

**8TS10A  
CHANNEL SCAN PROGRAM**

**January 15, 1962**



## Channel Scan Program

### I. Purpose of Test

To examine the contents of CWS for one or two channels or to look at only one CC for one channel, according to option selected, while writing and reading variable length records on tape with 1 to 4 channels operating, and to tabulate the results as output, on error.

### II. Method of Test

It is assumed that the 7080 CPU and channel operation are in good working order in all areas other than those specifically tested in this program.

1. The program runs in Interrupt mode with 4 channels overlapping each other. Each channel interrupt program consists of WR - BSP - RD routines.
2. After every 5 passes in the program the length of the record being written is changed. The change is under the control of a number generator which generates random numbers between 1 and 1000. The record length is different for each channel in any given pass.
3. The pass counter stepping is based on the number of passes made in the interrupt program for the channel that has been manually selected.
4. Each record being written has a tag. The tag counter stepping is under the control of the pass counter, stepping by one every time that the pass counter increases by 5.
5. With 912 ON the tag counter and Number generator are bypassed. Thus, the record length and the record tag on each channel do not change while 912 is on.
6. After WR or RD instruction has been given for the channel selected the program enters a WR or RD delay loop, as the case may be, where the program just waits for WR or RD to begin. This is followed by a variable delay which is under the manual control of the operator.

7. After WR or RD has begun the program looks at the words 1, 2 and 3 of the single or double channels selected and unloads them in a prescribed area, tabulating them under proper headings for output on tape, typewriter or printer, on error.
8. If C. C. option is selected the output table will contain only control characters for Data WD A and other characters in the channel will not appear in the table. The output will be on tape, typewriter or printer, on error, as above.
9. The output tables are so set up as to take care of a record of 1000 characters for a 729 IV or VI 62.5 KC tape. For slower tapes the tabulation will be for records of shorter length. In order to cover 1000 characters on slower tapes it will be necessary to generate the table a number of times depending upon the speed of the tape being used, taking advantage of the variable delay provided in the program. The variable delay consists of 3 SET LEFT instructions each with an address that can be varied from 0 to 19999 to give a total delay of from 0 to 60 ms. These are located at:

for WR	03924
	03929
	03934
for RD	04054
	04059
	04064

10. The records being written are as follows:
  - On channel 20 - Tag, ABCDE ..123....and multiples thereof
  - On channel 21 - Tag, ...987...EDCBA and multiples thereof
  - On channel 22 - Tag, ACE... 357..... and multiples thereof
  - On channel 23 - Tag, ....753.....ECA and multiples thereof

For complete description, refer to the listing.

11. There are two NOPS provided at the end of each of the three routines that generate one of the three possible output tables. These are there for the convenience of the operator should the table generation be in error. For their positions refer to the listing.

### III. Area of Machine Required

#### 1. Units

- a. 7080 CPU
- b. 7621 TCU
- c. Two tape drives on channel 21 - one with address 2109 at low density to be used as output tape if output on tape is desired.
- d. One tape drive for each channel tested - except for channel 21 which always requires two tapes, one with address 2109 at low density if output on tape is desired. Tapes 2000, 2100, 2200 and 2300 will not be used by the program.

#### 2. Memory Locations

- |    |                |   |
|----|----------------|---|
| a. | 00000 to 18174 | 8TS10   |
| b. | 18200 to 18800 | Load Program  |
| c. | 18995 to 46000 | Routines to prepare the output tables, generated by 8TS10 |
| d. | 46000 to 60000 | Output table for WR generated by 8TS10                    |
| e. | 66000 to 80000 | Output table for RD generated by 8TS10                    |

### IV. Loading Procedure

#### 1. Card

Use standard load program 8LD01 with cards in the following order:

8LD01	2 cards
8TS10	244 cards
8TR02	1 card
Blanks	3 cards

#### 2. Tape

Use a tape generated by 8TR06. Refer to 8TR06 write-up for complete details on generating and using this tape.

## V. Program Control

1. Check Switches - 901 and 902 to Program  
900, 903, 904 and 905 in Automatic
2. Alteration Switches
  - 911 ON - Bypass Error Typeouts and Halts
  - 912 ON - Keep Record Lengths and Tags Constant
  - 913 ON - Stop on Error
  - 914 ON - Repeat the Test
  - 915 ON - Output on Typewriter (on Error)
  - 916 ON - Output on Printer (on Error)
  - 915 & 916 Off - Output on Tape (on Error)
3. Other Switches
  - All Off.
4. Manual Control
  - a. 1 channel option (1 CWS option)  
When Halt 0000 occurs, at 00519 store a one digit number corresponding to channel selected.  
Example: "1" for channel 21, etc.
  - b. 2 channel option (2 CWS option)  
When Halt 00000 occurs, at 00518 store a two digit number corresponding to the two channels selected as above. Note that the last digit stored determines for which channel the output table will be prepared and thus the delays and the number of passes in the program will be governed by the interrupt program for that channel.
  - c. Control Character Option (C. C. Option)  
When Halt 00000 occurs, store the channel number as in "a". Also at 00517 store a "c".

## VI. Normal Stops

1. Halt 0000. This stop occurs on program entry. Store an option and start.
2. Halt 0030. This occurs when the output is on tape 2109 and when at completion of job INT 251 button is depressed. This halt tells the operator that tape mark has been put on tape 2109.

## VI. Normal Stops (Continued)

3. Halt 0040. This occurs when 2109 reaches end of file.
4. Halt 0050. This occurs when 2109 reaches end of file.  
When Halt 0040 or 0050 occur take 2109 off and put on a new one and start.

## VII. Error Stops

- a. Halt 0001. This stop occurs if digits lower than "0" are stored at 00519. Store again correctly and start.  
Note: If digits higher than 3 are stored at 00518 or 00519 incorrect operation will result but the above halt will not occur.
- b. Halt 0002. This stop occurs if the number generator is not functioning properly and if 913 is ON. Put 912 ON and start. If this halt does not occur again turn both 912 and 913 Off.
- c. Halt 0010. This stop occurs on channel check from any of the channels with 913 ON. If the error is in the selected channel put 912 ON, check output option selected and start. After obtaining output turn 912 Off. Otherwise just start.
- d. Halt 0020. This stop occurs if RD-WR fields on any channel do not compare equal, with 913 ON. Use the same procedure as above.

## VIII. Typeouts

### 1. Normal Typeouts

- a. " 1 CWS Option - At 00519 store a one digit No. 0, 1, 2 or 3 for channel 20, 21, 22 or 23".  
" 2 CWS Option - At 00518 store a 2 digit No. each digit corresponding to one channel as above".  
"C. C. Option - Store channel No. as in option 1 and at 00517 store a "c".  
"Output Option - 915 ON, TYPEOUT - 916 ON, PRINT - Both off WR ON TAPE". This typeout occurs on program entry in the first pass only. Follow the message and Start.
- b. "Z". This will be typed out after every 100 passes in the program if 914 is ON.

## 2. Error Typeouts

- a. "Set Up Incorrect". This occurs if any digit less than 0 is stored in position 00519. Check digits stored and Start. Note if digits higher than 3 are stored in positions 00518 and 00519 incorrect operation will result but this message will not be typed out.
- b. "Selected Chan 2X Not Available", where "X" stands for channel number. This occurs if by manual storing a channel is selected which is not available. Reset and Start, when Halt 0000 occurs store again, make the channel available and start.
- c. "CHK GENERATOR". This occurs if the number generator is not functioning correctly due to CPU errors. Put 912 ON and start. If the typeout does not occur again turn 912 Off. Or put both 912 and 913 ON and Start. If the typeout followed by Halt 0002 does not occur again turn 912 and 913 Off.
- d. "CHAN CHK ON -- CHAN 2X", where -- is either "WR" or "RD" and "X" stands for channel number. Example: "CHAN CHK ON RD CHAN 23".
- e. "RW REG VRC".  
 "REG A VRC".  
 "ECHO CHK".  
 "READ LRCR".  
 "CMP CHK".  
 "SKEW CHK".  
 "DWT CHK".  
 "UNANS DEMAND".  
 "CHANNEL ID".  
 "MPX OVFL".

All these typeouts are the result of interrogating Channel Check Scanner Information by means of a RD (03) instruction.

- f. "CHAN 2X RD-WR UNEQUAL", where "X" refers to channel number. This occurs when RD and WR fields on any channel do not compare equal.
- g. "CHAN CHK ON OUTPUT TAPE". This is typed out when channel check occurs while putting the tabulation on output tape.

## IX. Output On Error

### 1. I/O Units Used

- a. Typewriter                    915 ON
- b. Printer                        916 Off
- c. Tape, with address 2109 set at low density 915 and 916 Off

### 2. Procedure On Error

- a. Turn 912 ON. Otherwise in the following pass the length of the record being written might change.
- b. With more than one channel operating it is possible to get interrupts from the other channels just before entry is made in the routine that generates the table and thus, some of the information might be lost. If such an output table is obtained in order to minimize loss of information change every NOP to TR in those channel interrupt programs that interfere with the table. There are 2 NOP's in each channel program. Changing them to TR bypasses the error typeouts on WR and the whole of CMP routine for that channel. They are located as follows:

Channel 20	04575
	04720
Channel 23	07745
	07890
Channel 22	10910
	11055
Channel 21	14085
	14230

- c. The procedure for slow tapes has already been discussed. (See Method of Test).
- d. After obtaining correct output turn 912 OFF.
- e. If tape 2109 is used for output, at completion of job hit the INT 251 button. This will write Tape Mark and rewind the tape. This is signified by Halt 0030.
- f. Never hit Reset in the middle of the program.

### 3. Format of Output

- a. C. C. Option - The heading will indicate the channel and also the length of the record. It will indicate whether the table was formed during WR or RD. The control character tabulated is that for Data WD A for the channel selected. The control character will appear in the table once every 5 positions, the other positions containing blanks. Successive C. C. 's are printed from left to right. Wide paper must be used. (See sample)
- b. 1 CWS Option - The heading will be similar to that in "a" above. The table will be made up of 28 position entries each containing Data WD A, Data WD B and AWD for the channel selected and the first 4 characters of WD 0 of the next channel, with the latter appearing on the left and the others following in the order mentioned above. Successive CWS's are printed from left to right. Wide paper must be used. (See sample)
- c. 2 CWS Option - This will be the same as in "b" but for two channels. Wide paper must be used. (See sample)

Note: Since the channel operations are completely asynchronous, during the tabulation, the second channel may not be reading or writing, in such a case the tabulation for the second channel will be identical line by line and the length of the record to be read or written may or may not be tabulated. Also, the words "WR" and "RD" as they appear in the heading for the second channel will be exactly the same as in the heading for the first channel whether this is actually the case or not.

### X. Comments

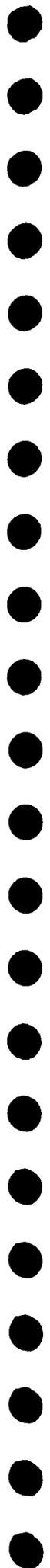
It should be emphasized that 8TS10 is a service aid program and that the operator should be quite familiar with the write up. A thorough familiarity with the manual intervention procedures is necessary in some cases in order to obtain an output table which contains all the information required.

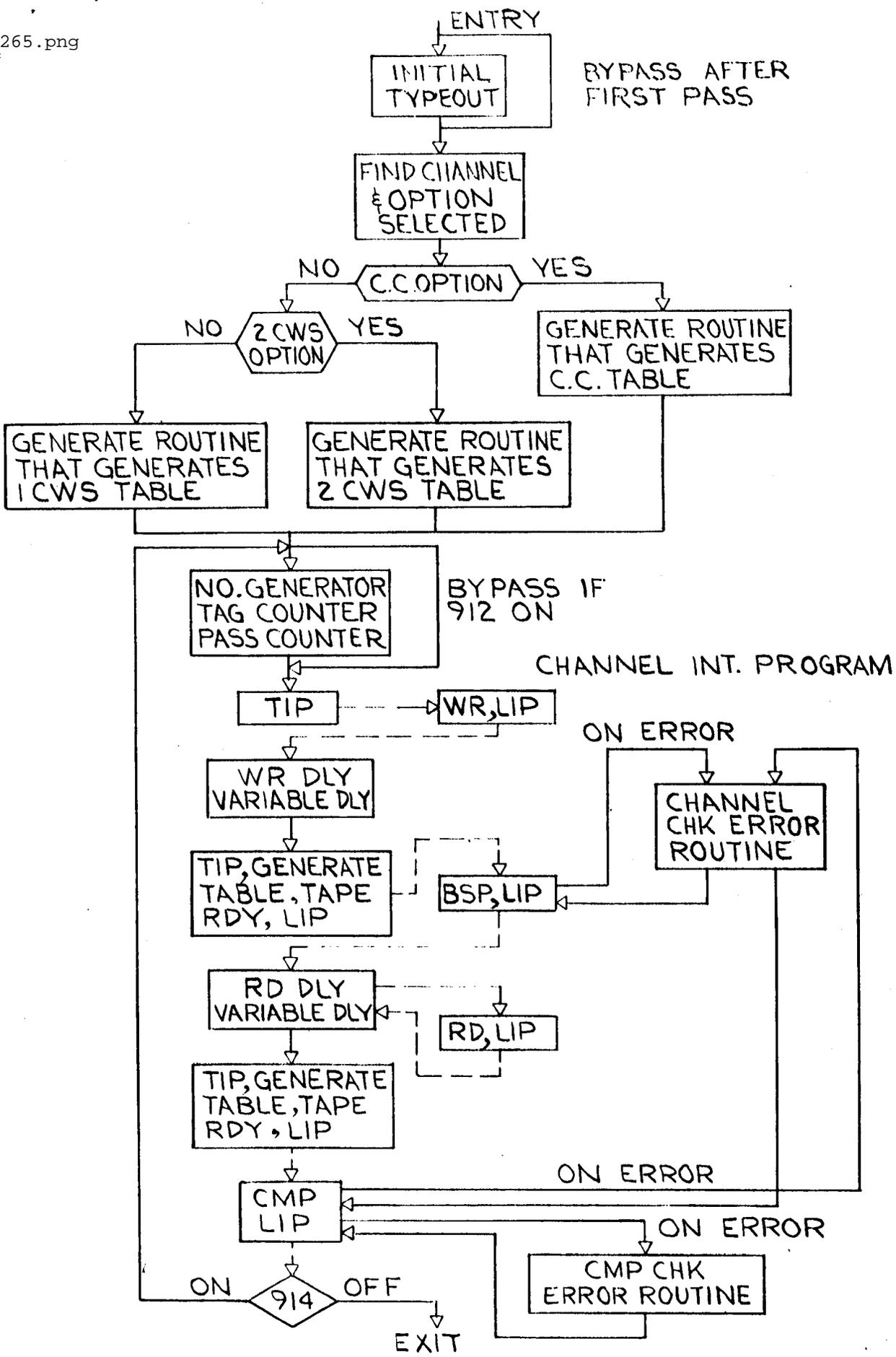
**Addition to 8TS10 Write-up**

The following notes are added to further clarify the write-up.

1. When output tape is being printed use 6 lines/inch and double space for the sake of clarity.
2. When Chan Chk occurs on WR and after tabulation for WR is complete, if it is desired to obtain the tabulation for RD for the same record, with or without Chan Chk on RD, change the first TRS 03 to TR in CMP routine of the Interrupt program for that channel. After output for RD has been obtained change TR back to TRS 03. Note that the tabulation will be automatically obtained when a channel chk occurs on RD.
3. If the record read back is a long record, the output table will show this by the last AWD being higher than what it should be for the record read.
4. It should be pointed out that since storage read out is 8 characters at a time the 24 or 28 character lines on the output table do not correspond to one point in time but to 3 or 4 points respectively, with channel operation going on in between.
5. The 24 character lines occur when the next higher channel is not used otherwise the lines will be 28 characters. Hence, the tabulation for chan 23 will always be in 24 character lines.

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LAYOUT OF THE PROGRAM







8TS10A 11/15/61  
 CHANNEL SCAN PROGRAM  
 900,903,904,905, ON AUTO  
 901,902, TO PROGRAM  
 911 ON-BYPASS ERROR  
 TYPEOUTS & HALTS  
 912 ON-FREEZE RECORD LENGTH  
 913 ON-STOP ON ERROR  
 914 ON-REPEAT PROGRAM  
 915 ON-TYPEOUT TABLE  
 AS PER SET UP.  
 916 ON-PRINT TABLE  
 AS PER SET UP.  
 915 & 916 BOTH OFF-WRITE TABLE  
 ON TAPE 2109 AS PER SET UP  
 STORE AS PER TYPEOUT ACCORDING  
 TO OPTION DESIRED.

00004	EEM	3	14	0000	06-0	
00009	NOP	A		0654		
00014	CHR	3	13	0000	06 0	
00019	NOP	A		0094	-----	
00024	SGN	T		0015		I
00029	SPC	,		2004		I
00034	LFC	,	02	0734	07L4	I
00039	SPC	,		2104		I
00044	LFC	,	02	0734	07L4	I
00049	SPC	,		2204		I
00054	LFC	,	02	0734	07L4	I
00059	SPC	,		2304		I
00064	LFC	,	02	0734	07L4	I
00069	SPC	,		2510		I
00074	LFC	,	02	0739	07L9	I
00079	SPC	,		2514		I
00084	LFC	,	02	0734	07L4	I
00089	SPC	,		0000		I
00094	RCV	U		0517	.....	I
00099	BLM	\$	01	0003	00 3	I
00104	NOP	A		0144	-----	
00109	SGN	T		0100		I
00114	SEL	2		0500		I
00119	WR	R		0150		I
00124	WR	R		0194		I
00129	WR	R		0284		I
00134	WR	R		0376		I
00139	WR	R		0442		I
00144	HLT	J		0000	.....	I
00149	TR	1		0524	-----	

SWITCH TO RESET STORE FIELD  
 AFTER FIRST PASS

SWITCH TO BYPASS WR  
 AFTER FIRST PASS

-----A02 TO NEXT PAGE

- 2 043 00192
- 2 001 00193
- 2 032 00225
- 2 039 00264
- 2 018 00282
- 2 001 00283
- 2 030 00313
- 2 031 00344
- 2 030 00374
- 2 001 00375
- 2 029 00404
- 2 032 00436
- 2 004 00440
- 2 001 00441
- 2 035 00476
- 2 036 00512
- 2 001 00513

SET UP MESSAGE  
 900,903,904,905 TO AUTO,901,902, TO PROGRAM  
 1 CWS OPTION - AT 00519 STORE A  
 ONE DIGIT NO.0 , 1 , 2 OR 3 FOR CHAN.  
 20 , 21 , 22 OR 23  
 2 CWS OPTION - AT 00518 STORE  
 A 2 DIGIT NO. EACH DIGIT CORRES  
 PONDING TO ONE CHAN. AS ABOVE  
 C.C.OPTION - STORE CHAN. NO.  
 AS IN OPTION 1 & AT 00517 STORE  
 A C.  
 OUTPUT OPTION - 915 ON , TYPEOUT -  
 916 ON , PRINT - BOTH OFF,WR ON TAPE



DETERMINE SET UP

```

B02..... 00744 SPC , 0000
           00749 SET B 0001
           00754 LOD 8 0517
           00759 CMP 4 0965
           00764 TRE L 0789-----
           00769 LOD 8 0518
           00774 CMP 4 0966
           00779 TRH K 0809-----
           00784 TR 1 0834-----
           00789 LOD 8 0519.....
           00794 UNL 7 0977
           00799 UNL 7 0972
           00804 TR 1 0849-----
           00809 LOD 8 0518.....
           00814 UNL 7 0987
           00819 LOD 8 0519
           00824 UNL 7 0992
           00829 TR 1 1364-----D05
           00834 LOD 8 0519.....
           00839 UNL 7 0992
           00844 TR 1 2149-----F08
           00849 SET B 0010.....
           00854 LOD 8 0979
           00859 UNL 7 19004 Z004
           00864 SET B 02 0000 00-0
           00869 SET B 02 0020 00K0
           00874 SET B 0000
           00879 SET B 0134
           00884 SET B 01 0005 00 5
           00889 LOD 8 01 0984 09Y4
           00894 UNL 7 01 19009 Z0 9
           00899 LDA # 01 0984 09Y4
           00904 ADD G 01 0968 09W8
           00909 ULA * 01 0984 09Y4
           00914 LDA # 01 0894 08Z4
           00919 ADD G 01 0968 09W8
           00924 ULA * 01 0894 08Z4
           00929 NTR X 0884
           00934 NTR X 02 0874 08P4
           00939 SET B 0004
           00944 LOD 8 0999
           00949 UNL 7 0984
           00954 LOD 8 1003
           00959 UNL 7 0894
           00964 TR 1 1009-----C04
  
```

C. C. OPTION

2 CWS OPTION  
1 CWS OPTION

SELECT PROPER SUB ROUTINE  
GENERATOR

C. C. OPTION GENERATOR

2 CWS OPTION GENERATOR

1 CWS OPTION GENERATOR

C.C. OPTION GENERATOR

GENERATE THE ROUTINE  
THAT PREPARES THE TABLE  
WR-SECTION

ADD 5

ADD 5

TO NEXT PAGE

CONSTANTS

- 2 005 00969
  - 2 010 00979
  - 2 005 00984
  - 2 010 00994
  - 2 005 00999
  - 2 002 01001
  - 2 002 01003
- CZAE  
 22-0-,2-35  
 ,66&J  
 ,2-10,2-10  
 ,66&J  
 Z0  
 #9

C.C. OPTION GENERATOR  
CONTINUED.

```

C03..... 01009 SET B 0025
           01014 LOD 8 1244
           01019 UNL 7 32429 B429
           01024 RCV U 648M
           01029 BLM $ 0024
           01034 RCV U 2624M 024M
           01039 BLM $ 0024
           01044 SET B 0036
           01049 LOD 8 1315
           01054 UNL 7 6510
           01059 LOD 8 1351
           01064 UNL 7 26270 0270
           01069 SET B 0001
           01074 LOD 8 0977
           01079 UNL 7 1304
           01084 UNL 7 1340

```

LOD 5 INSTRUCTIONS END  
OF WR- SECTION

BLANK TABLE HEADING ON WR  
BLANK TABLE HEADING ON RD

SET UP TABLE HEADING ON WR  
SET UP TABLE HEADING ON RD

```

           01089 SET B 0010
           01094 LOD 8 0979
           01099 UNL 7 32439 B439
           01104 SET B 02 0000 00-0
           01109 SET B 02 0020 00K0
           01114 SET B 0000
           01119 SET B 0134
           01124 SET B 01 0005 00 5
           01129 LOD 8 01 1274 12X4
           01134 UNL 7 01 32444 B4U4
           01139 LDA # 01 1274 12X4
           01144 ADD G 01 0968 09W8
           01149 ULA * 01 1274 12X4
           01154 LDA # 01 1134 11T4
           01159 ADD G 01 0968 09W8
           01164 ULA * 01 1134 11T4
           01169 NTR X 1124
           01174 NTR X 02 1114 11J4
           01179 SET B 0004
           01184 LOD 8 1279
           01189 UNL 7 1274
           01194 LOD 8 1355
           01199 UNL 7 1134
           01204 SET B 0025
           01209 LOD 8 1269
           01214 UNL 7 586M
           01219 TR 1 2764

```

ADD 5

ADD 5

-----J10 CHK SEL CHAN RDY

```

2 025 01244
2 025 01269
2 005 01274
2 005 01279
2 036 01315
2 036 01351
2 004 01355

```

```

CONSTANTS
OB4/91B409A0000A0000,0&&9
O58VM1584MA0000A0000,0&&9
,03FJ
,03FJ
C.C. OPTION ON WR CHAN 2 LENGTH XXX
C.C. OPTION ON RD CHAN 2 LENGTH XXX
B4U4

```



```

E05..... 01609 SET B 0001
           01614 LOD 8 0992
           01619 UNL 7 1971
           01624 UNL 7 2008
           01629 SET B 0037
           01634 LOD 8 1982
           01639 UNL 7 651P
           01644 LOD 8 2019
           01649 UNL 7 2627P 027P
           01654 SET B 0001
           01659 LOD 8 0987
           01664 UNL 7 2095
           01669 UNL 7 2132
           01674 SET B 0037
           01679 LOD 8 2106
           01684 UNL 7 1279P S79P
           01689 LOD 8 2143
           01694 UNL 7 3255P B55P
           01699 SET B 0025
           01704 LOD 8 2044
           01709 UNL 7 22044 K044
           01714 LOD 8 2069
           01719 UNL 7 35499 E499
           01724 SET B 0005
           01729 LOD 8 0994
           01734 UNL 7 1914
           01739 LOD 8 0989
           01744 UNL 7 1924
  
```

```

           01749 SET B 0005
           01754 LOD 8 0974
           01759 UNL 7 32434 B434
           01764 SET B 0000
           01769 SET B 0152
           01774 SET B 02 0010 00J0
           01779 LOD 8 02 1919 19J9
           01784 UNL 7 02 32444 B4M4
           01789 LOD 8 02 1929 19K9
           01794 UNL 7 02 32454 B4N4
           01799 LDA # 02 1919 19J9
           01804 ADD G 02 1582 15Q2
           01809 ULA * 02 1919 19J9
           01814 LDA # 02 1929 19K9
           01819 ADD G 02 1582 15Q2
           01824 ULA * 02 1929 19K9
           01829 LDA # 02 1784 17Q4
           01834 ADD G 02 1585 15Q5
           01839 ULA * 02 1784 17Q4
           01844 LDA # 02 1794 17R4
           01849 ADD G 02 1585 15Q5
           01854 ULA * 02 1794 17R4
           01859 NTR X 1774
           01864 SET B 0004
           01869 LOD 8 1933
           01874 UNL 7 1919
           01879 LOD 8 1937
           01884 UNL 7 1929
           01889 LOD 8 1941
           01894 UNL 7 1784
           01899 LOD 8 1945
           01904 UNL 7 1794
           01909 TR 1 2669-----H10
  
```

GENERATE RD-SECTION

&40

&40

&20

&20

RESET FIELD ADDRESS

RESET FIELD ADDRESS

RESET UNLOAD ADDRESS

RESET UNLOAD ADDRESS

2 020 01929  
 2 016 01945  
 2 037 01982  
 2 037 02019  
 2 050 02069  
 2 037 02106  
 2 037 02143

CONSTANTS  
 7038Q 7B66Q  
 038QB66QB4M4B4N4  
 2 CWS OPTION ON WR CHAN 2X LENGTH XXX  
 2 CWS OPTION ON RD CHAN 2X LENGTH XXX  
 OKOT41K024A0000A0000,0&&90E4Y91E479A0000A0000,0&  
 2 CWS OPTION ON WR CHAN 2X LENGTH XXX  
 2 CWS OPTION ON RD CHAN 2X LENGTH XXX

1 CWS OPTION GENERATOR

```

F03..... 02149 SET B 0001
           02154 LOD 8 0519
           02159 UNL 7 0972
           02164 SET B 0005
           02169 LOD 8 0974
           02174 UNL 7 18999 Y999
           02179 LOD 8 0994
           02184 UNL 7 19004 Z004

```

LOD SEL AT 18999

LOD SPC AT 19004

```

           02189 SET B 02 0000 00-0
           02194 SET B 02 0004 00-4
I..... 02199 SET B 0000
I..... 02204 SET B 0082
I..... 02209 SET B 01 0005 00 5
II..... 02214 LOD 8 01 2364 23W4
II..... 02219 UNL 7 01 19009 Z0 9
II..... 02224 LDA # 01 2364 23W4
II..... 02229 ADD G 01 2367 23W7
II..... 02234 ULA * 01 2364 23W4
II..... 02239 LDA # 01 2219 22/9
II..... 02244 ADD G 01 2369 23W9
II..... 02249 ULA * 01 2219 22/9
I+--- 02254 NTR X 2209
I+--- 02259 NTR X 02 2199 21R9

```

GENERATE WR-SECTION

&40

&5

```

           02264 SET B 0004
           02269 LOD 8 2377
           02274 UNL 7 2364
           02279 LOD 8 2373
           02284 UNL 7 2219
           02289 SET B 0025
           02294 LOD 8 2402
           02299 UNL 7 20669 -669
           02304 SET B 0005
           02309 LOD 8 0974
           02314 UNL 7 32434 B434
           02319 LOD 8 0994
           02324 UNL 7 32439 B439
           02329 SET B 0001
           02334 LOD 8 0519
           02339 UNL 7 2428
           02344 SET B 0037
           02349 LOD 8 2439
           02354 UNL 7 651P
           02359 TR 1 2444

```

RESET VARIABLES IN GENERATOR

RESET UNL IN CONSTANTS AREA

RESET UNL 18999

LOD 5 INSTR. END OF GENERATOR

-----G09 TO NEXT PAGE

CONSTANTS

```

2 005 02364 7662Q
2 005 02369 A4&AE
2 002 02371 Z0
2 002 02373 #9
2 004 02377 662Q
2 025 02402 0-6V91-649A0000A0000,0&&9
2 037 02439 1 CWS OPTION ON WR CHAN 2X LENGTH XXX

```



CHECK THAT SELECTED CHANNELS ARE READY

```

H06.....02669 SET B 0001
I 02674 LOD 8 0518
I 02679 UNL 7 2692
I 02684 LOD 8 2855
I 02689 UNL 7 2694
I..02694 SEL 2 2-0-
II 02699 TRS 0 01 2764 27W4
II 02704 LOD 8 2694
II 02709 CMP 4 2858
II 02714 TRE L 2739
II 02719 LOD 8 2694
II 02724 ADD G 2857
II 02729 UNL 7 2694
I+-02734 TR 1 2694
I 02739 LOD 8 0518
I 02744 UNL 7 2874
I 02749 SEL 2 0500
I 02754 WR R 2859
+-02759 TR 1 2669

```

ADJUST SEL ADDRESS 1

9

&1

```

J04
J09.....02764 SET B 0001
I 02769 LOD 8 0519
I 02774 UNL 7 2787
I 02779 LOD 8 2855
I 02784 UNL 7 2789
I..02789 SEL 2 2-0-
II 02794 TRS 0 01 2894 28Z4
II 02799 LOD 8 2789
II 02804 CMP 4 2858
II 02809 TRE L 2834
II 02814 LOD 8 2789
II 02819 ADD G 2857
II 02824 UNL 7 2789
I+-02829 TR 1 2789
I 02834 LOD 8 0519
I 02839 UNL 7 2874
I 02844 SEL 2 0500
I 02849 WR R 2859
+-02854 TR 1 2764

```

ADJUST SEL ADDRESS 1

9

&1

CONSTANTS

```

2 004 02858
2 030 02888
2 001 02889

```

```

1AA9
SELECTED CHAN 2X NOT AVAILABLE

```

MODIFY THE DELAYS ACCORDING TO CHANNEL SELECTED

K10.....

02894	SET	B	0001	
02899	LOD	8	0519	
02904	UNL	7	3867	
02909	UNL	7	3912	

02914	SPC	,	2104	
02919	SET	B	0000	
02924	SPC	,	2204	
02929	SET	B	0000	
02934	SPC	,	2304	
02939	SET	B	0000	
02944	SPC	,	2400	
02949	SET	B	0000	
02954	SPC	,	0000	
02959	EIM	,	06 0000 0 -0	

PUT SM IN 4 CHANNELS

L16.....

02964	RCV	U	648M	
02969	BLM	\$	2703	
02974	RCV	U	2624M 024M	
02979	BLM	\$	2703	
02984	SET	B	0001	
02989	LOD	8	0517	
02994	CMP	4	3125	
02999	TRE	L	3099	
03004	LOD	8	0518	
03009	CMP	4	3126	
03014	TRH	K	3049	
03019	SET	B	0037	
03024	LOD	8	2439	
03029	UNL	7	651P	
03034	LOD	8	2664	
03039	UNL	7	2627P 027P	
03044	TR	1	3124	
03049	SET	B	0037.....	
03054	LOD	8	1982	
03059	UNL	7	651P	
03064	LOD	8	2019	
03069	UNL	7	2627P 027P	
03074	LOD	8	2106	
03079	UNL	7	1279P S79P	
03084	LOD	8	2143	
03089	UNL	7	3255P B55P	
03094	TR	1	3124	
03099	SET	B	0036.....	
03104	LOD	8	1315	
03109	UNL	7	6510	
03114	LOD	8	1351	
03119	UNL	7	26270 0270	
03124	TR	1	3134.....	

CLEAR TABLE AREA

C

Z

---M12 TO NEXT PAGE

2 002 03126

CZ

CONSTANTS

RANDOM LENGTH GENERATOR  
FOR WR & RD RECORDS

PASS COUNTER

&1

RESET TO 000000

0  
UPDATE TAG & LENGTH COUNTERS

5  
UPDATE TAG & LENGTH COUNTERS

IF ON BYPASS GENERATOR &  
TAG COUNTER

&1

TO NEXT PAGE

CONSTANTS

2	012	03296	000000100000
2	009	03305	AA5000000
2	021	03326	X00000&X00000&X00000& OLD NUMBERS
2	021	03347	X00000&X00000&X00000& NEW NUMBERS
2	007	03354	X00000& NEW NUMBER 4
2	005	03359	00000

```

M11.....
03134 SET B 0000
03139 SET B 0006
03144 LOD 8 3290
03149 ADD G 3298
03154 UNL 7 3290
03159 LOD 8 3296
03164 CMP 4 3290
03169 TRE L 3179-----
03174 TR 1 3199-----
03179 SET B 0006.....
03184 LOD 8 3305
03189 UNL 7 3290
03194 TR 1 3689-----S14
03199 SET B 0001.....
03204 LOD 8 3290
03209 CMP 4 3296
03214 TRE L 3239-----
03219 LOD 8 3290
03224 CMP 4 3299
03229 TRE L 3239-----
03234 TR 1 3689-----S14
03239 TRA I 02 3689 36Q9-----S14
03244 SET B 0005
03249 LOD 8 3359
03254 ADD G 3298
03259 UNL 7 3359
N14.....
03264 SPC , 0000
03269 SET B 0000
03274 SET B 0021
03279 UNL 7 3347
03284 TR 1 3364-----P13

```

LENGTH GENERATOR CONTD.

P12.....  
 03364 RAD H 3312  
 03369 SET B 0007  
 03374 ADD G 3319  
 03379 SET B 0006  
 03384 ST F 3333

OLD #1  
 EXTEND FOR CARRY  
 ADD OLD #2  
 DROP CARRY  
 PLACE NEW #1

03384 ST F 3333  
 03390 RAD H 3319  
 03394 SET B 0007  
 03399 ADD G 3326  
 03404 SET B 0006  
 03409 ST F 3340

OLD #2  
 ADD OLD #3  
 PLACE NEW #2

03409 ST F 3340  
 03414 RAD H 3326  
 03419 SET B 0007  
 03424 ADD G 3333  
 03429 SET B 0006  
 03434 ST F 3347

OLD #3  
 ADD NEW #1  
 PLACE NEW #3

03434 ST F 3347  
 03439 RAD H 3340  
 03444 SET B 0007  
 03449 ADD G 3347  
 03454 SET B 0006  
 03459 ST F 3354

NEW #2  
 ADD NEW #3  
 PLACE NEW #4

03459 ST F 3354  
 03464 RAD H 3333  
 03469 SET B 0007  
 03474 SUB P 3319  
 03479 SUB P 3312  
 03484 SET B 0006  
 03489 TRZ N 3499

NEW NUMBERS ARE COMPLETE  
 NOW CHECK THE ADDITION BY  
 SUBTRACTING TO OBTAIN ZERO

03494 TR 1 3599-----R14

03494 TR 1 3599  
 03499 RAD H 3340.....  
 03504 SET B 0007  
 03509 SUB P 3326  
 03514 SUB P 3319  
 03519 SET B 0006  
 03524 TRZ N 3534-----R14  
 03529 TR 1 3599-----R14

NEW #2

03529 TR 1 3599

03534 RAD H 3347.....  
 03539 SET B 0007  
 03544 SUB P 3333  
 03549 SUB P 3326  
 03554 SET B 0006  
 03559 TRZ N 3569-----Q14  
 03564 TR 1 3599-----R14

NEW #3







CHANNEL 20 INTERRUPT PROGRAM

```

V15..... 04144 EEM 3 14 0000 06-0
           04149 SPC , 1000
           04154 SET B 0001
           04159 LOD 8 5240
           04164 UNL 7 4169
W21..... 04169 SEL 2 200-
           04174 TRS 0 01 4219 42/9
           04179 LOD 8 4169
           04184 CMP 4 5241
           04189 TRE L 4214
           04194 LOD 8 4169
           04199 ADD G 5243
           04204 UNL 7 4169
           04209 TR 1 4169
           04214 LIP , 15 0009 0669.
           04219 EEM 3 14 0000 06-0
           04224 SPC , 1000
           04229 SET B 0001
           04234 LOD 8 0519
           04239 CMP 4 4167
           04244 TRE L 4254
           04249 TR 1 4349
           04254 SET B 0002
           04259 LOD 8 4169
           04264 UNL 7 18999 Y999
           04269 UNL 7 32434 B434
           04274 SET B 0001
           04279 LOD 8 0517
           04284 CMP 4 5244
           04289 TRE L 4299
           04294 TR 1 4324
           04299 RAD H 3312
           04304 SET B 0003
           04309 UNL 7 6510
           04314 UNL 7 26270 0270
           04319 TR 1 4394
           04324 RAD H 3312
           04329 SET B 0003
           04334 UNL 7 651P
           04339 UNL 7 2627P 027P
           04344 TR 1 4394
           04349 LOD 8 0518
           04354 CMP 4 5246
           04359 TRE L 4369
           04364 TR 1 4394
           04369 TR 1 4374

```

START CHANNEL 20

LOD 1  
SEL ADDRESS BELOW

CMP 9

ADD &1

WR ON CHANNEL 20

LOD SEL 20XX FOR WR ROUTINE  
LOD SEL 20XX FOR RD ROUTINE

CMP C

LENGTH

PUT IN TABLE FOR WR  
PUT IN TABLE FOR RD

LENGTH

PUT IN TABLE FOR WR  
PUT IN TABLE FOR RD

CMP 0

TO NEXT PAGE

CHANNEL 20 CONTD.

```

X17..... 04374 RAD H      3312
           04379 SET B      0003
           04384 UNL 7     1279P S79P
           04389 UNL 7     3255P B55P
Y17..... 04394 SET B      0003
           04399 LOD 8      3312
           04404 UNL 7      5249
           04409 LDA #      4429
           04414 ADD G      5249
           04419 ULA *      4429
           04424 SET B      0001
           04429 LOD 8      5296
           04434 UNL 7      5255
           04439 LDA #      4429
           04444 ULA *      4459
           04449 SET B      0001
           04454 LOD 8      5250
           04459 UNL 7      0000
           04464 SET B      0004
           04469 LOD 8      7299
           04474 UNL 7      4429
           04479 SET B      0005
           04484 LOD 8      3359
           04489 UNL 7      5299
           04494 WR  R      5295
           04499 SPC ,      2000
           04504 LFC , 02  5254 52N4
           04509 LIP , 15  0009 06&9

```

```

LENGTH
PUT IN TABLE FOR WR
PUT IN TABLE FOR RD
SAVE LENGTH
CORRECT LOD ADDRESS BELOW

SAVE CHARACTER
CORRECT UNL ADDRESS BELOW
LOD GM
REPLACE CHAR. BY GM

RESET THE LOD ADDRESS

```

```

I
I

```

```

04514 EEM 3 14 0000 06-0
04519 SPC ,      1000
04524 LDA #      4459
04529 ULA *      4544
04534 SET B      0001
04539 LOD 8      5255
04544 UNL 7      0000
04549 SET B      0001
04554 LOD 8      4169
04559 UNL 7      4639
04564 UNL 7      4574
04569 UNL 7      4729
04574 SEL 2      200-
04579 NOP A      4644
04584 TRS 0 03  4594 45I4
04589 TR  1      4644-----AA19
04594 SET B      0001.....
04599 LOD 8      5246
04604 UNL 7      17471 X471
04609 SET B      0002
04614 LOD 8      5257
04619 UNL 7      17463 X463
04624 RCV U      17446 X446
04629 TR  1 01  16819 W8/9-----BM37
04634 TR  1      4639-----Z19

```

```

BSP ROUTINE CHANNEL 20

PUT CHAR. BACK

ADJUST SEL ADDRESS

PUT CHANNEL NO. IN
ERROR ROUTINE

PUT WR IN ERROR ROUTINE

TO ERROR ROUTINE
TO NEXT PAGE

```



CHAN 20 CMP ROUTINE CONTD.

AC19.....

04929	TRE	L	4964	-----	I	
04934	SET	B	0001		I	
04939	LOD	8	5246		I	
04944	UNL	7	18086	Y086	I	
04949	RCV	U	18076	Y076	I	
04954	TR	1	01 17674	X6X4	-----BS40	
04959	TR	1	5074	-----	I	
04964	SPC	,	2000	.....	I	
04969	NTR	X	01 4874	48X4	-----AB19	
04974	SPC	,	1000		I	
04979	SET	B	0004		I	
04984	LOD	8	4914		I	
04989	UNL	7	5034		I	
04994	LOD	8	4919		I	
04999	UNL	7	5039		I	
05004	SET	B	0003		I	
05009	LOD	8	5278		I	
05014	AAM	@	5034		I	
05019	AAM	@	5039		I	
05024	UNL	7	5029		I	
05029	SET	B	0000		I	
05034	LOD	8	0000		I	
05039	CMP	4	0000		I	
05044	TRE	L	5074	-----	I	
05049	SET	B	0001		I	
05054	LOD	8	5246		I	
05059	UNL	7	18086	Y086	I	
05064	RCV	U	18076	Y076	I	
05069	TR	1	01 17674	X6X4	-----BS40	
05074	SET	B	0004	.....	I	
05079	LOD	8	5289		I	
05084	UNL	7	4914		I	
05089	LOD	8	5294		I	
05094	UNL	7	4919		I	
05099	TR	1	5199	-----	AE21	
AD19.....	05104	RAJ	H	5249		I
	05109	UNL	7	5124		I
	05114	AAM	@	5129		I
	05119	AAM	@	5134		I
	05124	SET	B	0000		I
	05129	LOD	8	5295		I
	05134	CMP	4	6295		I
	05139	TRE	L	5169	-----	I
	05144	SET	B	0001		I
	05149	LOD	8	5246		I
	05154	UNL	7	18086	Y086	I
	05159	RCV	U	18076	Y076	I
	05164	TR	1	01 17674	X6X4	-----BS40
	05169	SET	B	0004	.....	I
	05174	LOD	8	5289		I
	05179	UNL	7	5129		I
	05184	LOD	8	5294		I
	05189	UNL	7	5134		I
	05194	TR	1	5199	-----	AE21

PUT CHAN NO. IN ERROR ROUTINE

ADJUST LOD ADDRESS BELOW

ADJUST CMP ADDRESS BELOW

ADD REMAINDER TO LOD ADD.  
ADD REMAINDER TO CMP ADD.  
UNL IN SET ADDRESS

PUT CHAN NO. IN ERROR ROUTINE

RESET LOD & CMP ADDRESSES.

PUT NO. IN SET ADDRESS

ADJUST LOD & CMP ADDRESSES

PUT CHAN NO. IN ERROR ROUTINE

TO NEXT PAGE



CHANNEL 23 INTERRUPT PROGRAM

START CHANNEL 23

LOD 1  
SEL ADDRESS BELOW

CMP 9

ADD &1

WR ON CHANNEL 23

LOD SEL 23XX FOR WR ROUTINE  
LOD SEL 23XX FOR RD ROUTINE

CMP C

LENGTH

PUT IN TABLE FOR WR  
PUT IN TABLE FOR RD

LENGTH

PUT IN TABLE FOR WR  
PUT IN TABLE FOR RD

CMP 3

TO NEXT PAGE

```

AF15.....07314 EEM 3 14 0000 0&-0
          07319 SPC , 1000
          07324 SET B 0001
          07329 LOD 8 5240
          07334 UNL 7 7339
AG26.....07339 SEL 2 230-
          07344 TRS 0 01 7389 73Y9
          07349 LOD 8 7339
          07354 CMP 4 5241
          07359 TRE L 7384
          07364 LOD 8 7339
          07369 ADD G 5243
          07374 UNL 7 7339
          07379 TR 1 7339
          07384 LIP , 15 0009 0&&9
          07389 EEM 3 14 0000 0&-0
          07394 SPC , 1000
          07399 SET B 0001
          07404 LOD 8 0519
          07409 CMP 4 7337
          07414 TRE L 7424
          07419 TR 1 7519
          07424 SET B 0002
          07429 LOD 8 7339
          07434 UNL 7 18999 Y999
          07439 UNL 7 32434 B434
          07444 SET B 0001
          07449 LOD 8 0517
          07454 CMP 4 5244
          07459 TRE L 7469
          07464 TR 1 7494
          07469 RAD H 3354
          07474 SET B 0003
          07479 UNL 7 6510
          07484 UNL 7 26270 0270
          07489 TR 1 7564
          07494 RAD H 3354
          07499 SET B 0003
          07504 UNL 7 651P
          07509 UNL 7 2627P 027P
          07514 TR 1 7564
          07519 LOD 8 0518
          07524 CMP 4 7337
          07529 TRE L 7539
          07534 TR 1 7564
          07539 TR 1 7544

```

CHANNEL 23 CONTD.

```

AH22..... 07544 RAD H 3354
           07549 SET B 0003
           07554 UNL 7 1279P S79P
           07559 UNL 7 3255P B55P
AJ22..... 07564 SET B 0003
           07569 LOD 8 3354
           07574 UNL 7 8414
           07579 LDA # 7599
           07584 ADD G 8414
           07589 ULA * 7599
           07594 SET B 0001
           07599 LOD 8 8461
           07604 UNL 7 8420
           07609 LDA # 7599
           07614 ULA * 7629
           07619 SET B 0001
           07624 LOD 8 8415
           07629 UNL 7 0000
           07634 SET B 0004
           07639 LOD 8 10464 464
           07644 UNL 7 7599
           07649 SET B 0005
           07654 LOD 8 3359
           07659 UNL 7 8464
           07664 WR R 8460
           07669 SPC , 2300
           07674 LFC , 02 8429 84K9
           07679 LIP , 15 0009 0&&9

```

LENGTH

PUT IN TABLE FOR WR  
PUT IN TABLE FOR RD

SAVE LENGTH

SAVE CHARACTER

CORRECT UNL ADDRESS BELOW

LOD GM  
REPLACE CHAR. BY GM

RESET THE LOD ADDRESS

```

I
07684 EEM 3 14 0000 06-0
07689 SPC , 1000
07694 LDA # 7629
07699 ULA * 7714
07704 SET B 0001
07709 LOD 8 8420
07714 UNL 7 0000
07719 SET B 0001
07724 LOD 8 7339
07729 UNL 7 7809
07734 UNL 7 7744
07739 UNL 7 7899
07744 SEL 2 230-
07749 NOP A 7814
07754 TRS O 03 7764 77F4
07759 TR 1 7814-----AL24
07764 SET B 0001.....
07769 LOD 8 7337
07774 UNL 7 17471 X471
07779 SET B 0002
07784 LOD 8 8422
07789 UNL 7 17463 X463
07794 RCV U 17446 X446
07799 TR 1 01 16819 W8/9-----BM37
07804 TR 1 7809-----AK24

```

BSP ROUTINE CHANNEL 23

PUT CHAR. BACK

ADJUST SEL ADDRESS

PUT CHANNEL NO. IN  
ERROR ROUTINE

PUT WR IN ERROR ROUTINE

TO ERROR ROUTINE  
TO NEXT PAGE

BSP ROUTINE CONTD.

```

AK23.....07809 SEL 2 230-
AL23.....07814 BSP 3 0004
          07819 SPC , 2300
          07824 LFC , 02 8434 84L4
          07829 LIP , 15 0009 0669

```

```

          07834 EEM 3 14 0000 06-0
          07839 SPC , 1000
          07844 SET B 0001
          07849 LOD 8 7339
          07854 UNL 7 7859
          07859 SEL 2 230-
          07864 RD Y 9460
          07869 SPC , 2300
          07874 LFC , 02 8419 84J9
          07879 LIP , 15 0009 0669

```

RD ROUTINE CHAN. 23

```

          07884 EEM 3 14 0000 06-0
          07889 SPC , 1000
          07894 NOP A 8369
          07899 SEL 2 2300
          07904 TRS 0 03 7914 79A4
          07909 TR 1 7954
          07914 SET B 0001
          07919 LOD 8 7337
          07924 UNL 7 17471 X471
          07929 SET B 0002
          07934 LOD 8 8424
          07939 UNL 7 17463 X463
          07944 RCV U 17446 X446
          07949 TR 1 01 16819 W879
          07954 SPC , 1000
          07959 RAD H 8414
          07964 UNL 7 10474 474
          07969 RAD H 8439
          07974 SET B 0003
          07979 CMP 4 10474 474

```

CMP ROUTINE CHAN 23

PUT CHANNEL NO. IN  
 ERROR ROUTINE  
 PUT RD IN ERROR ROUTINE

```

          07984 TRH K 8274
          07989 RAD H 8414
          07994 DIV W 8439
          07999 UNL 7 8425
          08004 SHR C 0125
          08009 UNL 7 8443
          08014 SET B 0001
          08019 LOD 8 8425
          08024 UNL 7 8039
          08029 SPC , 2000
          08034 SET B 01 0000 00 0
          08039 SET B 01 0001 00 1
AM25.....08044 SPC , 1000
          08049 LDA # 8084
          08054 ADD G 8439
          08059 ULA * 8084
          08064 LDA # 8089
          08069 ADD G 8439
          08074 ULA * 8089
          08079 SET B 0250
          08084 LOD 8 8460
          08089 CMP 4 9460
          08094 TR 1 8099

```

RAD NO.  
 DIV BY 250  
 SAVE QUOTIENT  
 SAVE REMAINDER  
 QUOTIENT

ADD 250  
 TO NEXT PAGE

CHAN. 23 CMP ROUTINE CONTD.

AN24.....	08099	TRE	L	8134					
	08104	SET	B	0001					
	08109	LOD	8	7337					
	08114	UNL	7	18086	Y086				
	08119	RCV	U	18076	Y076				
	08124	TR	1	17674	X6X4				
	08129	TR	1	8244					BS40
	08134	SPC	,	2000					
	08139	NTR	X	8044	80U4				AM24
	08144	SPC	,	1000					
	08149	SET	B	0004					
	08154	LOD	8	8084					
	08159	UNL	7	8204					
	08164	LOD	8	8089					
	08169	UNL	7	8209					
	08174	SET	B	0003					
	08179	LOD	8	8443					
	08184	AAM	@	8204					
	08189	AAM	@	8209					
	08194	UNL	7	8199					
	08199	SET	B	0000					
	08204	LOD	8	0000					
	08209	CMP	4	0000					
	08214	TRE	L	8244					
	08219	SET	B	0001					
	08224	LOD	8	7337					
	08229	UNL	7	18086	Y086				
	08234	RCV	U	18076	Y076				
	08239	TR	1	17674	X6X4				
	08244	SET	B	0004					BS40
	08249	LOD	8	8449					
	08254	UNL	7	8084					
	08259	LOD	8	8454					
	08264	UNL	7	8089					
	08269	TR	1	8369					AQ26
AP24.....	08274	RAD	H	8414					
	08279	UNL	7	8294					
	08284	AAM	@	8299					
	08289	AAM	@	8304					
	08294	SET	B	0000					
	08299	LOD	8	8460					
	08304	CMP	4	9460					
	08309	TRE	L	8339					
	08314	SET	B	0001					
	08319	LOD	8	7337					
	08324	UNL	7	18086	Y086				
	08329	RCV	U	18076	Y076				
	08334	TR	1	17674	X6X4				
	08339	SET	B	0004					BS40
	08344	LOD	8	8449					
	08349	UNL	7	8299					
	08354	LOD	8	8454					
	08359	UNL	7	8304					
	08364	TR	1	8369					AQ26

PUT CHAN NO. IN ERROR ROUTINE

ADJUST LOD ADDRESS BELOW

ADJUST CMP ADDRESS BELOW

ADD REMAINDER TO LOD ADD.  
ADD REMAINDER TO CMP ADD.  
UNL IN SET ADDRESS

PUT CHAN NO. IN ERROR ROUTINE

RESET LOD & CMP ADDRESSES

ADJUST LOD & CMP ADDRESSES

PUT CHAN NO. IN ERROR ROUTINE

TO NEXT PAGE



CHANNEL 22 INTERRUPT PROGRAM

```

R15..... 10479 EEM 3 14 0000 06-0
           10484 SPC , 1000
           10489 SET B 0001
           10494 LOD 8 5240
           10499 UNL 7 10504 504
AS31..... 10504 SEL 2 220-
           10509 TRS 0 01 10554 5V4
           10514 LOD 8 10504 504
           10519 CMP 4 5241
           10524 TRE L 10549 549
           10529 LOD 8 10504 504
           10534 ADD G 5243
           10539 UNL 7 10504 504
           10544 TR 1 10504 504
           10549 LIP , 15 0009 0669

           10554 EEM 3 14 0000 06-0
           10559 SPC , 1000
           10564 SET B 0001
           10569 LOD 8 0519
           10574 CMP 4 10502 502
           10579 TRE L 10589 589
           10584 TR 1 10684 684
           10589 SET B 0002
           10594 LOD 8 10504 504
           10599 UNL 7 18999 Y999
           10604 UNL 7 32434 B434
           10609 SET B 0001
           10614 LOD 8 0517
           10619 CMP 4 5244
           10624 TRE L 10634 634
           10629 TR 1 10659 659
           10634 RAD H 3326
           10639 SET B 0003
           10644 UNL 7 6510
           10649 UNL 7 26270 0270
           10654 TR 1 10729 729
           10659 RAD H 3326
           10664 SET B 0003
           10669 UNL 7 651P
           10674 UNL 7 2627P 027P
           10679 TR 1 10729 729
           10684 LOD 8 0518
           10689 CMP 4 10502 502
           10694 TRE L 10704 704
           10699 TR 1 10729 729
           10704 TR 1 10709 709

```

START CHANNEL 22

LOD 1  
SEL ADDRESS BELOW

CMP 9

ADD &1

WR ON CHANNEL 22

LOD SEL 22XX FOR WR ROUTINE  
LOD SEL 22XX FOR RD ROUTINE

CMP C

LENGTH

PUT IN TABLE FOR WR  
PUT IN TABLE FOR RD

LENGTH

PUT IN TABLE FOR WR  
PUT IN TABLE FOR RD

CMP 2

TO NEXT PAGE

CHANNEL 22 CONTD.

LENGTH

PUT IN TABLE FOR WR  
PUT IN TABLE FOR RD

SAVE LENGTH

SAVE CHARACTER

LOD GM  
REPLACE CHAR. BY GM

RESET THE LOD ADDRESS

BSP ROUTINE CHANNEL 22

PUT CHAR. BACK

ADJUST SEL ADDRESS

PUT CHANNEL NO. IN  
ERROR ROUTINE

PUT WR IN ERROR ROUTINE

TO ERROR ROUTINE  
TO NEXT PAGE

```

AT27.....10709 RAD H      3326
          10714 SET B      0003
          10719 UNL 7     1279P S79P
          10724 UNL 7     3255P B55P
AU27.....10729 SET B      0003
          10734 LOD 8      3326
          10739 UNL 7     11579 /579
          10744 LDA #      10764 764
          10749 ADD G      11579 /579
          10754 ULA *      10764 764
          10759 SET B      0001
          10764 LOD 8     11626 /626
          10769 UNL 7     11585 /585
          10774 LDA #      10764 764
          10779 ULA *      10794 794
          10784 SET B      0001
          10789 LOD 8     11580 /580
          10794 UNL 7      0000
          10799 SET B      0004
          10804 LOD 8     13629 T629
          10809 UNL 7     10764 764
          10814 SET B      0005
          10819 LOD 8      3359
          10824 UNL 7     11629 /629
          10829 WR R       11625 /625
          10834 SPC ,      2200
          10839 LFC , 02  11594 /5R4
          10844 LIP , 15  0009 06&9

```

```

          10849 EEM 3 14  0000 06-0
          10854 SPC ,      1000
          10859 LDA #      10794 794
          10864 ULA *      10879 879
          10869 SET B      0001
          10874 LOD 8     11585 /585
          10879 UNL 7      0000
          10884 SET B      0001
          10889 LOD 8     10504 504
          10894 UNL 7     10974 974
          10899 UNL 7     10909 909
          10904 UNL 7     11064 /064
          10909 SEL 2      220-
          10914 NOP A      10979 979
          10919 TRS 0 03  10929 9B9
          10924 TR 1      10979 979
          10929 SET B      0001
          10934 LOD 8     10502 502
          10939 UNL 7     17471 X471
          10944 SET B      0002
          10949 LOD 8     11587 /587
          10954 UNL 7     17463 X463
          10959 RCV U      17446 X446
          10964 TR 1 01  16819 W879
          10969 TR 1      10974 974

```

-----AW29

-----BM37  
-----AV29

BSP ROUTINE CONTD.

```

AV28..... 10974 SEL 2 220-
AW28..... 10979 BSP 3 0004
          10984 SPC , 2200
          10989 LFC , 02 11599 /5R9
          10994 LIP , 15 0009 0&&9

```

```

          10999 EEM 3 14 0000 0&-0
          11004 SPC , 1000
          11009 SET B 0001
          11014 LOD 8 10504 504
          11019 UNL 7 11024 /024
          11024 SEL 2 220-
          11029 RD Y 12625 S625
          11034 SPC , 2200
          11039 LFC , 02 11584 /5Q4
          11044 LIP , 15 0009 0&&9

```

RD ROUTINE CHAN. 22

```

          11049 EEM 3 14 0000 0&-0
          11054 SPC , 1000
          11059 NOP A 11534 /534
          11064 SEL 2 2200
          11069 TRS 0 03 11079 /0G9
          11074 TR 1 11119 /119
          11079 SET B 0001
          11084 LOD 8 10502 502
          11089 UNL 7 17471 X471
          11094 SET B 0002
          11099 LOD 8 11589 /589
          11104 UNL 7 17463 X463
          11109 RCV U 17446 X446
          11114 TR 1 01 16819 W8/9
          11119 SPC , 1000
          11124 RAD H 11579 /579
          11129 UNL 7 13639 T639
          11134 RAD H 11604 /604
          11139 SET B 0003
          11144 CMP 4 13639 T639
          11149 TRH K 11439 /439
          11154 RAD H 11579 /579
          11159 DIV W 11604 /604
          11164 UNL 7 11590 /590
          11169 SHR C 0125
          11174 UNL 7 11608 /608
          11179 SET B 0001
          11184 LOD 8 11590 /590
          11189 UNL 7 11204 /204
          11194 SPC , 2000
          11199 SET B 01 0000 00 0
          11204 SET B 01 0001 00 1
          11209 SPC , 1000
          11214 LDA # 11249 /249
          11219 ADD G 11604 /604
          11224 ULA * 11249 /249
          11229 LDA # 11254 /254
          11234 ADD G 11604 /604
          11239 ULA * 11254 /254
          11244 SET B 0250
          11249 LOD 8 11625 /625
          11254 CMP 4 12625 S625
          11259 TR 1 11264 /264

```

CMP ROUTINE CHAN 22

PUT CHANNEL NO. IN  
ERROR ROUTINE

PUT RD IN ERROR ROUTINE

AX30.....

-----BM37

-----AZ30

DIV BY 250  
SAVE QUOTIENT  
SAVE REMAINDER  
QUOTIENT

ADD 250

-----AY30

TO NEXT PAGE



CHAN 22 CMP ROUTINE CONTD.

```

BA30.....□.11534 SET B      0001  □
□ 11539 LOD 8      0519    □
□ 11544 CMP 4      10502  502  □
□ 11549 TRE L      11559  /559-□-
□ 11554 TR 1       10504  504-□-
□ 11559 SPC ;      3700    □
□ 11564 LFC ; 02  11624 /6K4 □
□ 11569 SPC ;      0000    □
□ 11574 LIP ; 15  0009  0&&9 □
□□□□□□□□□□□□□□□□□□□□□□□□

```

AS27 REPEAT INT. PROGRAM

CONSTANTS & WORK AREA

2	005	11579		A0
2	001	11580		□
3		11584	11049 /049	
2	006	11590		WRRD
3		11594	10849 849	
2	001	11595		
3		11599	10999 999	
2	005	11604		A25&
2	004	11608		
2	002	11610		
3		11614	11625 /625	
2	001	11615		
3		11619	12625 5625	
2	001	11620		
3		11624	4074 4074	
2	005	11629		00000
2	050	11679		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	11729		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	11779		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	11829		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	11879		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	11929		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	11979		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	12029		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	12079		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	12129		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	12179		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	12229		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	12279		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	12329		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	12379		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	12429		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	12479		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	12529		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	050	12579		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	044	12623		ACEGIKMQQSUY&02468.,□%/&BDFHJLNPRTVXZ-13579\$**@
2	001	12624		□
2	005	12629		
5	994	13623		
2	002	13625		
3		13629	11626 /626	
2	001	13630		
3		13634	12626 5626	
2	005	13639		

CHANNEL 21 INTERRUPT PROGRAM

START CHANNEL 21

LOD 1

ADD &1

WR ON CHANNEL 21

LOD SEL 21XX FOR WR ROUTINE  
LOD SEL 21XX FOR RD ROUTINE

CMP C

LENGTH

PUT IN TABLE FOR WR  
PUT IN TABLE FOR RD

LENGTH

PUT IN TABLE FOR WR  
PUT IN TABLE FOR RD

CMP 1

TO NEXT PAGE

```

BB15.....13644 EEM 3 14 0000 06-0
          13649 SPC , 1000
          13654 SET B 0001
          13659 LOD 8 5240
BC36.....13664 UNL 7 13669 T669
          13669 SEL 2 210-
          13674 TRS 0 01 13729 T7S9
          13679 LOD 8 13669 T669
          13684 CMP 4 13675 T675
          13689 TRE L 13714 T714
          13694 LOD 8 13669 T669
          13699 ADD G 5243
          13704 UNL 7 13669 T669
          13709 TR 1 13669 T669
          13714 SPC , 2100
          13719 LFC , 02 16814 W8J4
          13724 LIP , 15 0009 06&9
          13729 EEM 3 14 0000 06-0
          13734 SPC , 1000
          13739 SET B 0001
          13744 LOD 8 0519
          13749 CMP 4 13667 T667
          13754 TRE L 13764 T764
          13759 TR 1 13859 T859
          13764 SET B 0002
          13769 LOD 8 13669 T669
          13774 UNL 7 18999 Y999
          13779 SET B 32434 B434
          13784 SET B 0001
          13789 LOD 8 0517
          13794 CMP 4 5244
          13799 TRE L 13809 T809
          13804 TR 1 13834 T834
          13809 RAD H 3319
          13814 SET B 0003
          13819 UNL 7 6510
          13824 UNL 7 26270 0270
          13829 TR 1 13904 T904
          13834 RAD H 3319
          13839 SET B 0003
          13844 UNL 7 651P
          13849 UNL 7 2627P 027P
          13854 TR 1 13904 T904
          13859 LOD 8 0518
          13864 CMP 4 13667 T667
          13869 TRE L 13879 T879
          13874 TR 1 13904 T904
          13879 TR 1 13884 T884

```

CHANNEL 21 CONTD.

```

BD32..... 13884 RAD H 3319
             13889 SET B 0003
             13894 UNL 7 1279P S79P
             13899 UNL 7 3255P B55P
BE32..... 13904 SET B 0003
             13909 LOD 8 3319
             13914 UNL 7 14749 U749
             13919 LDA # 13939 T939
             13924 ADD G 14749 U749
             13929 ULA * 13939 T939
             13934 SET B 0001
             13939 LOD 8 14796 U796
             13944 UNL 7 14755 U755
             13949 LDA # 13939 T939
             13954 ULA * 13969 T969
             13959 SET B 0001
             13964 LOD 8 14750 U750
             13969 UNL 7 0000
             13974 SET B 0004
             13979 LOD 8 16799 W799
             13984 UNL 7 13939 T939
             13989 SET B 0005
             13994 LOD 8 3359
             13999 UNL 7 14799 U799
             14004 WR R 14795 U795
             14009 SPC , 2100
             14014 LFC , 02 14764 U704
             14019 LIP , 15 0009 0&&9

```

PUT IN TABLE FOR WR  
 PUT IN TABLE FOR RD  
 SAVE LENGTH

SAVE CHARACTER  
 CORRECT UNL ADDRESS BELOW  
 LOD GM  
 REPLACE CHAR BY GM  
 RESET THE LOD ADDRESS

```

I
14024 EEM 3 14 0000 06-0
14029 SPC , 1000
14034 LDA # 13969 T969
14039 ULA * 14054 U054
14044 SET B 0001
14049 LOD 8 14755 U755
14054 UNL 7 0000
14059 SET B 0001
14064 LOD 8 13669 T669
14069 UNL 7 14149 U149
14074 UNL 7 14084 U084
14079 UNL 7 14239 U239
14084 SEL 2 210-
14089 NOP A 14154 U154
14094 TRS O 03 14104 U184
14099 TR 1 14154 U154
14104 SET B 0001
14109 LOD 8 13667 T667
14114 UNL 7 17471 X471
14119 SET B 0002
14124 LOD 8 14757 U757
14129 UNL 7 17463 X463
14134 RCV U 17446 X446
14139 TR 1 01 16819 W8/9
14144 TR 1 14149 U149

```

BSP ROUTINE CHANNEL 21

PUT CHAR. BACK

PUT CHANNEL NO. IN  
 ERROR ROUTINE  
 PUT WR IN ERROR ROUTINE  
 TO ERROR ROUTINE  
 TO NEXT PAGE

BG34

BM37

BF34











CONSTANTS & WORK AREA

2 022 17471  
 2 001 17472  
 2 010 17482  
 2 001 17483  
 2 009 17492  
 2 001 17493  
 2 008 17501  
 2 001 17502  
 2 009 17511  
 2 001 17512  
 2 008 17520  
 2 001 17521  
 2 008 17529  
 2 001 17530  
 2 007 17537  
 2 001 17538  
 2 012 17550  
 2 001 17551  
 2 010 17561  
 2 001 17562  
 2 008 17570  
 2 001 17571  
 2 005 17579  
 2 005 17584  
 2 030 17614  
 2 001 17615  
 3 17619  
 2 020 17639  
 2 023 17662  
 2 007 17669

00

17414 X414

CHAN CHK ON -- CHAN 2X  
 RW REG VRC  
 REG A VRC  
 ECHO CHK  
 READ LRCR  
 COMP CHK  
 SKEW CHK  
 DWT CHK  
 UNANS DEMAND  
 CHANNEL ID  
 MPX OVFL

659R079860AA12&0035R  
 CHAN CHK ON OUTPUT TAPE



```

BT40.....
ns/g0014290.png
18009 SPC 3700
18014 SET B 0028
18019 UNL 7 18129 Y129
18024 SPC 2100
18029 LFC 02 18134 Y1L4
18034 LIP 15 2100 2A&0
18039 TIP 14 18044 Y&M4
18044 SPC 2100
18049 SET B 0004
18054 SPC 3700
18059 LOD 8 18129 Y129
BU40.....
BV40.....
18064 SPC 1000
18069 TRS 0 11 18074 Y-G4
18074 TRS 0 12 18079 Y&79
18079 TR 1

```

LIP TO TIP BELOW

```

2 021 18100
2 001 18101
2 028 18129
2 001 18130
3      18134      18039 Y039

```

CONSTANTS  
 CHAN 2X RD-WR UNEQUAL  
 □

INT. 251 ROUTINE

```

18139 EEM 3 14 0000 0&-0
18144 SEL 2 2109
18149 TRS 0 01 18159 Y1V9
18154 TR 1 18149 Y149
18159 WTM 3 0001
18164 RWD 3 0002
18169 HLT J 0030
18174 LIP 15 0009 0&&9

```

PUT TAPE MARK  
 ON TAPE 2109