TABLE OF CONTENTS

MAINTENANCE TAPE

Stores J Series Programs on tape with ability to select and operate one, or more, or all programs.

1. Programs becoming obsolete - JA UC1

2. Used to control the selection of one, or more, programs on the Maintenance Tape.

1.   ENVIRONMENT

1.1   Equipment Used

Tape Unit 0, any channel (input)
Memory Locations 64-192
Refer also to writeup (s) of individual programs

2.   OPERATING PROCEDURE

2.1   Equipment Setup

1)   Set the CPU in Maintenance Mode.
2)   Place the Maintenance Tape on Tape Unit 0, any channel.
3)   Refer also to writeup (s) of individual programs.

2.2   Loading Procedure

1)   Make the selection of the desired program(s) as per Options, par. 2.3.
2)   Depress the IPL button on the Operator's Console, or on the CPU.
3)   Cause a Channel Signal to emanate from Tape Unit 0 of the channel used. (Make Tape Unit Not Ready then Ready.)
4)   Refer to the writeup (s) of the selected programs for additional procedures.
5)   Should loss of control occur, repeat steps 2.2.1 - 2.2.4 to recover.

Note: If this should prove unsuccessful, rewind Tape Unit 0 of the channel used and then repeat steps 1-4.

2.3   Options

Action Desired	Perform	
Operate one program	Set one of 32 Maintenance Switches 0-31	
Loop on one program	Set as above, plus set Maint Switch 37	
Loop on several programs	Set the corresponding Switches	0-31
Loop on all programs	Clear Maintenance Switches	0-31
Continue after Hang	Alter Maint Switch	63

Note: For individual program options, refer to the individual writeups.

2.3   Options

Action Desired	Perform
Continue after loop	Alter Maint. Switch 63
Bypass Console Printout	Set Maint. Switch 32, or make Operator's Console not ready

3.   PROGRAM RESULTS

3.1   Success Indications

As each program is operated, its ID number (as defined by TP LD1) will be typed out. Refer also to the individual program write-up.

3.2   Failure Indications

Refer to the individual program write-up.

4.   SUPPLEMENTARY INFORMATION

4.1   Program Restrictions

Each program must operate at a location greater than (8) 1000. The lower portion 100 - 777 is reserved for the Tape Loader.

The sequence number, (8) 0 - 37, assigned to each program has been defined by TP LD1.

Each program has been modified at the locations specified in the control card by TP LD1.

A loop within the control routine, at location WAIT 63, before the program has operated indicates that a manual intervention is required for the selected program prior to its start. Location OUT is displayed in the Upper Boundary Register.

A loop at location WAIT 63 after a program has operated indicates that the selected program has completed the requested pass(es) and another selection may be made. Location WTAFT is displayed in the Upper Boundary Register.

4.1 Program Restrictions (Cont'd)

The control routine is read each time a program is loaded, and occupies locations 64-192.

Each Maintenance Switch from 0 to 31 corresponds to one program on the Maintenance Tape.

Forward movement of tape causes that record to be loaded into memory. Backward movement is by Backspace or Rewind.

The control routine interrogates the maintenance switches, searches the tape for the corresponding sequence number and gives control to the main program. The main program after it completes its operation gives control back to the control routine which makes the next determination according to the setting of the Maintenance Switches.

When more than one program is requested, the selection will be from left to right, 0-31, and then back to the first.

CONTROL RECORD

RETURN FROM PROGRAM

Are Any Maintenance Bits Set ⟩——————— No ———→ Ⓐ

Yes

Is Only One Program Selected ⟩——————— No ———→ Ⓒ

Yes

Was It Just Run ⟩——————— No ———→ Ⓒ

Yes

Is Maint Bit 37 Set ⟩——————— Yes ———→ Ⓓ

No

Wait For MB 63

Ⓑ
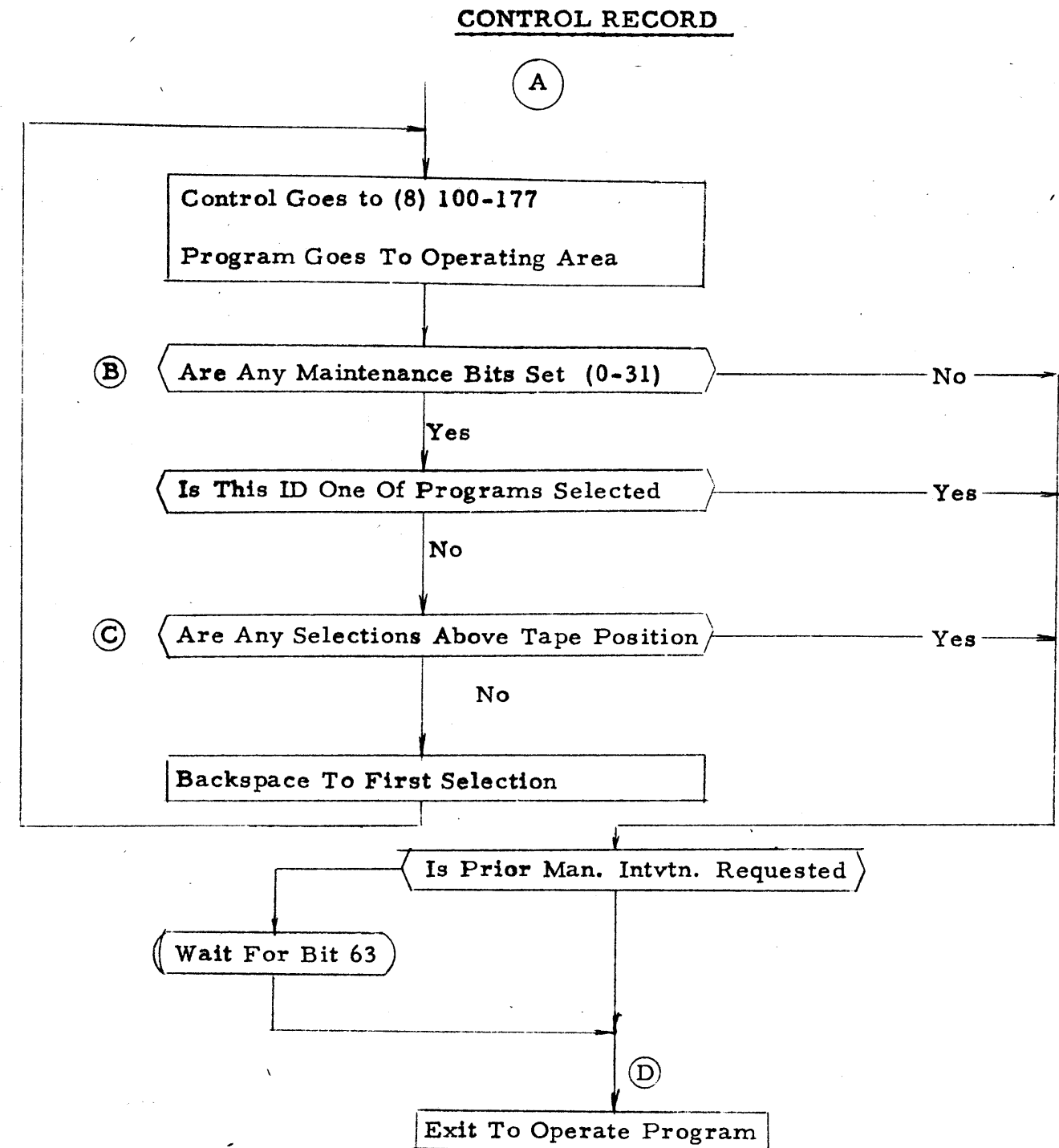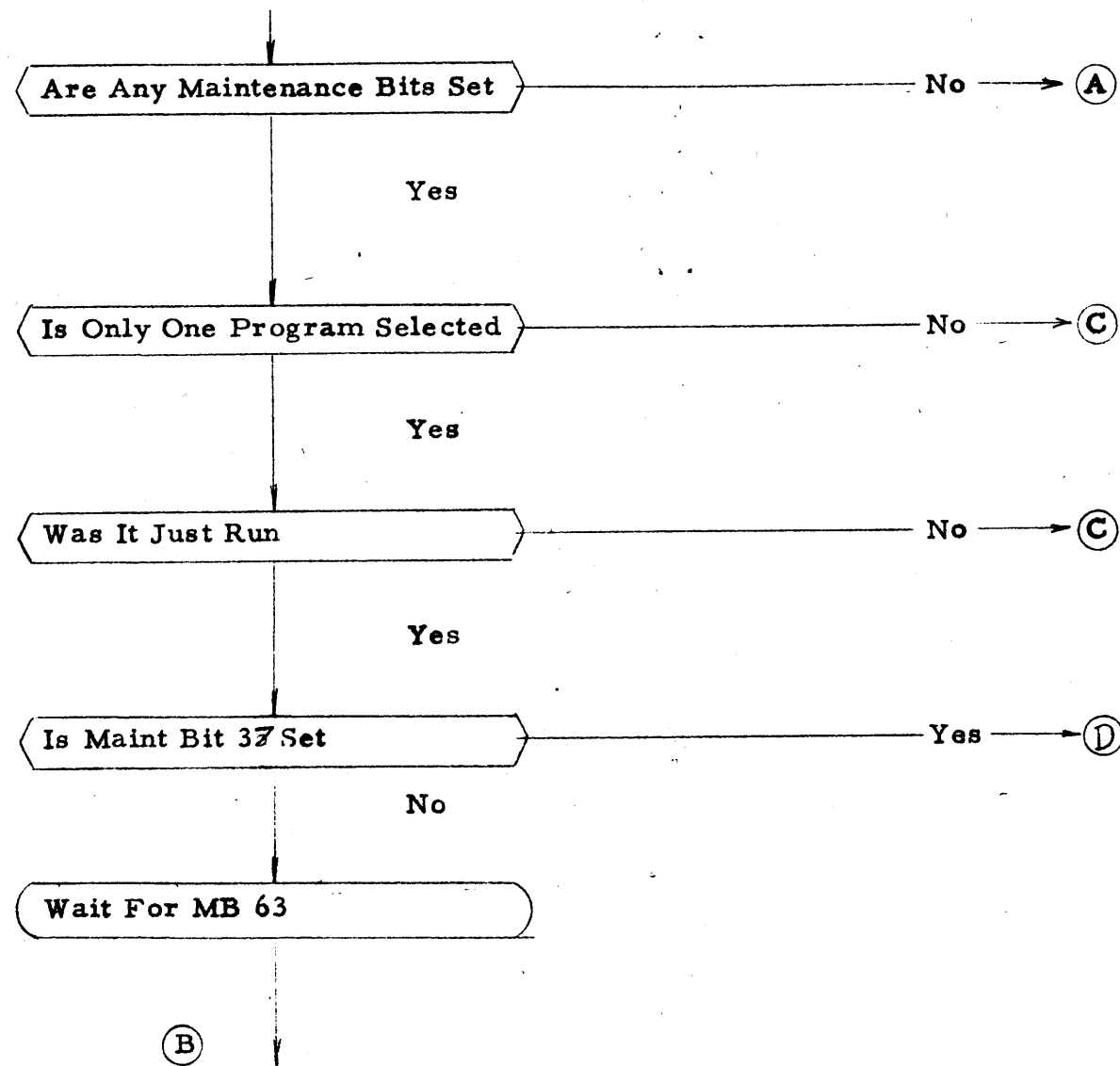
TAPE LOAD

LOADS J SERIES PROGRAMS

1. Programs becoming obsolete - JA UD1

2. Used to load Punful card loaded programs onto tape from which they can be operated. Also used to update any existing tape written by TP LD1.

    See also, writeup Mnt Tp 1, JA UC 1.

TABLE OF CONTENTS

1. INITIAL LOAD

1.1 Environment

1.1.1 Equipment Used

Card Reader (Input)
Central Processing Unit
Core Memory 64 - Maximum
Tape Unit 0, Channel 32 (Output)
Console Typewriter (Optional)

1.2 Operating Procedure

1.2.1 Equipment Setup

1. Set the CPU in Maintenance Mode.

2. Place a blank, non-file protected reel of tape on Tape Unit 0, Channel 32 and make it ready.

3. Place in front of each deck to be loaded its control card. (See paragraph 4.1, Control Card Format.)

4. Make ready the Operator's Console Typewriter (if used).

1.2.2 Loading Procedure

1. Read TP LD1, JA UD1 into memory. (Either IPL mode for Punful deck or STPPK for Punnor deck.) TP LD1 operates in locations (8) 100 - (8) 777.

2. Place, in the Reader, the program decks to be loaded onto tape. Insure that each deck is complete (i.e., no cards are missing from the deck).

3. Make the Reader ready and keep feeding cards thru the reader until the last program is loaded. (If any deck runs out of cards before the program identity is printed out, place any number of blank cards in the reader and make it ready.) Reading an END card (see 1.4.3), will terminate the initial load.

1.3   Program Results

1.3.1   Success Indications

The program decks will all be loaded. The tape will be rewound.
A list of program identifications with their corresponding sequence numbers
will be printed on the Console Typewriter (if requested) followed by the word
END.

1.3.2   Failure Indications

The program will loop within the program if a manual intervention
is required; e. g., card reader not ready. An error print on the typewriter
may indicate the requested intervention. Refer also to the program listing
for explanation of error loops or hangs.

1.4   Supplementary Information

1.4.1   Program Restrictions

Each record on the Maintenance Tape consists of the control rou-
tine and the maintenance program, and is of the IPL format.

1.4.2   Control Card Format

Col. 1 L - Identifying Column
Col. 2 M (Hollerith) - Manual intervention required prior to
                       program load.

Col. 4 and 5 - Used only in updating an existing master. (Will
               not affect the initial load.)
Col. 7, 8 and 9 - The number (octal) of passes of the program
                  to be made each time it is selected.

Col. 12 - 19   Locations of half words into which a Branch
     21 - 28   can be inserted from which the program will
     30 - 37   exit to the control routine when it is completed.
     39 - 46   This is if the form (xxxxxxx. x)$_8$. The period
     48 - 55   is required. The field will be omitted if any-
     57 - 62   thing but a period is in this column.
Col. 73 - 79   Program Identification - Hollerith characters

1.4.3   End Card Format

The end of programs to be loaded is signified by a card with an
"E" punched in column 1.

2.   UPDATING AN EXISTING MASTER

2.1   Environment

2.1.1   Equipment Used

Card Reader (Input)
Central Processor Unit
Core Memory 64 - Maximum
Tape Unit 0, Channel 32 (Output)
Tape Unit 0, Channel 33 (Input)
Console Typewriter (Optional)

2.2   Operating Procedure

2.2.1   Equipment Setup

1.   Set the CPU in maintenance mode.

2.   Place a blank, non-file protected reel of tape on Tape Unit 0,
      Channel 32 and make it ready.

3. Place the existing maintenance tape on Tape Unit 0, Channel 33 and make it ready.

4. Place in front of each deck to be loaded its control card.

5. Make ready the Operator's Console typewriter (if used).

6. Set bit 40 of the Maintenance Console.

2.2.2 Loading Procedure

Same as 1.2.2.

2.3 Program Results

Same as 1.3.

2.4 Supplementary Information

2.4.1 Program Restrictions

Same as 1.4.1.

2.4.2 Control Card Format

Col. 4-5 - These columns give the ID no. (as was defined by TP LD1) that the program is to replace on the master tape. These columns are never checked during the initial load.

The rest of the card is identical to that described in 1.4.2.

3. RECOMMENDATIONS

3.1 Use the best tape available. Because of space limitations imposed upon JA UC1, the most reliable tape available should be used. A manual intervention will be required any time an error occurs during a read in from tapes. (See 2.2.5, JA UC1.)

3.2 Terminating the Update Routine. TP LD1 will continue to update the tape until the last record on the existing master is read, and an END card is read from the reader. If programs are to be added to the end of an existing tape, as long as the ID no. (Col. 4-5) of the first to be added is greater than the last ID on the tape, all decks will be loaded until an END card is read.

3.3 Because of improper control words in the punful decks to be loaded, it is advisable to place one deck in the reader at a time. When TP LD1 has completed loading this record on tape, it will type out the program identity. If the reader goes out of material and TP LD1 does not type out the identity: (1) place blank cards in the reader if the program is completely loaded, or (2) place the remainder of the punful deck in the reader. Make the reader ready and TP LD1 will continue and signify that it has completed by typing out the program identity.

STRETCH RECORD OF PROGRAM CHANGES

PROGRAM _JA UCI JA UDI_ PROGRAMMER/ENGINEER _J.C. HANNIGAN_ DATE _SEPT. 7, 1961_

REMARKS _____

OCTAL LOCATION	SYMBOLIC INSTRUCTION	OCTAL HEX STATEMENT FIRST HALF		SECOND HALF		COMMENTS
000213.0	RD (SEØP), TCI, (8) 544.0			000544.1100		
000212.4	LV, $X7, (8) 547.0	000547.1633				
000213.0	Vt, $X7, (8) 543.4	000543.5680				
000213.4	KV, $X7, (8) 750.0	000750.1020				
000214.6	BZXE, (8) 17.4	000917.2800				
000334.0	BZ, (8) 443.22, (8) 541.0	000443.0050		000541.0000		
000541.0	REL (SEØP), RDR	000332.0000		000001.0000		
000542.0	B, (8) 342.0	000342.1000				
000335.0	NØP	000000.2000				
000543.4	VE, 0.01	000000.0100				
000544.0	CW (SECØ), B, JD-CWHY, (8) 545.	001000.0000		000000.0000		
000545.0	CW (CR), 5, 1	000546.0000		000000.0000		
000546.0	CW, 0					

STRETCH RECORD OF PROGRAM CHANGES

PROGRAM _JA UCI JA UDI_   PROGRAMMER/ENGINEER _J.C. HANNIGAN_   DATE _SEPT. 7, 1961_

REMARKS _____

OCTAL LOCATION	SYMBOLIC INSTRUCTION	OCTAL HEX STATEMENT			COMMENTS
		FIRST HALF	HEX	SECOND HALF	HARD
0002118	RD (SEØP), TCI, (8) 544.0			0005441100	
0002124	LV, $X7, (8) 547.0	0005461630			
0002130	V+, $X7, (8) 543.4	0005435680			
0002134	KV, $X7, (8) 750.0	0007501690			
0002144	BZXE, (8)217.4	0002173200			
0003340	BZ3, (8) 443.22, (8) 541.0	0004432480		0005413400	
0005410	REL (SEØP), RDR	0000220080		0000003300	
0005420	B, (8)342.0	0003421000			
0003350	NØP	0000003000			
0005434	VF, 0.01	0000000100			
0005440	CW(SCCR), (8)1000, ID-CWHAL, (8)545.	0010000050		0032200165	
0005450	CW(CR), 546., 1	0005460000		0000200000	
0005460	CW, 0				

PRINID,TP LDR,J.HANNIGAN   JA UC I A

8-31-61

```
          SFM.6.C
          PRNS
          SLC.63.0                                                        000077.00
          CW*CDSC□.START.CH1→START&1.CH1          100.00 60 011020.01 60   030077.00
                                              ●
                                              ●
START     BD.$6.32               @DISABLE INTERRUPT  100.44 00            000100.00
          RFL%SFOP□.RDR          @CLEAR CHANNELS      22.00 80 000000.33 00 000100.40
          REL%SFOP□.TC1                               20.00 80 000000.33 00 000101.40
          RFL%SFOP□.TC2                               20.40 80 000000.33 00 000102.40
          RFL%SFOP□.CNSL                              23.40 80 000000.33 00 000103.40
                                              ●
          RPG1Z.$6.32           @CLEAR INDICATOR      105.25 46            000104.40
          RPG2Z.$6.32                                 105.65 C6            000105.00
                                              ●
          SIC.TPWTX                                   427.40 80            000105.40
          B.TPWT                                      425.50 00            000106.00
          LOC%SFOP□.TC1         @SET UP TAPES         20.00 80 000000.17 00 000106.40
                                              ●
          RZB.$MB6.40.$63.      @BYPASS IF INITIAL LOAD 4.50 80 000112.74 00 000107.40
          SIC.RTPWX                                   425.00 80            000110.40
          R.RTPWT                                     423.10 00            000111.00
          LOC%SFOP□.TC2                               20.40 80 000000.17 00 000111.40
                                              ●
          SIC.TPWTX                                   427.40 80            000112.40
          B.TPWT                                      425.50 00            000113.00
          HD%SFOP□.TC1          @HI DENSITY           20.00 80 000036.15 00 000113.40
          RZB.$MB6.40.$63.      @BR IF INITIAL LOAD    4.50 80 000117.74 00 000114.40
          SIC.RTPWX                                   425.00 80            000115.40
          R.RTPWT                                     423.10 00            000116.00
          HD%SFOP□.STC2                               20.40 80 000036.15 00 000116.40
                                              ●
          SIC.TPWTX                                   427.40 80            000117.40
          B.TPWT                                      425.50 00            000120.00
          ODDNEC%SFOP□.TC1      @ODD PARITY-NO ECC    20.00 80 000157.15 00 000120.40
          RZB.$MB6.40.$63.      @BR IF INITIAL LOAD    4.50 80 000124.74 00 000121.40
          SIC.RTPWX                                   425.00 80            000122.40
          R.RTPWT                                     423.10 00            000123.00
          ODDNEC%SFOP□.TC2                            20.40 80 000157.15 00 000123.40
                                              ●
          SIC.TPWTX                                   427.40 80            000124.40
          B.TPWT                                      425.50 00            000125.00
          REW%SFOP□.TC1         @REWIND TAPE          20.00 80 000136.15 00 000125.40
          RZB.$MB6.40.MDYW                            4.50 80 000134.74 00  000126.40
                                              ●
          SIC.RTPWX                                   425.00 80            000127.40
          R.RTPWT                                     423.10 00            000130.00
          REW%SFOP□.TC2                               20.40 80 000136.15 00 000130.40
                                              ●
MDYW1     CCW.TC2.CWTEM         @WAIT FOR CHAN SIG    20.40 80 000443.21 00 000131.40
          RZB.CWTEM6.23.MDYW1                         443.27 80 000131.74 00 000132.40
          REL%SFOP□.TC2                               20.40 80 000000.33 00 000133.40
                                              ●
MDYW      CCW.TC1.CWTEM         @WAIT FOR CHAN SIGS   20.00 80 000443.21 00 000134.40
          RZB.CWTEM6.23.MDYW                          443.27 80 000134.74 00 000135.40
          RFL%SFOP□.TC1         @CLEAR CHAN SIG       20.00 80 000000.33 00 000136.40
                                              ●
          LVI.$X14.HDG                                514.35 01            000137.40
          SIC.CNSWX                                   422.40 80            000140.00
```

Label	Instruction	Comment	Machine Code	Line
	B.CNSWT		414.50 00	000140.40
STRT1	SIC.CTLCX		327.40 80	000141.00
	B.RCTLC	@READ CONTROL CARD	241.50 00	000141.40
	BZB.SMB&.40.CDRD1	@BYPASS IF INITIAL LOAD	4.50 80 000162.34 00	000142.00
	BPG2.CDRD1		162.25 C2	000143.00
TPRD	CCW.TC2.CWTEM	@ IS TAPE READY	20.40 80 000443.21 00	000143.40
	BZB.CWTFM&.18.FRD		443.22 80 000153.74 00	000144.40
	RD%SEOP¤.TC2.CWTR	@READ RECORD	20.40 80 000456.11 00	000145.40
TPR1	CCW.TC2.CWTFM		20.40 80 000443.21 00	000146.40
	BB.CWTFM&.24.TPR1	@WAIT FOR SEC?	443.30 80 000146.74 02	000147.40
	L%BU.6¤.CWTFM&.19	@CHECK TAPE OPFRATN	443.23 80 006000.20 50	000150.40
	BZRZ.FRD	@READ NO MORE	153.74 C0	000151.40
	L%BU.18¤.CWTEM&.28	@LOAD COUNT	443.34 80 022000.20 50	000152.00
	BRZ.TPR1A	@INCOMPLETE RECORD IS LAST	154.74 C2	000153.00
ERD	BZB1.SPG2.CDRD1	@SET TAPE END INDICATOR	13.53 80 000162.34 0C	000153.40
TPR1A	BPG1.WRT	@BR IF RDR EMPTY	165.65 42	000154.40
	L%BU¤.PO1		755.60 80 000000.20 50	000155.00
	ST%BU¤.CHAR	@IN PRINT IMAGE	510.50 80 000000.20 D0	000156.00
	L%BU.24¤.ID	@LOAD TAPE ID	750.00 80 030000.20 50	000157.00
	KF%BU.6¤.CDID	@COMPARE TO CARD ID	530.71 80 006000.23 10	000160.00
	BZAL.CDRD	@REPLACE RECORD WITH CARD PROGRAM	162.76 40	000161.00
	B.WRT		165.50 00	000161.40
CDRD1	BPG1.FINIS	@FINISH UP IF CARDS ALSO OUT	225.25 42	000162.00
CDRD	SIC.CDDKX		374.00 80	000162.40
	B.RCDDK	@READ CARD DECK	330.10 00	000163.00
	BZB.SMB&.40.WRT	@BYPASS IF INITIAL LOAD	4.50 80 000165.74 00	000163.40
	CM1111%BU.1¤.SEQ&.21		510.35 80 001000.36 F0	000164.40
WRT	SIC.TPWRX		400.00 80	000165.40
	B.TPWRT	@WRITE OUTPUT TAPE	375.10 00	000166.00
	SIC.TPWTX	@WAIT FOR TAPE	427.40 80	000166.40
	B.TPWT		425.50 00	000167.00
	L%BU.6¤.CWTFM&.19	@LOAD TAPE STATUS BITS	443.23 80 006000.20 50	000167.40
	BZRZ.WRER		177.34 C0	000170.40
	LVI.$X14.TYPO		510.35 01	000171.00
	SIC.CNSWX		422.40 80	000171.40
	B.CNSWT	@WAIT FOR CONSOLE EOP	414.50 00	000172.00
BYP	M&1%BU.24¤.ID	@INCREASE SEQUENCE NUMBER.	750.00 80 030000.22 B0	000172.40
	TI.1.CW2.CWLST	@SAVE IPL CONTROL WORD	760.00 80 000455.02 A0	000173.40
	BZB.SMB&.40.STRT1		4.50 80 000141.34 00	000174.40
	BRZ.SEQ&.21.STRT1		510.35 80 000141.34 06	000175.40
	B.STRT1&2.0		143.10 00	000176.40
WRER	REL%SEOP¤.TC1	@RELEASE TAPE	20.00 80 000000.33 00	000177.00
	CTL%SEOP¤.CNSL.127		23.40 80 000177.15 00	000200.00
	L%BU.56¤.ST		525.70 80 070000.20 50	000201.00
	CI0100%BU.21.3¤.-1.1	@CLEAR NUMBER FIFLD	777777.70 80 425300.50 70	000202.00 V
	C0111%BU.7.1¤.CWTFM&.18.1	@DEPOSIT STATUS BITS	443.22 80 007100.56 70	000203.00
	ST%BU.56¤.ST	@STORE IN IMAGE	525.70 80 070000.20 D0	000204.00
	LVI.$X14.TPER		523.35 01	000205.00

```
        SIC.CNSWX              @WRITE MSG                    422.40 80                        000205.40
        B.CNSWT                                              414.50 00                        000206.00

RSTP    BS%SEOPn.TC1           @BACKSPACE ONE RECORD          20.00 80 000176.15 00           000206.40
        SIC.TPWTX                                            427.40 80                        000207.40
        B.TPWT                                               425.50 00                        000210.00

        RD%SEOPn.TC1.CWRD1     @READ CONTROL WORD             20.00 80 000453.11 00           000210.40
        SIC.TPWTX                                            427.40 80                        000211.40
        B.TPWT                                               425.50 00                        000212.00

        L%BUn.CWLST            @LOOK FOR LAST GOOD RECORD     455.00 80 000000.20 50          000212.40
        K%BUn.CWTP                                            454.00 80 000000.21 10          000213.40
        BZAE.RSTP1                                            217.76 C0                        000214.40
BSTP2   ERG%SEOPn.TC1                                          20.00 80 000056.15 00           000215.00
        SIC.TPWTX                                            427.40 80                        000216.00
        B.TPWT                                               425.50 00                        000216.40
        B.TPWRT                                              375.10 00                        000217.00
BSTP1   BS%SEOPn.TC1                                          20.00 80 000176.15 00           000217.40
        SIC.TPWTX                                            427.40 80                        000220.40
        B.TPWT                @WAIT                          425.50 00                        000221.00
        BZB.CWTEM&.19.BSTP    @BRANCH IF NOT AT LOADPT.      443.23 80 000206.74 00           000221.40
        REL%SEOPn.TC1                                          20.00 80 000000.33 00           000222.40
        SIC.TPWTX                                            427.40 80                        000223.40
        B.TPWT                                               425.50 00                        000224.00
        B.BSTP2                                              215.10 00                        000224.40

FINIS   W%SEOPn.TC1.CWETR     @WRITE LAST RECORD             20.00 80 000452.13 00           000225.00

        SIC.TPWTX             @WAIT FOR TAPE                 427.40 80                        000226.00
        B.TPWT                                               425.50 00                        000226.40
        LI%BU.19n.CWETR                                      452.00 80 423000.20 50          000227.00
        SF%BU.19.8n.TPWRX-1.06.32                            377.40 80 023000.12 F0          000230.00
        LVI.$X14.FINIS&1.0                                   226.35 01                        000231.00
        SVA.$X14.TPWRX                                       400.35 D0                        000231.40
        L%BU.6n.CWTEM&.19                                    443.23 80 006000.20 50          000232.00
        BZRZ.WRER                                            177.34 C0                        000233.00
        LVI.$X14.FIN                                         512.35 01                        000233.40
        SIC.CNSWX             @WAIT FOR CONSOLE              422.40 80                        000234.00
        B.CNSWT                                              414.50 00                        000234.40

        SIC.TPWTX            @WAIT FOR TAPE                  427.40 80                        000235.00
        B.TPWT                                               425.50 00                        000235.40
        WEF%SEOPn.TC1         @WRITE TAPE MARK               20.00 80 000117.15 00           000236.00

        SIC.TPWTX                                            427.40 80                        000237.00
        B.TPWT                                               425.50 00                        000237.40
        REW%SEOPn.TC1        @REWIND TAPE                    20.00 80 000136.15 00           000240.00

FNSHD   B.$                  @                               241.10 00                        000241.00

RCTLC   CCW.RDR.CWTEM        @WAIT UNTIL                     22.00 80 000443.21 00           000241.40
        BZB.CWTEM&.18.RCTLC  @CARD READER READY              443.22 80 000241.74 00           000242.40
        RD%SEOPn.RDR.CWCTL                                    22.00 80 000444.11 00           000243.40
        SIC.RDWTX            @WAIT FCR XFR.                  433.00 80                        000244.40
        B.RDWT                                               430.10 00                        000245.00

        L.CTLCD             @CHECK COL 1                     462.00 80 014000.20 50          000245.40
        KFI%BU.24n.%8n21.00  @COMPARE TO L                   21.00 80 430000.23 10          000246.40
        BAE.CNVT            @BR. TO CONVERT ADDRESSES        255.76 C2                        000247.40

        SKFI.%8n40.20        @COMPARE TO E                   40.20 80 430000.23 10          000250.00
        BZAE.RCT2            @NOT END                        252.76 C0                        000251.00
        BZB1.SPG1.CTLCX      @SET ENDING INDICATOR           13.52 80 000327.74 0C          000251.40
```

```
RCT2     LX,$X2,CWCTL        @CHECK IF CARD IS BLANK        444.04 10                    000252.40
RCTLC1   L%V&IC□%BU□,1.0%$X2□                               1.00 82 200000.20 50         000253.00
         BZRZ,ERRCD          @BR IF NOT BLANK              406.74 CO                    000254.00

         BXCZ,RCTLC          @TRY NEXT CARD               241.70 42                    000254.40
         B,RCTLC1                                         253.10 00                    000255.00

CNVT     LX,$X2,CVX2         @COLUMN CHECK                445.04 10                    000255.40
         LX,$X3,CVX3         @ADDRESS PASIT               446.06 10                    000256.00
CNVT0    L%BU,12□,.70%$X2□   @CHECK FOR PERIOD             1.06 82 014000.20 50         000256.40
         KFI%BU,24□,%8□41.02 @COMPARE TO PERIOD          41.02 80 430000.23 10         000257.40
         BZAF,CVTSK          @NOT PERIOD, SKIP           271.36 CO                    000260.40

CNVT1    CT0011%V&I□%BU,8□,.12%$X2□ @CONVERT ROW 0-7 TO OCTAL  0.14 82 110000.07 70     000261.00
         L%BU,3□,SLZC6,4     @BLANK IS 0                   7.25 80 003000.20 50         000262.00
         ST%V&IC□%BU,3□,.3%$X3□ @STORE IN ADDRESS          0.03 83 203000.20 DO         000263.00
         BZXCZ,CNVT1                                     261.30 40                    000264.00

         BZB,.12&.4%$X2□,CNVT2  @CHECK FOR 4 PUNCH         0.20 82 000266.74 00         000264.40
         CM1111%BU,1□,-0%$X3□   @SET HALF WORD ADDRESS     0.00 83 001000.36 FO         000265.40

CNVT2    V&,$X2,B36          @INCREMENT INDEX TO NEXT COL  527.04 BO                    000266.40
         V&,$X3,B1           @INDEX STEPPED ONE MORE       634.06 BO                    000267.00
         C&I,$X3,6           @RESET COUNT                  6.07 00                      000267.40
CNVT3    CB,$X2,CNVT0                                     256.44 48                    000270.00

         B,CVTID             @CONVERT ID HOLLERITH.        272.10 00                    000270.40

CVTSK    V&C,$X2,B108        @INCREMENT TO NEXT FIELD      530.44 DO                    000271.00
         BZXCZ,CNVT0         @TRY NEXT FIELD              256.70 40                    000271.40

CVTID    LV,$X2,CVIX2        @COLUMN LOC & COUNT          531.04 30                    000272.00
         LX,$X3,CVIX3                                     447.06 10                    000272.40
CVTI2    CT0011%V&I□%BU,9□,.12%$X2□ @MINOR SORT 1-9         0.14 82 111000.07 70         000273.00
         L,SLZC,43           @BRING DOWN LEFT ZERO COUNT   7.21 80 007025.60 50         000274.00
         $BB,-.12-.3%$X2□,CVTI1 @TEST FOR 12 PUNCH     777777.61 82 000305.34 02         000275.00
         &I%BU,24□,9,43      @STEP TO NEXT BLOCK           0.11 80 430025.60 10         000276.00
         $BB,-.12-.2%$X2□,CVTI1 @TEST FOR 11 PUNCH     777777.62 82 000305.34 02         000277.00
         $&I,9,43            @INCREMENT BLOCK              0.11 80 430025.60 10         000300.00
         BZB,-.13%$X2□,$&3.  @CHK ZERO ROW           777777.63 82 000304.34 00         000301.00
         BB,$AOC&,6,CVTI1    @CHK FOR NUMBER PUNCH         7.62 80 000305.34 02         000302.00
         -I,18,43                                         0.22 80 430025.70 10         000303.00 M
         $&I,9,43            @INCREMENT BLOCK              0.11 80 430025.60 10         000304.00

CVTI1    LV,$X4,$R           @LOAD INDEX FROM ACCUMULATOR 11.10 30                    000305.00
         L,TYPE%$X4□         @FETCH CODE                 533.13 84 010000.20 50         000305.40
         ST%V&IC□%BU,8,8□,.8%$X3□ @STORE IN IMAGE         0.10 83 210000.20 DO         000306.40
         BZXCZ,CVTI2         @DECODE NEXT COL.           273.30 40                    000307.40

         BZB,SMB&,40,CTLCX1  @BYPASS IF INITIAL LOAD       4.50 80 000320.74 00         000310.00
         Z,$R                                            11.22 00                    000311.00
         CT0011%BU,10□,CTLCD&,48&,2  @COL 5              462.62 80 012000.07 70         000311.40
         BRZ,$&1,32                                     314.34 C2                    000312.40
         C0011%BU,4□,SLZC6,3 @UNITS                       7.24 80 004000.06 70         000313.00
         CT0011%BU,10□,CTLCD&,36&,2  @COL 4              462.46 80 012000.07 70         000314.00
         BRZ,$&1,32                                     316.74 C2                    000315.00
         C0011%BU,4□,SLZC6,3,4                            7.24 80 004002.06 70         000315.40
         CV%DU,8,4□,                                      0.00 80 010400.25 BO         000316.40
         ST%BU,5□,CDID&,1,68                             530.72 80 005042.20 DO         000317.40
         @ROUTINE TO DECODE & STORE
         @NUMBER OF PASSES DESIRED

CTLCX1   Z,$R                                            11.22 00                    000320.40
         LVI,$X2,0           @ WILL INDEX ADDRESS          0.05 01                      000321.00
         LVI,$X3,0                                        0.07 01                      000321.40
         LCI,$X3,3                                        3.07 02                      000322.00
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CTLCX2   CT0011%BU,9□,CTLCD&.96&.2%$X2□,64 @COL: ,8,69 HAVE PASS NO.    463.42 82 011040.07 70    000322.40
         BRZ,$&1.32              @BYPASS ADD IF ZERO                    325.34 C2                000323.40
         &%BU,3,1□,SLZC&.04,%$X3□                                       7.25 80 003100.20 13     000324.00
         V&,$X3,VF1                                                     527.46 B0                000325.00
         V&,$X2,VF2                                                     530.04 B0                000325.40
         CR,$X3,CTLCX2                                                  322.46 48                000326.00
         ST%BU,18,1□,PSLMT                                              646.00 80 022100.20 D0   000326.40
CTLCX    B,$                                                            327.50 00                000327.40
                                                             @
                                                             @
RCDDK    CCW,RDR,CWTEM           @WAIT FOR READR READY                  22.00 80 000443.21 00    000330.00
         BZR,CWTEM&.18,RCDDK                                            443.22 80 000330.34 00   000331.00
         RD%SEOP□,RDR,CWDK       @READ ENTIRE PROGRAM                   22.00 80 000450.11 00    000332.00
         SIC,RDWTX                                                      433.00 80                000333.00
         B,RDWT                  @WAIT FCR END OF XFR                   430.10 00                000333.40
                                                             @
         L%BU,6□,CWTEM&.19       @CHECK FOR UX                          443.23 80 006000.20 50   000334.00
         BRZ,RCDDK1                                                     342.34 C2                000335.00
         CCW,RDR,CWTEM                                                  22.00 80 000443.21 00    000335.40
         BZR,CWTEM&.23,$-1.0     @WAIT FOR CS                           443.27 80 000335.74 00   000336.00
         REL%SEOP□,RDR                                                  22.00 80 000000.33 00    000337.40
         LCI,$X10,4                                                     4.25 02                  000340.40
         CR,$X10,$                                                      341.24 48                000341.00
         B,RCDDK                                                        330.10 00                000341.40
RCDDK1   LCV%BU,6□,ID&.18        @STORE SEQ NO.                         750.22 80 006000.20 30   000342.00
         ST%BU,4□,PO&.3,4        @IN IMAGES                             755.13 80 004002.20 D0   000343.00
         ST%BU,4□,PO&.11                                                755.23 80 004000.20 D0   000344.00
         ST%BU,4□,SEO&.3,4                                              510.13 80 004002.20 D0   000345.00
         ST%BU,4□,SEO&.11                                               510.23 80 004000.20 D0   000346.00
                                                             @
         LI%BU,18□,%8□765432.    @SET UP LAST CW IDENT                  765432.00 80 422000.20 50 000347.00
         LVI,$X2,CW2             @REFILL ADDRESS FOR CHAIN              760.05 01                000350.00
         LCI,$X2,30.             @UP TO 30 CHAIN LINKS                  36.05 02                 000350.40
         LVI,$X1,CW2             @LOCATION OF CNTR WRD                  760.03 01                000351.00
CMF      CM0000%BU,1□,,.26%$X1□  @CLEAR MULTIPLE FLAG                   0.32 81 001000.00 F0     000351.40
         LX,$X0,0%$X1□           @BRING UP ORIGINAL CW                  0.00 11                  000352.40
         BZR,,.25%$X1□,STID      @TEST FOR NO CHAIN                     0.31 81 000357.34 00     000353.00
         BXVZ,STID               @TEST FOR ZERO VALUE FROM LAST REFILL  357.31 42                000354.00
         SR,$X0,$X1              @SET VAL X1 FROM REFILL ADDR           21.01 70                 000354.40
         LVI,$X3,-CW1&65.0       @SET CW REFILL TO CW2&N&1              777301.07 01             000355.00
         V&,$X3,$X2                                                     22.06 B0                 000355.40
         LR,$X0,$X3                                                     23.00 70                 000356.00
         CR&,$X2,CMF             @CHAIN UP TO LIMIT                     351.45 48                000356.40
                                                             @
STID     ST%BU,18□,,.46%$X2□                                           0.56 82 022000.20 D0     000357.00
         L%BU,64□,CHAR           @STORE ID                             510.50 80 000000.20 50   000360.00
         ST%BU□,PO1                                                     755.60 80 000000.20 D0   000361.00
                                                             @
         LX,$X3,CVX3             @INSERT BRANCHES                       446.06 10                000362.00
BDST2    L&V&I□%BU,19□,,.19%$X3□,45 @LOAD ADDRESS                       0.23 83 123026.60 50     000362.40
         BRZ,BDST1               @NON IN POSITION                       367.74 C2                000363.40
                                                             @
         $CM0000%BU,19□,-.19%$X3□ @CLEAR STORAGE                        777777.55 83 023000.00 F0 000364.00
         LV,$X5,SR               @SET ADDRESS IN INDEX                  11.12 30                 000365.00
         L%BU,32□,RD             @LOAD BRANCH TO CONTROL                374.10 80 040000.20 50   000365.40
BDST     ST%BU,32□,0%$X5□        @STORE IN PROGRAM                      0.00 85 040000.20 D0     000366.40
BDST1    CR,$X3,BDST2                                                   362.46 48                000367.40
                                                             @
         L%BU,12□,CTLCD&.12      @CHECK COLUMN 2                        462.14 80 014000.20 50   000370.00
         KFI%BU,24□,%8□20.40     @COMPARE TO K                         20.40 80 430000.23 10    000371.00
         L%BU,1□,SAE             @SET TO NOP OR BRANCH                  13.75 80 001000.20 50    000372.00
         CM1010%BU,1□,BNOP&.19   @ACCORDING TO COMPARE RESULT           642.23 80 001000.24 F0   000373.00
                                                             @
CDDKX    B,$                     @EXIT                                  374.10 00                000374.00
                                                             @
RD       RD,RETRN-CW1&64.0       @RETURN TO CONTROL ROUTINE             144.44 00                000374.40
```

Label	Instruction	Comment	Value 1	Value 2	Value 3	Value 4	Seq
TPWRT	CCW,TC1,CWTEM	@CHECK IF READY	20.00	80	000443.21	00	000375.00
	BZB,CWTEM&.18,TNR		443.22	80	000400.74	00	000376.00
	W%SEOP¤,TC1,CW1K	@WRITE CONTROL & PROGRAM	20.00	80	000451.13	00	000377.00
TPWRX	B,S	@EXIT	400.10	00			000400.00
TNR	CTL%SEOP¤,CNSL,127	@TAPE NOT READY	23.40	80	000177.15	00	000400.40
	LVI,$X14,TNRM		520.35	01			000401.40
	SIC,CNSWX	@WRITE CONSOLE	422.40	80			000402.00
	B,CNSWT		414.50	00			000402.40
	CCW,TC1,CWTEM		20.00	80	000443.21	00	000403.00
	BZB,CWTEM&.23,$-1	@WAIT FOR CHAN SIG	443.27	80	000403.74	00	000404.00
	REL%SEOP¤,TC1		20.00	80	000000.33	00	000405.00
	B,TPWRT	@TRY AGAIN	375.10	00			000406.00
ERRCD	LVI,$X14,CRDER		513.35	01			000406.40
	CTL%SEOP¤,CNSL,127		23.40	80	000177.15	00	000407.00
	SIC,CNSWX		422.40	80			000410.00
	B,CNSWT	@CONSOLE WRITE	414.50	00			000410.40
	CCW,RDR,CWTEM	@WAIT FOR CHAN SIG	22.00	80	000443.21	00	000411.00
	BZB,CWTEM&.23,$-1.0		443.27	80	000411.34	00	000412.00
	REL%SEOP¤,RDR	@CLEAR CHANNEL	22.00	80	000000.33	00	000413.00
ERCDX	B,RCTLC	@READ CONTROL CARD	241.50	00			000414.00
CNSWT	CCW,CNSL,CWTEM		23.40	80	000443.21	00	000414.40
	BB,SMR&.32,CNSWX	@BYPASS PRINT	4.40	80	000422.74	02	000415.40
	BZB,CWTEM&.18,CNSWX	@CONSOLE NOT READY	443.22	80	000422.74	00	000416.40
CNWT1	BB,CWTEM&.24,CNSWT	@WAIT FOR SEOP	443.30	80	000414.74	02	000417.40
	TI,4,0%$X14¤,MSG		0.00	8E	000504.10	A0	000420.40
	W%SEOP¤,CNSL,CNSCW		23.40	80	000457.13	00	000421.40
CNSWX	B,S	@EXIT	422.50	00			000422.40
RTPWT	CCW,TC2,CWTEM	@WAIT FOR SEOP	20.40	80	000443.21	00	000423.00
	BB,CWTEM&.24,RTPWT		443.30	80	000423.34	02	000424.00
RTPWX	$B,0		0.10	00			000425.00
TPWT	CCW,TC1,CWTEM	@GET CTL WRD	20.00	80	000443.21	00	000425.40
	BB,CWTEM&.24,TPWT	@WAIT FOR SEOP	443.30	80	000425.74	02	000426.40
TPWTX	B,S	@EXIT.	427.50	00			000427.40
RDWT	CCW,RDR,CWTEM	@GET CTL WRD	22.00	80	000443.21	00	000430.00
	BB,CWTEM&.21,RDWT1	@CHECK FOR END EXCEPT	443.25	80	000433.74	02	000431.00
	BB,CWTEM&.24,RDWT	@WAIT FOR SEOP	443.30	80	000430.34	02	000432.00
RDWTX	B,S	@EXIT	433.10	00			000433.00
RDWT1	CCW,RDR,CWTEM	@WAIT FOR CHAN SIG	22.00	80	000443.21	00	000433.40
	BZB,CWTEM&.23,RDWT1		443.27	80	000433.74	00	000434.40
	REL%SEOP¤,RDR	@CLEAR	22.00	80	000000.33	00	000435.40
	BB,CWTEM&.22,RDWTX		443.26	80	000433.34	02	000436.40
	RD%SEOP¤,RDR,CWTEM	@CONTINUE READ	22.00	80	000443.11	00	000437.40
RPTWT	CCW,TC2,CWTEM		20.40	80	000443.21	00	000440.40
	BB,CWTEM&.24,RTPWT		443.30	80	000423.34	02	000441.40
	B,RDWT		430.10	00			000442.40
CWTEM	CW,0	@TEMP STORAGE	0.00	00	000000.00	00	000443.00
CWCTL	CW%CR¤,CTLCD,15	@READS 1 CARD & IX FOR CHECK	462.00	00	000360.00	00	000444.00
CVX2	XW,CTLCD&.2%11¤,6	@START COL 12 ROW 0	464.06	00	000140.00	00	000445.00
CVX3	XW,BDAD,6	@START ADDRESS CONVERTED	531.31	00	000140.00	00	000446.00

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CVIX3    XW,CHAR,8              @HOLLERITH CODES            510.50 00 000200.00 00   000447.00
CWDK     CW%CCR¤,CW2,1,CW2      @READ CW & CHAIN            760.00 40 000020.01 F0   000450.00
CW1K     CW%CCR¤,CW1A1,RL,CW2   @WRITE IPL RECORD           577.00 40 003440.01 F0   000451.00
CWFTR    CW%CD¤,ECT,FCW1A-FCT61                             547.00 20 000460.00 00   000452.00
CWRD1    CW%CR¤,CWTP,1                                      454.00 00 000020.00 00   000453.00
CWTP     CW,0                                                 0.00 00 000000.00 00   000454.00
CWLST    CW,0                                                 0.00 00 000000.00 00   000455.00
CWTR     CW%SCCR¤,,ID-CW1A1,CWTR1 @SKIP FIRST PART            0.00 50 003220.01 30   000456.00
CNSCW    CW%CR¤,CONS,7                                      501.00 00 000160.00 00   000457.00
CWTR1    CW%CCR¤,ID,RL-ID&CW1A1,CW2                         750.00 40 000220.01 F0   000460.00
CWTR2    CW%SCCR¤,,RL-CH2&CW1A1,CW2  @SKIP END OF CTL REC     0.00 50 000000.01 F0   000461.00
                                                    @
CTLCD    DR%BU,12¤,%80¤         @80 COLUMNS.                17.00                    000462.00
                                                    @
CONS     DR%BU¤,%3¤             @LITES                       3.00                    000501.00
MSG      DR%BU¤,%4¤             @TYPEWRITER                  4.00                    000504.00
                                                    @
TYPO     DD%BU,8¤,%8¤375                                                      375    000510.00
SEQ      %IQS*¤DD%BU,8,8¤,00, * @SEQUENCE NO                                         000510.10
CHAR     DR%BU,8,8¤,%8¤         @IDENTITY                    1.00                    000510.50
         DD%BU,8,8¤,%8¤376                                                    376    000511.50
         CNOP
FIN      DD%BU,8¤,%8¤375                                                      375    000512.00
         %IQS*¤DD%BU,8,8¤,END*                                                      000512.10
         DD%BU,8,8¤,%8¤376      @END CODE                                     376    000512.40
         CNOP
CRDER    DD%BU,8¤,%8¤375        @CAR RTN                                      375    000513.00
         @IQS*¤DD%BU,8,8¤,CARD ERROR-RELOAD CONTROL CARD*                            000513.10
         DD%BU,8,8¤,%8¤376      @END                                         376    000513.10
         CNOP                                               0.30 00                 000513.40
HDG      DD%BU,8,8¤,%8¤375                                                    375    000514.00
         %IQS*¤DD%BU,8,8¤,PROGRAM SEQUENCE*                                          000514.10
         DD%BU,16,8¤,%8¤176775  @DOUBLE SPACE                             176775     000516.10
         %IQS*¤DD%BU,8,8¤,NO. IDENTITY*                                              000516.30
         DD%BU,8,8¤,%8¤376                                                    376    000517.70
         CNOP
TNRM     %IQSZ¤DD%BU,8,8¤,  TC1 UNIT 0 NOT RDY.Z                                     000520.00
         DD%BU,16¤,%8¤176776                                               176776    000522.50
         CNOP
TPER     %IQS*¤DD%BU,8,8¤, TAPE ERR-STATUS BITS  *                                   000523.00
ST       %IQS*¤DD%BU,8,8¤,0000000*                                                   000525.70
         DD%BU,16,8¤,%8¤176776                                             176776    000526.60
                                                    @
B36      VF,,36                                              0.44&                   000527.00
VF1      VF,1,32                                             1.40&                   000527.40
VF2      VF,-0.12                                            0.14-                   000530.00
B108     VF,,108                                             1.54&                   000530.40
CDID     DR%BU,6¤,%1¤                                        0.06                    000530.71
CVIX2    VF,CTLCD%72¤6.3        @ID COLUMN START-73         477.43&                  000531.00
BDAD     DR%BU,19¤,%6¤           @ADDRESSES FOR BRANCH DISABLE   1.62                000531.31
TYPE     %IQS*¤DD%BU,8,8¤,ABCDEFGHIJKLMNOPQRSTUVWXYZ123456789 *                      000533.13
CH1      CW%CDSC¤,CW1A1,CH2-CW1A1&1,CH2                     577.00 60 003460.01 F1   000540.00
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                SLC.%8¤547.                                                              000547.00

                                         ●
                                         ●
                                         @THIS CONTROL ROUTINE STARTS AT
                                         @LOCATION 100%8¤.
        ECT      CW%CR¤.64..RL-1                              100.00 00 003420.00 00       000547.00
        ENDTP    BD.ECW-ENDTP&65.0                            104.04 00                    000550.00
        EWT      CCW.TC1%SX7¤.ECW-ENDTP&64.                    20.00 87 000103.21 00       000550.40
                 BB.ECW-ENDTP&64.24.EWT-ENDTP&64.             103.30 80 000100.74 02       000551.40
        EWX      B.0%SX15¤                                      0.10 0F                    000552.40
                                         ●
        FCW      XW.-1               @CONTROL WORD WITH SEOP SET  0.01 80 000000.00 00     000553.00
                                         ●
                 LI%BU.18¤.%8¤765432.  @FIND CHAN NUMBER OF IPL 765432.00 80 422000.20 50  000554.00
                 LX.SX7.SZ             @REFILL FIELD OF CW WILL HAVE ID  0.16 10           000555.00
        ECSH     CCW.TC1%SX7¤.ECW-ENDTP&64.  @CHK ALL CN S      20.00 87 000103.21 00      000555.40
                 KF%BU.18¤.ECW-ENDTP&64.46  @COMPARE REFILL ADDR TO ID 103.56 80 022000.23 10  000556.40
                 RAE.S-ENDTP&65.0           @THIS IS IT        110.76 C2                    000557.40
                 CBH.SX7.ECSH-ENDTP&64.     @KEEP SEARCHING    105.56 C8                    000560.00
                 B.EWAIT-ENDTP&64.0                            112.10 00                    000560.40
        ERFAD    RD%SEOP¤.TC1%SX7¤.ECW1A-FNDTP&64.  @READ FIRST RECORD 20.00 87 000121.11 00  000561.00
                                         ●
        EWAIT    SIC.SX15                                       37.00 80                    000562.00
                 B.EWT-FNDTP&64.                               100.50 00                    000562.40
                                         ●
                 REW%SFOP¤.TC1%SX7¤    @REWIND                  20.00 87 000136.15 00       000563.00
                                       @WAIT FOR CHANNEL SIGNAL
                 CCW.TC1%SX7¤.ECW-ENDTP&64.                     20.00 87 000103.21 00       000564.00
                 RZB.ECW-ENDTP&64.23.S-FNDTP&63.              103.27 80 000114.34 00       000565.00
                 REL%SFOP¤.TC1%SX7¤                            20.00 87 000000.33 00       000566.00
                                         ●
                 B.FREAD-ENDTP&64.0         @TO READ RECORD    111.10 00                    000567.00
                                         ●
        CH3      CW%CDSC¤.EWT.END-EWT&1.FND                    550.40 60 004240.01 F2       000570.00 V
                                         ●
                                         ●
                                         ●
        FCW1A    CW%CCR¤.S-FNDTP&64..1.S-FNDTP&64.             121.00 40 000020.00 51       000571.00
        TC1      SYN.32                                         0.00&    &00000040
        TC2      SYN.33                                         0.00&    &00000041
        RDR      SYN.36                                         0.00&    &00000044
        CNSL     SYN.39                                         0.00&    &00000047
        RL       SYN.CH2-CW1A1                                162.00&    &00000000          BU.100.10
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                              @THIS CONTROL ROUTINE STARTS AT
                              @LOCATION 100%8¤.
            SLC,%8¤577,                                                                    000577.00

                              @LOAD SELF & CHAIN
CW1A1       CW%CCR¤,64.,RL-1,CW2-CW1&64.              100.00 40 003420.00 B0               000577.00

CW1         BD,CW3-CW1&65.0                           104.04 00                            000600.00
WAITC       CCW,TC1%$X7¤,CW3-CW1&64.  @WAIT FOR SEOP   20.00 87 000103.21 00               000600.40
            BB,CW3-CW1&64.24,WAITC-CW1&64.            103.30 80 000100.74 02               000601.40
WTXC        B,0%$X15¤                 @EXIT             0.10 0F                            000602.40
CW3         XW,-1                                       0.01 80 000000.00 00               000603.00


            LI%BU,18¤,&8¤765432.      @FIND CHANNEL NUMBER OF IPL  765432.00 80 422000.20 50  000604.00
            LX,$X7,$Z                 @REFILL FIELD OF CW WILL HAVE ID   0.16 10           000605.00
CHSCH       CCW,TC1%$X7¤,CW3-CW1&64.  @CHK ALL CW S     20.00 87 000103.21 00               000605.40
            KF%BU,18¤,CW3-CW1&64.46   @COMPARE ID TO REFILL FIELD  103.56 80 022000.23 10   000606.40
            BAF,$-CW1&65.             @THIS WAS THE CHAN          110.76 C2                 000607.40
            CBH,$X7,CHSCH-CW1&64.     @KEEP SEARCHING-           105.56 C8                 000610.00
            B,WAIT-CW1&64.0                                      112.10 00                 000610.40
READ        RD%SEOP¤,TC1%$X7¤,CW1A-CW1&64.  @READ NEXT RECORD     20.00 87 000257.11 00     000611.00

WAIT        SIC,$X15                                   37.00 80                            000612.00
            B,WAITC-CW1&64.           @TO COMMON WAIT           100.50 00                  000612.40
            SVA,$X7,TCID-CW1&64.0                      147.17 D0                           000613.00
            LVI,$X6,0                                   0.15 01                            000613.40
            LCI,$X6,B                                  10.15 02                            000614.00
            RFL%SEOP¤,TC1%$X6¤                          20.00 86 000000.33 00              000614.40
            CBH,$X6,$-CW1&64.0-.32                     115.14 C8                           000615.40

TEST        L%BU,6¤,CW3-CW1&64.06.19  @LOAD STATUS BITS  103.23 80 006000.20 50           000616.00
            BZRZ,$-CW1&64.0           @HANG IF ANY ERRORS       117.34 C0                 000617.00
            C0011%BU,32¤,SMB          @CONVET SWITCH POSITION    4.00 80 040000.06 70      000617.40
            BRZ,EXIT-CW1&64.          @NONE SET                 134.74 C2                 000620.40

            LV,$X3,ID-CW1&64.         @TEST SWITCH POSITION     250.06 30                 000621.00
            BB,SMB%$X3¤,EXIT-CW1&64.                    4.00 83 000134.74 02               000621.40

TST         LI%BU,6¤,31,55           @CHECK IF ANY SELECTIONS  370000.00 80 406033.60 50   000622.40
            -%BU,6¤,ID-CW1&64.18,55                    250.22 80 006033.70 10              000623.40
            BRZ,BKSPC-CW1&64.                          127.74 C2                           000624.40
            LV,$X4,$R                                   11.10 30                           000625.00

            L%BU¤,SMB&.1%$X3¤,64%$X4¤  @ANY ABOVE ID     4.01 83 000040.20 54              000625.40
            BRZ,BKSPC-CW1&64.         @NONE ABOVE       127.74 C2                          000626.40

            B,READ-CW1&64.0           @MOVE TAPE FORWARD.       111.10 00                  000627.00

BKSPC       LV,$X2,7.0                @RESET IX TO LOWEST SELECTION   7.04 30             000627.40
BK1         BS%SEOP¤,TC1%$X7¤,        @BACK ONE RECORD  20.00 87 000176.15 00              000630.00 A
            SIC,$X15                                    37.00 80                           000631.00
            B,WAITC-CW1&64.                            100.50 00                           000631.40

            VS,$X2,B1-CW1&64.0        @STEP COUNTER     134.04 80                          000632.00
            KV,$X2,ID-CW1&64.0        @WAIT UNTIL IX IS STEPPED HIGHER  250.04 90          000632.40
            BZXH,BK1-CW1&64.0         @THAN ID          130.33 40                          000633.00

            B,READ-CW1&64.0           @TAPE IN POSITION-READ NEXT RECO  111.10 00          000633.40
B1          VF,.1                                        0.01&                            000634.00
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                                                                              23.40 80 000103.21 00        000634.40
EXIT      CCW,CNSL,CW3-CW1664.0                                               103.22 80 000141.74 00        000635.40
          R7R,CW3-CW1664.06.18,BNOP-CW1664.0-.32                               23.40 80 000251.13 00        000636.40
          W%SEOP¤,CNSL,TY-CW1664.0   @WRITE ID                                 23.40 80 000103.21 00        000637.40
CN        CCW,CNSL,CW3-CW1664.0                                               103.30 80 000137.74 02        000640.40
          BB,CW3-CW1664.06.24,CN-CW1664.0  @WAIT FOR SEOP
                                                                      ●
          SIC,WTX-CW1664.              @TO MAN INTUN IF REQUIRED              171.00 80                     000641.40
BNOP      B,WAIT63-CW1664.0               @CHANGED TO NOP IF NOT NEEDED       164.50 00                     000642.00
                                                                      ●
OUT       LV,$X1,CW2-CW1664.0          @SET EXIT ADDRESS                      260.02 30                     000642.40
          M&1%BU,18¤,WTX-CW1664.32 @STEP PASS COUNTER                         171.40 80 022000.22 B0        000643.00
          B,0%$X1¤                     @TO START OF PROGRAM                     0.10 01                     000644.00
                                                                      ●
          @RETURN FROM MAIN PROGRAM AFTER A PASS                                0.01 01                     000644.40
RETRN     LVI,$X0,0                    @LOAD PASS COUNT                       144.40 80 022000.22 B0        000645.00
          M&1%BU,18¤,RETRN-CW1664.  @STEP PASS COUNT                            0.01 04                     000646.00
PSLMT     KVI,$X0,0                    @COMPARE TO LIMIT                      142.72 C0                     000646.40
          BZXE,OUT-CW1664.0                                                     0.17 01                     000647.00
TCID      LVI,$X7,0                    @SET UP CHANNEL NUMBER                 144.40 80 022000.00 F0        000647.40
          CM0000%BU,18¤,RETRN-CW1664.   @CLEAR PASS COUNTER                    20.00 87 000000.17 00        000650.40
          LOC%SFOP¤,TC1%$X7¤,          @SET UP TAPE                            37.00 80                     000651.40
          SIC,$X15                                                            100.50 00                     000652.00
          B,WAITC-CW1664.
                                                                      ●
          ODDNFC%SEOP¤,TC1%$X7¤                                               20.00 87 000157.15 00         000652.40
          SIC,$X15                                                            37.00 80                      000653.40
          B,WAITC-CW1664.                                                    100.50 00                      000654.00
                                                                      ●
          HD%SEOP¤,TC1%$X7¤                                                   20.00 87 000036.15 00         000654.40
          SIC,$X15                                                            37.00 80                      000655.40
          B,WAITC-CW1664.                                                    100.50 00                      000656.00
                                                                      ●
          C0011%BU,32¤,$MB           @CONVERT SELECTION                        4.00 80 040000.06 70         000656.40
          BRZ,READ-CW1664.           @NO SELECTION-CONTINUE                  111.34 C2                      000657.40
                                                                      ●
          LV,$X3,ID-CW1664.          @SET X3 TO IC                           250.06 30                      000660.00
          LV,$X2,$AOC-.12            @HOW MANY SELECTIONS                      7.44 30                      000660.40
          KVI,$X2,,32                                                          0.45 04                      000661.00
          BXH,TST-CW1664.            @MORE THAN ONE                          122.73 42                      000661.40
                                                                      ●
          BB,$MB6.37,OUT-CW1664.0    @INDEFINITE LOOP SELECTED                 4.45 80 000142.74 02         000662.00
          SIC,WTX-CW1664.0              @TO MINT LOOP                         171.00 80                      000663.00
          B,WAIT63-CW1664.0                                                  164.50 00                      000663.40
                                                                      ●
WTAFT     B,TEST-CW1664.0            @AFTER LOOP-TRY AGAIN                    116.10 00                      000664.00
                                                                      ●
WAIT63    LX,$X0,WTX-CW1664.         @DISPLAY LOCATION IN UPPER              171.00 10                      000664.40
          SX,$X0,$UB                 @AND PASS COUNT IN LOWER BOUNDARIES      3.01 10                      000665.00
                                                                      ●
          L%BU,1¤,$MB6.63            @SET INITIAL SETTING OF MB63              4.77 80 001000.20 50         000665.40
          CM1010%BU,1¤,WT2&.30-CW1664.  @MODIFY BRANCH IND ON/OFF            170.76 80 001000.24 F0         000666.40
                                                                      ●
WT1       L%BU,1¤,$MB6.63            @LOAD ONE BIT                             4.77 80 001000.20 50         000667.40
WT2       BZRZ,WT1-CW1664.0          @WAIT FOR CHANGE                        167.74 C0                      000670.40
          CNOP                                                                                             000671.00
WTX       B,$                        @EXIT WHEN CHANGED                      671.10 00                      000671.40
          VF,0                       @PASS COUNTER                             0.006
                                                                      ●
          SLC,%8¤750.0                                                                                     000750.00
ID        VF,0                                                                0.006                        000750.00
TY        CW%CR¤,$-CW1665.                                                  252.00 00 000000.00 00          000751.00
          DR%BU¤,%3¤                                                          3.00                          000752.00
          DD%BU,8,8¤,%8¤375                                                                   375           000755.00
PO        %IOS#¤DD%BU,32,8¤,,00.  *                                                                         000755.10
PO1       DD%BU,64¤,0                     0000000000000000000000000            000755.60
          DD%BU,8,8¤,%8¤376                                             376                                000756.60
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```
CW1A     CW%CCR¤,S-CW1&64,,1,S-CW1&64,   @SIMULATE IPL      257.00 40 000020.00 AF     000757.00
CW2      CW,0                                                 0.00 00 000000.00 00     000760.00
CH2      CW%CDSC¤,ECT,CH3-FCT&1,CH3                          547.00 60 000440.01 78     000761.00

FND      CW%CR¤,FND,15,END                                  762.00 00 000360.01 F2     000762.00
                          FND,START                         100.00                     000763.00
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