LQP LQPSE-F PDP11 DIAG AH-S329A-MC FEB 1981
CZLQPA0 FICHE 1 OF 1 COPYRIGHT@ 1980
MADE IN USA

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                                IDENTIFICATION
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                PRODUCT CODE:  AC-S327A-MC

                PRODUCT NAME:  CZLQPA0 LQPSE-F PDP-11 DIAG

                PRODUCT DATE:  7-NOV-80

                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:

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 "DDDDD".

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:DDDDD	EXECUTE DDDDD PASSES (DDDDD = 1 TO 64000)
/FLAGS:FLGS	SET SPECIFIED FLAGS. FLAGS ARE DESCRIBED IN SECTION 2.3.
/EOP:DDDDD	REPORT END OF PASS MESSAGE AFTER EVERY DDDDD PASSES ONLY. (DDDDD = 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
                CLEARED UNTIL EXPLICITLY SET USING THE FLAGS SWITCH.  FLAGS
                ARE ALSO CLEARED AFTER A START COMMAND UNLESS SET USING THE
                FLAG SWITCH.  THE ZFLAGS COMMAND MAY ALSO BE USED TO CLEAR
                ALL FLAGS.  WITH THE EXCEPTION OF THE START AND ZFLAGS COMMANDS,
                NO COMMANDS AFFECT THE STATE OF THE FLAGS;  THEY REMAIN SET OR
                CLEARED AS SPECIFIED BY THE LAST FLAG SWITCH.

                        FLAG            EFFECT
                        ----            ----------------------------------
                        HOE             HALT ON ERROR - CONTROL IS RETURNED TO
                                        RUNTIME SERVICES COMMAND MODE
                        LOE             LOOP ON ERROR   (NOT SUPPORTED IN THIS
                                        DIAGNOSTIC)
                        IER*            INHIBIT ALL ERROR REPORTS
                        IBR*            INHIBIT ALL ERROR REPORTS EXCEPT
                                        FIRST LEVEL  (FIRST LEVEL CONTAINS
                                        ERROR TYPE, NUMBER, PC, TEST AND UNIT)
                        IXR*            INHIBIT EXTENDED ERROR REPORTS (THOSE
                                        CALLED BY PRINTX MACRO'S)
                        PRI             DIRECT MESSAGES TO LINE PRINTER
                        PNT             PRINT TEST NUMBER AS TEST EXECUTES
                        BOE             "BELL" ON ERROR
                        UAM             UNATTENDED MODE (NO MANUAL INTERVENTION)
```

```
                        ISR             INHIBIT STATISTICAL REPORTS (DOES NOT
                                        APPLY TO DIAGNOSTICS WHICH DO NOT SUPPORT
                                        STATISTICAL REPORTING)
                        IDR             INHIBIT PROGRAM DROPPING OF UNITS
                        ADR             EXECUTE AUTODROP CODE
                        LOT             LOOP ON TEST
                        EVL             EXECUTE EVALUATION (ON DIAGNOSTICS WHICH
                                        HAVE EVALUATION SUPPORT)

                                *ERROR MESSAGES ARE DESCRIBED IN SECTION 3.1


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

        /FLAGS:IER:BOE



2.4  HARDWARE QUESTIONS

WHEN A DIAGNOSTIC IS STARTED, THE RUNTIME SERVICES WILL PROMPT
THE USER FOR HARDWARE INFORMATION BY TYPING "CHANGE HW (L) ?"
YOU MUST ANSWER "Y" AFTER A START COMMAND UNLESS THE HARDWARE
INFORMATION HAS BEEN "PRELOADED" USING THE SETUP UTILITY (SEE
CHAPTER 6 OF THE XXDP+ USER'S MANUAL).  WHEN YOU ANSWER THIS
QUESTION WITH A "Y", THE RUNTIME SERVICES WILL ASK FOR THE NUMBER
OF UNITS (IN DECIMAL).  YOU WILL THEN BE ASKED THE FOLLOWING
QUESTIONS FOR EACH UNIT.

Q1:     "CHOOSE PAGE WIDTH FOR THE PRINTER
         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>

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

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

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

UNIT 5
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  4<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 6
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  5<CR>
```

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

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

                                UNIT 8
                                CSR ADDRESS (O)  160000<CR>
                                SUB-DEVICE # (O) ?  7<CR>
                                Q-FACTOR (O) 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 (D) ?  8<CR>

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

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

                UNIT 7
                CSR ADDRESS (O) ?  160000<CR>
                SUB-DEVICE # (O) ?  6,7<CR>
                Q-FACTOR (O) 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 (D) ?  8<CR>

                                UNIT 1
                                CSR ADDRESS (O) ?  160000<CR>
                                SUB-DEVICE # (O) ?  0-7<CR>
                                Q-FACTOR (O) 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
                        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."
        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, EOT, OR ESC WAS EXPECTED BUT NOT
        RECEIVED.

```
                        "INCORRECT CSR ADDRESS GIVEN.  TRY AGAIN."
                                THE USER HAS ENTERRED 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, EXPLICILTY 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
                        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 PARTICULARY 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.

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
INHIBITTED AND WHERE N=1 MEANS THAT UNDERLINE IS EMPLOYED.

```
571                             TEST 3 -        HAMMER HIT COUNT TEST
572
573                                             FOUR LINES OF TEXT WILL BE PRINTED, EACH LINE OF TEXT BEING
574                                             PRINTED WITH A DIFFERENT HIT COUNT.  THE RESULTING PRINT
575                                             PATTERN WILL BE FOUR LINES, ONE BLANK LINE (HIT COUNT 0),
576                                             AND THREE LINES OF INCREASING DARKNESS (INCREASING HIT COUNT).
577                                             THE "ESC N D" SEQUENCE IS USED WITH N EQUAL TO 0, 1, 2, AND
578                                             N<0.  THE N<0 SEQUENCE WILL RESULT IN A HIT COUNT OF ZERO,
579                                             N=0 IS A HIT COUNT OF ONE, N=1 IS A HIT COUNT OF TWO AND N=2
580                                             IS A HIT COUNT OF THREE.
581
582                             TEST 4 -        CARRIAGE POSITIONING TEST
583
584                                             IN THIS TEST, TWO CHARACTERS ARE PRINTED SEPARATED BY A
585                                             SPACE OF ADJUSTABLE WIDTH.  BOTH FORWARD AND REVERSE
586                                             CARRIAGE MOTIONS ARE EXERCISED.  THE RANGE OF THE SPACE
587                                             SIZE IS DICTATED BY THE CURRENT PAGE WIDTH.  THE SPACE
588                                             SIZE IS ADJUSTED BY SENDING THE "ESC N ;" SEQUENCE TO THE
589                                             PRINTER.  THE VALUE N IS PROPORTIONAL TO THE SPACE SIZE
590                                             AND MAY BE POSITIVE (RIGHT MOVEMENT) OR NEGATIVE (LEFT
591                                             MOVEMENT).
592
593                             TEST 5 -        PAPER POSITIONING TEST (VERTICAL)
594
595                                             THE VERTICAL SPACING IS ADJUSTED IN THIS TEST BY SENDING
596                                             THE SEQUENCE "ESC N 9" WHERE N IS PROPORTIONAL TO THE VERTICAL
597                                             SPACE SIZE.  IN THIS TEST A LINE OF CHARACTERS WILL BE PRINTED
598                                             AND A CARRIAGE RETURN - LINE FEED TRANSMITTED.  THE VERTICAL
599                                             SPACE SIZE WILL THEN BE ADJUSTED AND THE SEQUENCE WILL BE
600                                             REPEATED.  THIS SEQUENCE WILL BE PERFORMED OVER A REASONABLE
601                                             RANGE OF VERTICAL SPACE SIZES.
602
603                             TEST 6 -        PRINT ONE LINE OF EACH CHARACTER
604
605                                             ONE LINE OF EACH PRINTABLE CHARACTER WILL BE PRINTED TO
606                                             CONFIRM THAT ALL POSITIONS ON THE PRINT WHEEL WILL ACTUALLY
607                                             PRINT.
608
609                             TEST 7 -        PRINT A SWIRL PATTERN
610
611                                             THE COMPLETE CHARACTER SET IS PRINTED ONE LINE AT A TIME
612                                             IN A "SWIRL PATTERN"..
613
614                             TEST 8 -        WORST CASE RAPID MOTION TEST
615
616                                             THIS TEST WILL PUT THE PRINT WHEEL THROUGH A MECHANICALLY STRESSFUL
617                                             SITUATION BY REPEATEDLY PRINTING THE SEQUENCE "ACA:ACA:AC.."
618
619                             TEST 9 -        PRINT RANDOM CHARACTERS
620
621                                             THIS TEST WILL PRINT A RANDOM SEQUENCE OF CHARACTERS ON THE
622                                             PRINTER.
623
624                             TEST 10 -       PRINT OPERATOR SELECTED CHARACTERS
625
626                                             THIS TEST WILL PRINT CHARACTER SEQUENCES DEFINED BY THE
627                                             USER.  THE TEST IS ENDED BY ENTERRING Q<RETURN>.
```

```
628
629                         TEST 11 -       LIFT / DROP RIBBON BY OPERATOR CONTROL
630                                         (OPTIONAL - SPECIAL TEST)
631
632                                         THIS TEST WILL HAVE TWO MODES SELECTABLE ON THE TEST MENU:
633                                         AUTOMATIC MODE AND MANUAL MODE.  IN THE AUTOMATIC MODE THE
634                                         RIBBON WILL RAISE AND DROP AT A RATE OF ABOUT ONCE PER SECOND.
635                                         THIS SEQUENCE WILL CONTINUE UNTIL THE OPERATOR STOPS IT BY
636                                         ACTION TAKEN AT THE OPERATORS CONSOLE.  IN MANUAL MODE THE
637                                         OPERATOR WILL RAISE AND DROP THE RIBBON AT WILL BY PRESSING
638                                         CONSOLE KEYS AS SPECIFIED ON THE CONSOLE SCREEN.
639
640                         TEST 12 -       BIDIRECTIONAL FORMS TRACTOR (OPTIONAL - SPECIAL TEST)
641
642                                         A VARIABLE SIZE MATRIX OF CHARACTERS WILL BE PRINTED IN A
643                                         RANDOM ORDER, FORCING RANDOM MOVEMENT OF THE CARRIAGE IN ALL
644                                         FOUR DIRECTIONS.
645
646                         TEST 13 -       CUT SHEET FEEDER EXERCISER (OPTIONAL - SPECIAL TEST)
647
648                                         IN THIS TEST THE PAGE SIZE IS SET TO ELEVEN INCHES, A SHEET
649                                         IS FED FROM THE FRONT TRAY, A LINE IS PRINTED AT THE TOP OF
650                                         THE PAGE AND A LINE IS PRINTED AT THE BOTTOM OF THE PAGE.
651                                         THE PROCESS IS THEN REPEATED WITH THE REAR TRAY FEEDING WHICH
652                                         SHOULD AUTOMATICALLY EJECT THE PAGE IN THE PRINTER FROM THE
653                                         FRONT TRAY.
654
655
656
657
658
659
660
661
662
663                         &
```

```
                                .ENABL  ABS
                                .ENABL  AMA

        002000                  .=2000
                                .MCALL  SVC
002000                          SVC                             ; INITIALIZE SUPERVISOR MACROS
002000                          BGNMOD

        000001          SVCINS= 1       ; LIST INSTRUCTIONS, SHIFTED RIGHT
        000001          SVCTST= 1       ; LIST TEST TAGS, SHIFTED RIGHT
        000001          SVCSUB= 1       ; LIST SUBTEST TAGS, SHIFTED RIGHT
        000001          SVCGBL= 1       ; LIST GLOBAL TAGS, SHIFTED RIGHT
        000001          SVCTAG= 1       ; LIST OTHER TAGS, SHIFTED RIGHT


002000                          POINTER ERRTBL

002000                          HEADER  CZLQP,A,0,240.,0,PRI07
002000                                                          L$NAME::
002000  103                                                             .ASCII /C/
002001  132                                                             .ASCII /Z/
002002  114                                                             .ASCII /L/
002003  121                                                             .ASCII /Q/
002004  120                                                             .ASCII /P/
002005  000                                                             .BYTE   0
002006  000                                                             .BYTE   0
002007  000                                                             .BYTE   0
002010                                                          L$REV::
002010  101                                                             .ASCII  /A/
002011                                                          L$DEPO::
002011  060                                                             .ASCII  /0/
002012                                                          L$UNIT::
002012  000000                                                          .WORD   0
002014                                                          L$TIML::
002014  000360                                                          .WORD   240.
002016                                                          L$HPCP::
002016  024406                                                          .WORD   L$HARD
002020                                                          L$SPCP::
002020  000000                                                          .WORD   0
002022                                                          L$HPTP::
002022  002160                                                          .WORD   L$HW
002024                                                          L$SPTP::
002024  000000                                                          .WORD   0
002026                                                          L$LADP::
002026  025234                                                          .WORD   L$LAST
002030                                                          L$STA::
002030  000000                                                          .WORD   0
002032                                                          L$CO::
002032  000000                                                          .WORD   0
002034                                                          L$DTYP::
002034  000000                                                          .WORD   0
```

```
002036
002036  000000                          L$APT::
                                                .WORD   0
002040                                  L$DTP::
002040  002124                                  .WORD   L$DISPATCH
002042                                  L$PRIO::
002042  000340                                  .WORD   PRI07
002044                                  L$ENVI::
002044  000000                                  .WORD   0
002046                                  L$EXP1::
002046  000000                                  .WORD   0
002050                                  L$MREV::
002050     003                                  .BYTE   C$REVISION
002051     003                                  .BYTE   C$EDIT
002052                                  L$EF::
002052  000000                                  .WORD   0
002054  000000                                  .WORD   0
002056                                  L$SPC::
002056  000000                                  .WORD   0
002060                                  L$DEVP::
002060  010102                                  .WORD   L$DVTYP
002062                                  L$REPP::
002062  000000                                  .WORD   0
002064                                  L$EXP4::
002064  000000                                  .WORD   0
002066                                  L$EXP5::
002066  000000                                  .WORD   0
002070                                  L$AUT::
002070  000000                                  .WORD   0
002072                                  L$DUT::
002072  000000                                  .WORD   0
002074                                  L$LUN::
002074  000000                                  .WORD   0
002076                                  L$DESP::
002076  010150                                  .WORD   L$DESC
002100                                  L$LOAD::
002100  104035                                  EMT     E$LOAD
002102                                  L$ETP::
002102  010072                                  .WORD   L$ERRTBL
002104                                  L$ICP::
002104  015522                                  .WORD   L$INIT
002106                                  L$CCP::
002106  017456                                  .WORD   L$CLEAN
002110                                  L$ACP::
002110  017454                                  .WORD   L$AUTO
002112                                  L$PRT::
002112  015514                                  .WORD   L$PROT
002114                                  L$TEST::
002114  000000                                  .WORD   0
002116                                  L$DLY::
002116  000000                                  .WORD   0
002120                                  L$HIME::
002120  000000                                  .WORD   0
25
26                      .SBTTL  DISPATCH TABLE
```

```
002122                              DISPATCH 13
002122  000015                                                  .WORD   13
002124                                                  L$DISPATCH::
002124  017470                                                  .WORD   T1
002126  017606                                                  .WORD   T2
002130  020026                                                  .WORD   T3
002132  020274                                                  .WORD   T4
002134  020610                                                  .WORD   T5
002136  021014                                                  .WORD   T6
002140  021160                                                  .WORD   T7
002142  021342                                                  .WORD   T8
002144  021470                                                  .WORD   T9
002146  021634                                                  .WORD   T10
002150  022050                                                  .WORD   T11
002152  022462                                                  .WORD   T12
002154  023360                                                  .WORD   T13

                          .SBTTL  DEFAULT HARDWARE P-TABLE
```

```
                                ;++
                                ; 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                                  BGNHW   DFPTBL
002156  000004                                                                 .WORD   L10000-L$HW/2
002160                                                                      L$HW::
002160                                                                      DFPTBL::

002160  000000                          .WORD   0       ;CSR ADDRESS.  IF = 0 THEN AUTO-SETUP MODE IS ASSUMED.
002162  000001                          .WORD   1       ;1="Y". I/O OPTION IS SINGLE LINE (NON-DZ11) INTERFACE
002164  000000                          .WORD   0       ;PRINTER CHANNEL DEFAULT IS CHANNEL 0.
002166  000001                          .WORD   1       ;LINE SIZE CHOICE.  1=80 CHARACTERS/LINE


002170                                  ENDHW
002170                                                                      L10000:

                        .TITLE GLOBAL AREAS
                        .SBTTL GLOBAL EQUATES SECTION
```

GLOBAL EQUATES SECTION -

```
      1
      2 002170                                EQUALS
                                        ;
                                        ; BIT DIFINITIONS
                                        ;
                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                  EVL==       4
```

```
GLOBAL AREAS    MACRO V03.01 7-NOV-80 10:06:10 PAGE 8-1
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                  PRI==     2000
                004000                  IXE==     4000
                010000                  IBE==    10000
                020000                  IER==    20000
                040000                  LOE==    40000
                100000                  HOE==   100000
      3
      4
      5                                 ;       DECIMAL VALUES
      6                                 ;
      7         000040                          ZERO    =32.    ;MNEMONICS FOR ESCAPE SEQUENCE ARGUMENTS.
      8         000041                          ONE     =33.
      9         000042                          TWO     =34.
     10         000043                          THREE   =35.
     11         000044                          FOUR    =36.
     12         000045                          FIVE    =37.
     13         000046                          SIX     =38.
     14         000047                          SEVEN   =39.
     15         000050                          EIGHT   =40.
     16         000051                          NINE    =41.
     17         000052                          HEXA    =42.
     18         000053                          HEXB    =43.
     19         000054                          HEXC    =44.
     20         000055                          HEXD    =45.
     21         000056                          HEXE    =46.
     22         000057                          HEXF    =47.
     23
     24         000001                          NUM1    =1
     25         000002                          NUM2    =2
     26         000003                          NUM3    =3
     27         000004                          NUM4    =4
     28         000005                          NUM5    =5
     29         000006                          NUM6    =6
     30         000007                          NUM7    =7
     31         000010                          NUM8    =8.
     32         000011                          NUM9    =9.
     33         000012                          NUM10   =10.
     34         000013                          NUM11   =11.
     35         000014                          NUM12   =12.
     36         000015                          NUM13   =13.
     37         000016                          NUM14   =14.
     38         000017                          NUM15   =15.
     39
     40
     41
     42         020000                          ECNRB   =BIT13
     43         010000                          UCRB    =BIT12
     44
     45
     46
```

```
        002000                      MXLF    =2000   ;MAXIMUM LINEFEED SIZE.  DECIMAL 2048X1/48 INCHES

                            .SBTTL  GLOBAL DATA SECTION
```

```
                                ;++
                                ; THE GLOBAL DATA SECTION CONTAINS DATA THAT ARE USED
                                ; IN MORE THAN ONE TEST.
                                ;--

002170  001200                  SKP14:  .WORD   640.            ;SKIP 14 INCHES MINUS 3 LINES ARGUMENT.
002172  001031                  SKPA4:  .WORD   537.            ;SKIP A4 SPACING MINUS 3 LINES ARGUMENT.
002174  000760                  SKP11:  .WORD   496.            ;SKIP 11 INCHES MINUS 3 LINES ARGUMENT.
002176  000000                  CRNTSK: .WORD                   ;TEMPORARY SAFE LOCATION FOR CURRENT SKIP SIZE.

002200  000000                  CSRADD:         .WORD           ;ADDRESS OF CSR REGISTER

002202  000000                  LOGUNIT:        .WORD           ;LOGICAL UNIT NUMBER
002204  000000                  PLOC:           .WORD           ;ADDRESS OF HARDWARE P-TABLE

                                ;
002206  000000                  GREASE: .WORD   0       ;WHEN = -1, A GREASED EXIT IS PROVIDED FROM THE
                                                        ;CURRENT ROUTINE.

                                ;
                                ;
                                ;               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.
                                ;

002210  033  060                 STSRES: .ASCII  <033>/0/                ;2 BYTES. EVOKE STATUS RESPONSE.
002212  033  065                 HZTLSP: .ASCII  <033>/5/                ;2 BYTES. PERFORM HORIZONTAL SPACING

002214  012  033  076             DUMMYS: .ASCII  <012><033>/>/<033>/(  9/ ;DUMMY SEQUENCE FOR PRINTER INTERFACE
002217  033  050  040
002222  040  071
                                                                        ;RESET SEQUENCE
002224  033  066                 RESET:  .ASCII  <033>/6/                ;2 BYTES. RESET INTERFACE, SHEET FEEDER
                                                                        ;       PRINTER. RECEIVE STATUS
                                                                        ;       RESPONSE AND "XON" CHARACTER.
002226  033  040  040             VRTCLS: .ASCII  <033>/   9/             ;5 BYTES. ACCUMULATE VERTICAL SPACES.
002231  040  071
002233  033  040  040             HRZTLS: .ASCII  <033>/   ;/             ;5 BYTES. ACCUMULATE HORIZONTAL SPACES.
002236  040  073
002240  033  041  075             RIBPOS: .ASCII  <033>/!=./              ;3 BYTES. SET RIBBON POSITON- DOWN.
002243  056
```

GLOBAL DATA SECTION

```
                                                                ;       & ONE EXTRA CHARACTER FOR TEST 11.
002244  033  040  040  STCHSZ: .ASCII  <033>/  'A/             ;5 BYTES. SET CHARACTER SIZE. 10 CHR/IN
002247  047  101
002251  033  040  050  STLNSZ: .ASCII  <033>/ (B/             ;4 BYTES. SET LINE SIZE. 6 LINES/INCH
002254  102
002255  033  103       SLFTST: .ASCII  <033>/C/              ;2 BYTES. DO A SELF TEST. SEND STATUS
                                                               ;AND SEND XON.
002257  033  040  104  STHTCT: .ASCII  <033>/ D/             ;3 BYTES. SET HIT COUNT TO 1 HIT/CHAR.
002262  033  040  047  STSPSZ: .ASCII  <033>/ 'F/            ;4 BYTES. SET SPACE SIZE.  10 SPACES/IN
002265  106
002266  033  040  107  STULMD: .ASCII  <033>/ G/            ;3 BYTES. SET UNDERLINE MODE TO NO-UND.
002271  033  040  040  STPGSZ: .ASCII  <033>/   H/          ;5 BYTES. SET PAGE SIZE.
002274  040  110
002276  033  040  040  SLTPFF: .ASCII  <033>/  !J/          ;5 BYTES. SELECT TRAY AND PERFORM FF.
002301  041  112
                                                               ;       SELECT FRONT TRAY AND EJECT.

002303  033  056  056  SETHT0: .ASCII  <033>/...D/           ;SET HIT COUNT TO 0 HITS. 5 BYTES.
002306  056  104
002310  033  040  101  SETCH0: .ASCII  <033>/ A/            ;SET SPACE SIZE TO ZERO.

002313  015       CR:      .ASCII  <015>                     ;1 BYTE FOR RETURN ONLY. 2 FOR <CRLF>.
002314  012       LF:      .ASCII  <012>                     ;1 BYTE FOR LINEFEED ONLY.

002315  033  040  040  STATUS: .ASCII  <033>/   0/          ;STAUS SEQUENCE TEMPLATE.
002320  040  060

002322  042  043  041  PSZA4:  .ASCII  /"#!/                ;PATTERN: TWO THREE ONE IN HEX
002325  042  041  040  PSZ11:  .ASCII  /"! /                ;PATTERN: 11 INCHES PAGE SIZE TWO ONE
                                                               ;                         ZERO IN HEX
002330  042  052  040  PSZ14:  .ASCII  /"* /                ;PATTERN: 14 INCHES PAGE SIZE
                                                               ;


                        ;
                        ;
                        ;
                        ;       ASCII STRING MESSAGES, TEST TITLES
                        ;
002333  045  116  045  TITLE1: .ASCIZ  /%N%N%ATEST 1 - SELF TEST/<015><012>    ;TITLE FOR TEST 1.
002336  116  045  101
002341  124  105  123
002344  124  040  061
002347  040  055  040
002352  123  105  114
002355  106  040  124
002360  105  123  124
002363  015  012  000
002366  045  116  045  TITLE2: .ASCIZ  /%N%ATEST 2 - UNDERLINE/<057>/NO-UNDERLINE MODE TEST/<015><012>
002371  101  124  105
002374  123  124  040
002377  062  040  055
002402  040  125  116
002405  104  105  122
```

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
```

```
 96                                                                    ;TITLE FOR TEST 5.
 97 002645  045  116  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                                                     ;TITLE FOR TEST 9.
    104
    105 003115      045     116     045  TITLEA: .ASCIZ  /%N%ATEST 10 - PRINT OPERATOR SELECTED CHARACTERS/<015><012>
        003120      101     124     105
        003123      123     124     040
        003126      061     060     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 10.
    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     122
        003252      105     124     125
        003255      122     116     076
        003260      056     015     012
        003263      000
    108                                                                 ;PROMPT FOR TEST 10.
    109 003264      045     116     045  TITLEB: .ASCIZ  /%N%ATEST 11 - LIFT/<57>/DROP RIBBON BY OPERATOR CONTROL/<015><012>
        003267      101     124     105
        003272      123     124     040
        003275      061     061     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
```

```
                003341  116     124     122
                003344  117     114     015
                003347  012     000
110                                                     ;TITLE FOR TEST 11.
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             .ASCIZ  /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  TITLEC: .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
```

```
        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
```

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GLOBAL AREAS    MACRO V03.01 7-NOV-80 10:06:10 PAGE 9-8
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
```

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                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             .ASCIZ  /ENTER ''Q<RETURN>'' TO EXIT TEST./
                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     FTYTPM: .ASCII  /THIS SHOULD BE PRINTED AT THE TOP OF THE PAGE./<12><15>
                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             .ASCII  /THE PAGE SHOULD HAVE COME FROM THE FRONT TRAY./<12><15>
                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     RTYTPM: .ASCII  /THIS SHOULD BE PRINTED AT THE TOP OF THE PAGE./<12><15>
                005017  123     040     123
                005022  110     117     125
```

```
        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             .ASCII  /THE PAGE SHOULD HAVE COME FROM THE REAR TRAY. /<12><15>
        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     WTSTPM: .ASCIZ  /%N%AWAITING TO SEND DATA TO PRINTER. PRINTER NOT READY.%/
        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     045     000
144
145
146                                             .EVEN
147
148     005246  000000              MSGADD: .WORD                           ;HOLDS ADDRESS OF A MESSAGE
149     005250  000000              TRXADD: .WORD
150     005252  000000              BAUDRT: .WORD
151     005254  176500              DLDFLT: .WORD   176500                  ;DEFAULT CSR ADDRESS - SINGLE LINE
152     005256  176010              DZDFLT: .WORD   176010                  ;DEFAULT CSR ADDRESS - MULTILINE.
```

```
    153 005260  000000                  DFAIL:  .WORD   C
    154
    155 005262  000000  000000  000101  BASET:  .WORD   0,0,101          ;TABLE ENTRY - 3 WORDS, INCLUDES THE
    156 005270  000000  000036  000102          .WORD   0,30.,102                ;ROW #, THE COLUMN #, THE ASCII
    157 005276  000000  000074  000103          .WORD   0,60.,103                ;VALUE AND THE ACCESS INDICATOR.
    158 005304  000000  000132  000104          .WORD   0,90.,104                ;THE ROW NUMBER AND THE COLUMN NUMBER
    159 005312  000000  000170  000105          .WORD   0,120.,105               ;ARE WORDS AND THE ASCII VALUE AND
    160 005320  000000  000226  000106          .WORD   0,150.,106               ;ACCESS INDICATOR ARE BYTES.  THE
    161 005326  000000  000264  000107          .WORD   0,180.,107               ;FORMAT IS AS FOLLOWS:
    162 005334  000000  000322  000110          .WORD   0,210.,110               ;
    163 005342  000000  000360  000111          .WORD   0,240.,111               ;-----------------------------------
    164 005350  000000  000416  000112          .WORD   0,270.,112               ;       ROW # - VRTCLS - LO BYTE    0
    165 005356  000014  000000  000102          .WORD   12.,0,102                ;-----------------------------------
    166 005364  000014  000036  000103          .WORD   12.,30.,103              ;       ROW # - VRTCLS - HI BYTE    1
    167 005372  000014  000074  000104          .WORD   12.,60.,104              ;-----------------------------------
    168 005400  000014  000132  000105          .WORD   12.,90.,105              ;    COLUMN # - HRZTLS - LO BYTE   2
    169 005406  000014  000170  000106          .WORD   12.,120.,106             ;-----------------------------------
    170 005414  000014  000226  000107          .WORD   12.,150.,107             ;    COLUMN # - HRZTLS - HI BYTE   3
    171 005422  000014  000264  000110          .WORD   12.,180.,110             ;-----------------------------------
    172 005430  000014  000322  000111          .WORD   12.,210.,111             ; UNIQUENESS INDICATOR - 1=UNIQUE  4
    173 005436  000014  000360  000112          .WORD   12.,240.,112             ;-----------------------------------
    174 005444  000014  000416  000113          .WORD   12.,270.,113             ;       ASCII BYTE FOR PRINTING     5
    175 005452  000030  000000  000103          .WORD   24.,0,103                ;-----------------------------------
    176 005460  000030  000036  000104          .WORD   24.,30.,104              ;
    177 005466  000030  000074  000105          .WORD   24.,60.,105              ;
    178 005474  000030  000132  000106          .WORD   24.,90.,106              ;(THE NUMBER TO THE RIGHT IN THE ABOVE
    179 005502  000030  000170  000107          .WORD   24.,120.,107             ; FIGURE IS THE BYTE OFFSET FROM THE
    180 005510  000030  000226  000110          .WORD   24.,150.,110             ; TABLE ENTRY ADDRESS.)
    181 005516  000030  000264  000111          .WORD   24.,180.,111             ;
    182 005524  000030  000322  000112          .WORD   24.,210.,112             ;
    183 005532  000030  000360  000113          .WORD   24.,240.,113             ;
    184 005540  000030  000416  000114          .WORD   24.,270.,114             ;
    185 005546  000044  000000  000104          .WORD   36.,0,104                ;
    186 005554  000044  000036  000105          .WORD   36.,30.,105              ;
    187 005562  000044  000074  000106          .WORD   36.,60.,106              ;
    188 005570  000044  000132  000107          .WORD   36.,90.,107              ;
    189 005576  000044  000170  000110          .WORD   36.,120.,110             ;
    190 005604  000044  000226  000111          .WORD   36.,150.,111             ;
    191 005612  000044  000264  000112          .WORD   36.,180.,112             ;
    192 005620  000044  000322  000113          .WORD   36.,210.,113             ;
    193 005626  000044  000360  000114          .WORD   36.,240.,114             ;
    194 005634  000044  000416  000115          .WORD   36.,270.,115             ;
    195 005642  000060  000000  000105          .WORD   48.,0,105                ;
    196 005650  000060  000036  000106          .WORD   48.,30.,106              ;
    197 005656  000060  000074  000107          .WORD   48.,60.,107              ;
    198 005664  000060  000132  000110          .WORD   48.,90.,110              ;
    199 005672  000060  000170  000111          .WORD   48.,120.,111             ;
    200 005700  000060  000226  000112          .WORD   48.,150.,112             ;
    201 005706  000060  000264  000113          .WORD   48.,180.,113             ;
    202 005714  000060  000322  000114          .WORD   48.,210.,114             ;
    203 005722  000060  000360  000115          .WORD   48.,240.,115             ;
    204 005730  000060  000416  000116          .WORD   48.,270.,116             ;
    205 005736  000074  000000  000106          .WORD   60.,0,106                ;
    206 005744  000074  000036  000107          .WORD   60.,30.,107              ;
    207 005752  000074  000074  000110          .WORD   60.,60.,110              ;
    208 005760  000074  000132  000111          .WORD   60.,90.,111              ;
    209 005766  000074  000170  000112          .WORD   60.,120.,112             ;
```

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    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
    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:   .BYTE   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                                          ;TEMPLATES
    266 006430  170377                    TMPLT1: .WORD   170377  ;BITS 8 - 11 USED IN DECODING PRINTER TRANSMISSIONS
```

;DO NOT SEPARATE THE ABOVE TABLE
;FROM THE FOLLOWING 3 LINES.....

```
    267 006432  177417              TMPLT2: .WORD   177417  ;BITS 4 - 7 USED IN CONVRT TO DECODE PRINTER XMISSIONS
    268 006434  177760              TMPLT3: .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                                                     ;       1)RX-ON
    278                                                     ;       2)9600 BAUD
    279                                                     ;       3)NO PARITY
    280                                                     ;       4)2 UNIT STOP CODE
    281                                                     ;       5)8 BIT CHARACTER LENGTH
    282                                                     ;
    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                             ;       SPECIAL CHARACTER DEFINITIONS
    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

```
                                SCQ:    .ASCII  /Q/     ;SINGLE CHARACTER "Q"
                                SCC:    .ASCII  /C/     ;SINGLE CHARACTER "C"
                                SCB:    .ASCII  /B/     ;SINGLE CHARACTER "B"
                                SCX:    .ASCII  /X/     ;SINGLE CHARACTER "X"
                                SCA:    .ASCII  /A/     ;SINGLE CHARACTER "A"
                                SC0:    .ASCII  /0/     ;SINGLE CHARACTER "0"
                                SC1:    .ASCII  /1/     ;SINGLE CHARACTER "1"
                                PERIOD: .ASCII  /./     ;SINGLE CHARACTER "."
006535  101     103     101     ACAS:   .ASCII  /ACA:/  ;WORST CASE SEQUENCE FOR TEST #8
006540  072

006541  040                     SPACE:  .ASCII / /                      ;SINGLE SPACE
006542  137     137     137     DASHES: .ASCII /__________/<15>         ;PRINTED IN TEST 5 BETWEEN LINEFEEDS
006545  137     137     137
006550  137     137     137
006553  137     015


                                ;       THE REPEATING PATTERN OF ASCII PRINTABLE CHARACTERS.

                                .ENABL LC
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
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
006707  173     174     175             .BYTE 173,174,175,176
006712  176
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 /:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_/<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:;<=>?@ABCEDFGHIJKLMNOPQRSTU/
        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
```

```
        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                                       ;       VARIABLE ASSIGNMENTS
  359
  360                                               .EVEN
  361
  362                                       ;       THE FOLLOWING LABELS ARE USED WITH THE INTERFACE OPTION WHICH THE
  363                                       ;       LQPSE IS CONNECTED TO.
  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

```
                                        .WORD   EDFM7
                                        .WORD   EDFM8
                                        .WORD   EDFM9
                                        .WORD   EDFMA
                                        .WORD   EDFMB
                                        .WORD   EDFMC
                                        .WORD   EDFMD


                        BFRA:   .BLKB   300.    ;BUFFER FOR INPUT FROM USER AND ALSO USED AS A
                                                ;SOFTWARE STACK.
                        TOPSTK: .WORD           ;USED TO POINT TO THE TOP OF THE SOFTWARE STACK
                                                ;WHEN NEEDED.  #BFRA + 150.
                        BFRB:   .WORD           ;DEFAULT AREAS FOR GMANID QUESTIONS. MAY BE CLEARED.
                        BFRC:   .WORD           ;       ''
                        BFRD:   .WORD           ;       ''

                        SPCSIZ: .WORD           ;THE NUMBER OF HORIZONTAL INCREMENTS PER SPACE.

                        LINN:   .WORD           ;THE NUMBER OF HORIZONTAL INCREMENTS PER LINE.

                        LINSIZ: .WORD           ;THE NUMBER OF CHARACTERS PER LINE ON PRINTER.

                        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.


                                                ;USED IN PROCEDURE CONVRT:
                        MNEB1:  .BYTE           ;USED TO PASS A MNEMONIC VALUE FROM THE CONVERSION
                        MNEB2:  .BYTE           ;ROUTINE.  A SINGLE WORD VALUE ACCEPTED, THREE BYTES
                        MNEB3:  .BYTE           ;RETURNED TO CALLER: MNEB1, MNEB2, MNEB3.

                                .EVEN

                        MLTLIN: .WORD           ;INDICATOR:  MULTILINE INTERFACE?-1  SINGLE LINE?-0


                        DELCNT: .WORD           ;COUNTER OF SMALL TIME INCREMENTS USED IN DELAY ROUTINE

                        NDATA:  .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 NDATA WORD
                                                ;TO ONE.
                        HITARG: .BYTE           ;TEMPORARY STORAGE OF THE HIT COUNT ARGUMENT USED IN
                                                ;SET HIT COUNT TEST.
                                .EVEN
                        LINCNT: .WORD           ;A LINE COUNTER USED IN TEST #5. PAPER POSITIONING TEST

                        CHRCNT: .WORD           ;A CHARACTER COUNTER USED IN TEST #6, WHERE ONE LINE OF
                                                ;EACH CHARACTER IS PRINTED.
                        CCOUNT: .WORD           ;A COUNT OF CYCLES, USED IN TEST #11- LIFT/DROP RIBBON
```

GLOBAL DATA SECTION

```
    440 010070  000000                  INUPB:  .WORD           ;AN INDICATOR OF WHETHER THE PRINTER RIBBON IS IN THE
    441                                                         ;UP OR DOWN POSITION.  TEST #11, LOCAL PROC. MANLD:
    442
    443
    444
    445 010072                          ERRTBL
        010072                                                                  L$ERRTBL::
        010072  000000                  ERRTYP::        .WORD   0
        010074  000000                  ERRNBR::        .WORD   0
        010076  000000                  ERRMSG::        .WORD   0
        010100  000000                  ERRBLK::        .WORD   0
    446
    447                                 .SBTTL  GLOBAL TEXT SECTION
```

GLOBAL TEXT SECTION

```
                                ;++
                                ; 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
                                ;
010102                                  DEVTYP  <LQPSE-F SERIAL LETTER QUALITY PRINTER>
010102                                                                          L$DVTYP::
010102  114     121     120                                                             .ASCIZ  /LQPSE-F SERIAL LETT
010105  123     105     055
010110  106     040     123
010113  105     122     111
010116  101     114     040
010121  114     105     124
010124  124     105     122
010127  040     121     125
010132  101     114     111
010135  124     131     040
010140  120     122     111
010143  116     124     105
010146  122     000
                                                                                .EVEN
                                ;
                                ; TEST DESCRIPTION
                                ;
                                ;
010150                                  DESCRIPT        <DIAGNOSTIC FOR LQPSE-F SERIAL PRINTER ON PDP-11>
010150                                                                          L$DESC::
/   010150  104     111     101                                                             .ASCIZ  /DIAGNOSTIC FOR LQPS
    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
```

```
    25                                          ;       PRINTER WHICH WILL BE USED IN THE DIAGNOSTIC PROCESS BY THE FIELD
    26                                          ;       SERVICE TECHNICIAN.
    27
    28                                                  .EVEN
    29
    30                                          ;
    31                                          ; FORMAT STATEMENTS USED IN PRINT CALLS
    32                                          ;
    33
    34                                          ;
    35                                          ;^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
    36                                          ;
    37                                          ;       ERROR STATEMENT TABLES
    38                                          ;
    39                                          ;       THESE TABLES ARE USED BY THE ERRDF, PRINTB, AND PRINTX MACROS
    40                                          ;       IN THE PROCESS OF PRINTING ERROR MESSAGES TO THE USER AT THE CONSOLE.
    41                                          ;
    42                                          ;..............................................................................
    43                                          ;
    44                                          ;       GENERAL FORMATS FOR OUTPUT OF PC AT TIME OF CALL AND ADDRESS OF
    45                                          ;       LATEST TRANSMISSION.
    46                                          ;
    47 010230     045      116      045     PRTBMO: .ASCIZ  /%N%AERROR  DETECTED AFTER CALL AT PC: %O6/
       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
    48                                          ;
    49 010302     045      116      045     PRTXMO: .ASCIZ  /%N%ALAST TRANSMISSION STARTED AT LOCATION: %O6/
       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
    50                                          ;
    51                                          ;
    52                                          ;..............................................................................
    53                                          ;
```

```
                                        ;       ERWORD BIT-0    I/O FAILURE
                                        ;
010361  111  055  117  EDFM0:  .ASCIZ  /I-O FAILURE DETECTED AT PRINTER./
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
                                        ;
                                        ;       USE OF THESE STRINGS WILL BE AS FOLLOWS...
                                        ;       ERRDF   #NUM0,EDFM8             -DEVICE FATAL ERROR CALL
                                        ;       PRINTB  PRTBM0,PGMCTR           -PRINT BASIC ERROR MESSAGE
                                        ;       PRINTX  PRTXM0,TRXADD,ERWORD    -PRINT EXTENDED ERROR MESSAGE
                                        ;
                                        ;.....................................................................
                                        ;
                                        ;       ERWORD BIT-1    BUFFER FULL
                                        ;
010422  104  105  126  FDFM1:  .ASCIZ  /DEVICE FATAL ERROR.  PRINTER BUFFER FULL. /
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   #NUM7,EDFM1             -DEVICE FATAL ERROR CALL
                                        ;       PRINTB  PRTBM0,PGMCTR           -PRINT BASIC ERROR MESSAGE
                                        ;       PRINTX  PRTXM0,TRXADD,ERWORD    -PRINT EXTENDED ERROR MESSAGE
                                        ;
                                        ;.....................................................................
                                        ;
                                        ;       ERWORD BIT-2    PROM/RAM FAILURE
                                        ;
010475  120  122  117  EDFM2:  .ASCIZ  /PROM/<57>/RAM FAILURE DETECTED BY PRINTER./
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
```

```
        010530      131      040      120
        010533      122      111      116
        010536      124      105      122
        010541      056      000
     79                                     ;
     80                                     ;       USE OF THESE STRINGS WILL BE AS FOLLOWS...
     81                                     ;       ERRDF   #NUM8,EDFM2             -DEVICE FATAL ERROR CALL
     82                                     ;       PRINTB  PRTBM0,PGMCTR           -PRINT BASIC ERROR MESSAGE
     83                                     ;       PRINTX  PRTXM0,TRXADD,ERWORD    -PRINT EXTENDED ERROR MESSAGE
     84                                     ;
     85                                     ;.....................................................................
     86                                     ;
     87                                     ;       ERWORD BIT-3 PRINTER ERROR - N OUT OF RANGE IN ESC SEQUENCE
     88                                     ;
     89 010543      120      122      111  EDFM3:  .ASCIZ  /PRINTER ERROR: N OUT OF RANGE IN ESC SEQUENCE./
        010546      116      124      105
        010551      122      040      105
        010554      122      122      117
        010557      122      072      040
        010562      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
     90                                     ;
     91                                     ;       USE OF THESE STRINGS WILL BE AS FOLLOWS...
     92                                     ;       ERRDF   #NUM9,EDFM3             -DEVICE FATAL ERROR CALL
     93                                     ;       PRINTB  PRTBM0,PGMCTR           -PRINT BASIC ERROR MESSAGE
     94                                     ;       PRINTX  PRTXM0,TRXADD,ERWORD    -PRINT EXTENDED ERROR MESSAGE
     95                                     ;
     96                                     ;.....................................................................
     97                                     ;
     98                                     ;       ERWORD BIT-4    PAUSE SWITCH
     99                                     ;
    100 010622      120      101      125  EDFM4:  .ASCIZ  /PAUSE SWITCH PRESSED./
        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
    101                                     ;
    102                                     ;PRTBM0 AND PRTXM0 ARE USED IN THIS ERROR RESPONSE ALSO.  USE OF THESE STRINGS
    103                                     ;WILL BE AS FOLLOWS...
    104                                     ;
    105                                     ;       USE OF THESE STRINGS WILL BE AS FOLLOWS...
    106                                     ;       ERRDF   #NUM2,EDFM4             -DEVICE FATAL ERROR CALL
    107                                     ;       PRINTB  PRTBM0,PGMCTR           -PRINT BASIC ERROR MESSAGE
    108                                     ;       PRINTX  PRTXM0,TRXADD,ERWORD    -PRINT EXTENDED ERROR MESSAGE
    109                                     ;
```

GLOBAL TEXT SECTION

```
                                ;.....................................................................
                                ;
                                ;       ERWORD BIT-5    RIBBON OUT
                                ;
010650  122 111 102  EDFM5:  .ASCIZ  /RIBBON OUT ON PRINTER./
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
                                ;
                                ;       USE OF THESE STRINGS WILL BE AS FOLLOWS...
                                ;       ERRDF   #NUM3,EDFM5             -DEVICE FATAL ERROR CALL
                                ;       PRINTB  PRTBM0,PGMCTR           -PRINT BASIC ERROR MESSAGE
                                ;       PRINTX  PRTXM0,TRXADD,ERWORD    -PRINT EXTENDED ERROR MESSAGE
                                ;
                                ;.....................................................................
                                ;
                                ;       ERWORD BIT-6    UNDEFINED CHARACTER OR ESC SEQUENCE RECEIVED.
                                ;
010677  125 116 104  EDFM6:  .ASCIZ  /UNDEFINED CHARACTER OR ESC SEQUENCE RECEIVED./
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
                                ;
                                ;       USE OF THESE STRINGS WILL BE AS FOLLOWS...
                                ;       ERRDF   #NUM4,EDFM6             -DEVICE FATAL ERROR CALL
                                ;       PRINTB  PRTBM0,PGMCTR           -PRINT BASIC ERROR MESSAGE
                                ;       PRINTX  PRTXM0,TRXADD,ERWORD    -PRINT EXTENDED ERROR MESSAGE
                                ;
                                ;.....................................................................
                                ;
                                ;       ERWORD BIT-7    SHEET FEEDER ERPOR
                                ;
010755  104 105 126  EDFM7:  .ASCIZ  /DEVICE FATAL ERROR.  SHEET FEEDER ERROR./
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
    137                                     ;
    138                                     ;       USE OF THESE STRINGS WILL BE AS FOLLOWS...
    139                                     ;       ERRDF   #NUM5,EDFM/             -DEVICE FATAL ERROR CALL
    140                                     ;       PRINTB  PRTBM0,PGMCTR           -PRINT BASIC ERROR MESSAGE
    141                                     ;       PRINTX  PRTXM0,TRXADD,ERWORD    -PRINT EXTENDED ERROR MESSAGE
    142                                     ;
    143                                     ;.....................................................................
    144                                     ;
    145                                     ;
    146 011026  127     101     122     EDFM8:  .ASCII  /WARNING:  SOFTWARE ERROR.  THIS MESSAGE SHOULD NOT PRINT/
                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
    147 011116  125     116     114             .ASCIZ  /UNLESS ERROR WORD (ERWORD) HAS BEEN CORRUPTED./
                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
    148 011175  105     122     122     EDFM9:  .ASCIZ  /ERROR DETECTED BY PRINTER./
                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
```

```
                011225  122     056     000
    149         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
                011313  105     105     116
    150         011316  103     117     122             .ASCIZ  /CORRUPTED./
                011321  122     125     120
                011324  124     105     104
                011327  056     000
    151         011331  127     101     122     FDFMB:  .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
                011414  105     105     116
    152         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/     ;WHEN GETCHR WAIT STARTS GETTING LONG...
                011435  101     111     124
                011440  111     116     107
                011443  000
    155
    156                                         ;.....................................................................
    157                                         ;
    158                                         ;       ERWORD BIT-12   UNEXPECTED CHARACTER RECEIVED
    159                                         ;
    160         011444  125     116     105     EDFMC:  .ASCIZ  /UNEXPECTED CHARACTER RECEIVED FROM PRINTER./
                011447  130     120     105
```

```
        011452  103     124     105
        011455  104     040     103
        011460  110     101     122
        011463  101     103     124
        011466  105     122     040
        011471  122     105     103
        011474  105     111     126
        011477  105     104     040
        011502  106     122     117
        011505  115     040     120
        011510  122     111     116
        011513  124     105     122
        011516  056     000
    161                                 ;
    162                                 ;       USE OF THESE STRINGS WILL BE AS FOLLOWS...
    163                                 ;       ERRDF   #NUM10,EDFMC            -DEVICE FATAL ERROR CALL
    164                                 ;       PRINTB  PRTBM0,PGMCTR           -PRINT BASIC ERROR MESSAGE
    165                                 ;       PRINTX  PRTXM0,TRXADD,ERWORD    -PRINT EXTENDED ERROR MESSAGE
    166                                 ;
    167                                 ;.....................................................................
    168                                 ;
    169                                 ;       ERWORD BIT-13   EXPECTED CHARACTER NOT RECEIVED FROM PRINTER
    170                                 ;
    171 011520  105     130     120     FDFMD:  .ASCIZ  /EXPECTED CHARACTER NOT RECEIVED FROM THE PRINTER./
        011523  105     103     124
        011526  105     104     040
        011531  103     110     101
        011534  122     101     103
        011537  124     105     122
        011542  040     116     117
        011545  124     040     122
        011550  105     103     105
        011553  111     126     105
        011556  104     040     106
        011561  122     117     115
        011564  040     124     110
        011567  105     040     120
        011572  122     111     116
        011575  124     105     122
        011600  056     000
    172                                 ;
    173                                 ;       USE OF THESE STRINGS WILL BE AS FOLLOWS...
    174                                 ;       ERRDF   #NUM11,EDFMD            -DEVICE FATAL ERROR CALL
    175                                 ;       PRINTB  PRTBM0,PGMCTR           -PRINT BASIC ERROR MESSAGE
    176                                 ;       PRINTX  PRTXM0,TRXADD,ERWORD    -PRINT EXTENDED ERROR MESSAGE
    177                                 ;
    178                                 ;.....................................................................
    179 011602  045     116     045     FAILM:  .ASCII  /%N%AFAILED TO FIND PRINTER AT DEFAULT ADDRESSES./
        011605  101     106     101
        011610  111     114     105
        011613  104     040     124
        011616  117     040     106
        011621  111     116     104
        011624  040     120     122
        011627  111     116     124
        011632  105     122     040
        011635  101     124     040
```

```
                011640  104     105     106
                011643  101     125     114
                011646  124     040     101
                011651  104     104     122
                011654  105     123     123
                011657  105     123     056
    180         011662  040     122     105             .ASCII  / RESTART PROGRAM.                              /<12><15>
                011665  123     124     101
                011670  122     124     040
                011673  120     122     117
                011676  107     122     101
                011701  115     056     040
                011704  040     040     040
                011707  040     040     040
                011712  040     040     040
                011715  040     040     040
                011720  040     040     040
                011723  040     040     040
                011726  040     040     012
                011731  015
    181         011732  045     116     045             .ASCII  /%N%ATHE CSR ADDRESS QUESTION MUST BE EXPLICITLY SPECIFIED./
                011735  101     124     110
                011740  105     040     103
                011743  123     122     040
                011746  101     104     104
                011751  122     105     123
                011754  123     040     121
                011757  125     105     123
                011762  124     111     117
                011765  116     040     115
                011770  125     123     124
                011773  040     102     105
                011776  040     105     130
                012001  120     114     111
                012004  103     111     124
                012007  114     131     040
                012012  123     120     105
                012015  103     111     106
                012020  111     105     104
                012023  056
    182         012024  045     116     045             .ASCIZ  /%N%N%N%N%A.                                                    %/
                012027  116     045     116
                012032  045     116     045
                012035  101     056     040
                012040  040     040     040
                012043  040     040     040
                012046  040     040     040
                012051  040     040     040
                012054  040     040     040
                012057  040     040     040
                012062  040     040     040
                012065  040     040     040
                012070  040     040     040
                012073  040     040     040
                012076  040     040     040
                012101  040     040     040
                012104  040     040     040
```

GLOBAL TEXT SECTION

```
        012107      040     040     040
        012112      040     040     040
        012115      040     040     040
        012120      045     000
    183
    184                                         ;
                                                ;       ERROR MESSAGE FORMAT FOR FAILURE IN DEFAULT PROCEDURE.
    185 012122      045     116     045 FAILDL: .ASCIZ  /%N%AINCORRECT CSR ADDRESS GIVEN.  TRY AGAIN..          %/
        012125      101     111     116
        012130      103     117     122
        012133      122     105     103
        012136      124     040     103
        012141      123     122     040
        012144      101     104     104
        012147      122     105     123
        012152      123     040     107
        012155      111     126     105
        012160      116     056     040
        012163      040     124     122
        012166      131     040     101
        012171      107     101     111
        012174      116     056     056
        012177      040     040     040
        012202      040     040     040
        012205      040     040     040
        012210      040     040     040
        012213      040     040     040
        012216      045     000
    186 012220      045     116     045 FAILDZ: .ASCIZ  /%N%AINCORRECT CSR ADDRESS OR CHANNEL GIVEN.  TRY AGAIN...  %/
        012223      101     111     116
        012226      103     117     122
        012231      122     105     103
        012234      124     040     103
        012237      123     122     040
        012242      101     104     104
        012245      122     105     123
        012250      123     040     117
        012253      122     040     103
        012256      110     101     116
        012261      116     105     114
        012264      040     107     111
        012267      126     105     116
        012272      056     040     040
        012275      124     122     131
        012300      040     101     107
        012303      101     111     116
        012306      056     056     056
        012311      040     040     040
        012314      045     000
    187 012316      045     116     045 FXRDYM: .ASCIZ  /%N%AFAILED TO TRANSMIT TO PRINTER.                      %/
        012321      101     106     101
        012324      111     114     105
        012327      104     040     124
        012332      117     040     124
        012335      122     101     116
        012340      123     115     111
        012343      124     040     124
        012346      117     040     120
```

GLOBAL TEXT SECTION

```
        012351     122     111     116
        012354     124     105     122
        012357     056     040     040
        012362     040     040     040
        012365     040     040     040
        012370     040     040     040
        012373     040     040     040
        012376     040     040     040
        012401     040     040     040
        012404     040     040     040
        012407     040     040     040
        012412     045     000
    188 012414     045     116     045  WFC:    .ASCIZ  /%N%AWAITING FOR A CHARACTER FROM THE PRINTER.          %/
        012417     101     127     101
        012422     111     124     111
        012425     116     107     040
        012430     106     117     122
        012433     040     101     040
        012436     103     110     101
        012441     122     101     103
        012444     124     105     122
        012447     040     106     122
        012452     117     115     040
        012455     124     110     105
        012460     040     120     122
        012463     111     116     124
        012466     105     122     056
        012471     040     040     040
        012474     040     040     040
        012477     040     040     040
        012502     040     040     040
        012505     040     040     040
        012510     045     000
    189 012512     045     116     045  TIMOM:  .ASCIZ  /%N%ATIME-OUT: CHECK TO SEE IF PRINTER CONNECTED PROPERLY.  %/
        012515     101     124     111
        012520     115     105     055
        012523     117     125     124
        012526     072     040     103
        012531     110     105     103
        012534     113     040     124
        012537     117     040     123
        012542     105     105     040
        012545     111     106     040
        012550     120     122     111
        012553     116     124     105
        012556     122     040     103
        012561     117     116     116
        012564     105     103     124
        012567     105     104     040
        012572     120     122     117
        012575     120     105     122
        012600     114     131     056
        012603     040     040     040
        012606     045     000
    190
    191
    192
```

```
    193                             .SBTTL  GLOBAL ERROR REPORT SECTION
```

```
GLOBAL AREAS    MACRO V03.01 7-NOV-80 10:06:10 PAGE 11
GLOBAL ERROR REPORT SECTION

      1
      2                                 ;++
      3                                 ; THE GLOBAL ERROR REPORT SECTION CONTAINS MESSAGE PRINTING AREAS
      4                                 ; USED BY MORE THAN TEST TO OUTPUT ADDITIONAL ERROR INFORMATION.  PRINTB
      5                                 ; (BASIC) AND PRINTX (EXTENDED) CALLS ARE USED TO CALL PRINT SERVICES.
      6                                 ;--
      7
      8                                 .EVEN
      9 012610                                  BGNMSG
     10
     11
     12 012610                                  EXIT    MSG
        012610  000167                                                          .WORD   J$JMP
        012612  000000                                                          .WORD   L10001-2$.
     13
     14
     15
     16 012614                                  ENDMSG
        012614                                                          L10001:
        012614  104423                                                         TRAP    C$MSG
     17                                 .SBTTL  GLOBAL SUBROUTINES SECTION
```

GLOBAL SUBROUTINES SECTION

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

```
;
;----------------------------------------------------------------------------
;----                                                                    ----
;----                        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 IA 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
;
;
;
```

```
     58 012616  011637  007314          XMIT:   MOV     (SP),PGMCTR     ;SAVE THE CALLING PC + 4
     59 012622  010146                          MOV     R1,-(SP)
     60 012624  010246                          MOV     R2,-(SP)
     61 012626  010346                          MOV     R3,-(SP)        ;SAVE ALL GUARANTEED
     62 012630  010446                          MOV     R4,-(SP)        ;       REGISTERS.
     63 012632  010546                          MOV     R5,-(SP)        ;
     64
     65 012634  010137  005250                  MOV     R1,TRXADD       ;SAVE THE TRANSMISSION ADDRESS
     66
     67 012640  012705  007352                  MOV     #BFRA,R5        ;BOTTOM OF SOFTWARE STACK
     68 012644  062705  000226                  ADD     #150.,R5        ;TOP OF SOFTWARE STACK
     69 012650  010537  010026                  MOV     R5,TOPSTK       ;TOP OF STACK ADDRESS
     70 012654  005237  010026                  INC     TOPSTK          ;PLUS 1 FOR COUNTING PURPOSES.
     71
     72 012660  005703                          TST     R3              ;IF ZERO THEN NO BIDIRECTIONAL PRINTING
     73 012662  001021                          BNE     BIDIRP          ;IF SET THEN GOTO BIDIRECTIONAL PRNTG CODE
     74
     75                                 ;
     76                                 ;                               NO BIDIRECTIONAL PRINTING.  ALL CARRIAGE
     77                                 ;                               CONTROL MUST BE EXPLICITLY SENT BY
     78                                 ;                               THE CALLING ROUTINE.
     79
     80 012664  010103                          MOV     R1,R3           ;ADDRESS OF THE FIRST CHARACTER IN THE STRING
     81 012666  060203                          ADD     R2,R3           ;ADDRESS OF THE LAST CHARACTER IN THE STRING
     82                                                                 ;                       PLUS ONE.
     83 012670  112102          XSTR:   MOVB    (R1)+,R2        ;GET THE CHARACTER INTO R2 AND POINT TO NEXT
     84                                                                 ;       CHARACTER IN STRING.
     85 012672  005037  002206                  CLR     GREASE          ;ASSUME NO PREVIOUS ERRORS.
     86 012676  004737  013366                  JSR     PC,SENCHR       ;SEND THE CHARACTER IN R2 TO THE PRINTER.
     87
     88 012702  022737  177777  002206          CMP     #-1,GREASE      ;TIME-OUT ERROR. ECNR STATUS.
     89 012710  001002                          BNE     LCHYET          ;EXPRESS EXIT FOR ECNR ERROR REPORT.
     90 012712  000137  013352                  JMP     EXITX
     91
     92 012716  020103          LCHYET: CMP     R1,R3           ;HAS THE LAST CHARACTER BEEN PRINTED YET?
     93 012720  100763                          BMI     XSTR            ;LOOP THROUGH THE LIST UNTIL DONE.
     94 012722  000137  013352                  JMP     EXITX           ;AND WHEN DONE WITH STRING, EXIT TEST...
     95                                 ;
     96                                 ;                               BIDIRECTIONAL PRINTING CODE FOLLOWS....
     97                                 ;
     98 012726  010103          BIDIRP: MOV     R1,R3           ;ADDRESS OF THE STRING TO BE PRINTED
     99 012730  060203                          ADD     R2,R3           ;ADDRESS OF LAST CHARACTER TO BE PRINTED.
    100                                                                 ;       PLUS 1 FOR COUNTING PURPOSES.
    101
    102 012732  023737  006502  010042  LNELOO: CMP     CRNTPR,LINSIZ   ;CRNTPR -CURRENT POINTER- IS INITIALIZED TO
    103                                                                 ; ZERO BY THE INITCD ROUTINE.  CRNTPR KEEPS
    104                                                                 ; TRACK OF HTE NUMBER OF CHARACTERS PRINTED
    105                                                                 ; SINCE THE LAST LINE FEED.
    106 012740  100567                          BMI     SENDR2          ;IF CRNTPR LESS THAN LINSIZ THEN THERE ARE
    107                                                                 ; MORE CHARACTERS TO PRINT ON THIS LINE.
    108 012742  113702  002314                  MOVB    LF,R2           ;LINE IS FINISHED.  SEND LINE FEED AND REVERSE
    109 012746  004737  013366                  JSR     PC,SENCHR       ; THE PRINT DIRECTION.
    110
    111 012752  005037  006502                  CLR     CRNTPR          ;RESET THE CHARACTER COUNT FOR THIS LINE.
    112 012756  005737  006504                  TST     DIRCTN          ;WHAT IS THE CURRENT PRINT DIRECTION? 0=FORWARD
    113 012762  001100                          BNE     FWRDO           ;IF REVERSE (1) THEN CHANGE TO FORWORD PRINT.
    114
```

```
                                                        ;IF FORWARD (1) THEN CHANGE TO REVERSE PRINT.
                                                        ;
012764  012737  000001  006504          MOV     #1,DIRCTN       ;
                                                        ;
012772  113702  002244                  MOVB    STCHSZ,R2       ;"ESC" CHAR
012776  004737  013366                  JSR     PC,SENCHR       ;TO RESET CHARACTER SIZE TO NEGATIVE 10 CHAR
                                                        ;                                              |
013002  022737  177777  002206          CMP     #-1,GREASE      ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT    |
013010  001560                          BEQ     EXITX           ;FROM THIS ROUTINE MAY BE REQUIRED.        |
                                                        ;                                              |
013012  112702  000057                  MOVB    #HEXF,R2        ;       PER INCH. THIS ENABLES REVERSE <---|
013016  004737  013366                  JSR     PC,SENCHR       ;       CARRIAGE MOTION WHILE PRINTING. <--|
                                                        ;
013022  022737  177777  002206          CMP     #-1,GREASE      ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
013030  001550                          BEQ     EXITX           ;FROM THIS ROUTINE MAY BE REQUIRED.
                                                        ;
013032  004737  013366                  JSR     PC,SENCHR       ;HEXF,HEXF,FOUR= -12 = -10 CHAR/INCH
                                                        ;
013036  022737  177777  002206          CMP     #-1,GREASE      ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
013044  001542                          BEQ     EXITX           ;FROM THIS ROUTINE MAY BE REQUIRED.
                                                        ;
013046  112702  000044                  MOVB    #FOUR,R2        ;
013052  004737  013366                  JSR     PC,SENCHR       ;
                                                        ;
013056  022737  177777  002206          CMP     #-1,GREASE      ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
013064  001532                          BEQ     EXITX           ;FROM THIS ROUTINE MAY BE REQUIRED.
                                                        ;
013066  012700  000004                  MOV     #4,R0
013072  116002  002244                  MOVB    STCHSZ(R0),R2   ; SEQUENCE: ESC 1111 1111 0100 A
013076  004737  013366                  JSR     PC,SENCHR       ; SENT TO THE PRINTER.
                                                        ;
013102  022737  177777  002206          CMP     #-1,GREASE      ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
013110  001520                          BEQ     EXITX           ;FROM THIS ROUTINE MAY BE REQUIRED.
                                                        ;
                                                        ;NOW MOVE THE CARRIAGE ONE SPACE TO THE
                                                        ;LEFT TO EVEN UP THE MARGIN.
                                                        ;
013112  113702  006521                  MOVB    ESCAPE,R2       ;SEND ESCAPE CHAR TO PRINTER
013116  004737  013366                  JSR     PC,SENCHR       ;
                                                        ;
013122  112702  000057                  MOVB    #HEXF,R2        ;NOW TRANSMIT -12 IN THREE HEX VALUES
013126  004737  013366                  JSR     PC,SENCHR       ;                 IN THREE CHARACTERS
                                                        ;
013132  112702  000057                  MOVB    #HEXF,R2        ;
013136  004737  013366                  JSR     PC,SENCHR       ;
                                                        ;
013142  112702  000044                  MOVB    #FOUR,R2        ;
013146  004737  013366                  JSR     PC,SENCHR       ;
                                                        ;
013152  112702  000073                  MOVB    #73,R2          ;SEMI-COLON TO COMPLETE THE SEQUENCE WHERE
013156  004737  013366                  JSR     PC,SENCHR       ; ESC HEXF,HEXF,FOUR (SEMI-COLON) CAUSES
                                                        ; THE ONE-TENTH INCH SPACE TO THE LEFT.
                                                        ;
                                                        ;THE MARGIN SHOULD NOW BE EVEN.
                                                        ;
013162  000456                          BR      SENDR2          ;NOW SEND THE CHARACTER TO THE PRINTER.
                                                        ;
```

```
                                                ;INDICATE THAT THE DIRECTION IS FORWARD PRINT.
                                                ;
                                                ;RESTORE CHARACTER SIZE TO A POSITIVE 10 CHAR
                                                ;PER INCH.  AT LEAST TWO MORE LINES TO GO....
                                                ;
013164  005037  006504          FWRDO:  CLR     DIRCTN          ;RESTORE CARRIAGE MOTION TO FORWARD.
013170  113702  002244                  MOVB    STCHSZ,R2       ;
013174  004737  013366                  JSR     PC,SENCHR
                                                ;
013200  022737  177777  002206          CMP     #-1,GREASE      ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
013206  001461                          BEQ     EXITX           ;FROM THIS ROUTINE MAY BE REQUIRED.
                                                ;
013210  112702  000040                  MOVB    #ZERO,R2        ;
013214  004737  013366                  JSR     PC,SENCHR       ;
                                                ;
013220  022737  177777  002206          CMP     #-1,GREASE      ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
013226  001451                          BEQ     EXITX           ;FROM THIS ROUTINE MAY BE REQUIRED.
                                                ;
013230  004737  013366                  JSR     PC,SENCHR       ;SEQUENCE SENT: ESC 0000 0000 1100 A
                                                ;
013234  022737  177777  002206          CMP     #-1,GREASE      ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
013242  001443                          BEQ     EXITX           ;FROM THIS ROUTINE MAY BE REQUIRED.
                                                ;
013244  112702  000054                  MOVB    #HEXC,R2        ;ZERO,ZERO,HEXC = 12 = 10 CHARACTERS/INCH
013250  004737  013366                  JSR     PC,SENCHR       ;
                                                ;
013254  022737  177777  002206          CMP     #-1,GREASE      ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
013262  001433                          BEQ     EXITX           ;FROM THIS ROUTINE MAY BE REQUIRED.
                                                ;
013264  012700  000004                  MOV     #4,R0
013270  116002  002244                  MOVB    STCHSZ(R0),R2   ;
013274  004737  013366                  JSR     PC,SENCHR       ;FORWARD CARRIAGE RESTORED.
                                                ;
013300  022737  177777  002206          CMP     #-1,GREASE      ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
013306  001421                          BEQ     EXITX           ;FROM THIS ROUTINE MAY BE REQUIRED.
                                                ;
013310  113702  006541                  MOVB    SPACE,R2        ;NOW TRANSMIT A SPACE TO EVEN UP THE MARGIN.
013314  004737  013366                  JSR     PC,SENCHR       ;
                                                ;
013320  112102          SENDR2: MOVB    (R1)+,R2        ;GET THE CHARACTER FOR TRANSMISSION.
013322  004737  013366                  JSR     PC,SENCHR       ;SEND THE CHARACTER TO THE PRINTER.
013326  022737  177777  002206          CMP     #-1,GREASE      ;
013334  001406                          BEQ     EXITX           ;EXPRESS EXIT IF ANY PROBLEMS.
                                                ;
013336  005237  006502                  INC     CRNTPR          ;CURRENT IN-LINE POINTER UPDATED.
013342  020103                          CMP     R1,R3           ;IS THE ADDRESS OF THE NEXT CHARACTER TO BE
                                                ;PRINTED EQUAL TO THE ADDRESS OF THE LAST
                                                ;CHARACTER (PLUS 1) TO BE TRANSMITTED?
013344  001402                          BEQ     EXITX           ;IF NOT YET THERE, REPEAT TRANSMIT PROCESS.
013346  000137  012732                  JMP     LNELOO
                                                ;
013352  012605          EXITX:  MOV     (SP)+,R5        ;RESTORE
013354  012604                  MOV     (SP)+,R4        ;       REGISTERS
013356  012603                  MOV     (SP)+,R3        ;
013360  012602                  MOV     (SP)+,R2
```

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GLOBAL SUBROUTINES SECTION

```
    229 013362  012601                        MOV     (SP)+,R1
    230
    231 013364  000207                        RTS     PC
    232
    233
    234
    235
    236                                 ;
    237                                 ;
    238                                 ;
    239
    240
```

```


                                      ;-------------------------------------------------------------------
                                      ;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.
                                      ;
                                      ;
                                      ;

 013366  010246                        SENCHR: MOV     R2,-(SP)        ;SAVE
 013370  010346                                MOV     R3,-(SP)
 013372  010446                                MOV     R4,-(SP)        ;       REGISTERS
 013374  010546                                MOV     R5,-(SP)

 013376  013777  006442  173702        SENCH2: MOV     LPRINI,@LPR     ;IF DZ THEN SET PARMS, IF DL THEN NO EFFECT.
 013404  013777  006436  173676                MOV     TCRENA,@TCR     ;IF DZ THEN SET CHANNEL. IF DL, NO EFFECT.
 013412  005005                                CLR     R5
 013414  005003                        RESINN: CLR     R3              ;COUNTER
 013416  005203                        SENCLP: INC     R3              ;COUNTER
 013420  020327  007000                        CMP     R3,#7000        ;INNER LOOP CHECK
 013424  100420                                BMI     CNTNU           ;KEEP LOOPING UNTIL WE REACH 77000
 013426  005205                                INC     R5              ;OUTER LOOP COUNTER

 013430  020527  000106                        CMP     R5,#70.         ;PRINT A WAITING TO SEND MESSAGE.
 013434  001010                                BNE     COIE            ;CONTINUE WITH LOOP IF NOT 70 YET.
 013436                                        PRINTX  WTSTPM          ;WAITING TO SEND TO PRINTER MESSAGE.
 013436  013746  005154                                                                  MOV     WTSTPM,-(SP)
 013442  012746  000001                                                                  MOV     #1,-(SP)
```

```
013446  010600                                                          MOV     SP,R0
013450  104415                                                          TRAP    C$PNTX
013452  062706  000004                                                  ADD     #4,SP
    56
    57 013456  020527  000144          COIE:   CMP     R5,#100.        ;ALLOW 100 LOOPS BEFORE TIME OUT.
    58 013462  100045                  BPL     EXETS                   ;FAILURE TO FIND TRDY.
    59 013464  000753                  BR      RESINN                  ;RESET INNER LOOP
    60
    61 013466  032777  000200  173602  CNTNU:  BIT     #BIT7,@RCSR     ;IS RECEIVER READY? SHOULD BE SET IF IT IS.
    62 013474  001007                  BNE     ALPHA                   ;IF SET, ALPHA TAKES CARE OF BUFFER READ.
    63
    64 013476  033777  010044  173574  BETA:   BIT     TRDYBT,@XCSR    ;RCVR NOT RDY.  SEE IF THE TRANSMITTER IS READY
    65 013504  001744                  BEQ     SENCLP                  ;IF ZERO, NOT READY, LOOP AND CHECK AGAIN.
    66
    67
    68
    69 013506  110277  173572                  MOVB    R2,@XBUF        ;PUT CHARACTER INTO TRANSMITTER BUFFER.
    70 013512  000445                  BR      EXITS                   ;AND EXIT
    71
    72
    73 013514  017704  173562          ALPHA:  MOV     @RBUF,R4        ;READ THE RECEIVER BUFFER.
    74
    75 013520  120437  006520                  CMPB    R4,XON          ;IS IT = ''XON''?
    76 013524  001764                  BEQ     BETA                    ;IF IT IS THEN ALL IS OK, CONTINUE.
    77
    78 013526  120437  006517                  CMPB    R4,XOFF         ;IS IT = ''XOFF''?
    79 013532  001007                  BNE     CHKCAN                  ;IF NOT ''XOFF'' THEN MAYBE IT IS A ''CAN''
    80
    81 013534  004737  013640                  JSR     PC,WAITXN       ;IF IT WAS AN XOFF THEN WE MUST WAIT FOR
    82                                                                 ;       AN XON AND THEN SEND CHARACTER.
    83 013540  022737  177777  002206          CMP     #-1,GREASE      ;HAS A TIME-OUT OCCURRED?  EXPRESS EXIT
    84 013546  001427                  BEQ     EXITS                   ;FROM THIS ROUTINE MAY BE REQUIRED.
    85
    86 013550  000712                  BR      SENCH2                  ;XON FOUND ON TIME.  LOOK FOR TRANSMIT READY.
    87
    88 013552  120437  006516          CHKCAN: CMPB    R4,CAN          ;CHARACTER = ''CAN'' ?
    89 013556  001416                  BEQ     SETER                   ;IF IT IS THEN SET APPROPRIATE FLAG (ERWORD)
    90
    91 013560  120437  006515                  CMPB    R4,EOT          ;CHARACTER = ''EOT'' ?
    92 013564  001413                  BEQ     SETER                   ;IF IT IS THEN SET APPROPRIATE FLAG (ERWORD)
    93
    94 013566  052737  010000  006500          BIS     #BIT12,ERWORD   ;NONE OF THE USUAL CHARACTERS FOUND
    95                                                                 ;       ASYNCHRONOUSLY.  UNEXPECTED CHARACTER
    96                                                                 ;       RECEIVED INDICATED IN ERWORD.
    97 013574  000740                  BR      BETA                    ;TRY AGAIN TO SEND CHARACTER
    98
    99 013576  012737  000001  006512  EXETS:  MOV     #1,FLTRDY       ;INDICATE FAILED TO FIND TRANSMIT READY.
   100 013604  012737  177777  002206          MOV     #-1,GREASE      ;ENABLE GREASED EXITS FROM TESTS.
   101 013612  000405                  BR      EXITS                   ;FAIL TO FIND TRDY
   102
   103 013614  052737  100000  006500  SETER:  BIS     #BIT15,ERWORD   ;CAN OR EOT TYPE ERROR
   104 013622  004737  014774                  JSR     PC,STSERR       ;SET UP ERWORD.
   105
   106 013626  012605                  EXITS:  MOV     (SP)+,R5
   107 013630  012604                          MOV     (SP)+,R4        ;RESTORE
   108 013632  012603                          MOV     (SP)+,R3
   109 013634  012602                          MOV     (SP)+,R2        ;       REGISTERS
```

```
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GLOBAL SUBROUTINES SECTION

    110
    111 013636  000207                        RTS     PC
    112
    113
    114
    115                                 ;
    116                                 ;
    117                                 ;
    118
```

```
                        ;*****************************************************************
                        ;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.
                        ;

013640  010146          WAITXN: MOV     R1,-(SP)        ;SAVE USED REGISTERS
013642  010446                  MOV     R4,-(SP)        ;
                        ;
013644  005037  006510          CLR     OUTSDC          ;OUTSIDE LOOP COUNTER.  1 MINUTE WAIT
013650  005001          OUTSDL: CLR     R1              ;INSIDE LOOP COUNTER.
                        ;
013652  012705  004000          MOV     #4000,R5        ;ARGUMENT FOR THE DELAY
013656  004737  015224  LOOPXN: JSR     PC,DELAYS       ;ABOUT 1 MSEC
                        ;
013662  032777  000200  173406          BIT     #BIT7,@RCSR     ;RECEIVER READY? =0 IF NOT READY.
013670  001415                  BEQ     LOOPCK          ;NOT READY? THEN CHECK AGAIN
013672  004737  014012          JSR     PC,GETCHR       ;GET THE BYTE
013676  120437  006520          CMPB    R4,XON          ;IS IT = "XON" ?
013702  001440                  BEQ     EXITON          ;IF = XON OK... EXIT ROUTINE WITH NO ERROR
                        ;
013704  012737  177777  002206  MOV     #-1,GREASE      ;UNEXPECTED CHARACTER RECEIVED.  ENABLE
013712  052737  010000  006500  BIS     #BIT12,ERWORD   ;"GREASED" EXIT FROM CALLING ROUTINE.
013720  000137  014004          JMP     EXITON          ;EXIT ROUTINE.
```

```
     58 013724  005201                    LOOPCK: INC     R1              ;UPDATE LOOP COUNTER
     59 013726  020127  077000                    CMP     R1,#077000      ;LOOPED ENOUGH TIMES YET?  5 SEC CHECK
     60 013732  100751                            BMI     LOOPXN          ;CONTINUE TO LOOP UNTIL 5000 EXCEEDED.
     61
     62 013734  005237  006510                    INC     OUTSDC          ;OUTSIDE LOOP COUNT
     63 013740  023727  006510  000015            CMP     OUTSDC,#15      ;13 LOOPS YET?
     64 013746  100740                            BMI     OUTSDL          ;NO? THEN START UP AGAIN
     65
     66 013750  052737  010000  006500            BIS     #BIT12,ERWORD   ;NOT XON.... ERROR UCRB
     67 013756  052737  100000  006500            BIS     #BIT15,ERWORD   ;AN ERROR IS DETECTED AND INDICATED
     68
     69 013764                                    PRINTX  #TIMOM          ;PRINT TIMEOUT MESSAGE
        013764  012746  012512                                                    MOV     #TIMOM,-(SP)
        013770  012746  000001                                                    MOV     #1,-(SP)
        013774  010600                                                            MOV     SP,R0
        013776  104415                                                            TRAP    C$PNTX
        014000  062706  000004                                                    ADD     #4,SP
     70
     71 014004  012604                    EXITON: MOV     (SP)+,R4        ;RESTORE THE REGISTERS
     72 014006  012601                            MOV     (SP)+,R1
     73
     74 014010  000207                            RTS     PC
     75
     76
     77
```

```
                        ;
                        ;-------------------------------------------------------------------
                        ;FUNCTIONAL DESCRIPTION
                        ;
                        ;       GLOBAL PROCEDURE GETCHR
                        ;
                        ;       THIS PROCEDURE WILL GET A CHARACTER AND WILL INDICATE A TIME-OUT
                        ;       ERROR IF IT FAILS TOO 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.
                        ;
                        ;
014012  010146          GETCHR: MOV     R1,-(SP)        ;SAVE REGISTERS
014014  010246                  MOV     R2,-(SP)        ;
014016  010546                  MOV     R5,-(SP)
                        ;
014020  005037  006506          CLR     OUTCTR          ;OUTER LOOP COUNTER.
014024  005001          OUTRLP: CLR     R1              ;TIMING INNER LOOP COUNTER.
                        ;
014026  032777  000200  173242  LOOPG:  BIT     #BIT07,@RCSR    ;RCSR-7 SET? RECEIVER READY? RDONE?
014034  001041                  BNE     SENDR           ;IF YES.....GET THE CHARACTER OUT OF THE BUFFER
                        ;                               ;AND INTO R4.
014036  012705  000001          MOV     #1,R5           ;SHORT DELAY... 100 USEC
014042  004737  015224          JSR     PC,DELAYS       ;WAIT AROUND FOR A WHILE
                        ;
014046  005201                  INC     R1              ;LOOP COUNTER UPDATE.
                        ;
014050  020127  002400  NOPRTM: CMP     R1,#2400        ;LOOPED LONG ENOUGH TO SET TIME-OUT INDICATOR?
014054  100764                  BMI     LOOPG           ;LOOP UNTIL 24400 OR RECEIVER IS SET.
                        ;
014056  005237  006506          INC     OUTCTR          ;UPDATE OUTSIDE COUNTER.
                        ;
014062  023727  006506  000024  CMP     OUTCTR,#20.     ;HAVE WE BEEN WAITING LONG?
014070  001010                  BNE     CONTLO          ;SKIP PRINT. ONCE PER LONG WAIT ONLY.
014072                          PRINTX  #WFC            ;PRINT WAITING FOR A CHARACTER FROM PRINTER.
014072  012746  012414                                                  MOV     #WFC,-(SP)
```

```
                014076  012746  000001                                          MOV     #1,-(SP)
                014102  010600                                                  MOV     SP,R0
                014104  104415                                                  TRAP    C$PNTX
                014106  062706  000004                                          ADD     #4,SP
     57
     58 014112  023727  006506  000132  CONTLO: CMP     OUTCTR,#90.     ;40 LOOPS MAXIMUM PERMITTED.
     59 014120  100741                          BMI     OUTRLP          ;NOT DONE YET?  CONTINUE OUTER LOOP.
     60
     61 014122  052737  020000  006500          BIS     #BIT13,ERWORD   ;ECNRB ERROR
     62 014130  052737  100000  006500          BIS     #BIT15,ERWORD   ;ERROR INDICATOR
     63
     64 014136  000413                          BR      EXITE           ;GIVE UP WITH THIS RECEPTION
     65                                                                  ;       AN ERROR WILL BE INDICATED.
     66
     67 014140  017704  173136          SENDR:  MOV     @RBUF,R4        ;PUT CHARACTER RECEIVED INTO R4
     68
     69 014144  120437  006516                  CMPB    R4,CAN          ;IS THE CHARACTER A "CAN" FROM THE PRINTER?
     70 014150  001403                          BEQ     ERSETT          ;THEN SET BIT15 IN ERWORD AND EXIT.
     71
     72 014152  120437  006515                  CMPB    R4,EOT          ;IS THE CHARACTER AN "EOT" FROM THE PRINTER?
     73 014156  001003                          BNE     EXITE           ;IF NOT THEN EXIT WITH CHARACTER.
     74
     75 014160  052737  100000  006500  ERSETT: BIS     #BIT15,ERWORD   ;WE HAVE AN ERROR CONDITION.  EITHER FATAL
     76                                                                  ;       OR NON-FATAL.  (CAN OR EOT)
     77
     78 014166  012605                  EXITE:  MOV     (SP)+,R5
     79 014170  012602                          MOV     (SP)+,R2        ;RESTORE REGISTERS
     80 014172  012601                          MOV     (SP)+,R1        ;
     81
     82 014174  000207                          RTS     PC
     83
     84
```

;

```
                        ;*****************************************************************
                        ;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.
                        ;
                        ;
                        ;
                        ;
                        ;
014176  010246          CONVRT: MOV     R2,-(SP)        ;SAVE REGISTERS
014200  010346                  MOV     R3,-(SP)        ;
                        ;
014202  010102                  MOV     R1,R2           ;GET COPY OF NUMBER TO BE CONVERTED.
014204  043702  006430          BIC     TMPLT1,R2       ;MASK IN BITS 8 - 11.
014210  000302                  SWAB    R2              ;RIGHT JUSTIFY MASKED BITS
                        ;
014212  052702  000040          BIS     #BIT5,R2                ;CONVERT TO THE ASCII VALUE
014216  110237  010046          MOVB    R2,MNEB1        ;STORE RESULT IN GLOBAL VARIABLE
                        ;
014222  010102                  MOV     R1,R2           ;COPY OF ORIGINAL NUMBER
014224  043702  006432          BIC     TMPLT2,R2       ;MASK BITS 4 - 7.
014230  006202                  ASR     R2              ; RIGHT JUSTIFY
014232  006202                  ASR     R2              ;       BITS 4 - 7
014234  006202                  ASR     R2              ;       INTO BIT POSITIONS
014236  006202                  ASR     R2              ;       0 - 3.
                        ;
014240  052702  000040          BIS     #BIT5,R2                ;CONVERT TO THE ASCII VALUE
014244  110237  010047          MOVB    R2,MNEB2        ;STORE RESULT IN GLOBAL VARIABLE
```

```
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GLOBAL SUBROUTINES SECTION

      58
      59 014250  010102                          MOV     R1,R2           ;GET ORIGINAL NUMBER
      60 014252  043702  006434                  BIC     TMPLT3,R2       ;MASK OUT LEFT 12 BITS.
      61 014256  052702  000040                  BIS     #BIT5,R2                ;SET BIT 5.  CONVERT TO ASCII VALUE
      62 014262  110237  010050                  MOVB    R2,MNEB3        ;MOVE TO GLOBAL VARIABLE
      63
      64 014266  012603                          MOV     (SP)+,R3        ;RESTORE REGISTERS
      65 014270  012602                          MOV     (SP)+,R2        ;
      66
      67 014272  000207                          RTS     PC
      68
      69
      70
      71
      72
      73                                  ;
      74                                  ;
      75                                  ;
      76
      77
      78
```

```
                        ;*****************************************************************
                        ;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.
                        ;
                        ;
                        ;
014274  005037  007314          INITCD: CLR     PGMCTR          ;DOES NOT YET POINT TO PC OF ERROR
014300  010146                          MOV     R1,-(SP)        ;SAVE REGISTERS
014302  010246                          MOV     R2,-(SP)        ;
014304  010346                          MOV     R3,-(SP)        ;
014306  010446                          MOV     R4,-(SP)        ;
                        ;
014310  032777  000200  172760  EMPTIB: BIT     #BIT7,@RCSR     ;IS THERE A CHARACTER IN THE RBUF?
014316  001403                          BEQ     RESETC          ;IF NO CHARACTER IN RBUF, THEN CONTINUE...
```

```
                                                TST     @RBUF           ;EMPTY RBUF.  IGNORE BUFFER CONTENTS.
                                                BR      EMPTIB          ;CHECK FOR RDONE AGAIN AND EMPTY BUFFER

                                        RESETC: MOV     #DUMMYS,R1      ;FIX INTERFACE TO ACCEPT PRINTER RESET.
                                                MOV     #8.,R2          ;
                                                CLR     R3              ;
                                                JSR     PC,XMIT         ;SEND DUMMY SEQUENCE

                                                CLR     ERWORD          ;ASSUME THAT NO ERRORS HAVE YET OCCURED.

                                                MOV     #RESET,R1       ;TRANSMIT PRINTER RESET SEQUENCE (ADDRESS)
                                                MOV     #2,R2           ;2 ARGUMENT LIST
                                                CLR     R3              ;NO BIDIRECTIONAL PRINTING NECESSARY
                                                JSR     PC,XMIT         ;SEND SEQUENCE TO PRINTER

                                                JSR     PC,GETCHR       ;READ   "ESC"   CHR FROM RBUF
                                                CMPB    R4,ESCAPE       ;CHECK FOR CORRECT CHARACTER
                                                BNE     INIERR          ;INDICATE ERROR IF NOT CORRECT. THEN CONTINUE

                                                JSR     PC,GETCHR       ;READ STATUS CHR. SHOULD BE SPACE CHARACTER.
                                                CMPB    R4,#ZERO                ;SHOULD BE NO ERRORS - RIGHT FOUR BITS = 0000
                                                BNE     INIERR          ;IF RIGHT FOUR BITS NONZERO, INDICATE ERROR.

                                                JSR     PC,GETCHR       ;READ 2ND STATUS NIBBLE.
                                                CMPB    R4,#ZERO        ;RIGHT FOUR BITS SHOULD BE 0000
                                                BNE     INIERR          ;IF NONZERO, INDICATE ERROR AND CONTINUE

                                                JSR     PC,GETCHR       ;READ 3RD STATUS NIBBLE.
                                                BIC     #BIT0,R4        ;CLEAR THE SHEET FEEDER PRESENT BIT IF SET.
                                                CMPB    R4,#ZERO        ;IS STATUS NIBBLE = 0000 ?
                                                BNE     INIERR          ;IF NOT, INDICATE ERROR AND CONTINUE

                                                JSR     PC,GETCHR       ;READ (HOPEFULLY) "0" FROM RBUF
                                                CMPB    R4,SC0          ;CONFIRM THE CHARACTER IS A "0".
                                                BNE     INIERR          ;IF NOT = "0", THEN INDICATE ERROR, CONTINUE

                                                JSR     PC,GETCHR       ;A CHARACTER IS EXPECTED FROM THE PRINTER
                                                CMPB    R4,XON          ;"XON" IS THE EXPECTED CHARACTER
                                                BEQ     SETUPI          ;IF YES, THEN SET UP THE PRINTER PARAMETERS

006500  INIERR: BIS     #BIT12,ERWORD   ;IF NO, THEN INDICATE ERRORS: UCRB
006500          BIS     #BIT13,ERWORD   ;       THEN INDICATE ERRORS: ECNRB
006500          BIS     #BIT15,ERWORD   ;       THEN INDICATE ERRORS: ERROR FOUND BI
                JSR     PC,STSERR       ;CHECK FOR MORE ERRORS

        SETUPI: MOV     #1,R0
002240          MOVB    #ZERO,RIBPOS(R0) ;RIBBON POSITION DOWN
                MOV     #RIBPOS,R1      ;ADDRESS OF ARGUMENT LIST
                MOV     #3,R2           ;3CHARACTERS IN ARGUMENT LIST
                CLR     R3              ;NC PRINTING
                JSR     PC,XMIT         ;SEND TO PRINTER

                MOV     #1,R0
002257          MOVB    #ZERO,STHTCT(R0) ;SET HIT COUNT TO 1 HIT PER CHARACTER
                MOV     #STHTCT,R1      ;ADDRESS OF ARGUMENT LIST
                MOV     #3,R2           ;THREE ARGUMENTS IN THE
```

```
                                                CLR     R3              ;NO PRINTING
                                                JSR     PC,XMIT         ;SEND TO PRINTER

                                                MOVB    #ZERO,STULMD(R0) ;SET UNDERLINE MODE
                                                MOV     #STULMD,R1      ;ADDRESS OF ARG LIST
                                                MOV     #3,R2           ;THREE ARGUMENTS
                                                CLR     R3              ;NO PRINTING
                                                JSR     PC,XMIT         ;SEND TO PRINTER

                                                MOV     #CR,R1          ;ADDRESS OF CRLF TO BE PRINTED
                                                MOV     #2,R2           ;2 CHARACTERS TO BE PRINTED
                                                CLR     R3              ;NO BIDIRECTIONAL PRINTING
                                                JSR     PC,XMIT         ;SEND TO PRINTER

                                                MOV     #LF,R1          ;ADDRESS OF LINEFEED
                                                MOV     #1,R2           ;PRINT THE SINGLE CHARACTER
                                                CLR     R3              ;WITHOUT BIDIRECTIONAL PRINTING
                                                JSR     PC,XMIT         ;SEND TO PRINTER
                                                JSR     PC,XMIT         ;AGAIN...
                                                JSR     PC,XMIT         ;AND AGAIN...

                                                CLR     CRNTPR          ;CLEAR CURRENT COUNT WHICH IS USED IN
                                                                        ;BIDIRECTIONAL PRINTING TO KEEP TRACK OF
                                                                        ;THE NUMBER OF CHARACTERS PRINTED CURRENTLY
                                                                        ;IN THE CURRENT DIRECTION.
                                                CLR     DIRCTN          ;INDICATOR THAT PRINTER IS PRINTING IN THE
                                                                        ;FORWARD DIRECTION. (0=FORWARD, 1=REVERSE)
                                                                        ;THIS IS TRUE AT THIS POINT BECAUSE THIS
                                                                        ;ROUTINE RE-INITIALIZES THE PRINTER.

                                                MOV     #7000,R5        ;SET UP FOR A DELAY (ARG FOR DELAYS ROUTINE)
                                                MOV     #7000,R4        ;LOOP COUNTER
                                        LODELY: JSR     PC,DELAYS       ;CAUSE A SHORT DELAY
                                                DEC     R4              ;LOOP COUNTER ADJUSTMENT
                                                BPL     LODELY          ;REPEAT UNTIL SUFFICIENT DELAY CAUSED.

                                                MOV     (SP)+,R4        ;RESTORE
                                                MOV     (SP)+,R3        ;       REGISTERS
                                                MOV     (SP)+,R2        ;
                                                MOV     (SP)+,R1        ;

                                                RTS     PC

                                        ;
                                        ;
                                        ;
```

```
                        ;*****************************************************************
                        ;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
                        ;
                        ;
014726  000240          RANDOM: NOP                     ;RANDOM NUMBER GENERATOR
                        ;
014730  012701  000001  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 RECCOMENDED)
014734  063701  006424          ADD     SEED1,R1        ;GET THE SEED1 VALUE (SLIGHTLY ALTERRED)
014740  063701  006426          ADD     SEED2,R1        ;ADD THE SECOND SEED VALUE
                        ;
014744  006101                  ROL     R1              ;ROTATE CONTENTS SO THAT VALUE IS LOST
014746  006101                  ROL     R1              ;ROTATE AGAIN.  VALUE IS CHANGED AGAIN
                        ;
014750  060137  006424          ADD     R1,SEED1        ;NOW A NEW SEED VALUE
014754  010137  006426          MOV     R1,SEED2        ;AND A NEW SECOND SEED VALUE
                        ;                               ;BOTH FAIRLY UNRELATED TO THE ORIGINAL SEEDS
                        ;
014760  042701  177600          BIC     #177600,R1      ;MASK OUT THE LEFT NINE BITS
                        ;                               ;THE NUMBER NOW HAS A POSSIBLE RANGE OF 0-127
014764  022701  000143          CMP     #99.,R1         ;IS THE NUMBER 0-99 ?
```

```
GLOBAL AREAS    MACRO V03.01 7-NOV-80 10:06:10 PAGE 19-1
GLOBAL SUBROUTINES SECTION

     58 014770  100757                         BMI     TRYAGN          ;NO? WELL TRY AGAIN. RANGE MUST BE 0-99.
     59
     60 014772  000207                         RTS     PC
     61
     62
     63
     64                                 ;
     65                                 ;
     66                                 ;
     67                                 ;
     68
```

```
                        ;
                        ;
                        ;-------------------------------------------------------------------------------
                        ;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.
                        ;
                        ;
                        ;
014774  113702  002210  STSERR: MOVB    STSRES,R2       ;SEND "ESC 0" TO THE PRINTER.
015000  004737  013366          JSR     PC,SENCHR       ;
015004  012700  000001          MOV     #1,R0
015010  116002  002210          MOVB    STSRES(R0),R2   ;
015014  004737  013366          JSR     PC,SENCHR       ;REQUEST STATUS FROM PRINTER.
                        ;
015020  010446          STATS:  MOV     R4,-(SP)        ;PUSH REGISTERS
015022  010346          MOV     R3,-(SP)        ;
                        ;
015024  004737  014012          JSR     PC,GETCHR       ;GET A CHARACTER FROM THE PRINTER.
015030  120437  002315          CMPB    R4,STATUS       ;THE CHARACTER IN R4 SHOULD BE AN ESC CHARACTER
015034  001057                  BNE     PALPHA          ;EXPECTED CHAR NOT RECVD, UNEXPECTED CHAR RCVD.
                        ;
015036  004737  014012          JSR     PC,GETCHR       ;GET N3 FROM PRINTER. FATAL ERRORS INDICATED.
015042  043704  006434          BIC     TMPLT3,R4       ;CLEAR LEFT 12 BITS.
```

```
     58 015046  000304                          SWAB    R4              ;PUT BITS IN PROPER POSITION FOR ERWORD
     59 015050  050437  006500                  BIS     R4,ERWORD       ;SET THE ERROR BITS APPROPRIATE IN ERWORD.
     60
     61 015054  004737  014012                  JSR     PC,GETCHR       ;GET N2 FROM PRINTER. NON-FATAL ERRORS FRM PRTR
     62 015060  043704  006434                  BIC     TMPLT3,R4       ;CLEAR THE LEFT 12 BITS. (NOT WANTED)
     63 015064  006304                          ASL     R4              ;SHIFT
     64 015066  006304                          ASL     R4              ;       LEFT
     65 015070  006304                          ASL     R4              ;                FOUR
     66 015072  006304                          ASL     R4              ;                     POSITIONS.
     67 015074  050437  006500                  BIS     R4,ERWORD       ;AND SET THE APPROPRIATE BITS IN ERWORD.
     68
     69 015100  004737  014012                  JSR     PC,GETCHR       ;GET ANOOTHER CHARACTER. N1. PRINTER CONDITION
     70 015104  043704  006434                  BIC     TMPLT3,R4       ;CLEAR THE 12 LEFT UNWANTED BITS.
     71 015110  042704  000001                  BIC     #BIT0,R4        ;SHEET FEEDER PRESENT NOT A GENERAL ERROR.
     72 015114  042704  000004                  BIC     #BIT2,R4        ;NOT USED BY PRINTER
     73 015120  042704  000010                  BIC     #BIT3,R4        ;NOT USED BY PRINTER
     74 015124  050437  006500                  BIS     R4,ERWORD       ;SET APPROPRIATE BITS IN ERWORD.
     75
     76 015130  042737  046400  006500          BIC     #46400,ERWORD   ;CLEAR BITS 14,11,10,8 (UNUSED BITS IN ERWORD)
     77
     78 015136  005737  006500                  TST     ERWORD          ;IS THE ERWORD = 0 ?
     79 015142  001403                          BEQ     CRCLX           ;IF IT IS CONTINUE...
     80 015144  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 015152  004737  014012          CRCLX:  JSR     PC,GETCHR       ;HOPE TO GET A "0"
     84 015156  123704  006532                  CMPB    SCO,R4          ;IS IT THE EXPECTED "0" ?
     85 015162  001415                          BEQ     EXITSR          ;IF EQUAL TO EXPECTED CHAR ("0"), THEN DONE.
     86
     87 015164  052737  020000  006500          BIS     #ECNRB,ERWORD   ;SET ECNRB ("0" NOT FOUND.)
     88 015172  000403                          BR      SET15           ;SET ERROR INDICATOR AND EXIT.
     89
     90 015174  052737  020000  006500  PALPHA: BIS     #ECNRB,ERWORD   ;EXPECTED CHARACTER NOT RECEIVED INDICATOR
     91
     92 015202  052737  100000  006500  SET15:  BIS     #BIT15,ERWORD   ;INDICATE THAT AN ERROR HAS OCCURRED.
     93 015210  012737  177777  002206          MOV     #-1,GREASE      ;ENABLE A "GREASED" EXIT FROM THE CALLING
     94                                                                  ;ROUTINES.
     95 015216  012603                  EXITSR: MOV     (SP)+,R3        ;RESTORE REGISTERS.
     96 015220  012604                          MOV     (SP)+,R4        ;
     97
     98 015222  000207                          RTS     PC
     99
    100
    101
    102
    103
    104                                 ;
    105                                 ;
    106                                 ;
```

```
                        ;
                        ;.....................................................................
                        ;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
                        ;
                        ;
                        ;
                        ;
                        ;
                        ;
                        ;
015224  012737  000025  010054  DELAYS: MOV     #21.,DELCNT     ;2.91USEC. - INNER LOOP INITIALIZATION
                        ;
015232  005337  010054          INLOOP: DEC     DELCNT          ;2.385USEC. -
                        ;                                               -TOTAL 4.77USEC. PER LOOP
015236  100375                  BPL     INLOOP          ;2.385USEC. -
                        ;                                                       0.103MSEC TO HERE
015240  005305                  DEC     R5              ;STARTS WITH # OF .1 MSEC INCREMENTS.
015242  100370                  BPL     DELAYS          ;IF R1 WERE 10,000 THEN TIME DELAY IS 1 SECOND.
                        ;
015244  000207                  RTS     PC
                        ;
                        ;
                        ;
                        ;
                        ;
```

```
      1
      2
      3                                ;
      4                                ;.....................................................................
```

```
                                ;
                                ;###############################################################################
                                ;
                                ;******************** ERROR DECODE AND PRINT SUBROUTINE ************************
                                ;
                                ;===============================================================================
                                ;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 ERRTYP, ERRNBR, ERRMSG AND ERRBLK 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
                                ;
                                ;

015246  010346                  ERRORS: MOV     R3,-(SP)        ;PUSH REGISTERS
015250  010446                          MOV     R4,-(SP)        ;

015252  032737  100000  006500          BIT     #BIT15,ERWORD   ;IS ERROR FOUND BIT SET?
015260  001473                          BEQ     EXTMCR          ;IF NOT SET, THEN EXIT THE SUBROUTINE.

015262  162737  000004  007314          SUB     #4,PGMCTR       ;ACCOUNT FOR AUTOINC OF PC WHEN PUSHED BY JSR

015270  005003                          CLR     R3              ;LOOP COUNTER AND TABLE POINTER.
015272  032737  000001  006500  NXTBIT: BIT     #BIT0,ERWORD    ;IS THE RIGHT-MOST BIT SET?
015300  001435                          BEQ     NXTERM          ;IF NOT SET, THEN CHECK THE NEXT BIT.

                                        ;                                ERRDF CALL = ERRTYP:1
015302  012737  000001  010072          MOV     #1,ERRTYP               ;USING THE ERRTBL SET UP BY THE
015310  016337  007316  010076          MOV     ERMSGB(R3),ERRMSG       ;SUPERVISOR DEVICE FATAL MACRO CALL
```

```
     58 015316  010337  010074                MOV     R3,ERRNBR               ;ERROR NUMBER BEING CHECKED.
     59 015322                                 ERROR                           ;MACRO CALL - WITH ABOVE PARMS
        015322  104460                                                                   TRAP    C$ERROR
     60
     61 015324                                 PRINTB  #PRTBM0,PGMCTR          ;PRINT BASIC ERROR MESSAGE AND PC
        015324  013746  007314                                                           MOV     PGMCTR,-(SP)
        015330  012746  010230                                                           MOV     #PRTBM0,-(SP)
        015334  012746  000002                                                           MOV     #2,-(SP)
        015340  010600                                                                   MOV     SP,R0
        015342  104414                                                                   TRAP    C$PNTB
        015344  062706  000006                                                           ADD     #6,SP
     62 015350                                 PRINTX  #PRTXM0,TRXADD          ;PRINT EXTENDED ERROR MESSAGE AND
        015350  013746  005250                                                           MOV     TRXADD,-(SP)
        015354  012746  010302                                                           MOV     #PRTXM0,-(SP)
        015360  012746  000002                                                           MOV     #2,-(SP)
        015364  010600                                                                   MOV     SP,R0
        015366  104415                                                                   TRAP    C$PNTX
        015370  062706  000006                                                           ADD     #6,SP
     63                                                                         ;ADDRESS OF TRANSMITTED STRING AND
     64                                                                         ;THE ERROR FLAG-WORG.
     65
     66 015374  062703  000002          NXTERM: ADD     #2,R3                ;POINT TO NEXT TABLE ENTRY.
     67 015400  006237  006500                  ASR     ERWORD               ;GET NEXT BIT INTO POSITION.
     68
     69 015404  022703  000034                  CMP     #28.,R3              ;DONE WITH ALL THIS WHEN R3 IS 28 AND 13
     70                                                                      ;       BITS HAVE BEEN CHECKED.
     71 015410  001330                          BNE     NXTBIT               ;REPEAT UNTIL 13 LOOPS COMPLETE.
     72 015412  005037  006500                  CLR     ERWORD               ;SINCE WE ARE DONE, CLEAR THE ERROR FLAG-WORD.
     73
     74 015416  022737  000001  006512          CMP     #1,FLTRDY            ;WAS THERE A FAILURE TO FIND TRANSMIT-READY?
     75 015424  001010                          BNE     DCUPA                ;IF NOT, DO CLEANUP
     76 015426                                  PRINTB  #FXRDYM              ;PRINT TO CONSOLE:  FAILED TO TRANSMIT TO PRNTR
        015426  012746  012316                                                           MOV     #FXRDYM,-(SP)
        015432  012746  000001                                                           MOV     #1,-(SP)
        015436  010600                                                                   MOV     SP,R0
        015440  104414                                                                   TRAP    C$PNTB
        015442  062706  000004                                                           ADD     #4,SP
     77
     78 015446                          DCUPA:  DOCLN
        015446  104444                                                                   TRAP    C$DCLN
     79
     80 015450  022737  000001  006512  EXTMCR: CMP     #1,FLTRDY
     81 015456  001010                          BNE     DDCUPA
     82 015460                                  PRINTB  #FXRDYM
        015460  012746  012316                                                           MOV     #FXRDYM,-(SP)
        015464  012746  000001                                                           MOV     #1,-(SP)
        015470  010600                                                                   MOV     SP,R0
        015472  104414                                                                   TRAP    C$PNTB
        015474  062706  000004                                                           ADD     #4,SP
     83
     84 015500  012604                  DDCUPA: MOV     (SP)+,R4             ;RESTORE REGISTERS
     85 015502  012603                          MOV     (SP)+,R3             ;
     86
     87 015504  000207                          RTS     PC
     88
     89
     90                                 ;
```

```
                                ;
                                ;
                                ;###############################################################################
                                ;
                                
                                
                                
                                
                                
                                .TITLE MISCELLANEOUS SECTIONS
                                .SBTTL  REPORT CODING SECTION
```

```
      1
      2
      3                                 ;++
      4                                 ; THE REPORT CODING SECTION CONTAINS THE
      5                                 ; "PRINTS" CALLS THAT GENERATE STATISTICAL REPORTS.
      6                                 ;--
      7
      8 015506                                  BGNRPT
        015506                                                                  L$RPT::
      9
     10 015506                                  EXIT    RPT
        015506  000167                                                                  .WORD   J$JMP
        015510  000000                                                                  .WORD   L10002-2-.
     11
     12                                         .EVEN
     13
     14 015512                                  ENDRPT
        015512                                                                  L10002:
        015512  104425                                                                  TRAP    C$RPT
     15                                 .SBTTL  PROTECTION TABLE
```

```
MISCELLANEOUS SECTIONS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 25
PROTECTION TABLE

      1
      2                                 ;++
      3                                 ; THIS TABLE IS USED BY THE RUNTIME SERVICES
      4                                 ; TO PROTECT THE LOAD MEDIA.
      5                                 ;--
      6
      7 015514                                  BGNPROT
        015514                                                                  L$PROT::
      8
      9 015514  177777                          -1              ;OFFSET INTO P-TABLE FOR CSR ADDRESS
     10 015516  177777                          -1              ;OFFSET INTO P-TABLE FOR MASSBUS ADDRESS
     11 015520  177777                          -1              ;OFFSET INTO P-TABLE FOR DRIVE NUMBER
     12
     13 015522                                  ENDPROT
     14
     15                                 .SBTTL  INITIALIZE SECTION
```

```
      1
      2                                         ;++
      3                                         ; THE INITIALIZE SECTION CONTAINS THE CODING THAT IS PERFORMED
      4                                         ; AT THE BEGINNING OF EACH PASS.
      5                                         ;--
      6
      7 015522                                          BGNINIT
        015522                                                                                  L$INIT::
      8
      9                                         ;
     10                                         ;*************************************************************************
     11                                         ;
     12                                         ;       INITIALIZE ROUTINE.
     13                                         ;
     14                                         ;       THIS CODE WILL ACT ON THE HARDWARE P-TABLE CONTENTS TO SET UP THE
     15                                         ;       SERIAL INTERFACE THAT THE PRINTER IS CONNECTED TO.
     16                                         ;
     17                                         ;*************************************************************************
     18
     19 015522                                  INITLZ: READEF  #EF.CONTINUE
        015522  012700  000036                                                                  MOV     #EF.CONTINUE,R0
        015526  104447                                                                          TRAP    C$REFG
     20 015530                                          BCOMPLETE       JENDIN
        015530  103425                                                                          BCS     JENDIN
     21
     22 015532                                          READEF  #EF.NEW
        015532  012700  000035                                                                  MOV     #EF.NEW,R0
        015536  104447                                                                          TRAP    C$REFG
     23 015540                                          BNCOMPLETE      NEXTU
        015540  103003                                                                          BCC     NEXTU
     24
     25
     26 015542  012737  177777  002202                  MOV     #-1,LOGUNIT
     27 015550  005237  002202          NEXTU:          INC     LOGUNIT
     28 015554  023737  002202  002012                  CMP     LOGUNIT,L$UNIT
     29 015562  001407                                  BEQ     ABORT
     30 015564                                          GPHARD  LOGUNIT,PLOC
        015564  013700  002202                                                                  MOV     LOGUNIT,R0
        015570  104442                                                                          TRAP    C$GPHRD
        015572  010037  002204                                                                  MOV     R0,PLOC
     31 015576                                          BNCOMPLETE      NEXTU
        015576  103364                                                                          BCC     NEXTU
     32 015600  000403                                  BR      STRTUP
     33 015602                                  ABORT:  DOCLN
        015602  104444                                                                          TRAP    C$DCLN
     34 015604  000137  016566                  JENDIN: JMP     ENDIN
     35
     36 015610                                  STRTUP: SETVEC  #4,#UBTRAP,#PRI07       ;SET UP TRAP VECTOR FOR ILLEGAL ADDRESS
        015610  012746  000340                                                                  MOV     #PRI07,-(SP)
        015614  012746  016572                                                                  MOV     #UBTRAP,-(SP)
        015620  012746  000004                                                                  MOV     #4,-(SP)
        015624  012746  000003                                                                  MOV     #3,-(SP)
        015630  104437                                                                          TRAP    C$SVEC
        015632  062706  000010                                                                  ADD     #10,SP
     37                                                                         ;TRAP... UNIBUS ERROR.
     38
     39 015636  005037  006500                          CLR     ERWORD                  ;ASSUME NO ERRORS
```

```
MISCELLANEOUS SECTIONS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 26-1
INITIALIZE SECTION

     40 015642  005037  010056                CLR     NDATA                   ;ASSUME NO UNIBUS ERRORS
     41 015646  005037  006512                CLR     FLTRDY                  ;ASSUME NO FAILURE TO FIND TRANSMIT RDY
     42 015652  005037  002206                CLR     GREASE                  ;ASSUME NO PREVIOUS ERRORS
     43
     44 015656  017701  164322                MOV     @PLOC,R1        ;GET CSR ADDRESS
     45 015662  001137                        BNE     SETUPC          ;IF NOT ZERO, THEN SET UP INTERFACE ADDRESSES
     46
     47                                                               ;CSR, LPR, TCR, RBUFF
     48 015664  005037  010056        CALLDF: CLR     NDATA           ;ASSUME NO UNIBUS ADDRESSING ERRORS YET.
     49 015670  004737  017032                JSR     PC,DFAULT       ;DO THE DEFAULT LOGIC & THEN THE LINE SIZE CODE
     50 015674  000137  016456                JMP     LINCOD          ;DO LINE SIZE LOGIC
     51
     52 015700  005037  010056        CALLDL: CLR     NDATA           ;ASSUME NO UNIBUS ADDRESSING ERRORS YET.
     53 015704  004737  016602                JSR     PC,DLSET        ;SET UP FOR A DL
     54 015710  005037  006500                CLR     ERWORD          ;ASSUME NO ERRORS
     55 015714  023727  010056  000001        CMP     NDATA,#1        ;NO DEVICE AT THAT ADDRESS?
     56 015722  001011                        BNE     EMPTI2          ;NO PROBLEM WITH UNIBUS
     57 015724                                PRINTF  #FAILDL         ;FAILED TO FIND DEVICE MESSAGE
        015724  012746  012122                                                        MOV     #FAILDL,-(SP)
        015730  012746  000001                                                        MOV     #1,-(SP)
        015734  010600                                                                MOV     SP,R0
        015736  104417                                                                TRAP    C$PNTF
        015740  062706  000004                                                        ADD     #4,SP
     58 015744                                DOCLN                   ;EXIT TEST SEQUENCE
        015744  104444                                                                TRAP    C$DCLN
     59
     60 015746  012700  000144        EMPTI2: MOV     #100.,R0        ;ASSUME NO MORE THAN 100 CHARACTERS IN BUFFER.
     61 015752  005300                EMPTL2: DEC     R0              ;COUNT DOWN ONE FOR EACH CHARACTER
     62 015754  002407                        BLT     NONDTA          ;STOP TRYING TO EMPTY THE BUFFER. ASSUME HOPELESS.
     63
     64 015756  032777  000200  171312        BIT     #BIT7,@RCSR     ;IS THERE A CHARACTER IN THE RBUF?
     65 015764  001403                        BEQ     NONDTA          ;IF NO CHARACTER IN RBUF, THEN CONTINUE...
     66
     67 015766  005777  171310                TST     @RBUF           ;EMPTY RBUF.  IGNORE BUFFER CONTENTS.
     68 015772  000767                        BR      EMPTL2          ;CHECK FOR RDONE AGAIN AND EMPTY BUFFER
     69
     70
     71 015774  005037  006500        NONDTA: CLR     ERWORD                  ;ASSUME NO ERRORS
     72 016000  005037  010056                CLR     NDATA                   ;ASSUME NO UNIBUS ERRORS
     73 016004  005037  006512                CLR     FLTRDY                  ;ASSUME NO FAILURE TO FIND TRANSMIT RDY
     74 016010  005037  002206                CLR     GREASE                  ;ASSUME NO PREVIOUS ERRORS.
     75
     76 016014  012701  002210                MOV     #STSRES,R1      ;ADDRESS OF REQUEST STATUS SEQUENCE
     77 016020  012702  000002                MOV     #2,R2           ;
     78 016024  005003                        CLR     R3              ;
     79 016026  004737  012616                JSR     PC,XMIT         ;SEND ANSWER BACK SEQUENCE TO PRINTER.
     80 016032  042737  100000  006500        BIC     #BIT15,ERWORD   ;EOT MAY HAVE OCCURED. IGNORE IT.
     81 016040  023727  006512  000001        CMP     FLTRDY,#1       ;FAIL TO FIND TRDY?
     82 016046  001404                        BEQ     PFM1            ;PRINT FAILURE MESSAGE
     83
     84 016050  023727  010056  000001        CMP     NDATA,#1        ;ANY UNIBUS ERRORS?
     85 016056  001011                        BNE     NONDT2          ;IF SO, PRINT FAILURE MESSAGE.
     86
     87 016060                        PFM1:   PRINTF  #FAILDL         ;PRINT FAILURE MESSAGE
        016060  012746  012122                                                        MOV     #FAILDL,-(SP)
        016064  012746  000001                                                        MOV     #1,-(SP)
        016070  010600                                                                MOV     SP,R0
```

```
                016072  104417                                                          TRAP    C$PNTF
                016074  062706  000004                                                  ADD     #4,SP
     88         016100                          DOCLN                   ;EXIT TEST SEQUENCE
                016100  104444                                                          TRAP    C$DCLN
     89
     90         016102  004737  014012  NONDT2: JSR     PC,GETCHR       ;CHECK FOR A RESPONSE CHARACTER
     91         016106  120437  006521          CMPB    R4,ESCAPE       ;WAS THE CHARACTER AN ESCAPE CHARACTER?
     92         016112  001411                  BEQ     NONDT3          ;GET THE REST IF ESC FOUND.
     93         016114                          PRINTF  #FAILDL         ;PRINT FAILURE MESSAGE FOR DL SETUP.
                016114  012746  012122                                                  MOV     #FAILDL,-(SP)
                016120  012746  000001                                                  MOV     #1,-(SP)
                016124  010600                                                          MOV     SP,R0
                016126  104417                                                          TRAP    C$PNTF
                016130  062706  000004                                                  ADD     #4,SP
     94         016134                          DOCLN                   ;EXIT TEST SEQUENCE
                016134  104444                                                          TRAP    C$DCLN
     95
     96         016136  004737  014012  NONDT3: JSR     PC,GETCHR       ;GET THE 2ND CHARACTER IN RESPONSE.
     97         016142  004737  014012          JSR     PC,GETCHR       ;       3RD
     98         016146  004737  014012          JSR     PC,GETCHR       ;       4TH
     99         016152  004737  014012          JSR     PC,GETCHR       ;       5TH AND FINAL RESPONSE CHARACTER.
    100
    101
    102         016156  000137  016456          JMP     LINCOD          ;AND THEN DO THE LINE SIZE LOGIC.
    103
    104         016162  012700  000002  SETUPC: MOV     #2,R0
    105         016166  063700  002204          ADD     PLOC,R0         ;RESPONSE FROM PTABLE.  ?DZ (Y,N)?
    106         016172  011001                  MOV     (R0),R1         ;IF = 0 THEN MULTILINE. IF 1 THEN SINGLE LINE
    107         016174  100633                  BMI     CALLDF          ;INTERFACE.
    108
    109         016176  001240                  BNE     CALLDL          ;IF = 1 THEN SINGLE LINE.
    110
    111         016200  005037  010056          CLR     NDATA           ;ASSUME NO ADDRESSING (UNIBUS) ERRORS YET.
    112         016204  004737  016672          JSR     PC,DZSET        ;IF = 0 THEN MULTILINE.
    113
    114
    115         016210  005037  006500          CLR     ERWORD          ;ASSUME NO ERRORS
    116         016214  023727  010056  000001  CMP     NDATA,#1        ;NO DEVICE AT THAT ADDRESS?
    117         016222  001011                  BNE     EMPTI3          ;NO PROBLEM WITH UNIBUS
    118         016224                          PRINTF  #FAILDZ         ;FAILED TO FIND DEVICE MESSAGE
                016224  012746  012220                                                  MOV     #FAILDZ,-(SP)
                016230  012746  000001                                                  MOV     #1,-(SP)
                016234  010600                                                          MOV     SP,R0
                016236  104417                                                          TRAP    C$PNTF
                016240  062706  000004                                                  ADD     #4,SP
    119         016244                          DOCLN                   ;EXIT TEST SEQUENCE
                016244  104444                                                          TRAP    C$DCLN
    120
    121         016246  012700  000144  EMPTI3: MOV     #100.,R0        ;ASSUME NO MORE THAN 100 CHARACTERS IN BUFFER.
    122         016252  005300          EMPTZ3: DEC     R0              ;COUNT DOWN ONE FOR EACH CHARACTER
    123         016254  002407                  BLT     NONDZA          ;STOP TRYING TO EMPTY THE BUFFER. ASSUME HOPELESS.
    124
    125         016256  032777  000200  171012  BIT     #BIT7,@RCSR     ;IS THERE A CHARACTER IN THE RBUF?
    126         016264  001403                  BEQ     NONDZA          ;IF NO CHARACTER IN RBUF, THEN CONTINUE...
    127
    128         016266  005777  171010          TST     @RBUF           ;EMPTY RBUF.  IGNORE BUFFER CONTENTS.
    129         016272  000767                  BR      EMPTZ3          ;CHECK FOR RDONE AGAIN AND EMPTY BUFFER
```

```



016274  005037  006500          NONDZA: CLR     ERWORD          ;ASSUME NO ERRORS
016300  005037  010056                  CLR     NDATA           ;ASSUME NO UNIBUS ERRORS
016304  005037  006512                  CLR     FLTRDY          ;ASSUME NO FAILURE TO FIND TRANSMIT RDY
016310  005037  002206                  CLR     GREASE          ;ASSUME NO PREVIOUS ERRORS.

016314  012701  002210                  MOV     #STSRES,R1      ;SEND REQUEST STATUS SEQUENCE.
016320  012702  000002                  MOV     #2,R2           ;
016324  005003                          CLR     R3              ;
016326  004737  012616                  JSR     PC,XMIT         ;SEND REQUEST STATUS SEQUENCE TO PRINTER.
016332  042737  100000  006500          BIC     #BIT15,ERWORD   ;IGNORE POSSIBLE EOT CONDITION.
016340  023727  006512  000001          CMP     FLTRDY,#1       ;FAILURE TO FIND TRDY?
016346  001404                          BEQ     PRTM2           ;PRINT FAILURE MESSAGE

016350  023727  010056  000001          CMP     NDATA,#1        ;ANY UNIBUS ERRORS?
016356  001011                          BNE     NONDZ2          ;IF SO, PRINT FAILURE MESSAGE.

016360                          PRTM2:  PRINTF  #FAILDZ         ;PRINT FAILURE MESSAGE
016360  012746  012220                                                  MOV     #FAILDZ,-(SP)
016364  012746  000001                                                  MOV     #1,-(SP)
016370  010600                                                          MOV     SP,R0
016372  104417                                                          TRAP    C$PNTF
016374  062706  000004                                                  ADD     #4,SP
016400                                  DOCLN                   ;EXIT TESTING SEQUENCE
016400  104444                                                          TRAP    C$DCLN

016402  004737  014012          NONDZ2: JSR     PC,GETCHR       ;CHECK FOR A RESPONSE CHARACTER
016406  120437  006521                  CMPB    R4,ESCAPE       ;WAS THE CHARACTER AN ESCAPE CHARACTER?
016412  001411                          BEQ     NONDZ3          ;GET THE REST IF ESC FOUND.
016414                                  PRINTF  #FAILDZ         ;PRINT FAILURE MESSAGE FOR DL SETUP.
016414  012746  012220                                                  MOV     #FAILDZ,-(SP)
016420  012746  000001                                                  MOV     #1,-(SP)
016424  010600                                                          MOV     SP,R0
016426  104417                                                          TRAP    C$PNTF
016430  062706  000004                                                  ADD     #4,SP
016434                                  DOCLN                   ;EXIT TESTING SEQUENCE
016434  104444                                                          TRAP    C$DCLN

016436  004737  014012          NONDZ3: JSR     PC,GETCHR       ;GET THE 2ND CHARACTER IN RESPONSE.
016442  004737  014012                  JSR     PC,GETCHR       ;       3RD
016446  004737  014012                  JSR     PC,GETCHR       ;       4TH
016452  004737  014012                  JSR     PC,GETCHR       ;       5TH AND FINAL RESPONSE CHARACTER.





016456  012700  000006          LINCOD: MOV     #6,R0
016462  063700  002204                  ADD     PLOC,R0         ;RESPONSE FROM PTABLE.  ?CHARACTERS PER LINE?
016466  011005                          MOV     (R0),R5         ;GET THE LINE CHARACTER DENSITY. 1=80CHAR/LINE
016470  022705  000001                  CMP     #1,R5           ;IF NOT = 1 THEN 132 CHARACTERS PER LINE.
016474  001404                          BEQ     EIGHTY          ;IF EQ 1 THEN 80 CHAR/LINE
016476  012737  000204  010042          MOV     #132.,LINSIZ    ;NOT EQ 1... THEN 132 CHAR/LINE
016504  000403                          BR      INFIN
016506  012737  000120  010042  EIGHTY: MOV     #80.,LINSIZ     ;LINE SIZE IS EIGHTY CHARS/LINE
```

```
                                INFIN:  MOV     LINSIZ,R1       ;GET THE LINE SIZE. NUMBER OF CHARACTERS/LINE
                                        ASL     R1              ;X 2
                                        ASL     R1              ;X 4
                                        MOV     R1,LINN         ;SAVE LINSIZ X 4
                                        ASL     R1              ;X 8
                                        ADD     R1,LINN         ;LINSIZ X (4+8) = LINSIZ X 12 => LINN

                                        CLR     ERWORD          ;ASSUME NO ERRORS - YET.
                                        CLRVEC  #4              ;RESET VECTOR TO ORIGINAL STATUS
016542  012700  000004                                                          MOV     #4,R0
016546  104436                                                                  TRAP    C$CVEC

                                                                ;EMPTY RECEIVER BUFFER...
                        170520  EMPTYR: BIT     #BIT7,@RCSR     ;IS THERE A CHARACTER IN THE RBUF?
                                        BEQ     ENDIN           ;IF NO CHARACTER IN RBUF, THEN EXIT.

                        170516          TST     @RBUF           ;EMPTY RBUF.  IGNORE BUFFER CONTENTS.
                                        BR      EMPTYR          ;CHECK FOR RDONE AGAIN AND EMPTY BUFFER
                                                                ;IF NEEDED.

016566                          ENDIN:  EXIT    INIT
016566  104432                                                                  TRAP    C$EXIT
016570  000662                                                                  .WORD   L10004-.

                                ;
                                ;.....................................................................
                                ;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.
                                ;
                                ;
016572                          ;       BGNSRV  UBTRAP          ;TRAP SERVICE ROUTINE
016572                                                                          UBTRAP::
```

```
016572  012737  000001  010056  UBTRAP: MOV     #1,NDATA        ;NO DEVICE AT THAT ADDRESS    INDICATED.

016600                                  ENDSRV
016600                                                                              L10005:
016600  000002                                                                              RTI

                                :
                                :
                                :
                                :
                                :
                                :
                                ;^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
                                ;FUNCTIONAL DESCRIPTION                                                       ^
                                :                                                                             ^
                                :       LOCAL PROCEDURE DLSET                                                 ^
                                :                                                                             ^
                                :       THIS PROCEDURE WILL TAKE THE CSR ADDRESS GIVEN IN CSRADD AND SET UP   ^
                                :       THE ADDRESSES FOR THE RCSR, THE XCSR, AND THE RBUF AND XBUF REGISTERS.^
                                :                                                                             ^
                                :       THIS CODE IF FOR SINGLE LINE INTERFACES ONLY.                         ^
                                :                                                                             ^
                                ;^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
                                :
                                :
                                ;INPUTS
                                :
                                :       CSRADD  -       ADDRESS OF CSR REGISTER.
                                :
                                ;OUTPUTS
                                :
                                :       NONE
                                :
                                ;SUBORDINATE ROUTINES
                                :
                                :       NONE
                                :
                                ;FUNCTIONAL SIDE EFFECTS
                                :
                                :       INTERFACE REGISTERS ARE SET UP IF THE CSR ADDRESS IS VALID.
                                :
                                ;CALLING SEQUENCE
                                :
                                :       PLACE ADDRESS OF CSR REGISTER INTO CSR ADD.
                                :               JSR     PC,DLSET
                                :
                                :

016602  017701  163376          DLSET:  MOV     @PLOC,R1        ;SET UP CSR ADDRESS & BUFFER ADDRESSES.
016606  010137  007276                  MOV     R1,RCSR         ;ADDRESS OF RECEIVER CSR REGISTER.

016612  062701  000002                  ADD     #2,R1
016616  010137  007302                  MOV     R1,RBUF         ;ADDRESS OF RECEIVER BUFFER REGISTER
016622  062701  000002                  ADD     #2,R1
016626  010137  007300                  MOV     R1,XCSR         ;ADDRESS OF THE TRANSMITTER CSR REGISTER.
016632  062701  000002                  ADD     #2,R1
016636  010137  007304                  MOV     R1,XBUF         ;ADDRESS OF THE TRANSMITTER BUFFER REGISTER.
```

```

016642  005037  010052                  CLR     MLTLIN          ;INDICATE THAT THIS IS A SINGLE LINE INTERFACE.
016646  012737  000200  010044          MOV     #BIT7,TRDYBT    ;PLACEMENT OF XMIT READY BIT FOR SINGLE LINE
                                                                ;INTERFACES.
016654  012737  006440  007306          MOV     #JUNKPL,LPR     ;WHEN LPR IS STUFFED, CONTENTS GO TO JUNKPL
016662  012737  006440  007310          MOV     #JUNKPL,TCR     ;WHEN SENCHR STUFFS TCR, CONTENTS GO TO JUNKPL

016670  000207                          RTS     PC



                                ;
                                ;***********************************************************************
                                ;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
                                ;
                                ;
                                ;



016672  017701  163306          DZSET:  MOV     @PLOC,R1        ;GET THE CSR ADDRESS TO SET UP INTERFACE REG'S
016676  010137  007276                  MOV     R1,RCSR         ;ADDRESS OF RCSR AND THE XCSR WILL BE THE SAME
                                                                ;       IN A DZ11. THE TRDYBT XMIT READY BIT
                                                                ;       WILL CHANGE, HOWEVER.
016702  010137  007300                  MOV     R1,XCSR         ;AND POINT TO THE NEXT REGISTER ADDRESS

016706  062701  000002                  ADD     #2,R1
016712  010137  007302                  MOV     R1,RBUF         ;ADDRESS OF THE RECEIVER BUFFER
016716  010137  007306                  MOV     R1,LPR          ;ADDRESS OF THE LINE PARAMETER REGISTER
```

```
                                                ADD     #2,R1
016722  062701  000002                          MOV     R1,TCR          ;ADDRESS OF THE TRANSMIT CONTROL REGISTER
                                                ADD     #2,R1
016732  062701  000002                          MOV     R1,TDR          ;ADDRESS OF THE TRANSMIT DATA REGISTER
016736  010137  007312
016742  013737  007312  007304                  MOV     TDR,XBUF        ;WHEN REFERENCING THE XBUF, YOU WILL WANT
                                                                        ;THE TDR - TRANSMIT DATA REGISTER.
016750  012777  000040  170320                  MOV     #BIT5,@RCSR     ;CLEARS INTERUPT ENABLE BITS AND
                                                                        ;SETS MASTER SCAN ENABLE.
016756  012737  100000  010044                  MOV     #BIT15,TRDYBT   ;DEFINE TRANSMIT READY BIT FOR DZ11 CSR.
016764  012700  000004                          MOV     #4,R0
016770  063700  002204                          ADD     PLOC,R0         ;PTABLE ENTRY.  ?DZ CHANNEL NUMBER?
016774  011002                                  MOV     (R0),R2         ;CHANNEL TO BE SET INTO TCR REGISTER
016776  006302                                  ASL     R2              ;CHANGE THE RANGE FROM 0-7 TO 0-14
                                                                        ;TO BE USED AS A TABLE OFFSET.
017000  016237  006444  006436                  MOV     TCRTBL(R2),TCRENA       ;GET MASK FROM TABLE, PLACE IN TCR REG.
                                                                                ;TO DETERMINE THE CHANNEL CHOSEN
017006  012700  000004                          MOV     #4,R0           ;PTABLE ENTRY #3
017012  063700  002204                          ADD     PLOC,R0         ;PTABLE ENTRY ADDRESS FOR CHANNEL #.
017016  051037  006442                          BIS     (R0),LPRINI     ;NEW LPR STATUS WITH CH # INCLUDED.
017022  013777  006442  170256                  MOV     LPRINI,@LPR     ;SET UP LPR ON DZ INTERFACE
017030  000207                                  RTS     PC
```

```
;*****************************************************************************
;FUNCTIONAL DESCRIPTION
;
;       LOCAL PROCEDURE DFAULT:
;
;       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.
;
;*****************************************************************************
;
;INPUTS
;
;       NONE
;
;OUTPUTS
;
;       CSRADD  -ADDRESS OF THE CONTROL STATUS REGISTER
;       RBUF    -BUFFER ADDRESS
;       XCSR    -TRANSMITTER CSR
;       RCSR    -RECEIVER CSR
;       XBUF    -TRANSMITTER BUFFER ADDRESS
```

```
                                ;       MLTLIN  -IS =1 IF THE INTERFACE IS A DZ11.
                                ;
                                ;SUBORDINATE ROUTINES
                                ;
                                ;       GETCHR  -       GET A CHARACTER.
                                ;       XMIT    -       SEND A SEQUENCE OF CHARACTERS TO THE PRINTER.
                                ;
                                ;FUNCTIONAL SIDE EFFECTS
                                ;
                                ;       THE INTERFACE REGISTERS SHOULD BE SET UP.
                                ;
                                ;CALLING SEQUENCE
                                ;
                                ;       JSR     PC,DFAULT
                                ;
                                ;
                                ;

017032  013777  005254  163144  DFAULT: MOV     DLDFLT,@PLOC    ;ASSUME A SINGLE LINE INTERFACE

017040  004737  016602                  JSR     PC,DLSET        ;SET UP THE REGISTER ADDRESSES

017044  023727  010056  000001          CMP     NDATA,#1        ;WAS THERE AN ILLEGAL ADDRESSING ERROR?
017052  001462                          BEQ     DZDCOD          ;IF SO, DL SETUP FAILED.  TRY DZ SETUP.

017054  005037  006500                  CLR     ERWORD          ;ASSUME THAT NO ERRORS HAVE BEEN FOUND - YET.

017060  012700  000144          EMPTI4: MOV     #100.,R0        ;ASSUME NO MORE THAN 100 CHARACTERS IN BUFFER.
017064  005300                  EMP4:   DEC     R0              ;COUNT DOWN ONE FOR EACH CHARACTER
017066  002407                          BLT     ABSND           ;STOP TRYING TO EMPTY THE BUFFER. ASSUME HOPELESS.

017070  032777  000200  170200          BIT     #BIT7,@RCSR     ;IS THERE A CHARACTER IN THE RBUF?
017076  001403                          BEQ     ABSND           ;IF NO CHARACTER IN RBUF, THEN CONTINUE...

017100  005777  170176                  TST     @RBUF           ;EMPTY RBUF.  IGNORE BUFFER CONTENTS.
017104  000767                          BR      EMP4            ;CHECK FOR RDONE AGAIN AND EMPTY BUFFER

017106  005037  006500          ABSND:  CLR     ERWORD                  ;ASSUME NO ERRORS
017112  005037  010056                  CLR     NDATA                   ;ASSUME NO UNIBUS ERRORS
017116  005037  006512                  CLR     FLTRDY                  ;ASSUME NO FAILURE TO FIND TRANSMIT RDY
017122  005037  002206                  CLR     GREASE                  ;ASSUME NO PREVIOUS ERRORS.

017126  012701  002210                  MOV     #STSRES,R1      ;SEND REQUEST STATUS SEQUENCE.
017132  012702  000002                  MOV     #2,R2           ;
017136  005003                          CLR     R3              ;
017140  004737  012616                  JSR     PC,XMIT         ;SEND ANSWER-BACK SEQUENCE TO PRINTER.
017144  042737  100000  006500          BIC     #BIT15,ERWORD   ;IGNORE POSSIBLE EOT INDICATION.

017152  023727  010056  000001          CMP     NDATA,#1        ;IF SET THEN TRY MULTILINE ADDRESS
017160  001417                          BEQ     DZDCOD          ;IF NOT SET, DO THE DZ CHECK

017162  005004                          CLR     R4              ;BR4 SHOULD GET ESCAPE CHAR IF DL PRESENT.
017164  004737  014012                  JSR     PC,GETCHR       ;THE DELAY SHOULD BE LONG ENOUGH TO PERMIT
                                                                ;THE PRINTER TO RESPOND.
                                                                ;NOW GET THE FIVE RESPONSE CHARACTERS
017170  120437  006521                  CMPB    R4,ESCAPE       ;IS IT AN ESCAPE CHARACTER?
```

```
                                                BNE     DZDCOD          ;NO? THEN TRY DZ ADDRESS DEFAULT.
017176  004737  014012                          JSR     PC,GETCHR       ;
017202  004737  014012                          JSR     PC,GETCHR       ;
017206  004737  014012                          JSR     PC,GETCHR       ;
017212  004737  014012                          JSR     PC,GETCHR       ;THE FINAL CHARACTER SHOULD BE A "C"
017216  000514                                  BR      DONEDF          ;YES? THEN SUCCESSFULLY COMPLETED.

017220  005037  006500          DZDCOD:         CLR     ERWORD                  ;ASSUME NO ERRORS
017224  005037  010056                          CLR     NDATA                   ;ASSUME NO UNIBUS ERRORS
017230  005037  006512                          CLR     FLTRDY                  ;ASSUME NO FAILURE TO FIND TRANSMIT RDY
017234  005037  002206                          CLR     GREASE                  ;ASSUME NO PREVIOUS ERRORS.

017240  013777  005256  162736                  MOV     DZDFLT,@PLOC    ;ASSUME A DZ INTERFACE AT ADDRESS 776010
017246  004737  016672                          JSR     PC,DZSET        ;SET UP REGISTERS FOR A DZ11 INTERFACE

017252  023727  010056  000001                  CMP     NDATA,#1        ;HAS AN ILLEGAL ADDRESS ERROR OCCURRED?
017260  001462                                  BEQ     FAILDF          ;IF SO, BOTH DL AND DZ DEAFUALTS HAVE FAILED.
                                                                        ;       SO LET USER KNOW.

017262  005003                                  CLR     R3              ;DISABLE BIDIRECTIONAL PRINTING LOGIC
017264  005037  006500                          CLR     ERWORD          ;ASSUME NO ERRORS HAVE YET OCCURRED.

017270  012700  000144          EMPTI5:         MOV     #100.,R0        ;ASSUME NO MORE THAN 100 CHARACTERS IN BUFFER.
017274  005300                  FMP5:           DEC     R0              ;COUNT DOWN ONE FOR EACH CHARACTER
017276  002407                                  BLT     ABS5            ;STOP TRYING TO EMPTY THE BUFFER. ASSUME HOPELESS.

017300  032777  000200  167770                  BIT     #BIT7,@RCSR     ;IS THERE A CHARACTER IN THE RBUF?
017306  001403                                  BEQ     ABS5            ;IF NO CHARACTER IN RBUF, THEN CONTINUE...

017310  005777  167766                          TST     @RBUF           ;EMPTY RBUF.  IGNORE BUFFER CONTENTS.
017314  000767                                  BR      EMP5            ;CHECK FOR RDONE AGAIN AND EMPTY BUFFER

017316  005037  006500          ABS5:           CLR     ERWORD                  ;ASSUME NO ERRORS
017322  005037  010056                          CLR     NDATA                   ;ASSUME NO UNIBUS ERRORS
017326  005037  006512                          CLR     FLTRDY                  ;ASSUME NO FAILURE TO FIND TRANSMIT RDY
017332  005037  002206                          CLR     GREASE                  ;ASSUME NO PREVIOUS ERRORS.

017336  012701  002210                          MOV     #STSRES,R1      ;SEND REQ STATUS SEQUENCE.
017342  012702  000002                          MOV     #2,R2           ;
017346  005003                                  CLR     R3              ;
017350  004737  012616                          JSR     PC,XMIT         ;SEND REQ STATUS SEQUENCE TO PRINTER.
017354  042737  100000  006500                  BIC     #BIT15,ERWORD   ;IGNORE POSSIBLE EOT INDICATION.

017362  023727  010056  000001                  CMP     NDATA,#1        ;CHECK FOR OCCURRANCE OF TRAP...
017370  001416                                  BEQ     FAILDF          ;IF SET THEN  PRINT AN ERROR AND START OVER

017372  004737  014012                          JSR     PC,GETCHR       ;DELAY SHOULD GIVE PRINTEWR ENOUGH TIME TO
                                                                        ;RESPOND TO ANSWER-BACK SEQUENCE.

                                                                        ;GET THE FIVE CHARACTER RESPONSE TO THE QUERY
017376  120437  006521                          CMPB    R4,ESCAPE       ;EXPECTING ESCAPE CHARACTER IF DZ PRESENT.
017402  001011                                  BNE     FAILDF          ;DEFAULT ADDRESSES DIDN'T WORK OUT.
017404  004737  014012                          JSR     PC,GETCHR       ;
017410  004737  014012                          JSR     PC,GETCHR       ;
017414  004737  014012                          JSR     PC,GETCHR       ;
017420  004737  014012                          JSR     PC,GETCHR       ;LAST CHARACTER A "C"(LOWER CASE)
017424  000411                                  BR      DONEDF          ;FOUND THE ADDRESS. EXIT.
```

```
    017426                          FAILDF: PRINTF  #FAILM          ;PRINT FAILURE MESSAGE AT CONSOLE
    017426  012746  011602                                                                   MOV     #FAILM,-(SP)
    017432  012746  000001                                                                   MOV     #1,-(SP)
    017436  010600                                                                           MOV     SP,R0
    017440  104417                                                                           TRAP    C$PNTF
    017442  062706  000004                                                                   ADD     #4,SP
    017446                                  DOCLN                   ;EXIT TESTING SEQUNCE
    017446  104444                                                                           TRAP    C$DCLN

    017450  000207                  DONEDF: RTS     PC




                                            .EVEN




    017452                                  ENDINIT
    017452                                                                           L10004:
    017452  104411                                                                           TRAP    C$INIT

                                    .SBTTL  AUTODROP SECTION

    017454                                  BGNAUTO
    017454                                                                           L$AUTO::

    017454                                  ENDAUTO
    017454                                                                           L10006:
    017454  104461                                                                           TRAP    C$AUTO






                                    .SBTTL  CLEANUP CODING SECTION
```

```
MISCELLANEOUS SECTIONS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 27
CLEANUP CODING SECTION


      1
      2                                 ;++
      3                                 ; THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
      4                                 ; AFTER THE HARDWARE TESTS HAVE BEEN PERFORMED.
      5                                 ;--
      6
      7 017456                                  BGNCLN
        017456                                                                  L$CLEAN::
      8
      9 017456  004737  014274                 JSR     PC,INITCD       ;RESET THE PRINTER
     10
     11 017462                                  EXIT    CLN
        017462  104432                                                                  TRAP    C$EXIT
        017464  000002                                                                  .WORD   L10007-.
     12
     13
     14                                         .EVEN
     15
     16 017466                                  ENDCLN
        017466                                                                  L10007:
        017466  104412                                                                  TRAP    C$CLEAN
     17
     18
     19                                         .EVEN
     20
     21
     22                                 .TITLE HARDWARE TESTS
     23                                 .SBTTL  TEST 1: PRINTER SELF TEST
```

```




017470                                   BGNTST
017470                                                                                   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.
                                 ;
                                 ;.................................................................................


017470  004737  014274           TEST1:  JSR     PC,INITCD       ;INITIALIZE FOR THIS TEST
017474                                   PRINTB  #TITLE1         ;CONSOLE TEST TITLE
017474  012746  002333                                                                           MOV     #TITLE1,-(SP)
017500  012746  000001                                                                           MOV     #1,-(SP)
017504  010600                                                                                   MOV     SP,R0
017506  104414                                                                                   TRAP    C$PNTB
017510  062706  000004                                                                           ADD     #4,SP
017514  012701  002255                   MOV     #SLFTST,R1      ;ADDRESS OF SELT TEST ARGUMENT SEQUENCE
017520  012702  000002                   MOV     #2,R2           ;2 CHARACTERS IN SEQUENCE
017524  005003                           CLR     R3              ;DISABLE BIDIRECTIONAL PRINTING
017526  004737  012616                   JSR     PC,XMIT         ;SEND THE ARGUMENT LIST

017532  023727  002206  177777           CMP     GREASE,#-1      ;WAS THERE A "GREASED" EXIT FROM XMIT?
017540  001402                           BEQ     PRNTIT          ;IF SO, PREPARE TO PRINT TO CONSOLE
                                                                 ;        THE ERRORS FOUND DURING XMIT ATTEMPT.
017542  004737  015020                   JSR     PC,STATS        ;RECEIVE STATUS AND FIT TO ERWORD.
017546  004737  015246           PRNTIT: JSR     PC,ERRORS       ;DECODE ERROR WORD & PRINT ERROR MESSAGES

017552  004737  014012           CHKN6:  JSR     PC,GETCHR       ;GET ANOTHER (SIXTH) CHARACTER
017556  123704  006520                   CMPB    XON,R4          ;IS IT AN "XON"?
017562  001406                           BEQ     STSCAL          ;IF OK, (XON FOUND) THEN CHECK STATUS
017564  052737  020000  006500           BIS     #BIT13,ERWORD   ;SET ECNRB
017572  052737  100000  006500           BIS     #BIT15,ERWORD   ;INDICATE ERROR

017600  004737  015246           STSCAL: JSR     PC,ERRORS       ;CHECK FOR ERRORS


017604                                   ENDTST
017604                                                                                   L10010:
017604  104401                                                                                   TRAP    C$ETST








```

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

```



017606                          BGNTST
017606                                                                          T2::

                                ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                                ;
                                ;       TEST #2
                                ;
                                ;       UNDERLINE / NO-UNDERLINE MODE
                                ;
                                ;
                                ;       PRINT A SINGLE LINE OF ALTERNATING UNDERLINED AND NON-UNDERLINED
                                ;       "A"S, CHECKING FOR ERRORS FROM THE PRINTER ALONG THE WAY.
                                ;.................................................................................


017606  004737  014274          TEST2:  JSR     PC,INITCD               ;INITIALIZE TEST
017612                                  PRINTB  #TITLE2                 ;CONSOLE PRINT TITLE
017612  012746  002366                                                                          MOV     #TITLE2,-(SP)
017616  012746  000001                                                                          MOV     #1,-(SP)
017622  010600                                                                                  MOV     SP,R0
017624  104414                                                                                  TRAP    C$PNTB
017626  062706  000004                                                                          ADD     #4,SP

017632  052737  040000  006500          BIS     #BIT14,ERWORD           ;INHIBIT ERROR HANG-UPS
017640  012701  002366                  MOV     #TITLE2,R1              ;ADDRESS OF STRING TO PRINT (TITLE)
017644  062701  000004                  ADD     #4,R1                   ;SKIP FIRST FOUR CHARACTERS
017650  012702  000053                  MOV     #43.,R2                 ;43 CHARACTERS TO PRINT IN STRING
017654  005003                          CLR     R3                      ;DISABLE BIDIRECTIONAL
017656  004737  012616                  JSR     PC,XMIT                 ;SEND THE ARGUMENT SEQUENCE
017662  042737  040000  006500          BIC     #BIT14,ERWORD           ;RE-ENABLE ERROR HANG-UPS

017670  012704  177777                  MOV     #-1,R4                  ;CHARACTER COUNT
017674  012701  006531          PLOOP:  MOV     #SCA,R1                 ; ADDRESS OF ASCII "A"
017700  012702  000001                  MOV     #1,R2                   ;ONE CHARACTER
017704  005003                          CLR     R3                      ;NO BIDIRECTIONAL PRINTING
017706  004737  012616                  JSR     PC,XMIT                 ;SEND "A" TO PRINTER FOR PRINTING.
017712  004737  015246                  JSR     PC,ERRORS               ;CHECK FOR ERRORS

017716  012700  000001                  MOV     #1,R0
017722  126027  002266  000041          CMPB    STULMD(R0),#ONE ;IS THE UNDERLINE MODE SET?
017730  001004                          BNE     SETONE                  ;NO, THEN CHANGE TO UNDERLINE MODE
017732  112760  000040  002266          MOVB    #ZERO,STULMD(R0) ;YES, THEN CHANGE TO NON-UNDERLINE MODE
017740  000405                          BR      NEWMOD                  ;TRANSMIT MODE CHANGE AT NEWMOD
017742  012700  000001          SETONE: MOV     #1,R0
017746  112760  000041  002266          MOVB    #ONE,STULMD(R0) ;CHANGE TO UNDERLINE MODE

017754  012701  002266          NEWMOD: MOV     #STULMD,R1              ;ADDRESS OF ARGUMENT STRING
017760  012702  000003                  MOV     #3,R2                   ;WHICH IS THREE CHARACTERS LOONG
017764  004737  012616                  JSR     PC,XMIT                 ;SEND THE SEQUENCE
017770  004737  015246                  JSR     PC,ERRORS               ;CHECK FOR ERRORS

017774  005204                          INC     R4                      ;UPDATE COUNT OF CHARACTERS.
017776  020437  010042                  CMP     R4,LINSIZ               ;PRINTED A LINE YET?
020002  001334                          BNE     PLOOP                   ;DO LOOP UNTIL DONE
```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 29-1
TEST 2: UNDERLINE / NO-UNDERLINE MODE TEST

     52
     53 020004  012701  002313                 MOV     #CR,R1          ;ADDRESS OF <CRLF>
     54 020010  012702  000002                 MOV     #2,R2           ;BOTH CHARACTERS
     55 020014  004737  012616                 JSR     PC,XMIT         ;PRINT (ACCUMULATE) <CR><LF>
     56 020020  004737  015246                 JSR     PC,ERRORS       ;CHECK FOR ERRORS.
     57
     58 020024                                 ENDTST
        020024                                                                  L10011:
        020024  104401                                                                  TRAP    C$ETST
     59
     60
     61                                 ;
     62                                 ;
     63
     64
     65
     66
     67
     68
     69                            .SBTTL  TEST 3: HAMMER HIT COUNT TEST
```

```
0020026                              BGNTST
 020026                                                                          T3::



                                     ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                                     ;
                                     ;
                                     ;       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.
                                     ;
                                     ;.................................................................................


 020026  004737  014274              TEST3:  JSR     PC,INITCD          ;INITIALIZE TEST
 020032                                      PRINTB  #TITLE3            ;CONSOLE PRINT TEST TITLE
 020032  012746  002446                                                                     MOV     #TITLE3,-(SP)
 020036  012746  000001                                                                     MOV     #1,-(SP)
 020042  010600                                                                             MOV     SP,R0
 020044  104414                                                                             TRAP    C$PNTB
 020046  062706  000004                                                                     ADD     #4,SP

 020052  052737  040000  006500              BIS     #BIT14,ERWORD      ;DISABLE ERROR HANGUPS
 020060  012701  002446                      MOV     #TITLE3,R1         ;TITLE ADDRESS
 020064  062701  000004                      ADD     #4,R1              ;SKIPPING THE FIRST FOUR TWO CHARACTERS.
 020070  012702  000040                      MOV     #32.,R2            ;32 CHARACTERS LONG
 020074  005003                              CLR     R3                 ;NO BIDIRECTIONAL PRINTING
 020076  004737  012616                      JSR     PC,XMIT            ;PRINT TEST TITLE
 020102  042737  040000  006500              BIC     #BIT14,ERWORD      ;RE-ENABLE ERROR HANG-UPS

 020110  113737  006533  006522              MOVB    SC1,SNGCHR         ; THE CHARACTER "1" TO BE PRINTED
 020116  112737  000040  010060              MOVB    #ZERO,HITARG       ;HIT COUNT ARGUMENT
 020124  012700  000001              LINLOO: MOV     #1,R0
 020130  113760  010060  002257              MOVB    HITARG,STHTCT(R0)  ;INSERT IN ARGUMENT TEMPLATE
 020136  005237  010060                      INC     HITARG             ;NEW ARGUMENT FOR HITARG
 020142  012701  002257                      MOV     #STHTCT,R1         ;ADDRESS OF ARGUMENT LIST
 020146  012702  000003                      MOV     #3,R2              ;3 CHARACTER ARGUMENT LIST
 020152  005003                              CLR     R3                 ;DISABLE BIDIRECTIONAL PRINTING FOR NOW.
 020154  004737  012616                      JSR     PC,XMIT            ;SEND THE LIST - ADJUST HIT COUNT
 020160  004737  015246                      JSR     PC,ERRORS          ;CHECK FOR ERRORS.

 020164  005004                              CLR     R4                 ;COUNT OF CHARACTERS
 020166  012701  006522              CHRLOO: MOV     #SNGCHR,R1         ;ADDRESS OF CHAR TO BE PRINTED
 020172  012702  000001                      MOV     #1,R2              ;SINGLE CHARACTER
```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 30-1
TEST 3: HAMMER HIT COUNT TEST

     52 020176  012703  177777                MOV     #-1,R3          ;ENABLE BIDIRECTIONAL PRINTING.
     53 020202  004737  012616                JSR     PC,XMIT         ;SEND THE CHARACTER
     54 020206  004737  015246                JSR     PC,ERRORS       ;CHECK FOR ERRORS.
     55
     56 020212  005204                        INC     R4              ;UPDATE NUMBER OF CHARACTERS PRINTED THUS FAR.
     57 020214  020437  010042                CMP     R4,LINSIZ       ;SENT A LINES WORTH YET?
     58 020220  001362                        BNE     CHRLOO          ;NO, CONTINUE SENDING.
     59
     60 020222  005237  006522                INC     SNGCHR          ;INCREASE ASCII PATTERNTO NEXT CHARACTER
     61 020226  123727  010060  000043        CMPB    HITARG,#THREE   ;PRINTED THE HIT COUNT = 3 LINE YET?
     62 020234  001333                        BNE     LINLOO          ;REPEAT PRINTING LINES UNTIL HIT COUNT = 3
     63
     64 020236  012700  000001                MOV     #1,R0
     65 020242  112760  000040  002257        MOVB    #ZERO,STHTCT(R0)        ;REVERT BACK TO HIT COUNT OF 1
     66 020250  012701  002257                MOV     #STHTCT,R1
     67 020254  012702  000003                MOV     #3,R2
     68 020260  005003                        CLR     R3              ;DISABLE BIDIRECTIONAL PRINTING
     69 020262  004737  012616                JSR     PC,XMIT         ;SEND PRINTER ARGUMENT LIST FOR HIT COUNT=1
     70 020266  004737  015246                JSR     PC,ERRORS       ;CHECK FOR ERRORS
     71
     72 020272                                ENDTST
        020272                                                                  L10012:
        020272  104401                                                                 TRAP    C$ETST
     73
     74
     75
     76
     77                                       ;
     78                                       ;
     79                                       ;
     80
     81                                  .SBTTL  TEST 4: CARRIAGE POSITIONING TEST
```

```



020274                                       BGNTST
020274                                                                              T4::


                                             ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                                             ;
                                             ;       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.
                                             ;
                                             ;........................................................................






020274  004737  014274                       TEST4:  JSR     PC,INITCD          ;INITIALIZE TEST
020300                                               PRINTB  #TITLE4            ;CONSOLE PRINT THE TEST TITLE
020300  012746  002513                                                                                 MOV     #TITLE4,-(SP)
020304  012746  000001                                                                                 MOV     #1,-(SP)
020310  010600                                                                                         MOV     SP,R0
020312  104414                                                                                         TRAP    C$PNTB
020314  062706  000004                                                                                 ADD     #4,SP

020320  052737  040000  006500                       BIS     #BIT14,ERWORD      ;INHIBIT ERROR HANG-UPS
020326  012701  002513                               MOV     #TITLE4,R1         ;ADDRESS OF TITLE #4 TO BE PRINTED
020332  062701  000004                               ADD     #4,R1              ;SKIP FIRST FOUR CHARACTERS
020336  012702  000044                               MOV     #36.,R2            ;36 CHARACTERS IN THE TITLE
020342  005003                                       CLR     R3                 ;DISABLE BIDIRECTIONAL PRINTING
020344  004737  012616                               JSR     PC,XMIT            ;TRANSMIT THE STRING TO THE PRINTER
020350  042737  040000  006500                       BIC     #BIT14,ERWORD      ;RE-ENABLE ERROR HANG-UPS

020356  012701  006530                               MOV     #SCX,R1            ;ADDRESS OF THE SINGLE CHARACTER "X".
020362  012702  000001                               MOV     #1,R2              ;SINGLE CHARACTER TO BE PRINTED
020366  004737  012616                               JSR     PC,XMIT            ;PRINT THE CHARACTER "A".
020372  004737  015246                               JSR     PC,ERRORS          ;CHECK FOR ERRORS.

020376  012701  002313                               MOV     #CR,R1             ;ADDRESS OF CARRIAGE RETURN ASCII
020402  012702  000002                               MOV     #2,R2              ;TWO CHARACTERS INCLUDE <CR> & <LF>.
020406  004737  012616                               JSR     PC,XMIT            ;SEND <CR><LF> TO PRINTER
020412  004737  015246                               JSR     PC,ERRORS          ;CHECK FOR ERRORS

020416  012737  000001  010036                       MOV     #1,SPCSIZ          ;INITIALIZE THE SPACE SIZE TO ITS SMALLEST

020424  013701  010036                       L1LOOP: MOV     SPCSIZ,R1          ;R1 HAS SPACE SIZE FOR THE CONVERSION ROUTINE
020430  162701  000014                               SUB     #12.,R1            ;TAKE AWAY THE 12 HORIZONTAL INCREMENTS
                                                                                ; PRODUCED BY THE PRINT OF THE CHARACTER.
020434  004737  014176                               JSR     PC,CONVRT          ;CONVERT R1 TO THREE ASCII MNEMONICS (BYTES)
```

```
     52 020440  012700  000001                MOV     #1,R0
     53 020444  113760  010046  002233        MOVB    MNEB1,HRZTLS(R0)        ;FIRST BYTE FROM CONVERT ROUTINE
     54 020452  005200                         INC     R0
     55 020454  113760  010047  002233        MOVB    MNEB2,HRZTLS(R0)        ;SECOND BYTE
     56 020462  005200                         INC     R0
     57 020464  113760  010050  002233        MOVB    MNEB3,HRZTLS(R0)        ;THIRD BYTE
     58
     59 020472  012701  006530                MOV     #SCX,R1         ;ADDRESS OF THE CHARACTER "X".
     60 020476  012702  000001                MOV     #1,R2           ;LENGTH OF STRING TO BE SENT = 1.
     61 020502  004737  012616                JSR     PC,XMIT         ;SEND "X" TO THE PRINTER
     62 020506  004737  015246                JSR     PC,ERRORS       ;CHECK FOR ERRORS
     63
     64
     65 020512  012701  002233                MOV     #HRZTLS,R1      ;ADDRESS OF TAB SEQUENCE JUST COMPUTED.
     66 020516  012702  000005                MOV     #5,R2           ;THERE ARE 5 CHARACTERS IN THE SEQUENCE
     67 020522  004737  012616                JSR     PC,XMIT         ;SEND THE LIST TO THE PRINTER
     68 020526  004737  015246                JSR     PC,ERRORS       ;CHECK FOR ERRORS
     69
     70 020532  012701  006530                MOV     #SCX,R1         ;ADDRESS OF "X"
     71 020536  012702  000001                MOV     #1,R2           ;SINGLE CHARACTER
     72 020542  004737  012616                JSR     PC,XMIT         ;PRINT "X"
     73 020546  004737  015246                JSR     PC,ERRORS       ;CHECK FOR ERRORS
     74
     75 020552  012701  002313                MOV     #CR,R1          ;ADDRESS OF <CR><LF>
     76 020556  012702  000002                MOV     #2,R2           ;TWO CHARACTERS TO BE SENT TO PRINTER
     77 020562  004737  012616                JSR     PC,XMIT         ;PRINT THE <CR><LF>
     78 020566  004737  015246                JSR     PC,ERRORS       ;CHECK FOR ERRORS
     79
     80 020572  006337  010036                ASL     SPCSIZ          ;DOUBLE THE SPACE SIZE
     81 020576  023737  010036  010040        CMP     SPCSIZ,LINN     ;IS THE SPACE SIZE LARGER THAN THE MAXIMUM?
     82 020604  100707                        BMI     L1LOOP          ;IF NOT THAN PRINTING MORE IS OK.
     83
     84 020606                                ENDTST
        020606                                                                  L10013:
        020606  104401                                                                  TRAP    C$ETST
     85
     86
     87
     88
     89                                 ;
     90                                 ;
     91                                 ;
     92                                 ;
     93
     94
     95
     96
     97                                 .SBTTL  TEST 5: PAPER POSITIONING TEST
```

```


020610                                  BGNTST
020610                                                                                  T5::






                                        ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                                        ;
                                        ;       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.
                                        ;
                                        ;..........................................................................





020610  004737  014274                  TEST5:  JSR     PC,INITCD       ;INITIALIZATION CODE
020614                                          PRINTB  #TITLE5         ;CONSOLE PRINT OF THE TEST TITLE.
020614  012746  002564                                                                          MOV     #TITLE5,-(SP)
020620  012746  000001                                                                          MOV     #1,-(SP)
020624  010600                                                                                  MOV     SP,R0
020626  104414                                                                                  TRAP    C$PNTB
020630  062706  000004                                                                          ADD     #4,SP

020634  052737  040000  006500                  BIS     #BIT14,ERWORD   ;DISABLE ERROR HANG-UPS
020642  012701  002564                          MOV     #TITLE5,R1      ;ADDRESS OF THE TITLE TO BE PRINTED
020646  062701  000004                          ADD     #4,R1           ;SKIP FIRST FOUR CHARACTERS.
020652  012702  000054                          MOV     #44.,R2         ;43 CHARACTERS IN THE TITLE
020656  005003                                  CLR     R3              ;DISABLE BIDIRECTIONAL PRINTING
020660  004737  012616                          JSR     PC,XMIT         ;SEND THE TITLE SEQUENCE TO THE PRINTER.
020664  042737  040000  006500                  BIC     #BIT14,ERWORD   ;RE-ENABLE THE ERROR HANG-UPS.

020672  012737  000001  010062                  MOV     #1,LINCNT       ;LINEFEED SIZE IN 1/48 INCH INCREMENTS.

020700  013701  010062                  AGN:    MOV     LINCNT,R1       ;A NUMBER FOR CONVERSION TO ASCII MNEMONICS
020704  004737  014176                          JSR     PC,CONVRT       ;CONVERT NUMBER IN R1 TO THREE MNEMONIC BYTES
020710  012700  000001                          MOV     #1,R0
020714  113760  010046  002226                  MOVB    MNEB1,VRTCLS(R0)  ;TRANSFER MNEMONICS INTO ARGUMENT
020722  005200                                  INC     R0
020724  113760  010047  002226                  MOVB    MNEB2,VRTCLS(R0)  ;      LIST SLOTS IN THE
020732  005200                                  INC     R0
020734  113760  010050  002226                  MOVB    MNEB3,VRTCLS(R0)  ;      ESCAPE SEQUENCE.

```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 32-1
TEST 5: PAPER POSITIONING TEST

     52 020742  012701  002226                  MOV     #VRTCLS,R1      ;ADDRESS OF VERTICAL SPACING ARGUMENTS
     53 020746  012702  000005                  MOV     #5,R2           ;THERE ARE 5 CHARACTERS : ESC N N N 9
     54 020752  004737  012616                  JSR     PC,XMIT         ;SEND TO PRINTER.
     55
     56 020756  012701  006542                  MOV     #DASHES,R1      ;ADDRESS OF THE DASHES
     57 020762  012702  000013                  MOV     #11.,R2         ;TEN DASHES & LF
     58 020766  004737  012616                  JSR     PC,XMIT         ;SEND TO PRINTER
     59 020772  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS
     60
     61 020776  006337  010062                  ASL     LINCNT          ;DOUBLE LINEFEED SIZE
     62 021002  023727  010062  002000          CMP     LINCNT,#MXLF    ;TOO LARGE A LINEFEED YET?
     63 021010  100733                          BMI     AGN             ;IF NOT REPEAT PRINT SEQUENCE. ELSE- EXIT TEST.
     64
     65 021012                                  ENDTST
        021012                                                                  L10014:
        021012  104401                                                                  TRAP    C$ETST
     66
     67
     68
     69
     70                                 ;
     71                                 ;
     72                                 ;
     73
     74                                 .SBTTL TEST 6:  PRINT ONE LINE OF EACH CHARACTER
```

```
  021014                                  BGNTST
  021014                                                                                T6::





                                          ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                                          ;
                                          ;       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.
                                          ;
                                          ;...............................................................................




  021014  004737  014274                  TEST6:  JSR     PC,INITCD       ;INITIALIZATION FOR TEST
  021020                                          PRINTB  #TITLE6         ;CONSOLE PRINT OF THE TEST TITLE.
  021020  012746  002645                                                                          MOV     #TITLE6,-(SP)
  021024  012746  000001                                                                          MOV     #1,-(SP)
  021030  010600                                                                                  MOV     SP,R0
  021032  104414                                                                                  TRAP    C$PNTB
  021034  062706  000004                                                                          ADD     #4,SP

  021040  052737  040000  006500                  BIS     #BIT14,ERWORD   ;DISABLE ERROR HANG-UPS
  021046  012701  002645                          MOV     #TITLE6,R1      ;ADDRESS OF THE TITLE
  021052  062701  000004                          ADD     #4,R1           ;SKIP FIRST FOUR CHARACTERS
  021056  012702  000053                          MOV     #43.,R2         ;43 CHARACTERS IN THE TITLE
  021062  005003                                  CLR     R3              ;DISABLE BIDIRECTIONAL PRINTING FOR THE MOMENT
  021064  004737  012616                          JSR     PC,XMIT         ;PRINT THE TITLE
  021070  042737  040000  006500                  BIC     #BIT14,ERWORD   ;ENABLE DESIRED ERROR HANG-UPS.

  021076  012703  177777                          MOV     #-1,R3          ;ENABLE BIDIRECTIONAL PRINTING
  021102  005004                                  CLR     R4              ;NO LINES YET PRINTED
  021104  005037  010064                  LINL06: CLR     CHRCNT          ;NO CHARACTERS YET PRINTED

  021110  010401                          CHRL06: MOV     R4,R1           ;GET OFFSET
  021112  062701  006555                          ADD     #CHRLST,R1      ;POINT TO DESIRED CHARACTER IN CHAR LIST.
  021116  012702  000001                          MOV     #1,R2           ;JUST THE ONE CHARACTER TO PRINT
  021122  004737  012616                          JSR     PC,XMIT         ;SEND THE CHARACTER
  021126  004737  015246                          JSR     PC,ERRORS       ;CHECK FOR ERRORS

  021132  005237  010064                          INC     CHRCNT          ;KEEP TRACK OF THE CHARACTERS PRINTED
  021136  023737  010064  010042                  CMP     CHRCNT,LINSIZ   ;HAS A FULL LINE BEEN PRINTED YET?
  021144  100761                                  BMI     CHRL06          ;IF NOT THEN PRINT UNTIL TRUE.

  021146  005204                                  INC     R4              ;KEEP TRACK OF THE LINES PRINTED
  021150  020427  000136                          CMP     R4,#94.         ;96 LINES PRINTED? (ALL CHARACTERS?)
```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 33-1
TEST 6: PRINT ONE LINE OF EACH CHARACTER

     52 021154  100753                       BMI     LINL06          ;IF NOT YET, MORE LINES TO PRINT.
     53
     54 021156                               ENDTST
        021156                                                                  L10015:
        021156  104401                                                                  TRAP    C$ETST
     55
     56
     57
     58
     59
     60
     61
     62
     63
     64                             ;
     65                             ;
     66                             ;
     67                             ;
     68
     69                             .SBTTL  TEST 7: PRINT A SWIRL PATTERN
```

```



021160                                 BGNTST
021160                                                                                     T7::


                                       ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                                       ;
                                       ;         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.
                                       ;
                                       ;
                                       ;..................................................................................


021160  004737  014274                 TEST7:   JSR     PC,INITCD          ;INITIALIZE THE TEST
021164                                          PRINTB  #TITLE7            ;CONSOLE PRINT THE TITLE
021164  012746  002725                                                                                          MOV     #TITLE7,-(SP)
021170  012746  000001                                                                                          MOV     #1,-(SP)
021174  010600                                                                                                  MOV     SP,R0
021176  104414                                                                                                  TRAP    C$PNTB
021200  062706  000004                                                                                          ADD     #4,SP

021204  052737  040000  006500                  BIS     #BIT14,ERWORD      ;INHIBIT ERROR HANG-UPS
021212  012701  002725                          MOV     #TITLE7,R1         ;ADDRESS OF THE TITLE TO BE PRINTED
021216  062701  000004                          ADD     #4,R1              ;SKIP 1ST 4 CHARACTERS.
021222  012702  000040                          MOV     #32.,R2            ;32 CHARACTERS INVOLVED
021226  005003                                  CLR     R3                 ;DISABLE BIDIRECTIONAL PRINTING FOR NOW.
021230  004737  012616                          JSR     PC,XMIT            ;SEND TO PRINTER
021234  042737  040000  006500                  BIC     #BIT14,ERWORD      ;ENABLE ERROR HANG-UPS

021242  012703  177777                          MOV     #-1,R3             ;ENABLE BIDIRECTIONAL PRINTING
021246  005004                                  CLR     R4                 ;NO LINES ARE PRINTED YET

021250  010401                         NXTLIN:  MOV     R4,R1                          ;OFFSET
021252  062701  006555                          ADD     #CHRLST,R1                     ;ADDRESS OF CHARACTER TO BE PRINTED.
021256  013702  010042                          MOV     LINSIZ,R2                      ;LENGTH OF LINE. PRINT A LINES WORTH
021262  004737  012616                          JSR     PC,XMIT                        ;TRANSMIT THE LINE TO THE PRINTER
021266  004737  015246                          JSR     PC,ERRORS                      ;CHECK FOR ERRORS

021272  010105                                  MOV     R1,R5              ;ADDRESS OF LAST CHARACTER FOR PRINTING....
021274  005205                                  INC     R5                 ;          POINT ONE FURTHER FOR SWIRL EFFECT.
021276  013701  010042                          MOV     LINSIZ,R1          ;
021302  060501                                  ADD     R5,R1              ;POINT TO THE FIRST CHARACTER TO BE PRINTED+1.

021304  005301                         REVRSP:  DEC     R1                 ;POINT TO THE NEXT CHARACTER TO BE PRINTED.
021306  012702  000001                          MOV     #1,R2              ;TELL XMIT THAT A SINGLE CHARACTER PRINTED.
021312  004737  012616                          JSR     PC,XMIT            ;SEND THE CHARACTER. (REVERSE PRINT)
021316  004737  015246                          JSR     PC,ERRORS          ;CHECK FOR ERRORS.

021322  020501                                  CMP     R5,R1              ;PRINTED ENOUGH CHARACTERS YET IN REVERSE?
```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 34-1
TEST 7: PRINT A SWIRL PATTERN

     52 021324  100767                          BMI     REVRSP          ;PRINT NEXT REVERSE CHAR.
     53
     54
     55                                 ;                               DONE WITH REVERSE PRINT.
     56
     57 021326  062704  000002                   ADD     #2,R4           ;KEEP TRACK OF THE NUMBER OF LINES PRINTED
     58 021332  020427  000024                   CMP     R4,#20.         ;TEN LINES PRINTED YET?
     59 021336  100744                          BMI     NXTLIN          ;IF DONE, EXIT TEST
     60
     61 021340                                  ENDTST
                021340                                                                  L10016:
                021340  104401                                                                TRAP    C$ETST
     62
     63
     64
     65
     66
     67
     68
     69                                 ;
     70                                 ;
     71                                 ;
     72
     73
     74                                 .SBTTL  TEST 8: WORST CASE RAPID MOTION TEST
```

```




021342                                  BGNTST
021342                                                                                  T8::



                                        ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                                        ;
                                        ;       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:".
                                        ;
                                        ;.............................................................................





021342  004737  014274                  TEST8:  JSR     PC,INITCD       ;INITIALIZE TEST
021346                                          PRINTB  #TITLE8         ;CONSOLE PRINT TEST TITLE
021346  012746  002772                                                                                  MOV     #TITLE8,-(SP)
021352  012746  000001                                                                                  MOV     #1,-(SP)
021356  010600                                                                                          MOV     SP,R0
021360  104414                                                                                          TRAP    C$PNTB
021362  062706  000004                                                                                  ADD     #4,SP

021366  052737  040000  006500                  BIS     #BIT14,ERWORD   ;DISABLE ERROR HANG-UPS
021374  012701  002772                          MOV     #TITLE8,R1      ;ADDRESS OF TITLE
021400  062701  000004                          ADD     #4,R1           ;SKIP FIRST 4 CHARACTERS
021404  012702  000047                          MOV     #39.,R2         ;39 CHARACTERS
021410  005003                                  CLR     R3              ;NO BIDIRECTIONAL PRINTING FOR NOW
021412  004737  012616                          JSR     PC,XMIT         ;SEND TO PRINTER
021416  042737  040000  006500                  BIC     #BIT14,ERWORD   ;ENABLE ERROR HANG-UPS

021424  012703  177777                          MOV     #-1,R3          ;ENABLE BIDIRECTIONAL PRINTING
021430  005004                                  CLR     R4              ;COUNT OF "ACA:" BLOCKS
021432  013705  010042                          MOV     LINSIZ,R5       ;# OF CHARACTERS PER LINE
021436  006205                                  ASR     R5              ;LINSIZ/2 : 1 BLOCK = 4 CHARACTERS...
                                                                        ;         PRINT 2 LINES AT NEW LINE SIZE

021440  012701  006535                  LOOP8:  MOV     #ACAS,R1        ;ADDRESS OF SEQUENCE
021444  012702  000004                          MOV     #4,R2           ;OF 4 CHARACTERS...
021450  004737  012616                          JSR     PC,XMIT         ;SEND TO PRINTER
021454  004737  015246                          JSR     PC,ERRORS       ;CHECK FOR ERRORS.

021460  005204                                  INC     R4
021462  020405                                  CMP     R4,R5           ;ENOUGH BLOCKS PRINTED??
021464  100765                                  BMI     LOOP8           ;IF NO, LOOP TO PRINT NEXT BLOCK...

021466                                          ENDTST
021466                                                                                  L10017:
```

```
        021466  104401                                                  TRAP    C$ETST
    51
    52
    53
    54
    55                                  ;
    56                                  ;
    57                                  ;
    58                                  ;
    59
    60
    61                                  .SBTTL  TEST 9: PRINT RANDOM CHARACTERS
```

```


021470                                  BGNTST
021470                                                                  T9::




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






021470  004737  014274                  TEST9:  JSR     PC,INITCD       ;INITIALIZE TEST
021474                                          PRINTB  #TITLE9         ;CONSOLE PRINT TITLE
021474  012746  003046                                                                          MOV     #TITLE9,-(SP)
021500  012746  000001                                                                          MOV     #1,-(SP)
021504  010600                                                                                  MOV     SP,R0
021506  104414                                                                                  TRAP    C$PNTB
021510  062706  000004                                                                          ADD     #4,SP

021514  052737  040000  006500                  BIS     #BIT14,ERWORD   ;DISABLE ERROR HANG-UPS
021522  012701  003046                          MOV     #TITLE9,R1      ;ADDRESS OF TITLE
021526  062701  000004                          ADD     #4,R1           ;SKIP 1ST 4 CHARACTERS
021532  012702  000042                          MOV     #34.,R2         ;34 CHARACTERS IN THE TITLE
021536  005003                                  CLR     R3              ;DISABLE BIDIRECTIONAL PRINTING
021540  004737  012616                          JSR     PC,XMIT         ;SEND TO PRINTER
021544  042737  040000  006500                  BIC     #BIT14,ERWORD   ;ENABLE ERROR HANG-UPS

021552  013705  010042                          MOV     LINSIZ,R5       ;GET THE LINE SIZE
021556  006305                                  ASL     R5              ;LINE SIZE * 2
021560  006305                                  ASL     R5              ;LINE SIZE * 4
021562  006305                                  ASL     R5              ;LINE SIZE * 8
                                                                        ; TO PRINT 8 LINES WORTH
021564  005037  010064                          CLR     CHRCNT          ;NO CHARACTERS PRINTED YET

021570  004737  014726                  PLOOP9: JSR     PC,RANDOM       ;RANDOM NUMBER (0 - 99) INTO R1

021574  062701  006555                          ADD     #CHRLST,R1      ;ADDRESS FOR THIS PRINT
021600  012702  000001                          MOV     #1,R2           ;SINGLE CHARACTER
021604  012703  177777                          MOV     #-1,R3          ;BIDIRECTIONAL PRINTING.
021610  004737  012616                          JSR     PC,XMIT         ;SEND TO PRINTER
021614  004737  015246                          JSR     PC,ERRORS       ;CHECK FOR ERRORS.

021620  005237  010064                          INC     CHRCNT          ;KEEP TRACK OF THE NUMBER OF CHARACTERS
021624  023705  010064                          CMP     CHRCNT,R5       ;EIGHT LINES YET?
```

```
     52 021630  100757                          BMI     PLOOP9          ;NO,LOOP UNTIL DONE
     53
     54 021632                                  ENDTST
        021632                                                                      L10020:
        021632  104401                                                                      TRAP    C$ETST
     55
     56
     57
     58
     59
     60                                 ;
     61                                 ;
     62                                 ;
     63                                 .SBTTL  TEST 10:        PRINT OPERATOR SELECTED CHARACTERS
```

```
  1
  2 021634                          BGNTST
    021634                                                                                  T10::
  3
  4
  5
  6
  7                                 ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
  8                                 ;
  9                                 ;       TEST #10
 10                                 ;
 11                                 ;       PRINT OPERATOR SELECTED CHARACTERS
 12                                 ;
 13                                 ;       THIS OPTIONAL TEST WILL PRINT CHARACTER SEQUENCES SELECTED BY THE
 14                                 ;       OPERATOR ONE LINE AT A TIME.
 15                                 ;
 16                                 ;.............................................................................
 17
 18
 19
 20
 21 021634  004737  014274          TESTA:  JSR     PC,INITCD         ;TEST INITIALIZE
 22 021640                                  PRINTB  #TITLEA           ;CONSOLE PRINT TITLE
    021640  012746  003115                                                                          MOV     #TITLEA,-(SP)
    021644  012746  000001                                                                          MOV     #1,-(SP)
    021650  010600                                                                                  MOV     SP,R0
    021652  104414                                                                                  TRAP    C$PNTB
    021654  062706  000004                                                                          ADD     #4,SP
 23
 24 021660  052737  040000  006500          BIS     #BIT14,ERWORD     ;DISABLE ERROR HANG-UPS
 25 021666  012701  003115                  MOV     #TITLEA,R1        ;ADDRESS OF TITLE
 26 021672  062701  000004                  ADD     #4,R1             ;SKIP 4 CHARACTERS
 27 021676  012702  000056                  MOV     #46.,R2           ;46 CHARACTERS IN THE TITLE
 28 021702  005003                          CLR     R3                ;DISABLE BIDIRECTIONAL PRINTING
 29 021704  004737  012616                  JSR     PC,XMIT           ;SEND TO PRINTER
 30 021710  042737  040000  006500          BIC     #BIT14,ERWORD     ;ENABLE ERROR HANG-UPS
 31
 32 021716                          LOOPA:  GMANID  PRMPTA,BFRA,A,0,1,72,NO
    021716  104443                                                                                  TRAP    C$GMAN
    021720  000406                                                                                  BR      10000$
    021722  007352                                                                                  .WORD   BFRA
    021724  000142                                                                                  .WORD   T$CODE
    021726  003200                                                                                  .WORD   PRMPTA
    021730  000000                                                                                  .WORD   0
    021732  000001                                                                                  .WORD   T$LOLIM
    021734  000072                                                                                  .WORD   T$HILIM
    021736                                                                                  10000$:
 33                                                                          ;PROMPT AT CONSOLE AND INPUT STRING.
 34
 35 021736  005004                          CLR     R4                ;R4 IS OFFSET IN INPUT STRING
 36
 37 021740  105764  007352          NXTA:   TSTB    BFRA(R4)          ;IS THE BYTE A ZERO?  GMANID IS EXPECTED TO
 38                                                                   ; SEND A ZERO AS THE LAST BYTE.  THIS WILL
 39                                                                   ; INDICATE THE END OF THE INPUT STRING.
 40 021744  001011                          BNE     TFCZ              ;NOT ZERO.  CHECK FOR CTL-Z
 41
 42 021746  012701  002313                  MOV     #CR,R1            ;ADDRESS OF CARRIAGE RETURN - LINEFEED
```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 37-1
TEST 10:        PRINT OPERATOR SELECTED CHARACTERS

     43 021752  012702  000002                  MOV     #2,R2           ;TWO BYTES TO SEND
     44 021756  004737  012616                  JSR     PC,XMIT         ;SEND THE STRING
     45 021762  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
     46
     47 021766  000753                          BR      LOOPA           ;BACK TO PROMPT...
     48
     49
     50 021770  126437  007352  006525  TFCZ:   CMPB    BFRA(R4),SCQ    ;IS IT A "Q" ?
     51 021776  001006                          BNE     NOTQ            ;IF IT IS, CHECK FOR <RETURN>
     52
     53 022000  005204                          INC     R4              ;CHECK NEXT BYTE FOR ZERO.
     54 022002  126427  007352  000000          CMPB    BFRA(R4),#0     ;IS THE BYTE A ZERO?
     55 022010  001415                          BEQ     EXITA           ;IF IT IS THEN EXIT TEST
     56 022012  005304                          DEC     R4              ;IF NOT ZERO THEN NOT RETURN
     57                                                                 ;AND NOT YET THE END.
     58 022014                          NOTQ:
     59 022014  012701  007352                  MOV     #BFRA,R1        ;PRINT THE CHARACTER...
     60 022020  060401                          ADD     R4,R1           ;       AS R4 POINTS THROUGH THE LIST.
     61 022022  012702  000001                  MOV     #1,R2           ;ONE CHARACTER TO PRINT.
     62 022026  005003                          CLR     R3              ;NOT BIDIR. PRINTING.
     63 022030  004737  012616                  JSR     PC,XMIT         ;SEND TO PRINTER.
     64 022034  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
     65
     66 022040  005204                          INC     R4              ;POINT TO NEXT CHARACTER
     67 022042  000736                          BR      NXTA            ;REPEAT TILL END OF STRING FOUND.
     68 022044  000240                  EXITA:  NOP
     69
     70 022046                                  ENDTST
        022046                                                                  L10021:
        022046  104401                                                                 TRAP    C$ETST
     71
     72
     73
     74
     75                                 ;
     76                                 ;
     77                                 ;
     78
     79                                 .SBTTL  TEST 11:        LIFT / DROP RIBBON BY OPERATOR CONTROL
```

```



022050                                  BGNTST
022050                                                                                  T11::




                                        ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                                        ;
                                        ;       TEST #11
                                        ;
                                        ;       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.
                                        ;
                                        ;
                                        ;...........................................................................





022050  004737  014274                  TESTB:  JSR     PC,INITCD       ;TEST INITIALIZE
022054                                          PRINTB  #TITLEB         ;CONSOLE PRINT TITLE
022054  012746  003264                                                                          MOV     #TITLEB,-(SP)
022060  012746  000001                                                                          MOV     #1,-(SP)
022064  010600                                                                                  MOV     SP,R0
022066  104414                                                                                  TRAP    C$PNTB
022070  062706  000004                                                                          ADD     #4,SP

022074  052737  040000  006500                  BIS     #BIT14,ERWORD   ;DISABLE ERROR HANG-UPS
022102  012701  003264                          MOV     #TITLEB,R1      ;ADDRESS OF TEST TITLE
022106  062701  000004                          ADD     #4,R1           ;SKIP 4 CHARACTERS
022112  012702  000060                          MOV     #48.,R2         ;48 CHARACTERS TO BE PRINTED.
022116  005003                                  CLR     R3              ;NO BIDIRECTIONAL PRINTING
022120  004737  012616                          JSR     PC,XMIT         ;SEND THE TEST TITLE
022124  042737  040000  006500                  BIC     #BIT14,ERWORD   ;ENABLE ERROR HANG-UPS

022132  012701  002303                          MOV     #SETHTO,R1      ;SET HIT COUNT TO ZERO
022136  012702  000005                          MOV     #5,R2           ;FIVE CHARACTER STRING SENT TO PRINTER
022142  005003                                  CLR     R3              ;NO BIDIRECTIONAL LOGIC REQUIRED.
022144  004737  012616                          JSR     PC,XMIT         ;SEND TO PRINTER.

022150  012701  002310                          MOV     #SETCHO,R1      ;SET CHARACTER SIZE TO ZERO.
022154  012702  000003                          MOV     #3,R2           ;ARGUMENT LIST IS 3 CHARACTERS LONG.
022160  005003                                  CLR     R3              ;NO BIDSIRECTIONAL LOGIC REQUIRED.
022162  004737  012616                          JSR     PC,XMIT         ;SEND TO PRINTER.


022166                                          GMANID  OPTN1,BFRB,A,0,1,72,YES
```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 38-1
TEST 11:        LIFT / DROP RIBBON BY OPERATOR CONTROL

        022166  104443                                                          TRAP    C$GMAN
        022170  000406                                                          BR      10000$
        022172  010030                                                          .WORD   BFRB
        022174  000152                                                          .WORD   T$CODE
        022176  003351                                                          .WORD   OPTN1
        022200  000000                                                          .WORD   0
        022202  000001                                                          .WORD   T$LOLIM
        022204  000072                                                          .WORD   T$HILIM
        022206                                                          10000$:
     52
     53
     54 022206  123737  010030  006531          CMPB    BFRB,SCA        ;IF CHARACTER IS "A" THEN AUTO MODE CHOSEN
     55 022214  001403                          BEQ     AUTCAL          ;SO CALL LOCAL ROUTINE TO HANDLE AUTO MODE
     56
     57                                                                  ;OTHERWISE, MANUAL IS CHOSEN.....
     58 022216  004737  022352                  JSR     PC,MANLD        ;DO MANUAL LIFT / DROP.
     59 022222  000402                          BR      EXIT            ;EXIT TEST WHEN DONE
     60
     61 022224  004737  022232          AUTCAL: JSR     PC,AUTOLD       ;DO AUTOMATIC MODE LIFT / DROP.
     62
     63 022230                          EXIT:   ENDTST
        022230                                                          L10022:
        022230  104401                                                          TRAP    C$ETST
     64
     65
     66
     67
     68
     69                                 ;;;;;;
     70
     71
     72
     73
     74
     75
     76
     77
     78
     79
     80
     81
     82
     83
     84
```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 39
TEST 11:        LIFT / DROP RIBBON BY OPERATOR CONTROL


                                ;.....
                                ;FUNCTIONAL DESCRIPTION
                                ;
                                ;       TEST #11
                                ;
                                ;       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
                                ;
                                ;
                                ;
022232  005037  010066        AUTOLD: CLR     CCOUNT          ;COUNT OF CYCLES (LIFT/DROP)
022236  012700  000001        AUTOLE: MOV     #1,R0                   ;POINT TO POSITION PARAMETER.
022242  112760  000040  002240        MOVB    #ZERO,RIBPOS(R0)        ;RIBBON UP ARGUMENT       LIFT/DROP
022250  012701  002240                MOV     #RIBPOS,R1              ;ADDRESS OF ARG LIST      CYCLE....
022254  012702  000004                MOV     #4,R2                   ;4 ARGUMENTS              .........
022260  004737  012616                JSR     PC,XMIT                 ;SEND TO PRINTER          .........
022264  004737  015246                JSR     PC,ERRORS               ;CHECK FOR ERRORS.        .........
                                                                        ;                         .....
022270  012705  001750                MOV     #1000.,R5       ;DELAY TIME IN R1 FOR  DELAY ROUTINE. .....
022274  004737  015224                JSR     PC,DELAYS       ;PERFORM DELAY OF ABOUT 1 SECOND.     .....
                                                                        ;                         ...
022300  012700  000001                MOV     #1,R0           ;POINT TO THE RIBBON POSITION PARAMETER ...
022304  112760  000041  002240        MOVB    #ONE,RIBPOS(R0) ;LOWER THE RIBBON.                      ...
022312  012701  002240                MOV     #RIBPOS,R1      ;ARGUMENT LIST ADDRESS.               .....
022316  012702  000004                MOV     #4,R2           ;4 CHARACTERS                         .....
022322  005003                        CLR     R3              ;BIDIRECTIONAL LOGIC DISABLED         .....
022324  004737  012616                JSR     PC,XMIT         ;SEND SEQUENCE TO PRINTER.            .........
022330  004737  015246                JSR     PC,ERRORS       ;                                     .........
                                                                ;                                     .........
022334  005237  010066                INC     CCOUNT          ;KEEP COUNT OF CYCLES SO FAR...       .........
022340  023727  010066  000024        CMP     CCOUNT,#20.     ;LOOP TEN TIMES FOR TEN LIFT / DROP CYCLES.
022346  100733                        BMI     AUTOLE          ;LOOP UNTIL TEN LOOPS DONE.                .

022350  000207                        RTS     PC
```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 39-1
TEST 11:        LIFT / DROP RIBBON BY OPERATOR CONTROL

      58
      59                              ;
      60                              ;
      61                              ;
      62
      63
      64
```

```
                        ;.....................................................................
                        ;FUNCTIONAL DESCRIPTION
                        ;
                        ;       TEST #11
                        ;
                        ;       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 ENTERRED 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
                        ;
                        ;
                        ;
                        ;
                        ;
022352                  MANLD:  PRINTB  #PRMPTC         ;PROMPT INSTRUCTIONS AT CONSOLE
022352  012746  003466                                                  MOV     #PRMPTC,-(SP)
022356  012746  000001                                                  MOV     #1,-(SP)
022362  010600                                                          MOV     SP,R0
022364  104414                                                          TRAP    C$PNTB
022366  062706  000004                                                  ADD     #4,SP
022372                  MANLE:  GMANID  NPRMPT,BFRC,A,0,1,72,YES
022372  104443                                                          TRAP    C$GMAN
022374  000406                                                          BR      10000$
022376  010032                                                          .WORD   BFRC
022400  000152                                                          .WORD   T$CODE
022402  004531                                                          .WORD   NPRMPT
022404  000000                                                          .WORD   0
022406  000001                                                          .WORD   T$LOLIM
022410  000072                                                          .WORD   T$HILIM
022412                                                          10000$:
                                        ;INPUT <RETURN> OR Q <RETURN>
                                        ;<RETURN> MEANS TO CHANGE RIBBON POSITION
                                        ;Q <RETURN> MEANS TO EXIT TEST.
022412  123737  010032  006525          CMPB    BFRC,SCQ        ;IS THE CHARACTER A "Q" ?
022420  001417                          BEQ     EXIT11          ;IF SO - EXIT TEST.
```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 40-1
TEST 11:        LIFT / DROP RIBBON BY OPERATOR CONTROL

     44
     45 022422  012700  000001                    MOV     #1,R0
     46 022426  112760  000040  002240            MOVB    #ZERO,RIBPOS(R0)        ;ARGUMENT FOR LIFT RIBBON
     47 022434  012701  002240                    MOV     #RIBPOS,R1              ;ADDRESS OF ARGUMENT LIST
     48 022440  012702  000004                    MOV     #4,R2                   ;4 ARGUMENT CHARACTERS IS LIST
     49 022444  005003                            CLR     R3                      ;DON'T BOTHER WITH BIDIRECTIONAL PRINTING CODE
     50 022446  004737  012616                    JSR     PC,XMIT                 ;SEND ARGUMENT LIST TO PRINTER
     51 022452  004737  015246                    JSR     PC,ERRORS               ;CHECK FOR ERRORS.
     52
     53 022456  000735                            BR      MANLD           ;REPEAT UNTIL A "Q" IS FOUND IN THE BUFFER
     54
     55 022460  000207                  EXIT11: RTS     PC
     56
     57
     58
     59
     60                                 ;
     61                                 ;
     62                                 ;
     63                                 .SBTTL  TEST 12:        BIDIRECTIONAL FORMS TRACTOR TEST
```

```



 022462                                 BGNTST
 022462                                                                          T12::


                                        ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                                        ;
                                        ;       TEST #12
                                        ;
                                        ;       BIDIRECTIONAL FORMS TRACTOR 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.
                                        ;
                                        ;...........................................................................


 022462 004737  014274                  TESTC:  JSR     PC,INITCD       ;TEST INITIALIZE
 022466                                         PRINTB  #TITLEC         ;CONSOLE PRINT TITLE OF TEST
 022466 012746  003717                                                                          MOV     #TITLEC,-(SP)
 022472 012746  000001                                                                          MOV     #1,-(SP)
 022476 010600                                                                                  MOV     SP,R0
 022500 104414                                                                                  TRAP    C$PNTB
 022502 062706  000004                                                                          ADD     #4,SP

 022506 052737  040000  006500                  BIS     #BIT14,ERWORD   ;TEMPORARILY SUSPEND ERROR HANG-UPS
 022514 012701  003717                          MOV     #TITLEC,R1      ;ADDRESS OF TITLE TO PRINT
 022520 062701  000004                          ADD     #4,R1           ;SKIP 4 CHARACTERS
 022524 012702  000047                          MOV     #39.,R2         ;
 022530 005003                                  CLR     R3              ;
 022532 004737  012616                          JSR     PC,XMIT         ;PRINT TITLE
 022536 042737  040000  006500                  BIC     #BIT14,ERWORD   ;REINSTATE ERROR HANG-UPS

 022544                                         GMANID T11PMT,BFRD,A,0,1,72,YES
 022544 104443                                                                                  TRAP    C$GMAN
 022546 000406                                                                                  BR      10001$
 022550 010034                                                                                  .WORD   BFRD
 022552 000152                                                                                  .WORD   T$CODE
 022554 004346                                                                                  .WORD   T11PMT
 022556 000000                                                                                  .WORD   0
 022560 000001                                                                                  .WORD   T$LOLIM
 022562 000072                                                                                  .WORD   T$HILIM
 022564                                                                                 10001$:





                                        ;
                                        ;                       CLEAR ALL TABLE UNIQUENESS INDICATORS.
                                        ;
 022564 012700  005262                          MOV     #BASET,R0       ;GET THE BASE ADDRESS OF THE VECTOR TABLE
 022570 062700  000005                  CLEART: ADD     #5,R0           ;POINT TO THE UNIQUENESS INDICATOR.
```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 41-1
TEST 12:        BIDIRECTIONAL FORMS TRACTOR TEST

     43 022574  105010                          CLRB    @R0             ;CLEAR THE UNIQUENESS INDICATOR.
     44 022576  005200                          INC     R0              ;POINT TO THE NEXT TABLE ENTRY.
     45 022600  020027  006412                   CMP     R0,#FRONT       ;IS IT POINTING BEYOND THE TABLE?
     46 022604  100771                          BMI     CLEART          ;REPEAT LOOP UNTIL ALL UNIQUENESS INDICATORS
     47                                                                  ;       ARE CLEARED.
     48
     49
     50                                                                  ;VECTOR TABLE READY TO USE.
     51
     52
     53 022606  005037  010066                   CLR     CCOUNT          ;COUNT CHARACTERS PRINTED
     54 022612  004737  014726           PLOOPC: JSR     PC,RANDOM       ;GET A RANDOM NUMBER (0 - 99) INTO R1
     55 022616  010104                          MOV     R1,R4           ;PUT INTO R4 FOR THE PRARCH ROUTINE.
     56
     57 022620  004737  022736                   JSR     PC,PRARCH               ;PRINT THE CHARACTER IN ITS
     58                                                                          ;CORRESPONDING POSITION.
     59
     60 022624  005237  010066                   INC     CCOUNT          ;KEEP TRACK OF THE COUNT OF CHARACTERS.
     61 022630  023727  010066  000144          CMP     CCOUNT,#100.    ;DONE WHEN 100 HAVE BEE PRINTED.
     62 022636  100765                          BMI     PLOOPC          ;REPEAT UNTIL DONE.
     63
     64 022640  012701  002313                   MOV     #CR,R1          ;PRINT A CARRIAGE RETURN AND SOME LINE FEEDS.
     65 022644  012702  000002                   MOV     #2,R2           ;
     66 022650  005003                          CLR     R3
     67 022652  004737  012616                   JSR     PC,XMIT         ;<CR><LF>
     68
     69 022656  012701  002314                   MOV     #LF,R1          ;SEVERAL LINE FEEDS...
     70 022662  012702  000001                   MOV     #1,R2
     71 022666  005003                          CLR     R3
     72 022670  004737  012616                   JSR     PC,XMIT
     73 022674  004737  012616                   JSR     PC,XMIT
     74 022700  004737  012616                   JSR     PC,XMIT
     75 022704  004737  012616                   JSR     PC,XMIT
     76 022710  004737  012616                   JSR     PC,XMIT
     77 022714  004737  012616                   JSR     PC,XMIT
     78 022720  004737  012616                   JSR     PC,XMIT
     79 022724  004737  012616                   JSR     PC,XMIT
     80 022730  004737  012616                   JSR     PC,XMIT
     81
     82 022734                                  ENDTST
        022734                                                          L10023:
        022734  104401                                                          TRAP    C$ETST
     83
     84
     85
     86
     87
     88
     89
     90                                  .
     91                                  .
     92                                  .
     93                                  .
     94
     95
     96
     97
```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 41-2
TEST 12:        BIDIRECTIONAL FORMS TRACTOR TEST


                ;.....................................................................
                ;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.
                ;


022736  010446          PRARCH: MOV     R4,-(SP)        ;SAVE REGISTERS
022740  010346                  MOV     R3,-(SP)        ;
022742  010246                  MOV     R2,-(SP)        ;       (THAT ARE NOT USED FOR PASSING)

022744  006304          GTNUM:  ASL     R4              ;OFFSET DESIRED * 2
022746  010403                  MOV     R4,R3           ;SAVE 2 * OFFSET FOR LATER
022750  006304                  ASL     R4              ;DESIRED OFFSET * 4
022752  060304                  ADD     R3,R4           ;6 * OFFSET NOW IN R4.
                                                        ;DESIRED TABLE INDEX NOW IN R4.

022754  062704  005262          ADD     #BASET,R4       ;ADDRESS OF TABLE ENTRY DESIRED

022760  062704  000005          ADD     #5,R4           ;TABLE OFFSET.
022764  105714                  TSTB    @R4             ;CHECK UNIQUE NUMBER INDICATOR....
022766  001404                  BEQ     NOT1            ;IF NOT UNIQUE THEN CONTROL TOO NOT1

022770  004737  014726          JSR     PC,RANDOM       ;RANDOM NUMBER IN R4
022774  010104                  MOV     R1,R4           ;GET THE RANDOM NUMBER IN THE RIGHT PLACE.
022776  000762                  BR      GTNUM           ;LAST ONE DIDN'T WORK... TRY THIS ONE.
```

```
023000  112714  000001           NOT1:   MOVB    #1,@R4              ;SET UNIQUE INDICATOR
023004  162704  000005                   SUB     #5,R4               ;
                                                                     ;AT THIS POINT R4 CONTAINS A TABLE ENTRY
                                                                     ;ADDRESS WHICH HAS NOT BEEN REFERENCED DURING
                                                                     ;THIS PASS.


023010  012401                           MOV     (R4)+,R1            ;GET THE VERTICAL COMPONENT OF THE VECTOR
023012  004737  014176                   JSR     PC,CONVRT           ;CONVERT R1 TO MNEMONICS
023016  012700  000001                   MOV     #1,R0
023022  113760  010046  002226           MOVB    MNEB1,VRTCLS(R0)            ;LOAD THE ARGUMENT LIST
023030  005200                           INC     R0
023032  113760  010047  002226           MOVB    MNEB2,VRTCLS(R0)            ;
023040  005200                           INC     R0
023042  113760  010050  002226           MOVB    MNEB3,VRTCLS(R0)            ;

023050  012401                           MOV     (R4)+,R1            ;GET HORIZONTAL COMPONENT OF THE VECTOR
023052  004737  014176                   JSR     PC,CONVRT           ;CONVERT R1 TO MNEMONICS
023056  012700  000001                   MOV     #1,R0
023062  113760  010046  002233           MOVB    MNEB1,HRZTLS(R0)  ;LOAD THE ARGUMENT LIST
023070  005200                           INC     R0
023072  113760  010047  002233           MOVB    MNEB2,HRZTLS(R0)  ;
023100  005200                           INC     R0
023102  113760  010050  002233           MOVB    MNEB3,HRZTLS(R0)  ;

023110  012701  002226                   MOV     #VRTCLS,R1          ;NOW, ACCUMULATE VERTICAL SPACING
023114  012702  000005                   MOV     #5,R2               ;
023120  005003                           CLR     R3
023122  004737  012616                   JSR     PC,XMIT             ;SEND TO PRINTER
023126  004737  015246                   JSR     PC,ERRORS           ;CHECK FOR ERRORS.

023132  012701  002233                   MOV     #HRZTLS,R1          ;NOW, ACCUMULATE HORIZONTAL SPACING
023136  012702  000005                   MOV     #5,R2               ;
023142  005003                           CLR     R3                  ;DISABLE BIDIRECTIONAL PRINT
023144  004737  012616                   JSR     PC,XMIT             ;SEND TO PRINTER
023150  004737  015246                   JSR     PC,ERRORS           ;CHECK FOR ERRORS.

023154  010401                           MOV     R4,R1               ;GET ADDRESS OF THE CHARACTER
023156  012702  000001                   MOV     #1,R2               ;SINGLE CHARACTER
023162  005003                           CLR     R3                  ;DISABLE BIDIRECTIONAL PRINT LOGIC.
023164  004737  012616                   JSR     PC,XMIT             ;SEND TO PRINTER
023170  004737  015246                   JSR     PC,ERRORS           ;CHECK FOR ERRORS.

023174  014401                           MOV     -(R4),R1            ;COLUMN NUMBER IN R1
023176  005401                           NEG     R1                  ;NEGATIVE NUMBER FOR LEFT SPACING
023200  162701  000014                   SUB     #12.,R1             ;AND ONE EXTRA SPACE ACCOUNTS FOR THE
                                                                     ;CHARACTER WHICH WAS PRINTED (12 INCREMENTS)

023204  004737  014176                   JSR     PC,CONVRT           ;CONVERT TO MNEMONIC
023210  012700  000001                   MOV     #1,R0
023214  113760  010046  002233           MOVB    MNEB1,HRZTLS(R0)  ;PUT IN ARGUMENT LIST
023222  005200                           INC     R0
023224  113760  010047  002233           MOVB    MNEB2,HRZTLS(R0)  ;
023232  005200                           INC     R0
023234  113760  010050  002233           MOVB    MNEB3,HRZTLS(R0)  ;

```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 41-4
TEST 12:        BIDIRECTIONAL FORMS TRACTOR TEST

    212 023242  012701  002233                  MOV     #HRZTLS,R1      ;ADDRESS OF ARGUMENT LIST
    213 023246  012702  000005                  MOV     #5,R2           ;5 ARGUMENTS
    214 023252  005003                          CLR     R3              ;DISABLE BIDIRECTIONAL LOGIC.
    215 023254  004737  012616                  JSR     PC,XMIT         ;SEND TO PRINTER
    216 023260  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
    217
    218 023264  014401                          MOV     -(R4),R1        ;GET THE COLUMN NUMBER
    219 023266  005401                          NEG     R1              ;REVERSE THE CARRIAGE MOVEMENT
    220 023270  004737  014176                  JSR     PC,CONVRT       ;CONVERT TO MNEMONICS
    221 023274  012700  000001                  MOV     #1,R0
    222 023300  113760  010046  002226          MOVB    MNEB1,VRTCLS(R0)  ;FILL ARGUMENT LIST
    223 023306  005200                          INC     R0
    224 023310  113760  010047  002226          MOVB    MNEB2,VRTCLS(R0)  ;
    225 023316  005200                          INC     R0
    226 023320  113760  010050  002226          MOVB    MNEB3,VRTCLS(R0)  ;
    227
    228 023326  012701  002226                  MOV     #VRTCLS,R1      ;ADDRESS OF ARGUMENT LIST
    229 023332  012702  000005                  MOV     #5,R2           ; TO ACCUMULATE VERTICAL SPACING
    230 023336  005003                          CLR     R3              ;DISABLE BIDIR. LOGIC
    231 023340  004737  012616                  JSR     PC,XMIT         ;SEND TO PRINTER
    232 023344  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
    233
    234 023350  012602                          MOV     (SP)+,R2        ;RESTORE REGISTERS
    235 023352  012603                          MOV     (SP)+,R3
    236 023354  012604                          MOV     (SP)+,R4
    237
    238
    239 023356  000207                          RTS     PC
    240
    241
    242
    243
    244
    245
    246
    247
    248
    249                         .SBTTL  TEST 13:        CUT SHEET FEEDER EXERCISOR
```

```
   1
   2
   3
   4 023360                          BGNTST
     023360                                                                                     T13::
   5
   6
   7                                 ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
   8                                 ;
   9                                 ;       TEST #13
  10                                 ;
  11                                 ;       CUT SHEET FEEDER EXERCISOR
  12                                 ;
  13                                 ;       THIS TEST WILL EXERCISE THE CUT SHEET FEEDER BY TESTING TO SEE THAT
  14                                 ;       THE FEEDER IS INSTALLED, FEEDING AND EJECTING SHEETS AND PRINTING
  15                                 ;       TEXT ON THE TOPS AND BOTTOMS OF THE SHEETS IN THE PRINTER.
  16                                 ;
  17                                 ;............................................................................
  18
  19
  20 023360  004737  014274          TESTD:  JSR     PC,INITCD       ;INITIALIZE TEST
  21 023364                                  PRINTB  #TITLED         ;CONSOLE PRINT TITLE
     023364  012746  003773                                                                             MOV     #TITLED,-(SP)
     023370  012746  000001                                                                             MOV     #1,-(SP)
     023374  010600                                                                                     MOV     SP,R0
     023376  104414                                                                                     TRAP    C$PNTB
     023400  062706  000004                                                                             ADD     #4,SP
  22 023404  005003                          CLR     R3              ;DISABLE BIDIRECTIONAL PRINTING
  23
  24 023406                                  GMANID  PRMPTD,BR2,A,0,1,72,YES
     023406  104443                                                                                     TRAP    C$GMAN
     023410  000406                                                                                     BR      10000$
     023412  006514                                                                                     .WORD   BR2
     023414  000152                                                                                     .WORD   T$CODE
     023416  004046                                                                                     .WORD   PRMPTD
     023420  000000                                                                                     .WORD   0
     023422  000001                                                                                     .WORD   T$LOLIM
     023424  000072                                                                                     .WORD   T$HILIM
     023426                                                                                     10000$:
  25
  26                                                                 ;PROMPT USER FOR PAGE SIZE USED.
  27                                                                 ;OPTIONS ARE A) 11 INCH, B) 14 INCH
  28                                                                 ;AND C) A4 EUROPEAN STANDARD.
  29
  30 023426  123737  006514  006527          CMPB    BR2,SCB         ;WAS THE CHOICE = "B" ?
  31 023434  001020                          BNE     CHKC            ;IF NOT THEN CHECK IF IT IS = "C"...
  32
  33 023436  012704  000001                  MOV     #1,R4                   ;OFFSET FOR PSZ14 & STPGSZ
  34 023442  113764  002330  002271          MOVB    PSZ14,STPGSZ(R4)        ;THEN = "B"... 14 INCH PAGE.  SET UP ARG LIST
  35 023450  012705  000001                  MOV     #1,R5
  36 023454  116564  002330  002271          MOVB    PSZ14(R5),STPGSZ(R4)    ;
  37 023462  005204                          INC     R4
  38 023464  005205                          INC     R5
  39 023466  116564  002330  002271          MOVB    PSZ14(R5),STPGSZ(R4)    ;
  40 023474  000447                          BR      TRNSMT                  ;SEND THE ARGUMENT SEQUENCE
  41
  42 023476  123737  006514  006526  CHKC:   CMPB    BR2,SCC         ;IS THE CHARACTER A "C" ?
```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 42-1
TEST 13:        CUT SHEET FEEDER EXERCISOR

     43 023504  001022                          BNE     MAKE11          ;IF NOT THEN ASSUME IT WAS AN "A".
     44
     45 023506  010146                          MOV     R1,-(SP)                ;SAVE R1 TEMPORARILY
     46 023510  012701  000002                  MOV     #2,R1                   ;OFFSET
     47 023514  012700  000001                  MOV     #1,R0                   ;OFFSET
     48 023520  113760  002322  002271          MOVB    PSZA4,STPGSZ(R0)        ;THEN = "C". SET UP ARG LIST
     49 023526  116061  002322  002271          MOVB    PSZA4(R0),STPGSZ(R1)    ;
     50 023534  012700  000003                  MOV     #3,R0                   ;OFFSET ADJUSTMENT
     51 023540  116160  002322  002271          MOVB    PSZA4(R1),STPGSZ(R0)    ;
     52 023546  012601                          MOV     (SP)+,R1                ;RESTORE R1
     53 023550  000421                          BR      TRNSMT
     54
     55 023552  010146                  MAKE11: MOV     R1,-(SP)                ;SAVE R1 TEMPORARILY
     56 023554  012701  000002                  MOV     #2,R1                   ;OFFSET
     57 023560  012700  000001                  MOV     #1,R0                   ;OFFSET
     58 023564  113760  002325  002271          MOVB    PSZ11,STPGSZ(R0)        ;THEN = "A". SET UP ARG LIST
     59 023572  116061  002325  002271          MOVB    PSZ11(R0),STPGSZ(R1)    ;       FOR 11 INCH PAGE.
     60 023600  012700  000003                  MOV     #3,R0                   ;OFFSET ADJUSTMENT
     61 023604  116160  002325  002271          MOVB    PSZ11(R1),STPGSZ(R0)    ;
     62 023612  012601                          MOV     (SP)+,R1                ;RESTORE R1
     63
     64 023614  012701  002271          TRNSMT: MOV     #STPGSZ,R1      ;ADDRESS OF ARGUMENT LIST
     65 023620  012702  000005                  MOV     #5,R2           ;
     66 023624  005003                          CLR     R3
     67 023626  004737  012616                  JSR     PC,XMIT         ;SEND TO PRINTER... SET PAGE SIZE
     68 023632  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
     69
     70 023636  012700  000001          SELECT: MOV     #1,R0
     71 023642  012701  000002                  MOV     #2,R1                           ;TRANSFER OFFSET FOR
     72 023646  113760  006412  002276          MOVB    FRONT,SLTPFF(R0)                ;SELECT TRAY-PERFORM FORMFEED
     73 023654  116061  006412  002276          MOVB    FRONT(R0),SLTPFF(R1)            ;ARGUMENT LIST
     74 023662  012700  000003                  MOV     #3,R0                           ;OFFSET ADJUSTMENT
     75 023666  116160  006412  002276          MOVB    FRONT(R1),SLTPFF(R0)            ;
     76
     77 023674  012701  002276                  MOV     #SLTPFF,R1      ;ADDRESS OF ARGUMENT LIST
     78 023700  012702  000005                  MOV     #5,R2           ;
     79 023704  005003                          CLR     R3
     80 023706  004737  012616                  JSR     PC,XMIT         ;SELECT TRAY AND PERFORM FORMFEED.
     81 023712  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
     82
     83 023716  012701  004654                  MOV     #FTYTPM,R1      ;FRONT TRAY TOP OF PAGE MESSAGE
     84 023722  012702  000140                  MOV     #96.,R2         ;96 CHARACTERS LONG
     85 023726  005003                          CLR     R3
     86 023730  004737  012616                  JSR     PC,XMIT         ;SEND TO PRINTER
     87 023734  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
     88
     89 023740  123737  006514  006527          CMPB    BR2,SCB         ;IS THE BYTE A "B"
     90 023746  001003                          BNE     CHC2            ;IF NOT THEN CHECK FOR A "C"
     91
     92 023750  013701  002170                  MOV     SKP14,R1        ;SKIP 14 INCHES MINUS 3 LINES VERTICALLY
     93 023754  000411                          BR      DOSPCS          ;PERFORM TASK
     94
     95 023756  123737  006514  006526  CHC2:   CMPB    BR2,SCC         ;IS THE CHARACTER A "C"?
     96 023764  001003                          BNE     ASSMA           ;MUST BE 11 INCH IF NOT B OR C.
     97
     98 023766  013701  002172                  MOV     SKPA4,R1        ;MUST BE A4 SIZE. SKIP A4 - 3 LINES VERTICALLY
     99 023772  000402                          BR      DOSPCS          ;PERFORM TASK
```

```
HARDWARE TESTS  MACRO V03.01 7-NOV-80 10:06:10 PAGE 42-2
TEST 13:        CUT SHEET FEFDER EXERCISOR

    100
    101 023774  013701  002174          ASSMA:  MOV     SKP11,R1        ;11 INCH PAGE. SKIP 11 INCHES - 3 LINES
    102
    103 024000  010137  002176          DOSPCS: MOV     R1,CRNTSK         ;SAVE CURRENT SKIP SIZE.
    104 024004  004737  014176                  JSR     PC,CONVRT         ;CONVERT TO MNEMONICS
    105 024010  012700  000001                  MOV     #1,R0
    106 024014  113760  010046  002226          MOVB    MNEB1,VRTCLS(R0)  ;MNEMONICS FOR ARG LIST
    107 024022  005200                          INC     R0
    108 024024  113760  010047  002226          MOVB    MNEB2,VRTCLS(R0)  ;
    109 024032  005200                          INC     R0
    110 024034  113760  010050  002226          MOVB    MNEB3,VRTCLS(R0)  ;
    111
    112 024042  012701  002226                  MOV     #VRTCLS,R1      ;ADDRESS OF ARGUMENT LIST FOR VERTICAL SPACING
    113 024046  012702  000005                  MOV     #5,R2           ;
    114 024052  005003                          CLR     R3
    115 024054  004737  012616                  JSR     PC,XMIT         ;SEND TO PRINTER
    116 024060  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
    117
    118 024064  012701  007203                  MOV     #FBTM,R1        ;PRINT BOTTOM OF PAGE MESSAGE
    119 024070  012702  000072                  MOV     #58.,R2         ;58 CHARACTERS
    120 024074  005003                          CLR     R3
    121 024076  004737  012616                  JSR     PC,XMIT         ;SEND TO PRINTER
    122 024102  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
    123
    124 024106  012700  000001                  MOV     #1,R0
    125 024112  010146                          MOV     R1,-(SP)
    126 024114  012701  000002                  MOV     #2,R1                   ;TEMPORARILY  SAVE R1
    127 024120  113760  006415  002276          MOVB    REAR,SLTPFF(R0)         ;SELECT REAR TRAY
    128 024126  116061  006415  002276          MOVB    REAR(R0),SLTPFF(R1)     ;       AND PERFORM
    129 024134  012700  000003                  MOV     #3,R0
    130 024140  116160  006415  002276          MOVB    REAR(R1),SLTPFF(R0)     ;       FORMFEED.
    131 024146  012601                          MOV     (SP)+,R1                ;RESTORE R1
    132
    133 024150  012701  002276                  MOV     #SLTPFF,R1      ;ADDRESS OF ARGUMENT LIST
    134 024154  012702  000005                  MOV     #5,R2           ;
    135 024160  005003                          CLR     R3
    136 024162  004737  012616                  JSR     PC,XMIT         ;SEND TO PRINTER
    137 024166  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
    138
    139 024172  012701  005014                  MOV     #RTYTPM,R1      ;REAR TRAY TOP OF PAGE MESSAGE
    140 024176  012702  000140                  MOV     #96.,R2         ;96 CHARACTERS LONG
    141 024202  005003                          CLR     R3
    142 024204  004737  012616                  JSR     PC,XMIT         ;SEND TO PRINTER
    143 024210  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
    144
    145 024214  013701  002176                  MOV     CRNTSK,R1         ;GET CURRENT SKIP SIZE.
    146 024220  004737  014176                  JSR     PC,CONVRT         ;CONVERT TO MNEMONICS
    147 024224  012700  000001                  MOV     #1,R0
    148 024230  113760  010046  002226          MOVB    MNEB1,VRTCLS(R0)  ;MNEMONICS FOR ARG LIST
    149 024236  005200                          INC     R0
    150 024240  113760  010047  002226          MOVB    MNEB2,VRTCLS(R0)  ;
    151 024246  005200                          INC     R0
    152 024250  113760  010050  002226          MOVB    MNEB3,VRTCLS(R0)  ;
    153
    154 024256  012701  002226                  MOV     #VRTCLS,R1      ;ADDRESS OF ARGUMENT LIST FOR VERTICAL SPACING
    155 024262  012702  000005                  MOV     #5,R2           ;
    156 024266  005003                          CLR     R3
```

```
    157 024270  004737  012616                  JSR     PC,XMIT         ;SEND TO PRINTER
    158 024274  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
    159
    160
    161 024300  012701  007203                  MOV     #FBTM,R1        ;MESSAGE FOR BOTTOM OF PAGE
    162 024304  012702  000072                  MOV     #58.,R2         ;
    163 024310  005003                          CLR     R3
    164 024312  004737  012616                  JSR     PC,XMIT         ;SEND TO PRINTER
    165 024316  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
    166
    167 024322  012700  000001                  MOV     #1,R0
    168 024326  012701  000002                  MOV     #2,R1                   ;OFFSET IN ARG LIST
    169 024332  113760  006420  002276          MOVB    NULL,SLTPFF(R0)         ;EJECT
    170 024340  116061  006420  002276          MOVB    NULL(R0),SLTPFF(R1)     ;  PAGE
    171 024346  012700  000003                  MOV     #3,R0
    172 024352  116160  006420  002276          MOVB    NULL(R1),SLTPFF(R0)     ;    PRESENTLY
    173 024360  012701  002276                  MOV     #SLTPFF,R1              ;       IN THE PRINTER
    174 024364  012702  000005                  MOV     #5,R2                   ;
    175 024370  005003                          CLR     R3
    176 024372  004737  012616                  JSR     PC,XMIT                 ;SEND TO PRINTER
    177 024376  004737  015246                  JSR     PC,ERRORS       ;CHECK FOR ERRORS.
    178
    179 024402                                  ENDTST
        024402                                                                  L10024:
        024402  104401                                                                 TRAP    C$ETST
    180
    181                                 ;
    182                                 ;
    183                                 ;
    184
    185
    186
    187
    188
    189
    190
    191
    192
    193
    194
    195
    196
    197                                         .EVEN
    198
    199
    200                                 .TITLE PARAMETER CODING
    201                                 .SBTTL  HARDWARE PARAMETER CODING SECTION
```

```
                                ;++
                                ; THE HARDWARE PARAMETER CODING SECTION CONTAINS MACROS
                                ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                ; WITH THE OPERATOR.
                                ;--

                                        BGNHRD
024404  000022                                                            .WORD L10025-L$HARD/2
024406                                                                  L$HARD::

                                        GPRMD   GPD2MS,6,0,3,1,2,YES            ;PRINTER WIDTH QUESTION.
024406  003032                                                            .WORD   T$CODE
024410  025002                                                            .WORD   GPD2MS
024412  000003                                                            .WORD   3
024414  000001                                                            .WORD   T$LOLIM
024416  000002                                                            .WORD   T$HILIM
                                        GPRMA   GPAMSG,0,0,160000,177777,YES    ;CSR ADDRESS QUESTION.
024420  000031                                                            .WORD   T$CODE
024422  024452                                                            .WORD   GPAMSG
024424  160000                                                            .WORD   T$LOLIM
024426  177777                                                            .WORD   T$HILIM
                                        GPRML   GPLMSG,2,1,YES                  ;DZ11? QUESTION.
024430  001130                                                            .WORD   T$CODE
024432  024624                                                            .WORD   GPLMSG
024434  000001                                                            .WORD   1
                                        XFERT   SNGLP                           ;SKIP CHANNEL QUESTION IF DL11.
024436  006024                                                            .WORD   T$CODE
                                        GPRMD   GPDMSG,4,0,7,0,7,YES            ;CHANNEL # QUESTION.
024440  002032                                                            .WORD   T$CODE
024442  024707                                                            .WORD   GPDMSG
024444  000007                                                            .WORD   7
024446  000000                                                            .WORD   T$LOLIM
024450  000007                                                            .WORD   T$HILIM
                                SNGLP:
                                        ENDHRD
                                                                          .EVEN
024452                                                                  L10025:

                                ;       MESSAGES FOR THE ABOVE CALLS

024452  012  015  111  GPAMSG: .ASCII  <12><15>/IF DEFAULT VALUES FOR INTERFACE DESIRED, ENTER ^Z./<12><15>
024455  106  040  104
024460  105  106  101
024463  125  114  124
024466  040  126  101
024471  114  125  105
024474  123  040  106
024477  117  122  040
024502  111  116  124
024505  105  122  106
024510  101  103  105
024513  040  104  105
024516  123  111  122
```

HARDWARE PARAMETER CODING SECTION

```
        024521  105     104     054
        024524  040     105     116
        024527  124     105     122
        024532  040     136     132
        024535  056     012     015
    24  024540  012     015     040             .ASCII  <12><15>/ /<12><15>
        024543  012     015
    25  024545  105     116     124             .ASCIZ  /ENTER CONTROL STATUS REGISTER (CSR) ADDRESS.>>/
        024550  105     122     040
        024553  103     117     116
        024556  124     122     117
        024561  114     040     123
        024564  124     101     124
        024567  125     123     040
        024572  122     105     107
        024575  111     123     124
        024600  105     122     040
        024603  050     103     123
        024606  122     051     040
        024611  101     104     104
        024614  122     105     123
        024617  123     056     076
        024622  076     000
    26  024624  012     015     120  GPLMSG: .ASCIZ  <12><15>/PRINTER CONNECTED TO A SINGLE LINE INTERFACE? >>/
        024627  122     111     116
        024632  124     105     122
        024635  040     103     117
        024640  116     116     105
        024643  103     124     105
        024646  104     040     124
        024651  117     040     101
        024654  040     123     111
        024657  116     107     114
        024662  105     040     114
        024665  111     116     105
        024670  040     111     116
        024673  124     105     122
        024676  106     101     103
        024701  105     077     040
        024704  076     076     000
    27  024707  012     015     105  GPDMSG: .ASCIZ  <12><15>/ENTER INTERFACE CHANNEL NUMBER FOR THE PRINTER. (0-7) >>/
        024712  116     124     105
        024715  122     040     111
        024720  116     124     105
        024723  122     106     101
        024726  103     105     040
        024731  103     110     101
        024734  116     116     105
        024737  114     040     116
        024742  125     115     102
        024745  105     122     040
        024750  106     117     122
        024753  040     124     110
        024756  105     040     120
        024761  122     111     116
        024764  124     105     122
        024767  056     040     050
```

```
                024772  060     055     067
                024775  051     040     076
                025000  076     000
          28
          29    025002  040     012     015     GPD2MS: .ASCII  / /<12><15>
          30    025005  103     110     117             .ASCII  /CHOOSE PAGE WIDTH FOR PRINTER/<12><15>
                025010  117     123     105
                025013  040     120     101
                025016  107     105     040
                025021  127     111     104
                025024  124     110     040
                025027  106     117     122
                025032  040     120     122
                025035  111     116     124
                025040  105     122     012
                025043  015
          31    025044  103     110     117             .ASCII  /CHOOSE ONE:  1) 80 CHARACTERS PER PRINTER LINE/<15><12>
                025047  117     123     105
                025052  040     117     116
                025055  105     072     040
                025060  040     061     051
                025063  040     070     060
                025066  040     103     110
                025071  101     122     101
                025074  103     124     105
                025077  122     123     040
                025102  120     105     122
                025105  040     120     122
                025110  111     116     124
                025113  105     122     040
                025116  114     111     116                                             ;
                025121  105     015     012
          32    025124  011     040     040             .ASCII  /              2) 132 CHARACTERS PER PRINTER LINE/<15><12>
                025127  040     040     040
                025132  040     062     051
                025135  040     061     063
                025140  062     040     103
                025143  110     101     122
                025146  101     103     124
                025151  105     122     123
                025154  040     120     105
                025157  122     040     120
                025162  122     111     116
                025165  124     105     122
                025170  040     114     111
                025173  116     105     015
                025176  012
          33    025177  050     061     054             .ASCIZ  /(1,2) >>/
                025202  062     051     040
                025205  076     076     000
          34                                            .EVEN
          35
          36    025210                          $PATCH::
          37                                            .BLKW   10 ;(ADJUST SIZE OF PATCH AREA UNTIL)
          38                                    ;                  (LASTAD + 27264 HAS BIT 7 CLEAR )
          39
          40
```

```
     41 025230                                  LASTAD

                                                                    .EVEN
        025230  000000                                              .WORD   0
        025232  000000                                              .WORD   0
        025234                              L$LAST::
```

```
PARAMETER CODING        MACRO V03.01 7-NOV-80 10:06:10 PAGE 44
HARDWARE PARAMETER CODING SECTION

      1 025234                                  ENDMOD
      2         000001                  .END
```

PARAMETER CODING MACRO V03.01 7-NOV-80 10:06:10 PAGE 44-1
SYMBOL TABLE

```
ABORT   015602        CHRCNT  010064        C$QIO = 000377        EMPTYR  016550        F$SRV = 000010
ABSND   017106        CHRLOO  020166        C$RDBU= 000007        EMPTZ3  016252        F$SUB = 000002
ABS5    017316        CHRLO6  021110        C$REFG= 000047        EMP4    017064        F$SW  = 000014
ACAS    006535        CHRLST  006555        C$RESE= 000033        EMP5    017274        F$TEST= 000001
ADR   = 000020 G      CLEART  022570        C$REVI= 000003        ENDIN   016566        GETCHR  014012
AGN     020700        CNTNU   013466        C$RFLA= 000021        EOT     006515        GPAMSG  024452
ALPHA   013514        COIE    013456        C$RPT = 000025        ERMSGB  007316        GPDMSG  024707
ASSEMB= 000010        CONTLO  014112        C$SEFG= 000046        ERRBLK  010100 G      GPD2MS  025002
ASSMA   023774        CONVRT  014176        C$SPRI= 000041        ERRMSG  010076 G      GPLMSG  024624
AUTCAL  022224        CR      002313        C$SVEC= 000037        ERRNBR  010074 G      GREASE  002206
AUTOLD  022232        CRCLX   015152        C$TPRI= 000013        ERRORS  015246        GTNUM   022744
AUTOLE  022236        CRNTPR  006502        DASHES  006542        ERRTYP  010072 G      G$CNTO= 000200
BASET   005262        CRNTSK  002176        DCUPA   015446        ERSETT  014160        G$DELM= 000372
BAUDRT  005252        CSRADD  002200        DDCUPA  015500        ERWORD  006500        G$DISP= 000003
BAUTBL  006464        CTLZ    006524        DELAYS  015224        ESCAPE  006521        G$EXCP= 000400
BETA    013476        C$AU  = 000052        DELCNT  010054        EVL   = 000004 G      G$HILI= 000002
BFRA    007352        C$AUTO= 000061        DFAIL   005260        EXETS   013576        G$LOLI= 000001
BFRB    010030        C$BRK = 000022        DFAULT  017032        EXIT    022230        G$NO  = 000000
BFRC    010032        C$BSEG= 000004        DFPTBL  002160 G      EXITA   022044        G$OFFS= 000400
BFRD    010034        C$BSUB= 000002        DIAGMC= 000000        EXITE   014166        G$OFSI= 000376
BIDIRP  012726        C$CEFG= 000045        DIRCTN  006504        EXITON  014004        G$PRMA= 000001
BIT0  = 000001 G      C$CLCK= 000062        DLDFLT  005254        EXITS   013626        G$PRMD= 000002
BIT00 = 000001 G      C$CLEA= 000012        DLSET   016602        EXITSR  015216        G$PRML= 000000
BIT01 = 000002 G      C$CLOS= 000035        DONEDF  017450        EXITX   013352        G$RADA= 000140
BIT02 = 000004 G      C$CLP1= 000006        DOSPCS  024000        EXIT11  022460        G$RADB= 000000
BIT03 = 000010 G      C$CVEC= 000036        DUMMYS  002214        EXTMCR  015450        G$RADD= 000040
BIT04 = 000020 G      C$DCLN= 000044        DZDCOD  017220        E$END = 002100        G$RADL= 000120
BIT05 = 000040 G      C$DODU= 000051        DZDFLT  005256        E$LOAD= 000035        G$RADO= 000020
BIT06 = 000100 G      C$DRPT= 000024        DZSET   016672        FAILDF  017426        G$XFER= 000004
BIT07 = 000200 G      C$DU  = 000053        ECNRB = 020000        FAILDL  012122        G$YES = 000010
BIT08 = 000400 G      C$EDIT= 000003        EDFMA   011230        FAILDZ  012220        HEXA  = 000052
BIT09 = 001000 G      C$ERDF= 000055        EDFMB   011331        FAILM   011602        HEXB  = 000053
BIT1  = 000002 G      C$ERHR= 000056        EDFMC   011444        FBTM    007203        HEXC  = 000054
BIT10 = 002000 G      C$ERRO= 000060        EDFMD   011520        FIVE  = 000045        HEXD  = 000055
BIT11 = 004000 G      C$ERSF= 000054        EDFM0   010361        FLTRDY  006512        HEXE  = 000056
BIT12 = 010000 G      C$ERSO= 000057        EDFM1   010422        FOUR  = 000044        HEXF  = 000057
BIT13 = 020000 G      C$ESCA= 000010        EDFM2   010475        FRONT   006412        HITARG  010060
BIT14 = 040000 G      C$ESEG= 000005        EDFM3   010543        FTYTPM  004654        HOE   = 100000 G
BIT15 = 100000 G      C$ESUB= 000003        EDFM4   010622        FWRDO   013164        HRZTLS  002233
BIT2  = 000004 G      C$ETST= 000001        EDFM5   010650        FXRDYM  012316        HZTLSP  002212
BIT3  = 000010 G      C$EXIT= 000032        EDFM6   010677        F$AU  = 000015        IBE   = 010000 G
BIT4  = 000020 G      C$GETB= 000026        EDFM7   010755        F$AUTO= 000020        IDU   = 000040 G
BIT5  = 000040 G      C$GETW= 000027        EDFM8   011026        F$BGN = 000040        IER   = 020000 G
BIT6  = 000100 G      C$GMAN= 000043        EDFM9   011175        F$CLEA= 000007        INFIN   016514
BIT7  = 000200 G      C$GPHR= 000042        EF.CON= 000036 G      F$DU  = 000016        INIERR  014466
BIT8  = 000400 G      C$GPLO= 000030        EF.NEW= 000035 G      F$END = 000041        INITCD  014274
BIT9  = 001000 G      C$GPRI= 000040        EF.PWR= 000034 G      F$HARD= 000004        INITLZ  015522
BOE   = 000400 G      C$INIT= 000011        EF.RES= 000037 G      F$HW  = 000013        INLOOP  015232
BR2     006514        C$INLP= 000020        EF.STA= 000040 G      F$INIT= 000006        INUPB   010070
CALLDF  015664        C$MANI= 000050        EIGHT = 000050        F$JMP = 000050        ISR   = 000100 G
CALLDL  015700        C$MEM = 000031        EIGHTY  016506        F$MOD = 000000        IXE   = 004000 G
CAN     006516        C$MSG = 000023        EMPTIB  014310        F$MSG = 000011        I$AU  = 000041
CCOUNT  010066        C$OPEN= 000034        EMPTI2  015746        F$PROT= 000021        I$AUTO= 000041
CHC2    023756        C$PNTB= 000014        EMPTI3  016246        F$PWR = 000017        I$CLN = 000041
CHKC    023476        C$PNTF= 000017        EMPTI4  017060        F$RPT = 000012        I$DU  = 000041
CHKCAN  013552        C$PNTS= 000016        EMPTI5  017270        F$SEG = 000003        I$HRD = 000041
CHKN6   017552        C$PNTX= 000015        EMPTL2  015752        F$SOFT= 000005        I$INIT= 000041
```

SYMBOL TABLE

```
I$MOD = 000041          L$EXP5  002066 G      MXLF   = 002000        PLOOP9  021570          SKP11   002174
I$MSG = 000041          L$HARD  024406 G      NDATA    010056        PNT    = 001000 G       SKP14   002170
I$PROT= 000040          L$HIME  002120 G      NEWMOD   017754        PRARCH  022736          SLFTST  002255
I$PTAB= 000041          L$HPCP  002016 G      NEXTU    015550        PRI    = 002000 G       SLTPFF  002276
I$PWR = 000041          L$HPTP  002022 G      NINE   = 000051        PRI00  = 000000 G       SNGCHR  006522
I$RPT = 000041          L$HW    002160 G      NONDTA   015774        PRI01  = 000040 G       SNGLP   024452
I$SEG = 000041          L$ICP   002104 G      NONDT2   016102        PRI02  = 000100 G       SPACE   006541
I$SETU= 000041          L$INIT  015522 G      NONDT3   016136        PRI03  = 000140 G       SPCSIZ  010036
I$SRV = 000041          L$LADP  002026 G      NONDZA   016274        PRI04  = 000200 G       STATS   015020
I$SUB = 000041          L$LAST  025234 G      NONDZ2   016402        PRI05  = 000240 G       STATUS  002315
I$TST = 000041          L$LOAD  002100 G      NONDZ3   016436        PRI06  = 000300 G       STCHSZ  002244
JENDIN  015604          L$LUN   002074 G      NOPRTM   014050        PRI07  = 000340 G       STHTCT  002257
JUNKPL  006440          L$MREV  002050 G      NOTQ     022014        PRMPTA  003200          STLNSZ  002251
J$JMP = 000167          L$NAME  002000 G      NOT1     023000        PRMPTC  003466          STPGSZ  002271
LCHYET  012716          L$PRIO  002042 G      NPRMPT   004531        PRMPTD  004046          STRTUP  015610
LF      002314          L$PROT  015514 G      NULL     006420        PRNTIT  017546          STSCAL  017600
LINCNT  010062          L$PRT   002112 G      NUM1   = 000001        PRTBM0  010230          STSERR  014774
LINCOD  016456          L$REPP  002062 G      NUM10  = 000012        PRTM2   016360          STSPSZ  002262
LINLOO  020124          L$REV   002010 G      NUM11  = 000013        PRTXM0  010302          STSRES  002210
LINL06  021104          L$RPT   015506 G      NUM12  = 000014        PSZA4   002322          STULMD  002266
LINN    010040          L$SPC   002056 G      NUM13  = 000015        PSZ11   002325          SVCGBL= 000000
LINSIZ  010042          L$SPCP  002020 G      NUM14  = 000016        PSZ14   002330          SVCINS= 000001
LNELOO  012732          L$SPTP  002024 G      NUM15  = 000017        RANDOM  014726          SVCSUB= 000001
LODELY  014704          L$STA   002030 G      NUM2   = 000002        RBUF    007302          SVCTAG= 000001
LOE    = 040000 G       L$TEST  002114 G      NUM3   = 000003        RCSR    007276          SVCTST= 000001
LOGUNI  002202          L$TIML  002014 G      NUM4   = 000004        REAR    006415          S$LSYM= 010000
LOOPA   021716          L$UNIT  002012 G      NUM5   = 000005        RESET   002224          TCR     007310
LOOPCK  013724          L1LOOP  020424         NUM6   = 000006        RESETC  014326          TCRENA  006436
LOOPG   014026          L10000  002170         NUM7   = 000007        RESINN  013414          TCRTBL  006444
LOOPXN  013656          L10001  012614         NUM8   = 000010        REVRSP  021304          TDR     007312
LOOP8   021440          L10002  015512         NUM9   = 000011        RIBPOS  002240          TESTA   021634
LOT    = 000010 G       L10004  017452         NXTA     021740        RTYTPM  005014          TESTB   022050
LPR     007306          L10005  016600         NXTBIT   015272        SCA     006531          TESTC   022462
LPRINI  006442          L10006  017454         NXTERM   015374        SCB     006527          TESTD   023360
L$ACP   002110 G        L10007  017466         NXTLIN   021250        SCC     006526          TEST1   017470
L$APT   002036 G        L10010  017604         ONE    = 000041        SCQ     006525          TEST2   017606
L$AUT   002070 G        L10011  020024         OPTN1    003351        SCX     006530          TEST3   020026
L$AUTO  017454 G        L10012  020272         OUTCTR   006506        SCO     006532          TEST4   020274
L$CCP   002106 G        L10013  020606         OUTRLP   014024        SC1     006533          TEST5   020610
L$CLEA  017456 G        L10014  021012         OUTSDC   006510        SEED1   006424          TEST6   021014
L$CO    002032 G        L10015  021156         OUTSDL   013650        SEED2   006426          TEST7   021160
L$DEPO  002011 G        L10016  021340         O$APTS=  000000        SELECT  023636          TEST8   021342
L$DESC  010150 G        L10017  021466         O$AU   = 000000        SENCHR  013366          TEST9   021470
L$DESP  002076 G        L10020  021632         O$BGNR=  000000        SENCH2  013376          TFCZ    021770
L$DEVP  002060 G        L10021  022046         O$BGNS=  000000        SENCLP  013416          THREE  = 000043
L$DISP  002124 G        L10022  022230         O$DU   = 000000        SENDR   014140          TIMOM   012512
L$DLY   002116 G        L10023  022734         O$ERRT=  000001        SENDR2  013320          TITLEA  003115
L$DTP   002040 G        L10024  024402         O$GNSW=  000000        SETCH0  002310          TITLEB  003264
L$DTYP  002034 G        L10025  024452         O$POIN=  000001        SETER   013614          TITLEC  003717
L$DUT   002072 G        MAKE11  023552         O$SETU=  000000        SETHT0  002303          TITLED  003773
L$DVTY  010102 G        MANLD   022352         PALPHA   015174        SETONE  017742          TITLE1  002333
L$EF    002052 G        MANLE   022372         PERIOD   006534        SETUPC  016162          TITLE2  002366
L$ENVI  002044 G        MLTLIN  010052         PFM1     016060        SETUPI  014514          TITLE3  002446
L$ERRT  010072 G        MNEB1   010046         PGMCTR   007314        SET15   015202          TITLE4  002513
L$ETP   002102 G        MNEB2   010047         PLOC     002204        SEVEN  = 000047          TITLE5  002564
L$EXP1  002046 G        MNEB3   010050         PLOOP    017674        SIX    = 000046          TITLE6  002645
L$EXP4  002064 G        MSGADD  005246         PLOOPC   022612        SKPA4   002172          TITLE7  002725
```

```
PARAMETER CODING        MACRO V03.01 7-NOV-80 10:06:10 PAGE 44-3
SYMBOL TABLE

TITLE8  002772          T$GMAN= 000000          T$TEMP= 000000          T11     022050 G        WAITMX  011432
TITLE9  003046          T$HILI= 000007          T$TEST= 000015          T11PMT  004346          WAITXN  013640
TMPLT1  006430          T$LAST= 000001          T$TSTM= 177777          T12     022462 G        WFC     012414
TMPLT2  006432          T$LOLI= 000000          T$TSTS= 000001          T13     023360 G        WTSTPM  005154
TMPLT3  006434          T$LSYM= 010000          T$$AUT= 010006          T2      017606 G        XBUF    007304
TOPSTK  010026          T$LTNO= 000015          T$$CLE= 010007          T3      020026 G        XCSR    007300
TRDYBT  010044          T$NEST= 177777          T$$HAR= 010025          T4      020274 G        XMIT    012616
TRNSMT  023614          T$NS0 = 000000          T$$HW = 010000          T5      020610 G        XOFF    006517
TRXADD  005250          T$NS1 = 000004          T$$INI= 010004          T6      021014 G        XON     006520
TRYAGN  014730          T$NS2 = 000010          T$$MSG= 010001          T7      021160 G        XSTR    012670
TWO   = 000042          T$PTNU= 000000          T$$PRO= 010003          T8      021342 G        X$ALWA= 000000
T$ARGC= 000001          T$SAVL= 177777          T$$RPT= 010002          T9      021470 G        X$FALS= 000040
T$CODE= 002032          T$SEGL= 177777          T$$SRV= 010005          UAM   = 000200 G        X$OFFS= 000400
T$ERRN= 000000          T$SUBN= 000000          T$$TES= 010024          UBTRAP  016572 G        X$TRUE= 000020
T$EXCP= 000000          T$TAGL= 177777          T1      017470 G        UCRB  = 010000          ZERO  = 000040
T$FLAG= 000040          T$TAGN= 010026          T10     021634 G        VRTCLS  002226          $PATCH  025210 G

. ABS.  025234      000
        000000      001
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  20886 WORDS  ( 82 PAGES)
DYNAMIC MEMORY AVAILABLE FOR  69 PAGES
CZLQPA.BIN,CZLQPA.SEQ/C/N:TOC=SVC34R.MLB.CZLQPA.P11
```

PARAMETER CODING MACRO V03.01 7-NOV-80 10:06:10 PAGE S-1
CROSS REFERENCE TABLE (CREF V01-05)

```
$PATCH  43-36#
ABORT   26-29    26-33#
ABS5    26-477   26-480   26-485#
ABSND   26-426   26-429   26-434#
ACAS     9-332#  35-41
ADR      8-2#
AGN     32-43#   32-63
ALPHA   14-62    14-73#
ASSEMB   5-7      5-7
ASSMA   42-96    42-101#
AUTCAL  38-55    38-61#
AUTOLD  38-61    39-31#
AUTOLE  39-32#   39-52
BASET    9-155#  41-41    41-146
BAUDRT   9-150#
BAUTBL   9-293#
BETA    14-64#   14-76    14-97
BFRA     9-396#  13-67    37-32    37-37    37-50    37-54    37-59
BFRB     9-400#  38-51    38-54
BFRC     9-401#  40-38    40-42
BFRD     9-402#  41-33
BIDIRP  13-73    13-98#
BITO     8-2#    18-87    20-71    23-52
BIT00    8-2     8-2#
BIT01    8-2     8-2#
BIT02    8-2     8-2#
BIT03    8-2     8-2#
BIT04    8-2     8-2#
BIT05    8-2     8-2#
BIT06    8-2     8-2#
BIT07    8-2     8-2#     16-41
BIT08    8-2     8-2#
BIT09    8-2     8-2#
BIT1     8-2#
BIT10    8-2#
BIT11    8-2#
BIT12    8-2#     8-43    14-94    15-55    15-66    18-99
BIT13    8-2#     8-42    16-61    18-100   28-35
BIT14    8-2#    29-21    29-27    30-30    30-36    31-28    31-34    32-33    32-39    33-28    33-34    34-24    34-30    35-27
        35-33    36-27    36-33    37-24    37-30    38-32    38-38    41-25    41-31
BIT15    8-2#    14-103   15-67    16-62    16-75    18-101   20-80    20-92    23-46    26-80    26-142   26-351   26-443   26-494
        28-36
BIT2     8-2#    20-72
BIT3     8-2#    20-73
BIT4     8-2#
BIT5     8-2#    17-46    17-56    17-61    26-349
BIT6     8-2#
BIT7     8-2#    14-61    15-48    18-56    26-64    26-125   26-186   26-284   26-428   26-479
BIT8     8-2#
BIT9     8-2#
BOE      8-2#
BR2      9-315#  42-24    42-30    42-42    42-89    42-95
C$AU     5-7#
C$AUTO   5-7#    26-529
C$BRK    5-7#
C$BSEG   5-7#
```

PARAMETER CODING MACRO V03.01 7-NOV-80 10:06:10 PAGE S-2
CROSS REFERENCE TABLE (CREF V01-05)

```
C$BSUB    5-7#
C$CEFG    5-7#
C$CLCK    5-7#
C$CLEA    5-7#     27-16
C$CLOS    5-7#
C$CLP1    5-7#
C$CVEC    5-7#     26-183
C$DCLN    5-7#     23-78    26-33    26-58    26-88    26-94    26-119   26-150   26-156   26-512
C$DODU    5-7#
C$DRPT    5-7#
C$DU      5-7#
C$EDIT    5-7#      5-24
C$ERDF    5-7#
C$ERHR    5-7#
C$ERRO    5-7#     23-59
C$ERSF    5-7#
C$ERSO    5-7#
C$ESCA    5-7#
C$ESEG    5-7#
C$ESUB    5-7#
C$ETST    5-7#     28-41    29-58    30-72    31-84    32-65    33-54    34-61    35-50    36-54    37-70    38-63    41-82    42-179
C$EXIT    5-7#     26-193   27-11
C$GETB    5-7#
C$GETW    5-7#
C$GMAN    5-7#     37-32    38-51    40-38    41-33    42-24
C$GPHR    5-7#     26-30
C$GPLO    5-7#
C$GPRI    5-7#
C$INIT    5-7#     26-523
C$INLP    5-7#
C$MANI    5-7#
C$MEM     5-7#
C$MSG     5-7#     11-16
C$OPEN    5-7#
C$PNTB    5-7#     23-61    23-76    23-82    28-20    29-19    30-28    31-26    32-31    33-26    34-22    35-25    36-25    37-22
          38-30    40-36    41-23    42-21
C$PNTF    5-7#     26-57    26-87    26-93    26-118   26-149   26-155   26-511
C$PNTS    5-7#
C$PNTX    5-7#     14-55    15-69    16-56    23-62
C$QIO     5-7#
C$RDBU    5-7#
C$REFG    5-7#     26-19    26-22
C$RESE    5-7#      5-7#
C$REVI    5-7#      5-24
C$RFLA    5-7#
C$RPT     5-7#     24-14
C$SEFG    5-7#
C$SPRI    5-7#
C$SVEC    5-7#     26-36
C$TPRI    5-7#
CALLDF    26-48#   26-107
CALLDL    26-52#   26-109
CAN        9-317#  14-88    16-69
CCOUNT     9-438#  39-31*   39-50*   39-51    41-53*   41-60*   41-61
CHC2      42-30    42-95#
CHKC      42-31    42-42#
CHKCAN    14-79    14-88#
```

PARAMETER CODING MACRO V03.01 7-NOV-80 10:06:10 PAGE S-3
CROSS REFERENCE TABLE (CREF V01-05)

```
CHKN6    28-32#
CHRCNT    9-436#  33-38*  33-46*  33-47   36-40*  36-50*  36-51
CHRLO6   33-40#   33-48
CHRLOO   30-50#   30-58
CHRLST    9-342#  33-41   34-36   36-44
CLEART   41-42#   41-46
CNTNU    14-50    14-61#
COIE     14-54    14-57#
CONTLO   16-55    16-58#
CONVRT   17-39#   31-51   32-44   41-164  41-173  41-204  41-220  42-104  42-146
CR        9-68#   18-124  29-53   31-41   31-75   37-42   41-64
CRCLX    20-79    20-83#
CRNTPR    9-303#  13-102  13-111* 13-218* 18-136*
CRNTSK    9-10#   42-103* 42-145
CSRADD    9-13#
CTLZ      9-323#
DASHES    9-335#  32-56
DCUPA    23-75    23-78#
DDCUPA   23-81    23-84#
DELAYS   15-46    16-45   18-147  21-40#  21-47   39-40
DELCNT    9-425#  21-40*  21-42*
DFAIL     9-153#
DFAULT   26-49    26-415#
DFPTBL    7-9#
DIAGMC    5-7      5-7
DIRCTN    9-306#  13-112  13-117* 13-175* 18-140*
DLDFLT    9-151#  26-415
DLSET    26-53    26-273# 26-417
DONEDF   26-458   26-509  26-514#
DOSPCS   42-93    42-99   42-103#
DUMMYS    9-45#   18-62
DZDCOD   26-420   26-446  26-453  26-460#
DZDFLT    9-152#  26-465
DZSET    26-112   26-330# 26-466
E$END     5-7#
E$LOAD    5-7#     5-24
ECNRB     8-42#   20-87   20-90
EDFM0     9-376   10-56#
EDFM1     9-377   10-67#
EDFM2     9-378   10-78#
EDFM3     9-379   10-89#
EDFM4     9-380   10-100#
EDFM5     9-381   10-114#
EDFM6     9-382   10-125#
EDFM7     9-383   10-136#
EDFM8     9-384   10-146#
EDFM9     9-385   10-148#
EDFMA     9-386   10-149#
EDFMB     9-387   10-151#
EDFMC     9-388   10-160#
EDFMD     9-389   10-171#
EF.CON    8-2#    26-19
EF.NEW    8-2#    26-22
EF.PWR    8-2#
EF.RES    8-2#
EF.STA    8-2#
EIGHT     8-15#
```

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CROSS REFERENCE TABLE (CREF V01-05)

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CROSS REFERENCE TABLE (CREF V01-05)

```
F$JMP     5-7#     11-12    11-12    24-10    24-10    26-193   27-11
F$MOD     5-7#      5-8     44-1
F$MSG     5-7#     11-9     11-16
F$PROT    5-7#     25-7     25-13
F$PWR     5-7#
F$RPT     5-7#     24-8     24-14
F$SEG     5-7#
F$SOFT    5-7#
F$SRV     5-7#     26-225   26-229
F$SUB     5-7#
F$SW      5-7#
F$TEST    5-7#     28-5     28-41    29-4     29-58    30-8     30-72    31-4     31-84    32-3     32-65    33-4     33-54    34-4
          34-61    35-5     35-50    36-3     36-54    37-2     37-70    38-4     38-63    41-4     41-82    42-4     42-179
FAILDF    26-469   26-497   26-504   26-511#
FAILDL    10-185#  26-57    26-87    26-93
FAILDZ    10-186#  26-118   26-149   26-155
FAILM     10-179#  26-511
FBTM       9-354#  42-118   42-161
FIVE       8-12#
FLTRDY     9-310#  14-99*   23-74    23-80    26-41*   26-73*   26-81    26-135*  26-143   26-436*  26-462*  26-487*
FOUR       8-11#   13-136   13-161
FRONT      9-258#  41-45    42-72    42-73    42-75
FTYTPM     9-139#  42-83
FWRDO     13-113   13-175#
FXRDYM    10-187#  23-76    23-82
G$CNTO     5-7#
G$DELM     5-7#
G$DISP     5-7#
G$EXCP     5-7#
G$HILI     5-7#
G$LOLI     5-7#
G$NO       5-7#    37-32
G$OFFS     5-7#    37-32    38-51    40-38    41-33    42-24    43-13    43-14    43-15    43-17
G$OFSI     5-7#    37-32    38-51    40-38    41-33    42-24    43-13    43-14    43-15    43-17
G$PRMA     5-7#    43-14
G$PRMD     5-7#    37-32    38-51    40-38    41-33    42-24    43-13    43-17
G$PRML     5-7#    43-15
G$RADA     5-7#    37-32    38-51    40-38    41-33    42-24
G$RADB     5-7#
G$RADD     5-7#
G$RADL     5-7#    43-15
G$RADO     5-7#    43-13    43-14    43-17
G$XFER     5-7#    43-16
G$YES      5-7#    38-51    40-38    41-33    42-24    43-13    43-14    43-15    43-17
GETCHR    15-50    16-34#   18-74    18-78    18-82    18-86    18-91    18-95    20-52    20-56    20-61    20-69    20-83    26-90
          26-96    26-97    26-98    26-99    26-152   26-158   26-159   26-160   26-161   26-449   26-454   26-455   26-456   26-457
          26-499   26-505   26-506   26-507   26-508   28-32
GPAMSG    43-14    43-23#
GPD2MS    43-13    43-29#
GPDMSG    43-17    43-27#
GPLMSG    43-15    43-26#
GREASE     9-20#   13-85*   13-88    13-122   13-128   13-133   13-139   13-146   13-183   13-189   13-194   13-200   13-207   13-215
          14-83    14-100*  15-54*   20-93*   26-42*   26-74*   26-136*  26-437*  26-463*  26-488*  28-26
GTNUM     41-140#  41-154
HEXA       8-17#
HEXB       8-18#
HEXC       8-19#   13-197
```

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CROSS REFERENCE TABLE (CREF V01-05)

```
HEXD      8-20#
HEXE      8-21#
HEXF      8-22#    9-260    9-260    9-260    13-125   13-155   13-158
HITARG    9-431#   30-39*   30-41    30-42*   30-61
HOE       8-2#
HRZTLS    9-51#    31-53*   31-55*   31-57*   31-65    41-175*  41-177*  41-179*  41-187   41-206*  41-208*  41-210*  41-212
HZTLSP    9-43#
I$AU      5-7#
I$AUTO    5-7#     26-527#  26-529#
I$CLN     5-7#     27-7#    27-11    27-16#
I$DU      5-7#
I$HRD    43-11#    43-19#
I$INIT    5-7#     26-7#    26-193   26-523#
I$MOD     5-7#      5-8      5-8#    44-1     44-1#
I$MSG     5-7#     11-9#    11-16#
I$PROT    5-7#     25-7#
I$PTAB    5-7#
I$PWR     5-7#
I$RPT     5-7#     24-8#    24-14#
I$SEG     5-7#     28-5     29-4     30-8     31-4     32-3     33-4     34-4     35-5     36-3     37-2     38-4     41-4     42-4
I$SETU    5-7#
I$SRV     5-7#     26-225#  26-229#
I$SUB     5-7#     28-5     29-4     30-8     31-4     32-3     33-4     34-4     35-5     36-3     37-2     38-4     41-4     42-4
I$TST     5-7#     28-5     28-5#    28-41    28-41#   28-41#   29-4     29-4#    29-58    29-58#   29-58#   30-8     30-8#    30-72
         30-72#   30-72#   31-4     31-4#    31-84    31-84#   31-84#   32-3     32-3#    32-65    32-65#   32-65#   33-4     33-4#
         33-54    33-54#   33-54#   34-4     34-4#    34-61    34-61#   34-61#   35-5     35-5#    35-50    35-50#   35-50#   36-3
         36-3#    36-54    36-54#   36-54#   37-2     37-2#    37-70    37-70#   37-70#   38-4     38-4#    38-63    38-63#   38-63#
         41-4     41-4#    41-82    41-82#   41-82#   42-4     42-4#    42-179   42-179#  42-179#
IBE       8-2#
IDU       8-2#
IER       8-2#
INFIN    26-173    26-175#
INIERR   18-76     18-80    18-84    18-89    18-93    18-99#
INITCD   18-50#    27-9     28-19    29-18    30-27    31-25    32-30    33-25    34-21    35-24    36-24    37-21    38-29    41-22
         42-20
INITLZ   26-19#
INLOOP   21-42#    21-44
INUPB     9-440#
ISR       8-2#
IXE       8-2#
J$JMP     5-7#     11-12    24-10
JENDIN   26-20     26-34#
JUNKPL    9-272#   26-286   26-287
L$ACP     5-24#
L$APT     5-24#
L$AUT     5-24#
L$AUTO    5-24     26-527#
L$CCP     5-24#
L$CLEA    5-24     27-7#
L$CO      5-24#
L$DEPO    5-24#
L$DESC    5-24     10-17#
L$DESP    5-24#
L$DEVP    5-24#
L$DISP    5-24      6-5#
L$DLY     5-24#
L$DTP     5-24#
```

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CROSS REFERENCE TABLE (CREF V01-05)

```
L$DTYP    5-24#
L$DUT     5-24#
L$DVTY    5-24     10-11#
L$EF      5-24#
L$ENVI    5-24#
L$ERRT    5-24      9-445#
L$ETP     5-24#
L$EXP1    5-24#
L$EXP4    5-24#
L$EXP5    5-24#
L$HARD    5-24     43-11     43-11#
L$HIME    5-24#
L$HPCP    5-24#
L$HPTP    5-24#
L$HW      5-24      7-9       7-9#
L$ICP     5-24#
L$INIT    5-24     26-7#
L$LADP    5-24#
L$LAST    5-24     43-41#
L$LOAD    5-24#
L$LUN     5-24#
L$MREV    5-24#
L$NAME    5-24#
L$PRIO    5-24#
L$PROT    5-24     25-7#
L$PRT     5-24#
L$REPP    5-24#
L$REV     5-24#
L$RPT    24-8#
L$SPC      5-24#
L$SPLP     5-24#
L$SPTP     5-24#
L$STA      5-24#
L$TEST     5-24#
L$TIML     5-24#
L$UNIT     5-24#    26-28
L10000     7-9       7-17#
L10001    11-12     11-16#
L10002    24-10     24-14#
L10004    26-193    26-523#
L10005    26-229#
L10006    26-529#
L10007    27-11     27-16#
L10010    28-41#
L10011    29-58#
L10012    30-72#
L10013    31-84#
L10014    32-65#
L10015    33-54#
L10016    34-61#
L10017    35-50#
L10020    36-54#
L10021    37-70#
L10022    38-63#
L10023    41-82#
L10024    42-179#
L10025    43-11     43-19#
```

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CROSS REFERENCE TABLE (CREF V01-05)

```
L1LOOP  31-48#   31-82
LCHYET  13-89    13-92#
LF       9-69#   13-108   18-129   41-69
LINCNT   9-434#  32-41*   32-43    32-61*   32-62
LINCOD  26-50    26-102   26-167#
LINLO6  33-38#   33-52
LINLOO  30-40#   30-62
LINN     9-406#  26-178*  26-180*  31-81
LINSIZ   9-408#  13-102   26-172*  26-174*  26-175   29-50   30-57   33-47   34-37   34-43   35-37   36-35
LNELOO  13-102#  13-223
LODELY  18-147#  18-149
LOE      8-2#
LOGUNI   9-16#   26-26*   26-27*   26-28    26-30
LOOP8   35-41#   35-48
LOOPA   37-32#   37-47
LOOPCK  15-49    15-58#
LOOPG   16-41#   16-50
LOOPXN  15-46#   15-60
LOT      8-2#
LPR      9-369#  14-44*   26-286*  26-338*  26-363*
LPRINI   9-275#  14-44    26-362*  26-363
MAKE11  42-43    42-55#
MANLD   38-58    40-36#   40-53
MANLE   40-38#
MLTLIN   9-422#  26-283*
MNEB1    9-416#  17-47*   31-53    32-46    41-166   41-175   41-206   41-222   42-106   42-148
MNEB2    9-417#  17-57*   31-55    32-48    41-168   41-177   41-208   41-224   42-108   42-150
MNEB3    9-418#  17-62*   31-57    32-50    41-170   41-179   41-210   41-226   42-110   42-152
MSGADD   9-148#
MXLF     8-52#   32-62
NDATA    9-427#  26-40*   26-48*   26-52*   26-55    26-72*   26-84    26-111*  26-116   26-134*  26-146   26-227*  26-419   26-435*
        26-445   26-461*  26-468   26-486*  26-496
NEWMOD  29-40    29-44#
NEXTU   26-23    26-27#   26-31
NINE     8-16#
NONDT2  26-85    26-90#
NONDT3  26-92    26-96#
NONDTA  26-62    26-65    26-71#
NONDZ2  26-147   26-152#
NONDZ3  26-154   26-158#
NONDZA  26-123   26-126   26-133#
NOPRTM  16-49#
NOT1    41-150   41-156#
NOTQ    37-51    37-58#
NPRMPT   9-137#  40-38
NULL     9-260#  42-169   42-170   42-172
NUM1     8-24#
NUM10    8-33#
NUM11    8-34#
NUM12    8-35#
NUM13    8-36#
NUM14    8-37#
NUM15    8-38#
NUM2     8-25#
NUM3     8-26#
NUM4     8-27#
NUM5     8-28#
```

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CROSS REFERENCE TABLE (CREF V01-05)

```
NUM6      8-29#
NUM7      8-30#
NUM8      8-31#
NUM9      8-32#
NXTA     37-37#    37-67
NXTBIT   23-52#    23-71
NXTERM   23-53     23-66#
NXTLIN   34-35#    34-59
O$APTS    5-7#      5-24
O$AU      5-7#      5-24
O$BGNR    5-7#      5-24
O$BGNS    5-7#      5-24
O$DU      5-7#      5-24
O$ERRT    5-7#      5-21#     5-24
O$GNSW    5-7#      5-24
O$POIN    5-7#      5-21      5-21#     5-24
O$SETU    5-7#      5-24     43-41
ONE       8-8#      9-258    29-37     29-42     39-43
OPTN1     9-111#   38-51
OUTCTR    9-308#   16-38*    16-52*    16-54     16-58
OUTRLP   16-39#    16-59
OUTSDC    9-309#   15-42*    15-62*    15-63
OUTSDL   15-43#    15-64
PALPHA   20-54     20-90#
PERIOD    9-331#
PFM1     26-82     26-87#
PGMCTR    9-372#   13-58*    18-50*    23-49*    23-61
PLOC      9-17#    26-30*    26-44     26-105    26-168    26-273    26-330    26-354    26-361    26-415*   26-465*
PLOOP    29-30#    29-51
PLOOP9   36-42#    36-52
PLOOPC   41-54#    41-62
PNT       8-2#
PRARCH   41-57     41-135#
PRI       8-2#
PRI00     8-2#
PRI01     8-2#
PRI02     8-2#
PRI03     8-2#
PRI04     8-2#
PRI05     8-2#
PRI06     8-2#
PRI07     5-24      8-2#      26-36
PRMPTA    9-107#   37-32
PRMPTC    9-115#   40-36
PRMPTD    9-125#   42-24
PRNTIT   28-27     28-30#
PRTBM0   10-47#    23-61
PRTM2    26-144    26-149#
PRTXM0   10-49#    23-62
PSZ11     9-76#    42-58     42-59     42-61
PSZ14     9-78#    42-34     42-36     42-39
PSZA4     9-75#    42-48     42-49     42-51
RANDOM   19-38#    36-42     41-54     41-152
RBUF      9-367#   14-73     16-67     18-59     26-67     26-128    26-189    26-277*   26-337*   26-431    26-482
RCSR      9-365#   14-61     15-48     16-41     18-56     26-64     26-125    26-186    26-274*   26-331*   26-349*   26-428    26-479
REAR      9-259#   42-127    42-128    42-130
RESET     9-47#    18-69
```

CROSS REFERENCE TABLE (CREF V01-05)

```
          7-9      9-445    10-11    10-17    24-8     25-7     26-7     26-225   26-527   27-7     43-11    43-41    43-41    43-41
          43-41#
SVCINS    5-7#     5-10#    5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24
          5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24
          5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24
          5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24
          5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24
          5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24
          5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24
          5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24
          5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24
          5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24     5-24
          5-24     5-24     5-24     6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5
          6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5
          6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5      6-5
          6-5      6-5      6-5      7-9      7-9      7-9      10-11    10-11    10-11    10-11    10-11    10-11    10-17    10-17
          10-17    10-17    10-17    10-17    11-12    11-12    11-12    11-12    11-12    11-12    11-16    11-16    11-16    14-55
          14-55    14-55    14-55    14-55    14-55    14-55    14-55    14-55    14-55    14-55    14-55    14-55    14-55    14-55
          15-69    15-69    15-69    15-69    15-69    15-69    15-69    15-69    15-69    15-69    15-69    15-69    15-69    15-69
          15-69    16-56    16-56    16-56    16-56    16-56    16-56    16-56    16-56    16-56    16-56    16-56    16-56    16-56
          16-56    16-56    23-59    23-59    23-59    23-61    23-61    23-61    23-61    23-61    23-61    23-61    23-61    23-61
          23-61    23-61    23-61    23-61    23-61    23-61    23-61    23-61    23-61    23-62    23-62    23-62    23-62    23-62
          23-62    23-62    23-62    23-62    23-62    23-62    23-62    23-62    23-62    23-62    23-62    23-62    23-62    23-76
          23-76    23-76    23-76    23-76    23-76    23-76    23-76    23-76    23-76    23-76    23-76    23-76    23-76    23-76
          23-78    23-78    23-78    23-82    23-82    23-82    23-82    23-82    23-82    23-82    23-82    23-82    23-82    23-82
          23-82    23-82    23-82    23-82    24-10    24-10    24-10    24-10    24-10    24-10    24-14    24-14    24-14    26-19
          26-19    26-19    26-19    26-19    26-19    26-20    26-20    26-20    26-22    26-22    26-22    26-22    26-22    26-22
          26-23    26-23    26-23    26-30    26-30    26-30    26-30    26-30    26-30    26-30    26-30    26-30    26-31    26-31
          26-31    26-33    26-33    26-33    26-36    26-36    26-36    26-36    26-36    26-36    26-36    26-36    26-36    26-36
          26-36    26-36    26-36    26-36    26-36    26-36    26-36    26-36    26-57    26-57    26-57    26-57    26-57    26-57
          26-57    26-57    26-57    26-57    26-57    26-57    26-57    26-57    26-57    26-58    26-58    26-58    26-87    26-87
          26-87    26-87    26-87    26-87    26-87    26-87    26-87    26-87    26-87    26-87    26-87    26-87    26-87    26-88
          26-88    26-88    26-93    26-93    26-93    26-93    26-93    26-93    26-93    26-93    26-93    26-93    26-93    26-93
          26-93    26-93    26-93    26-94    26-94    26-94    26-118   26-118   26-118   26-118   26-118   26-118   26-118   26-118
          26-118   26-118   26-118   26-118   26-118   26-118   26-118   26-119   26-119   26-119   26-149   26-149   26-149   26-149
          26-149   26-149   26-149   26-149   26-149   26-149   26-149   26-149   26-149   26-149   26-149   26-150   26-150   26-150
          26-155   26-155   26-155   26-155   26-155   26-155   26-155   26-155   26-155   26-155   26-155   26-155   26-155   26-155
          26-155   26-156   26-156   26-156   26-183   26-183   26-183   26-183   26-183   26-183   26-193   26-193   26-193   26-193
          26-193   26-193   26-229   26-229   26-229   26-511   26-511   26-511   26-511   26-511   26-511   26-511   26-511   26-511
          26-511   26-511   26-511   26-511   26-511   26-511   26-512   26-512   26-512   26-523   26-523   26-523   26-529   26-529
          26-529   27-11    27-11    27-11    27-11    27-11    27-11    27-16    27-16    27-16    28-20    28-20    28-20    28-20
          28-20    28-20    28-20    28-20    28-20    28-20    28-20    28-20    28-20    28-20    28-20    28-41    28-41    28-41
          29-19    29-19    29-19    29-19    29-19    29-19    29-19    29-19    29-19    29-19    29-19    29-19    29-19    29-19
          29-19    29-58    29-58    29-58    30-28    30-28    30-28    30-28    30-28    30-28    30-28    30-28    30-28    30-28
          30-28    30-28    30-28    30-28    30-28    30-72    30-72    30-72    31-26    31-26    31-26    31-26    31-26    31-26
          31-26    31-26    31-26    31-26    31-26    31-26    31-26    31-26    31-26    31-84    31-84    31-84    32-31    32-31
          32-31    32-31    32-31    32-31    32-31    32-31    32-31    32-31    32-31    32-31    32-31    32-31    32-31    32-65
          32-65    32-65    33-26    33-26    33-26    33-26    33-26    33-26    33-26    33-26    33-26    33-26    33-26    33-26
          33-26    33-26    33-26    33-54    33-54    33-54    34-22    34-22    34-22    34-22    34-22    34-22    34-22    34-22
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          35-25    35-25    35-25    35-25    35-25    35-25    35-25    35-25    35-25    35-25    35-25    35-50    35-50    35-50
          36-25    36-25    36-25    36-25    36-25    36-25    36-25    36-25    36-25    36-25    36-25    36-25    36-25    36-25
          36-25    36-54    36-54    36-54    37-22    37-22    37-22    37-22    37-22    37-22    37-22    37-22    37-22    37-22
          37-22    37-22    37-22    37-22    37-22    37-32    37-32    37-32    37-32    37-32    37-32    37-32    37-32    37-32
          37-32    37-32    37-32    37-32    37-32    37-32    37-32    37-32    37-32    37-32    37-32    37-32    37-32    37-32
          37-32    37-70    37-70    37-70    38-30    38-30    38-30    38-30    38-30    38-30    38-30    38-30    38-30    38-30
          38-30    38-30    38-30    38-30    38-30    38-51    38-51    38-51    38-51    38-51    38-51    38-51    38-51    38-51
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        41-23   41-23   41-33   41-33   41-33   41-33   41-33   41-33   41-33   41-33   41-33   41-33   41-33   41-33
        41-33   41-33   41-33   41-33   41-33   41-33   41-33   41-33   41-33   41-33   41-33   41-33   41-82   41-82
        41-82   42-21   42-21   42-21   42-21   42-21   42-21   42-21   42-21   42-21   42-21   42-21   42-21   42-21
        42-21   42-21   42-24   42-24   42-24   42-24   42-24   42-24   42-24   42-24   42-24   42-24   42-24   42-24
        42-24   42-24   42-24   42-24   42-24   42-24   42-24   42-24   42-24   42-24   42-24   42-24   42-179  42-179
        42-179  43-11   43-11   43-11   43-13   43-13   43-13   43-13   43-13   43-13   43-13   43-13   43-13   43-13
        43-13   43-13   43-13   43-13   43-13   43-14   43-14   43-14   43-14   43-14   43-14   43-14   43-14   43-14
        43-14   43-14   43-14   43-15   43-15   43-15   43-15   43-15   43-15   43-15   43-15   43-15   43-16   43-16
        43-16   43-17   43-17   43-17   43-17   43-17   43-17   43-17   43-17   43-17   43-17   43-17   43-17   43-17
        43-17   43-17   43-19   43-19   43-19   43-41   43-41   43-41   43-41   43-41   43-41   43-41   43-41   43-41
SVCSUB   5-7#    5-12#
SVCTAG   5-7#    5-14#    7-17   11-16   24-14   26-229  26-523  26-529  27-16   28-41   29-58   30-72   31-84   32-65
        33-54   34-61   35-50   36-54   37-32   37-70   38-51   38-63   40-38   41-33   41-82   42-24   42-179  43-19
SVCTST   5-7#    5-11#   28-5    29-4    30-8    31-4    32-3    33-4    34-4    35-5    36-3    37-2    38-4    41-4
        42-4
T$$AUT  26-527#  26-529
T$$CLE  27-7#    27-11   27-16
T$$HAR  43-11    43-11#  43-19
T$$HW    7-9      7-9#    7-17
T$$INI  26-7#    26-193  26-523
T$$MSG  11-9#    11-12   11-16
T$$PRO  25-7#
T$$RPT  24-8#    24-10   24-14
T$$SRV  26-225#  26-229
T$$TES  28-5#    28-41   29-4#   29-58   30-8#   30-72   31-4#   31-84   32-3#   32-65   33-4#   33-54   34-4#   34-61
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        23-61   23-61#  23-61#  23-62   23-62   23-62   23-62#  23-62#  23-76   23-76   23-76#  23-82   23-82   23-82#
        26-57   26-57   26-57#  26-87   26-87   26-87#  26-93   26-93   26-93#  26-118  26-118  26-118#  26-149  26-149
        26-149# 26-155  26-155  26-155# 26-511  26-511  26-511# 28-20   28-20   28-20#  29-19   29-19   29-19#  30-28
        30-28   30-28#  31-26   31-26   31-26#  32-31   32-31   32-31#  33-26   33-26   33-26#  34-22   34-22   34-22#
        35-25   35-25   35-25#  36-25   36-25   36-25#  37-22   37-22   37-22#  38-30   38-30   38-30#  40-36   40-36
        40-36#  41-23   41-23   41-23#  42-21   42-21   42-21#
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        40-38   40-38#  40-38#  40-38#  41-33   41-33   41-33   41-33#  41-33#  41-33#  42-24   42-24   42-24   42-24#
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        43-16#  43-17   43-17   43-17   43-17#  43-17#  43-17#
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T$EXCP  37-32   37-32#  38-51   38-51#  40-38   40-38#  41-33   41-33#  42-24   42-24#  43-13   43-13#  43-14   43-14#
        43-17   43-17#
T$FLAG  11-12   11-12#  11-12#  24-10   24-10#  24-10#  26-193  26-193  26-193#  26-193#  27-11   27-11   27-11#  27-11#
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        42-24#  42-24#
T$HILI  37-32   37-32#  38-51   38-51#  40-38   40-38#  41-33   41-33#  42-24   42-24#  43-13   43-13#  43-14   43-14#
        43-17   43-17#
T$LAST   5-7#   43-41#
T$LOLI  37-32   37-32#  38-51   38-51#  40-38   40-38#  41-33   41-33#  42-24   42-24#  43-13   43-13#  43-14   43-14#
        43-17   43-17#
T$LSYM   5-7     5-7#    7-17   11-16   24-14   26-229  26-523  26-529  27-16   28-41   29-58   30-72   31-84   32-65
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        26-523  26-523  26-523  26-523#  26-527  26-527  26-527#  26-529  26-529  26-529  26-529#  27-7    27-7    27-7#
        27-16   27-16   27-16   27-16#   28-5    28-5    28-5#   28-41   28-41   28-41   28-41#   29-4    29-4    29-4#
        29-58   29-58   29-58   29-58#   30-8    30-8    30-8#   30-72   30-72   30-72   30-72#   31-4    31-4    31-4#
        31-84   31-84   31-84   31-84#   32-3    32-3    32-3#   32-65   32-65   32-65   32-65#   33-4    33-4    33-4#
        33-54   33-54   33-54   33-54#   34-4    34-4    34-4#   34-61   34-61   34-61   34-61#   35-5    35-5    35-5#
        35-50   35-50   35-50   35-50#   36-3    36-3    36-3#   36-54   36-54   36-54   36-54#   37-2    37-2    37-2#
        37-70   37-70   37-70   37-70#   38-4    38-4    38-4#   38-63   38-63   38-63   38-63#   41-4    41-4    41-4#
        41-82   41-82   41-82   41-82#   42-4    42-4    42-4#   42-179  42-179  42-179  42-179#  43-11   43-11   43-11#
        43-16   43-19   43-19   43-19    43-19#  44-1    44-1    44-1    44-1#
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T$NS1    7-9#    7-17   11-9#   11-16    24-8#   24-14   25-7#   25-13   26-7#   26-523  26-527#  26-529  27-7#   27-16
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        35-5#   35-50   36-3#   36-54    37-2#   37-70   38-4#   38-63   41-4#   41-82   42-4#   42-179  43-11#  43-16
        43-19
T$NS2   26-225#  26-229
T$PTNU   5-7#
T$SAVL   5-7#
T$SEGL   5-7#
T$SUBN   5-7#   28-5#   29-4#   30-8#   31-4#   32-3#   33-4#   34-4#   35-5#   36-3#   37-2#   38-4#   41-4#   42-4#
T$TAGL   5-7#
T$TAGN   5-7#    7-9     7-9     7-9#    11-9    11-9    11-9#   24-8    24-8    24-8#   25-7    25-7    25-7#   26-7
        26-7    26-7#   26-225  26-225   26-225#  26-527  26-527  26-527#  27-7    27-7    27-7#   28-5    28-5    28-5#
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        38-4    38-4#   41-4    41-4     41-4#   42-4    42-4    42-4#   43-11   43-11   43-11#
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        11-12   11-12#  11-16   11-16#   24-10   24-10#  24-14   24-14#  25-13   25-13#  26-193  26-193#  26-229  26-229#
        26-523  26-523#  26-529  26-529#  27-11   27-11#  27-16   27-16#  28-41   28-41#  29-58   29-58#  30-72   30-72#
        31-84   31-84#   32-65   32-65#   33-54   33-54#  34-61   34-61#  35-50   35-50#  36-54   36-54#  37-32   37-32
        37-32   37-32#   37-32#  37-32#   37-70   37-70#  38-51   38-51   38-51   38-51#  38-51#  38-51#  38-63   38-63#
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        42-24   42-24    42-24   42-24#   42-24#  42-24#  42-179  42-179#  43-13   43-13   43-13   43-13#  43-13#  43-13#
        43-14   43-14    43-14   43-14#   43-14#  43-14#  43-15   43-15   43-15   43-15#  43-15#  43-15#  43-17   43-17
        43-17   43-17#   43-17#  43-17#   43-19   43-19#  44-1    44-1#
T$TEST   5-7#   28-5     28-5    28-5#    29-4    29-4    29-4#   30-8    30-8    30-8#   31-4    31-4    31-4#   32-3
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        37-2    37-2     37-2#   38-4     38-4    38-4#   41-4    41-4    41-4#   42-4    42-4    42-4#   43-41
T$TSTM   5-7#   11-16    14-55   15-69    16-56   23-59   23-61   23-62   23-76   23-78   23-82   24-14   26-19   26-22
        26-30   26-33    26-36   26-57    26-58   26-87   26-88   26-93   26-94   26-118  26-119  26-149  26-150  26-155
        26-156  26-183   26-193  26-511   26-512  26-523  26-529  27-11   27-16   28-20   28-41   29-19   29-58   30-28
        30-72   31-26    31-84   32-31    32-65   33-26   33-54   34-22   34-61   35-25   35-50   36-25   36-54   37-22
        37-32   37-70    38-30   38-51    38-63   40-36   40-38   41-23   41-33   41-82   42-21   42-24   42-179
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T1       6-5    28-5#
T10      6-5    37-2#
T11      6-5    38-4#
T11PMT   9-133#  41-33
T12      6-5    41-4#
T13      6-5    42-4#
T2       6-5    29-4#
T3       6-5    30-8#
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T6        6-5      33-4#
T7        6-5      34-4#
T8        6-5      35-5#
T9        6-5      36-3#
TCR       9-370#   14-45*   26-287*  26-341*
TCRENA    9-271#   14-45    26-358*
TCRTBL    9-283#   26-358
TDR       9-371#   26-344*  26-346
TEST1    28-19#
TEST2    29-18#
TEST3    30-27#
TEST4    31-25#
TEST5    32-30#
TEST6    33-25#
TEST7    34-21#
TEST8    35-24#
TEST9    36-24#
TESTA    37-21#
TESTB    38-29#
TESTC    41-22#
TESTD    42-20#
TFCZ     37-40    37-50#
THREE     8-10#   30-61
TIMOM    10-189#  15-69
TITLE1    9-88#   28-20
TITLE2    9-89#   29-19    29-22
TITLE3    9-91#   30-28    30-31
TITLE4    9-93#   31-26    31-29
TITLE5    9-95#   32-31    32-34
TITLE6    9-97#   33-26    33-29
TITLE7    9-99#   34-22    34-25
TITLE8    9-101#  35-25    35-28
TITLE9    9-103#  36-25    36-28
TITLEA    9-105#  37-22    37-25
TITLEB    9-109#  38-30    38-33
TITLEC    9-121#  41-23    41-26
TITLED    9-123#  42-21
TMPLT1    9-266#  17-43
TMPLT2    9-267#  17-50
TMPLT3    9-268#  17-60    20-57    20-62    20-70
TOPSTK    9-398#  13-69*   13-70*
TRDYBT    9-410#  14-64    26-284*  26-351*
TRNSMT   42-40    42-53    42-64#
TRXADD    9-149#  13-65*   23-62
TRYAGN   19-40#   19-58
TWO       8-9#     9-259
UAM       8-2#
UBTRAP   26-36    26-225#  26-227#
UCRB      8-43#
VRTCLS    9-50#   32-46*   32-48*   32-50*   32-52    41-166*  41-168*  41-170*  41-181   41-222*  41-224*  41-226*  41-228   42-106*
         42-108*  42-110*  42-112   42-148*  42-150*  42-152*  42-154
WAITMX   10-154#
WAITXN   14-81    15-39#
WFC      10-188#  16-56
WTSTPM    9-143#  14-55
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ENDSUB   1-596#  5-7#
ENDSW    1-614#  5-7#
ENDTST   1-624#  5-7#   28-41   29-58   30-72   31-84   32-65   33-54   34-61   35-50   36-54   37-70   38-63   41-82
        42-179
EQUALS   1-642#  5-7#    8-2
ERRDF    1-714#  5-7#
ERRHRD   1-718#  5-7#
ERROR    1-722#  5-7#   23-59
ERRSF    1-726#  5-7#
ERRSOF   1-730#  5-7#
ERRTBL   1-734#  5-7#    9-445
ESCAPE   1-744#  5-7#
EXIT     1-771#  5-7#   11-12   24-10   26-193  27-11
FEQUAL   1-810#  5-7#
GETBYT   1-824#  5-7#
GETPRI   1-834#  5-7#
GETWOR   1-829#  5-7#
GMANIA   1-839#  5-7#
GMANID   1-848#  5-7#   37-32   38-51   40-38   41-33   42-24
GMANIL   1-859#  5-7#
GPHARD   1-868#  5-7#   26-30
GPRMA    1-874#  5-7#   43-14
GPRMD    1-903#  5-7#   37-32   37-32#  38-51   38-51#  40-38   40-38#  41-33   41-33#  42-24   42-24#  43-13   43-17
GPRML    1-934#  5-7#   43-15
HEADER   1-954#  5-7#    5-24
INLOOP   1-962#  5-7#
IOSETU   1-966#  5-7#
IOSTAR   1-974#  5-7#
KT11     1-982#  5-7#
LASTAD   1-;47#  5-7#   43-41
MSBYTE   1-D00#  5-7#    5-24    5-24    5-24    5-24#
MSCHEC   1-E18#  5-7#   11-12   11-12#  24-10   24-10#  26-193  26-193#  27-11   27-11#
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        42-179  42-179#  43-19   43-19#  44-1    44-1#
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MSESCS   1-D10#  5-7#
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                32-3    32-3#   33-4    33-4#   34-4    34-4#   35-5    35-5#   36-3    36-3#   37-2    37-2#   38-4    38-4#
                41-4    41-4#   42-4    42-4#   43-11   43-11#
M$PUT            1-C72#  5-7#   14-55   14-55   14-55#  15-69   15-69   15-69#  16-56   16-56   16-56#  23-61   23-61   23-61
                23-61#  23-62   23-62   23-62   23-62#  23-76   23-76   23-76#  23-82   23-82   23-82#  26-36   26-36   26-36
                26-36   26-36#  26-57   26-57   26-57#  26-87   26-87   26-87#  26-93   26-93   26-93#  26-118  26-118  26-118#
                26-149  26-149  26-149#  26-155  26-155  26-155#  26-511  26-511  26-511#  28-20   28-20   28-20#  29-19   29-19
                29-19#  30-28   30-28   30-28#  31-26   31-26   31-26#  32-31   32-31   32-31#  33-26   33-26   33-26#  34-22
                34-22   34-22#  35-25   35-25   35-25#  36-25   36-25   36-25#  37-22   37-22   37-22#  38-30   38-30   38-30#
                40-36   40-36   40-36#  41-23   41-23   41-23#  42-21   42-21   42-21#
M$PUT1           1-C81#  5-7#   14-55   14-55   14-55#  14-55#  15-69   15-69   15-69#  15-69#  16-56   16-56   16-56#  16-56#
                23-61   23-61   23-61   23-61#  23-61#  23-61#  23-62   23-62   23-62   23-62#  23-62#  23-62#  23-76   23-76
                23-76#  23-76#  23-82   23-82   23-82#  23-82#  26-36   26-36   26-36   26-36   26-36#  26-36#  26-36#  26-36#
                26-57   26-57   26-57#  26-57#  26-87   26-87   26-87#  26-87#  26-93   26-93   26-93#  26-93#  26-118  26-118
                26-118#  26-118#  26-149  26-149  26-149#  26-149#  26-155  26-155  26-155#  26-155#  26-511  26-511  26-511#  26-511#
                28-20   28-20   28-20#  28-20#  29-19   29-19   29-19#  29-19#  30-28   30-28   30-28#  30-28#  31-26   31-26
                31-26#  31-26#  32-31   32-31   32-31#  32-31#  33-26   33-26   33-26#  33-26#  34-22   34-22   34-22#  34-22#
                35-25   35-25   35-25#  35-25#  36-25   36-25   36-25#  36-25#  37-22   37-22   37-22#  37-22#  38-30   38-30
                38-30#  38-30#  40-36   40-36   40-36#  40-36#  41-23   41-23   41-23#  41-23#  42-21   42-21   42-21#  42-21#
M$RADI           1-D77#  5-7#   37-32   37-32#  38-51   38-51#  40-38   40-38#  41-33   41-33#  42-24   42-24#  43-13   43-13#
                43-14   43-14#  43-15   43-15#  43-17   43-17#
M$RBRO           1-C52#  5-7#
M$RNRO           1-C62#  5-7#   26-30   26-30#
M$SETS           1-D32#  5-7#    5-8     5-8#    7-9     7-9#   11-9    11-9#   24-8    24-8#   25-7    25-7#   26-7    26-7#
                26-225  26-225#  26-527  26-527#  27-7    27-7#   28-5    28-5#   29-4    29-4#   30-8    30-8#   31-4    31-4#
                32-3    32-3#   33-4    33-4#   34-4    34-4#   35-5    35-5#   36-3    36-3#   37-2    37-2#   38-4    38-4#
                41-4    41-4#   42-4    42-4#   43-11   43-11#
M$STAR           1-A33#  5-7#
M$SVC            1-C33#  5-7#   11-12#  11-16   11-16#  14-55   14-55#  15-69   15-69#  16-56   16-56#  23-59   23-59#  23-61
                23-61#  23-62   23-62#  23-76   23-76#  23-78   23-78#  23-82   23-82#  24-10#  24-14   24-14#  26-19   26-19#
                26-22   26-22#  26-30   26-30#  26-33   26-33#  26-36   26-36#  26-57   26-57#  26-58   26-58#  26-87   26-87#
                26-88   26-88#  26-93   26-93#  26-94   26-94#  26-118  26-118#  26-119  26-119#  26-149  26-149#  26-150  26-150#
                26-155  26-155#  26-156  26-156#  26-183  26-183#  26-193  26-193#  26-511  26-511#  26-512  26-512#  26-523  26-523#
                26-529  26-529#  27-11   27-11#  27-16   27-16#  28-20   28-20#  28-41   28-41#  29-19   29-19#  29-58   29-58#
                30-28   30-28#  30-72   30-72#  31-26   31-26#  31-84   31-84#  32-31   32-31#  32-65   32-65#  33-26   33-26#
                33-54   33-54#  34-22   34-22#  34-61   34-61#  35-25   35-25#  35-50   35-50#  36-25   36-25#  36-54   36-54#
                37-22   37-22#  37-32   37-32#  37-70   37-70#  38-30   38-30#  38-51   38-51#  38-63   38-63#  40-36   40-36#
                40-38   40-38#  41-23   41-23#  41-33   41-33#  41-82   41-82#  42-21   42-21#  42-24   42-24#  42-179  42-179#
M$TLAB           1-C29#  5-7#   11-16#  14-55#  15-69#  16-56#  23-59#  23-61#  23-62#  23-76#  23-78#  23-82#  24-14#  26-19#
                26-22#  26-30#  26-33#  26-36#  26-57#  26-58#  26-87#  26-88#  26-93#  26-94#  26-118#  26-119#  26-149#  26-150#
                26-155#  26-156#  26-183#  26-193#  26-511#  26-512#  26-523#  26-529#  27-11#  27-16#  28-20#  28-41#  29-19#  29-58#
                30-28#  30-72#  31-26#  31-84#  32-31#  32-65#  33-26#  33-54#  34-22#  34-61#  35-25#  35-50#  36-25#  36-54#
                37-22#  37-32#  37-70#  38-30#  38-51#  38-63#  40-36#  40-38#  41-23#  41-33#  41-82#  42-21#  42-24#  42-179#
M$TSTL           1-C21#  5-7#   11-16   11-16#  14-55   14-55#  15-69   15-69#  16-56   16-56#  23-59   23-59#  23-61   23-61#
                23-62   23-62#  23-76   23-76#  23-78   23-78#  23-82   23-82#  24-14   24-14#  26-19   26-19#  26-22   26-22#
                26-30   26-30#  26-33   26-33#  26-36   26-36#  26-57   26-57#  26-58   26-58#  26-87   26-87#  26-88   26-88#
                26-93   26-93#  26-94   26-94#  26-118  26-118#  26-119  26-119#  26-149  26-149#  26-150  26-150#  26-155  26-155#
                26-156  26-156#  26-183  26-183#  26-193  26-193#  26-511  26-511#  26-512  26-512#  26-523  26-523#  26-529  26-529#
                27-11   27-11#  27-16   27-16#  28-20   28-20#  28-41   28-41#  29-19   29-19#  29-58   29-58#  30-28   30-28#
                30-72   30-72#  31-26   31-26#  31-84   31-84#  32-31   32-31#  32-65   32-65#  33-26   33-26#  33-54   33-54#
                34-22   34-22#  34-61   34-61#  35-25   35-25#  35-50   35-50#  36-25   36-25#  36-54   36-54#  37-22   37-22#
                37-32   37-32#  37-70   37-70#  38-30   38-30#  38-51   38-51#  38-63   38-63#  40-36   40-36#  40-38   40-38#
                41-23   41-23#  41-33   41-33#  41-82   41-82#  42-21   42-21#  42-24   42-24#  42-179  42-179#
M$WORD           1-C94#  5-7#    5-24    5-24#   6-5     6-5     6-5     6-5     6-5     6-5     6-5     6-5     6-5     6-5
                 6-5     6-5     6-5     6-5     6-5#   11-12   11-12#  24-10   24-10#  26-193#  27-11#  37-32   37-32   37-32#
                37-32#  38-51   38-51   38-51#  38-51#  40-38   40-38   40-38#  40-38#  41-33   41-33   41-33#  41-33#  42-24
                42-24   42-24#  42-24#  43-13   43-13#  43-14   43-14#  43-15   43-15#  43-16   43-16#  43-17   43-17#  43-41
                43-41
```

CROSS REFERENCE TABLE (CREF V01-05)

```
M$XFER   1-@82#   5-7#    43-16    43-16#
MANUAL   1-;62#   5-7#
MEMORY   1-;66#   5-7#
OPEN     1-;71#   5-7#
POINTE   1-;76#   5-7#     5-21
PRINTB   1-<39#   5-7#    23-61    23-76    23-82    28-20    29-19    30-28    31-26    32-31    33-26    34-22    35-25    36-25
        37-22    38-30    40-36    41-23    42-21
PRINTF   1-<79#   5-7#    26-57    26-87    26-93    26-118   26-149   26-155   26-511
PRINTS   1-=19#   5-7#
PRINTX   1-=59#   5-7#    14-55    15-69    16-56    23-62
READBU   1-=99#   5-7#
READEF   1->03#   5-7#    26-19    26-22
RFLAGS   1->08#   5-7#
SETPRI   1->13#   5-7#
SETVEC   1->18#   5-7#    26-36
SLASH    1->24#   5-7#
STARS    1->38#   5-7#
SVC      1->52#   5-6#     5-7
XFER     1-@12#   5-7#    11-12#   24-10#   26-193#  27-11#
XFERF    1-@16#   5-7#
XFERT    1-@20#   5-7#    43-16
```