACHED TO IT. THESE UNITS ARE DESCRIBED BY THE OCTAL NUMBERS 0 THROUGH 7. THERE IS ONE HARDWARE PARAMETER THAT CAN VARY AMONG UNITS CALLED THE Q-FACTOR. THIS Q-FACTOR MAY BE 0 OR 1. BELOW IS A SIMPLE WAY TO BUILD A TABLE FOR ONE XY11 WITH EIGHT UNITS.

# UNITS (D) ? 8<CR>

UNIT 1  
CSR ADDRESS (O) ? 160000<CR>  
SUB-DEVICE # (O) ? 0<CR>  
Q-FACTOR (O) 0 ? 1<CR>

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UNIT 2
CSR ADDRESS (0) ? 160000<CR>
SUB-DEVICE # (0) ? 1<CR>
Q-FACTOR (0) 1 ? 0<CR>
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UNIT 3
CSR ADDRESS (0) ? 160000<CR>
SUB-DEVICE # (0) ? 2<CR>
Q-FACTOR (0) 0 ? <CR>
```

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UNIT 4
CSR ADDRESS (0) ? 160000<CR>
SUB-DEVICE # (0) ? 3<CR>
Q-FACTOR (0) 0 ? <CR>
```

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UNIT 5
CSR ADDRESS (0) ? 160000<CR>
SUB-DEVICE # (0) ? 4<CR>
Q-FACTOR (0) 0 ? <CR>
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UNIT 6
CSR ADDRESS (0) ? 160000<CR>
SUB-DEVICE # (0) ? 5<CR>
Q-FACTOR (0) 0 ? <CR>
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```
UNIT 7
CSR ADDRESS (0) ? 160000<CR>
SUB-DEVICE # (0) ? 6<CR>
Q-FACTOR (0) 0 ? 1<CR>
```

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UNIT 8
CSR ADDRESS (0) 160000<CR>
SUB-DEVICE # (0) ? 7<CR>
Q-FACTOR (0) 1 ? <CR>
```

NOTICE THAT THE DEFAULT VALUE FOR THE Q-FACTOR CHANGES WHEN A NON-DEFAULT RESPONSE IS GIVEN. BE CAREFUL WHEN SPECIFYING MULTIPLE UNITS.

AS YOU CAN SEE FROM THE ABOVE EXAMPLE, THE HARDWARE PARAMETERS DO NOT VARY SIGNIFICANTLY FROM UNIT TO UNIT. THE PROCEDURE SHOWN IS NOT VERY EFFICIENT.

THE RUNTIME SERVICES CAN TAKE MULTIPLE UNIT SPECIFICATIONS HOWEVER. LET'S BUILD THE SAME TABLE USING THE MULTIPLE SPECIFICATION FEATURE.

```
# UNITS (0) ? 8<CR>
```

```
UNIT 1
CSR ADDRESS (0) ? 160000<CR>
SUB-DEVICE # (0) ? 0,1<CR>
Q-FACTOR (0) 0 ? 1,0<CR>
```

```
UNIT 3
CSR ADDRESS (0) ? 160000<CR>
SUB-DEVICE # (0) ? 2-5<CR>
```



Q-FACTOR (0) 0 ? 0<CR>

UNIT 7

CSR ADDRESS (0) ? 160000<CR>

SUB-DEVICE # (0) ? 6,7<CR>

Q-FACTOR (0) 0 ? 1<CR>

AS YOU CAN SEE IN THE ABOVE DIALOGUE, THE RUNTIME SERVICES WILL BUILD AS MANY ENTRIES AS IT CAN WITH THE INFORMATION GIVEN IN ANY ONE PASS THROUGH THE QUESTIONS. IN THE FIRST PASS, TWO ENTRIES ARE BUILT SINCE TWO SUB-DEVICES AND Q-FACTORS WERE SPECIFIED. THE SERVICES ASSUME THAT THE CSR ADDRESS IS 160000 FOR BOTH SINCE IT WAS SPECIFIED ONLY ONCE. IN THE SECOND PASS, FOUR ENTRIES WERE BUILT. THIS IS BECAUSE FOUR SUB-DEVICES WERE SPECIFIED. THE "-" CONSTRUCT TELLS THE RUNTIME SERVICES TO INCREMENT THE DATA FROM THE FIRST NUMBER TO THE SECOND. IN THIS CASE, SUB-DEVICES 2, 3, 4 AND 5 WERE SPECIFIED. (IF THE SUB-DEVICE WERE SPECIFIED BY ADDRESSES, THE INCREMENT WOULD BE BY 2 SINCE ADDRESSES MUST BE ON AN EVEN BOUNDARY.) THE CSR ADDRESSES AND Q-FACTORS FOR THE FOUR ENTRIES ARE ASSUMED TO BE 160000 AND 0 RESPECTIVELY SINCE THEY WERE ONLY SPECIFIED ONCE. THE LAST TWO UNITS ARE SPECIFIED IN THE THIRD PASS.

THE WHOLE PROCESS COULD HAVE BEEN ACCOMPLISHED IN ONE PASS AS SHOWN BELOW.

# UNITS (0) ? 8<CR>

UNIT 1

CSR ADDRESS (0) ? 160000<CR>

SUB-DEVICE # (0) ? 0-7<CR>

Q-FACTOR (0) 0 ? 0,1,0,....,1,1<CR>

AS YOU CAN SEE FROM THIS EXAMPLE, NULL REPLIES (COMMAS ENCLOSING A NULL FIELD) TELL THE RUNTIME SERVICES TO REPEAT THE LAST REPLY.

## 2.7 QUICK START-UP PROCEDURE (XXDP+)

TO START-UP THIS PROGRAM:

1. BOOT XXDP+
2. GIVE THE DATE AND ANSWER THE LSI AND 50HZ (IF THERE IS A CLOCK) QUESTIONS
3. TYPE 'R NAME', WHERE NAME IS THE NAME OF THE BIN OR BIC FILE FOR THIS PROGRAM
4. TYPE "START"
5. ANSWER THE "CHANGE HW" QUESTION WITH "Y"
6. ANSWER ALL THE HARDWARE QUESTIONS
7. ANSWER THE "CHANGE SW" QUESTION WITH "N" (NOT ASKED)

WHEN YOU FOLLOW THIS PROCEDURE YOU WILL BE USING ONLY THE

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DEFAULTS FOR FLAGS AND SOFTWARE PARAMETERS. THESE DEFAULTS ARE DESCRIBED IN SECTIONS 2.3 AND 2.5.

### 3.0 ERROR INFORMATION

#### 3.1 TYPES OF ERROR MESSAGES

THERE ARE THREE LEVELS OF ERROR MESSAGES THAT MAY BE ISSUED BY A DIAGNOSTIC: GENERAL, BASIC AND EXTENDED. GENERAL ERROR MESSAGES ARE ALWAYS PRINTED UNLESS THE "IER" FLAG IS SET (SECTION 2.3). THE GENERAL ERROR MESSAGE IS OF THE FORM:

```
NAME *TYPE NUMBER ON UNIT NUMBER TST NUMBER PC:XXXXXX
ERROR MESSAGE
```

WHERE: NAME = DIAGNOSTIC NAME  
TYPE = ERROR TYPE (SYS FATAL, DEV FATAL, HARD OR SOFT)  
NUMBER = ERROR NUMBER  
UNIT NUMBER - 0 - N (N IS LAST UNIT IN PTABLE)  
TST NUMBER - TEST AND SUBTEST WHERE ERROR OCCURRED  
PC:XXXXXX = ADDRESS OF ERROR MESSAGE CALL

BASIC ERROR MESSAGES ARE MESSAGES THAT CONTAIN SOME ADDITIONAL INFORMATION ABOUT THE ERROR. THESE ARE ALWAYS PRINTED UNLESS THE "IER" OR "IBR" FLAGS ARE SET (SECTION 2.3). THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL MESSAGE.

EXTENDED ERROR MESSAGES CONTAIN SUPPLEMENTARY ERROR INFORMATION SUCH AS REGISTER CONTENTS OR GOOD/BAD DATA. THESE ARE ALWAYS PRINTED UNLESS THE "IER", "IBR" OR "IXR" FLAGS ARE SET (SECTION 2.3). THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL ERROR MESSAGE AND ANY ASSOCIATED BASIC ERROR MESSAGES.

#### 3.2 SPECIFIC ERROR MESSAGES

"I/O FAILURE DETECTED AT PRINTER."  
PROBLEM WITH THE SELF TEST SEQUENCE. CHECK PRINTER ROM.

"PRINTER BUFFER FULL."  
A "CAN" CHARACTER HAS BEEN RECEIVED, AND THE PRINTER HAS DETECTED THAT ITS BUFFER LIMIT HAS BEEN REACHED.

"PROM/RAM FAILURE DETECTED BY PRINTER."  
VALID ONLY AFTER THE SELF TEST. CHECK THE PRINTER MEMORY.

"PRINTER ERROR: N OUT OF RANGE IN ESCAPE SEQUENCE."  
AN UNDEFINED OR OUT OF RANGE ARGUMENT HAS BEEN SENT TO THE PRINTER WITHIN AN ESCAPE SEQUENCE.(PRINTER COMMAND)

"PAUSE SWITCH PRESSED."  
THE PRINTER FRONT PANEL PAUSE SWITCH HAS BEEN PRESSED.

"RIBBON OUT ON PRINTER."  
THE PRINTER RIBBON MUST BE IN PLACE.

"UNDEFINED CHARACTER OR ESCAPE SEQUENCE RECEIVED."

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AN ILLEGAL SEQUENCE OR CHARACTER HAS BEEN RECEIVED.  
CHECK THE ADDRESS OF THE LAST TRANSMISSION WHICH  
IS GIVEN BY THE DIAGNOSTIC.

'SHEET FEEDER ERROR.'

THE SHEET FEEDER HAS FAILED TO OPERATE PROPERLY. THIS  
ERROR CONDITION MAY BE CLEARED BY SENDING AN 'ESC 6' TO  
THE PRINTER.

'SOFTWARE ERROR'

THIS MESSAGE SHOULD NOT PRINT UNLESS THE SOFTWARE HAS  
BEEN CORRUPTED.

'UNEXPECTED CHARACTER RECEIVED FROM PRINTER.'

AN XON, XOFF, ANSWER-BACK RESPONSE OR STATUS RESPONSE  
WAS EXPECTED, OR NO TRANSMISSION WAS EXPECTED FROM THE  
PRINTER. SOMETHING WAS NONE THE LESS RECEIVED.

'EXPECTED CHARACTER NOT RECEIVED FROM THE PRINTER.'

AN XON, XOFF, CAN, EOI, OR ESC WAS EXPECTED BUT NOT  
RECEIVED.

'INCORRECT CSR ADDRESS GIVEN. TRY AGAIN.'

THE USER HAS ENTERED AN INCORRECT CSR ADDRESS OR THE  
DEFAULT ADDRESSES DID NOT WORK WHEN TRYED. THE USER  
MUST NOW EXPLICITLY ENTER THE CORRECT CSR ADDRESS.

'INCORRECT CSR ADDRESS OR CHANNEL GIVEN. TRY AGAIN.'

EITHER THE ADDRESS OR THE CHANNEL IS INCORRECT.

'FAILED TO TRANSMIT TO PRINTER.'

THE TRANSMIT READY CONDITION COULD NOT BE OBTAINED.  
CHECK THAT THE INTERFACE CABLE IS PROPERLY ATTACHED.

'WAITING FOR A CHARACTER FROM THE PRINTER.'

THIS IS NOT AN ERROR MESSAGE. IF THE CHARACTER IS NOT  
RECEIVED EVENTUALLY, AN ERROR WILL OCCUR. THIS IS AN  
INDICATOR TO THE USER THAT THE PROGRAM IS IN A WAITING  
STATE AND NOT SIMPLY 'LOST'. WHEN THIS MESSAGE IS SEEN,  
WAIT FOR NO MORE THAN FIVE MINUTES BEFORE TAKING ACTION.

'FAILED TO FIND PRINTER AT DEFAULT ADDRESSES. RESTART PROGRAM.'

THIS INDICATES THAT THE DEFAULT SEQUENCE WHICH  
THE PROGRAM WAS INSTRUCTED TO EXERCISE FAILED  
TO FIND A PRINTER AT THE ASSUMED DEFAULT  
ADDRESSES. THE USER MUST NOW RESTART THE  
PROGRAM, EXPLICITLY SPECIFYING THE CSR ADDRESS  
AND THE DZ11 CHANNEL (IF APPLICABLE) AND THE  
INTERFACE TYPE.

#### 4.0 PERFORMANCE AND PROGRESS REPORTS

AT THE END OF EACH PASS, THE PASS COUNT IS GIVEN ALONG WITH THE

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TOTAL NUMBER OF ERRORS REPORTED SINCE THE DIAGNOSTIC WAS STARTED. THE 'EOP' SWITCH CAN BE USED TO CONTROL HOW OFTEN THE END OF PASS MESSAGE IS PRINTED. SECTION 2.2 DESCRIBES SWITCHES.

NONE

## 5.0 DEVICE INFORMATION TABLES

### P-TABLE ENTRIES:

CSRADD - CSR ADDRESS. IF FOUND TO BE ZERO, THIS INDICATES THAT THE DEFAULT CSR ADDRESSES ARE TO BE TRIED AS THE CSR ADDRESS. THE CSR ADDRESS IS THE ADDRESS OF THE RECEIVER CONTROL STATUS REGISTER IN THE SINGLE LINE INTERFACES AND THE RECEIVER AND TRANSMITTER CSR FOR THE DZ11 INTERFACE.

IOOPTN - I/O OPTION. A LOGICAL VALUE. IF EQUAL TO 'Y' THEN A DZ11 INTERFACE IS ASSUMED. IF EQUAL TO 'N' THEN A SINGLE LINE INTERFACE IS ASSUMED.

PTRCHN - PRINTER CHANNEL. THIS NUMBER (0-7) IS THE CHANNEL NUMBER ON A DZ11 INTERFACE WHICH IS CONNECTED TO THE PRINTER.

LINCHS - PRINTER LINE SIZE CHOICE. THIS NUMBER (1-2) CORRESPONDS TO THE NUMBER OF CHARACTERS PER HORIZONTAL LINE DESIRED ON THE PRINTER. THIS SHOULD BE CHOSEN BY THE USER BASED ON THE WIDTH OF THE FORMS USED ON THE PRINTER.

## 6.0 TEST SUMMARIES

EACH TEST WILL PRINT THE CURRENT TEST TITLE ON THE PRINTER AS PART OF THE TEST SEQUENCE. THIS WILL AID THE USER IN THE DIAGNOSIS PROCESS BY INFORMING THE USER OF THE PURPOSE OF THE CURRENT TEST. THIS IS THOUGHT TO BE PARTICULARLY USEFUL WHEN THE USER IS RUNNING TESTS OUT OF THE NUMERIC TEST SEQUENCE BECAUSE THE USUAL OVERALL TEST PRINT PATTERN WILL BE DIFFERENT.

IN ALL TESTS, BEFORE AND AFTER EACH TRANSMISSION TO THE PRINTER, THE RECEIVER BUFFER IS CHECKED. IF THE BUFFER CONTAINS A CHARACTER THEN THE PROGRAM CHECKS TO SEE IF IT IS AN EOT, OR A CAN CHARACTER. IF THE CHARACTER IS ONE OF THESE TWO THEN AN ERROR CONDITION EXISTS AND AN

ERROR HANDLING ROUTINE IS CALLED.

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TEST 1 - SELF TEST

A SELF TEST IS INITIATED BY SENDING THE SEQUENCE 'ESC N C' TO THE PRINTER. IT IS ASSUMED THAT NO CAN OR EOT SIGNALS WILL BE GENERATED IN THE PROCESS. A TIME DELAY WILL BE GENERATED TO WAIT FOR THE SELF TEST COMPLETION. THE PRINTER STATUS IS THEN EXAMINED. THE ARGUMENT N MAY BE ANY VALUE WITH NO EFFECT TO THE TEST.

SELF TEST COMPLETION WILL BE CONFIRMED BY THE SOFTWARE BY THE RECEPTION FROM THE PRINTER OF AN 'XON' CHARACTER AND AN ACCEPTABLE PRINTER STATUS WORD.

TEST 2 - UNDERLINE / NO UNDERLINE MODE TEST

A LINE OF CHARACTERS WILL BE PRINTED, ALTERNATING UNDERLINED AND THEN NON-UNDERLINED CHARACTERS. THE MODE IS GENERATED BY THE 'ESC N G' SEQUENCE WHERE N=0 MEANS THAT UNDERLINE IS INHIBITED AND WHERE N=1 MEANS THAT UNDERLINE IS EMPLOYED.

TEST 3 - HAMMER HIT COUNT TEST

FOUR LINES OF TEXT WILL BE PRINTED, EACH LINE OF TEXT BEING PRINTED WITH A DIFFERENT HIT COUNT. THE RESULTING PRINT PATTERN WILL BE FOUR LINES, ONE BLANK LINE (HIT COUNT 0), AND THREE LINES OF INCREASING DARKNESS (INCREASING HIT COUNT). THE 'ESC N D' SEQUENCE IS USED WITH N EQUAL TO 0, 1, 2, AND N<0. THE N<0 SEQUENCE WILL RESULT IN A HIT COUNT OF ZERO, N=0 IS A HIT COUNT OF ONE, N=1 IS A HIT COUNT OF TWO AND N=2 IS A HIT COUNT OF THREE.

TEST 4 - CARRIAGE POSITIONING TEST

IN THIS TEST, TWO CHARACTERS ARE PRINTED SEPARATED BY A SPACE OF ADJUSTABLE WIDTH. BOTH FORWARD AND REVERSE CARRIAGE MOTIONS ARE EXERCISED. THE RANGE OF THE SPACE SIZE IS DICTATED BY THE CURRENT PAGE WIDTH. THE SPACE SIZE IS ADJUSTED BY SENDING THE 'ESC N ;' SEQUENCE TO THE PRINTER. THE VALUE N IS PROPORTIONAL TO THE SPACE SIZE AND MAY BE POSITIVE (RIGHT MOVEMENT) OR NEGATIVE (LEFT MOVEMENT).

TEST 5 - PAPER POSITIONING TEST (VERTICAL)

THE VERTICAL SPACING IS ADJUSTED IN THIS TEST BY SENDING THE SEQUENCE 'ESC N 9' WHERE N IS PROPORTIONAL TO THE VERTICAL SPACE SIZE. IN THIS TEST A LINE OF CHARACTERS WILL BE PRINTED AND A CARRIAGE RETURN - LINE FEED TRANSMITTED. THE VERTICAL SPACE SIZE WILL THEN BE ADJUSTED AND THE SEQUENCE WILL BE REPEATED. THIS SEQUENCE WILL BE PERFORMED OVER A REASONABLE RANGE OF VERTICAL SPACE SIZES.

TEST 6 - PRINT ONE LINE OF EACH CHARACTER

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745

ONE LINE OF EACH PRINTABLE CHARACTER WILL BE PRINTED TO CONFIRM THAT ALL POSITIONS ON THE PRINT WHEEL WILL ACTUALLY PRINT.

TEST 7 -

PRINT A SWIRL PATTERN

THE COMPLETE CHARACTER SET IS PRINTED ONE LINE AT A TIME IN A 'SWIRL PATTERN'.

TEST 8 -

WORST CASE RAPID MOTION TEST

THIS TEST WILL PUT THE PRINT WHEEL THROUGH A MECHANICALLY STRESSFUL SITUATION BY REPEATEDLY PRINTING THE SEQUENCE 'ACA:ACA:AC...'

TEST 9 -

PRINT RANDOM CHARACTERS

THIS TEST WILL PRINT A RANDOM SEQUENCE OF CHARACTERS ON THE PRINTER.

TEST 10 -

PRINT OPERATOR SELECTED CHARACTERS

THIS TEST WILL PRINT CHARACTER SEQUENCES DEFINED BY THE USER. THE TEST IS ENDED BY ENTERING ^-RETURN>.

TEST 11 -

LIFT / DROP RIBBON BY OPERATOR CONTROL  
(OPTIONAL - SPECIAL TEST)

THIS TEST WILL HAVE TWO MODES SELECTABLE ON THE TEST MENU: AUTOMATIC MODE AND MANUAL MODE. IN THE AUTOMATIC MODE THE RIBBON WILL RAISE AND DROP AT A RATE OF ABOUT ONCE PER SECOND. THIS SEQUENCE WILL CONTINUE UNTIL THE OPERATOR STOPS IT BY ACTION TAKEN AT THE OPERATORS CONSOLE. IN MANUAL MODE THE OPERATOR WILL RAISE AND DROP THE RIBBON AT WILL BY PRESSING CONSOLE KEYS AS SPECIFIED ON THE CONSOLE SCREEN.

TEST 12 -

BIDIRECTIONAL FORMS TRACTOR (OPTIONAL - SPECIAL TEST)

A VARIABLE SIZE MATRIX OF CHARACTERS WILL BE PRINTED IN A RANDOM ORDER, FORCING RANDOM MOVEMENT OF THE CARRIAGE IN ALL FOUR DIRECTIONS.

TEST 13 -

CUT SHEET FEEDER EXERCISER (OPTIONAL - SPECIAL TEST)

IN THIS TEST THE PAGE SIZE IS SET TO ELEVEN INCHES. A SHEET IS FED FROM THE FRONT TRAY, A LINE IS PRINTED AT THE TOP OF THE PAGE AND A LINE IS PRINTED AT THE BOTTOM OF THE PAGE. THE PROCESS IS THEN REPEATED WITH THE REAR TRAY FEEDING WHICH SHOULD AUTOMATICALLY EJECT THE PAGE IN THE PRINTER FROM THE FRONT TRAY.



2

PROGRAM HEADER

1				
2	000000		.ENABL	ABS
3			.ENABL	AMA
4				
5		002000	.=2000	
6			.MCALL	SVC
7	002000		SVC	
8	002000		BGNMOD	
9				
10	000001		SVCINS= 1	: LIST INSTRUCTIONS, SHIFTED RIGHT
11	000001		SVCTST= 1	: LIST TEST TAGS, SHIFTED RIGHT
12	000001		SVCSUB= 1	: LIST SUBTEST TAGS, SHIFTED RIGHT
13	000001		SVCGBL= 1	: LIST GLOBAL TAGS, SHIFTED RIGHT
14	000001		SVCTAG= 1	: LIST OTHER TAGS, SHIFTED RIGHT
15				
16				
17				
18				
19				
20				
21	002000		POINTER	ERRTBL
22				
23				
24	002000		HEADER	CZLQP,B,0,240.,0,PRI07
	002000			
	002000	103		
	002001	132		
	002002	114		
	002003	121		
	002004	120		
	002005	000		
	002006	000		
	002007	000		
	002010			
	002010	102		
	002011			
	002011	060		
	002012			
	002012	000000		
	002014			
	002014	000360		
	002016			
	002016	025024		
	002020			
	002020	000000		
	002022			
	002022	002160		
	002024			
	002024	000000		
	002026			
	002026	026042		
	002030			
	002030	000000		
	002032			
	002032	000000		
	002034			
	002034	000000		

; INITIALIZE SUPERVISOR MACROS

```

L$NAME::
        .ASCII /C/
        .ASCII /Z/
        .ASCII /L/
        .ASCII /Q/
        .ASCII /P/
        .BYTE 0
        .BYTE 0
        .BYTE 0
L$REV::
        .ASCII /B/
L$DEPO::
        .ASCII /O/
L$UNIT::
        .WORD 0
L$TIML::
        .WORD 240.
L$HPCP::
        .WORD L$HARD
L$SPCP::
        .WORD 0
L$HPTP::
        .WORD L$HW
L$SPTP::
        .WORD 0
L$LADP::
        .WORD L$LAST
L$STA::
        .WORD 0
L$CO::
        .WORD 0
L$DTYP::
        .WORD 0
    
```

## PROGRAM HEADER

002036	
002036	000000
002040	
002040	002124
002042	
002042	000340
002044	
002044	000000
002046	
002046	000000
002050	
002050	003
002051	003
002052	
002052	000000
002054	000000
002056	
002056	000000
002060	
002060	010102
002062	
002062	000000
002064	
002064	000000
002066	
002066	000000
002070	
002070	000000
002072	
002072	000000
002074	
002074	000000
002076	
002076	010150
002100	
002100	104035
002102	
002102	010072
002104	
002104	015634
002106	
002106	017570
002110	
002110	017566
002112	
002112	015626
002114	
002114	000000
002116	
002116	000000
002120	
002120	000000

25  
26

.SBITL DISPATCH TABLE

LSAPT::		
	.WORD	0
LSDTP::		
	.WORD	LSDISPATCH
LSPRIO::		
	.WORD	PRI07
LSENV1::		
	.WORD	0
LSEXP1::		
	.WORD	0
LSMREV::		
	.BYTE	C\$REVISION
	.BYTE	C\$EDIT
LSEF::		
	.WORD	0
	.WORD	0
LS\$PC::		
	.WORD	0
LS\$DEVP::		
	.WORD	LS\$DVTYP
LS\$REPP::		
	.WORD	0
LS\$EXP4::		
	.WORD	0
LS\$EXP5::		
	.WORD	0
LS\$AUT::		
	.WORD	0
LS\$DUT::		
	.WORD	0
LS\$LUN::		
	.WORD	0
LS\$DESP::		
	.WORD	LS\$DESC
LS\$LOAD::		
	EMT	ES\$LOAD
LS\$ETP::		
	.WORD	LS\$ERRTBL
LS\$I\$CP::		
	.WORD	LS\$INIT
LS\$CCP::		
	.WORD	LS\$CLEAN
LS\$ACP::		
	.WORD	LS\$A\$TO
LS\$PRT::		
	.WORD	LS\$PROT
LS\$TEST::		
	.WORD	0
LS\$DLY::		
	.WORD	0
LS\$HIME::		
	.WORD	0

DISPATCH TABLE

1  
2  
3  
4  
5  
6  
7

002122	000015
002122	017632
002124	017766
002126	020224
002130	020510
002132	021042
002134	021264
002136	021446
002140	021646
002142	022012
002144	022174
002146	022634
002150	023060
002152	023766

DISPATCH 13

.WORD	T13
L\$DISPATCH::	
.WORD	T1
.WORD	T2
.WORD	T3
.WORD	T4
.WORD	T5
.WORD	T6
.WORD	T7
.WORD	T8
.WORD	T9
.WORD	T10
.WORD	T11
.WORD	T12
.WORD	T13

.SBTTL DEFAULT HARDWARE P-TABLE

DEFAULT HARDWARE P-TABLE

1  
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3  
4  
5  
6  
7  
8  
9  
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11  
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```

: **
: THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
: THE TEST-DEVICE PARAMETERS. THE STRUCTURE OF THIS TABLE
: IS IDENTICAL TO THE STRUCTURE OF THE HARDWARE P-TABLES,
: AND IS USED AS A "TEMPLATE" FOR BUILDING THE P-TABLES.
: **

```

```

002156
002156 000004
002160
002160

```

BGNHW DFPTBL

```

.WORD L10000-L$HW/2
L$HW::
DFPTBL::

```

```

002160 000000
002162 000001
002164 000000
002166 000001

```

```

.WORD 0 ;CSR ADDRESS. IF = 0 THEN AUTO-SETUP MODE IS ASSUMED.
.WORD 1 ;1-'Y'. I/O OPTION IS SINGLE LINE (NON-DZ11) INTERFACE
.WORD 0 ;PRINTER CHANNEL DEFAULT IS CHANNEL 0.
.WORD 1 ;LINE SIZE CHOICE. 1-80 CHARACTERS/LINE

```

```

002170
002170

```

ENDHW

L'10000:

```

.TITLE GLOBAL AREAS
.SBTTL GLOBAL EQUATES SECTION

```

## GLOBAL EQUATES SECTION

1  
2 002170

## EQUALS

```

: BIT DEFINITIONS
:
100000 BIT15== 100000
040000 BIT14== 40000
020000 BIT13== 20000
010000 BIT12== 10000
004000 BIT11== 4000
002000 BIT10== 2000
001000 BIT09== 1000
000400 BIT08== 400
000200 BIT07== 200
000100 BIT06== 100
000040 BIT05== 40
000020 BIT04== 20
000010 BIT03== 10
000004 BIT02== 4
000002 BIT01== 2
000001 BIT00== 1
:
001000 BIT9== BIT09
000400 BIT8== BIT08
000200 BIT7== BIT07
000100 BIT6== BIT06
000040 BIT5== BIT05
000020 BIT4== BIT04
000010 BIT3== BIT03
000004 BIT2== BIT02
000002 BIT1== BIT01
000001 BIT0== BIT00
:
: EVENT FLAG DEFINITIONS
: EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
:
000040 EF.START== 32. ; START COMMAND WAS ISSUED
000037 EF.RESTART== 31. ; RESTART COMMAND WAS ISSUED
000036 EF.CONTINUE== 30. ; CONTINUE COMMAND WAS ISSUED
000035 EF.NEW== 29. ; A NEW PASS HAS BEEN STARTED
000034 EF.PWR== 28. ; A POWER-FAIL/POWER-UP OCCURRED
:
: PRIORITY LEVEL DEFINITIONS
:
000340 PRI07== 340
000300 PRI06== 300
000240 PRI05== 240
000200 PRI04== 200
000140 PRI03== 140
000100 PRI02== 100
000040 PRI01== 40
000000 PRI00== 0
:
: OPERATOR FLAG BITS
:
000004 F.L-- 4

```



GLOBAL EQUATES SECTION

000010	LOT==	10
000020	ADR==	20
000040	IDU==	40
000100	ISR==	100
000200	UAM==	200
000400	BOE==	400
001000	PNT==	1000
002000	PRJ==	2000
004000	IXF==	4000
010000	IBE==	10000
020000	IER==	20000
040000	LOE==	40000
100000	HOE==	100000

: DECIMAL VALUES

:	ZERO	=32.
:	ONE	=33.
:	TWO	=34.
:	THREE	=35.
:	FOUR	=36.
:	FIVE	=37.
:	SIX	=38.
:	SEVEN	=39.
:	EIGHT	=40.
:	NINE	=41.
:	HEXA	=42.
:	HEXB	=43.
:	HEXC	=44.
:	HEXD	=45.
:	HEXE	=46.
:	HEXF	=47.

; MNEMONICS FOR ESCAPE SEQUENCE ARGUMENTS.

3	
4	
5	
6	
7	000040
8	000041
9	000042
10	000043
11	000044
12	000045
13	000046
14	000047
15	000050
16	000051
17	000052
18	000053
19	000054
20	000055
21	000056
22	000057
23	
24	000001
25	000002
26	000003
27	000004
28	000005
29	000006
30	000007
31	000010
32	000011
33	000012
34	000013
35	000014
36	000015
37	000016
38	000017
39	
40	
41	
42	020000
43	010000
44	
45	
46	

NUM1	=1
NUM2	=2
NUM3	=3
NUM4	=4
NUM5	=5
NUM6	=6
NUM7	=7
NUM8	=8.
NUM9	=9.
NUM10	=10.
NUM11	=11.
NUM12	=12.
NUM13	=13.
NUM14	=14.
NUM15	=15.

ECNRB	BIT13
UCRB	-BIT12

GLOBAL EQUATES SECTION

47  
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49  
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61  
62

002000

MXLF =2000 ;MAXIMUM LINEFEED SIZE. DECIMAL 2048x1/48 INCHES

.SBTTL GLOBAL DATA SECTION

GLOBAL DATA SECTION

```

1
2
3 :++
4 : THE GLOBAL DATA SECTION CONTAINS DATA THAT ARE USED
5 : IN MORE THAN ONE TEST.
6 :--
7 002170 001200 SKP14: .WORD 640. ;SKIP 14 INCHES MINUS 3 LINES ARGUMENT.
8 002172 001031 SKPA4: .WORD 537. ;SKIP A4 SPACING MINUS 3 LINES ARGUMENT.
9 002174 000760 SKP11: .WORD 496. ;SKIP 11 INCHES MINUS 3 LINES ARGUMENT.
10 002176 000000 CRNTSK: .WORD ;TEMPORARY SAFE LOCATION FOR CURRENT SKIP SIZE.
11
12
13 002200 000000 CSRADD: .WORD ;ADDRESS OF CSR REGISTER
14
15
16 002202 000000 LOGUNIT: .WORD ;LOGICAL UNIT NUMBER
17 002204 000000 PLOC: .WORD ;ADDRESS OF HARDWARE P-TABLE
18
19
20 002206 000000 GREASE: .WORD 0 ;WHEN = -1, A GREASED EXIT IS PROVIDED FROM THE
21 ;CURRENT ROUTINE.
22
23
24
25
26
27
28
29
30
31
32
33
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36
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41

```

ESCAPE SEQUENCE TRANSMISSION TABLE

```

THE FOLLOWING ASSIGNMENTS MAKE UP A TABLE IN THE FOLLOWING FORMAT:
THE LABEL IS USED TO REFERENCE THE DESIRED TABLE ENTRY. THE FIRST
BYTE IN EACH TABLE ENTRY IS AN ESCAPE CHARACTER. SOME OF THE TABLE
ENTRIES HAVE ONLY ONE ADDITIONAL BYTE. THESE ENTRIES CORRESPOND TO
PRINTER TASKS WHICH REQUIRE NO VARIABLE PARAMETERS. THOSE TABLE
ENTRIES WITH MORE THAN TWO BYTES CORRESPOND TO PRINTER TASKS WHICH
REQUIRE SOME PARAMETER. THE PARAMETERS IN EACH ENTRY MAY BE FROM
ONE TO THREE BYTES AND MUST BE MNEMONIC VALUES (SUCH AS THOSE ASSIGNED
BY THE CONVRT ROUTINE). TO USE A TABLE ENTRY IN CONJUNCTION WITH THE
XMIT ROUTINE, THE TABLE ENTRY LABEL IS PLACED IN R1 AND THE NUMBER OF
BYTES TO BE TRANSMITTED IS PLACED IN R2.

```

```

42 002210 033 060 STSRES: .ASCII <033>/0/ ;2 BYTES. EVOKE STATUS RESPONSE.
43 002212 033 065 HZTLSP: .ASCII <033>/5/ ;2 BYTES. PERFORM HORIZONTAL SPACING
44
45 002214 012 033 076 DUMMYS: .ASCII <012><033>/>/<033>/(( 9/ ;DUMMY SEQUENCE FOR PRINTER INTERFACE
002217 033 050 040
002222 040 071
46
47 002224 033 066 RESET: .ASCII <033>/6/ ;RESET SEQUENCE
;2 BYTES. RESET INTERFACE, SHEET FEEDER
48 ; PRINTER. RECEIVE STATUS
49 ; RESPONSE AND 'XON' CHARACTER.
50 002226 033 040 040 VRTCLS: .ASCII <033>/ 9/ ;5 BYTES. ACCUMULATE VERTICAL SPACES.
002231 040 071
51 002233 033 040 040 HRZTLS: .ASCII <033>/ ;/ ;5 BYTES. ACCUMULATE HORIZONTAL SPACES.
002236 040 073
52 002240 033 041 075 RIBPCS: .ASCII <033>/!-./ ;3 BYTES. SET RIBBON POSITON- DOWN.
002243 056

```



## GLOBAL DATA SECTION

	002410	114	111	116	
	002413	105	057	116	
	002416	117	055	125	
	002421	116	104	105	
	002424	122	114	111	
	002427	116	105	040	
	002432	115	117	104	
	002435	105	040	124	
	002440	105	123	124	
	002443	015	012	000	
90					:TITLE FOR TEST 2.
91	002446	045	116	045	TITLE3: .ASCIZ /%N%ATEST 3 - HAMMER HIT COUNT TEST/<015><012>
	002451	101	124	105	
	002454	123	124	040	
	002457	063	040	055	
	002462	040	110	101	
	002465	115	115	105	
	002470	122	040	110	
	002473	111	124	040	
	002476	103	117	125	
	002501	116	124	040	
	002504	124	105	123	
	002507	124	015	012	
	002512	000			
92					:TITLE FOR TEST 3.
93	002513	045	116	045	TITLE4: .ASCIZ /%N%ATEST 4 - CARRIAGE POSITIONING TEST/<015><012>
	002516	101	124	105	
	002521	123	124	040	
	002524	064	040	055	
	002527	040	103	101	
	002532	122	122	111	
	002535	101	107	105	
	002540	040	120	117	
	002543	123	111	124	
	002546	111	117	116	
	002551	111	116	107	
	002554	040	124	105	
	002557	123	124	015	
	002562	012	000		
94					:TITLE FOR TEST 4.
95	002564	045	116	045	TITLE5: .ASCIZ /%N%ATEST 5 - PAPER POSITIONING (VERTICAL) TEST/<015><012>
	002567	101	124	105	
	002572	123	124	040	
	002575	065	040	055	
	002600	040	120	101	
	002603	120	105	122	
	002606	040	120	117	
	002611	123	111	124	
	002614	111	117	116	
	002617	111	116	107	
	002622	040	050	126	
	002625	105	122	124	
	002630	111	103	101	
	002633	114	051	040	
	002636	124	105	123	
	002641	124	015	012	
	002644	000			

## GLOBAL DATA SECTION

96					:TITLE FOR TEST 5.
97	002645	045	i16	045	TITLE6: .ASCIZ /%N%ATEST 6 - PRINT ONE LINE OF EACH CHARACTER/<015><012>
	002650	101	124	105	
	002653	123	124	040	
	002656	066	040	055	
	002661	040	120	122	
	002664	111	116	124	
	002667	040	117	116	
	002672	105	040	114	
	002675	111	116	105	
	002700	040	117	106	
	002703	040	105	101	
	002706	103	110	040	
	002711	103	110	101	
	002714	122	101	103	
	002717	124	105	122	
	002722	015	012	000	
98					:TITLE FOR TEST 6.
99	002725	045	116	045	TITLE7: .ASCIZ /%N%ATEST 7 - PRINT A SWIRL PATTERN/<015><012>
	002730	101	124	105	
	002733	123	124	040	
	002736	067	040	055	
	002741	040	120	122	
	002744	111	116	124	
	002747	040	101	040	
	002752	123	127	111	
	002755	122	114	040	
	002760	120	101	124	
	002763	124	105	122	
	002766	116	015	012	
	002771	000			
100					:TITLE FOR TEST 7.
101	002772	045	116	045	TITLE8: .ASCIZ /%N%ATEST 8 - WORST CASE RAPID MOTION TEST/<015><012>
	002775	101	124	105	
	003000	123	124	040	
	003003	070	040	055	
	003006	040	127	117	
	003011	122	123	124	
	003014	040	103	101	
	003017	123	105	040	
	003022	122	101	120	
	003025	111	104	040	
	003030	115	117	124	
	003033	111	117	116	
	003036	040	124	105	
	003041	123	124	015	
	003044	012	000		
102					:TITLE FOR TEST 8.
103	003046	045	116	045	TITLE9: .ASCIZ /%N%ATEST 9 - PRINT RANDOM CHARACTERS/<015><012>
	003051	101	124	105	
	003054	123	124	040	
	003057	071	040	055	
	003062	040	120	122	
	003065	111	116	124	
	003070	040	122	101	
	003073	116	104	117	
	003076	115	040	103	



GLOBAL DATA SECTION

	003101	110	101	122	
	003104	101	103	124	
	003107	105	122	123	
	003112	015	012	000	
104					:TITLE FOR TEST 9.
105	003115	045	116	045	TITLEA: .ASCIZ /%N%ATEST 11 - PRINT OPERATOR SELECTED CHARACTERS/<015><012>
	003120	101	124	105	
	003123	123	124	040	
	003126	061	061	040	
	003131	055	040	120	
	003134	122	111	116	
	003137	124	040	117	
	003142	120	105	122	
	003145	101	124	117	
	003150	122	040	123	
	003153	105	114	105	
	003156	103	124	105	
	003161	104	040	103	
	003164	110	101	122	
	003167	101	103	124	
	003172	105	122	123	
	003175	015	012	000	
106					:TITLE FOR TEST 11.
107	003200	105	116	124	PRMPTA: .ASCIZ /ENTER STRING. Q TO EXIT TEST. END WITH <RETURN>./<015><012>
	003203	105	122	040	
	003206	123	124	122	
	003211	111	116	107	
	003214	056	040	121	
	003217	040	124	117	
	003222	040	105	130	
	003225	111	124	040	
	003230	124	105	123	
	003233	124	056	040	
	003236	040	105	116	
	003241	104	040	127	
	003244	111	124	110	
	003247	040	074	22	
	003252	105	124	25	
	003255	122	116	116	
	003260	056	015	112	
	003263	000			
108					:PROMPT FOR TEST 11.
109	003264	045	116	045	TITLEB: .ASCIZ /%N%ATEST 10 - LIFT/<57>/DROP RIBBON BY OPERATOR CONTROL/<015><012>
	003267	101	124	105	
	003272	123	124	040	
	003275	061	060	040	
	003300	055	040	114	
	003303	111	106	124	
	003306	057	104	122	
	003311	117	120	040	
	003314	122	111	102	
	003317	102	117	116	
	003322	040	102	131	
	003325	040	117	120	
	003330	105	122	101	
	003333	124	117	122	
	003336	040	103	117	

## GLOBAL DATA SECTION

	003341	116	124	122	
	003344	117	114	015	
	003347	012	000		
110					
111	003351	103	110	117	OPTN1: .ASCII /CHOOSE ONE: A OR B/<015><012>
	003354	117	123	105	
	003357	040	117	116	
	003362	105	072	040	
	003365	101	040	117	
	003370	122	040	102	
	003373	015	012		
112	003375	101	040	055	.ASCII /A - AUTOMATIC MODE/<015><012>
	003400	040	101	125	
	003403	124	117	115	
	003406	101	124	111	
	003411	103	040	115	
	003414	117	104	105	
	003417	015	012		
113	003421	102	040	055	.ASCII /B - MANUAL MODE/<015><012>
	003424	040	115	101	
	003427	116	125	101	
	003432	114	040	115	
	003435	117	104	105	
	003440	015	012		
114	003442	105	116	104	.ASCIIZ /END WITH <RETURN>/<012><015>
	003445	040	127	111	
	003450	124	110	040	
	003453	074	122	105	
	003456	124	125	122	
	003461	116	076	012	
	003464	015	000		
115	003466	115	101	116	PRMPTC: .ASCII /MANUAL MODE: EACH TIME THE <RETURN> KEY IS HIT, THE RIBBON/
	003471	125	101	114	
	003474	040	115	117	
	003477	104	105	072	
	003502	040	105	101	
	003505	103	110	040	
	003510	124	111	115	
	003513	105	040	124	
	003516	110	105	040	
	003521	074	122	105	
	003524	124	125	122	
	003527	116	076	040	
	003532	113	105	131	
	003535	040	111	123	
	003540	040	110	111	
	003543	124	054	040	
	003546	124	110	105	
	003551	040	122	111	
	003554	102	102	117	
	003557	116			
116	003560	012	015		.ASCII <012><015>
117	003562	127	111	114	.ASCII /WILL RAISE FOR A MOMENT. TO EXIT TEST, ENTER /
	003565	114	040	122	
	003570	101	111	123	
	003573	105	040	106	
	003576	117	122	040	

GLOBAL DATA SECTION

	003601	101	040	115	
	003604	117	115	105	
	003607	116	124	056	
	003612	040	124	117	
	003615	040	105	130	
	003620	111	124	040	
	003623	124	105	123	
	003626	124	054	040	
	003631	105	116	124	
	003634	105	122	040	
118	003637	012	015		.ASCII <012><015>
119	003641	101	040	042	.ASCII /A 'Q' FOLLOWED BY PRESSING THE <RETURN> KEY./<012><015>
	003644	121	042	040	
	003647	106	117	114	
	003652	114	117	127	
	003655	105	104	040	
	003660	102	131	040	
	003663	120	122	105	
	003666	123	123	111	
	003671	116	107	040	
	003674	124	110	105	
	003677	040	074	122	
	003702	105	124	125	
	003705	122	116	076	
	003710	040	113	105	
	003713	131	056	012	
	003716	015			
120					:PROMPTS FOR TEST 11
121	003717	045	116	045	TITLED: .ASCIZ /%N%ATEST 12 - BIDIRECTIONAL FORMS TRACTOR/<012><015>
	003722	101	124	105	
	003725	123	124	040	
	003730	061	062	040	
	003733	055	040	102	
	003736	111	104	111	
	003741	122	105	103	
	003744	124	111	117	
	003747	116	101	114	
	003752	040	106	117	
	003755	122	115	123	
	003760	040	124	122	
	003763	101	103	124	
	003766	117	122	012	
	003771	015	000		
122					:TITLE FOR TEST 12.
123	003773	045	116	045	TITLED: .ASCIZ /%N%ATEST 13 - CUT SHEET FEEDER EXERCISOR/<012><015>
	003776	101	124	105	
	004001	123	124	040	
	004004	061	063	040	
	004007	055	040	103	
	004012	125	124	040	
	004015	123	110	105	
	004020	105	124	040	
	004023	106	105	105	
	004026	104	105	122	
	004031	040	105	130	
	004034	105	122	103	
	004037	111	123	117	

GLOBAL DATA SECTION

	004042	122	012	015	
	004045	000			
124					:TITLE FOR TEST 13.
125	004046	123	120	105	PRMPTD: .ASCII /SPECIAL TEST: CUT PAGE SHEET FEEDER MUST BE INSTALLED./<12><15>
	004051	103	111	101	
	004054	114	040	124	
	004057	105	123	124	
	004062	072	040	103	
	004065	125	124	040	
	004070	120	101	107	
	004073	105	040	123	
	004076	110	105	105	
	004101	124	040	106	
	004104	105	105	104	
	004107	105	122	040	
	004112	115	125	123	
	004115	124	040	102	
	004120	105	040	111	
	004123	116	123	124	
	004126	101	114	114	
	004131	105	104	056	
	004134	012	015		
126	004136	012	015		.ASCII <12><15>
127	004140	127	110	101	.ASCII /WHAT IS THE PAGE LENGTH? ENTER A, B, OR C./<012><015>
	004143	124	040	111	
	004146	123	040	124	
	004151	110	105	040	
	004154	120	101	107	
	004157	105	040	114	
	004162	105	116	107	
	004165	124	110	077	
	004170	040	040	105	
	004173	116	124	105	
	004176	122	040	101	
	004201	054	040	102	
	004204	054	040	117	
	004207	122	040	103	
	004212	056	012	015	
128	004215	104	105	106	.ASCII /DEFAULT SIZE IS 11 INCHES./<012><015>
	004220	101	125	114	
	004223	124	040	123	
	004226	111	132	105	
	004231	040	111	123	
	004234	040	061	061	
	004237	040	111	116	
	004242	103	110	105	
	004245	123	056	012	
	004250	015			
129	004251	012	015		.ASCII <012><015>
130	004253	101	040	040	.ASCII /A -11 INCHES./<012><015>
	004256	055	061	061	
	004261	040	111	116	
	004264	103	110	105	
	004267	123	012	015	
131	004272	102	040	040	.ASCII /B -14 INCHES./<012><015>
	004275	055	061	064	
	004300	040	111	116	

## GLOBAL DATA SECTION

	004303	103	110	105	
	004306	123	012	015	
132	004311	103	040	040	.ASCIZ /C -A4 (EUROPEAN STANDARD)/<012><015>
	004314	055	101	064	
	004317	040	050	105	
	004322	125	122	117	
	004325	120	105	101	
	004330	116	040	123	
	004333	124	101	116	
	004336	104	101	122	
	004341	104	051	012	
	004344	015	000		
133	004346	123	120	105	T11PMT: .ASCII /SPECIAL TEST:/<12><15>
	004351	103	111	101	
	004354	114	040	124	
	004357	105	123	124	
	004362	072	012	015	
134	004365	124	110	111	.ASCII /THIS TEST IS FOR PRINTERS WITH THE BIDIRECTIONAL FORMS /
	004370	123	040	124	
	004373	105	123	124	
	004376	040	111	123	
	004401	040	106	117	
	004404	122	040	120	
	004407	122	111	116	
	004412	124	105	122	
	004415	123	040	127	
	004420	111	124	110	
	004423	040	124	110	
	004426	105	040	102	
	004431	111	104	111	
	004434	122	105	103	
	004437	124	111	117	
	004442	116	101	114	
	004445	040	106	117	
	004450	122	115	123	
	004453	040			
135	004454	124	122	101	.ASCII /TRACTOR ONLY./<12><15>
	004457	103	124	117	
	004462	122	040	117	
	004465	116	114	131	
	004470	056	012	015	
136	004473	105	116	124	.ASCIZ /ENTER <RETURN> TO CONTINUE.../
	004476	105	122	040	
	004501	074	122	105	
	004504	124	125	122	
	004507	116	076	040	
	004512	124	117	040	
	004515	103	117	116	
	004520	124	111	116	
	004523	125	105	056	
	004526	056	056	000	
137	004531	105	116	124	NPRMPT: .ASCII /ENTER "<RETURN>" TO LIFT THE RIBBON FOR A MOMENT./<12><15>
	004534	105	122	040	
	004537	042	074	122	
	004542	105	124	125	
	004545	122	116	076	
	004550	042	040	124	

GLOBAL DATA SECTION

	004553	117	040	114
	004556	111	106	124
	004561	040	124	110
	004564	105	040	122
	004567	111	102	102
	004572	117	116	040
	004575	106	117	122
	004600	040	101	040
	004603	115	117	115
	004606	105	116	124
	004611	056	012	015
138	004614	105	116	124
	004617	105	122	040
	004622	042	121	074
	004625	122	105	124
	004630	125	122	116
	004633	076	042	040
	004636	124	117	040
	004641	105	130	111
	004644	124	040	124
	004647	105	123	124
	004652	056	000	
139	004654	124	110	111
	004657	123	040	123
	004662	110	117	125
	004665	114	104	040
	004670	102	105	040
	004673	120	122	111
	004676	116	124	105
	004701	104	040	101
	004704	124	040	124
	004707	110	105	040
	004712	124	117	120
	004715	040	117	106
	004720	040	124	110
	004723	105	040	120
	004726	101	107	105
	004731	056	012	015
140	004734	124	110	105
	004737	040	120	101
	004742	107	105	040
	004745	123	110	117
	004750	125	114	104
	004753	040	110	101
	004756	126	105	040
	004761	103	117	115
	004764	105	040	106
	004767	122	117	115
	004772	040	124	110
	004775	105	040	106
	005000	122	117	116
	005003	124	040	124
	005006	122	101	131
	005011	056	012	015
141	005014	124	110	111
	005017	123	040	123
	005022	110	117	125

.ASCII /ENTER 'Q<RETURN>' TO EXIT TEST./

FTYTPM: .ASCII /THIS SHOULD BE PRINTED AT THE TOP OF THE PAGE./<12><15>

.ASCII /THE PAGE SHOULD HAVE COME FROM THE FRONT TRAY./<12><15>

RTYTPM: .ASCII /THIS SHOULD BE PRINTED AT THE TOP OF THE PAGE./<12><15>

GLOBAL DATA SECTION

	005025	114	104	040
	005030	102	105	040
	005033	120	122	111
	005036	116	124	105
	005041	104	040	101
	005044	124	040	124
	005047	110	105	040
	005052	124	117	120
	005055	040	117	106
	005060	040	124	110
	005063	105	040	120
	005066	101	107	105
	005071	056	012	015
142	005074	124	110	105
	005077	040	120	101
	005102	107	105	040
	005105	123	110	117
	005110	125	114	104
	005113	040	110	101
	005116	126	105	040
	005121	103	117	115
	005124	105	040	106
	005127	122	117	115
	005132	040	124	110
	005135	105	040	122
	005140	105	101	122
	005143	040	124	122
	005146	101	131	056
	005151	040	012	015
143	005154	045	116	045
	005157	101	127	101
	005162	111	124	111
	005165	116	107	040
	005170	124	117	040
	005173	123	105	116
	005176	104	040	104
	005201	101	124	101
	005204	040	124	117
	005207	040	120	122
	005212	111	116	124
	005215	105	122	056
	005220	040	120	122
	005223	111	116	124
	005226	105	122	040
	005231	116	117	124
	005234	040	122	105
	005237	101	104	131
	005242	056	000	

.ASCII /THE PAGE SHOULD HAVE COME FROM THE REAR TRAY. /<12><15>

WTSTPM: .ASCIZ /%N%AWAITING TO SEND DATA TO PRINTER. PRINTER NOT READY./

144  
145  
146  
147

.EVEN

148	005244	000000
149	005246	000000
150	005250	000000
151	005252	176500
152	005254	176010

MSGADD:	.WORD	
TRXADD:	.WORD	
BAUDRT:	.WORD	
D1DFLT:	.WORD	176500
D2DFLT:	.WORD	176010

:HOLDS ADDRESS OF A MESSAGE

:DEFAULT CSR ADDRESS - SINGLE LINE  
:DEFAULT CSR ADDRESS - MULTILINE.





GLOBAL DATA SECTION

210	005774	000074	000226	000113	.WORD	60.,150.,113
211	006002	000074	000264	000114	.WORD	60.,180.,114
212	006010	000074	000322	000115	.WORD	60.,210.,115
213	006016	000074	000360	000116	.WORD	60.,240.,116
214	006024	000074	000416	000117	.WORD	60.,270.,117
215	006032	000110	000000	000107	.WORD	72.,0.,107
216	006040	000110	000036	000110	.WORD	72.,30.,110
217	006046	000110	000074	000111	.WORD	72.,60.,111
218	006054	000110	000132	000112	.WORD	72.,90.,112
219	006062	000110	000170	000113	.WORD	72.,120.,113
220	006070	000110	000226	000114	.WORD	72.,150.,114
221	006076	000110	000264	000115	.WORD	72.,180.,115
222	006104	000110	000322	000116	.WORD	72.,210.,116
223	006112	000110	000360	000117	.WORD	72.,240.,117
224	006120	000110	000416	000120	.WORD	72.,270.,120
225	006126	000124	000000	000110	.WORD	84.,0.,110
226	006134	000124	000036	000111	.WORD	84.,30.,111
227	006142	000124	000074	000112	.WORD	84.,60.,112
228	006150	000124	000132	000113	.WORD	84.,90.,113
229	006156	000124	000170	000114	.WORD	84.,120.,114
230	006164	000124	000226	000115	.WORD	84.,150.,115
231	006172	000124	000264	000116	.WORD	84.,180.,116
232	006200	000124	000322	000117	.WORD	84.,210.,117
233	006206	000124	000360	000120	.WORD	84.,240.,120
234	006214	000124	000416	000121	.WORD	84.,270.,121
235	006222	000140	000000	000111	.WORD	96.,0.,111
236	006230	000140	000036	000112	.WORD	96.,30.,112
237	006236	000140	000074	000113	.WORD	96.,60.,113
238	006244	000140	000132	000114	.WORD	96.,90.,114
239	006252	000140	000170	000115	.WORD	96.,120.,115
240	006260	000140	000226	000116	.WORD	96.,150.,116
241	006266	000140	000264	000117	.WORD	96.,180.,117
242	006274	000140	000322	000120	.WORD	96.,210.,120
243	006302	000140	000360	000121	.WORD	96.,240.,121
244	006310	000140	000416	000122	.WORD	96.,270.,122
245	006316	000154	000000	000112	.WORD	108.,0.,112
246	006324	000154	000036	000113	.WORD	108.,30.,113
247	006332	000154	000074	000114	.WORD	108.,60.,114
248	006340	000154	000132	000115	.WORD	108.,90.,115
249	006346	000154	000170	000116	.WORD	108.,120.,116
250	006354	000154	000226	000117	.WORD	108.,150.,117
251	006362	000154	000264	000120	.WORD	108.,180.,120
252	006370	000154	000322	000121	.WORD	108.,210.,121
253	006376	000154	000360	000122	.WORD	108.,240.,122
254	006404	000154	000416	000123	.WORD	108.,270.,123

-----  
 ; DO NOT SEPARATE THE ABOVE TABLE  
 ; FROM THE FOLLOWING 3 LINES.....  
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255						
256						
257						
258	006412	040	040	041	FRONT: .BYTE	ZERO,ZERO,ONE ; ARGUMENTS FOR SELECT FRONT TRAY. TEST #13.
259	006415	040	040	042	REAR: .BYTE	ZERO,ZERO,TWO ; ARGUMENTS FOR SELECT REAR TRAY. TEST #13.
260	006420	057	057	057	NULL: .BYE	HEXF,HEXF,HEXF ; ARGUMENTS FOR SELECT NULL TRAY. TEST #13.
261						.EVEN
262	006424	002416			SEED1: .WORD	1294. ; SEED FOR RANDOM NUMBER GENERATOR
263	006426	013020			SEED2: .WORD	5648. ; SEED FOR RANDOM NUMBER GENERATOR
264						
265						
266	006430	170377			TMP11: .WORD	170377 ; TEMPLATES ; BITS 8 - 11 USED IN DECODING PRINTER TRANSMISSIONS

## GLOBAL DATA SECTION

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267 006432 177417      TEMPL2: .WORD 177417 ;BITS 4 - 7 USED IN CONVRT TO DECODE PRINTER XMISSIONS
268 006434 177760      TEMPL3: .WORD 177760 ;BITS 0 - 3
269
270
271 006436 000000      TCRENA: .WORD          ;WILL CONTAIN TCR ARGUMENT - CHANNEL SELECT
272 006440 000000      JUNKPL: .WORD          ;WILL CONTAIN NOTHING IF DZ CHOSEN. WILL
273                                     ;CONTAIN JUNK IF DL CHOSEN. SEE SENCHR ROUTINE
274
275 006442 017070      LPRINI: .WORD 017070   ;LPR INITIALIZE REGISTER.
276                                     ;THE FOLLOWING STATUS IS ASSUMED:
277                                     :
278                                     :       1)RX-ON
279                                     :       2)9600 BAUD
280                                     :       3)NO PARITY
281                                     :       4)2 UNIT STOP CODE
282                                     :       5)8 BIT CHARACTER LENGTH
283 006444 000001      TCRTBL: .WORD 1       ;TABLE OF BIT POSITIONS USED TO SET UP THE
284 006446 000002      .WORD 2             ;TCR REGISTER FOR THE APPROPRIATE CHANNEL.
285 006450 000004      .WORD 4
286 006452 000010      .WORD 8.
287 006454 000020      .WORD 16.
288 006456 000040      .WORD 32.
289 006460 000100      .WORD 64.
290 006462 000200      .WORD 128.
291
292
293 006464 002400      BAUTBL: .WORD 1280.   ;TABLE OF MASKS TO USE IN SETTING THE BAUD
294 006466 002600      .WORD 1408.         ;RATE FOR THE PRINTER IN THE LPR REGISTER.
295 006470 003000      .WORD 1536.
296 006472 005000      .WORD 2560.
297 006474 006000      .WORD 3072.
298 006476 007000      .WORD 3584.
299
300
301
302 006500 000000      ERWORD: .WORD 0       ;CONTAINS VARIOUS ERROR FLAGS
303 006502 000000      CRNTPR: .WORD 0       ;CONTAINS THE COUNT OF CHARACTERS ALREADY PRINTED
304                                     ;ON THE CURRENT LINE IN THE BIDIRECTIONAL PRINTING
305                                     ;CODE. (XMIT)
306 006504 000000      DIRCTN: .WORD 0       ;CURRENT PRINTING DIRECTION. 0-FORWARD, 1=REVERSE
307
308 006506 000000      OUTCTR: .WORD          ;COUNTERS USED IN WAITXN
309 006510 000000      OUTSDC: .WORD          ; AND GETCHR TO WAIT OUT THE PRINTER OPERATIONS.
310 006512 000000      FLTRDY: .WORD          ;INDICATES FAILURE TO FIND TRANSMIT READY CONDITION.
311
312
313
314
315 006514 000         BR2: .BYTE          ;TEMPORARY STORAGE FOR A BYTE VALUE. TEST #13
316 006515 004         EOT: .BYTE 004      ;ASCII 'EOT'
317 006516 030         CAN: .BYTE 030    ;ASCII 'CAN'
318 006517 023         XOFF: .BYTE 023   ;ASCII 'XOFF'
319 006520 021         XON: .BYTE 021   ;OCTAL 021 = ASCII 'XON'
320 006521 033         ESCAPE: .BYTE 033 ;OCTAL 033 = ASCII 'ESC'
321 .EVEN
322 006522 000000      SNGCHR: .WORD          ;STORAGE FOR A SINGLE CHARACTER
323 006524 032         CTLZ: .BYTE 032   ;OCTAL 032 = ASCII '^Z'

```

GLOBAL DATA SECTION

324	006525	121			SCQ: .ASCII /Q/ ;SINGLE CHARACTER 'Q'
325	006526	103			SCC: .ASCII /C/ ;SINGLE CHARACTER 'C'
326	006527	102			SCB: .ASCII /B/ ;SINGLE CHARACTER 'B'
327	006530	130			SCX: .ASCII /X/ ;SINGLE CHARACTER 'X'
328	006531	101			SCA: .ASCII /A/ ;SINGLE CHARACTER 'A'
329	006532	060			SCO: .ASCII /O/ ;SINGLE CHARACTER 'O'
330	006533	061			SCI: .ASCII /I/ ;SINGLE CHARACTER 'I'
331	006534	056			PERIOD: .ASCII /./ ;SINGLE CHARACTER '.'
332	006535	101	103	101	ACAS: .ASCII /ACA:/ ;WORST CASE SEQUENCE FOR TEST #8
	006540	072			
333					
334	006541	040			SPACE: .ASCII / / ;SINGLE SPACE
335	006542	137	137	137	DASHES: .ASCII /-----/<15> ;PRINTED IN TEST 5 BETWEEN LINEFEEDS
	006545	137	137	137	
	006550	137	137	137	
	006553	137	015		
336					
337					
338					
339					: THE REPEATING PATTERN OF ASCII PRINTABLE CHARACTERS.
340					
341					.ENABL LC
342	006555	041	042	043	CHRLST: .ASCII /.'#\$%&'()*+,-./<57>/0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ/
	006560	044	045	046	
	006563	047	050	051	
	006566	052	053	054	
	006571	055	056	057	
	006574	060	061	062	
	006577	063	064	065	
	006602	066	067	070	
	006605	071	072	073	
	006610	074	075	076	
	006613	077	100	101	
	006616	102	103	104	
	006621	105	106	107	
	006624	110	111	112	
	006627	113	114	115	
	006632	116	117	120	
	006635	121	122	123	
	006640	124	125	126	
	006643	127	130	131	
	006646	132			
343	006647	133	134	135	.ASCII /[\]^_<140>/abcdefghijklmnopqrstuvwxyz/
	006652	136	137	140	
	006655	141	142	143	
	006660	144	145	146	
	006663	147	150	151	
	006666	152	153	154	
	006671	155	156	157	
	006674	160	161	162	
	006677	163	164	165	
	006702	166	167	170	
	006705	171	172		
344	006707	173	174	175	.BYTE 173,174,175,176
	006712	176			
345	006713	041	042	043	.ASCII /!'#\$%&'()*+,-./<57>/0123456789/
	006716	044	045	046	

## GLOBAL DATA SECTION

	006721	047	050	051	
	006724	052	053	054	
	006727	055	056	057	
	006732	060	061	062	
	006735	063	064	065	
	006740	066	067	070	
	006743	071			
346	006744	072	073	074	.ASCII /:;<=>?@ABCDEFGHIJKLMNopRSTUvwXYZ[\]^_<140>/abcdefghijklmnopqrstuv/
	006747	075	076	077	
	006752	100	101	102	
	006755	103	104	105	
	006760	106	107	110	
	006763	111	112	113	
	006766	114	115	116	
	006771	117	120	121	
	006774	122	123	124	
	006777	125	126	127	
	007002	130	131	132	
	007005	133	134	135	
	007010	136	137	140	
	007013	141	142	143	
	007016	144	145	146	
	007021	147	150	151	
	007024	152	153	154	
	007027	155	156	157	
	007032	160	161	162	
	007035	163	164	165	
	007040	166			
347	007041	167	170	171	.ASCII /wxyz/
	007044	172			
348	007045	173	174	175	.BYTE 173,174,175,176
	007050	176			
349	007051	041	042	043	.ASCII /.'#\$%&'()*+,-./<57>/0123456789:;<=>?@ABCDEFGHIJKLMNopRSTU/
	007054	044	045	046	
	007057	047	050	051	
	007062	052	053	054	
	007065	055	056	057	
	007070	060	061	062	
	007073	063	064	065	
	007076	066	067	070	
	007101	071	072	073	
	007104	074	075	076	
	007107	077	100	101	
	007112	102	103	105	
	007115	104	106	107	
	007120	110	111	112	
	007123	113	114	115	
	007126	116	117	120	
	007131	121	122	123	
	007134	124	125		
350	007136	126	127	130	.ASCII /vwXYZ[\]^_<140>/abcdefghijklmnopqrstuvwxyz/
	007141	131	132	133	
	007144	134	135	136	
	007147	137	140	141	
	007152	142	143	144	
	007155	145	146	147	
	007160	150	151	152	

## GLOBAL DATA SECTION

	007163	153	154	155	
	007166	156	157	160	
	007171	161	162	163	
	007174	164	165	166	
	007177	167	170	171	
	007202	172			
351					.DSABL LC
352					
353					
354	007203	124	110	111	FBTM: .ASCII /THIS MESSAGE SHOULD BE PRINTED AT THE BOTTOM OF THE PAGE./<15>
	007206	123	040	115	
	007211	105	123	123	
	007214	101	107	105	
	007217	040	123	110	
	007222	117	125	114	
	007225	104	040	102	
	007230	105	040	120	
	007233	122	111	116	
	007236	124	105	104	
	007241	040	101	124	
	007244	040	124	110	
	007247	105	040	102	
	007252	117	124	124	
	007255	117	115	040	
	007260	117	106	040	
	007263	124	110	105	
	007266	040	120	101	
	007271	107	105	056	
	007274	015			
355					
356					
357					
358					
359					
360					
361					
362					
363					
364					
365	007276	000000			RCSR: .WORD ;ADDRESS OF THE RECEIVER CSR REGISTER
366	007300	000000			XCSR: .WORD ;ADDRESS OF THE TRANSMITTER CSR REGISTER
367	007302	000000			RBUF: .WORD ;ADDRESS OF THE RECEIVER BUFFER
368	007304	000000			XBUF: .WORD ;ADDRESS OF THE TRANSMITTER BUFFER
369	007306	000000			LPR: .WORD ;ADDRESS OF THE LINE PARAMETER REGISTER (DZ11)
370	007310	000000			TCR: .WORD ;ADDRESS OF THE TRANSMITTER CONTROL REGISTER (DZ11)
371	007312	000000			TDR: .WORD ;ADDRESS OF THE TRANSMITTER DATA REGISTER (DZ11)
372	007314	000000			PGMCTR: .WORD ;ADDRESS + 4 WHERE THE LAST TRANSMISSION CALL OCCURRED.
373					
374					
375					
376	007316	010361			ERMSGB: .WORD EDFM0 ;TABLE OF ERROR MESSAGE ADDRESSES USED IN
377	007320	010422			.WORD EDFM1
378	007322	010475			.WORD EDFM2
379	007324	010543			.WORD EDFM3
380	007326	010622			.WORD EDFM4
381	007330	010650			.WORD EDFM5 ;THE ERRORS ROUTINE.
382	007332	010677			.WORD EDFM6

## GLOBAL DATA SECTION

383	007334	010755	.WORD	EDFM7	
384	007336	011026	.WORD	EDFM8	
385	007340	011175	.WORD	EDFM9	
386	007342	011230	.WORD	EDFMA	
387	007344	011331	.WORD	EDFMB	
388	007346	011464	.WORD	EDFMC	
389	007350	011540	.WORD	EDFMD	
390					
391					
392					
393					
394					
395					
396	007352		BFRA: .BLKB	300.	;BUFFER FOR INPUT FROM USER AND ALSO USED AS A ;SOFTWARE STACK.
397					;USED TO POINT TO THE TOP OF THE SOFTWARE STACK
398	010026	000000	TOPSTK: .WORD		;WHEN NEEDED. #BFRA + 150.
399					;DEFAULT AREAS FOR GMANID QUESTIONS. MAY BE CLEARED.
400	010030	000000	BFRB: .WORD		;
401	010032	000000	BFRC: .WORD		;
402	010034	000000	BFRD: .WORD		;
403					
404	010036	000000	SPCSIZ: .WORD		;THE NUMBER OF HORIZONTAL INCREMENTS PER SPACE.
405					
406	010040	000000	LINN: .WORD		;THE NUMBER OF HORIZONTAL INCREMENTS PER LINE.
407					
408	010042	000000	LINSIZ: .WORD		;THE NUMBER OF CHARACTERS PER LINE ON PRINTER.
409					
410	010044	000000	TRDYBT: .WORD		;TRANSMIT READY BIT POSITION. VALUE IS SET DYNAMICALLY ;IN THE INITIALIZATION CODE SO THAT BOTH SINGLE LINE ;INTERFACES AND DZ11 INTERFACES MAY BE USED.
411					
412					
413					
414					
415					;USED IN PROCEDURE CONVRT:
416	010046	000	MNEB1: .BYTE		;USED TO PASS A MNEMONIC VALUE FROM THE CONVERSION
417	010047	000	MNEB2: .BYTE		;ROUTINE. A SINGLE WORD VALUE ACCEPTED, THREE BYTES
418	010050	000	MNEB3: .BYTE		;RETURNED TO CALLER: MNEB1, MNEB2, MNEB3.
419					
420			.EVEN		
421					
422	010052	000000	MLTLIN: .WORD		;INDICATOR: MULTILINE INTERFACE?-1 SINGLE LINE?-0
423					
424					
425	010054	000000	DELCNT: .WORD		;COUNTER OF SMALL TIME INCREMENTS USED IN DELAY ROUTINE
426					
427	010056	000000	NDAATA: .WORD	0	;NO DEVICE AT THAT ADDRESS INDICATOR. UNIBUS FAILURE ;TO FIND A DEVICE AT THE REFERENCED ADDRESS CAUSES A ;TRAP TO OCCUR WHICH IN TURN WILL SET THE NDAATA WORD ;TO ONE.
428					
429					
430					
431	010060	000	HITARG: .BYTE		;TEMPORARY STORAGE OF THE HIT COUNT ARGUMENT USED IN ;SET HIT COUNT TEST.
432					
433			.EVEN		
434	010062	000000	LINCNT: .WORD		;A LINE COUNTER USED IN TEST #5. PAPER POSITIONING TEST
435					
436	010064	000000	CHRCNT: .WORD		;A CHARACTER COUNTER USED IN TEST #6, WHERE ONE LINE OF ;EACH CHARACTER IS PRINTED.
437					
438	010066	000000	CCOUNT: .WORD		;A COUNT OF CYCLES, USED IN TEST #11- LIFT/DROP RIBBON
439					

GLOBAL DATA SECTION

440 010070 000000  
 441  
 442  
 443  
 444  
 445 010072  
 010072  
 010072 000000  
 010074 000000  
 010076 000000  
 010100 000000

INUPB: .WORD

:AN INDICATOR OF WHETHER THE PRINTER RIBBON IS IN THE  
 :UP OR DOWN POSITION. TEST #11, LOCAL PROC. MANLD:

ERRTBL

LSERRTBL::

ERRTYP:: .WORD 0  
 ERRNBR:: .WORD 0  
 ERRMSG:: .WORD 0  
 ERRBLK:: .WORD 0

446  
 447

.SBTTL GLOBAL TEXT SECTION

GLOBAL TEXT SECTION

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\*\*\*  
: THE GLOBAL TEXT SECTION CONTAINS FORMAT STATEMENTS,  
: MESSAGES, AND ASCII INFORMATION THAT ARE USED IN  
: MORE THAN ONE TEST.  
:--

:  
: NAMES OF DEVICES SUPPORTED BY PROGRAM

:  
:       DEVTYPE <LQPSE-F SERIAL LETTER QUALITY PRINTER>

LSDEVTYPE::  
          .ASCIIZ /LQPSE-F SERIAL LETT

010102			
010102			
010102	114	121	120
010105	123	105	055
010110	106	040	123
010113	105	122	111
010116	101	114	040
010121	114	105	124
010124	124	105	122
010127	040	121	125
010132	101	114	111
010135	124	131	040
010140	120	122	111
010143	116	124	105
010146	122	000	

.EVEN

:  
: TEST DESCRIPTION

:  
:       DESCRIP           <DIAGNOSTIC FOR LQPSE-F SERIAL PRINTER ON PDP-11>

LSDESC::  
          .ASCIIZ /DIAGNOSTIC FOR LQPS

010150			
010150			
010150	104	111	101
010153	107	116	117
010156	123	124	111
010161	103	040	106
010164	117	122	040
010167	114	121	120
010172	123	105	055
010175	106	040	123
010200	105	122	111
010203	101	114	040
010206	120	122	111
010211	116	124	105
010214	122	040	117
010217	116	040	120
010222	104	120	055
010225	061	061	000

.EVEN

:  
: THIS PROGRAM WILL PERFORM UP TO THIRTEEN SEQUENTIAL TESTS ON THE  
: LQPSE-F SERIAL INTERFACE PRINTER. THE TESTS WILL CHECK BOTH THE  
: LOCAL PRINTER SOFTWARE AND THE PRINTER HARDWARE BY SENDING VARIOUS  
: CHARACTER SEQUENCES TO THE PRINTER WHICH WILL CHALLENGE THE PRINTER  
: SPECIFIED CAPABILITIES. A PRINT PATTERN WILL BE GENERATED ON THE



GLOBAL TEXT SECTION

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: PRINTER WHICH WILL BE USED IN THE DIAGNOSTIC PROCESS BY THE FIELD  
: SERVICE TECHNICIAN.

.EVEN

:  
: FORMAT STATEMENTS USED IN PRINT CALLS  
:

.....  
ERROR STATEMENT TABLES

THESE TABLES ARE USED BY THE ERRDF, PRINTB, AND PRINTX MACROS  
IN THE PROCESS OF PRINTING ERROR MESSAGES TO THE USER AT THE CONSOLE.

.....  
GENERAL FORMATS FOR OUTPUT OF PC AT TIME OF CALL AND ADDRESS OF  
LATEST TRANSMISSION.

010230	045	116	045
010233	101	105	122
010236	122	117	122
010241	040	040	104
010244	105	124	105
010247	103	124	105
010252	104	040	101
010255	106	124	105
010260	122	040	103
010263	101	114	114
010266	040	101	124
010271	040	120	103
010274	072	040	045
010277	117	066	000
010302	045	116	045
010305	101	114	101
010310	123	124	040
010313	124	122	101
010316	116	123	115
010321	111	123	123
010324	111	117	116
010327	040	123	124
010332	101	122	124
010335	105	104	040
010340	101	124	040
010343	114	117	103
010346	101	124	111
010351	117	116	072
010354	040	045	117
010357	066	000	

PRTBMO: .ASCIZ /%N%AERROR DETECTED AFTER CALL AT PC: %06/

:  
: PRTXMO: .ASCIZ /%N%ALAST TRANSMISSION STARTED AT LOCATION: %06/  
:

:  
: .....  
:

GLOBAL TEXT SECTION

54				
55				
56	010361	111	055	117
	010364	040	106	101
	010367	111	114	125
	010372	122	105	040
	010375	104	105	124
	010400	105	103	124
	010403	105	104	040
	010406	101	124	040
	010411	120	122	111
	010414	116	124	105
	010417	122	056	000

```

: ERWORD BIT-0 I/O FAILURE
: EDFM0: .ASCIZ /I-O FAILURE DETECTED AT PRINTER./

```

57				
58				
59				
60				
61				
62				
63				
64				
65				
66				
67	010422	104	105	126
	010425	111	103	105
	010430	040	106	101
	010433	124	101	114
	010436	040	105	122
	010441	122	117	122
	010444	056	040	040
	010447	120	122	111
	010452	116	124	105
	010455	122	040	102
	010460	125	106	106
	010463	105	122	040
	010466	106	125	114
	010471	114	056	040
	010474	000		

```

: USE OF THESE STRINGS WILL BE AS FOLLOWS...
: ERRDF #NUM0,EDFM8 -DEVICE FATAL ERROR CALL
: PRINTB PRIBM0,PGMCTR -PRINT BASIC ERROR MESSAGE
: PRINTX PRIXM0,TRXADD,ERWORD -PRINT EXTENDED ERROR MESSAGE
: .....

```

```

: ERWORD BIT-1 BUFFER FULL
: EDFM1: .ASCIZ /DEVICE FATAL ERROR. PRINTER BUFFER FULL. /

```

68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78	010475	120	122	117
	010500	115	057	122
	010503	101	115	040
	010506	106	101	111
	010511	114	125	122
	010514	105	040	104
	010517	105	124	105
	010522	103	124	105
	010525	104	040	102

```

: USE OF THESE STRINGS WILL BE AS FOLLOWS...
: ERRDF #NUM7,EDFM1 -DEVICE FATAL ERROR CALL
: PRINTB PRIBM0,PGMCTR -PRINT BASIC ERROR MESSAGE
: PRINTX PRIXM0,TRXADD,ERWORD -PRINT EXTENDED ERROR MESSAGE
: .....

```

```

: ERWORD BIT-2 PROM/RAM FAILURE
: EDFM2: .ASCIZ /PROM/<57>/RAM FAILURE DETECTED BY PRINTER./

```

GLOBAL TEXT SECTION

	010530	131	040	120
	010533	122	111	116
	010536	124	105	122
	010541	056	000	

79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89

010543	120	122	111
010546	116	124	105
010551	122	040	105
010554	122	122	117
010557	122	072	040
C10562	116	040	117
010565	125	124	040
010570	117	106	040
010573	122	101	116
010576	107	105	040
010601	111	116	040
010604	105	123	103
010607	040	123	105
010612	121	125	105
010615	116	103	105
010620	056	000	

```

USE OF THESE STRINGS WILL BE AS FOLLOWS...
ERRDF  #NUM8,EDFM2      -DEVICE FATAL ERROR CALL
PRINTB PRTBMO,PGMCTR    -PRINT BASIC ERROR MESSAGE
PRINTX PRTXMO,TRXADD,ERWORD -PRINT EXTENDED ERROR MESSAGE
    
```

ERWORD BIT-3 PRINTER ERROR - N OUT OF RANGE IN ESC SEQUENCE

EDFM3: .ASCIZ /PRINTER ERROR: N OUT OF RANGE IN ESC SEQUENCE./

90  
91  
92  
93  
94  
95  
96  
97  
98  
99

010622	120	101	125
010625	123	105	040
010630	123	127	111
010633	124	103	110
010636	040	120	122
010641	105	123	123
010644	105	104	056
010647	000		

```

USE OF THESE STRINGS WILL BE AS FOLLOWS...
ERRDF  #NUM9,EDFM3      -DEVICE FATAL ERROR CALL
PRINTB PRTBMO,PGMCTR    -PRINT BASIC ERROR MESSAGE
PRINTX PRTXMO,TRXADD,ERWORD -PRINT EXTENDED ERROR MESSAGE
    
```

ERWORD BIT-4 PAUSE SWITCH

EDFM4: .ASCIZ /PAUSE SWITCH PRESSED./

101  
102  
103  
104  
105  
106  
107  
108  
109

PRTBMO AND PRTXMO ARE USED IN THIS ERROR RESPONSE ALSO. USE OF THESE STRINGS WILL BE AS FOLLOWS...

```

USE OF THESE STRINGS WILL BE AS FOLLOWS...
ERRDF  #NUM2,EDFM4      -DEVICE FATAL ERROR CALL
PRINTB PRTBMO,PGMCTR    -PRINT BASIC ERROR MESSAGE
PRINTX PRTXMO,TRXADD,ERWORD -PRINT EXTENDED ERROR MESSAGE
    
```

## GLOBAL TEXT SECTION

110					.....
111					ERWORD BIT-5 RIBBON OUT
112					.....
113					EDFM5: .ASCIZ /RIBBON OUT ON PRINTER./
114	010650	122	111	102	
	010653	102	117	116	
	010656	040	117	125	
	010661	124	040	117	
	010664	116	040	120	
	010667	122	111	116	
	010672	124	105	122	
	010675	056	000		
115					.....
116					USE OF THESE STRINGS WILL BE AS FOLLOWS...
117					ERRDF #NUM3,EDFM5 -DEVICE FATAL ERROR CALL
118					PRINTB PRTBM0,PGMCTR -PRINT BASIC ERROR MESSAGE
119					PRINTX PRTXMO,TRXADD,ERWORD -PRINT EXTENDED ERROR MESSAGE
120					.....
121					ERWORD BIT-6 UNDEFINED CHARACTER OR ESC SEQUENCE RECEIVED.
122					.....
123					EDFM6: .ASCIZ /UNDEFINED CHARACTER OR ESC SEQUENCE RECEIVED./
124					
125	010677	125	116	104	
	010702	105	106	111	
	010705	116	105	104	
	010710	040	103	110	
	010713	101	122	101	
	010716	103	124	105	
	010721	122	040	117	
	010724	122	040	105	
	010727	123	103	040	
	010732	123	105	121	
	010735	125	105	116	
	010740	103	105	040	
	010743	122	105	103	
	010746	105	111	126	
	010751	105	104	056	
	010754	000			
126					.....
127					USE OF THESE STRINGS WILL BE AS FOLLOWS...
128					ERRDF #NUM4,EDFM6 -DEVICE FATAL ERROR CALL
129					PRINTB PRTBM0,PGMCTR -PRINT BASIC ERROR MESSAGE
130					PRINTX PRTXMO,TRXADD,ERWORD -PRINT EXTENDED ERROR MESSAGE
131					.....
132					ERWORD BIT-7 SHEET FEEDER ERROR
133					.....
134					EDFM7: .ASCIZ /DEVICE FATAL ERROR. SHEET FEEDER ERROR./
135					
136	010755	104	105	126	
	010760	111	103	105	
	010763	040	106	101	
	010766	124	101	114	
	010771	040	105	122	
	010774	122	117	122	
	010777	056	040	040	
	011002	123	110	105	
	011005	105	124	040	

GLOBAL TEXT SECTION

011010	106	105	105
011013	104	105	122
011016	040	105	122
011021	122	117	122
011024	056	000	

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```

USE OF THESE STRINGS WILL BE AS FOLLOWS...
ERRDF #NUM5,EDFM7 -DEVICE FATAL ERROR CALL
PRINTB PRIBM0,PGMCTR -PRINT BASIC ERROR MESSAGE
PRINTX PRIXM0,TRXADD,ERWORD -PRINT EXTENDED ERROR MESSAGE

```

EDFM8: .ASCII /WARNING: SOFTWARE ERROR. THIS MESSAGE SHOULD NOT PRINT/

011026	127	101	122
011031	116	111	116
011034	107	072	040
011037	040	123	117
011042	106	124	127
011045	101	122	105
011050	040	105	122
011053	122	117	122
011056	056	040	040
011061	124	110	111
011064	123	040	115
011067	105	123	123
011072	101	107	105
011075	040	123	110
011100	117	125	114
011103	104	040	116
011106	117	124	040
011111	120	122	111
011114	116	124	
011116	125	116	114
011121	105	123	123
011124	040	105	122
011127	122	117	122
011132	040	127	117
011135	122	104	040
011140	050	105	122
011143	127	117	122
011146	104	051	040
011151	110	101	123
011154	040	102	105
011157	105	116	040
011162	103	117	122
011165	122	125	120
011170	124	105	104
011173	056	000	
011175	105	122	122
011200	117	122	040
011203	104	105	124
011206	105	103	124
011211	105	104	040
011214	102	131	040
011217	120	122	111
011222	116	124	105

147

.ASCIIZ /UNLESS ERROR WORD (ERWORD) HAS BEEN CORRUPTED./

148

EDFM9: .ASCIIZ /ERROR DETECTED BY PRINTER./

GLOBAL TEXT SECTION

149	011225	122	056	000	
	011230	127	101	122	EDFMA: .ASCII /WARNING: SOFTWARE ERROR. ERROR WORD (ERWORD) HAS BEEN/
	011233	116	111	116	
	011236	107	072	040	
	011241	123	117	106	
	011244	124	127	101	
	011247	122	105	040	
	011252	105	122	122	
	011255	117	122	056	
	011260	040	040	105	
	011263	122	122	117	
	011266	122	040	127	
	011271	117	122	104	
	011274	040	050	105	
	011277	122	127	117	
	011302	122	104	051	
	011305	040	110	101	
	011310	123	040	102	
150	011313	105	105	116	
	011316	103	117	122	.ASCIZ /CORRUPTED./
	011321	122	125	120	
	011324	124	105	104	
	011327	056	000		
151	011331	127	101	122	EDFMB: .ASCII /WARNING: SOFTWARE ERROR. ERROR WORD (ERWORD) HAS BEEN/
	011334	116	111	116	
	011337	107	072	040	
	011342	123	117	106	
	011345	124	127	101	
	011350	122	105	040	
	011353	105	122	122	
	011356	117	122	056	
	011361	040	040	105	
	011364	122	122	117	
	011367	122	040	127	
	011372	117	122	104	
	011375	040	050	105	
	011400	122	127	117	
	011403	122	104	051	
	011406	040	110	101	
	011411	123	040	102	
152	011414	105	105	116	
	011417	103	117	122	.ASCIZ /CORRUPTED./
	011422	122	125	120	
	011425	124	105	104	
	011430	056	000		
153					
154	011432	045	101	127	WAITMX: .ASCIZ /%AWAITING: NOT AN ERROR./ ;WHEN GETCHR WAIT STARTS GETTING LONG...
	011435	101	111	124	
	011440	111	116	107	
	011443	072	040	040	
	011446	116	117	124	
	011451	040	101	116	
	011454	040	105	122	
	011457	122	117	122	
	011462	056	000		
155					
156					.....

GLOBAL TEXT SECTION

157  
 158  
 159  
 160 011464 125 116 105  
 011467 130 120 105  
 011472 103 124 105  
 011475 104 040 103  
 011500 110 101 122  
 011503 101 103 124  
 011506 105 122 040  
 011511 122 105 103  
 011514 105 111 126  
 011517 105 104 040  
 011522 106 122 117  
 011525 115 040 120  
 011530 122 111 116  
 011533 124 105 122  
 011536 056 000

ERWORD BIT-12 UNEXPECTED CHARACTER RECEIVED  
 EDFMC: .ASCIZ /UNEXPECTED CHARACTER RECEIVED FROM PRINTER./

161  
 162  
 163  
 164  
 165  
 166  
 167  
 168  
 169  
 170  
 171 011540 105 130 120  
 011543 105 103 124  
 011546 105 104 040  
 011551 103 110 101  
 011554 122 101 103  
 011557 124 105 122  
 011562 040 116 117  
 011565 124 040 122  
 011570 105 103 105  
 011573 111 126 105  
 011576 104 040 106  
 011601 122 117 115  
 011604 040 124 110  
 011607 105 040 120  
 011612 122 111 116  
 011615 124 105 122  
 011620 056 000

USE OF THESE STRINGS WILL BE AS FOLLOWS...  
 ERRDF #NUM10,EDFMC -DEVICE FATAL ERROR CALL  
 PRINTB PRTBMO,PGMCTR -PRINT BASIC ERROR MESSAGE  
 PRINTX PRTXMO,TRXADD,ERWORD -PRINT EXTENDED ERROR MESSAGE

ERWORD BIT-13 EXPECTED CHARACTER NOT RECEIVED FROM PRINTER  
 EDFMD: .ASCIZ /EXPECTED CHARACTER NOT RECEIVED FROM THE PRINTER./

172  
 173  
 174  
 175  
 176  
 177  
 178  
 179 011622 045 116 045  
 011625 101 106 101  
 011630 111 114 105  
 011633 104 040 124  
 011636 117 040 106

USE OF THESE STRINGS WILL BE AS FOLLOWS...  
 ERRDF #NUM11,EDFMD -DEVICE FATAL ERROR CALL  
 PRINTB PRTBMO,PGMCTR -PRINT BASIC ERROR MESSAGE  
 PRINTX PRTXMO,TRXADD,ERWORD -PRINT EXTENDED ERROR MESSAGE  
 FAILM: .ASCII /%N%AFIILED TO FIND PRINTER AT DEFAULT ADDRESSES./

## GLOBAL TEXT SECTION

	011641	111	116	104	
	011644	040	120	122	
	011647	111	116	124	
	011652	105	122	040	
	011655	101	124	040	
	011660	104	105	106	
	011663	101	125	114	
	011666	124	040	101	
	011671	104	104	122	
	011674	105	123	123	
	011677	105	123	056	
180	011702	040	122	105	.ASCII / RESTART PROGRAM. /<12><15>
	011705	123	124	101	
	011710	122	124	040	
	011713	120	122	117	
	011716	107	122	101	
	011721	115	056	040	
	011724	040	040	040	
	011727	040	040	040	
	011732	040	040	040	
	011735	040	040	040	
	011740	040	040	040	
	011743	040	040	040	
	011746	040	040	012	
	011751	015			
181	011752	045	116	045	.ASCII /%N%ATHE CSR ADDRESS QUESTION MUST BE EXPLICITLY SPECIFIED./
	011755	101	124	110	
	011760	105	040	103	
	011763	123	122	040	
	011766	101	104	104	
	011771	122	105	123	
	011774	123	040	121	
	011777	125	105	123	
	012002	124	111	117	
	012005	116	040	115	
	012010	125	123	124	
	012013	040	102	105	
	012016	040	105	130	
	012021	120	114	111	
	012024	103	111	124	
	012027	114	131	040	
	012032	123	120	105	
	012035	103	111	106	
	012040	111	105	104	
	012043	056			
182	012044	045	116	045	.ASCIIZ /%N%N%N%N%A. /
	012047	116	045	116	
	012052	045	116	045	
	012055	101	056	040	
	012060	040	040	040	
	012063	040	040	040	
	012066	040	040	040	
	012071	040	040	040	
	012074	040	040	040	
	012077	040	040	040	
	012102	040	040	040	
	012105	040	040	040	



## GLOBAL TEXT SECTION

	012110	040	040	040	
	012113	040	040	040	
	012116	040	040	040	
	012121	040	040	040	
	012124	040	040	040	
	012127	040	040	040	
	012132	040	040	040	
	012135	040	040	040	
	012140	000			
183					
184					ERROR MESSAGE FORMAT FOR FAILURE IN DEFAULT PROCEDURE.
185	012141	045	116	045	FAILDL: .ASCIZ /%N%AINCORRECT CSR ADDRESS GIVEN. TRY AGAIN.. /
	012144	101	111	116	
	012147	103	117	122	
	012152	122	105	103	
	012155	124	040	103	
	012160	123	122	040	
	012163	101	104	104	
	012166	122	105	123	
	012171	123	040	107	
	012174	111	126	105	
	012177	116	056	040	
	012202	040	124	122	
	012205	131	040	101	
	012210	107	101	111	
	012213	116	056	056	
	012216	040	040	040	
	012221	040	040	040	
	012224	040	040	040	
	012227	040	040	040	
	012232	040	040	040	
	012235	000			
186	012236	045	116	045	FAILDZ: .ASCIZ /%N%AINCORRECT CSR ADDRESS OR CHANNEL GIVEN. TRY AGAIN... /
	012241	101	111	116	
	012244	103	117	122	
	012247	122	105	103	
	012252	124	040	103	
	012255	123	122	040	
	012260	101	104	104	
	012263	122	105	123	
	012266	123	040	117	
	012271	122	040	103	
	012274	110	101	116	
	012277	116	105	114	
	012302	040	107	111	
	012305	126	105	116	
	012310	056	040	040	
	012313	124	122	131	
	012316	040	101	107	
	012321	101	111	116	
	012324	056	056	056	
	012327	040	040	040	
	012332	000			
187	012333	045	116	045	FXRDYM: .ASCIZ /%N%AF AILED TO TRANSMIT TO PRINTER. /
	012336	101	106	101	
	012341	111	114	105	
	012344	104	040	124	

## GLOBAL TEXT SECTION

	012347	117	040	124	
	012352	122	101	116	
	012355	123	115	111	
	012360	124	040	124	
	012363	117	040	120	
	012366	122	111	116	
	012371	124	105	122	
	012374	056	040	040	
	012377	040	040	040	
	012402	040	040	040	
	012405	040	040	040	
	012410	040	040	040	
	012413	040	040	040	
	012416	040	040	040	
	012421	040	040	040	
	012424	040	040	040	
	012427	000			
188	012430	045	116	045	WFC: .ASCIZ /%N%AWAITING FOR A CHARACTER FROM THE PRINTER. - NOT AN ERROR./
	012433	101	127	101	
	012436	111	124	111	
	012441	116	107	040	
	012444	106	117	122	
	012447	040	101	040	
	012452	103	110	101	
	012455	122	101	103	
	012460	124	105	122	
	012463	040	106	122	
	012466	117	115	040	
	012471	124	110	105	
	012474	040	120	127	
	012477	111	116	124	
	012502	105	122	056	
	012505	040	055	040	
	012510	116	117	124	
	012513	040	101	116	
	012516	040	105	122	
	012521	122	117	122	
	012524	056	000		
189	012526	045	116	045	TIMOM: .ASCIZ /%N%ATIME-OUT: CHECK TO SEE IF PRINTER CONNECTED PROPERLY. /
	012531	101	124	111	
	012534	115	105	055	
	012537	117	125	124	
	012542	072	040	103	
	012545	110	105	103	
	012550	113	040	124	
	012553	117	040	123	
	012556	105	105	040	
	012561	111	106	040	
	012564	120	122	111	
	012567	116	124	105	
	012572	122	040	103	
	012575	117	116	116	
	012600	105	103	124	
	012603	105	104	040	
	012606	120	122	117	
	012611	120	105	122	
	012614	114	131	056	

GLOBAL TEXT SECTION

190	012617	040	040	040
191	012622	000		
192				
193				

.SBTTL GLOBAL ERROR REPORT SECTION

GLOBAL ERROR REPORT SECTION

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012624  
012624 000167  
012626 000000  
012630  
012630  
012630 104423

\*\*\*  
THE GLOBAL ERROR REPORT SECTION CONTAINS MESSAGE PRINTING AREAS  
USED BY MORE THAN TEST TO OUTPUT ADDITIONAL ERROR INFORMATION. PRINTB  
(BASIC) AND PRINTX (EXTENDED) CALLS ARE USED TO CALL PRINT SERVICES.  
---

.EVEN BGNMSG  
EXIT MSG  
L10001: TRAP CMSG  
L10001: TRAP CMSG  
.WORD JSJMP  
.WORD L10001-2-

.SBTTL GLOBAL SUBROUTINES SECTION

GLOBAL SUBROUTINES SECTION

1  
2  
3  
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1  
:++  
: THE GLOBAL SUBROUTINES SECTION CONTAINS THE SUBROUTINES  
: THAT ARE USED IN MORE THAN ONE TEST.

## GLOBAL SUBROUTINES SECTION

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-----
GLOBAL PROCEDURES
-----
-----

```

## FUNCTIONAL DESCRIPTION:

## GLOBAL PROCEDURE XMIT:

THIS PROCEDURE WILL TRANSMIT CHARACTER SEQUENCES TO THE PRINTER. THE SEQUENCE WILL BE TRANSMITTED IN ONE OF TWO MODES: WITH BIDIRECTIONAL PRINTING ENABLED AND WITH BIDIRECTIONAL PRINTING DISABLED. THERE ARE THREE ARGUMENTS SENT TO THIS ROUTINE IN REGISTERS R1, R2, AND R3. R1 IS EXPECTED TO CONTAIN THE ADDRESS OF THE FIRST BYTE (ASCII) TO BE SENT TO THE PRINTER CONTROLLER. R2 IS EXPECTED TO CONTAIN THE NUMBER OF BYTES TO BE TRANSMITTED TO THE PRINTER FROM THE CONTIGUOUS ARRAY WHOSE ADDRESS IS IN R1. R3, IF SET TO -1, ENABLES BIDIRECTIONAL PRINTING SOFTWARE TO CONTROL THE TRANSMISSION PROCESS. IF R3 IS EQUAL TO ZERO, THEN NO BIDIRECTIONAL PRINTING IS PERMITTED AND ALL CARRIAGE CONTROL CHARACTERS MUST BE EXPLICITLY SENT BY THE CALLING ROUTINE.

## INPUTS

```

R1 - ADDRESS OF STRING TO PRINT
R2 - NUMBER OF BYTES IN STRING TO BE PRINTED.
R3 - IF SET, BIDIRECTIONAL PRINTING IS TO BE ENABLED.

```

## OUTPUTS

```

THE STRING IS PRINTED ON THE PRINTER.
GREASE - IF SET TO -1, AN ERROR HAS OCCURRED. SET FOR FAST EXIT

```

## SUBROUTINES USED

```

SENCHR - THIS ROUTINE WILL SEND THE CHARACTER TO THE PRINTER
BUFFER (IF THERE IS ROOM IN THE BUFFER AND NO
CHARACTERS ARE CURRENTLY BEING RECEIVED.

```

## SIDE EFFECTS

THE CONTENTS OF R1 AND R2 ARE NOT PRESERVED. R3, R4, AND R5 ARE PRESERVED. IF A TRANSMISSION ERROR OCCURS, THIS ROUTINE WILL CAUSE A GREASED EXIT TO OCCUR FROM THE CURRENT TEST.

## CALLING SEQUENCE

```

PUT THE STRING ADDRESS INTO R1, THE NUMBER OF CHARACTERS TO BE PRINTED
INTO R2 AND SET R3 TO ENABLE OR DISABLE THE BIDIRECTIONAL PRINTING.
SET R3 TO 0 FOR NO BIDIRECTIONAL PRINTING. SET R3 TO -1 FOR
BIDIRECTIONAL PRINTING ENABLE. THE CALL IS THEN...
      JSR    PC,XMIT

```

## GLOBAL SUBROUTINES SECTION

```

58 012632 011637 007314      XMIT:  MOV      (SP),PGMCTR      ;SAVE THE CALLING PC + 4
59 012636 010146              MOV      R1,-(SP)
60 012640 010246              MOV      R2,-(SP)
61 012642 010346              MOV      R3,-(SP)      ;SAVE ALL GUARANTEED
62 012644 010446              MOV      R4,-(SP)      ;
63 012646 010546              MOV      R5,-(SP)      ;
64                               ;
65 012650 010137 005246      MOV      R1,TRXADD      ;SAVE THE TRANSMISSION ADDRESS
66                               ;
67 012654 012705 007352      MOV      #B'RA,R5      ;BOTTOM OF SOFTWARE STACK
68 012660 062705 000226      ADD      #150.,R5      ;TOP OF SOFTWARE STACK
69 012664 010537 010026      MOV      R5,TOPSTK     ;TOP OF STACK ADDRESS
70 012670 005237 010026      INC      TOPSTK        ;PLUS 1 FOR COUNTING PURPOSES.
71                               ;
72 012674 005703              TST      R3            ;IF ZERO THEN NO BIDIRECTIONAL PRINTING
73 012676 001021              BNE      BIDIRP       ;IF SET THEN GOTO BIDIRECTIONAL PRNTG CODE
74                               ;
75                               ;
76                               ;
77                               ;
78                               ;
79                               ;
80 012700 010103              MOV      R1,R3         ;ADDRESS OF THE FIRST CHARACTER IN THE STRING
81 012702 060203              ADD      R2,R3         ;ADDRESS OF THE LAST CHARACTER IN THE STRING
82                               ;                          PLUS ONE.
83 012704 112102      XSTR:  MOV      (R1)+,R2 ;GET THE CHARACTER INTO R2 AND POINT TO NEXT
84                               ;                          CHARACTER IN STRING.
85 012706 005037 002206      CLR      GREASE        ;ASSUME NO PREVIOUS ERRORS.
86 012712 004737 013402      JSR      PC,SENCHR     ;SEND THE CHARACTER IN R2 TO THE PRINTER.
87                               ;
88 012716 022737 177777 002206  CMP      #-1,GREASE    ;TIME-OUT ERROR. ECNR STATUS.
89 012724 001002              BNE      LCHYET        ;EXPRESS EXIT FOR ECNR ERROR REPORT.
90 012726 000137 013366      JMP      EXITX
91                               ;
92 012732 020103      LCHYET: CMP      R1,R3   ;HAS THE LAST CHARACTER BEEN PRINTED YET?
93 012734 100763      BMI      XSTR          ;LOOP THROUGH THE LIST UNTIL DONE.
94 012736 000137 013366      JMP      EXITX        ;AND WHEN DONE WITH STRING, EXIT TEST...
95                               ;
96                               ;
97                               ;
98 012742 010103      BIDIRP: MOV      R1,R3   ;ADDRESS OF THE STRING TO BE PRINTED
99 012744 060203      ADD      R2,R3         ;ADDRESS OF LAST CHARACTER TO BE PRINTED.
100                               ;                          PLUS 1 FOR COUNTING PURPOSES.
101                               ;
102 012746 023737 006502 010042  LN2LOO: CMP      CRNTPR,LINSIZ ;CRNTPR -CURRENT POINTER- IS INITIALIZED TO
103                               ;                          ZERO BY THE INITCD ROUTINE. CRNTPR KEEPS
104                               ;                          TRACK OF THE NUMBER OF CHARACTERS PRINTED
105                               ;                          SINCE THE LAST LINE FEED.
106 012754 100567      BMI      SENDR2       ;IF CRNTPR LESS THAN LINSIZ THEN THERE ARE
107                               ;                          MORE CHARACTERS TO PRINT ON THIS LINE.
108 012756 113702 002314      MOV      LF,R2        ;LINE IS FINISHED. SEND LINE FEED AND REVERSE
109 012762 004737 013402      JSR      PC,SENCHR     ; THE PRINT DIRECTION.
110                               ;
111 012766 005037 006502      CLR      CRNTPR       ;RESET THE CHARACTER COUNT FOR THIS LINE.
112 012772 005737 006504      TST      DIRCN        ;WHAT IS THE CURRENT PRINT DIRECTION? 0=FORWARD
113 012776 001100      BNE      FWRDO        ;IF REVERSE (1) THEN CHANGE TO FORWARD PRINT.
114

```

## GLOBAL SUBROUTINES SECTION

```

115
116
117 C13000 012737 000001 006504      MOV    #1,DIRCTN      ;IF FORWARD (1) THEN CHANGE TO REVERSE PRINT.
118
119 013006 113702 002244      MOVB   STCHSZ,R2      ;'ESC' CHAR
120 013012 004737 013402      JSR    PC,SENCHR      ;TO RESET CHARACTER SIZE TO NEGATIVE 10 CHAR
121
122 013016 022737 177777 002206      CMP    #-1,GREASE     ;HAS A TIME-OUT OCCURRED? EXPRESS EXIT
123 013024 001560                      BEQ    EXITX          ;FROM THIS ROUTINE MAY BE REQUIRED.
124
125 013026 112702 000057      MOVB   #HEXF,R2      ;
126 013032 004737 013402      JSR    PC,SENCHR      ;          PER INCH. THIS ENABLES REVERSE <---.
127
128 013036 022737 177777 002206      CMP    #-1,GREASE     ;HAS A TIME-OUT OCCURRED? EXPRESS EXIT
129 013044 001550                      BEQ    EXITX          ;FROM THIS ROUTINE MAY BE REQUIRED.
130
131 013046 004737 013402      JSR    PC,SENCHR      ;HEXF,HEXF,FOUR= -12 = -10 CHAR/INCH
132
133 013052 022737 177777 002206      CMP    #-1,GREASE     ;HAS A TIME-OUT OCCURRED? EXPRESS EXIT
134 013060 001542                      BEQ    EXITX          ;FROM THIS ROUTINE MAY BE REQUIRED.
135
136 013062 112702 000044      MOVB   #FOUR,R2      ;
137 013066 004737 013402      JSR    PC,SENCHR      ;
138
139 013072 022737 177777 002206      CMP    #-1,GREASE     ;HAS A TIME-OUT OCCURRED? EXPRESS EXIT
140 013100 001532                      BEQ    EXITX          ;FROM THIS ROUTINE MAY BE REQUIRED.
141
142 013102 012700 000004      MOV    #4,R0
143 013106 116002 002244      MOVB   STCHSZ(R0),R2 ; SEQUENCE: ESC 1111 1111 0100 A
144 013112 004737 013402      JSR    PC,SENCHR      ; SENT TO THE PRINTER.
145
146 013116 022737 177777 002206      CMP    #-1,GREASE     ;HAS A TIME-OUT OCCURRED? EXPRESS EXIT
147 013124 001520                      BEQ    EXITX          ;FROM THIS ROUTINE MAY BE REQUIRED.
148
149
150
151
152 013126 113702 006521      MOVB   ESCAPE,R2     ;NOW MOVE THE CARRIAGE ONE SPACE TO THE
153 013132 004737 013402      JSR    PC,SENCHR      ;LEFT TO EVEN UP THE MARGIN.
154
155 013136 112702 000057      MOVB   #HEXF,R2     ;
156 013142 004737 013402      JSR    PC,SENCHR      ;          SEND ESCAPE CHAR TO PRINTER
157
158 013146 112702 000057      MOVB   #HEXF,R2     ;
159 013152 004737 013402      JSR    PC,SENCHR      ;
160
161 013156 112702 000044      MOVB   #FOUR,R2     ;
162 013162 004737 013402      JSR    PC,SENCHR      ;
163
164 013166 112702 000073      MOVB   #73,R2       ;SEMI-COLON TO COMPLETE THE SEQUENCE WHERE
165 013172 004737 013402      JSR    PC,SENCHR      ; ESC HEXF,HEXF,FOUR (SEMI-COLON) CAUSES
166
167
168
169
170 013176 000456      BR     SENDR2        ; THE ONE-TENTH INCH SPACE TO THE LEFT.
171
;THE MARGIN SHOULD NOW BE EVEN.
;NOW SEND THE CHARACTER TO THE PRINTER.

```



## GLOBAL SUBROUTINES SECTION

```

172
173
174
175 013200 005037 006504      FWRDO: CLR      DIRCTN      ;INDICATE THAT THE DIRECTION IS FORWARD PRINT.
176                                     ;
177                                     ;RESTORE CHARACTER SIZE TO A POSITIVE 10 CHAR
178                                     ;PER INCH.  AT LEAST TWO MORE LINES TO GO....
179                                     ;
180 013204 113702 002244      MOVB     STCHSZ,R2      ;RESTORE CARRIAGE MOTION TO FORWARD.
181 013210 004737 013402      JSR      PC,SENCHR     ;
182
183 013214 022737 177777 002206  CMP      #-1,GREASE     ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
184 013222 001461              BEQ      EXITX         ;FROM THIS ROUTINE MAY BE REQUIRED.
185
186 013224 112702 000040      MOVB     #ZERO,R2      ;
187 013230 004737 013402      JSR      PC,SENCHR     ;
188
189 013234 022737 177777 002206  CMP      #-1,GREASE     ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
190 013242 001451              BEQ      EXITX         ;FROM THIS ROUTINE MAY BE REQUIRED.
191
192 013244 004737 013402      JSR      PC,SENCHR     ;SEQUENCE SENT: ESC 0000 0000 1100 A
193
194 013250 022737 177777 002206  CMP      #-1,GREASE     ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
195 013256 001443              BEQ      EXITX         ;FROM THIS ROUTINE MAY BE REQUIRED.
196
197 013260 112702 000054      MOVB     #HEXC,R2      ;ZERO,ZERO,HEXC - 12  10 CHARACTERS/INCH
198 013264 004737 013402      JSR      PC,SENCHR     ;
199
200 013270 022737 177777 002206  CMP      #-1,GREASE     ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
201 013276 001433              BEQ      EXITX         ;FROM THIS ROUTINE MAY BE REQUIRED.
202
203 013300 012700 000004      MOV      #4,R0
204 013304 116002 002244      MOVB     STCHSZ(R0),R2  ;
205 013310 004737 013402      JSR      PC,SENCHR     ;FORWARD CARRIAGE RESTORED.
206
207 013314 022737 177777 002206  CMP      #-1,GREASE     ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
208 013322 001421              BEQ      EXITX         ;FROM THIS ROUTINE MAY BE REQUIRED.
209
210 013324 113702 006541      MOVB     SPACE,R2      ;NOW TRANSMIT A SPACE TO EVEN UP THE MARGIN.
211 013330 004737 013402      JSR      PC,SENCHR     ;
212
213 013334 112102              SENDR2: MOVB     (R1)+,R2  ;GET THE CHARACTER FOR TRANSMISSION.
214 013336 004737 013402      JSR      PC,SENCHR     ;SEND THE CHARACTER TO THE PRINTER.
215 013342 022737 177777 002206  CMP      #-1,GREASE     ;
216 013350 001406              BEQ      EXITX         ;EXPRESS EXIT IF ANY PROBLEMS.
217
218 013352 005237 006502      INC      CRNTPR        ;CURRENT IN-LINE POINTER UPDATED.
219 013356 020103              CMP      R1,R3         ;IS THE ADDRESS OF THE NEXT CHARACTER TO BE
220                                     ;PRINTED EQUAL TO THE ADDRESS OF THE LAST
221                                     ;CHARACTER (PLUS 1) TO BE TRANSMITTED?
222 013360 001402              BEQ      EXITX         ;IF NOT YET THERE, REPEAT TRANSMIT PROCESS.
223 013362 000137 012746      JMP      LNELOO
224
225 013366 012605      EXITX: MOV      (SP)+,R5  ;RESTORE
226 013370 012604      MOV      (SP)+,R4      ;
227 013372 012603      MOV      (SP)+,R3      ;
228 013374 012602      MOV      (SP)+,R2      ;

```

GLOBAL SUBROUTINES SECTION

229	013376	012601	MOV	(SP)+,R1
230				
231	013400	000207	RTS	PC
232				
233				
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GLOBAL SUBROUTINES SECTION

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FUNCTIONAL DESCRIPTION

GLOBAL PROCEDURE SENCHR:

THIS ROUTINE TAKES THE ASCII BYTE IN REGISTER R2 AND SENDS IT TO THE PRINTER - WHEN POSSIBLE.

-----  
INPUTS

R2 - THE LOW BYTE IN R2 IS THE CHARACTER TO BE PRINTED.

OUTPUTS

THE CHARACTER IS SENT TO THE PRINTER.

SUBORDINATE ROUTINES USED

WAITXN - WAITS FOR THE XON CHARACTER TO BE SENT FROM THE PRINTER. IF THE XON IS NOT RECEIVED, A TIME-OUT ERROR MAY OCCUR AND A GREASED EXIT IS ENABLED.

STSERR - ADJUSTS THE ERROR FLAG-WORD. THE PRINTER IS QUERIED ABOUT THE PRINTER STATUS.

FUNCTIONAL SIDE EFFECTS

THE REGISTERS R2 AND R3 ARE PRESERVED. WITH THE SETTING OF AN ERROR STATE, THE GREASED EXIT MAY BE INITIATED.

```

SENCHR: MOV     R2,-(SP)      ;SAVE
        MOV     R3,-(SP)
        MOV     R4,-(SP)    ;
        MOV     R5,-(SP)    ;   REGISTERS

SENCH2: MOV     LPRINI,@LPR  ;IF DZ THEN SET PARMS, IF DL THEN NO EFFECT.
        MOV     TCRENA,@TCR ;IF DZ THEN SET CHANNEL. IF DL, NO EFFECT.
        CLR     R5
RESINW: CLR     R3          ;COUNTER
        BREAK   ;ENABLE ^C FROM CONSOLE DURING LOOP TRAP CSBRK

SENCLP: INC     R3          ;COUNTER
        CMP     R3,#7000    ;INNER LOOP CHECK
        BMI     CNTNU       ;KEEP LOOPING UNTIL WE REACH 77000
        INC     R5          ;OUTER LOOP COUNTER

        CMP     R5,#70.     ;PRINT A WAITING TO SEND MESSAGE.
        BNE     CO!E        ;CONTINUE WITH LOOP IF NOT 70 YET.
        PRINTX WTSTPM      ;WAITING TO SEND TO PRINTER MESSAGE.
    
```

## GLOBAL SUBROUTINES SECTION

	013454	013746	005154				MOV	WTSTPM,-(SP)
	013460	012746	000001				MOV	#1,-(SP)
	013464	010600					MOV	SP,R0
	013466	104415					TRAP	(SPNTX
	013470	062706	000004				ADD	#4,SP
57								
58	013474	020527	000144	COIE:	CMP	R5,#100.		;ALLOW 100 LOOPS BEFORE TIME OUT.
59	013500	100045			BPL	EXETS		;FAILURE TO FIND TRDY.
60	013502	000752			BR	RESINN		;RESET INNER LOOP
61								
62	013504	032777	000200	173564	CNTNU:	BIT	#BIT7,@RCSR	;IS RECEIVER READY? SHOULD BE SET IF IT IS.
63	013512	001007				BNE	ALPHA	;IF SET, ALPHA TAKES CARE OF BUFFER READ.
64								
65	013514	033777	010044	173556	BETA:	BIT	TRDYBT,@XCSR	;RCVR NOT RDY. SEE IF THE TRANSMITTER IS READY
66	013522	001744				BEQ	SENCLP	;IF ZERO, NOT READY, LOOP AND CHECK AGAIN.
67								
68								
69								
70	013524	110277	173554		MOVB	R2,@XBUF		;PUT CHARACTER INTO TRANSMITTER BUFFER.
71	013530	000445			BR	EXITS		;AND EXIT
72								
73								
74	013532	017704	173544	ALPHA:	MOV	@RBUF,R4		;READ THE RECEIVER BUFFER.
75								
76	013536	120437	006520		CMPB	R4,XON		;IS IT - 'XON'?
77	013542	001764			BEQ	BETA		;IF IT IS THEN ALL IS OK, CONTINUE.
78								
79	013544	120437	006517		CMPB	R4,XOFF		;IS IT - 'XOFF'?
80	013550	001007			BNE	CHKCAN		;IF NOT 'XOFF' THEN MAYBE IT IS A 'CAN'
81								
82	013552	004737	013656		JSR	PC,WAITXN		;IF IT WAS AN XOFF THEN WE MUST WAIT FOR
83								;AN XON AND THEN SEND CHARACTER.
84	013556	022737	177777	002206	CMP	#-1,GREASE		;HAS A TIME-OUT OCCURRED? EXPRESS EXIT
85	013564	001427			BEQ	EXITS		;FROM THIS ROUTINE MAY BE REQUIRED.
86								
87	013566	000711			BR	SENCH2		;XON FOUND ON TIME. LOOK FOR TRANSMIT READY.
88								
89	013570	120437	006516	CHKCAN:	CMPB	R4,CAN!		;CHARACTER = 'CAN' ?
90	013574	001416			BEQ	SETER		;IF IT IS THEN SET APPROPRIATE FLAG (ERWORD)
91								
92	013576	120437	006515		CMPB	R4,EOT		;CHARACTER = 'EOT' ?
93	013602	001413			BEQ	SETER		;IF IT IS THEN SET APPROPRIATE FLAG (ERWORD)
94								
95	013604	052737	010000	006500	BIS	#BIT12,ERWORD		;NONE OF THE USUAL CHARACTERS FOUND
96								;ASYNCHRONOUSLY. UNEXPECTED CHARACTER
97								;RECEIVED INDICATED IN ERWORD.
98	013612	000740			BR	BETA		;TRY AGAIN TO SEND CHARACTER
99								
100	013614	012737	000001	006512	EXETS:	MOV	#1,FLTRDY	;INDICATE FAILED TO FIND TRANSMIT READY.
101	013622	012737	177777	002206		MOV	#-1,GREASE	;ENABLE GREASED EXITS FROM TESTS.
102	013630	000405				BR	EXITS	;FAIL TO FIND TRDY
103								
104	013632	052737	100000	006500	SETER:	BIS	#BIT15,ERWORD	;CAN OR EOT TYPE ERROR
105	013640	004737	015106			JSR	PC,STERR	;SET UP ERWORD.
106								
107	013644	012605			EXITS:	MOV	(SP)+,R5	
108	013646	012604				MOV	(SP)+,R4	;RESTORE

GLOBAL SUBROUTINES SECTION

109 013650 012603  
110 013652 012602  
111  
112 013654 000207  
113  
114  
115  
116  
117  
118  
119

MOV (SP)+,R3  
MOV (SP)+,R2 ; REGISTERS  
RTS PC

⋮

## GLOBAL SUBROUTINES SECTION

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:FUNCTIONAL DESCRIPTION

GLOBAL PROCEDURE WAITXN:

THIS PROCEDURE WAITS FOR THE 'XON' CHARACTER TO BE SENT BY THE  
PRINTER. IF THE CHARACTER IS NOT SENT WITHIN A REASONABLE AMOUNT  
OF TIME, THEN A TIME - OUT WARNING IS GIVEN.

-----

## :INPUTS

NO INPUTS FROM CALLING ROUTINE.

## :OUTPUTS

IF A TIME-OUT OCCURS DUE TO TOO LONG A WAIT FOR THE XON CHARACTER  
TO BE RECEIVED, THE ERROR FLAG-WORD IS CHANGED.

## :SUBORDINATE ROUTINES

DELAYS - THIS ROUTINE WILL CAUSE A 100 USEC DELAY  
WITH R5 SET TO 1.

## :FUNCTIONAL SIDE EFFECTS

R1 AND R2 ARE PRESERVED. NO SIDE EFFECTS.

```

WAITXN: MOV    R1,-(SP)      ;SAVE USED REGISTERS
        MOV    R4,-(SP)      ;
        CLR    OUTSDC        ;OUTSIDE LOOP COUNTER. 1 MINUTE WAIT
        CLR    R1            ;INSIDE LOOP COUNTER.

LOOPXN: MOV    #4000,R5      ;ARGUMENT FOR THE DELAY
        JSR    PC,DELAYS     ;ABOUT 1 MSEC
        BREAK                ;ENABLE ^C INTERRUPTION FROM CONSOLE.

        BIT    #BIT7,@RCSR   ;RECEIVER READY? =0 IF NOT READY.
        BEQ    LOOPCK        ;NOT READY? THEN CHECK AGAIN
        JSR    PC,GETCHR     ;GET THE BYTE
        CMPB   R4,XON        ;IS IT = 'XON' ?
        BEQ    EXITON        ;IF = XON OK... EXIT ROUTINE WITH NO ERROR

SENDX:  BREAK                ;ENABLE USER INTERRUPTS WITH ^C
        MOVB   ESCAPE,R2     ;SEND REQUEST STATUS TO PRINTER

```

## GLOBAL SUBROUTINES SECTION

```

56 013732 004737 013402      JSR    PC,SENCHR      ;ESCAPE SENT
57 013736 113702 006532      MOV#   SC0,R2         ;AND
58 013742 004737 013402      JSR    PC,SENCHR      ;'0' SENT
59
60 013746 004737 014126      JSR    PC,GETCHR      ;GET ESCAPE FROM PRINTER.
61 013752 120437 006521      CMP#   R4,ESCAPE     ;CHECK FOR VALID CHARACTER (ESCAPE ONLY)
62 013756 001020                BNE    ELSEX         ;IF NO ESCAPE THEN OTHER ERROR.
63 013760 004737 014126      JSR    PC,GETCHR      ;GET N3
64 013764 004737 014126      JSR    PC,GETCHR      ;GET N2
65 013770 010400                MOV    R4,R0         ;SAVE N2 (CONTAINS PAUSE STATUS)
66 013772 004737 014126      JSR    PC,GETCHR      ;GET N1
67 013776 004737 014126      JSR    PC,GETCHR      ;GET '0'
68 014002 120437 006532      CMP#   R4,SC0        ;CONFIRM THAT THE LAST BYTE WAS A '0'
69 014006 001004                BNE    ELSEX         ;IF NOT PROPER, INDICATE AN ERROR.
70 014010 032700 000001      BIT    #BIT0,R0      ;WAS THE PAUSE SWITCH SET?
71 014014 001343                BNE    SENDX         ;REPEAT PROCESS IF BIT IS SET.
72 014016 000410                BR     LOOPCK        ;SWITCH NO LONGER PRESSED. LOOK FOR XON.
73
74 014020 012737 177777 002206 ELSEX: MOV    #-1,GREASE ;UNEXPECTED CHARACTER RECEIVED. ENABLE
75 014026 052737 010000 006500     BIS    #BIT12,ERWORD ;'GREASED' EXIT FROM CALLING ROUTINE.
76 014034 000137 014120                JMP    EXITON        ;EXIT ROUTINE.
77
78 014040 005201                LOOPCK: INC   R1      ;UPDATE LOOP COUNTER
79 014042 020127 077000     CMP    R1,#077000   ;LOOPED ENOUGH TIMES YET? 5 SEC CHECK
80 014046 100712                BMI    LOOPXN       ;CONTINUE TO LOOP UNTIL 5000 EXCEEDED.
81
82 014050 005237 006510                INC   OUTSDC        ;OUTSIDE LOOP COUNT
83 014054 023727 006510 000015     CMP    OUTSDC,#15  ;13 LOOPS YET?
84 014062 100701                BMI    OUTSDL        ;NO? THEN START UP AGAIN
85
86 014064 052737 010000 006500     BIS    #BIT12,ERWORD ;NOT XON.... ERROR UCRB
87 014072 052737 100000 006500     BIS    #BIT15,ERWORD ;AN ERROR IS DETECTED AND INDICATED
88
89 014100                PRINTX #TIMOM       ;PRINT TIMEOUT MESSAGE
90 014100 012746 012526                MOV    #TIMOM,-(SP)
91 014104 012746 000001                MOV    #1,-(SP)
92 014110 010600                MOV    SP,R0
93 014112 104415                TRAP  C$PNTX
94 014114 062706 000004                ADD    #4,SP
95
96
97 014120 012604                EXITON: MOV   (SP)+,R4 ;RESTORE THE REGISTERS
98 014122 012601                MOV   (SP)+,R1
99
100 014124 000207                RTS    PC

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GLOBAL SUBROUTINES SECTION

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:-----
:FUNCTIONAL DESCRIPTION
:
:   GLOBAL PROCEDURE GETCHR
:
:   THIS PROCEDURE WILL GET A CHARACTER AND WILL INDICATE A TIME-OUT
:   ERROR IF IT FAILS TO RECEIVE A CHARACTER WITHIN A REASONABLE TIME.
:-----

```

```

:INPUTS
:
:   NONE

```

```

:OUTPUTS
:
:   THE RECEIVER BUFFER IS READ AND PLACED IN R4.

```

```

:SUBORDINATE ROUTINES
:
:   DELAYS - GET A 100 USEC DELAY

```

```

:FUNCTIONAL SIDE EFFECTS
:
:   THE ERROR FLAG-WORD MAY CHANGE IF AN ERROR IS FOUND.

```

```

GETCHR: MOV     R1,-(SP)      ;SAVE REGISTERS
        MOV     R2,-(SP)      ;
        MOV     R5,-(SP)
OUTRLP: CLR     OUTCTR      ;OUTER LOOP COUNTER.
        CLR     R1           ;TIMING INNER LOOP COUNTER.
LOOPG:  BIT     #BIT07,@RCSR  ;RCSR-7 SET? RECEIVER READY? RDONE?
        BNE    SENDR        ;IF YES.....GET THE CHARACTER OUT OF THE BUFFER
                                ;AND INTO R4.
        MOV     #1,R5        ;SHORT DELAY... 100 USEC
        JSR    PC,DELAYS    ;WAIT AROUND FOR A WHILE
        BREAK
                                ;ENABLE INTERRUPT FROM ^C ON CONSOLE.
                                TRAP      (SBRK
48          INC     R1           ;LOOP COUNTER UPDATE.
49          NOPRTM: CMP     R1,#2400 ;LOOPEd LONG ENOUGH TO SET TIME-OUT INDICATOR?
50          BMI    LOOPG      ;LOOP UNTIL 24400 OR RECEIVER IS SET.
51          INC     OUTCTR      ;UPDATE OUTSIDE COUNTER.
52          CMP     OUTCTR,#20. ;HAVE WE BEEN WAITING LONG?
53          BNE    CONTLO     ;SKIP PRINT. ONCE PER LONG WAIT ONLY.
54          INC     OUTCTR
55          CMP     OUTCTR,#20.
56          BNE    CONTLO

```

```

014126 010146
014130 010246
014132 010546
014134 005037 006506
014140 005001
014142 032777 000200 173126
014150 001042
014152 012705 000001
014156 004737 015336
014162
014162 104422
014164 005201
014166 020127 002400
014172 100763
014174 005237 006506
014200 023727 006506 000024
014206 001010

```



## GLOBAL SUBROUTINES SECTION

```

57 014210          PRINTX #WFC          ;PRINT WAITING FOR A CHARACTER FROM PRINTER.
    014210 012746 012430          MOV      #WFC,-(SP)
    014214 012746 000001          MOV      #1,-(SP)
    014220 010600          MOV      SP,R0
    014222 104'          TRAP    C$PNTX
    014224 062          ADD     #4,SP
58
59 014230 023727 06 000132 CONTLO: CMP     OUTCTR,#90.      ;40 LOOPS MAXIMUM PERMITTED.
60 014236 100740          EMI     OUTRLP          ;NOT DONE YET? CONTINUE OUTER LOOP.
61
62 014240 052737 020000 006500 BIS     #BIT13,ERWORD  ;ECNRB ERROR
63 014246 052737 100000 006500 BIS     #BIT15,ERWORD  ;ERROR INDICATOR
64
65 014254 000413          BR     EXITE          ;GIVE UP WITH THIS RECEPTION
66                          ; AN ERROR WILL BE INDICATED.
67
68 014256 017704 173020          SENDR: MOV    @RBUF,R4      ;PUT CHARACTER RECEIVED INTO R4
69
70 014262 120437 006516          CMPB   R4,CAN          ;IS THE CHARACTER A 'CAN' FROM THE PRINTER?
71 014266 001403          BEQ    ERSETT         ;THEN SET BIT15 IN ERWORD AND EXIT.
72
73 014270 120437 006515          CMPB   R4,EOT          ;IS THE CHARACTER AN 'EOT' FROM THE PRINTER?
74 014274 001003          BNE    EXITE          ;IF NOT THEN EXIT WITH CHARACTER.
75
76 014276 052737 100000 006500 ERSETT: BIS   #BIT15,ERWORD  ;WE HAVE AN ERROR CONDITION. EITHER FATAL
77                          ; OR NON-FATAL. (CAN OR EOT)
78
79 014304 012605          EXITE: MOV    (SP)+,R5
80 014306 012602          MOV    (SP)+,R2
81 014310 012601          MOV    (SP)+,R1
82                          ;RESTORE REGISTERS
83 014312 000207          RTS     PC
84
85

```

## GLOBAL SUBROUTINES SECTION

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## :FUNCTIONAL DESCRIPTION

## GLOBAL PROCEDURE CONVRT:

THIS PROCEDURE CONVERTS A NUMBER CONTAINED IN REGISTER R1 INTO THREE ASCII BYTES WHICH ARE MNEMONIC ARGUMENTS ACCEPTABLE TO THE LQP CONTROLLER. THE THREE BYTES ARE CONTAINED IN THE LOCATIONS: MNEB1 (MOST SIGNIFICANT BYTE), MNEB2, AND MNEB3 (LEAST SIGNIFICANT BYTE).

## :INPUTS

R1 - CONTAINS THE NUMBER TO BE CONVERTED INTO MNEMONIC FORM

## :OUTPUTS

MNEB1 - HIGH ORDER BYTE MNEMONIC FROM VALUE IN R1.  
MNEB2 - MIDDLE BYTE MNEMONIC FROM VALUE IN R1.  
MNEB3 - LOW ORDER BYTE MNEMONIC FROM VALUE IN R1.

## :SUBORDINATE ROUTINES

NONE

## :FUNCTIONAL SIDE EFFECTS

REGISTERS ARE PRESERVED.

```

CONVRT: MOV    R2,-(SP)      ;SAVE REGISTERS
        MOV    R3,-(SP)      ;
        MOV    R1,R2         ;GET COPY OF NUMBER TO BE CONVERTED.
        BIC    TEMPL1,R2     ;MASK IN BITS 8 - 11.
        SWAB   R2           ;RIGHT JUSTIFY MASKED BITS
        BIS    #BITS,R2      ;CONVERT TO THE ASCII VALUE
        MOVB   R2,MNEB1     ;STORE RESULT IN GLOBAL VARIABLE
        MOV    R1,R2         ;COPY OF ORIGINAL NUMBER
        BIC    TEMPL2,R2     ;MASK BITS 4 - 7.
        ASR    R2           ;RIGHT JUSTIFY
        ASR    R2           ;BITS 4 - 7
        ASR    R2           ;INTO BIT POSITIONS
        ASR    R2           ;0 - 3.
        BIS    #BITS,R2      ;CONVERT TO THE ASCII VALUE
        MOVB   R2,MNEB2     ;STORE RESULT IN GLOBAL VARIABLE

```

```

014314 010246
014316 010346
014320 010102
014322 043702 006430
014326 000302
014330 052702 000040
014334 110237 010046
014340 010102
014342 043702 006432
014346 006202
014350 006202
014352 006202
014354 006202
014356 052702 000040
014362 110237 010047

```

## GLOBAL SUBROUTINES SECTION

```
58
59 014366 010102      MOV      R1,R2          ;GET ORIGINAL NUMBER
60 014370 043702 006434 BIC      TEMPL3,R2      ;MASK OUT LEFT 12 BITS.
61 014374 052702 000040 BIS      #BIT5,R2      ;SET BIT 5. CONVERT TO ASCII VALUE
62 014400 110237 010050 MOVB     R2,MNEB3      ;MOVE TO GLOBAL VARIABLE
63
64 014404 012603      MOV      (SP)+,R3      ;RESTORE REGISTERS
65 014406 012602      MOV      (SP)+,R2      ;
66
67 014410 000207      RTS      PC
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GLOBAL SUBROUTINES SECTION

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FUNCTIONAL DESCRIPTION

GLOBAL PROCEDURE INITCD

THIS ROUTINE IS USED TO INITIALIZE EACH TEST. THIS PROCEDURE WILL GUARANTEE THAT THE PRINTER BEING TESTED WILL BE IN A TESTABLE CONDITION (IF THE INITCD ROUTINE SUCCEEDS IN PERFORMING IN ITS ENTIRETY). THIS CODE WILL SET UP THE INTERFACE DEVICE USED TO COMMUNICATE WITH THE PRINTER. THE ROUTINE WILL RESET THE PRINTER TO ITS DEFAULT START-UP CONDITION, IT WILL SET THE RIBBON TO ITS DOWN POSITION, IT WILL SET THE HIT COUNT TO ONE HIT PER CHARACTER PRINTED, AND IT WILL SET THE UNDERLINE MODE OPTION TO 'NO-UNDERLINE'. FINALLY, THIS ROUTINE WILL SEND A CARRIAGE RETURN AND FOUR LINEFEEDS TO THE PRINTER TO AID IN THE READABILITY OF THE PRINT PATTERN.

INPUTS

NONE

OUTPUTS

NONE

SUBORDINATE ROUTINES

XMIT - SEND SEQUENCES TO THE PRINTER  
 STATS - CHECK FOR ERRORS. ENTRYPOINT IN STSERR.  
 GETCHR - GET A CHARACTER FROM THE PRINTER  
 STSERR - ADJUST THE STATUS WORD VIA PRINTER QUERY

FUNCTIONAL SIDE EFFECTS

- 1) PRINTER STATUS IS DETERMINED.
- 2) RIBBON POSITION IS SET DOWN.
- 3) HIT COUNT IS SET TO 1.
- 4) NO-UNDERLINE MODE IS SET.
- 5) PRINT CARRIAGE RETURN AND FOUR LINEFEEDS.

```
INITCD: CLR      PGMCTR      ; DOES NOT YET POINT TO PC OF ERROR
        MOV      R1, -(SP)   ; SAVE REGISTERS
        MOV      R2, -(SP)   ;
        MOV      R3, -(SP)   ;
        MOV      R4, -(SP)   ;
RESETC: MOV      #DUMMYS, R1 ; FIX INTERFACE TO ACCEPT PRINTER RESFT.
        MOV      #8., R2     ;
```

```
014412 005037 007314
014416 010146
014420 010246
014422 010346
014424 010446
014426 012701 002214
014432 012702 000010
```

## GLOBAL SUBROUTINES SECTION\*

58	014436	005003			CLR	R3	:	
59	014440	004737	C12632		JSR	PC,XMIT	;SEND DUMMY SEQUENCE	
60								
61	014444	005037	006500		CLR	ERWORD	;ASSUME THAT NO ERRORS HAVE YET OCCURED.	
62								
63	014450	012701	002224		MOV	#RESET,R1	;TRANSMIT PRINTER RESET SEQUENCE (ADDRESS)	
64	014454	012702	000002		MOV	#2,R2	;2 ARGUMENT LIST	
65	014460	005003			CLR	R3	;NO BIDIRECTIONAL PRINTING NECESSARY	
66	014462	004737	012632		JSR	PC,XMIT	;SEND SEQUENCE TO PRINTER	
67								
68	014466	012700	000020		MOV	#16.,R0	;SIXTEEN TRIES ARE GIVEN TO FIND THE ESC CHAR	
69	014472	005300		LOUEF:	DEC	R0	;COUNT DOWN OF LOOPS TO FIND ESCAPE	
70	014474	005700			TST	R0	;MAX TRIES USED TO FIND ESCAPE?	
71	014476	001440			BEQ	INIERR	;IF SO AN ERROR MUST BE REPORTED.	
72								
73	014500	004737	014126		JSR	PC,GETCHR	;READ 'ESC' CHR FROM RBUF	
74	014504	120437	006521		CMPB	R4,ESCAPE	;CHECK FOR CORRECT CHARACTER	
75	014510	001370			BNE	LOUEF	;IF NO ESCAPE FOUND THEN TRY AGAIN	
76								
77	014512	004737	014126		JSR	PC,GETCHR	;READ STATUS CHR. SHOULD BE SPACE CHARACTER.	
78	014516	120427	000040		CMPB	R4,#ZERO	;SHOULD BE NO ERRORS - RIGHT FOUR BITS = 0000	
79	014522	001026			BNE	INIERR	;IF RIGHT FOUR BITS NONZERO, INDICATE ERROR.	
80								
81	014524	004737	014126		JSR	PC,GETCHR	;READ 2ND STATUS NIBBLE.	
82	014530	120427	000040		CMPB	R4,#ZERO	;RIGHT FOUR BITS SHOULD BE 0000	
83	014534	001021			BNE	INIERR	;IF NONZERO, INDICATE ERROR AND CONTINUE	
84								
85	014536	004737	014126		JSR	PC,GETCHR	;READ 3RD STATUS NIBBLE.	
86	014542	042704	000001		BIC	#BIT0,R4	;CLEAR THE SHEET FEEDER PRESENT BIT IF SET.	
87	014546	120427	000040		CMPB	R4,#ZERO	;IS STATUS NIBBLE = 0000 ?	
88	014552	001012			BNE	INIERR	;IF NOT, INDICATE ERROR AND CONTINUE	
89								
90	014554	004737	014126		JSR	PC,GETCHR	;READ (HOPEFULLY) 'O' FROM RBUF	
91	014560	120437	006532		CMPB	R4,SCO	;CONFIRM THE CHARACTER IS A 'O'.	
92	014564	001005			BNE	INIERR	;IF NOT = 'O', THEN INDICATE ERROR, CONTINUE	
93								
94	014566	004737	014126		JSR	PC,GETCHR	;A CHARACTER IS EXPECTED FROM THE PRINTER	
95	014572	120437	006520		CMPB	R4,XON	; 'XON' IS THE EXPECTED CHARACTER	
96	014576	001413			BEQ	SETUPI	;IF YES, THEN SET UP THE PRINTER PARAMETERS	
97								
98	014600	052737	010000	006500	INIERR:	BIS	#BIT12,ERWORD	;IF NO, THEN INDICATE ERRORS: UCRB
99	014606	052737	020000	006500		BIS	#BIT13,ERWORD	; THEN INDICATE ERRORS: ECNRB
100	014614	052737	100000	006500		BIS	#BIT15,ERWORD	; THEN INDICATE ERRORS: ERROR FOUND BIT
101	014622	004737	015106		JSR	PC,STSERR	;CHECK FOR MORE ERRORS	
102								
103	014626	012700	000001		SETUPI:	MOV	#1,R0	
104	014632	112760	000040	002240	MOV	#ZERO,RIBPOS(R0)	;RIBBON POSITION DOWN	
105	014640	012701	002240		MOV	#RIBPOS,R1	;ADDRESS OF ARGUMENT LIST	
106	014644	012702	000003		MOV	#3,R2	;3CHARACTERS IN ARGUMENT LIST	
107	014650	005003			CLR	R3	;NO PRINTING	
108	014652	004737	012632		JSR	PC,XMIT	;SEND TO PRINTER	
109								
110	014656	012700	000001		MOV	#1,R0		
111	014662	112760	000040	002257	MOV	#ZERO,STHTCT(R0)	;SET HIT COUNT TO 1 HIT PER CHARACTER	
112	014670	012701	002257		MOV	#STHTCT,R1	;ADDRESS OF ARGUMENT LIST	
113	014674	012702	000003		MOV	#3,R2	;THREE ARGUMENTS IN THE	
114	014700	005003			CLR	R3	;NO PRINTING	

## GLOBAL SUBROUTINES SECTION

```

115 014702 004737 012632      JSR    PC,XMIT      ;SEND TO PRINTER
116
117 014706 112760 000040 002266  MOVB   #ZERO,STULMD(R0) ;SET UNDERLINE MODE
118 014714 012701 002266      MOV    #STULMD,R1   ;ADDRESS OF ARG LIST
119 014720 012702 000003      MOV    #3,R2        ;THREE ARGUMENTS
120 014724 005003      CLR    R3           ;NO PRINTING
121 014726 004737 012632      JSR    PC,XMIT      ;SEND TO PRINTER
122
123 014732 012701 002313      MOV    #CR,R1       ;ADDRESS OF CRLF TO BE PRINTED
124 014736 012702 000002      MOV    #2,R2        ;2 CHARACTERS TO BE PRINTED
125 014742 005003      CLR    R3           ;NO BIDIRECTIONAL PRINTING
126 014744 004737 012632      JSR    PC,XMIT      ;SEND TO PRINTER
127
128 014750 012701 002314      MOV    #LF,R1       ;ADDRESS OF LINEFEED
129 014754 012702 000001      MOV    #1,R2        ;PRINT THE SINGLE CHARACTER
130 014760 005003      CLR    R3           ;WITHOUT BIDIRECTIONAL PRINTING
131 014762 004737 012632      JSR    PC,XMIT      ;SEND TO PRINTER
132 014766 004737 012632      JSR    PC,XMIT      ;AGAIN...
133 014772 004737 012632      JSR    PC,XMIT      ;AND AGAIN...
134
135 014776 005037 006502      CLR    CRNTPR       ;CLEAR CURRENT COUNT WHICH IS USED IN
136                                     ;BIDIRECTIONAL PRINTING TO KEEP TRACK OF
137                                     ;THE NUMBER OF CHARACTERS PRINTED CURRENTLY
138                                     ;IN THE CURRENT DIRECTION.
139 015002 005037 006504      CLR    DIRCTN       ;INDICATOR THAT PRINTER IS PRINTING IN THE
140                                     ;FORWARD DIRECTION. (0=FORWARD, 1=REVERSE)
141                                     ;THIS IS TRUE AT THIS POINT BECAUSE THIS
142                                     ;ROUTINE RE-INITIALIZES THE PRINTER.
143
144 015006 012705 007000      MOV    #7000,R5     ;SET UP FOR A DELAY (ARG FOR DELAYS ROUTINE)
145 015012 012704 007000      MOV    #7000,R4     ;LOOP COUNTER
146 015016 004737 015336  LODELY: JSR    PC,DELAYS ;CAUSE A SHORT DELAY
147 015022 005304      DEC    R4           ;LOOP COUNTER ADJUSTMENT
148 015024 100374      BPL    LODELY       ;REPEAT UNTIL SUFFICIENT DELAY CAUSED.
149
150 015026 012604      MOV    (SP)+,R4     ;RESTORE
151 015030 012603      MOV    (SP)+,R3     ;
152 015032 012602      MOV    (SP)+,R2     ;   REGISTERS
153 015034 012601      MOV    (SP)+,R1     ;
154
155
156 015036 000207      RTS    PC
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## GLOBAL SUBROUTINES SECTION

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FUNCTIONAL DESCRIPTION

GLOBAL PROCEDURE RANDOM

RANDOM NUMBER GENERATOR. THE RANDOM NUMBER: RANGE 0 - 99  
WILL BE HELD IN REGISTER: R1. THE ALGORITHM FOR THIS RANDOM  
NUMBER GENERATOR WAS SUPPLIED BY THE LQP DIAGNOSTIC ON THE  
PDP-8 WRITTEN BY BILLY CRAFT.

-----  
INPUTS

SEED1 - NOT EXPLICITLY PASSED BY SOFTWARE. FIRST SEED  
SEED2 - SAME AS SEED1. USED FOR RANDOM NUMBER GENERATION.

## OUTPUTS

R1 - WILL CONTAIN THE RANDOM NUMBER (0-99)

## SUBORDINATE ROUTINES

NONE

## FUNCTIONAL SIDE EFFECTS

SEED1 AND SEED2 WILL BOTH BE CHANGED SO THAT THE NEXT RANDOM NUMBER  
WILL BE DIFFERENT FROM THE ONE JUST COMPUTED.

## CALLING SEQUENCE

NO EXPLICIT PARAMETERS ARE PASSED.  
JSR PC,RANDOM

RANDOM: NOP				;RANDOM NUMBER GENERATOR
TRYAGN: MOV	#1,R1			;RANDOM NUMBER IS GENERATED FROM
				;TWO SEEDS: SEED1 AND SEED2. IF DESIRED,
				;THESE SEEDS MAY BE CHANGED USING A DYNAMIC
				;DEBUGGER OR RE-ASSEMBLY OF THE PROGRAM WITH
				;NEW SEED VALUES. (NOT RECOMMENDED)
				;GET THE SEED1 VALUE (SLIGHTLY ALTERED)
				;ADD THE SECOND SEED VALUE
				;ROTATE CONTENTS SO THAT VALUE IS LOST
				;ROTATE AGAIN. VALUE IS CHANGED AGAIN
				;NOW A NEW SEED VALUE
				;AND A NEW SECOND SEED VALUE
				;BOTH FAIRLY UNRELATED TO THE ORIGINAL SEEDS
				;MASK OUT THE LEFT NINE BITS
				;THE NUMBER NOW HAS A POSSIBLE RANGE OF 0-127
				;IS THE NUMBER 0-99 ?

015040	000240		
015042	012701	000001	
015046	063701	006424	
015052	063701	006426	
015056	006101		
015060	006101		
015062	060137	006424	
015066	010137	006426	
015072	042701	177600	
015076	022701	000143	

GLOBAL SUBROUTINES SECTION

58 015102 100757  
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60 015104 000207  
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BMI TRYAGN  
RTS PC

;NO? WELL TRY AGAIN. RANGE MUST BE 0-99.

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GLOBAL SUBROUTINES SECTION

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FUNCTIONAL DESCRIPTION

GLOBAL PROCEDURE STSERR:

THIS ROUTINE DOES TWO THINGS: IT REQUESTS STATUS FROM THE PRINTER AND SETS UP THE ERROR FLAG - WORD (ERWORD). THE ENTRY POINT -STATS- MAY BE USED TO SKIP THE REQUEST STATUS CODE.

INPUTS

ERWORD - SOME BITS MAY ALREADY BE SET, INDICATING ERRORS ALREADY

OUTPUTS

ERWORD - THIS GLOBAL SYMBOL WILL INDICATE ALL COMPUTABLE ERRORS.

SUBORDINATE ROUTINES

SENCHR - USED TO TRANSMIT CHARACTERS TO THE PRINTER.  
GETCHR - USED TO RECEIVE CHARACTERS FROM THE PRINTER.

FUNCTIONAL SIDE EFFECTS

THE GLOBAL SYMBOL ERWORD WILL REFLECT THE STATUS OF THE PRINTER. REGISTERS ARE PRESERVED.

CALLING SEQUENCE

NO EXPLICIT PARAMETERS ARE PASSED TO THE ROUTINE.  
JSR PC, STSERR - NORMAL ENTRY  
STATUS REQUESTED FROM PRINTER  
JSR PC, STATS - 2ND ENTRY POINT. THE STATUS  
IS CHECKED AS IS.

```

STSERR: MOVB STSRES,R2 ;SEND 'ESC 0' TO THE PRINTER.
        JSR PC,SENCHR ;
        MOV #1,R0
        MOVB STSRES(R0),R2 ;
        JSR PC,SENCHR ;REQUEST STATUS FROM PRINTER.

STATS: MOV R4,-(SP) ;PUSH REGISTERS
        MOV R3,-(SP) ;

        JSR PC,GETCHR ;GET A CHARACTER FROM THE PRINTER.
        CMPB R4,STATUS ;THE CHARACTER IN R4 SHOULD BE AN ESC CHARACTER
        BNE PALPHA ;EXPECTED CHAR NOT RCVD, UNEXPECTED CHAR RCVD.

        JSR PC,GETCHR ;GET N3 FROM PRINTER. FATAL ERRORS INDICATED.
        BIC IMPLT3,R4 ;CLEAR LEFT 12 BITS.
    
```

```

43 015106 113702 002210
44 015112 004737 013402
45 015116 012700 000001
46 015122 116002 002210
47 015126 004737 013402
48
49 015132 010446
50 015134 010346
51
52 015136 004737 014126
53 015142 120437 002315
54 015146 001057
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56 015150 004737 014126
57 015154 043704 006434
    
```

GLOBAL SUBROUTINES SECTION

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58 015160 000304          SWAB  R4          ;PUT BITS IN PROPER POSITION FOR ERWORD
59 015162 050437 006500  BIS   R4,ERWORD ;SET THE ERROR BITS APPROPRIATE IN ERWORD.
60
61 015166 004737 014126  JSR  PC,GETCHR ;GET N2 FROM PRINTER. NON-FATAL ERRORS FRM PRTR
62 015172 043704 006434  BIC  TMPLT3,R4 ;CLEAR THE LEFT 12 BITS. (NOT WANTED)
63 015176 006304          ASL  R4          ;SHIFT
64 015200 006304          ASL  R4          ;
65 015202 006304          ASL  R4          ;
66 015204 006304          ASL  R4          ;
67 015206 050437 006500  BIS   R4,ERWORD ;AND SET THE APPROPRIATE BITS IN ERWORD.
68
69 015212 004737 014126  JSR  PC,GETCHR ;GET ANOOTHER CHARACTER. N1. PRINTER CONDITION
70 015216 043704 006434  BIC  TMPLT3,R4 ;CLEAR THE 12 LEFT UNWANTED BITS.
71 015222 042704 000001  BIC  #BIT0,R4  ;SHEET FEEDER PRESENT NOT A GENERAL ERROR.
72 015226 042704 000004  PIC  #BIT2,R4  ;NOT USED BY PRINTER
73 015232 042704 000010  BIC  #BIT3,R4  ;NOT USED BY PRINTER
74 015236 050437 006500  BIS   R4,ERWORD ;SET APPROPRIATE BITS IN ERWORD.
75
76 015242 042737 046400 006500 BIC  #46400,ERWORD ;CLEAR BITS 14,11,10,8 (UNUSED BITS IN ERWORD)
77
78 015250 005737 006500          TST  ERWORD      ;IS THE ERWORD = 0 ?
79 015254 001403          BEQ  CRCLX       ;IF IT IS CONTINUE...
80 015256 053737 100000 006500 BIS   BIT15,ERWORD ;IF IT ISN'T... INDICATE AN ERROR (GENERAL)
81                                     ; BY SETTING BIT 15 IN THE ERROR WORD.
82
83 015264 004737 014126          CRCLX: JSR  PC,GETCHR ;HOPE TO GET A 'O'
84 015270 123704 006532          CMPB SC0,R4    ;IS IT THE EXPECTED 'O' ?
85 015274 001415          BEQ  EXITSR     ;IF EQUAL TO EXPECTED CHAR ('O'), THEN DONE.
86
87 015276 052737 020000 006500 BIS   #ECNRB,ERWORD ;SET ECNRB ('O' NOT FOUND.)
88 015304 000403          BR   SET15      ;SET ERROR INDICATOR AND EXIT.
89
90 015306 052737 020000 006500 PALPHA: BIS   #ECNRB,ERWORD ;EXPECTED CHARACTER NOT RECEIVED INDICATOR
91
92 015314 052737 100000 006500 SET15: BIS   #BIT15,ERWORD ;INDICATE THAT AN ERROR HAS OCCURRED.
93 015322 012737 177777 002206 MOV   #-1,GREASE ;ENABLE A 'GREASED' EXIT FROM THE CALLING
94                                     ;ROUTINES.
95 015330 012603          EXITSR: MOV  (SP)+,R3 ;RESTORE REGISTERS.
96 015332 012604          MOV  (SP)+,R4 ;
97
98 015334 000207          RTS   PC
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GLOBAL SUBROUTINES SECTION

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FUNCTIONAL DESCRIPTION

GLOBAL PROCEDURE DELAYS

THIS PROCEDURE ACCEPTS A NUMBER IN REGISTER R5 AND CAUSES A DELAY OF 100 MICROSECONDS X R5. THE VALUE AFTER CALLING OF THIS ROUTINE IN R5 WILL BE ZERO.

.....  
INPUTS

R5 - CONTAINS THE NUMBER OF 100 USEC INCREMENTS DESIRED.

OUTPUTS

NONE

SUBORDINATE ROUTINES

NONE

FUNCTIONAL SIDE EFFECTS

THE DELAY IS AT LEAST 0.103MSEC X R5

CALLING SEQUENCE

NO PARAMETERS.  
JSR PC, DELAYS

.....  
DELAYS: MOV #21, DELCNT ;2.91USEC. - INNER LOOP INITIALIZATION  
INLOOP: DEC DELCNT ;2.385USEC. -  
BPL INLOOP ;2.385USEC. - -TOTAL 4.77USEC. PER LOOP  
DEC R5 ;0.103MSEC TO HERE  
BPL DELAYS ;STARTS WITH # OF .1 MSEC INCREMENTS.  
RTS PC ;IF R1 WERE 10,000 THEN TIME DELAY IS 1 SECOND.

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GLOBAL SUBROUTINES SECTION

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GLOBAL SUBROUTINES SECTION

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*****
***** ERROR DECODE AND PRINT SUBROUTINE *****
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FUNCTIONAL DESCRIPTION
    THIS PROCEDURE ACCEPTS ERWORD (THE ERROR FLAG-WORD) AS A PARAMETER, AND
    DECODES THE ERRORS WHICH HAVE OCCURRED. THE ROUTINE WILL PRINT THE
    ERROR MESSAGES ON THE CONSOLE TERMINAL. REGISTERS ARE PRESERVED. THE
    GLOBAL VARIABLES ERRTP, ERRNR, ERRMSG AND ERRBK ARE USED AS IF THEY
    WERE LOCAL VARIABLES. IT IS ASSUMED THAT THESE VARIABLES ARE NOT USED
    ELSEWHERE IN THE MODULE. (THE FOUR GLOBAL VARIABLES WERE ASSIGNED BY
    THE DIAGNOSTIC SUPERVISOR MACRO CALL ERRTBL.)
.....
INPUTS
    ERWORD - REFLECTS THE ERROR STATUS OF THE PRINTER.
    PGMCTR - PROGRAM COUNTER AT TIME OF CALL WHEN THE ERROR OCCURRED
OUTPUTS
    ERWORD - CLEARED AFTER EXECUTION OF ROUTINE
IMPLICIT OUTPUTS
    THE ERROR TABLE IS CHANGED (ERRTBL). ERROR MESSAGES ARE PRINTED.
    TO THE CONSOLE TERMINAL.
SUBORDINATE ROUTINES
    SUPERVISOR MACROS PRINTB,PRINTX,ERROR
CALLING SEQUENCE
    JSR    PC,ERRORS
:
ERRORS: MOV    R3,-(SP)    ;PUSH REGISTERS
        MOV    R4,-(SP)    ;
        BIT    #BIT15,ERWORD ;IS ERROR FOUND BIT SET?
        BEQ    EXTMCR      ;IF NOT SET, THEN EXIT THE SUBROUTINE.
        SUB    #4,PGMCTR    ;ACCOUNT FOR AUTOINC OF PC WHEN PUSHED BY JSR
        CLR    R3          ;LOOP COUNTER AND TABLE POINTER.
NXTBIT: BIT    #BIT0,ERWORD ;IS THE RIGHT-MOST BIT SET?
        BEQ    NXTERM      ;IF NOT SET, THEN CHECK THE NEXT BIT.
:
        MOV    #1,ERRTP    ;ERRDF CALL = ERRTP:1
        MOV    ERMSGB(R3),ERRMSG ;USING THE ERPTBL SET UP BY THE
                                ;SUPERVISOR DEVICE FATAL MACRO CALL
    
```

GLOBAL SUBROUTINES SECTION

58	015430	010337	010074		MOV	R3,ERRNBR		:ERROR NUMBER BEING CHECKED.
59	015434				ERROR			:MACRO CALL - WITH ABOVE PARMS
	015434	104460						TRAP C\$ERROR
60								
61	015436				PRINTB	#PRTBMO,PGMCTR		:PRINT BASIC ERROR MESSAGE AND PC
	015436	013746	007314					MOV PGMCTR,-(SP)
	015442	012746	010230					MOV #PRTBMO,-(SP)
	015446	012746	000002					MOV #2,-(SP)
	015452	010600						MOV SP,R0
	015454	104414						TRAP C\$PNTB
	015456	062706	000006					ADD #6,SP
62	015462				PRINTX	#PRTXMO,TRXADD		:PRINT EXTENDED ERROR MESSAGE AND
	015462	013746	005246					MOV TRXADD,-(SP)
	015466	012746	010302					MOV #PRTXMO,-(SP)
	015472	012746	000002					MOV #2,-(SP)
	015476	010600						MOV SP,R0
	015500	104415						TRAP C\$PNTX
	015502	062706	000006					ADD #6,SP
63								:ADDRESS OF TRANSMITTED STRING AND
64								:THE ERROR FLAG-WORG.
65								
66	015506	062703	000002		NXTERM:	ADD #2,R3		:POINT TO NEXT TABLE ENTRY.
67	015512	006237	006500			ASR ERWORD		:GET NEXT BIT INTO POSITION.
68								
69	015516	022703	000034			CMP #28.,R3		:DONE WITH ALL THIS WHEN R3 IS 28 AND 13
70								:BITS HAVE BEEN CHECKED.
71	015522	001330				BNE NXTBIT		:REPEAT UNTIL 13 LOOPS COMPLETE.
72	015524	005037	006500			CLR ERWORD		:SINCE WE ARE DONE, CLEAR THE ERROR FLAG-WORD.
73								
74	015530	022737	000001	006512		CMP #1,FLTRDY		:WAS THERE A FAILURE TO FIND TRANSMIT-READY?
75	015536	001010				BNE DCUPA		:IF NOT, DO CLEANUP
76	015540					PRINTB #FXRDYM		:PRINT TO CONSOLE: FAILED TO TRANSMIT TO PRNTR
	015540	012746	012333					MOV #FXRDYM,-(SP)
	015544	012746	000001					MOV #1,-(SP)
	015550	010600						MOV SP,R0
	015552	104414						TRAP C\$PNTB
	015554	062706	000004					ADD #4,SP
77								
78	015560				DCUPA:	DOCLN		
	015560	104444						TRAP C\$DCLN
79								
80	015562	022737	000001	006512	EXTMCR:	CMP #1,FLTRDY		
81	015570	001010				BNE DDCUPA		
82	015572					PRINTB #FXRDYM		
	015572	012746	012333					MOV #FXRDYM,-(SP)
	015576	012746	000001					MOV #1,-(SP)
	015602	010600						MOV SP,R0
	015604	104414						TRAP C\$PNTB
	015606	062706	000004					ADD #4,SP
83								
84	015612	012604			DDCUPA:	MOV (SP)+,R4		:RESTORE REGISTERS
85	015614	012603				MOV (SP)+,R3		:
86								
87	015616	000207				RTS PC		
88								
89								
90								

GLOBAL SUBROUTINES SECTION

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.TITLE MISCELLANEOUS SECTIONS  
.SBTTL REPORT CODING SECTION

REPORT CODING SECTION

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7  
8 015620  
015620  
9  
10 015620  
015620 000167  
015622 000000  
11  
12  
13  
14 015624  
015624  
015624 104425  
15

```

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

```

BGNRPT

L\$RPT::

EXIT RPT

```

.WORD JSJMP
.WORD L10002-2-.

```

.EVEN

ENDRPT

L10002:

TRAP CSRPT

.SBTTL PROTECTION TABLE



PROTECTION TABLE

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015626  
015626  
015626 -77777  
015630 177777  
015632 177777  
015634

\*\*\*  
THIS TABLE IS USED BY THE RUNTIME SERVICES  
TO PROTECT THE LOAD MEDIA.  
---

BGNPROT  
L\$PROT::  
-1 ;OFFSET INTO P-TABLE FOR CSR ADDRESS  
-1 ;OFFSET INTO P-TABLE FOR MASSBUS ADDRESS  
-1 ;OFFSET INTO P-TABLE FOR DRIVE NUMBER

ENDPROT

.SBTTL INITIALIZE SECTION

INITIALIZE SECTION

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015634 012700 000036
015640 104447 -
015642 103425
015644 012700 000035
015650 104447
015652 103003
015654 012737 177777 002202
015662 005237 002202
015666 023737 002202 002012
015674 001407
015676 013700 002202
015702 104442
015704 010037 002204
015710 103364
015712 000403
015714 104444
015716 000137 016700
015722 012746 000340
015726 012746 016704
015732 012746 000004
015736 012746 000003
015742 104437
015744 062706 000010
015750 005037 006500
    
```

```

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

BGNINIT

L\$INIT::

INITIALIZE ROUTINE.

THIS CODE WILL ACT ON THE HARDWARE P-TABLE CONTENTS TO SET UP THE SERIAL INTERFACE THAT THE PRINTER IS CONNECTED TO.

INITLZ: READEF #EF.CONTINUE

MOV #EF.CONTINUE,RO  
TRAP C\$REFG

BCOMPLETE JENDIN

BCS JENDIN

READEF #EF.NEW

MOV #EF.NEW,RO  
TRAP C\$REFG

BNCOMPLETE NEXTU

BCC NEXTU

NEXTU: MOV #-1,LOGUNIT  
INC LOGUNIT  
CMP LOGUNIT,L\$UNIT  
BEQ ABORT  
GPHARD LOGUNIT,PLOC

MOV LOGUNIT,RO  
TRAP C\$GPHRD  
MOV RO,PLOC

BNCOMPLETE NEXTU

BCC NEXTU

ABORT: BR STRTUP  
DOCLN

TRAP C\$DCLN

JENDIN: JMP ENDIN

STRTUP: SETVEC #4,#UBTRAP,#PRI07

;SET UP TRAP VECTOR FOR ILLEGAL ADDRESS  
MOV #PRI07,-(SP)  
MOV #UBTRAP,-(SP)  
MOV #4,-(SP)  
MOV #3,-(SP)  
TRAP C\$SVEC  
ADD #10,SP

;TRAP... UNIBUS ERROR.

CLR ERWORD

;ASSUME NO ERRORS

## INITIALIZE SECTION

```

40 015754 005037 010056      CLR      NDATA      ;ASSUME NO UNIBUS ERRORS
41 015760 005037 006512      CLR      FLTRDY     ;ASSUME NO FAILURE TO FIND TRANSMIT RDY
42 015764 005037 002206      CLR      GREASE     ;ASSUME NO PREVIOUS ERRORS
43
44 015770 017701 164210      MOV      @PLOC,R1   ;GET CSR ADDRESS
45 015774 001137              BNE      SETUPC    ;IF NOT ZERO, THEN SET UP INTERFACE ADDRESSES
46
47
48 015776 005037 010056      CALLDF: CLR      NDATA      ;CSR, LPR, TCR, RBUF
49 016002 004737 017144      JSR      PC,DFULT   ;ASSUME NO UNIBUS ADDRESSING ERRORS YET.
50 016006 000137 016570      JMP      LINCOD     ;DO THE DEFAULT LOGIC & THEN THE LINE SIZE CODE
51
52 016012 005037 010056      CALLDL: CLR      NDATA      ;ASSUME NO UNIBUS ADDRESSING ERRORS YET.
53 016016 004737 016714      JSR      PC,DLSET   ;SET UP FOR A DL
54 016022 005037 006500      CLR      ERWORD     ;ASSUME NO ERRORS
55 016026 023727 010056      CMP      NDATA,#1   ;NO DEVICE AT THAT ADDRESS?
56 016034 001011              BNE      EMPTI2     ;NO PROBLEM WITH UNIBUS
57 016036              PRINTF #FAILDL    ;FAILED TO FIND DEVICE MESSAGE
   016036 012746 012141              MOV      #FAILDL,-(SP)
   016042 012746 000001              MOV      #1,-(SP)
   016046 010600              MOV      SP,R0
   016050 104417              TRAP    C$PNTF
   016052 062706 000004              ADD      #4,SP
58 016056              DOCLN              ;EXIT TEST SEQUENCE
   016056 104444              TRAP    C$DCLN
59
60 016060 012700 000144      EMPTI2: MOV      #100.,R0 ;ASSUME NO MORE THAN 100 CHARACTERS IN BUFFER.
61 016064 005300      EMPTL2: DEC      R0      ;COUNT DOWN ONE FOR EACH CHARACTER
62 016066 002407              BLT      NONDTA     ;STOP TRYING TO EMPTY THE BUFFER. ASSUME HOPELESS.
63
64 016070 032777 000200      BIT      #BIT7,@RCSR ;IS THERE A CHARACTER IN THE RBUF?
65 016076 001403              BEQ      NONDTA     ;IF NO CHARACTER IN RBUF, THEN CONTINUE...
66
67 016100 005777 171176      TST      @RBUF      ;EMPTY RBUF. IGNORE R IFFER CONTENTS.
68 016104 000767              BR       EMPTL2     ;CHECK FOR R DONE AGAIN AND EMPTY BUFFER
69
70
71 016106 005037 006500      NONDTA: CLR      ERWORD     ;ASSUME NO ERRORS
72 016112 005037 010056      CLR      NDATA      ;ASSUME NO UNIBUS ERRORS
73 016116 005037 006512      CLR      FLTRDY     ;ASSUME NO FAILURE TO FIND TRANSMIT RDY
74 016122 005037 002206      CLR      GREASE     ;ASSUME NO PREVIOUS ERRORS.
75
76 016126 012701 002210      MOV      #STSRES,R1 ;ADDRESS OF REQUEST STATUS SEQUENCE
77 016132 012702 000002      MOV      #2,R2
78 016136 005003              CLR      R3
79 016140 004737 012632      JSR      PC,XMIT    ;SEND ANSWER BACK SEQUENCE TO PRINTER.
80 016144 042737 100000      BIC      #BIT15,ERWORD ;EOT MAY HAVE OCCURED. IGNORE IT.
81 016152 023727 006512      CMP      FLTRDY,#1  ;FAIL TO FIND TRDY?
82 016160 001404              BEQ      PFM1       ;PRINT FAILURE MESSAGE
83
84 016162 023727 010056      CMP      NDATA,#1   ;ANY UNIBUS ERRORS?
85 016170 001011              BNE      NONDT2     ;IF SO, PRINT FAILURE MESSAGE.
86
87 016172              PFM1:  PRINTF #FAILDL ;PRINT FAILURE MESSAGE
   016172 012746 012141              MOV      #FAILDL,-(SP)
   016176 012746 000001              MOV      #1,-(SP)
   016202 010600              MOV      SP,R0

```

## INITIALIZE SECTION

	016204	104417					TRAP	C\$PNTF
	016206	062706	C00004				ADD	#4,SP
88	016212			DOCLN				
	016212	104444					TRAP	C\$DCLN
89								
90	016214	004737	014126	NONDT2:	JSR	PC,GETCHR		;CHECK FOR A RESPONSE CHARACTER
91	016220	120437	006521		CMPB	R4,ESCAPE		;WAS THE CHARACTER AN ESCAPE CHARACTER?
92	016224	001411			BEQ	NONDT3		;GET THE REST IF ESC FOUND.
93	016226				PRINTF	#FAILDL		;PRINT FAILURE MESSAGE FOR DL SETUP.
	016226	012746	012141				MOV	#FAILDL,-(SP)
	016232	012746	000001				MOV	#1,-(SP)
	016236	010600					MOV	SP,RO
	016240	104417					TRAP	C\$PNTF
	016242	062706	000004				ADD	#4,SP
94	016246			DOCLN				
	016246	104444					TRAP	C\$DCLN
95								
96	016250	004737	014126	NONDT3:	JSR	PC,GETCHR		;GET THE 2ND CHARACTER IN RESPONSE.
97	016254	004737	014126		JSR	PC,GETCHR		: 3RD
98	016260	004737	014126		JSR	PC,GETCHR		: 4TH
99	016264	004737	014126		JSR	PC,GETCHR		: 5TH AND FINAL RESPONSE CHARACTER.
100								
101								
102	016270	000137	016570		JMP	LINCOD		;AND THEN DO THE LINE SIZE LOGIC.
103								
104	016274	012700	000002	SETUPC:	MOV	#2,RO		;RESPONSE FROM PTABLE. ?DZ (Y,N)?
105	016300	063700	002204		ADD	PLOC,RO		;IF = 0 THEN MULTILINE. IF 1 THEN SINGLE LINE
106	016304	011001			MOV	(RO),R1		;INTERFACE.
107	016306	100633			BMI	CALLDF		
108								
109	016310	001240			BNE	CALLDL		;IF = 1 THEN SINGLE LINE.
110								
111	016312	005037	010056		CLR	NDATA		;ASSUME NO ADDRESSING (UNIBUS) ERRORS YET.
112	016316	004737	017004		JSR	PC,DZSET		;IF = 0 THEN MULTILINE.
113								
114								
115	016322	005037	006500		CLR	ERWORD		;ASSUME NO ERRORS
116	016326	023727	010056	000001	CMP	NDATA,#1		;NO DEVICE AT THAT ADDRESS?
117	016334	001011			BNE	EMPTI3		;NO PROBLEM WITH UNIBUS
118	016336				PRINTF	#FAILDZ		;FAILED TO FIND DEVICE MESSAGE
	016336	012746	012236				MOV	#FAILDZ,-(SP)
	016342	012746	000001				MOV	#1,-(SP)
	016346	010600					MOV	SP,RO
	016350	104417					TRAP	C\$PNTF
	016352	062706	000004				ADD	#4,SP
119	016356			DOCLN				
	016356	104444					TRAP	C\$DCLN
120								
121	016360	012700	000144	EMPTI3:	MOV	#100.,RO		;ASSUME NO MORE THAN 100 CHARACTERS IN BUFFER.
122	016364	005300		EMPTZ3:	DEC	RO		;COUNT DOWN ONE FOR EACH CHARACTER
123	016366	002407			BLT	NONDZA		;STOP TRYING TO EMPTY THE BUFFER. ASSUME HOPELESS.
124								
125	016370	032777	000200	170700	BIT	#BIT7,@RCSR		;IS THERE A CHARACTER IN THE RBUF?
126	016376	001403			BEQ	NONDZA		;IF NO CHARACTER IN RBUF, THEN CONTINUE...
127								
128	016400	005777	170676		TST	@RBUF		;EMPTY RBUF. IGNORE BUFFER CONTENTS.
129	016404	000767			BR	EMPTZ3		;CHECK FOR RDONE AGAIN AND EMPTY BUFFER

## INITIALIZE SECTION

```

130
131
132
133 016406 005037 006500      NONDZA: CLR      ERWORD      ;ASSUME NO ERRORS
134 016412 005037 010056      CLR      NDATA        ;ASSUME NO UNIBUS ERRORS
135 016416 005037 006512      CLR      FLTRDY       ;ASSUME NO FAILURE TO FIND TRANSMIT RDY
136 016422 005037 002206      CLR      GREASE       ;ASSUME NO PREVIOUS ERRORS.
137
138 016426 012701 002210      MOV      #STSRES,R1   ;SEND REQUEST STATUS SFQUENCE.
139 016432 012702 000002      MOV      #2,R2       ;
140 016436 005003              CLR      R3           ;
141 016440 004737 012632      JSR      PC,XMIT      ;SEND REQUEST STATUS SEQUENCE TO PRINTER.
142 016444 042737 100000 006500 BIC      #BIT15,ERWORD ;IGNORE POSSIBLE EOT CONDITION.
143 016452 023727 006512 000001 CMP      FLTRDY,#1    ;FAILURE TO FIND TRDY?
144 016460 001404              BEQ      PRTM2        ;PRINT FAILURE MESSAGE
145
146 016462 023727 010056 000001 CMP      NDATA,#1    ;ANY UNIBUS ERRORS?
147 016470 001011              BNE      NONDZ2      ;IF SO, PRINT FAILURE MESSAGE.
148
149 016472              PRTM2: PRINTF #FAILDZ ;PRINT FAILURE MESSAGE
150 016472 012746 012236              MOV      #FAILDZ,-(SP)
151 016476 012746 000001              MOV      #1,-(SP)
152 016502 010600              MOV      SP,R0
153 016504 104417              TRAP    ($PNTF
154 016506 062706 000004              ADD     #4,SP
155 016512              DOCLN ;EXIT TESTING SEQUENCE
156 016512 104444              TRAP    ($DCLN
157
158 016514 004737 014126      NONDZ2: JSR      PC,GETCHR ;CHECK FOR A RESPONSE CHARACTER
159 016520 120437 006521      CMPB    R4,ESCAPE    ;WAS THE CHARACTER AN ESCAPE CHARACTER?
160 016524 001411              BEQ     NONDZ3       ;GET THE RST IF ESC FOUND.
161 016526              PRINTF #FAILDZ      ;PRINT FAILURE MESSAGE FOR DL SETUP.
162 016526 012746 012236              MOV     #FAILDZ,-(SP)
163 016532 012746 000001              MOV     #1,-(SP)
164 016536 010600              MOV     SP,R0
165 016540 104417              TRAP   ($PNTF
166 016542 062706 000004              ADD    #4,SP
167 016546              DOCLN ;EXIT TESTING SEQUENCE
168 016546 104444              TRAP   ($DCLN
169
170 016550 004737 014126      NONDZ3: JSR      PC,GETCHR ;GET THE 2ND CHARACTER IN RESPONSE.
171 016554 004737 014126      JSR     PC,GETCHR   ;
172 016560 004737 014126      JSR     PC,GETCHR   ;
173 016564 004737 014126      JSR     PC,GETCHR   ;
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INITIALIZE SECTION

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175 016626 013701 010042      INF IN:  MOV      LINSIZ,R1      ;GET THE LINE SIZE. NUMBER OF CHARACTERS/LINE
176 016632 006301              ASL      R1          ;X 2
177 016634 006301              ASL      R1          ;X 4
178 016636 010137 010040      MOV      R1,LINN     ;SAVE LINSIZ X 4
179 016642 006301              ASL      R1          ;X 8
180 016644 060137 010040      ADD      R1,LINN     ;LINSIZ X (4+8) = LINSIZ X 12 => LINN
181
182 016650 005037 006500      CLR      ERWORD     ;ASSUME NO ERRORS - YET.
183 016654              CLRVEC  #4          ;RESET VECTOR TO ORIGINAL STATUS
184 016654 012700 000004              MOV      #4,R0
185 016660 104436              TRAP
186
186 016662 032777 000200 170406  EMPTYR: BIT      #BIT7,@RCSR     ;EMPTY RECEIVER BUFFER...
187 016670 001403              BEQ      ENDIN      ;IS THERE A CHARACTER IN THE RBUF?
188                                     ;IF NO CHARACTER IN RBUF, THEN EXIT.
189 016672 005777 170404              TST      @RBUF      ;EMPTY RBUF. IGNORE BUFFER CONTENTS.
190 016676 000771              BR       EMPTYR     ;CHECK FOR RDONE AGAIN AND EMPTY BUFFER
191                                     ;IF NEEDED.
192
193 016700              ENDIN:  EXIT      INIT
194 016700 104432              TRAP      C$EXIT
195 016702 000662              .WORD    L10004-.

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226 016704

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FUNCTIONAL DESCRIPTION

TRAP HANDLER FOR UNIBUS FAILURE TO FIND A DEVICE AT THE REFERENCED ADDRESS.  
ALL THAT IS NECESSARY IS TO INDICATE THAT THE TRAP ROUTINE HAS BEEN ACCESSED (THAT A DEVICE WAS UNSUCCESSFULLY ADDRESSED) AND RETURN FOR ANOTHER TRY.  
.....

INPUTS

NONE

OUTPUTS

NDATA - IF THIS ROUTINE IS PERFORMED, NDATA WILL BE SET.

SUBORDINATE ROUTINES

NONE

CALLING SEQUENCE

WHEN A TRAP OCCURS THE ROUTINE IS CALLED.

BGNSRV UBTRAP ;TRAP SERVICE ROUTINE

JBTRAP::

INITIALIZE SECTION

```

227 016704 012737 000001 010056 UBTRAP: MOV #1,NDATA ;NO DEVICE AT THAT ADDRESS INDICATED.
228
229 016712 ENDSRV L10005:
016712 000002 RTI
016712
230
231 :
232 :
233 :
234 :
235 :
236 :
237 :
238 :*****
239 :FUNCTIONAL DESCRIPTION
240 : LOCAL PROCEDURE DLSET
241 : THIS PROCEDURE WILL TAKE THE CSR ADDRESS GIVEN IN CSRADD AND SET UP
242 : THE ADDRESSES FOR THE RCSR, THE XCSR, AND THE RBUF AND XBUF REGISTERS.
243 : THIS CODE IS FOR SINGLE LINE INTERFACES ONLY.
244 :*****
245 :
246 :
247 :
248 :
249 :
250 :INPUTS
251 : CSRADD - ADDRESS OF CSR REGISTER.
252 :
253 :OUTPUTS
254 : NONE
255 :
256 :SUBORDINATE ROUTINES
257 : NONE
258 :
259 :FUNCTIONAL SIDE EFFECTS
260 : INTERFACE REGISTERS ARE SET UP IF THE CSR ADDRESS IS VALID.
261 :
262 :CALLING SEQUENCE
263 : PLACE ADDRESS OF CSR REGISTER INTO CSR ADD.
264 : JSR PC,DLSET
265 :
266 :
267 :
268 :
269 :
270 :
271 :
272 :
273 016714 017701 163264 DLSET: MOV @PLOC,R1 ;SET UP CSR ADDRESS & BUFFER ADDRESSES.
274 016720 010137 007276 MOV R1,RCSR ;ADDRESS OF RECEIVER CSR REGISTER.
275
276 016724 062701 000002 ADD #2,R1 ;ADDRESS OF RECEIVER BUFFER REGISTER
277 016730 010137 007302 MOV R1,RBUF ;ADDRESS OF THE TRANSMITTER CSR REGISTER.
278 016734 062701 000002 ADD #2,R1 ;ADDRESS OF THE TRANSMITTER BUFFER REGISTER.
279 016740 010137 007300 MOV R1,XCSR
280 016744 062701 000002 ADD #2,R1
281 016750 010137 007304 MOV R1,XBUF
    
```

INITIALIZE SECTION

```

282
283 016754 005037 C10052 CLR MLTLIN ;INDICATE THAT THIS IS A SINGLE LINE INTERFACE.
284 016760 012737 000200 010044 MOV #BIT7,TRDYBT ;PLACEMENT OF XMIT READY BIT FOR SINGLE LINE
285 ;INTERFACES.
286 016766 012737 006440 007306 MOV #JUNKPL,LPR ;WHEN LPR IS STJFFED, CONTENTS GO TO JUNKPL
287 016774 012737 006440 007310 MOV #JUNKPL,TCR ;WHEN SENCHR STUFFS TCR, CONTENTS GO TO JUNKPL
288
289 017002 000207 RTS PC
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329
330 017004 017701 163174 DZSET: MOV @PLOC,R1 ;GET THE CSR ADDRESS TO SET UP INTERFACE REG'S
331 017010 010137 007276 MOV R1,RCSR ;ADDRESS OF RCSR AND THE XCSR WILL BE THE SAME
332 ; IN A DZ11. THE TRDYBT XMIT READY BIT
333 ; WILL CHANGE, HOWEVER.
334 017014 010137 007300 MOV R1,XCSR ;AND POINT TO THE NEXT REGISTER ADDRESS
335
336 017020 062701 000002 ADD #2,R1
337 017024 010137 007302 MOV R1,RBUF ;ADDRESS OF THE RECEIVER BUFFER
338 017030 010137 007306 MOV R1,LPR ;ADDRESS OF THE LINE PARAMETER REGISTER
    
```

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.....
:FUNCTIONAL DESCRIPTION
:
:LOCAL PROCEDURE DZSET:
:
:THIS ROUTINE WILL ACCEPT THE ADDRESS IN THE GLOBAL VARIABLE CSRADD
:AND THEN SET UP THE VARIOUS MULTILINE INTERFACE REGISTERS ASSOCIATED
:WITH THE DZ11 OPTION: CSR, RBUF, LPR, TCR, MSR (IGNORED), AND TDR.
:
:.....
:INPUTS
:
:CSRADD - ADDRESS ASSUMED AS THE CSR REGISTER.
:
:OUTPUTS
:
:NONE
:
:SUBORDINATE ROUTINES
:
:NONE
:
:FUNCTIONAL SIDE EFFECTS
:
:THE DZ11 INTERFACE ADDRESSES ARE SET UP IF THE CSR ADDRESS IS VALID.
:
:CALLING SEQUENCE
:
:THE CSR ADDRESS MUST BE IN CSRADD. THE CALL:
:JSR PC,DZSET
:
:.....
    
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## INITIALIZE SECTION

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339
340 017034 062701 000002      ADD    #2,R1
341 017040 010137 007310      MOV    R1,TCR                ;ADDRESS OF THE TRANSMIT CONTROL REGISTER
342
343 017044 062701 000002      ADD    #2,R1
344 017050 010137 007312      MOV    R1,TDR                ;ADDRESS OF THE TRANSMIT DATA REGISTER
345
346 017054 013737 007312 007304  MOV    TDR,XBUF              ;WHEN REFERENCING THE XBUF, YOU WILL WANT
347                                     ;THE TDR - TRANSMIT DATA REGISTER.
348
349 017062 012777 000040 170206  MOV    #BIT5,@RCSR           ;CLEARS INTERRUPT ENABLE BITS AND
350                                     ;SETS MASTER SCAN ENABLE.
351 017070 012737 100000 010044  MOV    #BIT15,TRDYBT        ;DEFINE TRANSMIT READY BIT FOR DZ11 CSR.
352
353 017076 012700 000004      MOV    #4,R0
354 017102 063700 002204      ADD    PLOC,R0               ;PTABLE ENTRY. ?DZ CHANNEL NUMBER?
355 017106 011002                MOV    (R0),R2               ;CHANNEL TO BE SET INTO TCR REGISTER
356 017110 006302                ASL    R2                    ;CHANGE THE RANGE FROM 0-7 TO 0-14
357                                     ;TO BE USED AS A TABLE OFFSET.
358 017112 016237 006444 006436  MOV    TCRTBL(R2),TCRENA     ;GET MASK FROM TABLE, PLACE IN TCR REG.
359                                     ;TO DETERMINE THE CHANNEL CHOSEN
360 017120 012700 000004      MOV    #4,R0                 ;PTABLE ENTRY #3
361 017124 063700 002204      ADD    PLOC,R0               ;PTABLE ENTRY ADDRESS FOR CHANNEL #.
362 017130 051037 006442      BIS    (R0),LPRINI           ;NEW LPR STATUS WITH CH # INCLUDED.
363 017134 013777 006442 170144  MOV    LPRINI,@LPR          ;SET UP LPR ON DZ INTERFACE
364
365 017142 000207                RTS    PC
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:FUNCTIONAL DESCRIPTION

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:      LOCAL PROCEDURE DFAULT:

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:      THIS CODE WILL COMPUTE THE CSR ADDRESS AND SET UP THE INTERFACE
:      REGISTER ADDRESSES. THE CSR ADDRESSES ARE CHECKED BY SENDING THE
:      PRINTER AN "ANSWER BACK" QUERY AND CHECKING FOR THE APPROPRIATE
:      RESPONSE FROM THE PRINTER.

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.....
:INPUTS

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:      NONE

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:OUTPUTS

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```

:      CSRADD  -ADDRESS OF THE CONTROL STATUS REGISTER
:      RBUF    -BUFFER ADDRESS
:      XCSR    -TRANSMITTER CSR
:      RCSR    -RECEIVER CSR
:      XBUF    -TRANSMITTER BUFFER ADDRESS

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## INITIALIZE SECTION

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414
415 C17144 013777 0C5252 163032 DFAULT: MOV DLDFLT,@PLOC ;ASSUME A SINGLE LINE INTERFACE
416
417 017152 004737 016714 JSR PC,DLSET ;SET UP THE REGISTER ADDRESSES
418
419 017156 023727 010056 000001 CMP NDATA,#1 ;WAS THERE AN ILLEGAL ADDRESSING ERROR?
420 017164 001462 BEQ DZDCOD ;IF SO, DL SETUP FAILED. TRY DZ SETUP.
421
422 017166 005037 006500 CLR ERWORD ;ASSUME THAT NO ERRORS HAVE BEEN FOUND - YET.
423
424 017172 012700 000144 EMP14: MOV #100.,R0 ;ASSUME NO MORE THAN 100 CHARACTERS IN BUFFER.
425 017176 005300 EMP4: DEC R0 ;COUNT DOWN ONE FOR EACH CHARACTER
426 017200 002407 BLT ABSND ;STOP TRYING TO EMPTY THE BUFFER. ASSUME HOPELESS.
427
428 017202 032777 000200 170066 BIT #BIT7,@RCSR ;IS THERE A CHARACTER IN THE RBUF?
429 017210 001403 BEQ ABSND ;IF NO CHARACTER IN RBUF, THEN CONTINUE...
430
431 017212 005777 170064 TST @RBUF ;EMPTY RBUF. IGNORE BUFFER CONTENTS.
432 017216 000767 BR EMP4 ;CHECK FOR RDONE AGAIN AND EMPTY BUFFER
433
434 017220 005037 006500 ABSND: CLR ERWORD ;ASSUME NO ERRORS
435 017224 005037 010056 CLR NDATA ;ASSUME NO UNIBUS ERRORS
436 017230 005037 006512 CLR FLTRDY ;ASSUME NO FAILURE TO FIND TRANSMIT RDY
437 017234 005037 002206 CLR GREASE ;ASSUME NO PREVIOUS ERRORS.
438
439 017240 012701 002210 MOV #STSRES,R1 ;SEND REQUEST STATUS SEQUENCE.
440 017244 012702 000002 MOV #2,R2 ;
441 017250 005003 CLR R3 ;
442 017252 004737 012632 JSR PC,XMIT ;SEND ANSWER-BACK SEQUENCE TO PRINTER.
443 017256 042737 100000 006500 BIC #BIT15,ERWORD ;IGNORE POSSIBLE EOT INDICATION.
444
445 017264 023727 010056 000001 CMP NDATA,#1 ;IF SET THEN TRY MULTILINE ADDRESS
446 017272 001417 BEQ DZDCOD ;IF NOT SET, DO THE DZ CHECK
447
448 017274 005004 CLR R4 ;BR4 SHOULD GET ESCAPE CHAR IF DL PRESENT.
449 017276 004737 014126 JSR PC,GETCHR ;THE DELAY SHOULD BE LONG ENOUGH TO PERMIT
450 ;THE PRINTER TO RESPOND.
451 ;NOW GET THE FIVE RESPONSE CHARACTERS
452 017302 120437 006521 CMPB R4,ESCAPE ;IS IT AN ESCAPE CHARACTER?

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## INITIALIZE SECTION

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453 017306 001011      BNE      DZDCOD      ;NO? THEN TRY DZ ADDRESS DEFAULT.
454 017310 004737 014126 JSR      PC,GETCHR   ;
455 017314 004737 014126 JSR      PC,GETCHR   ;
456 017320 004737 014126 JSR      PC,GETCHR   ;
457 017324 004737 014126 JSR      PC,GETCHR   ;THE FINAL CHARACTER SHOULD BE A 'C'
458 017330 000514      BR       DONEDF     ;YES? THEN SUCCESSFULLY COMPLETED.
459
460 017332 005037 006500      DZDCOD: CLR      ERWORD      ;ASSUME NO ERRORS
461 017336 005037 010056      CLR      NDATA       ;ASSUME NO UNIBUS ERRORS
462 017342 005037 006512      CLR      FLTRDY      ;ASSUME NO FAILURE TO FIND TRANSMIT RDY
463 017346 005037 002206      CLR      GREASE      ;ASSUME NO PREVIOUS ERRORS.
464
465 017352 013777 005254 162624 MOV      DZDFLT,@PLOC ;ASSUME A DZ INTERFACE AT ADDRESS 776010
466 017360 004737 017004      JSR      PC,DZSET    ;SET UP REGISTERS FOR A DZ11 INTERFACE
467
468 017364 023727 010056 000001 CMP      NDATA,#1    ;HAS AN ILLEGAL ADDRESS ERROR OCCURRED?
469 017372 001462      BEQ      FAILDF     ;IF SO, BOTH DL AND DZ DEAFUALTS HAVE FAILED.
470
471
472 017374 005003      CLR      R3         ;DISABLE BIDIRECTIONAL PRINTING LOGIC
473 017376 005037 006500      CLR      ERWORD     ;ASSUME NO ERRORS HAVE YET OCCURRED.
474
475 017402 012700 000144      EMPT15: MOV     #100.,R0 ;ASSUME NO MORE THAN 100 CHARACTERS IN BUFFER.
476 017406 005300      EMP5:  DEC     R0     ;COUNT DOWN ONE FOR EACH CHARACTER
477 017410 002407      BLT     ABS5       ;STOP TRYING TO EMPTY THE BUFFER. ASSUME HOPELESS.
478
479 017412 032777 000200 167656 BIT      #BIT7,@RCSR ;IS THERE A CHARACTER IN THE RBUF?
480 017420 001403      BEQ      ABS5      ;IF NO CHARACTER IN RBUF, THEN CONTINUE...
481
482 017422 005777 167654      TST     @RBUF      ;EMPTY RBUF. IGNORE BUFFER CONTENTS.
483 017426 000767      BR       EMP5      ;CHECK FOR RDONE AGAIN AND EMPTY BUFFER
484
485 017430 005037 006500      ABS5:  CLR      ERWORD      ;ASSUME NO ERRORS
486 017434 005037 010056      CLR      NDATA       ;ASSUME NO UNIBUS ERRORS
487 017440 005037 006512      CLR      FLTRDY      ;ASSUME NO FAILURE TO FIND TRANSMIT RDY
488 017444 005037 002206      CLR      GREASE      ;ASSUME NO PREVIOUS ERRORS.
489
490 017450 012701 002210      MOV     #STSRES,R1  ;SEND REQ STATUS SEQUENCE.
491 017454 012702 000002      MOV     #2,R2      ;
492 017460 005003      CLR     R3         ;
493 017462 004737 012632      JSR     PC,XMIT     ;SEND REQ STATUS SEQUENCE TO PRINTER.
494 017466 042737 100000 006500 BIC     #BIT15,ERWORD ;IGNORE POSSIBLE EOT INDICATION.
495
496 017474 023727 010056 000001 CMP      NDATA,#1    ;CHECK FOR OCCURRANCE OF TRAP...
497 017502 001416      BEQ      FAILDF     ;IF SET THEN PRINT AN ERROR AND START OVER
498
499 017504 004737 014126      JSR     PC,GETCHR   ;DELAY SHOULD GIVE PRINTEWR ENOUGH TIME TO
500
501
502
503 017510 120437 006521      CMPS   R4,ESCAPE   ;GET THE FIVE CHARACTER RESPONSE TO THE QUERY
504 017514 001011      BNE     FAILDF     ;EXPECTING ESCAPE CHARACTER IF DZ PRESENT.
505 017516 004737 014126      JSR     PC,GETCHR   ;DEFAULT ADDRESSES DIDN'T WORK OUT.
506 017522 004737 014126      JSR     PC,GETCHR   ;
507 017526 004737 014126      JSR     PC,GETCHR   ;
508 017532 004737 014126      JSR     PC,GETCHR   ;LAST CHARACTER A 'C'(LOWER CASE)
509 017536 000411      BR      DONEDF     ;FOUND THE ADDRESS. EXIT.

```

## INITIALIZE SECTION

```

510
511 017540          FAILDF: PRINTF  #FAILM          ;PRINT FAILURE MESSAGE AT CONSOLE
    017540 012746 011622          MOV          #FAILM,-(SP)
    017544 012746 000001          MOV          #1,-(SP)
    017550 010600          MOV          SP,R0
    017552 104417          TRAP        C$PRINTF
    017554 062706 000004          ADD          #4,SP
512 017560          DOCLN          ;EXIT TESTING SEQUENCE
    017560 104444          TRAP        C$DCLN
513
514 017562 000207          DONELF: RTS          PC
515
516
517
518          .EVEN
519
520
521
522
523 C17564          ENDINIT
    017564          L10004:
    017564 104411          TRAP        C$INIT
524
525          .SBTTL AUTODROP SECTION
526
527 017566          BGNAUTO
    017566          L$AUTO::
528
529 017566          ENDAUTO
    017566          L10006:
    017566 104461          TRAP        C$AUTO
530
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535          .SBTTL CLEANUP CODING SECTION
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```

CLEANUP CODING SECTION

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

```

      BGNCLN
      L$CLEAN::
9 017570 012701 002214      MOV      #DUMMYS,R1      ;FIX INTERFACE TO ACCEPT PRINTER RESET.
10 017574 012702 000010     MOV      #8.,R2         ;
11 017600 005003             CLR      R3              ;
12 017602 004737 012632     JSR      PC,XMIT        ;SEND DUMMY SEQUENCE
13
14 017606 012701 002224     MOV      #RESET,R1      ;TRANSMIT PRINTER RESET SEQUENCE (ADDRESS)
15 017612 012702 000002     MOV      #2,R2          ;2 ARGUMENT LIST
16 017616 005003             CLR      R3              ;NO BIDIRECTIONAL PRINTING NECESSARY
17 017620 004737 012632     JSR      PC,XMIT        ;SEND SEQUENCE TO PRINTER
18
19 017624             EXIT      CLN
      TRAP      C$EXIT
      .WORD     L10007-.
20
21
22      .EVEN
23
24 017630             ENDCLN
      L10007:
      TRAP      C$CLEAN
25
26
27      .EVEN
28
29
30      .TITLE  HARDWARE TESTS
31      .SBTTL  TEST 1: PRINTER SELF TEST

```

TEST 1: PRINTER SELF TEST

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017632  
017632

BGNTST

T1::

```

.....!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
TEST #1

THIS TEST WILL INITIATE THE PRINTER SELF-TEST. AFTER THE SELF-TEST
IS COMPLETE, THE PRINTER SENDS THE PRINTER STATUS AND AN XON CHARACTER
IF EVERYTHING HAS OPERATED PROPERLY. THE PRINTER STATUS IS THEN
EXAMINED AND APPROPRIATE ERROR REPORTING IS INITIATED.
.....

```

017632 004737 014412

017636  
017636 104421  
017640 010037 005260

017644 032737 000010 005260

017652 001010

017654  
017654 012746 002333  
017660 012746 000001  
017664 010600  
017666 104414  
017670 062706 000004

017674 012701 002255

017700 012702 000002

017704 005003

017706 004737 012632

017712 023727 002206 177777

017720 001402

017722 004737 015132

017726 004737 015360

017732 004737 014126

017736 123704 006520

017742 001406

017744 052737 020000 006500

017752 052737 100000 006500

017760 004737 015360

017764  
017764  
017764 104401

```

TEST1: JSR    PC,INITCD      ;INITIALIZE FOR THIS TEST
        RFLAGS  FLAGS      ;READ THE START TIME SUPERVISOR FLAGS
                                TRAP    CSRFLA
                                MOV     RO,FLAGS
        BIT     #LOT,FLAGS   ;WAS LOOP ON TEST ASKED FOR?
        BNE    T1LOT        ;IF LOT THEN DON'T PRINT TEST TITLE.
                                -----
        PRINTB #TITLE1      ;CONSOLE TEST TITLE
                                MOV     #TITLE1,(SP)
                                MOV     #1,-(SP)
                                MOV     SP,RO
                                TRAP   (SPNTB
                                ADD     #4,SP

T1LOT:  MOV     #SLFTST,R1   ;ADDRESS OF SELT TEST ARGUMENT SEQUENCE
        MOV     #2,R2      ;2 CHARACTERS IN SEQUENCE
        CLR    R3          ;DISABLE BIDIRECTIONAL PRINTING
        JSR    PC,XMIT     ;SEND THE ARGUMENT LIST

        CMP     GREASE,#-1  ;WAS THERE A 'GREASED' EXIT FROM XMIT?
        BEQ    PRNTIT      ;IF SO, PREPARE TO PRINT TO CONSOLE
                                ; THE ERRORS FOUND DURING XMIT ATTEMPT.
                                ;RECEIVE STATUS AND FIT TO ERWORD.
        JSR    PC,STATS    ;RECEIVE STATUS AND FIT TO ERWORD.
        JSR    PC,ERRORS   ;DECODE ERROR WORD & PRINT ERROR MESSAGES

CHK6:   JSR    PC,GETCHR   ;GET ANOTHER (SIXTH) CHARACTER
        CMPB   XON,R4      ;IS IT AN 'XON'?
        BEQ    STSCAL      ;IF OK, (XON FOUND) THEN CHECK STATUS
        BIS    #BIT13,ERWORD ;SET ECNRB
        BIS    #BIT15,ERWORD ;INDICATE ERROR

STSCAL: JSR    PC,ERRORS   ;CHECK FOR ERRORS

        ENDTST

        .10010: TRAP    'SETST

```

TEST 1: PRINTER SELF TEST

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.SBTTL TEST 2: UNDERLINE / NO-UNDERLINE MODE TEST

TEST 2: UNDERLINE / NO-UNDERLINE MODE TEST

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4 017766          BGNTST
5 017766          T2::
6 .....
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17
18 017766 004737 014412 TEST2: JSR    PC,INITCD      ;INITIALIZE TEST
19
20 017772          RFLAGS  FLAGS      ;READ START TIME SUPERVISOR FLAGS
   017772 104421          TRAP    C$RFLA
   017774 010037 005260          MOV    RO,FLAGS
21 020000 032737 000010 005260 BIT    #LOT,FLAGS      ;WAS THE LOOP ON TEST FLAG SET?
22 020006 001027          BNE    T2LOT          ;SKIP PRINT OF TEST TITLE IF 'LOT'.
23
24 020010          PRINTB #TITLE2      ;CONSOLE PRINT TITLE
   020010 012746 002366          MOV    #TITLE2,-(SP)
   020014 012746 000001          MOV    #1,-(SP)
   020020 010600          MOV    SP,RO
   020022 104414          TRAP    C$PNTB
   020024 062706 000004          ADD    #4,SP
25
26 020030 052737 040000 006500 BIS    #BIT14,ERWORD    ;INHIBIT ERROR HANG-UPS
27 020036 012701 002366          MOV    #TITLE2,R1      ;ADDRESS OF STRING TO PRINT (TITLE)
28 020042 062701 000004          ADD    #4,R1          ;SKIP FIRST FOUR CHARACTERS
29 020046 012702 000053          MOV    #43.,R2        ;43 CHARACTERS TO PRINT IN STRING
30 020052 005003          CLR    R3            ;DISABLE BIDIRECTIONAL
31 020054 004737 012632          JSR    PC,XMIT        ;SEND THE ARGUMENT SEQUENCE
32 020060 042737 040000 006500 BIC    #BIT14,ERWORD    ;RE-ENABLE ERROR HANG-UPS
33
34 020066 012704 177777          T2LOT: MOV   #-1,R4      ;CHARACTER COUNT
35 020072 012701 006531          PLOOP: MOV   #SCA,R1    ; ADDRESS OF ASCII 'A'
36 020076 012702 000001          MOV   #1,R2          ;ONE CHARACTER
37 020102 005003          CLR   R3            ;NO BIDIRECTIONAL PRINTING
38 020104 004737 012632          JSR   PC,XMIT        ;SEND 'A' TO PRINTER FOR PRINTING.
39 020110 004737 015360          JSR   PC,ERRORS      ;CHECK FOR ERRORS
40
41 020114 012700 000001          MOV   #1,RO
42 020120 126027 002266 000041 CMPB  STULMD(RO),#ONE    ;IS THE UNDERLINE MODE SET?
43 020126 001004          BNE  SETONE         ;NO, THEN CHANGE TO UNDERLINE MODE
44 020130 112760 000040 002266 MOVB  #ZERO,STULMD(RO) ;YES, THEN CHANGE TO NON-UNDERLINE MODE
45 020136 000405          BR   NEWMOD         ;TRANSMIT MODE CHANGE AT NEWMOD
46 020140 012700 000001          SETONE: MOV  #1,RO
47 020144 112760 000041 002266 MOVB  #ONE,STULMD(RO) ;CHANGE TO UNDERLINE MODE
48
49 020152 012701 002266          NEWMOD: MOV  #STULMD,R1 ;ADDRESS OF ARGUMENT STRING

```



TEST 2: UNDERLINE / NO-UNDERLINE MODE TEST

50 020156 012702 000003  
 51 020162 004737 012632  
 52 020166 004737 015360  
 53  
 54 020172 005204  
 55 020174 020437 010042  
 56 020200 001334  
 57  
 58 020202 012701 002313  
 59 020206 012702 000002  
 60 020212 004737 012632  
 61 020216 004737 015360

MOV #3,R2 ;WHICH IS THREE CHARACTERS LOONG  
 JSR PC,XMIT ;SEND THE SEQUENCE  
 JSR PC,ERRORS ;CHECK FOR ERRORS  
 INC ~~R4~~ ;UPDATE COUNT OF CHARACTERS.  
 CMP R4,LINSIZ ;PRINTED A LINE YET?  
 BNE PLOOP ;DO LOOP UNTIL DONE  
 MOV #CR,R1 ;ADDRESS OF <CRLF>  
 MOV #2,R2 ;BOTH CHARACTERS  
 JSR PC,XMIT ;PRINT (ACCUMULATE) <CR><LF>  
 JSR PC,ERRORS ;CHECK FOR ERRORS.

62  
 63 020222  
 020222  
 020222 104401

ENDTST

L10011: TRAP CSETST

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.SBTTL TEST 3: HAMMER HIT COUNT TEST

TEST 3: HAMMER HIT COUNT TEST

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BGNTST

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TEST #3
HAMMER HIT COUNT TEST

FOUR LINES ARE TRANSMITTED TO THE PRINTER. THE HIT COUNT
RANGES FROM 0 TO 3 HITS PER CHARACTER TRANSMITTED. ONE BLANK
LINE AND THREE NON-BLANK LINES OF INCREASING DARKNESS SHOULD
BE EVIDENT ON THE PRINT PATTERN.
.....

```

```

27 020224 004737 014412 TEST3: JSR PC,INITCD ;INITIALIZE TEST
28
29 020230 RFLAGS FLAGS ;READ START TIME SUPERVISOR FLAGS
020230 104421 TRAP CSRFLA
020232 010037 005260 MOV RO,FLAGS
30 020236 032737 000010 005260 BIT #LOT,FLAGS ;WAS THE LOOP ON TEST FLAG SET?
31 020244 001027 BNE T3LOT ;SKIP PRINT OF TEST TITL IF 'LOT'.
32
33 020246 PRINTB #TITLE3 ;CONSOLE PRINT TEST TITLE
020246 012746 002446 MOV #TITLE3,-(SP)
020252 012746 000001 MOV #1,-(SP)
020256 010600 MOV SP,RO
020260 104414 TRAP CSNTB
020262 062706 000004 ADD #4,SP

34
35 020266 052737 040000 006500 BIS #BIT14,ERWORD ;DISABLE ERROR HANGUPS
36 020274 012701 002446 MOV #TITLE3,R1 ;TITLE ADDRESS
37 020300 062701 000004 ADD #4,R1 ;SKIPPING THE FIRST FOUR TWO CHARACTERS.
38 020304 012702 000040 MOV #32.,R2 ;32 CHARACTERS LONG
39 020310 005003 CLR R3 ;NO BIDIRECTIONAL PRINTING
40 020312 004737 012632 JSR PC,XMIT ;PRINT TEST TITLE
41 020316 042737 040000 006500 BIC #BIT14,ERWORD ;RE-ENABLE ERROR HANG-UPS
42
43 020324 113737 006533 006522 T3LOT: MOVB SC1,SNGCHR ; THE CHARACTER '1' TO BE PRINTED
44 020332 112737 000040 010060 MOVB #ZERO,HITARG ;HIT COUNT ARGUMENT
45 020340 012700 000001 LINLOO: MOV #1,RO
46 020344 113760 010060 002257 MOVB HITARG,STHTCT(RO) ;INSERT IN ARGUMENT TEMPLATE
47 020352 005237 010060 INC HITARG ;NEW ARGUMENT FOR HITARG
48 020356 012701 002257 MOV #STHTCT,R1 ;ADDRESS OF ARGUMENT LIST
49 020362 012702 000003 MOV #3,R2 ;3 CHARACTER ARGUMENT LIST

```

TEST 3: HAMMER HIT COUNT TEST

50	020366	005003		CLR	R3		;DISABLE BIDIRECTIONAL PRINTING FOR NOW.
51	020370	004737	012632	JSR	PC,XMIT		;SEND THE LIST - ADJUST HIT COUNT
52	020374	004737	015360	JSR	PC,ERRORS		;CHECK FOR ERRORS.
53							
54	020400	005004		CLR	R4		;COUNT OF CHARACTERS
55	020402	012701	006522	CHRLOO: MOV	#SNGCHR,R1		;ADDRESS OF CHAR TO BE PRINTED
56	020406	012702	000001	MOV	#1,R2		;SINGLE CHARACTER
57	020412	012703	177777	MOV	#-1,R3		;ENABLE BIDIRECTIONAL PRINTING.
58	020416	004737	012632	JSR	PC,XMIT		;SEND THE CHARACTER
59	020422	004737	015360	JSR	PC,ERRORS		;CHECK FOR ERRORS.
60							
61	020426	005204		INC	R4		;UPDATE NUMBER OF CHARACTERS PRINTED THUS FAR.
62	020430	020437	010042	CMP	R4,LINSIZ		;SENT A LINES WORTH YET?
63	020434	001362		BNE	CHRLOO		;NO, CONTINUE SENDING.
64							
65	020436	005237	006522	INC	SNGCHR		;INCREASE ASCII PATTERN TO NEXT CHARACTER
66	020442	123727	010060	CMPB	HITARG,#THREE		;PRINTED THE HIT COUNT = 3 LINE YET?
67	020450	001333		BNE	LINLOO		;REPEAT PRINTING LINES UNTIL HIT COUNT - 3
68							
69	020452	012700	000001	MOV	#1,R0		
70	020456	112760	000040	MOVB	#ZERO,STHTCT(R0)		;REVERT BACK TO HIT COUNT OF 1
71	020464	012701	002257	MOV	#STHTCT,R1		
72	020470	012702	000003	MOV	#3,R2		
73	020474	005003		CLR	R3		;DISABLE BIDIRECTIONAL PRINTING
74	020476	004737	012632	JSR	PC,XMIT		;SEND PRINTER ARGUMENT LIST FOR HIT COUNT-1
75	020502	004737	015360	JSR	PC,ERRORS		;CHECK FOR ERRORS
76							
77	020506			ENDTST			
	020506						
	020506	104401					L10012: TRAP C\$ETST
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.SBTTL TEST 4: CARRIAGE POSITIONING TEST

TEST 4: CARRIAGE POSITIONING TEST

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020510

BGNTST

T4::

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.....
TEST #4
CARRIAGE POSITIONING TEST

IN THIS TEST THE PRINTER CARRIAGE WILL BE EXERCISED BY MOVING
THE CARRIAGE BACK AND FORTH INCREASING AMOUNTS FROM THE MINIMUM
HORIZONTAL INCREMENT OF MOVEMENT TO THE MAXIMUM (PAGE SIZE) HORIZONTAL
INCREMENT OF MOVEMENT. IN THE PROCESS, ANY ERRORS DETECTED BY THE
PRINTER WILL BE IDENTIFIED AND REPORTED.
.....

```

020510 004737 014412  
020514  
020514 104421  
020516 010037 005260  
020522 032737 000010 005260  
020530 001027  
020532  
020532 012746 002513  
020536 012746 000001  
020542 010600  
020544 104414  
020546 062706 000004  
020552 052737 040000 006500  
020560 012701 002513  
020564 062701 000004  
020570 012702 000044  
020574 005003  
020576 004737 012632  
020602 042737 040000 006500  
020610 012701 006530  
020614 012702 000001  
020620 004737 012632  
020624 004737 015360  
020630 012701 002313  
020634 012702 000002  
020640 004737 012632  
020644 004737 015360

```

TEST4: JSR    PC,INITCD      ;INITIALIZE TEST
        RFLAGS  FLAGS        ;READ START TIME SUPERVISOR FLAGS
                                TRAP    ($RFLA
                                MOV     RO,FLAGS
        BIT     #LOT,FLAGS    ;WAS THE LOOP ON TEST FLAG SET?
        BNE    T4LOT         ;SKIP PRINT OF TEST TITLE IF 'LOT'.
                                TRAP    ($PNTB
                                ADD     #4,SP
        PRINTB #TITLE4        ;CONSOLE PRINT THE TEST TITLE
                                MOV     #TITLE4,-(SP)
                                MOV     #1,-(SP)
                                MOV     SP,RO
                                TRAP    ($PNTB
                                ADD     #4,SP
        BIS    #BIT14,ERWORD   ;INHIBIT ERROR HANG-UPS
        MOV    #TITLE4,R1      ;ADDRESS OF TITLE #4 TO BE PRINTED
        ADD   #4,R1            ;SKIP FIRST FOUR CHARACTERS
        MOV   #36,R2           ;36 CHARACTERS IN THE TITLE
        CLR   R3               ;DISABLE BIDIRECTIONAL PRINTING
        JSR   PC,XMIT          ;TRANSMIT THE STRING TO THE PRINTER
        BIC   #BIT14,ERWORD    ;RE-ENABLE ERROR HANG-UPS
T4LOT:  MOV   #SCX,R1          ;ADDRESS OF THE SINGLE CHARACTER 'X'.
        MOV   #1,R2            ;SINGLE CHARACTER TO BE PRINTED
        JSR   PC,XMIT          ;PRINT THE CHARACTER 'A'.
        JSR   PC,ERRORS        ;CHECK FOR ERRORS.
        MOV   #CR,R1           ;ADDRESS OF CARRIAGE RETURN ASCII
        MOV   #2,R2            ;TWO CHARACTERS INCLUDE <CR> & <LF>.
        JSR   PC,XMIT          ;SEND <CR><LF> TO PRINTER
        JSR   PC,ERRORS        ;CHECK FOR ERRORS

```

## TEST 4: CARRIAGE POSITIONING TEST

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50
51 020650 012737 000001 010036      MOV      #1,SPCSIZ      ;INITIALIZE THE SPACE SIZE TO ITS SMALLEST
52
53 020656 013701 010036      L1LOOP: MOV      SPCSIZ,R1      ;R1 HAS SPACE SIZE FOR THE CONVERSION ROUTINE
54 020662 162701 000014      SUB      #12.,R1      ;TAKE AWAY THE 12 HORIZONTAL INCREMENTS
55                                ; PRODUCED BY THE PRINT OF THE CHARACTER.
56 020666 004737 014314      JSR      PC,CONVRT      ;CONVERT R1 TO THREE ASCII MNEMONICS (BYTES)
57 020672 012700 000001      MOV      #1,R0
58 020676 113760 010046 002233    MOVVB   MNEB1,HRZTLS(R0)      ;FIRST BYTE FROM CONVERT ROUTINE
59 020704 005200      INC      R0
60 020706 113760 010047 002233    MOVVB   MNEB2,HRZTLS(R0)      ;SECOND BYTE
61 020714 005200      INC      R0
62 020716 113760 010050 002233    MOVVB   MNEB3,HRZTLS(R0)      ;THIRD BYTE
63
64 020724 012701 006530      MOV      #SCX,R1      ;ADDRESS OF THE CHARACTER 'X'.
65 020730 012702 000001      MOV      #1,R2      ;LENGTH OF STRING TO BE SENT - 1.
66 020734 004737 012632      JSR      PC,XMIT      ;SEND 'X' TO THE PRINTER
67 020740 004737 015360      JSR      PC,ERRORS     ;CHECK FOR ERRORS
68
69
70 020744 012701 002233      MOV      #HRZTLS,R1    ;ADDRESS OF TAB SEQUENCE JUST COMPUTED.
71 020750 012702 000005      MOV      #5,R2      ;THERE ARE 5 CHARACTERS IN THE SEQUENCE
72 020754 004737 012632      JSR      PC,XMIT      ;SEND THE LIST TO THE PRINTER
73 020760 004737 015360      JSR      PC,ERRORS     ;CHECK FOR ERRORS
74
75 020764 012701 006530      MOV      #SCX,R1      ;ADDRESS OF 'X'
76 020770 012702 000001      MOV      #1,R2      ;SINGLE CHARACTER
77 020774 004737 012632      JSR      PC,XMIT      ;PRINT 'X'
78 021000 004737 015360      JSR      PC,ERRORS     ;CHECK FOR ERRORS
79
80 021004 012701 002313      MOV      #CR,R1      ;ADDRESS OF <CR><LF>
81 021010 012702 000002      MOV      #2,R2      ;TWO CHARACTERS TO BE SENT TO PRINTER
82 021014 004737 012632      JSR      PC,XMIT      ;PRINT THE <CR><LF>
83 021020 004737 015360      JSR      PC,ERRORS     ;CHECK FOR ERRORS
84
85 021024 006337 010036      ASL      SPCSIZ      ;DOUBLE THE SPACE SIZE
86 021030 023737 010036 010040    CMP      SPCSIZ,LINN    ;IS THE SPACE SIZE LARGER THAN THE MAXIMUM?
87 021036 100707      BMI      L1LOOP      ;IF NOT THAN PRINTING MORE IS OK.
88
89 021040      ENDTST
021040
021040 104401      L10013: TRAP      C$ETST
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94      :
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101      .SBTTL TEST 5: PAPER POSITIONING TEST
102

```

TEST 5: PAPER POSITIONING TEST

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021042

BGNTST

T5::

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!!!!!!
TEST #5
PAPER POSITIONING TEST

IN THIS TEST THE VERTICAL PAGE MOVEMENT CAPABILITIES OF THE PRINTER
ARE EXERCISED. A LINE OF DASHES WILL BE PRINTED BETWEEN EACH VERTICAL
CARRIAGE MOVEMENT SO THAT THE PATTERN CAN BE DETECTED BY THE USER.
IN EACH LOOP THROUGH THE PRINTING CYCLE OF THIS TEST, THE VERTICAL
INCREMENT OF MOVEMENT WILL BE DOUBLED. THE LINES OF DASHES WILL THUS
BECOME TWICE AS FAR APART AS EACH PASS THROUGH THE PRINTING CYCLE IS
COMPLETED.

```

```

30 021042 004737 014412 TEST5: JSR PC,INITCD ;INITIALIZATION CODE
31
32 021046 RFLAGS FLAGS ;READ START TIME SUPERVISOR FLAGS
021046 104421 TRAP C$RFLA
021050 010037 005260 MOV RO,FLAGS
33 021054 032737 000010 005260 BIT #LOT,FLAGS ;WAS THE LOOP ON TEST FLAG SET?
34 021062 001027 BNE T5LOT ;SKIP PRINT OF TEST TITLE IF 'LOT'.
35
36 021064 PRINTB #TITLES5 ;CONSOLE PRINT OF THE TEST TITLE.
021064 012746 002564 MOV #TITLES5,-(SP)
021070 012746 000001 MOV #1,-(SP)
021074 010600 MOV SP,RO
021076 104414 TRAP C$PNTB
021100 062706 000004 ADD #4,SP
37
38 021104 052737 040000 006500 BIS #BIT14,ERWORD ;DISABLE ERROR HANG-UPS
39 021112 012701 002564 MOV #TITLES5,R1 ;ADDRESS OF THE TITLE TO BE PRINTED
40 021116 062701 000004 ADD #4,R1 ;SKIP FIRST FOUR CHARACTERS.
41 021122 012702 000054 MOV #44.,R2 ;43 CHARACTERS IN THE TITLE
42 021126 005003 CLR R3 ;DISABLE BIDIRECTIONAL PRINTING
43 021130 004737 012632 JSR PC,XMIT ;SEND THE TITLE SEQUENCE TO THE PRINTER.
44 021134 042737 040000 006500 BIC #BIT14,ERWORD ;RE-ENABLE THE ERROR HANG-UPS.
45
46 021142 012737 000001 010062 T5LOT: MOV #1,LINCNT ;LINEFEED SIZE IN 1/48 INCH INCREMENTS.
47
48 021150 013701 010062 AGN: MOV LINCNT,R1 ;A NUMBER FOR CONVERSION TO ASCII MNEMONICS
49 021154 004737 014314 JSR PC,CONVRT ;CONVERT NUMBER IN R1 TO THREE MNEMONIC BYTES

```

TEST 5: PAPER POSITIONING TEST

50	021160	012700	000001		MOV	#1,R0	
51	021164	113760	010046	002226	MOVB	MNEB1,VRTCLS(R0)	;TRANSFER MNEMONICS INTO ARGUMENT
52	021172	005200			INC	R0	
53	021174	113760	010047	002226	MOVB	MNEB2,VRTCLS(R0)	; LIST SLOTS IN THE
54	021202	005200			INC	R0	
55	021204	113760	010050	002226	MOVB	MNEB3,VRTCLS(R0)	; ESCAPE SEQUENCE.
56							
57	021212	012701	002226		MOV	#VRTCLS,R1	;ADDRESS OF VERTICAL SPACING ARGUMENTS
58	021216	012702	000005		MOV	#5,R2	;THERE ARE 5 CHARACTERS : ESC N N N 9
59	021222	004737	012632		JSR	PC,XMIT	;SEND TO PRINTER.
60							
61	021226	012701	006542		MOV	#DASHES,R1	;ADDRESS OF THE DASHES
62	021232	012702	000013		MOV	#11,R2	;TEN DASHES & LF
63	021236	004737	012632		JSR	PC,XMIT	;SEND TO PRINTER
64	021242	004737	015360		JSR	PC,ERRORS	;CHECK FOR ERRORS
65							
66	021246	006337	010062		ASL	LINCNT	;DOUBLE LINEFEED SIZE
67	021252	023727	010062	002000	CMP	LINCNT,#MXLF	;TOO LARGE A LINEFEED YET?
68	021260	100733			BMI	AGN	;IF NOT REPEAT PRINT SEQUENCE. ELSE- EXIT TEST.
69							
70	021262				ENDTST		
	021262						
	021262	104401					
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L10014: TRAP C\$ETST

.SBTTL TEST 6: PRINT ONE LINE OF EACH CHARACTER

TEST 6: PRINT ONE LINE OF EACH CHARACTER

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TEST #6
PRINT ONE LINE OF EACH CHARACTER

IN THIS TEST ONE LINE OF EACH CHARACTER WILL BE PRINTED FOR THE
ENTIRE PRESET PAGE WIDTH. PRINTER DETECTED ERRORS WILL BE DETECTED
CLASSIFIED.
.....
    
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```

25 021264 004737 014412 TEST6: JSR PC,INITCD ;INITIALIZATION FOR TEST
26
27 021270 RFLAGS FLAGS ;READ START TIME SUPERVISOR FLAGS
021270 104421 TRAP CSRFLA
021272 010037 005260 MOV RO,FLAGS
28 021276 032737 000010 005260 BIT #LOT,FLAGS ;WAS THE LOOP ON TEST FLAG SET?
29 021304 001027 BNE T6LOT ;SKIP PRINT OF TEST TITLE IF 'LOT'.
30
31 021306 PRINTB #TITLE6 ;CONSOLE PRINT OF THE TEST TITLE.
021306 012746 002645 MOV #TITLE6,-(SP)
021312 012746 000001 MOV #1,-(SP)
021316 010600 MOV SP,RO
021320 104414 TRAP C$PNTB
021322 062706 000004 ADD #4,SP
32
33 021326 052737 040000 006500 BIS #BIT14,ERWORD ;DISABLE ERROR HANG-UPS
34 021334 012701 002645 MOV #TITLE6,R1 ;ADDRESS OF THE TITLE
35 021340 062701 000004 ADD #4,R1 ;SKIP FIRST FOUR CHARACTERS
36 021344 012702 000053 MOV #43,R2 ;43 CHARACTERS IN THE TITLE
37 021350 005003 CLR R3 ;DISABLE BIDIRECTIONAL PRINTING FOR THE MCMENT
38 021352 004737 012632 JSR PC,XMIT ;PRINT THE TITLE
39 021356 042737 040000 006500 BIC #BIT14,ERWORD ;ENABLE DESIRED ERROR HANG-UPS.
40
41 021364 012703 177777 T6LOT: MOV #-1,R3 ;ENABLE BIDIRECTIONAL PRINTING
42 021370 005004 CLR R4 ;NO LINES YET PRINTED
43 021372 005037 010064 LINL06: CLR CHRCNT ;NO CHARACTERS YET PRINTED
44
45 021376 010401 CHRL06: MOV R4,R1 ;GET OFFSET
46 021400 062701 006555 ADD #CHRLST,R1 ;POINT TO DESIRED CHARACTER IN CHAR LIST.
47 021404 012702 000001 MOV #1,R2 ;JUST THE ONE CHARACTER TO PRINT
48 021410 004737 012632 JSR PC,XMIT ;SEND THE CHARACTER
49 021414 004737 015360 JSR PC,ERRORS ;CHECK FOR ERRORS
    
```



TEST 6: PRINT ONE LINE OF EACH CHARACTER

```

50
51 021420 005237 C10064      INC   CHR CNT      ;KEEP TRACK OF THE CHARACTERS PRINTED
52 021424 023737 010064 010042  CMP   CHR CNT,LINSIZ ;HAS A FULL LINE BEEN PRINTED YET?
53 021432 100761          BMI   CHR L06      ;IF NOT THEN PRINT UNTIL TRUE.
54
55 021434 005204          INC   R4           ;KEEP TRACK OF THE LINES PRINTED
56 021436 020427 000136  CMP   R4,#94.     ;96 LINES PRINTED? (ALL CHARACTERS?)
57 021442 100753          BMI   LIN L06     ;IF NOT YET, MORE LINES TO PRINT.
58
59 021444          ENDTST
   021444
   021444 104401          L10015: TRAP C$ETST
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73
74      .SBTTL TEST 7: PRINT A SWIRL PATTERN

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TEST 7: PRINT A SWIRL PATTERN

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:
: TEST #7
:
: PRINT A SWIRL PATTERN
:
: IN THIS TEST, A SWIRL PATTERN IS PRINTED BY SENDING THE SEQUENCE
: OF CHARACTERS IN THE CHARACTER LIST AND INCREMENTING THE STARTING
: POINT IN THAT LIST SO THAT THE SEQUENCE STARTS AT A DIFFERENT
: CHARACTER EVERY LINE.
:
:.....

```

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21 021446 004737 014412 TEST7: JSR PC,INITCD ;INITIALIZE THE TEST
22
23 021452 RFLAGS FLAGS ;READ START TIME SUPERVISOR FLAGS
021452 104421 TRAP C$RFLA
021454 010037 005260 MOV RO,FLAGS
24 021460 032737 000010 005260 BIT #LOT,FLAGS ;WAS THE LOOP ON TEST FLAG SET?
25 021466 001027 BNE T7LOT ;SKIP PRINT OF TEST TITLE IF 'LOT'.
26
27 021470 PRINTB #TITLE7 ;CONSOLL PRINT THE TITLE
021470 012746 002725 MOV #TITLE7,-(SP)
021474 012746 000001 MOV #1,-(SP)
021500 010600 MOV SP,RO
021502 104414 TRAP C$PNTB
021504 062706 000004 ADD #4,SP
28
29 021510 052737 040000 006500 BIS #BIT14,ERWORD ;INHIBIT ERROR HANG-UPS
30 021516 012701 002725 MOV #TITLE7,R1 ;ADDRESS OF THE TITLE TO BE PRINTED
31 021522 062701 000004 ADD #4,R1 ;SKIP 1ST 4 CHARACTERS.
32 021526 012702 000040 MOV #32.,R2 ;32 CHARACTERS INVOLVED
33 021532 005003 CLR R3 ;DISABLE BIDIRECTIONAL PRINTING FOR NOW.
34 021534 004737 012632 JSR PC,XMIT ;SEND TO PRINTER
35 021540 042737 040000 006500 BIC #BIT14,ERWORD ;ENABLE ERROR HANG-UPS
36
37 021546 012703 177777 T7LOT: MOV #-1,R3 ;ENABLE BIDIRECTIONAL PRINTING
38 021552 005004 CLR R4 ;NO LINES ARE PRINTED YET
39
40 021554 010401 NXTLIN: MOV R4,R1 ;OFFSET
41 021556 062701 006555 ADD #CHRLST,R1 ;ADDRESS OF CHARACTER TO BE PRINTED.
42 021562 013702 010042 MOV LINSIZ,R2 ;LENGTH OF LINE. PRINT A LINES WORTH
43 021566 004737 012632 JSR PC,XMIT ;TRANSMIT THE LINE TO THE PRINTER
44 021572 004737 015360 JSR PC,ERRORS ;CHECK FOR ERRORS
45
46 021576 010105 MOV R1,R5 ;ADDRESS OF LAST CHARACTER FOR PRINTING....
47 021600 005205 INC R5 ; POINT ONE FURTHER FOR SWIRL EFFECT.
48 021602 013701 010042 MOV LINSIZ,R1
49 021606 060501 ADD R5,R1 ;POINT TO THE FIRST CHARACTER TO BE PRINTED+1.

```

TEST 7: PRINT A SWIRL PATTERN

```

50
51 021610 005301          REVRSP: DEC      R1          ;POINT TO THE NEXT CHARACTER TO BE PRINTED.
52 021612 012702 000001   MOV      #1,R2      ;TELL XMIT THAT A SINGLE CHARACTER PRINTED.
53 021616 004737 012632   JSR     PC,XMIT     ;SEND THE CHARACTER. (REVERSE PRINT)
54 021622 004737 015360   JSR     PC,ERRORS   ;CHECK FOR ERRORS.
55
56 021626 020501          .      CMP      R5,R1      ;PRINTED ENOUGH CHARACTERS YET IN REVERSE?
57 021630 100767          .      BMI     REVRSP     ;PRINT NEXT REVERSE CHAR.
58
59
60      ;
61
62 021632 062704 000002   ADD     #2,R4      ;KEEP TRACK OF THE NUMBER OF LINES PRINTED
63 021636 020427 000036   CMP     R4,#30     ;FIFTEEN LINES PRINTED YET THIS PASS?
64 021642 100744          .      BMI     NX1LIN    ;IF DONE, EXIT TEST
65
66 021644          .      ENDTST
67
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74      ;
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79      .SBTTL TEST 8: WORST CASE RAPID MOTION TEST

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L10016: TRAP C\$ETST

TEST 8: WORST CASE RAPID MOTION TEST

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.....
TEST #8
WORST CASE RAPID MOTION TEST
THIS TEST WILL PUT THE PRINT WHEEL THROUGH A MECHANICALLY STRESSFUL
SITUATION BY REPEATEDLY PRINTING THE SEQUENCE 'ACA:'.
.....
    
```

```

24 021646 004737 014412 TEST8: JSR PC,INITCD ;INITIALIZE TEST
25
26 021652 RFLAGS FLAGS ;READ START TIME SUPERVISOR FLAGS
021652 104421 TRAP CSRFLA
021654 010037 005260 MOV RO,FLAGS
27 021660 032737 000010 005260 BIT #LOT,FLAGS ;WAS THE LOOP ON TEST FLAG SET?
28 021666 001027 BNE T8LOT ;SKIP PRINT OF TEST TITLE IF 'LOT'.
29
30 021670 PRINTB #TITLE8 ;CONSOLE PRINT TEST TITLE
021670 012746 002772 MOV #TITLE8,-(SP)
021674 012746 000001 MOV #1,-(SP)
021700 010600 MOV SP,RO
021702 104414 TRAP CSPNTB
021704 062706 000004 ADD #4,SP
31
32 021710 052737 040000 006500 BIS #BIT14,ERWORD ;DISABLE ERROR HANG-UPS
33 021716 012701 002772 MOV #TITLE8,R1 ;ADDRESS OF TITLE
34 021722 062701 000004 ADD #4,R1 ;SKIP FIRST 4 CHARACTERS
35 021726 012702 000047 MOV #39.,R2 ;39 CHARACTERS
36 021732 005003 CLR R3 ;NO BIDIRECTIONAL PRINTING FOR NOW
37 021734 004737 012632 JSR PC,XMIT ;SEND TO PRINTER
38 021740 042737 040000 006500 BIC #BIT14,ERWORD ;ENABLE ERROR HANG-UPS
39
40 021746 012703 177777 T8LOT: MOV #-1,R3 ;ENABLE BIDIRECTIONAL PRINTING
41 021752 005004 CLR R4 ;COUNT OF 'ACA:' BLOCKS
42 021754 013705 010042 MOV LINSIZ,R5 ;# OF CHARACTERS PER LINE
43 021760 006205 ASR R5 ;LINSIZ/2 : 1 BLOCK - 4 CHARACTERS...
44 ; PRINT 2 LINES AT NEW LINE SIZE
45
46 021762 012701 006535 LOOP8: MOV #ACAS,R1 ;ADDRESS OF SEQUENCE
47 021766 012702 000004 MOV #4,R2 ;OF 4 CHARACTERS...
48 021772 004737 012632 JSR PC,XMIT ;SEND TO PRINTER
49 021776 004737 015360 JSR PL,ERRORS ;CHECK FOR ERRORS.
    
```

TEST 8: WORST CASE RAPID MOTION TEST

```

50
51 022002 005204      INC      R4
52 022004 020405      CMP      R4,R5      ;ENOUGH BLOCKS PRINTED??
53 022006 100765      BMI      LOOP8      ;IF NO, LOOP TO PRINT NEXT BLOCK...
54
55 022010              ENDTST
                    L10017: TRAP C$ETST
    022010 104401
56
57
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60      :
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66      .SBTTL TEST 9: PRINT RANDOM CHARACTERS

```

TEST 9: PRINT RANDOM CHARACTERS

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.....!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
TEST #9
PRINT RANDOM CHARACTERS
THIS TEST WILL PRINT A RANDOM SEQUENCE OF CHARACTERS ON THE
PRINTER.
.....

```

```

24 022012 004737 014412 TEST9: JSR PC,INITCD ;INITIALIZE TEST
25 RFLAGS FLAGS ;READ START TIME SUPERVISOR FLAGS
26 022016 104421 TRAP CSRFLA
022016 010037 005260 MOV RO,FLAGS
27 022024 032737 000010 005260 BIT #LOT,FLAGS ;WAS THE LOOP ON TEST FLAG SET?
28 022032 001027 BNE T9LOT ;SKIP PRINT OF TEST TITLE IF 'LOT'.
29
30 022034 PRINTB #TITLE9 ;CONSOLE PRINT TITLE
022034 012746 003046 MOV #TITLE9,-(SP)
022040 012746 000001 MOV #1,-(SP)
022044 010600 MOV SP,RO
022046 104414 TRAP PSPNTB
022050 062706 000004 ADD #4,SP
31
32 022054 052737 040000 006500 BIS #BIT14,ERWORD ;DISABLE ERROR HANG-UPS
33 022062 012701 003046 MOV #TITLE9,R1 ;ADDRESS OF TITLE
34 022066 062701 000004 ADD #4,R1 ;SKIP 1ST 4 CHARACTERS
35 022072 012702 000042 MOV #34,R2 ;34 CHARACTERS IN THE TITLE
36 022076 005003 CLR R3 ;DISABLE BIDIRECTIONAL PRINTING
37 022100 004737 012632 JSR PC,XMIT ;SEND TO PRINTER
38 022104 042737 040000 006500 BIC #BIT14,ERWORD ;ENABLE ERROR HANG-UPS
39
40 022112 013705 010042 T9LOT: MOV LINSIZ,R5 ;GET THE LINE SIZE
41 022116 006305 ASL R5 ;LINE SIZE * 2
42 022120 006305 ASL R5 ;LINE SIZE * 4
43 022122 006305 ASL R5 ;LINE SIZE * 8
44 ; TO PRINT 8 LINES WORTH
45 022124 005037 010064 CLR CHRCNT ;NO CHARACTERS PRINTED YET
46
47 022130 004737 015040 PLOOP9: JSR PC,RANDOM ;RANDOM NUMBER (0 - 99) INTO R1
48
49 022134 062701 006555 ADD #CHRLST,R1 ;ADDRESS FOR THIS PRINT

```

TEST 9: PRINT RANDOM CHARACTERS

```

50 022140 012702 000001      MOV      #1,R2          :SINGLE CHARACTER
51 022144 012703 177777      MOV      #-1,R3         :BIDIRECTIONAL PRINTING.
52 022150 004737 012632      JSR      PC,XMIT        :SEND TO PRINTER
53 022154 004737 015360      JSR      PC,ERRORS     :CHECK FOR ERRORS.
54
55 022160 005237 010064      INC      CHRCNT         :KEEP TRACK OF THE NUMBER OF CHARACTERS
56 022164 023705 010064      CMP      CHRCNT,R5     :EIGHT LINES YET?
57 022170 100757             BMI      PLOOP9        :NO,LOOP UNTIL DONE
58
59 022172             .ENDTST
   022172
   022172 104401             L10020: TRAP C$ETST
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.SBTTL TEST 10: LIFT / DROP RIBBON BY OPERATOR CONTROL

TEST 10: LIFT / DROP RIBBON BY OPERATOR CONTROL

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TEST #10
LIFT / DROP RIBBON BY OPERATOR CONTROL

THIS TEST WILL EITHER ENABLE THE USER TO MANUALLY LIFT AND
DROP THE PRINTER RIBBON OR IT WILL LIFT AND DROP THE PRINTER
RIBBON AUTOMATICALLY. THE USER LIFTS AND DROPS THE RIBBON
BY PUSHING THE RETURN KEY AFTER SELECTING THE MANUAL MODE. IF
THE AUTOMATIC MODE IS SELECTED BY THE USER, THEN THE RIBBON LIFTS
AND DROPS TEN TIMES AT A RATE OF ABOUT ONCE PER SECOND.
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28 022174          TESTB:  MANUAL          ;MANUAL INTERVENTION PERMITTED?
    022174 104450          ;DO TEST IF MANUAL INTERVENTION PERMITTED. TRAP C$MANI
29 022176          BCOMPLETE TBMANB          ;DO TEST IF MANUAL INTERVENTION PERMITTED. BCS TBMANB
    022176 103402          ;SKIP TEST IF UNATTENDED MODE SET.
30 022200 000137 022402          JMP      EXIT
31 022204 004737 014412          TBMANB: JSR      PC,INITCD          ;TEST INITIALIZE
32 022210          RFLAGS  FLAGS          ;READ START TIME SUPERVISOR FLAGS
    022210 104427          ;WAS THE LOOP ON TEST FLAG SET? TRAP C$RFLA
    022212 010037 005260          ;SKIP PRINT OF TEST TITLE IF 'LOT'. MOV RO,FLAGS
35 022216 032737 000010 005260          BIT      #LOT,FLAGS
36 022224 001027          BNE      TBLOT
37 022226          PRINTB #TITLEB          ;CONSOLE PRINT TITLE
38 022226 012746 003264          ;MOV #TITLEB,-(SP)
    022232 012746 000001          ;MOV #1,-(SP)
    022236 010600          ;MOV SP,R0
    022240 104414          ;TRAP C$PNTB
    022242 062706 000004          ;ADD #4,SP
39 022246 052737 040000 006500          BIS      #BIT14,ERWORD          ;DISABLE ERROR HANG-UPS
40 022254 012701 003264          MOV      #TITLEB,R1          ;ADDRESS OF TEST TITLE
41 022260 062701 000004          ADD      #4,R1          ;SKIP 4 CHARACTERS
42 022264 012702 000060          MOV      #48.,R2          ;48 CHARACTERS TO BE PRINTED.
43 022270 005003          CLR      R3          ;NO BIDIRECTIONAL PRINTING
44 022272 004737 012632          JSR      PC,XMIT          ;SEND THE TEST TITLE
45 022276 042737 040000 006500          BIC      #BIT14,ERWORD          ;ENABLE ERROR HANG-UPS

```



TEST 10:

LIFT / DROP RIBBON BY OPERATOR CONTROL

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48 022304 012701 002303      TBLOT:  MOV    #SETH0,R1      ;SET HIT COUNT TO ZERO
49 022310 012702 000005      MOV    #5,R2        ;FIVE CHARACTER STRING SENT TO PRINTER
50 022314 005003              CLR    R3           ;NO BIDIRECTIONAL LOGIC REQUIRED.
51 022316 004737 012632      JSR    PC,XMIT      ;SEND TO PRINTER.
52
53 022322 012701 002310      MOV    #SETH0,R1      ;SET CHARACTER SIZE TO ZERO.
54 022326 012702 000003      MOV    #3,R2        ;ARGUMENT LIST IS 3 CHARACTERS LONG.
55 022332 005003              CLR    R3           ;NO BIDSIRECTIONAL LOGIC REQUIRED.
56 022334 004737 012632      JSR    PC,XMIT      ;SEND TO PRINTER.
57
58
59 022340              GMANID OPTN1,BFRB,A,0,1,72,YES
   022340 104443              TRAP   CS$GMAN
   022342 000406              BR     10000$
   022344 010030              .WORD BFRB
   022346 000152              .WORD T$CODE
   022350 003351              .WORD OPTN1
   022352 000000              .WORD 0
   022354 000001              .WORD T$LOLIM
   022356 000072              .WORD T$HILIM
   022360
60
61
62 022360 123737 010030 006531  CMPB  BFRB,SCA      ;ASK USER TO CHOOSE AUTO OR MANUAL MODE.
63 022366 001403              BEQ   AUTCAL        ;IF CHARACTER IS 'A' THEN AUTO MODE CHOSEN
64
65
66 022370 004737 022574              JSR   PC,MANLD      ;SO CALL LOCAL ROUTINE TO HANDLE AUTO MODE
67 022374 000402              BR   EXIT           ;OTHERWISE, MANUAL IS CHOSEN.....
68
69 022376 004737 022404      AUTCAL: JSR   PC,AUTOLD ;DO MANUAL LIFT / DROP.
70
71 022402              EXIT:  ENDTST      ;EXIT TEST WHEN DONE
   022402
   022402 104401              L10021: TRAP   ($ETST
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TEST 10: LIFT / DROP RIBBON BY OPERATOR CONTROL

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.....
FUNCTIONAL DESCRIPTION
TEST #10
LOCAL PROCEDURE AUTOLD
AUTOMATIC MODE OF RIBBON LIFT AND RIBBON DROP.
.....
INPUTS
NONE
OUTPUTS
NONE
FUNCTIONAL SIDE EFFECTS
THE PRINTER RIBBON WILL LIFT/DROP AUTOMATICALLY.
CALLING SEQUENCE
JSR PC,AUTOLD
.....
AUTOLD: CLR CCOUNT ;COUNT OF CYCLES (LIFT/DROP)
AUTOLE: MOV #1,R0 ;POINT TO POSITION PARAMETER.
MOVB #ZERO,RIBPOS(R0) ;RIBBON UP ARGUMENT LIFT/DROP
MOV #RIBPOS,R1 ;ADDRESS OF ARG LIST CYCLE....
MOV #4,R2 ;4 ARGUMENTS .....
JSR PC,XMIT ;SEND TO PRINTER .....
JSR PC,ERRORS ;CHECK FOR ERRORS. ....
MOV #1000.,R5 ;DELAY TIME IN R1 FOR DELAY ROUTINE. ....
JSR PC,DELAYS ;PERFORM DELAY OF ABOUT 1 SECOND. ....
.....
MOV #1,R0 ;POINT TO THE RIBBON POSITION PARAMETER ...
MOVB #ONE,RIBPOS(R0) ;LOWER THE RIBBON. ...
MOV #RIBPOS,R1 ;ARGUMENT LIST ADDRESS. ....
MOV #4,R2 ;4 CHARACTERS .....
CLR R3 ;BIDIRECTIONAL LOGIC DISABLED .....
JSR PC,XMIT ;SEND SEQUENCE TO PRINTER. ....
JSR PC,ERRORS ; .....
.....
INC CCOUNT ;KEEP COUNT OF CYCLES SO FAR... .....
CMP CCOUNT,#20. ;LOOP TEN TIMES FOR TEN LIFT / DROP CYCLES.
BMI AUTOLE ;LOOP UNTIL TEN LOOPS DONE.
RTS PC

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002240

002240

000024

TEST 10: LIFT / DROP RIBBON BY OPERATOR CONTROL

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TEST 10: LIFT / DROP RIBBON BY OPERATOR CONTROL

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.....
:FUNCTIONAL DESCRIPTION
:
:   TEST #10
:
:   LOCAL PROCEDURE MANLD
:
:   MANUAL LIFT / DROP MODE.  IF SELECTED, THIS MODE WILL PERMIT
:   THE USER TO EITHER LIFT OR DROP THE RIBBON BY SIMPLY HITTING
:   THE <RETURN> KEY.  IF A 'Q' CHARACTER IS ENTERED BEFORE THE
:   <RETURN> KEY IS HIT THEN THE TEST IS STOPPED.
:
:.....
:INPUTS
:
:   NONE
:
:OUTPUTS
:
:   NONE
:
:FUNCTIONAL SIDE EFFECTS
:
:   THE RIBBON WILL LIFT/DROP BY OPERATOR CONTROL.
:
:CALLING SEQUENCE
:
:   JSR    PC,MANLD
:
:.....

```

```

36 022524          MANLD: PRINTB #PRMPTC          ;PROMPT INSTRUCTIONS AT CONSOLE
    022524 012746 003466          MOV          #PRMPTC,-(SP)
    022530 012746 000001          MOV          #1,-(SP)
    022534 010600          MOV          SP,R0
    022536 104414          TRAP         ($PNTB
    022540 062706 000004          ADD          #4,SP

37
38 022544          MANLD: GMANLD NPRMPT,BFRC,A,0,1,72,YES
    022544 104443          TRAP         ($GMAN
    022546 000406          BR          10000$
    022550 010032          .WORD     BFRC
    022552 000152          .WORD     T$CODE
    022554 004531          .WORD     NPRMPT
    022556 000000          .WORD     0
    022560 000001          .WORD     T$LOCLIM
    022562 000072          .WORD     T$HILIM
    022564          10000$:

39          ;INPUT <RETURN> OR Q <RETURN>
40          ;<RETURN> MEANS TO CHANGE RIBBON POSITION
41          ;Q <RETURN> MEANS TO EXIT TEST.
42 022564 123737 010032 006525    CMPB      BFRC,SC0
43 022572 001417          BEQ       EXIT11

```

TEST 10:

LIFT / DROP RIBBON BY OPERATOR CONTROL

```

44
45 022574 012700 000001          MOV    #1,R0
46 022600 112760 000040 002240  MOVB  #ZERO,RIBPOS(R0)      ;ARGUMENT FOR LIFT RIBBON
47 022606 012701 002240          MOV  #RIBPOS,R1             ;ADDRESS OF ARGUMENT LIST
48 022612 012702 000004          MOV  #4,R2                 ;4 ARGUMENT CHARACTERS IS LIST
49 022616 005003          CLR  R3                    ;DON'T BOTHER WITH BIDIRECTIONAL PRINTING CODE
50 022620 004737 012632          JSR  PC,XMIT              ;SEND ARGUMENT LIST TO PRINTER
51 022624 004737 015360          JSR  PC,ERRORS           ;CHECK FOR ERRORS.
52
53 022630 000735          BR   MA'ILD              ;REPEAT UNTIL A '0' IS FOUND IN THE BUFFER
54
55 022632 000207          EXIT11: RTS    PC
56
57          ;
58          ;SBTTL TEST 11:          PRINT OPERATOR SELECTED CHARACTERS

```

TEST 11: PRINT OPERATOR SELECTED CHARACTERS

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T11::

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.....
TEST #11
PRINT OPERATOR SELECTED CHARACTERS /OPTIONAL SPECIAL TEST
THIS OPTIONAL TEST WILL PRINT CHARACTER SEQUENCES SELECTED BY THE
OPERATOR ONE LINE AT A TIME.
.....

```

022634  
022634 104450  
022636  
022636 103402  
022640 000137 023054  
022644 004737 014412  
022650  
022650 012746 003115  
022654 012746 000001  
022660 010600  
022662 104414  
022664 062706 000004  
022670 052737 040000 006500  
022676 012701 003115  
022702 062701 000004  
022706 012702 000056  
022712 005003  
022714 004737 012632  
022720 042737 040000 006500  
022726  
022726 104443  
022730 000406  
022732 007352  
022734 000142  
022736 003200  
022740 000000  
022742 000001  
022744 000072  
022746

```

TESTA: MANUAL ;MANUAL INTERVENTION PERMITTED? TRAP C$MANI
BCOMPLETE TAMAN ;DO TEST IS MANUAL INTERVENTION SET. C$MANI
;MANUAL NOT OK - DON'T DO THIS TEST. BCS TAMAN
JMP EXITA
TAMAN: JSR PC,INITCD ;TEST INITIALIZE
PRINTB #TITLEA ;CONSOLE PRINT TITLE
MOV #TITLEA,-(SP)
MOV #1,-(SP)
MOV SP,R0
TRAP C$PNTB
ADD #4,SP

BIS #BIT14,ERWORD ;DISABLE ERROR HANG-UPS
MOV #TITLEA,R1 ;ADDRESS OF TITLE
ADD #4,R1 ;SKIP 4 CHARACTERS
MOV #46.,R2 ;46 CHARACTERS IN THE TITLE
CLR R3 ;DISABLE BIDIRECTIONAL PRINTING
JSR PC,XMIT ;SEND TO PRINTER
BIC #BIT14,ERWORD ;ENABLE ERROR HANG-UPS

LOOPA: GMANID PRMPTA,BFRA,A,0,1,72,NO
TRAP C$GMAN
BR 10001$
.WORD BFRA
.WORD T$CODE
.WORD PRMPTA
.WORD 0
.WORD T$LOLIM
.WORD T$HILIM
10001$:
;PROMPT AT CONSOLE AND INPUT STRING.

CLR R4 ;R4 IS OFFSET IN INPUT STRING

```

TEST 11: PRINT OPERATOR SELECTED CHARACTERS

```

41
42 022750 105764 007352      NXTA:  TSTB  BFRA(R4)      ;IS THE BYTE A ZERO?  GMANID IS EXPECTED TO
43                                ; SEND A ZERO AS THE LAST BYTE.  THIS WILL
44                                ; INDICATE THE END OF THE INPUT STRING.
45 022754 001011            BNE  TFCZ      ;NOT ZERO.  CHECK FOR CTL-Z
46
47 022756 012701 002313      MCV  #CR,R1    ;ADDRESS OF CARRIAGE RETURN - LINEFEED
48 022762 012702 000002      MCV  #2,R2     ;TWO BYTES TO SEND
49 022766 004737 012632      JSR  PC,XMIT   ;SEND THE STRING
50 022772 004737 015360      JSR  PC,ERRORS ;CHECK FOR ERRORS.
51
52 022776 000753            BR   L00PA     ;BACK TO PROMPT...
53
54
55 023000 126437 007352 006525 TFCZ:  (MPB  BFRA(R4),SC0    ;IS IT A '0'?
56 023006 001006            BNE  NOT0     ;IF IT IS, CHECK FOR <RETURN>
57
58 023010 005204            INC  R4       ;CHECK NEXT BYTE FOR ZERO.
59 023012 126427 007352 000000 (MPB  BFRA(R4),#0    ;IS THE BYTE A ZERO?
60 023020 001415            BEQ  EXITA    ;IF IT IS THEN EXIT TEST
61 023022 005304            DEC  R4       ;IF NOT ZERO THEN NOT RETURN
62                                ;AND NOT YET THE END.
63                                NOT0:
64 023024 012701 007352      MOV  #BFRA,R1  ;PRINT THE CHARACTER...
65 023030 060401            ADD  R4,R1    ; AS R4 POINTS THROUGH THE LIST.
66 023032 012702 000001      MOV  #1,R2    ;ONE CHARACTER TO PRINT.
67 023036 005003            CLR  R3       ;NOT BIDIR. PRINTING.
68 023040 004737 012632      JSR  PC,XMIT   ;SEND TO PRINTER.
69 023044 004737 015360      JSR  PC,ERRORS ;CHECK FOR ERRORS.
70
71 023050 005204            INC  R4       ;POINT TO NEXT CHARACTER
72 023052 000736            BR   NXTA    ;REPEAT TILL END OF STRING FOUND.
73 023054 000240            EXITA:  NOP
74
75 023056            ENDTST
    023056
    023056 104401
76
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    .SBTTL  TEST 12:      BIDIRECTIONAL FORMS TRACTOR TEST
    
```

L10022: TRAP CSETST

TEST 12: BIDIRECTIONAL FORMS TRACTOR TEST

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T12::

TEST #12

BIDIRECTIONAL FORMS TRACTOR TEST /OPTIONAL SPECIAL TEST

THIS TEST WILL PRINT A TEN BY TEN ARRAY OF ASCII CHARACTERS  
IN A RANDOM ORDER ON THE PRINTER. THE TEST WILL NOT OVERPRINT  
ANY LOCATIONS IN THE ARRAY. THIS TEST SHOULD EXERCISE BOTH UP  
AND DOWN CARRIAGE MOTION AS WELL AS FORWARD AND BACKWARD CARRIAGE  
MOTION.

```

TESTC:  MANUAL                ;MANUAL INTERVENTION PERMITTED?
        BCOMPLETE TCMAN      ;DO TEST IF MANUAL INTERVENTION
        JMP ENDC              ;OTHERWISE, EXIT TEST.
TCMAN:  JSR PC,INITCD        ;TEST INITIALIZE
        PRINTB #TITLEC       ;CONSOLE PRINT TITLE OF TEST
                                MOV #TITLEC,-(SP)
                                MOV #1,-(SP)
                                MOV SP,R0
                                TRAP (SPNTB
                                ADD #4,SP
        BIS #BIT14,ERWORD    ;TEMPORARILY SUSPEND ERROR HANG-UPS
        MOV #TITLEC,R1       ;ADDRESS OF TITLE TO PRINT
        ADD #4,R1             ;SKIP 4 CHARACTERS
        MOV #39,R2
        CLR R3
        JSR PC,XMIT          ;PRINT TITLE
        BIC #BIT14,ERWORD    ;REINSTATE ERROR HANG-UPS
        GMANID T11PMT,BFRD,A,0,1,72,YES
                                TRAP (SGMAN
                                BR 10000$
                                .WORD BFRD
                                .WORD TSCODE
                                .WORD T11PMT
                                .WORD 0
                                .WORD T$LOLIM
                                .WORD T$HILIM

```

023060 104450  
023062 103402  
023064 000137 023342  
023070 004737 014412  
023074 012746 003717  
023100 012746 000001  
023104 010600  
023106 104414  
023110 062706 000004  
023114 052737 040000 006500  
023122 012701 003717  
023126 062701 000004  
023132 012702 000047  
023136 005003  
023140 004737 012632  
023144 042737 040000 006500  
023152 104443  
023154 000406  
023156 010034  
023160 000152  
023162 004346  
023164 000000  
023166 000001  
023170 000072  
023172

10000\$:



TEST 12: BIDIRECTIONAL FORMS TRACTOR TEST

41						
42						
43						
44						CLEAR ALL TABLE UNIQUENESS INDICATORS.
45	023172	012700	005262			
46	023176	062700	000005	CLEAR:	MOV #BASET,R0	:GET THE BASE ADDRESS OF THE VECTOR TABLE
47	023202	105010			ADD #5,R0	:POINT TO THE UNIQUENESS INDICATOR.
48	023204	005200			CLRB @R0	:CLEAR THE UNIQUENESS INDICATOR.
49	023206	020027	006412		INC R0	:POINT TO THE NEXT TABLE ENTRY.
50	023212	100771			CMP R0,#FRONT	:IS IT POINTING BEYOND THE TABLE?
51					BMI CLEAR	:REPEAT LOOP UNTIL ALL UNIQUENESS INDICATORS ARE CLEARED.
52						
53						
54						:VECTOR TABLE READY TO USE.
55						
56						
57	023214	005037	010066		CLR CCOUNT	:COUNT CHARACTERS PRINTED
58	023220	004737	015040	PLOOPC:	JSR PC,RANDOM	:GET A RANDOM NUMBER (0 - 99) INTO R1
59	023224	010104			MOV R1,R4	:PUT INTO R4 FOR THE PRARCH ROUTINE.
60						
61	023226	004737	023344		JSR PC,PRARCH	:PRINT THE CHARACTER IN ITS CORRESPONDING POSITION.
62						
63						
64	023232	005237	010066		INC CCOUNT	:KEEP TRACK OF THE COUNT OF CHARACTERS.
65	023236	023727	010066	000144	CMP CCOUNT,#100.	:DONE WHEN 100 HAVE BEE PRINTED.
66	023244	100765			BMI PLOOPC	:REPEAT UNTIL DONE.
67						
68	023246	012701	002313		MOV #CR,R1	:PRINT A CARRIAGE RETURN AND SOME LINE FEEDS.
69	023252	012702	000002		MOV #2,R2	:
70	023256	005003			CLR R3	
71	023260	004737	012632		JSR PC,XMIT	:<CR><LF>
72						
73	023264	012701	002314		MOV #LF,R1	:SEVERAL LINE FEEDS...
74	023270	012702	000001		MOV #1,R2	
75	023274	005003			CLR R3	
76	023276	004737	012632		JSR PC,XMIT	
77	023302	004737	012632		JSR PC,XMIT	
78	023306	004737	012632		JSR PC,XMIT	
79	023312	004737	012632		JSR PC,XMIT	
80	023316	004737	012632		JSR PC,XMIT	
81	023322	004737	012632		JSR PC,XMIT	
82	023326	004737	012632		JSR PC,XMIT	
83	023332	004737	012632		JSR PC,XMIT	
84	023336	004737	012632		JSR PC,XMIT	
85						
86	023342			ENDC:	ENDTST	
	023342					L10023: TRAP C&TST
	023342	104401				
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TEST 12: BIDIRECTIONAL FORMS TRACTOR TEST

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:FUNCTIONAL DESCRIPTION

TEST #12  
LOCAL PROCEDURE PRARCH  
THIS SUB-PROCEDURE WILL INPUT THE RANDOM NUMBER, FIND THE CORRESPONDING PLACE IN THE VECTOR TABLE, PRINT THE APPROPRIATE CHARACTER AT THE APPROPRIATE VECTOR AND ACCUMULATE SPACING TO RE-POSITION THE CARRIAGE AT THE ( 0,0 ) POSITION IN THE ARRAY.

.....  
:INPUTS

R4 - RANDOM NUMBER CONTAINED IN R4.  
- USED TO GET A RANDOM TABLE ENTRY WHICH IS PRINTED.

:OUTPUTS

THE TABLE ENTRY IS MARKED AS IT IS PRINTED.

:SUBORDINATE ROUTINES

RANDOM - GETS ANOTHER RANDOM NUMBER IF THE ONE SUPPLIED WAS CHOSEN ALREADY DURING THIS PASS.

PRARCH: MOV R4,-(SP) ;SAVE REGISTERS  
MOV R3,-(SP) ;  
MOV R2,-(SP) ; (THAT ARE NOT USED FOR PASSING)

GTNUM: ASL R4 ;OFFSET DESIRED \* 2  
MOV R4,R3 ;SAVE 2 \* OFFSET FOR LATER  
ASL R4 ;DESIRED OFFSET \* 4  
ADD R3,R4 ;6 \* OFFSET NOW IN R4.  
;DESIRED TABLE INDEX NOW IN R4.

ADD #BASET,R4 ;ADDRESS OF TABLE ENTRY DESIRED

```

TEST 12:      BIDIRECTIONAL FORMS TRACTOR TEST

153
154 023366 062704 000005      ADD      #5,R4      ;TABLE OFFSET.
155 023372 105714             TSTB     @R4        ;CHECK UNIQUE NUMBER INDICATOR....
156 023374 001404             BEQ      NOT1      ;IF NOT UNIQUE THEN CONTROL TOO NOT1
157
158 023376 004737 015040      JSR      PC,RANDOM ;RANDOM NUMBER IN R4
159 023402 010104             MOV      R1,R4     ;GET THE RANDOM NUMBER IN THE RIGHT PLACE.
160 023404 000762             BR       GTNUM     ;LAST ONE DIDN'T WORK... TRY THIS ONE.
161
162 023406 112714 000001      NOT1:    MOVB   #1,@R4 ;SET UNIQUE INDICATOR
163 023412 162704 000005      SUB      #5,R4     ;
164
165
166
167
168
169 023416 012401             MOV      (R4)+,R1  ;GET THE VERTICAL COMPONENT OF THE VECTOR
170 023420 004737 014314      JSR      PC,CONVRT ;CONVERT R1 TO MNEMONICS
171 023424 012700 000001      MOV      #1,R0
172 023430 113760 010046 002226  MOVB     MNEB1,VRTCLS(R0) ;LOAD THE ARGUMENT LIST
173 023436 005200             INC      R0
174 023440 113760 010047 002226  MOVB     MNEB2,VRTCLS(R0) ;
175 023446 005200             INC      R0
176 023450 113760 010050 002226  MOVB     MNEB3,VRTCLS(R0) ;
177
178 023456 012401             MOV      (R4)+,R1  ;GET HORIZONTAL COMPONENT OF THE VECTOR
179 023460 004737 014314      JSR      PC,CONVRT ;CONVERT R1 TO MNEMONICS
180 023464 012700 000001      MOV      #1,R0
181 023470 113760 010046 002233  MOVB     MNEB1,HRZTLS(R0) ;LOAD THE ARGUMENT LIST
182 023476 005200             INC      R0
183 023500 113760 010047 002233  MOVB     MNEB2,HRZTLS(R0) ;
184 023506 005200             INC      R0
185 023510 113760 010050 002233  MOVB     MNEB3,HRZTLS(R0) ;
186
187 023516 012701 002226      MOV      #VRTCLS,R1 ;NOW, ACCUMULATE VERTICAL SPACING
188 023522 012702 000005      MOV      #5,R2     ;
189 023526 005003             CLR      R3
190 023530 004737 012632      JSR      PC,XMIT   ;SEND TO PRINTER
191 023534 004737 015360      JSR      PC,ERRORS ;CHECK FOR ERRORS.
192
193 023540 012701 002233      MOV      #HRZTLS,R1 ;NOW, ACCUMULATE HORIZONTAL SPACING
194 023544 012702 000005      MOV      #5,R2     ;
195 023550 005003             CLR      R3
196 023552 004737 012632      JSR      PC,XMIT   ;SEND TO PRINTER
197 023556 004737 015360      JSR      PC,ERRORS ;CHECK FOR ERRORS.
198
199 023562 010401             MOV      R4,R1     ;GET ADDRESS OF THE CHARACTER
200 023564 012702 000001      MOV      #1,R2     ;SINGLE CHARACTER
201 023570 005003             CLR      R3
202 023572 004737 012632      JSR      PC,XMIT   ;DISABLE BIDIRECTIONAL PRINT LOGIC.
203 023576 004737 015360      JSR      PC,ERRORS ;SEND TO PRINTER
204
205 023602 014401             MOV      -(R4),R1  ;CHECK FOR ERRORS.
206 023604 005401             NEG      R1
207 023606 162701 000014      SUB      #12,,R1   ;COLUMN NUMBER IN R1
208
209

```

TEST 12: BIDIRECTIONAL FORMS TRACTOR TEST

210	023612	004737	014314	JSR	PC,CONVRT	:CONVERT TO MNEMONIC
211	023616	012700	000001	MOV	#1,R0	
212	023622	113760	010046	MOVB	MNEB1,HRZTLS(R0)	:PUT IN ARGUMENT LIST
213	023630	005200		INC	R0	
214	023632	113760	010047	MOVB	MNEB2,HRZTLS(R0)	:
215	023640	005200		INC	R0	
216	023642	113760	010050	MOVB	MNEB3,HRZTLS(R0)	:
217						
218	023650	012701	002233	MOV	#HRZTLS,R1	:ADDRESS OF ARGUMENT LIST
219	023654	012702	000005	MOV	#5,R2	:5 ARGUMENTS
220	023660	005003		CLR	R3	:DISABLE BIDIRECTIONAL LOGIC.
221	023662	004737	012632	JSR	PC,XMIT	:SEND TO PRINTER
222	023666	004737	015360	JSR	PC,ERRORS	:CHECK FOR ERRORS.
223						
224	023672	014401		MOV	-(R4),R1	:GET THE COLUMN NUMBER
225	023674	005401		NEG	R1	:REVERSE THE CARRIAGE MOVEMENT
226	023676	004737	014314	JSR	PC,CONVRT	:CONVERT TO MNEMONICS
227	023702	012700	000001	MOV	#1,R0	
228	023706	113760	010046	MOVB	MNEB1,VRTCLS(R0)	:FILL ARGUMENT LIST
229	023714	005200		INC	R0	
230	023716	113760	010047	MOVB	MNEB2,VRTCLS(R0)	:
231	023724	005200		INC	R0	
232	023726	113760	010050	MOVB	MNEB3,VRTCLS(R0)	:
233						
234	023734	012701	002226	MOV	#VRTCLS,R1	:ADDRESS OF ARGUMENT LIST
235	023740	012702	000005	MOV	#5,R2	:TO ACCUMULATE VERTICAL SPACING
236	023744	005003		CLR	R3	:DISABLE BIDIR. LOGIC
237	023746	004737	012632	JSR	PC,XMIT	:SEND TO PRINTER
238	023752	004737	015360	JSR	PC,ERRORS	:CHECK FOR ERRORS.
239						
240	023756	012602		MOV	(SP)+,R2	:RESTORE REGISTERS
241	023760	012603		MOV	(SP)+,R3	
242	023762	012604		MOV	(SP)+,R4	
243						
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245	023764	000207		RTS	PC	
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TEST 13: CUT SHEET FEEDER EXERCISOR

TEST 13: CUT SHEET FEEDER EXERCISOR

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024042  
024044  
104450  
103402  
000137  
025020  
004737  
014412  
012746  
012746  
010600  
104414  
062706  
000004  
005003  
104443  
000406  
006514  
000152  
004046  
000000  
000001  
000072  
123737  
001020  
006514  
006527  
000001  
113764  
002330  
002271  
000001  
002330  
002271

BGNIST

T13::

.....  
TEST #13  
CUT SHEET FEEDER EXERCISOR /OPTIONAL SPECIAL TEST  
THIS TEST WILL EXERCISE THE CUT SHEET FEEDER BY TESTING TO SEE THAT  
THE FEEDER IS INSTALLED, FEEDING AND EJECTING SHEETS AND PRINTING  
TEXT ON THE TOPS AND BOTTOMS OF THE SHEETS IN THE PRINTER.  
.....

TESTD: MANUAL ;MANUAL INTERVENTION PERMITTED? TRAP C\$MANI  
BCOMPLETE TDMAN ;DO TEST IF SET. BCS TDMAN  
JMP ENDD ;SKIP TEST IF NOT SET.  
TDMAN: JSR PC,INITCD ;INITIALIZE TEST  
PRINTB #TITLED ;CONSOLE PRINT TITLE  
MOV #TITLED,-(SP)  
MOV #1,-(SP)  
MOV SP,R0  
TRAP C\$PNTB  
ADD #4,SP  
CLR R3 ;DISABLE BIDIRECTIONAL PRINTING  
G\$MANID PRMPTD,BR2,A,0,1,72,YES TRAP C\$G\$MAN  
BR 10000\$  
.WORD BR2  
.WORD T\$CODE  
.WORD PRMPTD  
.WORD 0  
.WORD T\$LOLIM  
.WORD T\$HILIM  
10000\$:  
:PROMPT USER FOR PAGE SIZE USED.  
:OPTIONS ARE A) 11 INCH, B) 14 INCH  
:AND C) A4 EUROPEAN STANDARD.  
:WAS THE CHOICE = 'B' ?  
:IF NOT THEN CHECK IF IT IS = 'C'...  
CMPB BR2,SCB  
BNE CHKC  
MOV #1,R4 ;OFFSET FOR PSZ14 & STPGSZ  
MOVB PSZ14,STPGSZ(R4) ;THEN = 'B'... 14 INCH PAGE. SET UP ARG LIST  
MOV #1,R5  
MOVB PSZ14(R5),STPGSZ(R4) ;

TEST 13:

CUT SHEET FEEDER EXERCISOR

```

41 024100 005204      INC      R4
42 024102 005205      INC      R5
43 024104 116564 002330 002271  MOVB    PSZ14(R5),STPGSZ(R4)  ;
44 024112 000447      BR       TRNSMT              ;SEND THE ARGUMENT SEQUENCE
45
46 024114 123737 006514 006526  CHKC:  CMPB    BR2,SCC          ;IS THE CHARACTER A 'C' ?
47 024122 001022      BNE     MAKE11              ;IF NOT THEN ASSUME IT WAS AN 'A'.
48
49 024124 010146      MOV     R1,-(SP)           ;SAVE R1 TEMPORARILY
50 024126 012701 000002  MOV     #2,R1             ;OFFSET
51 024132 012700 000001  MOV     #1,R0             ;OFFSET
52 024136 113760 002322 002271  MOVB   PSZA4,STPGSZ(R0)    ;THEN = 'C'. SET UP ARG LIST
53 024144 116061 002322 002271  MOVB   PSZA4(R0),STPGSZ(R1) ;
54 024152 012700 000003  MOV     #3,R0             ;OFFSET ADJUSTMENT
55 024156 116160 002322 002271  MOVB   PSZA4(R1),STPGSZ(R0) ;
56 024164 012601      MOV     (SP)+,R1          ;RESTORE R1
57 024166 000421      BR       TRNSMT
58
59 024170 010146      MAKE11: MOV    R1,-(SP)      ;SAVE R1 TEMPORARILY
60 024172 012701 000002  MOV    #2,R1             ;OFFSET
61 024176 012700 000001  MOV    #1,R0             ;OFFSET
62 024202 113760 002325 002271  MOVB   PSZ11,STPGSZ(R0)    ;THEN = 'A'. SET UP ARG LIST
63 024210 116061 002325 002271  MOVB   PSZ11(R0),STPGSZ(R1) ;
64 024216 012700 000003  MOV    #3,R0             ;OFFSET ADJUSTMENT
65 024222 116160 002325 002271  MOVB   PSZ11(R1),STPGSZ(R0) ;
66 024230 012601      MOV    (SP)+,R1          ;RESTORE R1
67
68 024232 012701 002271      TRNSMT: MOV    #STPGSZ,R1   ;ADDRESS OF ARGUMENT LIST
69 024236 012702 000005      MOV    #5,R2             ;
70 024242 005003      CLR    R3                ;
71 024244 004737 012632  JSR    PC,XMIT           ;SEND TO PRINTER... SET PAGE SIZE
72 024250 004737 015360  JSR    PC,ERRORS        ;CHECK FOR ERRORS.
73
74 024254 012700 000001      SELECT: MOV    #1,R0
75 024260 012701 000002  MOV    #2,R1             ;TRANSFER OFFSET FOR
76 024264 113760 006412 002276  MOVB   FRONT,SLTPFF(R0)   ;SELECT TRAY-PERFORM FORMFEED
77 024272 116061 006412 002276  MOVB   FRONT(R0),SLTPFF(R1) ;ARGUMENT LIST
78 024300 012700 000003  MOV    #3,R0             ;OFFSET ADJUSTMENT
79 024304 116160 006412 002276  MOVB   FRONT(R1),SLTPFF(R0) ;
80
81 024312 012701 002276      MOV    #SLTPFF,R1       ;ADDRESS OF ARGUMENT LIST
82 024316 012702 000005      MOV    #5,R2             ;
83 024322 005003      CLR    R3                ;
84 024324 004737 012632  JSR    PC,XMIT           ;SELECT TRAY AND PERFORM FORMFEED.
85 024330 004737 015360  JSR    PC,ERRORS        ;CHECK FOR ERRORS.
86
87 024334 012701 004654      MOV    #FTYTPM,R1       ;FRONT TRAY TOP OF PAGE MESSAGE
88 024340 012702 000140      MOV    #96.,R2          ;96 CHARACTERS LONG
89 024344 005003      CLR    R3                ;
90 024346 004737 012632  JSR    PC,XMIT           ;SEND TO PRINTER
91 024352 004737 015360  JSR    PC,ERRORS        ;CHECK FOR ERRORS.
92
93 024356 123737 006514 006527  CMPB   BR2,SCB          ;IS THE BYTE A 'B'
94 024364 001003      BNE     CHC2              ;IF NOT THEN CHECK FOR A 'C'
95
96 024366 013701 002170      MOV    SKP14,R1         ;SKIP 14 INCHES MINUS 3 LINES VERTICALLY
97 024372 000411      BR     DOSPCS            ;PERFORM TASK

```

## TEST 13: CUT SHEET FEEDER EXERCISOR

```

98
99 024374 123737 006514 006526 MC2: CMPB BR2,SCC ;IS THE CHARACTER A 'C'?
100 024402 001003 BNE ASSMA ;MUST BE 11 INCH IF NOT B OR C.
101
102 024404 013701 002172 MOV SKPA4,R1 ;MUST BE A4 SIZE. SKIP A4 - 3 LINES VERTICALLY
103 024410 000402 BR DOSPCS ;PERFORM TASK
104
105 024412 013701 002174 ASSMA: MOV SKP11,R1 ;11 INCH PAGE. SKIP 11 INCHES - 3 LINES
106
107 024416 010137 002176 DOSPCS: MOV R1,CRNTSK ;SAVE CURRENT SKIP SIZE.
108 024422 004737 014314 JSR PC,CONVRT ;CONVERT TO MNEMONICS
109 024426 012700 000001 MOV #1,R0
110 024432 113760 010046 002226 MOVB MNEB1,VRTCLS(R0) ;MNEMONICS FOR ARG LIST
111 024440 005200 INC R0
112 024442 113760 010047 002226 MOVB MNEB2,VRTCLS(R0) ;
113 024450 005200 INC R0
114 024452 113760 010050 002226 MOVB MNEB3,VRTCLS(R0) ;
115
116 024460 012701 002226 MOV #VRTCLS,R1 ;ADDRESS OF ARGUMENT LIST FOR VERTICAL SPACING
117 024464 012702 000005 MOV #5,R2 ;
118 024470 005003 CLR R3
119 024472 004737 012632 JSR PC,XMIT ;SEND TO PRINTER
120 024476 004737 015360 JSR PC,ERRORS ;CHECK FOR ERRORS.
121
122 024502 012701 007203 MOV #FBTM,R1 ;PRINT BOTTOM OF PAGE MESSAGE
123 024506 012702 000072 MOV #58,R2 ;58 CHARACTERS
124 024512 005003 CLR R3
125 024514 004737 012632 JSR PC,XMIT ;SEND TO PRINTER
126 024520 004737 015360 JSR PC,ERRORS ;CHECK FOR ERRORS.
127
128 024524 012700 000001 MOV #1,R0
129 024530 010146 MOV R1,-(SP)
130 024532 012701 000002 MOV #2,R1 ;TEMPORARILY SAVE R1
131 024536 113760 006415 002276 MOVB REAR,SLTPFF(R0) ;SELECT REAR TRAY
132 024544 116061 006415 002276 MOVB REAR(R0),SLTPFF(R1) ; AND PERFORM
133 024552 012700 000003 MOV #3,R0
134 024556 116160 006415 002276 MOVB REAR(R1),SLTPFF(R0) ; FORMFEED.
135 024564 012601 MOV (SP)+,R1 ;RESTORE R1
136
137 024566 012701 002276 MOV #SLTPFF,R1 ;ADDRESS OF ARGUMENT LIST
138 024572 012702 000005 MOV #5,R2 ;
139 024576 005003 CLR R3
140 024600 004737 012632 JSR PC,XMIT ;SEND TO PRINTER
141 024604 004737 015360 JSR PC,ERRORS ;CHECK FOR ERRORS.
142
143 024610 012701 005014 MOV #RTYTPM,R1 ;REAR TRAY TOP OF PAGE MESSAGE
144 024614 012702 000140 MOV #96,R2 ;96 CHARACTERS LONG
145 024620 005003 CLR R3
146 024622 004737 012632 JSR PC,XMIT ;SEND TO PRINTER
147 024626 004737 015360 JSR PC,ERRORS ;CHECK FOR ERRORS.
148
149 024632 013701 002176 MOV CRNTSK,R1 ;GET CURRENT SKIP SIZE.
150 024636 004737 014314 JSR PC,CONVRT ;CONVERT TO MNEMONICS
151 024642 012700 000001 MOV #1,R0
152 024646 113760 010046 002226 MOVB MNEB1,VRTCLS(R0) ;MNEMONICS FOR ARG LIST
153 024654 005200 INC R0
154 024656 113760 010047 002226 MOVB MNEB2,VRTCLS(R0) ;

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TEST 13: CUT SHEET FEEDER EXERCISGR

```

155 024664 005200          INC      R0
156 024666 113760 010050 002226  MOVB   #MNEB3,VRTCLS(R0) ;
157                                     ;
158 024674 012701 002226  MOV     #VRTCLS,R1      ;ADDRESS OF ARGUMENT LIST FOR VERTICAL SPACING
159 024700 012702 000005  MOV     #5,R2           ;
160 024704 005003          CLR     R3
161 024706 004737 012632  JSR    PC,XMIT         ;SEND TO PRINTER
162 024712 004737 015360  JSR    PC,ERRORS      ;CHECK FOR ERRORS.
163                                     ;
164                                     ;
165 024716 012701 007203  MOV     #F3TM,R1       ;MESSAGE FOR BOTTOM OF PAGE
166 024722 012702 000072  MOV     #58.,R2        ;
167 024726 005003          CLR     R3
168 024730 004737 012632  JSR    PC,XMIT         ;SEND TO PRINTER
169 024734 004737 015360  JSR    PC,ERRORS      ;CHECK FOR ERRORS.
170                                     ;
171 024740 012700 000001  MOV     #1,R0
172 024744 012701 000002  MOV     #2,R1          ;OFFSET IN ARG LIST
173 024750 113760 006420 002276  MOVB   NULL,SLTPFF(R0) ;EJECT
174 024756 116061 006420 002276  MOVB   NULL(R0),SLTPFF(R1) ; PAGE
175 024764 012700 000003  MOV     #3,R0
176 024770 116160 006420 002276  MOVB   NULL(R1),SLTPFF(R0) ; PRESENTLY
177 024776 012701 002276  MOV     #SLTPFF,R1     ; IN THE PRINTER
178 025002 012702 000005  MOV     #5,R2
179 025006 005003          CLR     R3
180 025010 004737 012632  JSR    PC,XMIT         ;SEND TO PRINTER
181 025014 004737 015360  JSR    PC,ERRORS      ;CHECK FOR ERRORS.
182                                     ;
183 025020          ENDD:  ENDTST
    025020
    025020 104401
184
185
186
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200
201          .EVEN
202
203
204          .TITLE PARAMETER CODING
205          .SBTTL  HARDWARE PARAMETER CODING SECTION

```

L10024: TRAP C\$ETST



HARDWARE PARAMETER CODING SECTION

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1
2
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9
10
11 025022          BGNHRD
    025022 000022          .WORD L10025-L$HARD/2
    025024          $HARD::
12
13 025024          GPRMD  GPD2MS,6,0,3,1,2,YES          ;PRINTER WIDTH QUESTION.
    025024 003032          .WORD  T$CODE
    025026 025420          .WORD  GPD2MS
    025030 000003          .WORD  3
    025032 000001          .WORD  T$LLOLIM
    025034 000002          .WORD  T$HILIM
14 025036          GPRMA  GPAMSG,0,0,160000,177777,YES          ;CSR ADDRESS QUESTION.
    025036 000031          .WORD  T$CODE
    025040 025070          .WORD  GPAMSG
    025042 160000          .WORD  T$LLOLIM
    025044 177777          .WORD  T$HILIM
15 025046          GPRML  GPLMSG,2,1,YES          ;DZ11? QUESTION.
    025046 J01130          .WORD  T$CODE
    025050 025242          .WORD  GPLMSG
    025052 000001          .WORD  1
16 025054          XFERT  SNGLP          ;SKIP CHANNEL QUESTION IF DL11.
    025054 006024          .WORD  T$CODE
17 025056          GPRMD  GPDMSG,4,0,7,0,7,YES          ;CHANNEL # QUESTION.
    025056 002032          .WORD  T$CODE
    025060 025325          .WORD  GPDMSG
    025062 000007          .WORD  7
    025064 000J00          .WORD  T$LLOLIM
    025066 000007          .WORD  T$HILIM
18 025070          SNGLP:
19 025070          ENDHRD
    025070          .EVEN
    L10025:
20
21 ;      MESSAGES FOR THE ABOVE CALLS
22
23 025070          012      015      111      GPAMSG: .ASCII <12><15>/IF DEFAULT VALUES FOR INTERFACE DESIRED, ENTER ^Z./<12><15>
    025073          106      040      104
    025076          105      106      101
    025101          123      114      124
    025104          040      126      101
    025107          114      125      105
    025112          123      040      106
    025115          117      122      040
    025120          111      116      124
    025123          105      122      106
    025126          101      03      105
    025131          040      104      105
    025134          123      111      122

```

## HARDWARE PARAMETER CODING SECTION

	025137	105	104	054	
	025142	040	105	116	
	025145	124	105	122	
	025150	040	136	132	
	025153	056	012	015	
24	025156	012	015	040	.ASCII <12><15>/ /<12><15>
	025161	012	015		
25	025163	105	116	124	.ASCIIZ /ENTER CONTROL STATUS REGISTER (CSR) ADDRESS.>>/
	025166	105	122	040	
	025171	103	117	116	
	025174	124	122	117	
	025177	114	040	123	
	025202	124	101	124	
	025205	125	123	040	
	025210	122	105	107	
	025213	111	123	124	
	025216	105	122	040	
	025221	050	103	123	
	025224	122	051	040	
	025227	101	104	104	
	025232	122	105	123	
	025235	123	056	076	
	025240	076	000		
26	025242	012	015	120	GPLMSG: .ASCIIZ <12><15>/PRINTER CONNECTED TO A SINGLE LINE INTERFACE? >>/
	025245	122	111	116	
	025250	124	105	122	
	025253	040	103	117	
	025256	116	116	105	
	025261	103	124	105	
	025264	104	040	124	
	025267	117	040	101	
	025272	040	123	111	
	025275	116	107	114	
	025300	105	040	114	
	025303	111	116	105	
	025306	040	111	116	
	025311	124	105	122	
	025314	106	101	103	
	025317	105	077	040	
	025322	076	076	000	
27	025325	012	015	105	GPMSG: .ASCIIZ <12><15>/ENTER INTERFACE CHANNEL NUMBER FOR THE PRINTER. (0-7) >>/
	025330	116	124	105	
	025333	122	040	111	
	025336	116	124	105	
	025341	122	106	101	
	025344	103	105	040	
	025347	103	110	101	
	025352	116	116	105	
	025355	114	040	116	
	025360	125	115	102	
	025363	105	122	040	
	025366	106	117	122	
	025371	040	124	110	
	025374	105	040	120	
	025377	122	111	116	
	025402	124	105	122	
	025405	056	040	050	

## HARDWARE PARAMETER CODING SECTION

	025410	060	055	067	
	025413	051	040	076	
	025416	076	000		
28					
29	025420	040	012	015	GPD2MS: .ASCII / /<12><15>
30	025423	103	110	117	.ASCII /CHOOSE PAGE WIDTH FOR PRINTER/<12><15>
	025426	117	123	105	
	025431	040	120	101	
	025434	107	105	040	
	025437	127	111	104	
	025442	124	110	040	
	025445	106	117	122	
	025450	040	120	122	
	025453	111	116	124	
	025456	105	122	012	
	025461	015			
31	025462	103	110	117	.ASCII /CHOOSE ONE: 1) 80 CHARACTERS PER PRINTER LINE/<15><12>
	025465	117	123	105	
	025470	040	117	116	
	025473	105	072	040	
	025476	040	061	051	
	025501	040	040	070	
	025504	060	040	103	
	025507	110	101	122	
	025512	101	103	124	
	025515	105	122	123	
	025520	040	120	105	
	025523	122	040	120	
	025526	122	111	116	
	025531	124	105	122	
	025534	040	114	111	
	025537	116	105	015	
	025542	012			
32	025543	040	040	040	.ASCII / 2) 132 CHARACTERS PER PRINTER LINE/<15><12>
	025546	040	040	040	
	025551	040	040	040	
	025554	040	040	040	
	025557	040	062	051	
	025562	040	061	063	
	025565	062	040	103	
	025570	110	101	122	
	025573	101	103	124	
	025576	105	122	123	
	025601	040	120	105	
	025604	122	040	120	
	025607	122	111	116	
	025612	124	105	122	
	025615	040	114	111	
	025620	116	105	015	
	025623	012			
33	025624	050	061	054	.ASCIIZ / (1,2) >>/
	025627	062	051	040	
	025632	076	076	000	
34					.EVEN
35					
36	025636				\$PATCH: .BLKW 100; (ADJUST SIZE OF PATCH AREA UNTIL)
37					

HARDWARE PARAMETER CODING SECTION

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026036

026036 000000  
026040 000000  
026042

:

(LASTAD + 27264 HAS BIT 7 CLEAR )

LASTAD

LSLAST::

.EVEN  
.WORD 0  
.WORD 0

HARDWARE PARAMETER CODING SECTION

1 026042 .  
2

000001

.END

ENDMOD

## SYMBOL TABLE

ABORT	015714	CHRCNT	010064	CSQIO =	000377	EMPTYR	016662	FSRPT =	000012
ABSND	017220	CHRL00	020402	CSRDBU=	000007	EMPTZ3	016364	FSSEG =	000003
ABS5	017430	CHRL06	021376	CSREFG=	000047	EMP4	017176	FSSOFT=	000005
ACAS	006535	CHRLST	006555	CSRESE=	000033	EMP5	017406	FSSRV =	000010
ADR =	000020	CLEART	023176	CSREVI=	000003	ENDC	023342	FSSUB =	000002
AGN	021150	CNTNU	013504	CSRFLA=	000021	ENDD	025020	FSSW =	000014
ALPHA	013532	COIE	013474	CSRPT =	000025	ENDIN	016700	FSTEST=	000001
ASSEMB=	000010	CONTLO	014230	CSSEFG=	000046	EOT	006515	GETCHR	014126
ASSMA	024412	CONVRT	014314	CSSPRI=	000041	ERMSGB	007316	GPAMSG	025070
AUTCAL	022376	CR	002313	CSSEVC=	000037	FRRBLK	010100	GPDMMSG	025325
AUTOLD	022404	CRCLX	015264	CSSTPRI=	000013	ERRMSG	010076	GPDMMS	025420
AUTOLE	022410	CRNTPR	006502	DASHES	006542	ERRNBR	010074	GPLMSG	025242
BASET	005262	CRNTSK	002176	DCUPA	015560	ERRORS	015360	GREASE	002206
BAUDRT	005250	CSRADD	002200	DDCUPA	015612	ERRTYP	010072	GTNUM	023352
BAUTBL	006464	CTLZ	006524	DELAYS	015336	ERSETT	014276	GSCNTO=	000200
BETA	013514	C\$AU =	000052	DELCNT	010054	ERWORD	006500	G\$DELM=	000372
BFRA	007352	C\$AUTO=	000061	DFAIL	005256	ESCAPE	006521	G\$DISP=	000003
BFRB	010030	C\$BRK =	000022	DFAULT	017144	EVL -	000004	G\$EXCP=	000400
BFRC	010032	C\$BSEG=	000004	DFPTBL	002160	EXETS	013614	G\$HILI=	000002
BFRD	010034	C\$BSUB=	000002	DIAGMC=	000000	EXIT	022402	G\$LOLI=	000001
BIDIRP	012742	C\$CEFG=	000045	DIRCTN	006504	EXITA	023054	G\$NO =	000000
BIT0 -	000001	C\$CLCK=	000062	DLDFLT	005252	EXITE	014304	G\$OFFS=	000400
BIT00 =	000001	C\$CLEA=	000012	DLSET	016714	EXITON	014120	G\$OF SI=	000376
BIT01 =	000002	C\$CLOS=	000035	DONEDF	017562	EXITS	013644	G\$PRMA=	000001
BIT02 =	000004	C\$CLP1=	000006	DOSPCS	024416	EXITSR	015330	G\$PRMD=	000002
BIT03 =	000010	C\$CVEC=	000036	DUMMYS	002214	EXITX	013366	G\$PRML=	000000
BIT04 -	000020	C\$DCLN=	000044	DZDCOD	017332	EXIT11	022632	G\$RADA=	000140
BIT05 -	000040	C\$DODU=	000051	DZDFLT	005254	EXTMCR	015562	G\$RADB=	000000
BIT06 =	000100	C\$DRPT=	000024	DZSET	017004	E\$END =	002100	G\$RADD=	000040
BIT07 =	000200	C\$DU =	000053	ECNRB -	020000	E\$LOAD=	000035	G\$RADL=	000120
BIT08 -	000400	C\$EDIT=	000003	EDFMA	011230	FAILDF	017540	G\$RADO=	000020
BIT09 =	001000	C\$ERDF=	000055	EDFMB	011331	FAILDL	012141	G\$XFER=	000004
BIT1 -	000002	C\$ERHR=	000056	EDFMC	011464	FAILDZ	012236	G\$YES =	000010
BIT10 -	002000	C\$ERRO=	000060	EDFMD	011540	FAILM	011622	HEXA =	000052
BIT11 -	004000	C\$ERSF=	000054	EDFM0	010361	FBTM	007203	HEXB =	000053
BIT12 =	010000	C\$ERSO=	000057	EDFM1	010422	FIVE -	000045	HEXC =	000054
BIT13 -	020000	C\$ESCA=	000010	EDFM2	010475	FLAGS	005260	HEXD =	000055
BIT14 -	040000	C\$ESEG=	000005	EDFM3	010543	FLTRDY	006512	HEXE =	000056
BIT15 -	100000	C\$ESUB=	000003	EDFM4	010622	FOUR =	000044	HEXF =	000057
BIT2 -	000004	C\$ETST=	000001	EDFM5	010650	FRONT	006412	HITARG	010060
BIT3 -	000010	C\$EXIT=	000032	EDFM6	010677	FTYTPM	004654	HOE =	100000
BIT4 =	000020	C\$GETB=	000026	EDFM7	010755	FWRDO	013200	HRZTLS	002233
BIT5 -	000040	C\$GETW=	000027	EDFM8	011026	FXRDYM	012333	HZTLSP	002212
BIT6 -	000100	C\$GMAN=	000043	EDFM9	011175	F\$AU =	000015	IBE =	010000
BIT7 =	000200	C\$GPHR=	000042	EF.CON=	000036	F\$AUTO=	000020	IDU =	000040
BIT8	000400	C\$GPLO=	000030	EF.NEW=	000035	F\$BGN -	000040	IER =	020000
BIT9 -	001000	C\$GPRI=	000040	EF.PWR=	000034	F\$CLEA=	000007	INFIN	016626
BOE =	000400	C\$INIT=	000011	EF.RES=	000037	F\$DU =	000016	INIERR	014600
BR2	006514	C\$INLP=	000020	EF.STA=	000040	F\$END =	000041	INITCD	014412
CALLDF	015776	C\$MANI=	000050	EIGHT =	000050	F\$HARD=	000004	INITLZ	015634
CALLDL	016012	C\$MEM =	000031	EIGHTY	016620	F\$HW =	000013	INLOOP	015344
CAN	006516	C\$MSG =	000023	ELSEX	014020	F\$INIT=	000006	INUPB	010070
CCOUNT	010066	C\$OPEN=	000034	EMPTI2	016060	F\$JMP =	000050	ISR =	000100
CHC2	024374	C\$PNTB=	000014	EMPTI3	016360	F\$MOD =	000000	IXE =	004000
CHC	024114	C\$PNTF=	000017	EMPTI4	017172	F\$MSG =	000011	I\$AU =	000041
CHKCAN	013570	C\$PNTS=	000016	EMPTI5	017402	F\$PROT=	000021	I\$AUTO=	000041
CHKNB	017732	C\$PNTX=	000015	EMPTL2	016064	F\$PWR =	000017	I\$LN =	000041

## SYMBOL TABLE

ISDU = 000041	L\$ERRT 010072 G	MNEB1 010046	PGMCTR 007314	SETUPI 014626
ISHRD = 000041	L\$ETP 002102 G	MNEB2 010047	PLOC 002204	SET15 015314
ISINIT= 000041	L\$EXP1 002046 G	MNEB3 010050	PLOOP 020072	SEVEN = 000047
ISMOD = 000041	L\$EXP4 002064 G	MSGADD 005244	PLOOPC 023220	SIX = 000046
ISMSG = 000041	L\$EXP5 002066 G	MXLF = 002000	PLOOP9 022130	SKPA4 002172
ISPROT= 000040	L\$HARD 025024 G	NDATA 010056	PNT = 001000 G	SKP11 002174
ISPTAB= 000041	L\$HIME 002120 G	NEWMOD 020152	PRARCH 023344	SKP14 002170
ISPRW = 000041	L\$HPCP 002016 G	NEXTU 015662	PRI = 002000 G	SLFTST 002255
ISRPT = 000041	L\$HPTP 002022 G	NINE = 000051	PRI00 = 000000 G	SLTPFF 002276
ISSEG = 000041	L\$HW 002160 G	NONDTA 013106	PRI01 = 000040 G	SNGCHR 006522
ISSETU= 000041	L\$IICP 002104 G	NONDT2 016214	PRI02 = 000100 G	SNGLP 025070
ISSRV = 000041	L\$INIT 015634 G	NONDT3 016250	PRI03 = 000140 G	SPACE 006541
ISSUB = 000041	L\$LADP 002026 G	NONDZA 016406	PRI04 = 000200 G	SPCSIZ 010036
ISTST = 000041	L\$LAST 026042 G	NONDZ2 016514	PRI05 = 000240 G	STATS 015132
JENDIN 015716	L\$LOAD 002100 G	NONDZ3 016550	PRI06 = 000300 G	STATUS 002315
JUNKPL 006440	L\$LUN 002074 G	NOPRTM 014166	PRI07 = 000340 G	STCHSZ 002244
J\$JMP - 000167	L\$MREV 002050 G	NOTQ 023024	PRMPTA 003200	STHTCT 002257
LCHYET 012732	L\$NAME 002000 G	NOT1 023406	PRMPTC 003466	STLNSZ 002251
LF 002314	L\$PRIO 002042 G	NPRMPT 004531	PRMPTD 004046	STPGSZ 002271
LINCNT 010062	L\$PROT 015626 G	NULL 006420	PRNTIT 017726	STRTUP 015722
LINCOD 016570	L\$PRT 002112 G	NUM1 = 000001	PRTBMO 010230	STSCAL 017760
LINLOO 020340	L\$REPP 002062 G	NUM10 = 000012	PRTM2 016472	STSERR 015106
LINLO6 021372	L\$REV 002010 G	NUM11 = 000013	PRTXMO 010302	STSPSZ 002262
LINN 010040	L\$RPT 015620 G	NUM12 = 000014	PSZA4 002322	STSRES 002210
LINSIZ 010042	L\$SPC 002056 G	NUM13 = 000015	PSZ11 002325	STULMD 002266
LNELOO 012746	L\$SPCP 002020 G	NUM14 = 000016	PSZ14 002330	SVCGBL= 000000
LODELY 015016	L\$SPTP 002024 G	NUM15 = 000017	RANDOM 015040	SVCINS= 000001
LOE = 040000 G	L\$STA 002030 G	NUM2 = 000002	RBUF 007302	SVCSUB= 000001
LOGUNI 002202	L\$TEST 002114 G	NUM3 = 000003	RCSR 007276	SVCTAG= 000001
LOOPA 022726	L\$TML 002014 G	NUM4 = 000004	REAR 006415	SVCTST= 000001
LOOPCK 014040	L\$UNIT 002012 G	NUM5 = 000005	RESET 002224	\$SYM= 010000
LOOPG 014142	L1LOOP 020656	NUM6 = 000006	RESETC 014426	TAMAN 022644
LOOPXN 013674	L10000 002170	NUM7 = 000007	RESINN 013430	TBLOT 022304
LOOPB 021762	L10001 012630	NUM8 = 000010	REVRSP 021610	TBMANB 022204
LOT = 000010 G	L10002 015624	NUM9 = 000011	RIBPOS 002240	TCMAN 023070
LOUEF 014472	L10004 017564	NXTA 022750	RTYTPM 005014	TCR 007310
LPR 007306	L10005 016712	NXTBIT 015404	SCA 006531	TCRENA 006436
LPRINI 006442	L10006 017566	NXTERM 015506	SCB 006527	TCRTBL 006444
L\$ACP 002110 G	L10007 017630	NXTLIN 021554	SCC 006526	TDMAN 023776
L\$APT 002036 G	L10010 017764	ONE = 000041	SCQ 006525	TDR 007312
L\$AUT 002070 G	L10011 020222	OPTN1 003351	SCX 006530	TESTA 022634
L\$AUTO 017566 G	L10012 020506	OUTCTR 006506	SCO 006532	TESTB 022174
L\$CCP 002106 G	L10013 021040	OUTRLP 014140	SC1 006533	TESTC 023060
L\$CLEA 017570 G	L10014 021262	OUTSDC 006510	SEED1 006424	TESTD 023766
L\$CO 002032 G	L10015 021444	OUTSDL 013666	SEED2 006426	TEST1 017632
L\$DEPO 002011 G	L10016 021644	O\$APTS= 000000	SELECT 024254	TEST2 017766
L\$DESC 010150 G	L10017 022010	O\$AU = 000000	SENCHR 013402	TEST3 020224
L\$DESP 002076 G	L10020 022172	O\$BGNR= 000000	SENCH2 013412	TEST4 020510
L\$DEVP 002060 G	L10021 022402	O\$BGNS= 000000	SENCLP 013434	TEST5 021042
L\$DISP 002124 G	L10022 023056	O\$DU = 000000	SENDR 014256	TEST6 021264
L\$DLY 002116 G	L10023 023342	O\$ERRT= 000001	SENDR2 013334	TEST7 021446
L\$DTP 002040 G	L10024 025020	O\$GNSW= 000000	SENDX 013724	TEST8 021646
L\$DTYP 002034 G	L10025 025070	O\$POIN= 000001	SETCHO 002310	TEST9 022012
L\$DUT 002072 G	MAKE11 024170	O\$SETU= 000000	SETER 013632	IFCZ 023000
L\$DVT 010102 G	MANLD 022524	O\$PALPHA 015306	SETHO 002303	THREE = 000043
L\$EF 002052 G	MANIF 022544	PERIOD 006534	SETONE 020140	TIMOM 012526
L\$ENVI 002044 G	MLTLIN 010052	P\$MI 016172	SFTUPC 016274	TITLEA 003115

SYMBOL TABLE

TITLEB	003264	TWO =	000042	T\$TAGL=	177777	T11PMT	004346	UBTRAP	016704 G
TITLEC	003717	T\$ARGC=	000001	T\$TAGN=	010026	T12	023060 G	UCRB =	010000
TITLED	003773	T\$MODE=	002032	T\$TEMP=	000000	T13	023766 G	VRTCLS	002226
TITLE1	002333	T\$ERRN=	000000	T\$TEST=	000015	T2	017766 G	WAITMX	011432
TITLE2	002366	T\$EXCP=	000000	T\$TSTM=	177777	T2LOT	020066	WAITXN	013656
TITLE3	002446	T\$FLAG=	000040	T\$TSTS=	000001	T3	020224 G	WFC	012430
TITLE4	002513	T\$GMAN=	000000	T\$\$AUT=	010006	T3LOT	020324	WTSTPM	005154
TITLE5	002564	T\$HILI=	000007	T\$\$CLE=	010007	T4	020510 G	XBUF	007304
TITLE6	002645	T\$LAST=	000001	T\$\$HAR=	010025	T4LOT	020610	XCSR	007300
TITLE7	002725	T\$LOLI=	000000	T\$\$HW =	010000	T5	021042 G	XMIT	012632
TITLE8	002772	T\$LSYM=	010000	T\$\$INI=	010004	T5LOT	021142	XOFF	006517
TITLE9	003046	T\$LTNO=	000015	T\$\$MSG=	010001	T6	021264 G	XON	006520
TMPLT1	006430	T\$NEST=	177777	T\$\$PRO=	010003	T6LOT	021364	XSTR	012704
TMPLT2	006432	T\$NSO =	000000	T\$\$RPT=	010002	T7	021446 G	X\$ALWA=	000000
TMPLT3	006434	T\$NS1 =	000004	T\$\$SRV=	010005	T7LOT	021546	X\$FALS=	000040
TOPSTK	010026	T\$NS2 =	000010	T\$\$TES=	010024	T8	021646 G	X\$OFFS=	000400
TRDYBT	010044	T\$PTNU=	000000	T1	017632 G	T8LOT	021746	X\$TRUE=	000020
TRNSMT	024232	T\$SAVL=	177777	T1LOT	017674	T9	022012 G	ZERO	000040
TRXADD	005246	T\$SEGL=	177777	T10	022174 G	T9LOT	022112	\$PATCH	025636 G
TRYAGN	C15042	T\$SUBN=	000000	T11	022634 G	JAM =	000200 G		

. ABS. 026042 000  
000000 001

ERRORS DETECTED: 0

VIRTUAL MEMORY USED: 20966 WORDS ( 82 PAGES)  
DYNAMIC MEMORY AVAILABLE FOR 69 PAGES  
ZLQPB.BIN,CZLQPB.SEO/C/N:TOC=SV034R.MLB,CZLQPB.P11











## CROSS REFERENCE TABLE (CREF V01-05 )

F\$HW	2-7#	4-9	4-17											
F\$INIT	2-7#	23-7	23-523											
F\$JMP	2-7#	8-12	8-12	21-10	21-10	23-193	24-19							
F\$MOD	2-7#	2-8	41-1											
F\$MSG	2-7#	8-9	8-16											
F\$PROT	2-7#	22-7	22-13											
F\$PWR	2-7#													
F\$RPT	2-7#	21-8	21-14											
F\$SEG	2-7#													
F\$SOFT	2-7#													
F\$SRV	2-7#	23-225	23-229											
F\$SUB	2-7#													
F\$SW	2-7#													
F\$TEST	2-7#	25-5	25-47	26-4	26-63	27-8	27-77	28-4	28-89	29-3	29-70	30-4	30-59	31-4
	31-66	32-5	32-55	33-3	33-59	34-3	34-71	37-2	37-75	38-4	38-86	39-4	39-183	
FAILDF	23-469	23-497	23-504	23-511#										
FAILDL	7-185#	23-57	23-87	23-93										
FAILDZ	7-186#	23-118	23-149	23-155										
FAILM	7-179#	23-511												
FBTM	6-354#	39-122	39-165											
FIVE	5-12#													
FLAGS	6-154#	25-21*	25-22	26-20*	26-21	27-29*	27-30	28-27*	28-28	29-32*	29-33	30-27*	30-28	31-23*
	31-24	32-26*	32-27	33-26*	33-27	34-34*	34-35							
FLTRDY	6-310#	11-100*	20-74	20-80	23-41*	23-73*	23-81	23-135*	23-143	23-436*	23-462*	23-487*		
FOUR	5-11#	10-136	10-161											
FRONT	6-258#	38-49	39-76	39-77	39-79									
F TYTPM	6-139#	39-87												
FWRDO	10-113	10-175#												
FXRDYM	7-187#	20-76	20-82											
G\$CNTO	2-7#													
G\$DELM	2-7#													
G\$DISP	2-7#													
G\$EXCP	2-7#													
G\$HILI	2-7#													
G\$LOLI	2-7#													
G\$NO	2-7#	37-37												
G\$OFFS	2-7#	34-59	36-38	37-37	38-37	39-28	40-13	40-14	40-15	40-17				
G\$OFFSI	2-7#	34-59	36-38	37-37	38-37	39-28	40-13	40-14	40-15	40-17				
G\$PRMA	2-7#	40-14												
G\$PRMD	2-7#	34-59	36-38	37-37	38-37	39-28	40-13	40-17						
G\$PRML	2-7#	40-15												
G\$RADA	2-7#	34-59	36-38	37-37	38-37	39-28								
G\$RADB	2-7#													
G\$RADD	2-7#													
G\$RADL	2-7#	40-15												
G\$RADO	2-7#	40-13	40-14	40-17										
G\$XFER	2-7#	40-16												
G\$YES	2-7#	34-59	36-38	38-37	39-28	40-13	40-14	40-15	40-17					
GETCHR	12-50	12-60	12-63	12-64	12-66	12-67	13-34#	15-73	15-77	15-81	15-85	15-90	15-94	17-52
	17-56	17-61	17-69	17-83	23-90	23-96	23-97	23-98	23-99	23-152	23-158	23-159	23-160	23-161
	23-449	23-454	23-455	23-456	23-457	23-499	23-505	23-506	23-507	23-508	25-38			
GPAMSG	40-14	40-23#												
GPD2MS	40-13	40-29#												
GPDMSG	40-17	40-27#												
GPLMSG	40-15	40-26#												
GREASE	6-20#	10-85*	10-88	10-122	10-128	10-133	10-139	10-146	10-183	10-189	10-194	10-200	10-207	10-215
	11-84	11-101*	12-74*	17-93*	23-42*	23-74*	23-136*	23-437*	23-463*	23-488*	25-32			



## CROSS REFERENCE TABLE (CREF V01-05 )

L\$DISP	2-24	3-5#	
L\$DLY	2-24#		
L\$DTP	2-24#		
L\$DTYP	2-24#		
L\$DUT	2-24#		
L\$DVTY	2-24	7-11#	
L\$EF	2-24#		
L\$ENVI	2-24#		
L\$ERRT	2-24	6-445#	
L\$ETP	2-24#		
L\$EXP1	2-24#		
L\$EXP4	2-24#		
L\$EXP5	2-24#		
L\$HARD	2-24	40-11	40-1 #
L\$HIME	2-24#		
L\$HPCP	2-24#		
L\$HPTP	2-24#		
L\$HW	2-24	4-9	4-9#
L\$ICP	2-24#		
L\$INIT	2-24	23-7#	
L\$LADP	2-24#		
L\$LAST	2-24	40-41#	
L\$LOAD	2-24#		
L\$LUN	2-24#		
L\$MREV	2-24#		
L\$NAME	2-24#		
L\$PRIO	2-24#		
L\$PROT	2-24	22-7#	
L\$PRT	2-24#		
L\$REPP	2-24#		
L\$REV	2-24#		
L\$RPT	21-8#		
L\$SPC	2-24#		
L\$SPCP	2-24#		
L\$SPTP	2-24#		
L\$STA	2-24#		
L\$TEST	2-24#		
L\$TIML	2-24#		
L\$UNIT	2-24#	23-28	
L10000	4-9	4-17#	
L10001	8-12	8-16#	
L10002	21-10	21-14#	
L10004	23-193	23-523#	
L10005	23-229#		
L10006	23-529#		
L10007	24-19	24-24#	
L10010	25-47#		
L10011	26-63#		
L10012	27-77#		
L10013	28-89#		
L10014	29-70#		
L10015	30-59#		
L10016	31-66#		
L10017	32-55#		
L10020	33-59#		
L10021	34-71#		
L10022	37-75#		













CROSS REFERENCE TABLE (.REF V01-05 )

TSEXCP	34-59 40-17	34-59# 40-17#	36-38	36-38#	37-37	37-37#	38-37	38-37#	39-28	39-28#	40-13	40-13#	40-14	40-14#	
TFLAG	8-12	8-12#	8-12#	21-10	21-10#	21-10#	23-193	23-193	23-193#	23-193#	24-19	24-19	24-19#	24-19#	
TSGMAN	2-7# 39-28#	34-59 39-28#	34-59#	34-59#	36-38	36-38#	36-38#	37-37	37-37#	37-37#	38-37	38-37#	38-37#	39-28	
TSHILI	34-59 40-17	34-59# 40-17#	36-38	36-38#	37-37	37-37#	38-37	38-37#	39-28	39-28#	40-13	40-13#	40-14	40-14#	
TSLAST	2-7#	40-41#													
TLOLI	34-59 40-17	34-59# 40-17#	36-38	36-38#	37-37	37-37#	38-37	38-37#	39-28	39-28#	40-13	40-13#	40-14	40-14#	
TLSYM	2-7 30-59	2-7# 31-66	4-17	8-16	21-14	23-229	23-523	23-529	24-24	25-47	26-63	27-77	28-89	29-70	
TSLT.J	40-41#														
TNEST	2-7# 8-16 22-13 23-523 24-24 26-63 28-89 30-59 32-55 34-71 38-86 40-16	2-8 8-16 22-13 23-523 24-24 26-63 28-89 30-59 32-55 34-71 38-86 40-19	2-8 8-16 22-13 23-523 24-24 26-63 28-89 30-59 32-55 34-71 38-86 40-19	2-8# 8-16# 22-13# 23-523# 24-24# 26-63# 28-89# 30-59# 32-55# 34-71# 38-86# 40-19	4-9 21-8 23-7 23-527 25-5 27-8 29-3 31-4 33-3 37-2 39-4 40-19#	4-9 21-8 23-7 23-527 25-5 27-8 29-3 31-4 33-3 37-2 39-4 41-1	4-9# 21-8# 23-7# 23-527# 25-5# 27-8# 29-3# 31-4# 33-3# 37-2# 39-4# 41-1	4-17 21-14 23-225 23-529 25-47 27-77 29-70 31-66 33-59 37-75 39-183 41-1	4-17 21-14 23-225 23-529 25-47 27-77 29-70 31-66 33-59 37-75 39-183 41-1#	4-17 21-14 23-225# 23-529# 25-47# 27-77# 29-70# 31-66# 33-59# 37-75# 39-183# 40-11	4-17# 21-14# 23-225# 23-529# 25-47# 27-77# 29-70# 31-66# 33-59# 37-75# 39-183# 40-11	8-9 22-7 23-229 24-7 26-4 28-4 30-4 32-5 34-3 38-4 40-11	8-9 22-7 23-229 24-7 26-4 28-4 30-4 32-5 34-3 38-4 40-11	8-9# 22-7# 23-229# 24-7# 26-4# 28-4# 30-4# 32-5# 34-3# 38-4# 40-11#	
TNSO	2-8#	41-1													
TNS1	4-9# 25-5# 32-5# 40-19	4-17 25-47 32-55	8-9# 26-4# 33-3#	8-16 26-63 33-59	21-8# 27-8# 34-5#	21-14 27-77 34-71	22-7# 28-4# 37-2#	22-13 28-89 37-75	23-7# 29-3# 38-4#	23-523 29-70 38-86	23-527# 30-4# 39-4#	23-529 30-59 39-183	24-7# 31-4# 40-11#	24-24 31-66 40-16	
TNS2	23-225#	23-229													
TPTNU	2-7#														
TSAVL	2-7#														
TSEGL	2-7#														
TSSUBN	2-7#	25-5#	26-4#	27-8#	28-4#	29-3#	30-4#	31-4#	32-5#	33-3#	34-3#	37-2#	38-4#	39-4#	
TSTAGL	2-7#														
TSTAGN	2-7# 23-7 26-4 30-4# 37-2	4-9 23-7# 26-4 31-4 37-2#	4-9 23-225 26-4# 31-4 38-4	4-9# 23-225 27-8 31-4# 38-4	8-9 23-225# 27-8 32-5 38-4#	8-9 23-527 27-8# 32-5 39-4	8-9# 23-527 28-4 32-5# 39-4	21-8 23-527# 28-4 33-3 39-4#	21-8 24-7 28-4# 33-3 40-11	21-8# 24-7 28-4# 33-3# 40-11	22-7 24-7# 29-3 34-3 40-11#	22-7 25-5 29-3# 34-3 40-11#	22-7# 25-5 30-4 34-3# 40-11#	23-7 25-5# 30-4 37-2	
TTEMP	3-5 3-5 3-5# 8-12 23-523 28-89 34-59 37-37 39-28 40-14 40-17	3-5 3-5 3-5# 8-12# 23-523# 28-89# 34-59# 37-37# 39-28 40-14 40-17#	3-5 3-5 3-5# 8-16 23-529 29-70 34-59# 37-37#	3-5 3-5 3-5# 8-16# 23-529# 29-70# 34-59# 37-37#	3-5 3-5 3-5# 21-10 24-19 30-59 34-71 37-75	3-5 3-5 3-5# 21-10# 24-19# 30-59# 34-71# 37-75	3-5 3-5 3-5# 21-14 24-24 31-66 36-38 37-75	3-5 3-5 3-5# 21-14# 24-24# 31-66# 36-38 38-37	3-5 3-5 3-5# 22-13 24-24# 31-66# 36-38 39-183	3-5 3-5 3-5# 22-13# 25-47 32-55 36-38 39-183#	3-5 3-5 3-5# 23-193 26-63 33-59 36-38# 38-37#	3-5 3-5 3-5# 23-193# 26-63# 33-59# 36-38# 38-37#	3-5 3-5 3-5# 23-229 27-77 34-59 36-38# 38-37#	3-5 3-5 3-5# 23-229# 27-77# 34-59# 36-38# 38-86	3-5 3-5 3-5# 23-229# 27-77# 34-59# 36-38# 38-86#
TSTEST	2-7# 29-3 34-3	25-5 29-3# 34-3	25-5 30-4 37-2	25-5# 30-4 37-2	26-4 30-4# 37-2	26-4 31-4 37-2#	26-4# 31-4 38-4	27-8 31-4# 38-4	27-8 32-5 39-4	27-8# 32-5# 39-4#	27-8 32-5 39-4	27-8# 32-5# 39-4	28-4 33-3 39-4#	28-4 33-3# 39-4#	
TSTSM	2-7# 20-82	8-16 2-14	11-48 23-19	11-56 23-22	12-47 23-30	12-54 23-33	12-89 23-36	13-47 23-57	13-57 23-58	20-59 23-87	20-61 23-88	20-62 23-93	20-76 23-94	20-78 23-1#	









## CROSS REFERENCE TABLE (CREF V01-05 )

ENDSUB	1-596#	2-7#												
ENDSW	1-614#	2-7#												
ENDTST	1-624#	2-7#	25-47	26-63	27-77	28-89	29-70	30-59	31-66	32-55	33-59	34-71	37-75	38-86
	39-183													
EQUALS	1-642#	2-7#	5-2											
ERRDF	1-714#	2-7#												
ERRHRD	1-718#	2-7#												
ERROR	1-722#	2-7#	20-59											
ERRSF	1-726#	2-7#												
ERRSOF	1-730#	2-7#												
ERRTBL	1-734#	2-7#	6-445											
ESCAPE	1-744#	2-7#												
EXIT	1-771#	2-7#	8-12	21-10	23-193	24-19								
FEQUAL	1-810#	2-7#												
GETBYT	1-824#	2-7#												
GETPRI	1-834#	2-7#												
GETWOR	1-829#	2-7#												
GMANIA	1-839#	2-7#												
GMANID	1-848#	2-7#	34-59	36-38	37-37	38-37	39-28							
GMANIL	1-859#	2-7#												
GPHARD	1-868#	2-7#	23-30											
GPRMA	1-874#	2-7#	40-14											
GPRMD	1-903#	2-7#	34-59	34-59#	36-38	36-38#	37-37	37-37#	38-37	38-37#	39-28	39-28#	40-13	40-17
GPRML	1-934#	2-7#	40-15											
HEADER	1-954#	2-7#	2-24											
INLOOP	1-962#	2-7#												
IOSETU	1-966#	2-7#												
IOSTAR	1-974#	2-7#												
KT11	1-982#	2-7#												
LASTAD	1-:47#	2-7#	40-41											
MSBYTE	1-D00#	2-7#	2-24	2-24	2-24	2-24#								
MSCHEC	1-E18#	2-7#	8-12	8-12#	21-10	21-10#	23-193	23-193#	24-19	24-19#				
MSCNTO	1-E82#	2-7#	34-59	34-59#	36-38	36-38#	37-37	37-37#	38-37	38-37#	39-28	39-28#	40-13	40-13#
	40-14	40-14#	40-15	40-15#	40-17	40-17#								
MSCOUN	1-D66#	2-7#	11-56	11-56#	12-89	12-89#	13-57	13-57#	20-61	20-61#	20-62	20-62#	20-76	20-76#
	20-82	20-82#	23-57	23-57#	23-87	23-87#	23-93	23-93#	23-118	23-118#	23-149	23-149#	23-155	23-155#
	23-511	23-511#	25-25	25-25#	26-24	26-24#	27-33	27-33#	28-31	28-31#	29-36	29-36#	30-31	30-31#
	31-27	31-27#	32-30	32-30#	33-30	33-30#	34-38	34-38#	36-36	36-36#	37-27	37-27#	38-27	38-27#
	39-25	39-25#												
MSDATA	1-867#	2-7#	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24
	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24
	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24	2-24
	7-11#	7-17	7-17#											7-11
MSDECR	1-D29#	2-7#	4-17	4-17#	8-16	8-16#	21-14	21-14#	22-13	22-13#	23-229	23-229#	23-523	23-523#
	23-529	23-529#	24-24	24-24#	25-47	25-47#	26-63	26-63#	27-77	27-77#	28-89	28-89#	29-70	29-70#
	30-59	30-59#	31-66	31-66#	32-55	32-55#	33-59	33-59#	34-71	34-71#	37-75	37-75#	38-86	38-86#
	39-183	39-183#	40-19	40-19#	41-1	41-1#								
MSDEFA	1-E70#	2-7#	34-59	34-59#	36-38	36-38#	37-37	37-37#	38-37	38-37#	39-28	39-28#	40-13	40-13#
	40-14	40-14#	40-15	40-15#	40-17	40-17#								
MSENDE	1-D74#	2-7#	4-17#	8-16#	21-14#	23-229#	23-523#	23-529#	24-24#	25-47#	26-63#	27-77#	28-89#	29-70#
	30-59#	31-66#	32-55#	33-59#	34-71#	37-75#	38-86#	39-183#	40-19#	41-1#				
MSERRI	1-249#	2-7#												
MSESCA	1-D06#	2-7#												
MSESCS	1-D10#	2-7#												
MSEXCP	1-E01#	2-7#	34-59	34-59	34-59#	36-38	36-38	36-38#	37-37	37-37	37-37#	38-37	38-37	38-37#
	39-28	39-28	39-28#	40-13	40-13	40-13#	40-14	40-14	40-14#	40-17	40-17	40-17#		
MSEXIT	1-D14#	2-7#	8-12#	21-10#	23-193	23-193#	24-19	24-19#						



CROSS REFERENCE TABLE (CREF V01-05 )

	26-24#	26-24#	26-63	26-63#	27-29	27-29	27-29#	27-29#	27-33	27-33	27-33	27-33	27-33	27-33#
	27-33#	27-33#	27-33#	27-77	27-77#	28-27	28-27	28-27#	28-27#	28-31	28-31	28-31	28-31	28-31
	28-31#	28-31#	28-31#	28-31#	28-89	28-89#	29-32	29-32	29-32#	29-32#	29-36	29-36	29-36	29-36
	29-36	29-36#	29-36#	29-36#	29-36#	29-70	29-70#	30-27	30-27	30-27#	30-27#	30-31	30-31	30-31
	30-31	30-31	30-31#	30-31#	30-31#	30-31#	30-59	30-59#	31-23	31-23	31-23#	31-23#	31-27	31-27
	31-27	31-27	31-27	31-27#	31-27#	31-27#	31-66	31-66#	32-26	32-26	32-26#	32-26#	32-30	32-30
	32-30	32-30	32-30	32-30	32-30#	32-30#	32-30#	32-30#	32-55	32-55#	33-26	33-26	33-26#	33-26#
	33-30	33-30	33-30	33-30	33-30#	33-30#	33-30#	33-30#	33-59	33-59#	34-28	34-28#	34-29	34-29
	34-29#	34-34	34-34	34-34#	34-34#	34-38	34-38	34-38	34-38	34-38#	34-38#	34-38#	34-38#	34-38#
	34-59	34-59	34-59	34-59	34-59	34-59	34-59	34-59#	34-59#	34-59#	34-59#	34-59#	34-71	34-71#
	36-36	36-36	36-36	36-36	36-36	36-36#	36-36#	36-36#	36-38	36-38	36-38	36-38	36-38	36-38
	36-38	36-38	36-38	36-38#	36-38#	36-38#	36-38#	37-21	37-21#	37-22	37-22#	37-27	37-27	37-27
	37-27	37-27	37-27#	37-27#	37-27#	37-27#	37-37	37-37	37-37	37-37	37-37	37-37	37-37	37-37
	37-37#	37-37#	37-37#	37-37#	37-75	37-75#	38-22	38-22#	38-23	38-23#	38-27	38-27	38-27	38-27
	38-27	38-27#	38-27#	38-27#	38-27#	38-37	38-37	38-37	38-37	38-37	38-37	38-37	38-37	38-37#
	38-37#	38-37#	38-37#	38-86	38-86#	39-20	39-20#	39-21	39-21#	39-25	39-25	39-25	39-25	39-25
	39-25#	39-25#	39-25#	39-25#	39-28	39-28	39-28	39-28	39-28	39-28	39-28	39-28	39-28#	39-28#
	39-28#	39-28#	39-183	39-183#	40-11	40-11#	40-13	40-13	40-13	40-13	40-13	40-13#	40-14	40-14
	40-14	40-14	40-14#	40-15	40-15	40-15	40-15#	40-16	40-16#	40-17	40-17	40-17	40-17	40-17
	40-17#	40-19	40-19#	40-41	40-41	40-41	40-41#	40-41#	40-41#					
MSGNLS	1-C13#	2-7#	34-59	34-59#	36-38	36-38#	37-37	37-37#	38-37	38-37#	39-28	39-28#		
MSGNSU	1-B98#	2-7#												
MSGNTA	1-B90#	2-7#	4-17	4-17#	8-16	8-16#	21-14	21-14#	23-229	23-229#	23-523	23-523#	23-529	23-529#
	24-24	24-24#	25-47	25-47#	26-63	26-63#	27-77	27-77#	28-89	28-89#	29-70	29-70#	30-59	30-59#
	31-66	31-66#	32-55	32-55#	33-59	33-59#	34-71	34-71#	37-75	37-75#	38-86	38-86#	39-183	39-183#
	40-19	40-19#												
MSGNTE	1-B94#	2-7#	25-5	25-5#	26-4	26-4#	27-8	27-8#	28-4	28-4#	29-3	29-3#	30-4	30-4#
	31-4	31-4#	32-5	32-5#	33-3	33-3#	34-3	34-3#	37-2	37-2#	38-4	38-4#	39-4	39-4#
M\$HAPT	1-A39#	2-7#	2-24	2-24#										
M\$HNP	1-B24#	2-7#	2-24	2-24#										
M\$INCR	1-D26#	2-7#	2-8	2-8#	4-9	4-9	4-9#	4-9#	8-9	8-9	8-9#	8-9#	8-16#	11-48#
	11-56#	12-47#	12-54#	12-89#	13-47#	13-57#	20-59#	20-61#	20-62#	20-76#	20-78#	20-82#	21-8	21-8
	21-8#	21-8#	21-14#	22-7	22-7	22-7#	22-7#	23-7	23-7	23-7#	23-7#	23-19#	23-22#	23-30#
	23-33#	23-36#	23-57#	23-58#	23-87#	23-88#	23-93#	23-94#	23-118#	23-119#	23-149#	23-150#	23-155#	23-156#
	23-183#	23-193#	23-225	23-225	23-225#	23-225#	23-511#	23-512#	23-523#	23-527	23-527#	23-527#	23-527#	23-529#
	24-7	24-7	24-7#	24-7#	24-19#	24-24#	25-5	25-5	25-5	25-5#	25-5#	25-5#	25-21#	25-25#
	25-47#	26-4	26-4	26-4	26-4#	26-4#	26-4#	26-20#	26-24#	26-63#	27-8	27-8	27-8	27-8#
	27-8#	27-8#	27-29#	27-33#	27-77#	28-4	28-4	28-4	28-4#	28-4#	28-27#	28-31#	28-89#	28-89#
	29-3	29-3	29-3	29-3#	29-3#	29-3#	29-32#	29-36#	29-70#	30-4	30-4	30-4	30-4#	30-4#
	30-4#	30-27#	30-31#	30-59#	31-4	31-4	31-4	31-4#	31-4#	31-4#	31-23#	31-27#	31-66#	32-5
	32-5	32-5	32-5#	32-5#	32-5#	32-26#	32-30#	32-55#	33-3	33-3	33-3	33-3#	33-3#	33-3#
	33-26#	33-30#	33-59#	34-3	34-3	34-3	34-3#	34-3#	34-3#	34-28#	34-34#	34-38#	34-59	34-59#
	34-59#	34-71#	36-36#	36-38	36-38#	36-38#	37-2	37-2	37-2	37-2#	37-2#	37-2#	37-21#	37-27#
	37-37	37-37#	37-37#	37-75#	38-4	38-4	38-4	38-4#	38-4#	38-4#	38-22#	38-27#	38-37	38-37#
	38-37#	38-86#	39-4	39-4	39-4	39-4#	39-4#	39-4#	39-20#	39-25#	39-28	39-28#	39-28#	39-183#
	40-11	40-11	40-11#	40-11#										
M\$IOSE	1-A00#	2-7#												
M\$LDRO	1-C42#	2-7#	23-19	23-19#	23-22	23-22#	23-30	23-30#	23-183	23-183#				
M\$MASK	1-a71#	2-7#												
M\$MCHI	1-4#	2-7	2-7#	2-7#										
M\$MCLO	1-a24#	2-7	2-7#	2-7#										
M\$MSK1	1-a77#	2-7#												
M\$POP	1-B81#	2-7#	4-17	4-17#	8-16	8-16#	21-14	21-14#	22-13	22-13#	23-229	23-229#	23-523	23-523#
	23-529	23-529#	24-24	24-24#	25-47	25-47#	26-63	26-63#	27-77	27-77#	28-89	28-89#	29-70	29-70#
	30-59	30-59#	31-66	31-66#	32-55	32-55#	33-59	33-59#	34-71	34-71#	37-75	37-75#	38-86	38-86#
	39-183	39-183#	40-19	40-19#	41-1	41-1#								
M\$PRIN	1-a36#	2-7#	11-56	11-56#	12-89	12-89#	13-57	13-57#	20-61	20-61#	20-62	20-62#	20-76	20-76#

CROSS REFERENCE TABLE (CREF V01-05)

	20-82	20-82#	23-57	23-57#	23-87	23-87#	23-93	23-93#	23-118	23-118#	23-149	23-149#	23-155	23-155#
	23-511	23-511#	25-25	25-25#	26-24	26-24#	27-33	27-33#	28-31	28-31#	29-36	29-36#	30-31	30-31#
	31-27	31-27#	32-30	32-30#	33-30	33-30#	34-38	34-38#	36-36	36-36#	37-27	37-27#	38-27	38-27#
	39-25	39-25#												
MSPUSH	1-@31#	2-7#	2-8	2-8#	4-9	4-9#	8-9	8-9#	21-8	21-8#	22-7	22-7#	23-7	23-7#
	23-225	23-225#	23-527	23-527#	24-7	24-7#	25-5	25-5#	26-4	26-4#	27-8	27-8#	28-4	28-4#
	29-3	29-3#	30-4	30-4#	31-4	31-4#	32-5	32-5#	33-3	33-3#	34-3	34-3#	37-2	37-2#
	38-4	38-4#	39-4	39-4#	40-11	40-11#								
MSPUT	1-C72#	2-7#	11-56	11-56	11-56#	11-56#	12-89	12-89#	13-57	13-57	13-57#	20-61	20-61	20-61
	20-61#	20-62	20-62	20-62	20-62#	20-62#	20-76	20-76#	20-82	20-82	20-82#	23-36	23-36	23-36
	23-36	23-36#	23-57	23-57	23-57#	23-57#	23-87	23-87#	23-93	23-93	23-93#	23-118	23-118	23-118#
	23-149	23-149	23-149#	23-155	23-155	23-155#	23-511	23-511#	23-511#	25-25	25-25#	26-24	26-24	26-24
	26-24#	27-33	27-33	27-33#	28-31	28-31#	28-31	28-31#	29-36	29-36#	30-31	30-31	30-31#	31-27
	31-27	31-27#	32-30	32-30	32-30#	32-30#	33-30	33-30#	33-30#	34-38	34-38#	36-36	36-36	36-36#
	37-27	37-27#	37-27#	38-27	38-27	38-27#	39-25	39-25#	39-25#					
MSPUT1	1-C81#	2-7#	11-56	11-56	11-56#	11-56#	12-89	12-89	12-89#	12-89#	13-57	13-57	13-57#	13-57#
	20-61	20-61	20-61	20-61#	20-61#	20-61#	20-62	20-62	20-62	20-62#	20-62#	20-62#	20-76	20-76
	20-76#	20-76#	20-82	20-82	20-82#	20-82#	23-36	23-36	23-36	23-36	23-36#	23-36#	23-36#	23-36#
	23-57	23-57	23-57#	23-57#	23-87	23-87	23-87#	23-87#	23-93	23-93	23-93#	23-93#	23-118	23-118
	23-118#	23-118#	23-149	23-149	23-149#	23-149#	23-155	23-155	23-155#	23-155#	23-511	23-511	23-511#	23-511#
	25-25	25-25	25-25#	25-25#	26-24	26-24	26-24#	26-24#	27-33	27-33	27-33#	27-33#	28-31	28-31
	28-31#	28-31#	29-36	29-36	29-36#	29-36#	30-31	30-31	30-31#	30-31#	31-27	31-27	31-27#	31-27#
	32-30	32-30	32-30#	32-30#	33-30	33-30	33-30#	33-30#	34-38	34-38	34-38#	34-38#	36-36	36-36
	36-36#	36-36#	37-27	37-27	37-27#	37-27#	38-27	38-27	38-27#	38-27#	39-25	39-25	39-25#	39-25#
M\$RADI	1-D77#	2-7#	34-59	34-59#	36-38	36-38#	37-37	37-37#	38-37	38-37#	39-28	39-28#	40-13	40-13#
	40-14	40-14#	40-15	40-15#	40-17	40-17#								
M\$RBRO	1-C52#	2-7#												
M\$RNRO	1-C62#	2-7#	23-30	23-30#	25-21	25-21#	26-20	26-20#	27-29	27-29#	28-27	28-27#	29-32	29-32#
	30-27	30-27#	31-23	31-23#	32-26	32-26#	33-26	33-26#	34-34	34-34#				
M\$SETS	1-D32#	2-7#	2-8	2-8#	4-9	4-9#	8-9	8-9#	21-8	21-8#	22-7	22-7#	23-7	23-7#
	23-225	23-225#	23-527	23-527#	24-7	24-7#	25-5	25-5#	26-4	26-4#	27-8	27-8#	28-4	28-4#
	29-3	29-3#	30-4	30-4#	31-4	31-4#	32-5	32-5#	33-3	33-3#	34-3	34-3#	37-2	37-2#
	38-4	38-4#	39-4	39-4#	40-11	40-11#								
M\$STAR	1-A33#	2-7#												
M\$SVC	1-C33#	2-7#	8-12#	8-16	8-16#	11-48	11-48#	11-56	11-56#	12-47	12-47#	12-54	12-54#	12-89
	12-89#	13-47	13-47#	13-57	13-57#	20-59	20-59#	20-61	20-61#	20-62	20-62#	20-76	20-76#	20-78
	20-78#	20-82	20-82#	21-10#	21-14	21-14#	23-19	23-19#	23-22	23-22#	23-30	23-30#	23-33	23-33#
	23-36	23-36#	23-57	23-57#	23-58	23-58#	23-87	23-87#	23-88	23-88#	23-93	23-93#	23-94	23-94#
	23-118	23-118#	23-119	23-119#	23-149	23-149#	23-150	23-150#	23-155	23-155#	23-156	23-156#	23-183	23-183#
	23-193	23-193#	23-511	23-511#	23-512	23-512#	23-523	23-523#	23-529	23-529#	24-19	24-19#	24-24	24-24#
	25-21	25-21#	25-25	25-25#	25-47	25-47#	26-20	26-20#	26-24	26-24#	26-63	26-63#	27-29	27-29#
	27-33	27-33#	27-77	27-77#	28-27	28-27#	28-31	28-31#	28-89	28-89#	29-32	29-32#	29-36	29-36#
	29-70	29-70#	30-27	30-27#	30-31	30-31#	30-59	30-59#	31-23	31-23#	31-27	31-27#	31-66	31-66#
	32-26	32-26#	32-30	32-30#	32-55	32-55#	33-26	33-26#	33-30	33-30#	33-59	33-59#	34-28	34-28#
	34-34	34-34#	34-38	34-38#	34-59	34-59#	34-71	34-71#	36-36	36-36#	36-38	36-38#	37-21	37-21#
	37-27	37-27#	37-37	37-37#	37-75	37-75#	38-22	38-22#	38-27	38-27#	38-37	38-37#	38-86	38-86#
	39-20	39-20#	39-25	39-25#	39-28	39-28#	39-183	39-183#						
M\$TLAB	1-C29#	2-7#	8-16#	11-48#	11-56#	12-47#	12-54#	12-89#	13-47#	13-57#	20-59#	20-61#	20-62#	20-76#
	20-78#	20-82#	21-14#	23-19#	23-22#	23-30#	23-33#	23-36#	23-57#	23-58#	23-87#	23-88#	23-93#	23-94#
	23-118#	23-119#	23-149#	23-150#	23-155#	23-156#	23-183#	23-193#	23-511#	23-512#	23-523#	23-529#	24-19#	24-24#
	25-21#	25-25#	25-47#	26-20#	26-24#	26-63#	27-29#	27-33#	27-77#	28-27#	28-31#	28-89#	29-32#	29-36#
	29-70#	30-27#	30-31#	30-59#	31-23#	31-27#	31-66#	32-26#	32-30#	32-55#	33-26#	33-30#	33-59#	34-28#
	34-34#	34-38#	34-59#	34-71#	36-36#	36-38#	37-21#	37-27#	37-37#	37-75#	38-22#	38-27#	38-37#	38-86#
	39-20#	39-25#	39-28#	39-183#										
M\$TSTL	1-C21#	2-7#	8-16	8-16#	11-48	11-48#	11-56	11-56#	12-47	12-47#	12-54	12-54#	12-89	12-89#
	13-47	13-47#	13-57	13-57#	20-59	20-59#	20-61	20-61#	20-62	20-62#	20-76	20-76#	20-78	20-78#
	20-82	20-82#	21-14	21-14#	23-19	23-19#	23-22	23-22#	23-30	23-30#	23-33	23-33#	23-36	23-36#

