

**CONTROL DATA**

**G15 COMPUTER**

**G15**

**DIAPER\***

**\* DIAGNOSTIC PROGRAM FOR EASY REPAIR**



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<u>Reel 1:</u>		<u>Reel 2:</u>	
.147x86w	Number Track	-.u05v1ww	Block Selection
<u>.7u348y1</u>	Block Selection	-.46xz010	Interrogator
-.46xz010	Interrogator	.x693002	
-.z665461		.3303w2v	
-.21w2xxx	Command Register	-.82384x3	Test 8
.0000000	Test 2	.uzy5657	
.0000000		-.6uvvw65	
.wv12535	Test 3	.0000000	
.x60zw16		-.12706wx	Test 9
.0000000		-.w21920w	
-.536x49x		.0000000	
.wu94w12	Test 4	.luvu0zu	Test u
-.w4uw5vu		.1yv38y3	
-.98840z5		.zxx9zw7	
.w86xv51		.0000000	
-.744y0xy	Test 5	.z7vy2zw	
.0xv667x		.z0860u6	Test v
-.x09wx11		.55940v9	
-.2y456wx	Test 6	.u480690	
.5v05v08		-.5067118	Test w
-.yz143uv		.0000000	
.7wyx187	Test 7 (Phase 1)	.u2y5u21	Test x
-.6v5672v		.77u8020	
.w34z700	Test 7 (Phase 2)	-.v74w973	
.0000000	Photo-Reader	-.86v8x99	Test y
-.7v18v9u	Typewriter	.0000000	Test z

METHOD OF OPERATION

The program is mounted on two reels. Tests 1 through 7, Photo-Reader Test and Typewriter Test are mounted on Reel 1; Tests 8 through z are mounted on Reel 2.

If it is desired to run Tests 1 through z, proceed as follows: Mount Reel 1 on photo-reader; read two blocks either via automatic turn on cycle or two p keys and "Go"; 111111 should be typed out if number track is correct or another indication (See text on Block Selection) may be made if number track is apparently in error. At this point, type-in is gated and an "s" key will initiate further testing beginning with Test 2. Type-in is gated after the identification of Test 7, Phase 1; operator should type in a random number of any number of digits followed by an "s" key - testing will resume; no further intervention should be necessary until the completion of Test 7, Phase 2 when a multiplicity of bell ringing occurs. At this point, mount Reel 2; compute switch to idle and back to "Go".

Indications of a full run with no errors would be as follows:

```
1111111 s
2222010
3333102
4444025
5555016
6666016
7777145   DDDs(Random #)
7777015
8888018
9999019
uuuu025
vvvv026
wwww012
xxxx010
yyyy010
zzzz043
```

The last three digits of the test tags (except test 1) to the left indicate the approximate running times of the respective tests in minutes and seconds exclusive of read-in time.

Each reel has its own block selection routine and any test can be entered by typing the appropriate digit for the test followed by tab s. Example: 4tab s to enter Test 4; vtab s to enter Test v (with appropriate block selection routine operating). Note: Type 9tab s to enter Photo-Reader Test and 8tab s to enter Typewriter Test with block selection for Reel 1 operating. Any test can be entered manually by p keying in the first block of the test and placing compute switch to "Go".

An arrangement has been made so that any test can be cycled through indefinitely under control of punch switch. For Long Lines Test, Phase 1, punch switch on causes the computer to enter a continuous long lines recheck mode after random number loading has been completed. scf initializes the "random number loading" program and sclf initializes the recheck mode of operation. scf restarts any test.

The m and r functions can be used in conjunction with the Interrogator if desired. m and r should not be used in Test 7, Phases 1 and 2.

The computer will allow testing to continue in all tests through Test 5 even if read-in error is apparent; starting with Test 6, computer halts - read back can be attempted by "idle" and back to "Go".

BLOCK SELECTION - REEL 1

This routine consists of one block and operates from Line 0. Number track is checked by addition in AR and subtraction of prestored information; llllllll should be typed if check is effected; summation of number track in error is typed in following format if error is apparent: sign.DDDDDDD (complemented version if sign is negative). Line 0 summation is checked and .xxxxxxx typed if error is apparent. The Interrogator Routine (See pg.4) is read in and stored in Line 5. Line 5 summation is checked and .yyyyyyy typed if error is apparent. Type-in is gated at which time any test on Reel 1 can be selected. (See Method of Operation, pg. 2). Legitimate selections are 0 through 9 tab s or -7 tab s; if any number outside of the legitimate range is typed, it is ignored and type-in is gated for a new entry. Whenever a proper selection is detected, branching into proper test is effected by shifting selected number into N number position of a dummy command; a search for designated test is carried out with AR being involved in a counting loop. If zero is the typed selection (such as "s" key only), the branching and block counting part of the program as described above are by passed and Test 2 is called for directly via three "read tapes".

BLOCK SELECTION - REEL 2

Block Selection for Reel 2 can be entered either manually (p and "Go") or automatically after the running of Reel 1. In both the manual and automatic modes, Block Selection read-in is checked and .xxxxxx typed if error is apparent. There is a programmed halt if read-in error is detected - it is necessary to rewind and reenter manually. The Interrogator is read in and .yyyyyy is typed if read-in error is apparent - in this case, read back of Interrogator is automatic in event of read-in error.

In the manual operating mode, the test selection procedure is similar to that for Block Selection - Reel 1. Legitimate selections are 8 through z tab s.

In the automatic mode, Lines 6 through 18 are loaded with information in order to present a typical loading condition for clock, the last test of Reel 1 having left the memory nearly cleared. Test 8 is then entered directly.

INTERROGATOR

The Interrogator Routine has been developed to facilitate communication with the computer during the operation of the diagnostic routine. The Interrogator is a one line program and is stored in Line 5 at all times except during the operation of Test 7 (Long Lines, Phases 1 and 2) and Test x (Mark Exit).

The Interrogator has four main functions as follows: To call out information from any address in memory; to replace information in any address in memory; to type the summation of any channel; to type the full contents of any channel.

Operating Procedure: At any time during testing except during Tests 7 and x, place compute switch in idle position; strike sc5f and place compute switch to go (If test is set at time of entry, computer will halt - it is necessary to return to idle and back to go); computer transfers contents of Line 23, AR, Line 2,0-3, Line 3,2-3, MQ, ID and PN to intermediate storage in Line 18; computer gates type-in and waits for ready; to call out a location in memory, type CHWD tab s (CH = channel and WD = word position in channel - for example, to type out the contents of word 20 of Line 1, type 0120 tab s) - the typeout will include sign and seven hexadecimal digits and a verification of the address called for; to replace information in any address, type sign DDDDDDD tab CHWDx tab s; to type any channel in its entirety, type CHy tab s; to type the summation of any channel (complementary form if negative), type CHz tab s. When all operations involving the Interrogator have been accomplished, the operator should strike tab s in order to reset the short lines and formats to their status as of the time of the entry to the Interrogator. Computer will come to a halt and operator can manually reenter test; reentry can be either via scf or r (m is permissible prior to sc5f at time of entry).

Intermediate storage for the short lines etc. follows: Line 2,0-3 to Line 18,0-3; Line 3,2-3 to Line 18,4-5; Line 23 to Line 18,8-11; AR to Line 18,12; ID to Line 18,14-15 (Sign from IP); ID to Line 18,16-17 (compl. if neg.); MQ to Line 18,18-19 (compl. if neg.); PN to Line 18,20-21 (compl. if neg.).

Miscellaneous Notes: To call out the address Line 00, Word 00, it is necessary to precede the type-in of 0000 tab s with any digit (10000 tab s would be satisfactory). Information in Line 19 is left intact unless a channel typeout is called for (y code). There is no check for illogical instructions to the Interrogator; therefore, it is essential that type-ins be made with extreme care. It is recommended that, while marginal trouble-shooting with Diaper, the computer be returned to center margin prior to entering the Interrogator Routine. During the operation of Long Lines Test (Test 7, Phase 1), the Interrogator can be of use as follows: When operating in the long lines recheck mode (punch switch on), move compute switch to idle; manually position Interrogator on photo-reader; strike p; type q 0180265 tab fi; type scf to resume testing; Lines 5 and 19 should show errors on reentry. Interrogator can then be entered at any point in the conventional manner.

COMMAND REGISTER

This test consists of one block plus a loader. The loader operates from Line 3 and inserts the same program proper into Lines 19, 0, 1, 2 and 4. Summation of Line 19 is typed (-.21w2xxx); Line 19 is transferred to Line 3 and testing commences at Line 3,00.

The program executes a continuous series of 1 mod 4 commands which have identical static contents: 7.10.22. No other commands should be executed and the stepping of information through the control switch can be conveniently observed.

If a scope is synced on TF, CC should be observed with no base line at T-21 during 0 mod 4 word times. Transfer should be high during 2 mod 4 word times and the reset pulse for CL should be observed without baseline at T-29 of 2 mod 4 word times. Much of the related circuitry of the above can be traced by extensions of the technique described.

The program has ring bell commands at all locations other than 1 mod 4. In each case, control is returned to command 01 when a ring bell has occurred. A ring bell other than one at beginning of routine indicates failure.

The routine can be operated from any command line other than 5 by manually selecting the line and placing compute switch to "Go". If it is desired to operate the routine from Line 5, it must first be manually entered into Line 5 from any of the other command lines as Line 5 holds the Interrogator.

This routine is entered by typing 1 tab s with Block Selection, Reel 1 operating.

TYPEWRITER

Routine stops on gate type-in. Operator should type in four hex words, after which he has a choice of two modes of operation. "s" will result in the above four words being typed from Line 19 repeatedly which offers excellent opportunity for checking output circuits and typewriter. If "/" is hit instead, the four words will be typed back, after which the computer will gate type-in for entry of another four words. The / may be hit repeatedly to dump the same four words or any information may be entered at the gate type-in. Routine initializes on schf.





CQ FLIP FLOP AND ASSOCIATED GATES

This test has been written to detect malfunctions of CQ flip flop and associated testing circuitry. Commands are written in duplicate so that control will not be lost if a command is taken illegally from N + 1 at any point.

Line 1 is in control for this single block test and Line 1 summation is checked after typeout of test tag (2222010). If Line 1 summation does not check, the erroneous summation is typed as an error flag. The test tag and the error flag are the only programmed typeouts, and breakpoints have been included in both output commands so that a separation could be effected between the output commands and the test ready commands which follow.

A system of error lockup loops is employed for error indication. For example, if command N is the beginning of an error sequence, control is returned to N locking the computer in a one command loop. Command N + 1 has the same static contents as command N and also returns control to N. The source, destination neurons are used as error indicators; error lockup #1 = source 1, destination 1; error lockup #n = source n, destination n.

For successive passes through the test and eventual exit, it is necessary to have a counting device which is independent of the testing circuitry itself. This is effected by clearing ID,0 and inserting information into the high order part of ID,1; at the end of each pass, ID is shifted one bit, ID,0 is transferred to Line 1,10 and control is transferred to Line 1,10. Thus, control goes to Line 1,00 until a hit appears in T20 of ID,0 at which time control is transferred to Line 1,64.

The test requires the use of some number "A" which can be altered for each pass. "A" is generated by subtracting the contents of MQ from AR for seven word times. MQ is used for intermediate storage at the beginning of the program and undergoes a one bit shift in the process described in the preceding paragraph after each pass.

The first test involves a "test ready" at a point when "ready" should be high. If "not ready" is indicated, computer enters error lockup #1.

Line 1,34 is a clear location in the program. Line 1,34 is zero tested; if non zero is indicated, computer enters error lockup #2.

"A" is zero tested (Line 22,0). "A" should go to zero at no point during the course of the passes through the tests. If "A" tests zero, computer enters error lockup #3.

Absolute value of "A" is sent to AR and negated. Sign of AR is tested. If AR tests negative, computer enters error lockup #4.

CQ FLIP FLOP AND ASSOCIATED GATES (Cont.)

Absolute value of "A" is negated and stored in AR. Sign of AR is tested; if AR tests positive, computer enters error lockup #5.

AR holds the negation of the absolute value of "A". AR is tested for negative zero; if negative zero is indicated, computer enters error lockup #6.

Negative zero is sent to AR. AR is tested for negative zero; if negative zero is not indicated, computer enters error lockup #7.

AR holds a negative number (-0000000). A command with S22 and D22 is executed to test for illegal appearance of DS at E of K14 (3D291, zone 3C); if test is set, computer enters error lockup #8.

The command Ch1, S21, D31 is executed to test for illegal appearance of SW at T of K18 (3D291, zone 3C); if test is set, computer enters error lockup #9.

The command Ch1, S26, D31 is executed to test for illegal appearance of S5 at F of K14 (3D291, zone 3C); if test is set, computer enters error lockup # 10.

AR sign is tested (AR holds negative zero); if AR tests positive, computer enters error lockup #5. If the negative test is realized, computer idles for one command and if the next command is taken from N + 1, indications are that CQ did not reset and computer enters error lockup #11.

The command S00, D03 is executed to test for illegal appearance of D6 at A of K18 (3D291, zone 3C); if test is set, computer enters error lockup #12.

The command S03, D26 is executed to test for illegal appearance of DX at D of K18 (3D291, zone 3C); if test is set, computer enters error lockup #13.

The command S29, D04 is executed to test for illegal appearance of DS at D of K20 (3D291, zone 3C); if test is set, computer enters error lockup #14.

The command S17, D31 is executed to test for illegal appearance of S7 at E of K20 (3D291, zone 3C); if test is set, computer enters error lockup #15.

SUMMARY OF CONTROL: Line 1, ID, Inverting Gates, AR

SHORT LINES - LOGICAL COMMANDS

This test operates from Lines 0, 1 and 2. Lines 20, 21, 22, 23 and the two word registers are tested as well as a few of the logical commands. Logical commands not included here are covered in test 6.

Each program line is sum checked after read-in and characteristic typeout occurs if failure is apparent. The test is permitted to continue even if a failure is indicated, on grounds that some failure other than read-in or of the long line in question has occurred.

The first test is a test of the clear command (CO-S23-D31). MQ, ID, and PN are tested for zero after the clear command is given. IP resetting is checked by transferring MQ to AR and testing sign. Prior to reentering test, MQ, ID and PN are loaded and IP is set.

The short lines test commences with command 82 of Line 0 (Page 10 of the coding sheets). Line 1,72-73 are used in the MQ, ID and PN memory tests. Line 0, 16-17-18-19 are used for the Line 20, 21, 22, and 23 memory tests. Prior to checking the short lines for accuracy, the computer goes into a delay loop for 160 drum revolutions.

The logical command involving Source 31 is tested beginning with command 74 of page 13 of the coding sheets. A four word pattern is inserted into Line 20; the one's complement is inserted into Line 21. A zero test is performed using Source 31 for one drum revolution.

With identical information in Lines 20 and 21, the logical command of Source 30 is tested. Line 21 is added to AR for one drum revolution. Not Line 20 and Line 21 are then subtracted from AR for one drum revolution. AR should be clear at this point and is so tested.

An additional test of Source 31 is run by inserting identical information into Lines 20 and 21 ; addition and subtraction for one drum revolution using Source 31 (Dest. AR) follows.

SUMMARY OF CONTROL: Lines 0,1 and 2 ; AR ; Inverting Gates

SUMMARY OF ERROR INDICATIONS

.xxxxxx L0(read-in)	5DD ; L20	12DD ; Source 31
.yyyyyy L1(read-in)	6DD ; L21	13DD ; Source 30
.zzzzzz L2(read-in)	7DD ; L22	14DD ; Source 31
	8DD ; L23	
1DD ; IP not reset by 'clear'	9DD ; MQ	DD = # of failures in hex ;
2DD ; PN not cleared by 'clear'	10DD ; ID	Microtests 1-4, 12-14 = 25
3DD ; ID not cleared by 'clear'	11DD ; PN	passes; microtests 5-11 =
4DD ; MQ not cleared by 'clear'		10 passes.

AR AND PN

This test involves fifteen microtests, all of which are designed to recognize AR, PN and associated circuit failures.

The first three microtests involve a check of AR as a memory unit. (Pages 16, 17 of coding sheets). Three constants are addressed to AR in separate tests: 0000000; -zzzzzzz; uuuuuuu. In each test, there is a two and one-half second programmed delay prior to verifying contents of AR. The delay loop involves a 1-26-31 command and microtests 1, 2 and 3 will indicate errors if the 1 characteristic in command 1-26-31 fails to block AR tally.

Beginning with microtest 4, the number of passes through each test is kept track of as follows: by inserting a marker in ID,1; shifting this marker one bit right for each pass; looking for the marker to appear in the low order side of ID,0. The marker is placed so that each test is passed through twenty nine times.

Logical commands involving Lines 20 and 21 are used to detect failures in most instances. To guard against the possibility of a malfunction of the logical commands giving erroneous indications, a sample failure is typed each time an error indication is typed. The sample failure can be checked against the expected correct value, and if coincidence occurs, a malfunction of the error detecting circuitry can be suspected. Other than for this reason, it was thought that a sample error typeout would be of considerable aid in tracing the cause of error.

When an error is detected on a pass through any test beginning with microtest 4, a bit is inserted into T29 of MQ,0. When ID shifts right after each pass (see above) MQ, of course, shifts left. When all twenty nine passes in any particular test have been effected, MQ,1 holds information not only as to the number of failures which occurred but also a direct record of which pass the circuit failed on. Therefore, a bit in the highest order position of MQ,1 indicates a failure on the first pass. -zzzzzzz would indicate a solid failure.

Following is a rundown on each of the microtests of this series beginning with microtest 4: (Page references in all cases are for coding sheets)

Microtest 4; -0000000 to AR (Command 42, page 17); add -0000000 to AR with 0 characteristic. This test is aimed principally at failure caused by a carry getting into T2. The carry set term at T1 should be blocked by T1.

Microtest 5; Clear and add -0000000 to AR with 1 characteristic (Command 42, page 17). At T29 of transfer, AC should get set term qualified by T29 and TR and D7 and  $\bar{C}3$  and IS and  $\bar{I}C$  and  $\bar{A}D$ . Therefore, AC should be up in time for T1 immediately after transfer and the negative sign of AR should be deleted.

Microtest 6; This test is similar in all respects to Microtest 5 except that

AR AND PN (Cont.)

-0000000 is transferred to AR with a 0 characteristic. Therefore, the bit in T1 should not be deleted as in microtest 5 since IS should never have come up during transfer.

Microtest 7; zOzOuuz (Command u0, page 18) and 8yzOuu0 are added with 0 characteristics. The result is logically checked against -7zy154z.

Microtests 8 through 11; Program Line 3 is the object of four block additions in AR, an addition being carried out for each of the characteristics 0 through 3. (Command u4, page 19 through command 22, page 21)

Microtests 12 through 15; Program Line 3 is the object of four block additions in PN, an addition being carried out for each of the characteristics 4 through 7. (Command 22, page 21 to end of test)

SUMMARY OF CONTROL: Lines 0,1,2,3,4,20,21; Logical Commands of sources 30, 31 and Shift Command

SUMMARY OF ERROR INDICATIONS

Erroneous summation of loader followed by:	vvvvvvv				
"	"	" Line 1	"	"	Read
"	"	" Line 3	"	"	in
"	"	" Line 4	"	"	check
"	"	" Line 0	"	"	

	Sample Failure	# Failures	Tag
Format:	signDDDDDDtab	signDDDDDDtab	signDDDDDDtab
<u>Sample (Correct val.)</u>	Tag		
0000000	1	AR	
-zzzzzzz	2	Memory	
uuuuuuu	3	Tests	
0000000	4	Check of illegal carry into T2 of AR	
0000000	5	Negative zero to AR, characteristic 1	
-0000000	6	Negative zero to AR, characteristic 0	
-7zy154z	7	zOzOuuz + 8yzOuu0 computed in AR	
04u7384	8	Add all Line 3 in AR, characteristic 0	
wu94x12	9	" " " " " "	1
-04u7384	10	" " " " " "	2
-356v3yy	11	" " " " " "	3
w49v2w1	12	" " " " " PN	4
-wzvv2u1	13	" " " " " PN	5
w49v2w1	14	" " " " " PN	6
3044x5y	15	" " " " " PN	7

INVERTING GATES

Three blocks operating from Lines 0, 1 and 2 make up this series of nine microtests on the inverting gates. ID is again used to count the number of passes as was the case for Test 4. Method of error indication is similar to that employed for Test 4 (See page ). The logical commands are again used in the detection of errors, with a double test usually operative - one for the dropping of pertinent information; the other for the pickup of extraneous information.

SUMMARY OF CONTROL: Lines 0,1,2,20,21; Logical commands of Source 30,31; Shift command.

SUMMARY OF ERROR INDICATIONS

```

•xxxxxx LO      Read
•yyyyyy L2      in
•zzzzzz L1      check

```

Format: (# of Failures)      (Sample Failure)      (Tag)  
          signDDDDDD      tab signDDDDDD      tab      D

<u>Sample (Correct value)</u>	<u>Tag</u>	
-5555556	1	(-uuuuuuu to L21,2 characteristic 1) Page 24, command u0.
uuuuuuu	2	(uuuuuuu to L21,2 characteristic 1) Page 25, command u2.
uuuuuuu	3	(-uuuuuuu to AR characteristic 2) Page 25, command 96.
uuuuuuu	4	(uuuuuuu to AR characteristic 2) Page 26, command 94.
uuuuuuu	5	(-uuuuuuu to AR characteristic 3) Page 27, command 96.
-5555556	6	(uuuuuuu to AR characteristic 3) Page 27, command 24
uuuuuuu	7	(uuuuuuu to L20,2 characteristic 3) Page 27, command u0.
-5555556	8	(-uuuuuuu to L20,2 characteristic 3) Page 28, command 04.
-5555555	9	(-5555555 to L20,2 characteristic 2) Page 28, command 94.

PN ; LOGICAL COMMANDS

In addition to PN and Logical Command checks, this test is designed to detect malfunctioning components which could under certain circumstances cause illegal sign writing in AR or PN.

SUMMARY OF CONTROL: Lines 0,1,2,22; AR; Inverting Gates

SUMMARY OF ERROR INDICATIONS

Format: signDDDDDDDDtabsignDDDDDDDDtabTTDD  
 (Sample Failure) TT = Tag; DD = number of failures  
 in hex out of 25 passes

<u>Sample (Correct Value)</u>	<u>Tag</u>	<u>Reg. Involved</u>	
-YYYYYYY    YYYYYYY	1	PN	llllllll, llllllll to PN (Pg. 30) Add -uuuuuuu, uuuuuuu
uuuuuuu    uuuuuuu	2	PN	5555555, 5555555 to PN (Pg. 31) Add 5555555, 5555555
0000000	3	PN	-0000000 to PN (Pg. 31) Add -0000000
-zzzzzzz    -zzzzzzz	4	PN	-zzzzzzz, zzzzzzz to PN (Pg. 32) Add -zzzzzzz, zzzzzzz
0000000    0000000	5	PN	Neg. zero to PN, characteristic 1 (Pg. 33); several attempts are made to induce illegal writing of sign into PN; DD could exceed 19 as error loops are shared by many tests.
0000000	6	AR	AR was cleared prior to loading neg. zero in PN in 5 above; AR is checked for writing of illegal sign. (Pg. 33) DD can exceed 19.
uuuuuuu    0000000	7	PN	Check of Logical Command 3-23-31; (Pg.34)
0000000    uuuuuuu	8	ID	Check of Logical Command 3-23-31; (Pg.34)
zuzuzuz	9		Check of Logical Command of Source 27; (Page 35)
0000000    0000000	10		Test of Source 29 as source of zeros; (Page 35)

Note: All page references for coding sheets.

LONG LINES (PHASE 1)

This test has been designed to observe malfunctions of the long lines directly as well as failures caused by some instances where multiple destinations have occurred.

The routine consists of three blocks including a loader and operates from Lines 0 and 1. The loader is sum checked after read-in and computer rings bell and halts if reading error has occurred. Read back can be effected by placing compute switch to idle and back to go. With successful read-in of loader, type-in is gated and computer hangs on "test ready". At this point, the operator should type in a random number of digits followed by an "s" key. Computer will then load the program into Lines 1 and 0 with the same read-in check as noted above for the loader.

The computer clears Lines 2 through 19 and proceeds to load the memory with a series of random numbers generated as shown on page 38 of the coding sheets. Each word position of Lines 2 through 19 is loaded with a different random number starting in the lowest order part of each line. Loading of the random numbers is handled double precision. As each long line is being loaded, a running summation of the random information being entered is carried in Line 22,1. With the entry of each pair of words in a long line, the line is summed in the AR and checked against the running summation held in Line 22,1. As long as agreement exists between the two summations, the computer continues to fill the line through word u7. At this point, the summation of the line (L22,1) is transferred to an appropriate place in Line 1 for purposes of later rechecking. If a line fails during loading, no further information is entered into the line; an error indication is typed; the running summation of the line is corrected to correspond to the existing summation which is presumably in error and this value held in Line 1 for subsequent rechecking. We can in this way distinguish between line failures during loading or subsequent failures during recirculation. After each line has been filled, all lines already filled are rechecked; program lines 0 and 1 are also rechecked.

SUMMARY OF CONTROL; Lines 20,21,22,23; AR; PN ; Inverting Gates

SUMMARY OF ERROR INDICATIONS

<u>Line</u>	<u>Failure During Loading</u>	<u>Recheck Failure</u>
0		x0
1		x1
2	y2	u2
'	'	'
'	'	'
15	yz	uz
16	z0	v0
'	'	'
19	z3	v3



LONG LINES (PHASE 2)

This phase of the long lines testing constitutes a check of the long lines with identical information stored in each channel.

After loading identical information into all long lines (Program Line 0 to all channels), computer delays for approximately five seconds prior to checking Lines 0 through 19 for accuracy.

Lines 1 through 22 are cleared and computer again delays for approximately five seconds prior to verifying that Lines 1 through 22 have remained clear.

SUMMARY OF CONTROL: Lines 0,23; ID; AR ; Inverting Gates

SUMMARY OF ERROR INDICATIONS

<u>Line</u>	<u>Failed with Identical Information in Each Line</u>	<u>Picked Up Information After Clear Loop</u>
0	1	
1	1 1	2 1
2	1 2	2 2
3	1 3	2 3
4	1 4	2 4
5	1 5	2 5
6	1 6	2 6
7	1 7	2 7
8	1 8	2 8
9	1 9	2 9
10	1 u	2 u
11	1 v	2 v
12	1 w	2 w
13	1 x	2 x
14	1 y	2 y
15	1 z	2 z
16	1 10	2 10
17	1 11	2 11
18	1 12	2 12
19	1 13	2 13
20		2 14
21		2 15
22		2 16

IP FLIP FLOP AND ASSOCIATED GATES

This routine is made up of a series of seventeen microtests which involve a comprehensive check of sign circuitry associated with the two word registers. Following is a description of each of the microtests in this series: (Page references are for coding sheets).

Microtest 1;(Page 45); -000000 is transferred to ID,1. The minus sign should be blocked from T-1 of ID,1 by TR and  $\overline{DX} \cdot \overline{TR}$  and D6 and  $\overline{CW}$  and  $(CS + \overline{CX})$  and TS. (Zone 2C, 3D293) ID,1 is zero checked by command 8. Note that there should be no time of sign during word time 11 by virtue of the double precision command operating for an odd word time. The command was written in this way to minimize our chance of missing the bit in T-1 (if it did exist) due to other circuit failures.

Microtest 2;(Page 46); Command 10 transfers a negative number to ID,1. Sign should be held by IP. Command 22 transfers ID,1 to AR with an add characteristic. If microtest 1 above has passed, it is reasonable to assume that T-1 of ID,1 has no bit in this case. If AR tests negative, IP probably was not blocked during time of sign. Look for malfunction of  $\overline{CW}$  term in vicinity of Zones 2 and 3B,3D293 as pertaining to gates of package D1,All.

Microtest 3;(Page 46); A negative number is transferred to ID and a positive number to MQ. MQ is transferred to AR and sign checked. Positive AR indicates error. Several attempts are made to reset IP illegally. See commands 69 through 71, page 46.

Microtest 4;(Page 47); A negative number is transferred to MQ after clearing. MQ is transferred to AR and sign checked. Positive AR indicates error. Refer to Zone 3C,3D293. IP should be set by EB and IP and  $(\overline{S6} + SX)$  and D6 and  $(\overline{TR} \text{ and } \overline{DX})$  and  $\overline{CW}$  and  $(CS + \overline{CX})$  and TR and TS. If error is indicated and it is found that IP is being set during the execution of command 6, look for malfunction of IP to IB during time of sign of word time 13. Several checks are made of blockage of IP to IB under various conditions.(See page 47).

Microtest 5;(Page 48); A negative, then positive number is transferred to ID. FN is transferred to AR and sign tested. Negative AR indicates error. If previous tests have passed, look for difficulty in reset term of IP qualified by EB and IP and DV and  $(\overline{S6} + SX)$ , zone 3C,3D293.

Microtest 6;(Page 48); Two negative numbers are transferred to FN after clearing. FN is transferred to AR and sign tested. Negative AR indicates error. If tests 1 through 4 have passed, look for difficulty in reset term of IP as qualified by EB and IP and  $(\overline{TR} \text{ and } \overline{DV})$  and  $(\overline{S6} + SX)$ , zone 3C,3D293.

Microtest 7;(Page 49); A positive number is transferred to ID,1 and a bit is shifted into the T-1 position of ID,1. ID,1 is transferred to MQ,1; MQ to AR and sign test. Negative AR indicates error. If other tests have passed, look for difficulty with the  $\overline{S6}$  qualifying term for set of IP, zone 3C,3D293.

IP FLIP FLOP AND ASSOCIATED GATES (Cont.)

Microtest 8; (Page 49); A negative number is sent to MQ,1 with an add characteristic. The number should not be complemented as there is no time of sign during transfer by virtue of an odd T number; IP should be set by command 66; MQ is transferred to PN with a 0 characteristic; MQ,1 and PN,1 are added in AR and AR is zero tested. Non zero test indicates error. If microtest 7 has passed, ascertain if the expected bit is present in T-1 of MQ,1 after execution of command 63; if not, check qualifying terms for block of EB to IB, zone 2C,3D293.

Microtest 9; (Page 50); PN to PN is tested with negative sign in IP. Check set term for IS as qualified by six term "and" gate (D2A18, zone 2B,3D293).

Microtest 10; (Page 50); Two negative numbers are transferred to ID by command 10; ID to AR and sign test; positive sign indicates error. If microtests 2 and 5 have passed, IP probably received reset pulse during second word of transfer as effected by command 10. Check J, K of D1A15, zone 3C, 3D293 for illegal reset term.

Microtests 11, 12, 13; (Pages 51, 52); Clearing of the even sides of MQ, ID and PN is checked after transfer via AR to MQ, ID and PN. Note that the write terms for MQ, ID and PN are qualified by  $\overline{CS}$  or  $\overline{CE}$ .

Microtests 14, 15; (Pages 52, 53); Clearing of PN is checked on loading of ID with 0 characteristic; non-clearing of PN is checked on loading of ID with 1 characteristic. Check  $\overline{CW}$  and  $(CS + \overline{CX})$  and TR and D6 and DV, zone 3C,3D294.

Microtest 16; (Page 53); PN to PN is tested with positive sign in IP. If other tests have passed, check diode D on D2A18, zone 2B,3D293.

Microtest 17; (Pages 53, 54); Diodes associated with the generation of  $\overline{D6}$  are tested including MK of C14, MK of C15 and MK of C16 (3D292, zone 3A). Diodes associated with the generation of S6 + SX are tested including UA, TC, SD and RE of B10 (3D292, zone 1C). A common error loop is shared so that it is possible for the number of failures in an error timeout to exceed the basic number of passes.

SUMMARY OF CONTROL: Lines 0 through 4; Line 22, AR

SUMMARY OF ERROR INDICATIONS

Error timeouts are of the form TTDD; TT= Tag number and corresponds to microtest numbers listed above. DD= number of failures in hex out of twenty five passes. As an example, if microtest 9 had failed 18 times, the indication would be: 912. Note: DD could exceed 19 for Microtests 3 and 4 as error loops are shared by more than one test.

SHIFT AND NORMALIZESUMMARY OF CONTROL: Lines 0,1,2,21,22; PN; AR; Inverting Gates.SUMMARY OF ERROR INDICATIONS

Format: signDDDDDDDtabsignDDDDDDDDtabTTDD  
 (Sample Failure) TT = Tag; DD = number of failures  
 in hex out of 25 passes

Sample (Correct Value)	Tag	Reg.	Inv.	
0000000	uuuuuuu	1	ID	Pg. 55; uuuuuuu, 0000000 to ID,1-0;
uuuuuuu	0000000	2	MQ	0000000, uuuuuuu to MQ,1-0; clear AR;
	000001x	3	AR	29 bit shift by command 87.
0000000	0000000	4	ID	Pg. 57; xxxxxxx, xxxxxxx to ID and MQ;
0000000	0000000	5	MQ	clear AR; 58 bit shift by command 75;
	000003u	6	AR	ascertain that PN is not altered dur-
0000000	0000000	14	PN	ing shifting.
0000000	xxxxxxx	7	ID	Pg. 58; xxxxxxx, xxxxxxx to ID and MQ;
xxxxxxx	0000000	8	MQ	clear and subtract 000001x from AR;
	0000000	9	AR	shift under AR control. Before and after shift, several attempts are made to illegally alter AR contents.
uuuuuuu	0000000	10	MQ	Pg. 59; 0000000, uuuuuuu to MQ,1-0;
	000001x	11	AR	clear AR; Normalize by command 91.
-00xxxxxx	vu00000	12	MQ	Pg. 60; 0000000, xxxxxxx to MQ,1-0; Normalize under control of T # of command 9 (T # = 42)
uuuuuuu	0000000	13	MQ	Pg. 60; uuuuuuu, 0000000 to MQ,1-0; Normalize by command 45 (Note that T 29 of MQ,1 holds bit prior to normalize)

Note: All page references above are  
for coding sheets.

MULTIPLY AND DIVIDESUMMARY OF CONTROL: Lines 0,1,2,3,20,21,22,23; AR; Logical Command S30SUMMARY OF ERROR INDICATIONS

Format: signDDDDDDtabsignDDDDDDtabTTDDD  
 (Sample Failure) TT = Tag; DDD = number of failures  
 in hex; microtests  
 1-3 and 8-10=50 passes;  
 all others = 25 passes

<u>Sample (Correct Value)</u>	<u>Tag</u>	<u>Reg.</u>	<u>Inv.</u>	
0000000 0000000	1	ID		Pg. 63; Double precision typical multiplication
0000000 0000000	2	MQ		
50yw19w v1784xw	3	PN		
0000000 0000000	4	ID		Pg. 64; Clear; xxxxxxxx to PN,0; divide by zero for 58 word times
xxxxxxx 0000000	5	PN		
0000000 uuuuuuv	6	MQ		
lllllll5 lllllll6	7	PN		Pg. 65; Clear; xxxxxxxx, xxxxxxxx to ID; divide for two word times
-x37v2yz z248wv3	8	ID		Pg. 66; Double precision typical division
57u3xwy -z8x07uy	9	PN		
-7693zyu 26vz9v3	10	MQ		
0000000 0000000	11	MQ		Pg. 67; Multiply test with several attempts to illegally alter two word registers; commands marked with * may be omitted via Interrogator during trouble-shooting; the error timeout in this case will unconditionally show MQ, ID, PN
0000000 -zuz56v2	11	ID		
-v6y2v3v -8z996v8	11	PN		
0000000 -54v6y33	12	MQ		Pg. 69; Divide test with several attempts to illegally alter two word registers via commands marked with *; error timeout will include all two word registers even though only one or two happen to be in error.
y35y4v7 -0000000	12	ID		
w95v242 -0000000	12	PN		

Note: All page references are for  
coding sheets.

OVERFLOW

Thirty microtests are involved in this series and all possible conditions of AR and PN overflow are tested. Division overflow is checked.

SUMMARY OF CONTROL: Lines 0,1,2,3,4,20,21,22,23, AR, PN, Divide for Division Overflow.

SUMMARY OF ERROR INDICATIONS

Format: TTDD; TT = Tag; DD = # of failures in hex out of 25 passes.

<u>Tag</u>	<u>Sum or Difference Computed in AR</u>	<u>Erratic Overflow Status</u>
1	$5/8 + 5/8$	Not Set
2	$1/2 + 1/2$	Not Set
3	$1/2 + 1/4$	Set
4	$3/4 - 1/2$	Set
5	$3/4 - 3/4$	Set
6	$1/4 - 3/4$	Set
7	$- 1/2 + 3/4$	Set
8	$- 3/4 + 3/4$	Set
9	$- 3/4 + 5/8$	Set
10	$- 3/4 - 0$	Set
11	$- 1/4 - 5/8$	Set
12	$- 1/2 - 1/2$	Not Set
13	$- 3/4 - 5/8$	Not Set

14 ; Test overflow command did not reset overflow flip flop

	<u>Sum or Difference Computed in PN</u>	
15	$5/8 + 3/4$	Not Set
16	$1/2 + 1/2$	Not Set
17	$1/4 + 1/2$	Set
18	$3/4 - 1/4$	Set
19	$1/2 - 1/2$	Set
20	$1/4 - 3/4$	Set
21	$- 1/2 + 3/4$	Set
22	$- 1/2 + 1/2$	Set
23	$- 3/4 + 1/2$	Set
24	$- 1/2 - 0$	Set
25	$- 1/2 - 1/4$	Set
26	$- 1/2 - 1/2$	Not Set
27	$- 3/4 - 3/4$	Not Set

	<u>Division</u>	
28	$3/4$ divided by $1/4$ (57 = T #)	Not Set
29	$3/4$ divided by $1/4$ (55 = T #)	Set
30	$1/2$ divided by $- 3/4$ (v6 = T #)	Set

AR AS SOURCE OF COMMAND

This program inserts all z's in Line 2. A command is inserted in AR which when obeyed should clear Line 2, 03 through 63. AR should be obeyed at word time 02, and if control is not transferred to AR as directed by command 38 and Line 0 retains control, error loop will be entered at word time 02. With the proper execution of command from AR, control should be returned to Line 0 at word time 63. At this point, the clearing of Line 2, 03 through 63 is verified. Finally, all of Line 2 is tested for zero. If Line 2 tests zero here, it would tend to indicate that more than one command was executed consecutively from AR. (Note that N # of command from AR is 63 and T # 64 so that Line 2 would be cleared if AR were obeyed at time 63.)

SUMMARY OF CONTROL: Lines 0,2,21,22, Inverting Gates

SUMMARY OF ERROR INDICATIONS

Format: TDDD; T= Tag; DDD = # of failures in hex out of 50 passes

<u>Tag</u>	<u>Indication</u>
1	Control not transferred to AR by S31 D31; check set term for CG
2	Control was transferred to AR but order not properly executed
3	AR retained control for more than one command; check CG reset

MARK EXIT

Since there are eight command lines, there are sixty four possible combinations of inter line transfer, all of which are tested in this program. There are no typed error indications. If a failure occurs on exit from one line to another, it would be indicated by the computer locking in a one command loop with the source neons indicating the line from which the transfer of control command was given and the destination neons indicating the line to which control should have been transferred. The command line neons would indicate the line to which control was transferred to in error.

SUMMARY OF CONTROL: All Command Lines; Lines 8,9,10,22, AR

RETURN EXIT

The program inserts the following command in Line 1, 40 : w.40.50.0.21.31. All other locations in Line 1 have an exit to an error loop in Line 0 at word time 30. The test involves a four step subroutine in Line 0 starting with command 50. (Actually, this subroutine keeps tally of number of trials.) The concluding command of the subroutine is the return command at word time 34 : 36.35.1.20.31 . Control should be transferred to Line 1 at word time 40 at which point process is repeated. Error typeouts are held until all passes have been made and error indications are as follows:

Format:

TDDD ; T = Tag ; DDD = # of failures in hex out of 50 passes

<u>Tag</u>	<u>Indication</u>
1	Control was returned to incorrect word time in Line 1 when return command was given.
2	Control was retained by Line 0 when return command to Line 1 was given.

SUMMARY OF CONTROL: Lines 0,1,22, AR

CONTROL SWITCH

This test has been designed to detect malfunctions which are peculiar to some particular control switch configuration. All combinations of sources and destinations from 00 to 26 are exercised with the exception of source or destination 5 (Interrogator storage). The program operates as follows: An argument is transferred from A to B and B back to A at time T. Starting values of A and B are 00 and T = 55; B is incremented by 1 after each pass of A to B and B back to A, A and T being held constant; after B has reached 26, A is incremented by 1, T is incremented by 2, B is reset to 00 and the process repeated. The limiting situation is A = 26, B = 26, and T = u7. The program detects and skips all operations involving A = 5 or B = 5.

The argument or starting constant is located in Line 0,48 and its value is zu0zu0z. After all transfers have been effected, PN,1 is checked against Line 0,48 and if agreement does not exist, PN,1 is transferred to AR and AR is typed as an error flag. Whenever this occurs, the operator should be able to determine at which point failure occurred by checking the table which was generated as described above. The checking can be conveniently handled via the Interrogator. The Interrogator itself should be checked for accuracy by typing 05z tab s ; the correct summation is: -.46xz010 .



## BLOCK SELECTION - REEL 1

```

.00 s u.01.02.0.19.00 Line 19 to Line 0 - Test not set
.01 s u.02.02.0.19.00 Line 19 to Line 0 - Test set
.02 . .16.18.0.21.31 Exit to Line 0, 18 ; T # of 16 for format use
.18 s .00.48.1.19.31 Stop DA-1
.48 . .51.51.0.23.31 Clear
.51 . u.52.04.1.26.18 Clear Line 18
.04 . .05.05.1.31.31 Number track to Line 18
.05 . .06.07.3.00.28 Clear and subtract 147x86w from AR
.07 . u.08.11.1.18.29 Add all Line 18
.11 . .12.13.0.28.27 - Zero test AR ( Non zero = error )

.14 s .06.35.1.00.29 Number track apparently in error ; add 147x86w to AR
.35 . .02.08.4.00.03 Error format to Line 3; -8w00000, 10122vz ( Last six digits
See below for 08 - - not used for format )

.13 s .15.16.0.00.28 Number track checks ; 1111111 to AR
.16 . .19.20.0.00.23 Format to Line 23, 3
.20 . .03.08.0.23.03 Format to Line 3, 3 ; 0000062
.08 . .10.21.0.08.31 Type AR ; also from 35 above
.21 . .23.21.0.28.31 Test ready
.22 . .23.24.3.00.28 Clear and subtract summation of Line 0 from AR ; z5v4yv5
.24 . u.25.25.1.00.29 Add all Line 0
.25 . .26.27.0.28.27 - Zero test AR ( Non zero = error )
See below for 27

.28 s .29.26.0.00.28 xxxxxx0 to AR
.26 . .28.30.0.21.31 Mark 27 ; enter error subroutine
.30 s .31.32.0.00.23 Error format to Line 23, 3
.32 . .03.33.0.23.03 Error format to Line 3, 3 ; 6000022
.33 . .35.77.0.08.31 Type error indication
.77 . .77.77.0.28.31 Test ready
.78 . .80.79.0.20.31 Return command

.27 s .29.56.0.15.31 Read tape ( Interrogator Routine )
.56 . .57.59.3.00.28 Clear and subtract summation of Interrogator from AR ;
.59 . .59.59.0.28.31 Test ready
.60 . u.61.62.0.19.05 Line 19 to Line 5
.62 . u.63.65.1.05.29 Add all Line 5
.65 . .67.68.0.28.27 Zero test AR ( Non zero = error )
See below for 68

.69 s .71.74.0.00.28 yyyyyy0 to AR
.74 . w.70.30.0.21.31 Mark 70 ; enter error subroutine at 30 above

.68 s .69.70.0.28.28 Interrogator summation checks ; skip to 70
.70 . .36.37.0.00.23 Clear Line 23, 0 ; Line 0, 36 = 0000000
.37 . .39.39.0.12.31 Gate type-in
.39 . .41.39.0.28.31 Test ready
.40 . .67.09.0.00.22 Carriage return format to Line 22, 3 ; 4400000
.09 . .03.u6.0.22.03 Carriage return format to Line 3, 3
.u6 . .00.41.0.08.31 Type carriage return
.41 . .43.41.0.28.31 Test ready
.42 . .44.45.0.23.27 Test Line 23, 0 for zero ; see next page for 46

.45 s .47.49.0.15.31 Line 23, 0 = zero ; test 2 search - read tape
.49 . .49.49.0.28.31 Test ready

```

## BLOCK SELECTION - REEL 1

.50 . .52.72.0.15.31 Read tape  
 .72 . .72.72.0.28.31 Test ready  
 .73 . .75.u2.0.15.31 Read tape  
 .u2 . .u2.u2.0.28.31 Test ready  
 .u3 . .u5.00.6.21.31 Enter Test 2  
 From non-zero test of command 42, preceding page :  
 .46 s .48.u0.1.23.28 Line 23, 0 + to AR  
 .u0 . .u2.52.0.22.31 Test sign  
 See below for 52  
 .53 s .75.90.1.00.29 Input tests negative ; add 0000007 to AR  
 .90 . .92.96.0.28.27 Zero test AR ( Non zero indicates improper selection )  
 See below for 96  
 .97 s .98.70.0.17.31 Improper selection ; return to input ( See preceding page )  
 .96 s .47.99.3.00.28 Test 7, phase 2 selected ; Clear and subtract 0000015 from AR  
 .99 . .u1.12.0.15.31 Read tape  
 .12 . .u1.92.1.00.29 Add 0000001 to AR  
 .92 . .92.92.0.28.31 Test ready  
 .93 . .95.98.0.28.27 Zero test AR ( Zero test indicates last block read )  
 .98 s .u0.00.6.21.31 Exit to selected test  
 Enter here from positive test of command u0 above :  
 .52 s .54.55.3.00.29 Subtract 000000u from AR  
 .55 . .57.63.0.22.31 Test sign ( Positive indicates improper selection )  
 See below for 64  
 .63 s .64.70.0.17.31 Improper selection ; return to input ( See preceding page )  
 From positive test of command 55 above :  
 .64 s .68.91.0.23.28 Selected test # to AR ( In form of 000000D )  
 .91 . u.u4.u4.2.28.29 Shift D into N # position ( 12 bit shift )  
 .u4 . .10.17.0.00.29 Add dummy N # modifier to AR ; 004z021  
 .17 . .34.34.0.28.00 Modified command to Line 0, 34  
 Execute do nothing command at 34 ; skip to 79 + D  
 .79 s .80.70.0.17.31 Improper selection ( Minus zero ) ; return to input  
 .80 s .u1.99.3.00.28 Test 1 selected ; 0000001 from AR - go to 99 above  
 .81 s .95.99.3.00.28 Test 2 selected ; 0000003 from AR - go to 99 above  
 .82 s .89.99.3.00.28 Test 3 selected ; 0000004 from AR - go to 99 above  
 .83 s .75.99.3.00.28 Test 4 selected ; 0000007 from AR - go to 99 above  
 .84 s .66.99.3.00.28 Test 5 selected ; 000000w from AR - go to 99 above  
 .85 s .43.99.3.00.28 Test 6 selected ; 000000z from AR - go to 99 above  
 .86 s .58.99.3.00.28 Test 7 selected ; 0000012 from AR - go to 99 above  
 .87 s .61.99.3.00.28 Typewriter test selected ; 0000017 from AR - go to 99 above  
 .88 s .94.99.3.00.28 Photoreader test selected; 0000016 from AR - go to 99 above

.23	7u348y1	Sum LO	.57	-v920zz0	Sum Interrog.	.34	0000000	Dummy	Unused Loc.
.44	-7u348y1	Neg. sum	.71	yyyyyy0	Tag	.95	0000003	Prog. Const.	.38
.06	147x86w	Sum #	.36	0000000	Prog. Const.	.89	0000004	" "	.54
.03	-8w00000	track	.67	4400000	Format	.66	000000w	" "	.76
.02	10122vz	Format	.75	0000007	Prog. Const.	.43	000000z	" "	.u5
.15	1111111	Tag	.47	0000015	" "	.58	0000012	" "	.u7
.19	0000062	Format	.u1	0000001	" "	.61	0000017	" "	
.29	xxxxxxx0	Tag	.54	000000u	" "	.94	0000016	" "	
.31	6000022	Format	.10	004z021	Dummy				

## INTERROGATOR

```

.00 s .12.19.0.28.18 AR to Line 18, 12
.19 . .14.05.4.25.18 ID to Line 18, 14-15 ( For holding of IP contents )
.05 . .16.06.5.25.18 ID to Line 18, 16-17 ; complement if negative
.06 . .18.12.5.24.18 MQ to Line 18, 18-19 ; complement if negative
.12 . .20.08.5.26.18 PN to Line 18, 20-21 ; complement if negative
.08 . .00.09.4.02.18 Line 19 format to
.09 . .02.10.4.02.18 Line 18, 0 through 3
.10 . .02.46.4.03.25 AR format to
.46 . .04.07.4.25.18 Line 18, 04-05
.07 u.12.21.0.23.18 Line 23 to Line 18, 8 through 11
.21 . .24.26.4.29.23 Clear Line 23, 0-1
.26 . .28.22.0.12.31 Gate type-in
.22 . .22.22.0.28.31 Test ready
.23 . .24.28.4.23.27 Zero test Line 23, 0-1 ; see below for 29
.28 s .00.24.4.18.02 Enter restore loop ; restore Line 19
.24 . .02.25.4.18.02 format
.25 . .04.27.4.18.25 Restore AR
.27 . .02.31.4.25.03 AR format
.31 u.12.32.0.18.23 Restore Line 23
.32 . .14.33.4.18.25 Restore IP
.33 . .16.34.5.18.25 Restore ID ; complement if negative
.34 . .18.35.5.18.24 Restore MQ ; complement if negative
.35 . .20.36.5.18.26 Restore PN ; complement if negative
.36 . .12.01.0.18.28 Restore AR
.01 . .03.00.0.16.31 Halt - enter here if test set on entry
Enter here from non-zero test of command 23 above
.29 s .32.37.6.23.26 Line 23, 0 to PN,1 ; clear PN,0
.37 u.86.91.6.26.30 Shift PN 24 bits left; least sig. type-in = highest order PN,1
.91 . .85.86.0.05.30 Add 1000000 to PN,1
.86 . .87.93.1.26.27 Zero test PN,1 , i.e. test for z code; see next page for 93
.94 s .85.95.1.05.30 Non zero - command 86 ; add 1000000 to PN,1
.95 . .97.54.1.26.27 Zero test PN,1 , i.e. test for y code; see next page for 54
.55 s .85.72.1.05.30 Non zero - command 95 ; add 1000000 to PN,1
.72 . .73.80.1.26.27 Zero test PN,1 , i.e. test for x code; see next page for 80
.81 s .84.97.6.23.24 No code indicated; Line 23,0 to MQ,1
.97 . .24.02.1.26.31 Shift MQ 12 bits left
.02 w.82.83.5.21.31 Mark 82 ; enter source conversion
.83 s .14.17.6.05.25 0001400 to ID,1; clear ID,0 and PN,0-1 ; set IP positive
.17 . .08.u0.0.24.31 4 bit multiply
.u0 . .03.87.1.05.25 0000200 to ID,1
.87 . .08.53.0.24.31 4 bit multiply
.53 . .55.54.5.20.31 Return command
.82 s w.18.u4.5.21.31 Mark 18 ; enter T # conversion
.u4 s .57.75.1.05.25 u000000 to ID,1
.75 . .08.84.0.24.31 4 bit multiply
.84 . .85.87.1.05.25 1000000 to ID,1 - go to 87 above
.18 s .30.56.0.05.28 Dummy pickup command to AR ( 00.65.0.00.28 )
.56 . .57.68.1.26.29 Add PN,1 to AR
.68 . .70.70.0.31.31 Obey AR ; i.e. pick up selected location
.65 s w.49.45.5.21.31 Mark 49 ; enter output routine
.45 s .50.u6.4.05.25 Format to ID,0-1
.u6 . .02.04.4.25.03 Format to Line 3, 2-3
.04 . .06.52.0.08.31 Type AR

```

## INTERROGATOR

.52 . .52.52.0.28.31 Test ready ; to return command when ready  
.49 s u.52.74.2.05.25 Format to ID,1  
.74 . .76.78.0.23.28 Line 23, 0 to AR  
.78 . w.21.u6.5.21.31 Mark 21 ; enter output routine ; see preceding page  
Enter x code ; from zero test of command 72, preceding page  
.80 s .84.99.4.23.24 Line 23,0-1 to MQ,0-1  
.99 . .16.38.1.26.31 Shift MQ 8 bits left  
.38 . .39.43.5.24.28 MQ,1 to AR ; (direct transfer,including sign )

.43 . .46.u5.4.28.23 AR to Line 23,2-3  
.u5 . w.11.45.5.21.31 Mark 11 ; enter output routine ; see preceding page  
.11 s .12.71.6.23.24 Line 23,0 to MQ,1  
.71 . .16.88.1.26.31 Shift MQ 8 bits left  
.88 . w.13.92.5.21.31 Mark 13 ; enter destination conversion  
.92 s .96.u1.6.05.25 0000u0 to ID,1 ; clear ID,0 ; clear PN,0-1  
.u1 . .08.40.0.24.31 4 bit multiply  
.40 . .69.87.1.05.25 0000010 to ID,1 ; see 87 on preceding page  
.13 s w.98.u4.5.21.31 Mark 98 ; enter T # conversion ; see preceding page  
.98 s u.u4.39.1.23.25 Line 23,2-3 to ID,0-1 ; complement both if negative  
.39 . .42.56.0.05.28 Dummy store command to AR ; go to 56 - see preceding page  
.42 s( .00.70.1.25.00) Dummy store command ; executed from AR at 70 ; see prec. page  
.70 . .77.74.0.05.25 Format to ID,1 ; go to 74 above  
Enter y code ; from zero test of command 95, preceding page  
.54 s .79.16.0.05.23 Return command to Line 23,3  
.16 . .20.58.0.23.28 Line 23, 0 to AR  
.58 . .59.64.0.05.25 Format to ID,1  
.64 . w.48.u6.5.21.31 Mark 48 ; enter output routine ; see preceding page  
.48 s .52.67.6.23.24 Line 23,0 to MQ,1  
.67 . .32.u2.1.26.31 Shift MQ 16 bits left  
.u2 . w.44.83.5.21.31 Mark 44 ; enter source conversion ; see preceding page  
.44 s .47.68.0.23.28 Return command to AR - to obey AR  
.79 s .66.56.0.05.28 Dummy transfer command to AR ; go to 56 on preceding page  
.66 s(u.71.u3.0.00.19) Dummy transfer command  
.u3 . u.64.u7.0.05.23 Format to Line 23  
.u7 . u.04.76.0.23.02 Format to Line 2, 0 through 3  
.76 . .78.20.0.09.31 Type Line 19  
.20 . .20.20.0.28.31 Test ready ; to 21, preceding page when ready  
Enter z code ; from zero test of command 86, preceding page  
.93 s .15.16.0.05.23 Return command to Line 23, 3 ; go to 16 above  
.15 s .73.56.0.05.28 Dummy add command to AR ; to obey AR at 70  
.73 s(u.71.90.1.00.29) Dummy add command  
.90 . .91.47.3.26.29 Subtract PN,1 from AR  
.47 . .73.89.3.05.29 Subtact dummy command 73 from AR  
.89 . w.21.45.5.21.31 Mark 21 ; enter output routine at 45 on preceding page

.85	1000000	.96	0000u0	.61	00000x0	Unused Loc.
.14	0001400	.69	0000010	.60.	0000110	41
.03	0000200	.77	9z80022			
.57	u000000	.59	9zzy022			
.51	800000w	.63	800000x			
.50	zz80022	.62	0000034			

## COMMAND REGISTER

```

.00 s u.01.01.0.19.03 Line 19 to Line 3
.01 . .03.04.3.21.31 Exit to Line 3,04
.04 s .06.05.0.15.31 Read tape
.05 . .05.05.0.28.31 Test ready
.06 . .07.07.1.19.28 Clear and add Line 19,07 to AR
.07 . u.07.08.1.19.29 Add all Line 19 less 07
.08 . .10.09.0.08.31 Type check sum
.09 . u.10.10.0.19.00 Line 19 to Line 0
.10 . u.11.11.0.19.01 Line 19 to Line 1
.11 . u.12.12.0.19.02 Line 19 to Line 2
.12 . u.13.13.0.19.04 Line 19 to Line 4
.13 . .13.13.0.28.31 Test ready
.14 . u.15.00.0.19.03 Line 19 to Line 3
.03 -8w00000 .02 1000000

```

141523z	6v0123z	-6v01x56	690123z
680123z	670123z	-6769x56	650123z
640123z	630123z	-6365x56	610123z
600123z	5z0123z	-5z61x56	5x0123z
5w0123z	5v0123z	-5v5xx56	590123z
580123z	570123z	-5759x56	550123z
540123z	530123z	-5355x56	510123z
500123z	4z0123z	-4z51x56	4x0123z
4w0123z	4v0123z	-4v4xx56	490123z
480123z	470123z	-4749x56	450123z
440123z	430123z	-4345x56	410123z
400123z	3z0123z	-3z41x56	3x0123z
3w0123z	3v0123z	-3v3xx56	390123z
380123z	370123z	-3739x56	350123z
340123z	330123z	-3335x56	310123z
300123z	2z0123z	-2z31x56	2x0123z
2w0123z	2v0123z	-2v2xx56	290123z
280123z	270123z	-2729x56	250123z
240123z	230123z	-2325x56	210123z
200123z	1z0123z	-1z21x56	1x0123z
1w0123z	1v0123z	-1v1xx56	190123z
180123z	170123z	-1719x56	150123z
140123z	130123z	-1315x56	110123z
100123z	z0123z	- z11x56	x0123z
w0123z	v0123z	- v0xx56	90123z
80123z	70123z	- 709x56	50123z
40123z	30123z	- 305x56	10123z

## "CQ" FLIP FLOP AND ASSOCIATED GATES

```

.00 s u.01.02.0.19.01 Line 19 to Line 1
.01 s u.02.02.0.19.01
.02 . .04.04.1.21.31 Exit to Line 1,04
.03 s .05.04.1.21.31
.04 s u.12.12.0.01.23 Format to Line 23,3 ; 0000022 ; f key link
.05 s u.12.12.0.01.23 to Line 23,0-1 ; f key link to 26 below
.12 . .03.06.0.23.03 AR format to Line 3,3
.13 s .03.06.0.23.03
.06 . .14.16.0.01.28 Test identification tag to AR ; 2222010
.07 s .14.16.0.01.28
.16 . .18.18.0.08.31 -Type AR
.17 s .19.18.0.08.31 -
.18 . .18.18.0.28.31 Test ready
.19 . u.20.20.1.01.29 Add all Line 1
.20 . .21.22.0.28.27 -Zero test AR ; ( Non zero = error )
.21 s .22.22.0.28.27 -
.22 s .00.26.4.23.00 f key link to Line 0,0-1
Below for 26
.23 s .25.24.0.08.31 -Type erroneous summation of Line 1
.24 . .24.24.0.28.31 Test ready
.25 . .00.26.4.23.00 f key link to Line 0,0-1
.26 . .28.30.5.01.24 Line 1 link ( N = 00 ) to MQ,0-1
.27 s .28.30.5.01.24
.28 s .02.42.1.21.31 Line 1 link for N = 00
.29 s .03.42.1.21.31
.30 s .00.32.5.24.01 MQ,0-1 to Line 1,0-1
.31 s .00.32.5.24.01
.32 . .34.42.4.01.25 Clear ID,0 ; Ou00000 to ID,1
.33 s .34.42.4.01.25
.42 . u.50.44.3.24.29 Generate random"A" in AR
.43 s u.50.44.3.24.29
.44 . .48.36.0.28.22 "A" to Line 22,0
.45 s .48.36.0.28.22
.36 . .36.38.0.28.31 -Test ready
.37 s .37.38.0.28.31 -
.38 s .u7.40.0.01.01 If not ready, enter
.40 . .u7.40.0.01.01 error lockup # 1
.41 s .u7.40.0.01.01

```

## "CQ" FLIP FLOP AND ASSOCIATED GATES

.39 s .34,46,0,01,27 - Zero test Line 1,34 ; ( Non zero = error )

.47 s .u7.47.0.02.02  
.48 s .u7.47.0.02.02 Error lockup # 2

.46 s .48.49.0.22.27 - Zero test Line 22,0 ( "A" ) ; ( zero = error )

.49 s .u7.51.0.03.03  
.51 . .u7.51.0.03.03 Error lockup # 3  
.52 s .u7.51.0.03.03

.50 s .52.53.2.22.28 "A" to AR , absolute value  
.53 , .66.66.0.22.31 -  
.54 s .66.66.0.22.31 - Test sign ; ( Negative = error )

.67 s .u7.67.0.04.04  
.68 s .u7.67.0.04.04 Error lockup # 4

.66 s .67.69.3.28.28 Negate "A"  
.69 . .71.71.0.22.31 -  
.70 s .72.71.0.22.31 - Test sign ; ( Positive = error )

.71 s .u7.73.0.05.05  
.73 . .u7.73.0.05.05 Error lockup # 5  
.74 s .u7.73.0.05.05

.72 s .74.75.3.28.27 - Test AR for negative zero ; ( Negative zero = error )

.75 s .u7.77.0.06.06  
.77 . .u7.77.0.06.06 Error lockup # 6  
.78 s .u7.77.0.06.06

.76 s .15.79.0.01.28 -0000000 to AR  
.79 . .80.81.3.28.27 -  
.80 s .81.81.3.28.27 - Test AR for negative zero ; ( Not negative zero = error )

.82 s .u7.82.0.07.07  
.83 s .u7.82.0.07.07 Error lockup # 7

.81 s u.54.55.0.22,22 - Check for inability of  $\overline{DS}$  to hold down set term for CQ

.56 s .u7.56.0.08.08  
.57 s .u7.56.0.08.08 Error lockup # 8

.55 s .83.87.1.21.31 - Check for inability of  $\overline{SW}$  to hold down set term for CQ

.88 s .u7.88.0.09.09  
.89 s .u7.88.0.09.09 Error lockup # 9

.87 s .02.90.1.26.31 - Check for inability of  $\overline{S5}$  to hold down set term for CQ  
1 bit shift of ID for counting device ; MQ shift for "A" change

## "CQ" FLIP FLOP AND ASSOCIATED GATES

.91 s .u7.91.0.10.10  
.92 s .u7.91.0.10.10 Error lockup # 10

.90 s .92.93.0.22.31 -Test sign ; ( Positive = error )

.93 s .u7.73.0.05.05 Enter error lockup # 5 ; see preceding page

.94 s .95.96.0.00.00 -Idle

.97 s .u7.97.0.11.11 CQ apparently did not reset ; enter error  
.98 s .u7.97.0.11.11 lockup # 11

.96 s u.58.99.0.00.03 -Check for inability of  $\overline{D6}$  to hold down set term for CQ

.u0 s .u7.u0.0.12.12 Error lockup # 12  
.u1 s .u7.u0.0.12.12

.99 s u.58.61.0.00.26 -Check for inability of  $\overline{DX}$  to hold down set term for CQ

.62 s .u7.62.0.13.13 Error lockup # 13  
.63 s .u7.62.0.13.13

.61 s u.84.84.0.29.04 -Check for inability of  $\overline{DS}$  to hold down set term for CQ  
( DS associated with overflow gate ; overflow is set )

.85 s .u7.85.0.14.14 Error lockup # 14  
.86 s .u7.85.0.14.14

.84 s .86.u2.0.17.31 -Check for inability of  $\overline{S7}$  to hold down set term for CQ  
( note ; overflow is set )

.u3 s .u7.u3.0.15.15 Error lockup # 15  
.u4 s .u7.u3.0.15.15

.u2 s .10.10.0.25.01 ID,0 to Line 1,10 ; next command from 00 if marker bit  
not present in T20 of ID,0 ; to 64 if marker present

.64 s .65.59.1.17.31 Ring bell and test punch switch  
.65 s .66.59.1.17.31

.60 s .62.26.0.00.00 Punch switch on ; idle and reenter at 26 on page 6

.59 s .61.u5.0.15.31 Punch switch off ; read tape  
.u5 . .u5.u5.0.28.31 Test ready  
.u6 . .00.00.6.21.31 Exit to Line 19,00

.08 . .02.26.1.21.31 f key link to 26, page 6  
.09 . .03.26.1.21.31  $\overline{f}$  key link to 26, page 6

.11	0000022	Format	.35	0u00000	Prog. Const.	Unused Loc.
.u7	-21u1814	Bal. Const.	.15	-0000000	" "	.10
.14	2222010	Tag				.58
.34	0000000	Prog. Const.				.95



## SHORT LINES AND LOGICAL COMMANDS

.00 s u.01.01.0.19.00 Line 19 to Line 0  
 .01 . .03.04.0.21.31 Exit to Line 0,04  
 .04 s .06.06.0.15.31 Read tape  
 .06 . .08.06.0.28.31 Test ready  
 .07 . u.08.08.0.19.01 Line 19 to Line 1  
 .08 . .10.77.0.15.31 Read tape  
 .77 . .79.77.0.28.31 Test ready  
 .78 . u.79.85.0.19.02 Line 19 to Line 2  
 .85 . .77.90.0.01.28 3333102 to AR  
 .90 . .02.05.4.00.03 Format for test identification to Line 3,3 ; 0000022  
 .05 . .07.11.0.08.31 Type 3333102  
 .11 . .13.11.0.28.31 Test ready  
 .12 . .79.24.0.01.28 Error format to AR ( summation error ) ; 6000022  
 .24 . .03.09.0.28.03 Format to Line 3,3  
 .09 . .14.14.1.00.28 Clear and add L0, 14 to AR  
 .14 . u.14.16.1.00.29 Add L0, 15 through 13 to AR  
 .16 . .95.17.0.28.27 - Zero test AR ( Non zero = error ) ; see below for 17

.18 s .19.60.2.00.28 xxxxxx0 to AR  
 .60 . w.17.21.0.21.31 Mark 17 ; exit to error timeout

.21 s .23.27.0.08.31 Type error indication  
 .27 . .27.27.0.28.31 Test ready  
 .28 . .30.29.0.20.31 Return command

.17 s .74.u1.4.01.25 f key link to ID,0-1  
 .u1 . .00.u6.4.25.00 f key link to Line 0,0-1 ( f key link to 27, page 14 )  
 .u6 . .18.25.3.01.28 Clear and subtract summation of Line 1 from AR  
 .25 . u.26.26.1.01.29 Add all Line 1  
 .26 . .27.64.0.28.27 - Zero test AR ( Non zero = error ) ; see below for 64

.65 s .30.32.0.01.28 yyyyyy0 to AR  
 .32 . w.64.21.0.21.31 Mark 64 ; exit to error timeout

.64 s .29.36.3.01.28 Clear and subtract summation of Line 2 from AR  
 .36 . u.37.37.1.02.29 Add all Line 2  
 .37 . .38.98.0.28.27 - Zero test AR ( Non zero = error ) ; see below for 98

.99 s .u7.u4.0.01.28 zzzzzz0 to AR  
 .u4 . .u6.97.0.08.31 Type error indication  
 .97 . .99.97.0.28.31 Test ready  
 .98 . .02.10.4.01.03 Insert error format ; 9zz0004, 8000000  
 .10 . .13.31.0.23.31 Clear  
 .31 . .32.34.5.26.27 Test PN for zero ( Non zero = error ) ; see below for 34

.35 s .38.39.0.01.28 Running tally of errors to AR  
 .39 . .44.45.0.01.29 Increment  
 .45 . .38.34.0.28.01 Restore  
 .34 . .36.42.5.25.27 Test ID for zero ( Non zero = error ) ; see next page for 42

.43 s .39.40.0.01.28 Running tally of errors to AR  
 .40 . .44.50.0.01.29 Increment

## SHORT LINES AND LOGICAL COMMANDS

```

.50 . .39.42.0.28.01 Restore
.42 . .44.46.5.24.27 Test MQ for zero ( Non zero = error ) ; see below for 46

.47 s .40.41.0.01.28 Running tally of errors to AR
.41 . .44.70.0.01.29 Increment
.70 . .40.46.0.28.01 Restore
.46 . .48.49.0.24.28 MQ,0 to AR
.49 . .51.51.0.22.31 Sign test ( Negative sign = error ) ; see below for 51

.52 s .37.38.0.01.28 Running tally of errors to AR
.38 . .44.80.0.01.29 Increment
.80 . .37.51.0.28.01 Restore
.51 . .52.53.1.01.28 # of trials to AR
.53 . .54.55.3.01.29 Subtract 1
.55 . .56.57.0.28.27 Test for end of test ( Zero = end of test ) ; below for 57

.58 s .52.54.1.28.01 Restore remaining # of trials
.54 . .56.59.4.00.25 Load ID
.59 . .62.73.4.00.24 Load MQ
.73 . .90.10.4.00.26 Load PN ( Line 0, 90 = negative # ); reenter at 10 prec. page

.57 s .37.61.0.01.27 - Test for IP "not reset" failures ( Non zero = error )
Below for 61
.62 s .37.44.0.01.28 # of failures to AR
.44 . .46.48.0.01.29 Add tag ; 0000100
.48 . w.61.21.0.21.31 Mark 61 ; exit to error timeout ; see preceding page

.61 s .38.66.0.01.27 - Test for PN "not clear" failures ( Non zero = error )
Below for 66
.67 s .38.56.0.01.28 # of failures to AR
.56 . .57.63.0.01.29 Add tag ; 0000200
.63 . w.66.21.0.21.31 Mark 66 ; exit to error timeout ; see preceding page

.66 s .39.74.0.01.27 - Test for ID "not clear" failures ( Non zero = error )
Below for 74
.75 s .78.79.0.01.28 Tag to AR ; 0000300
.79 . .39.68.0.01.29 Add # of failures
.68 . w.74.21.0.21.31 Mark 74 ; exit to error timeout ; see preceding page

.74 s .40.82.0.01.27 - Test for MQ "not clear" failures ( Non zero = error )
Below for 82
.83 s .86.87.0.01.28 Tag to AR ; 0000400
.87 . .40.72.0.01.29 Add # of failures
.72 . w.82.21.0.21.31 Mark 82 ; exit to error timeout ; see preceding page
Begin short lines test :
.82 s .72.02.1.01.28 Clear and add Line 1, 72 to AR ; zuzuzuz
.02 . .73.84.1.01.29 Add Line 1, 73 to AR ; -3z5xyv7
.84 . .33.81.1.28.01 Store in Line 1, 33 ( Line 1, 72-73 used in ID, MQ, PN tests
.81 . .19.15.1.00.28 Clear and add Line 0, 19 to AR
.15 . u.19.88.1.00.29 Add Line 0, 16-17-18 to AR
.88 . u.20.89.0.00.20 Line 0, 16-17-18-19 to Line 20
.89 . u.20.91.0.00.21 Line 0, 16-17-18-19 to Line 21

```

## SHORT LINES AND LOGICAL COMMANDS

Test 3

.91 . u.20.92.0.00.22 Line 0, 16-17-18-19 to Line 22

.92 . u.20.93.0.00.23 Line 0, 16-17-18-19 to Line 23

.93 . .94.96.1.28.01 Store summation of Line 0, 16-17-18-19 in Line 1, 94

.96 . .72.23.5.01.25 Line 1, 72-73 to ID; complement if negative

.23 . .26.76.5.25.25 Complement ID if negative

.76 . .72.29.5.01.24 Line 1, 72-73 to MQ; complement if negative

.29 . .30.33.5.24.24 Complement MQ if negative

.33 . .72.86.5.01.26 Line 1, 72-73 to PN, complement if negative

.86 . .88.69.5.26.26 Complement PN if negative

.69 . .93.95.3.01.28 Enter delay loop; clear and subtract 0000050 from AR

.95 . u.13.13.2.28.18 Check for illegal appearance of DS·S7·SX at M of K16 (3D298C),  
Zone 3A

.13 . .30.30.1.31.31 Check for illegal appearance of ② at D of K16 (3D298C), Zone 3A

.30 . .44.20.1.01.29 Add 0000001 to AR and rejoin original routine

.20 . .22.94.0.28.27 Zero test AR (Non zero re-enter at 95 above)

.94 s u.99.22.3.20.29 End of 160 drum rev. delay; subtract all Line 20 from AR

.22 . .94.u0.1.01.29 Add stored summation of Line 20 to AR; see 93 above

.u0 . .u1.u2.0.28.27 Zero test AR (Non zero = error); see below for u2

.u3 s .u4.u5.0.01.28 Running tally of failures to AR (Line 20)

.u5 . .44.71.0.01.29 Increment

.71 . .u4.u2.0.28.01 Restore

.u2 . .u4.29.2.21.31 Exit to Line 2,29  
Following from Line 2:

.29 s .94.23.3.01.28 Clear and subtract Line 21 summation from AR; see 93 above

.23 . u.28.32.1.21.29 Add all Line 21

.32 . .34.52.0.28.27 Zero test AR (Non zero = error); see below for 52

.53 s .00.24.0.01.28 Running tally of failures to AR (Line 21)

.24 . .44.61.0.01.29 Increment

.61 . .00.52.0.28.01 Restore

.52 . .94.95.3.01.28 Clear and subtract Line 22 summation from AR; see 93 above

.95 . u.u0.u1.1.22.29 Add all Line 22

.u1 . .u2.u3.0.28.27 Zero test AR (Non zero = error); see below for u3

.u4 s .u5.u6.0.01.28 Running tally of failures to AR (Line 22)

.u6 . .44.72.0.01.29 Increment

.72 . .u5.u3.0.28.01 Restore

.u3 . .94.96.3.01.28 Clear and subtract Line 23 summation from AR; see 93 above

.96 . u.u1.u2.1.23.29 Add all Line 23

.u2 . .u3.01.0.28.27 Zero test AR (Non zero = error) ; see below for 01

.02 s .04.05.0.01.28 Running tally of failures to AR (Line 23)

.05 . .44.60.0.01.29 Increment

.60 . .04.01.0.28.01 Restore

.01 . .33.34.3.01.28 Clear and subtract MQ summation from AR

.34 . u.37.37.1.24.29 Add MQ to AR

.37 . .38.39.0.28.27 Zero test AR (Non zero = error); see below for 39

.40 s .41.42.0.01.28 Running tally of MQ failures to AR

.42 . .44.87.0.01.29 Increment

.87 . .41.39.0.28.01 Restore

.39 . .33.43.3.01.28 Clear and subtract ID summation from AR

.43 . u.46.46.1.25.29 Add ID to AR

Lines 0,2

## SHORT LINES AND LOGICAL COMMANDS

.46 . .47.48.0.28.27 Zero test AR ( Non zero = error ) ; see below for 48

.49 s .50.51.0.01.28 Running tally of ID failures to AR

.51 . .54.55.0.01.29 Increment

.55 . .50.48.0.28.01 Restore

.48 . .33.35.3.01.28 Clear and subtract PN summation from AR

.35 . u.38.38.1.26.29 Add PN to AR

.38 . .39.58.0.28.27 Zero test AR ( Non zero = error ) ; see below for 58

.59 s .60.80.0.01.28 Running tally of PN failures to AR

.80 . .44.56.0.01.29 Increment

.56 . .60.58.0.28.01 Restore

.58 . .05.06.0.01.28 # of trials to AR

.06 . .44.45.3.01.29 Subtract 1

.45 . .46.99.0.28.27 Test for end of test ( Zero = end of test )

.u0 s .05.33.1.28.01 Restore remaining # of trials

.33 . .35.82.0.21.31 Exit to beginning of short lines test ; see page 10

.99 s .u4.10.0.01.27 -End of short lines test ; test for Line 20 failures  
Below for 10 ( Non zero = error )

.11 s .12.41.0.01.28 Tag to AR ; 0000500

.41 . .u4,u5.0.01.29 Add # of failures ( Line 20 )

.u5 . .u7.09.0.08.31 Type error indication

.09 . .11.09.0.28.31 Test ready

.10 . .00.14.0.01.27 -Test for Line 21 failures ; ( Non zero = error )  
Below for 14

.15 s .16.50.0.01.28 Tag to AR ; 0000600

.50 . .00.03.0.01.29 Add # of failures ( Line 21 )

.03 . .05.13.0.08.31 Type error indication

.13 . .15.13.0.28.31 Test ready

.14 . .u5.18.0.01.27 -Test for Line 22 failures ( Non zero = error )  
Below for 18

.19 s .20.86.0.01.28 Tag to AR ; 0000700

.86 . .u5.04.0.01.29 Add # of failures ( Line 22 )

.04 . .06.17.0.08.31 Type error indication

.17 . .19.17.0.28.31 Test ready

.18 . .04.26.0.01.27 -Test for Line 23 failures ( Non zero = error )  
Below for 26

.27 s .28.30.0.01.28 Tag to AR ; 0000800

.30 . .04,u7.0.01.29 Add # of failures ( Line 23 )

.u7 . .01.25.0.08.31 Type error indication

.25 . .27.25.0.28.31 Test ready

.26 . .41.63.0.01.27 -Test for MQ failures ( Non zero = error )  
Below for 63

.64 s .65.66.0.01.28 Tag to AR ; 0000900

.66 . .41.44.0.01.29 Add # of failures ( MQ )

.44 . .46.62.0.08.31 Type error indication

.62 . .64.62.0.28.31 Test ready

.63 . .50.68.0.01.27 -Test for ID failures ( Non zero = error )  
Next page for 68

.69 s .70.71.0.01.28 Tag to AR ; 0001000

## SHORT LINES AND LOGICAL COMMANDS

Lines 2,1

```

.71 . .50.54.0.01.29 Add # of failures ( ID )
.54 . .56.67.0.08.31 Type error indication
.67 . .69.67.0.28.31 Test ready
.68 . .60.74.0.01.27 -Test for PN failures ( Non zero = error )
                          Below for 74
.75 s .76.77.0.01.28 Tag to AR ; 0001100
.77 . .60.65.0.01.29 Add # of failures ( PN )
.65 . .67.73.0.08.31 Type error indication
.73 . .75.73.0.28.31 Test ready
.74 . u.84.84.0.01.20 Begin logical commands test ; Line 1, 80-81-82-83 to Line 20
.84 . u.92.92.0.01.21 Line 1, 88-89-90-91 to Line 21
.92 . u.93.97.0.31.27 Line 20 and Line 21 zero test for one drum revolution
                          Below for 97 ( Non zero = error )
.98 s .99.20.0.01.28 Running tally of failures to AR
.20 . .54.70.0.01.29 Increment
.70 . .99.97.0.28.01 Restore
.97 . .98.22.1.21.28 Clear and add Line 21
.22 . u.22.28.1.21.29 to AR for one drum revolution
.28 . u.29.36.3.30.29 Subtract not Line 20 and Line 21 from AR for one drum rev.
.36 . .38.78.0.28.27 Zero test AR ( Non zero = error )
                          Below for 78
.79 s .84.85.0.01.28 Running tally of failures to AR
.85 . .54.76.0.01.29 Increment
.76 . .84.78.0.28.01 Restore
.78 . u.83.83.0.20.21 Line 20 to Line 21
.83 . .84.88.1.31.28 Clear and add Line 20
.88 . u.88.89.1.31.29 and Line 21 to AR for one drum rev.
.89 . u.90.90.3.31.29 Subtract Line 20 and Line 21 from AR for one drum rev.
.90 . .92.07.0.28.27 Zero test AR ( Non zero = error )
                          Below for 07
.08 s .10.16.0.01.28 Running tally of failures to AR
.16 . .54.57.0.01.29 Increment
.57 . .10.07.0.28.01 Restore
.07 . .08.12.0.01.28 # of trials to AR
.12 . .54.91.3.01.29 Subtract 1
.91 . .93.81.0.28.27 Test for end of test ( Zero = end of test )

.82 s .08.74.0.28.01 Restore remaining # of trials and reenter above at 74

.81 s .83.53.1.21.31 End of test ; exit to Line 1, 53
                          Following from Line 1 :
.53 s .99.u1.0.01.27 -Test for Line 20 and Line 21 failures ( S=31 ) ; Non zero
                          Below for u1 = error
.u2 s .u3.u6.0.01.28 Tag to AR ; 0001200
.u6 . .99.01.0.01.29 Add # of failures ( S=31 )
.01 . .03.u0.0.08.31 Type error indication
.u0 . .u2.u0.0.28.31 Test ready
.u1 . .84.14.0.01.27 -Test for not Line 20 and Line 21 failures ( S =30 )
                          Next page for 14 Non zero = error
.15 s .17.49.0.01.28 Tag to AR ; 0001300
.49 . .84.85.0.01.29 Add # of failures ( S=30 )
.85 . .87.13.0.08.31 Type error indication

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SHORT LINES AND LOGICAL COMMANDS

```

.13 . .15.13.0.28.31 Test ready
.14 . .10.22.0.01.27 -Test for S31 failures (2nd approach )
      Below for 22
.23 s .24.63.0.01.28 Tag to AR ; 0001400
.63 . .10.51.0.01.29 Add # of failures ( S31)
.51 . .53.21.0.08.31 Type error indication
.21 . .23.21.0.28.31 Test ready
.22 . .23.26.1.17.31 Ring bell ; test punch switch
      Below for 27
.26 s .28.31.0.15.31 Punch switch off ; read tape
.31 . .33.31.0.28.31 Test ready
.32 . .34.00.6.21.31 Exit to next test at Line 19,00

.27 s .34.36.0.01.28 Punch switch on ; clear AR
.36 . u.42.42.0.28.01
.42 . .50.55.0.28.01 Clear
.55 . .60.68.0.28.01
.68 . .84.87.0.28.01 error
.87 . .99.09.0.28.01
.09 . .10.56.0.28.01 indicators
.56 . .u4.58.4.28.01
.58 . .00.59.0.28.01
.59 . .04.11.0.28.01
.11 . .25.35.0.01.28 0000019 to AR
.35 . .52.64.0.28.01 Reset # of trials
.64 . .08.43.0.28.01 Reset # of trials
.43 . .61.62.0.01.28 000000u to AR
.62 . .05.66.0.28.01 Reset # of trials ( short lines test )
.66 . .68.97.0.21.31 Reenter test ; see page 9

.74 . .02.27.1.21.31 f key link
.75 . .03.27.1.21.31 f key link

```

Line 0 Const.:	Line 1 :	Unused Loc.
.03 000022 Format	.46 0000100 Tag	.83 -uuuuuuu .06
.u7 -862yx61	.57 0000200 "	.82 5555555 .07
Balancing Con-	.78 0000300 "	.81 -uuuuuuu .45
stant.	.86 0000400 "	.80 5555555 .47
	.12 0000500 "	.91 5555555 .48
	.16 0000600 "	.90 -uuuuuuu .67
Line 1 Const.:	.20 0000700 "	.89 5555555 .71
.77 3333102 Tag	.28 0000800 "	.88 -uuuuuuu .92
.18 wv12535 L1 Sum	.65 0000900 "	.34 0000000 .95
.19 -wv12535 Neg. Sum	.70 0001000 "	.25 0000019 .97
.29 x60zwl6 L2 Sum	.76 0001100 "	.61 000000u .98
.96 -x60zwl6 Neg. Sum	.u3 0001200 "	Line 2 :
.30 yyyyyy0 Tag	.60 " " 11	.31 xx5yw3w Not used
.79 6000022 Format	.99 " " 12	.93 ul22w3w Not used
.u7 zzzzzz0 Tag	.84 " " 13	Unused Loc.
.03 9zz0004	.10 " " 14	.00
.02 8000000 Format	.54 0000001 Const.	.93 0000050 Cons.
.44 0000001 Const.	.73 -3z5xyv7 MQ,PN	.05 000000u #trials
.52 0000019 # Trials	.72 zuzuzuz ID Test.	.08 0000019 " "
		.21
		.94

## AR AND PN

.00 s u.01.01.0.19.00 Line 19 to Line 0  
.01 . .03.04.0.21.31 Exit to Line 0,04  
.04 s .05.06.0.00.28 lllll025 to AR  
.06 . .03.07.0.00.03 Format to Line 3,3 ; 0000022  
.07 . .09.08.0.08.31 Type test #  
.08 . .08.08.0.28.31 Test ready  
.09 . u.12.12.0.00.23 Error format to Line 23,2-3  
.12 . .02.13.4.23.03 Error format to Line 3, 2-3  
.13 . u.14.83.1.00.29 Add all Line 0  
.83 . u.00.14.3.00.29 Subtract Line 0, 84 through u7  
.14 . .15.16.0.28.27 -Zero test AR ( Non zero = error ) ; see below for 16

.17 s .19.18.0.08.31 Type erroneous summation of loader  
.18 . .18.18.0.28.31 Test ready  
.19 . .20.21.0.00.28 vvvvvvvv to AR  
.21 . .23.15.0.08.31 Type vvvvvvvv  
.15 . .15.15.0.28.31 Test ready  
.16 . .18.22.0.15.31 Read tape ( Line 1 ) ; enter also from zero test of 14 above  
.22 . .23.24.3.00.28 Clear and subtract Line 1 summation from AR  
.24 . .24.24.0.28.31 Test ready  
.25 . u.26.26.0.19.01 Line 19 to Line 1  
.26 . u.27.27.1.01.29 Add all Line 1  
.27 . .28.29.0.28.27 -Zero test AR ( Non zero = error ) ; see below for 29

.30 s .32.31.0.08.31 Type erroneous summation of Line 1  
.31 . .31.31.0.28.31 Test ready  
.32 . .33.34.0.00.28 wwwwwwww to AR  
.34 . .36.28.0.08.31 Type wwwwwwww  
.28 . .28.28.0.28.31 Test ready  
.29 . .31.35.0.15.31 Read tape ( Line 2 ) ; enter also from zero test of 27 above  
.35 . .36.37.3.00.28 Clear and subtract Line 2 summation from AR  
.37 . .37.37.0.28.31 Test ready  
.38 . u.39.39.0.19.02 Line 19 to Line 2  
.39 . u.40.40.1.02.29 Add all Line 2  
.40 . .41.42.0.28.27 -Zero test AR ( Non zero = error ) ; see below for 42

.43 s .45.44.0.08.31 Type erroneous summation of Line 2  
.44 . .44.44.0.28.31 Test ready  
.45 . .46.47.0.00.28 xxxxxxxx to AR  
.47 . .49.41.0.08.31 Type xxxxxxxx  
.41 . .41.41.0.28.31 Test ready  
.42 . .45.48.0.23.31 Clear ; enter also from zero test of 40 above  
.48 . u.49.49.1.26.19 Clear Line 19  
.49 . .51.50.0.15.31 Read tape ( Line 4 )  
.50 . .51.52.3.00.28 Clear and subtract summation of Line 4 from AR  
.52 . .52.52.0.28.31 Test ready  
.53 . u.54.54.0.19.04 Line 19 to Line 4  
.54 . u.55.55.1.04.29 Add all Line 4  
.55 . .56.57.0.28.27 -Zero test AR ( Non zero = error ) ; see next page for 57

.58 s .60.59.0.08.31 Type erroneous summation of Line 4  
.59 . .59.59.0.28.31 Test ready

## AR AND PN

```

.60 . .61.62.0.00.28 yyyyyyy to AR
.62 . .64.56.0.08.31 Type yyyyyyy
.56 . .56.56.0.28.31 Test ready
.57 . .59.63.0.15.31 Read tape ( Line 0 ) ; enter also from zero test of 55
.63 . .64.65.3.00.28 Clear and subtract summation of Line 0 from AR
.65 . .65.65.0.28.31 Test ready
.66 . u.67.67.1.19.29 Add all Line 19
.67 . .68.69.0.28.27 -Zero test AR ( Non zero = error ) ; see below for 69

.70 s .72.71.0.08.31 Type erroneous summation of Line 0
.71 . .71.71.0.28.31 Test ready
.72 . .73.74.0.00.28 zzzzzzz to AR
.74 . .76.68.0.08.31 Type zzzzzzz
.68 . .68.68.0.28.31 Test ready
.69 . u.70.02.0.02.03 Line 2 to Line 3 ; enter also from zero test of 67 above
.02 . u.80.80.0.00.23 Error format to Line 23
.80 . u.04.75.0.23.02 Error format to Line 2, 0-3
.75 . u.76.00.0.19.00 Line 19 to Line 0
.23 -uw92v63 L1 Sum .05 hhhhh025 .33 wwwwww .79 800000x
.36 wu9lw12 L2 Sum .03 0000022 .46 xxxxxxx .78 0000034
.51 -3v53uh6 L4 Sum .11-8w00000 .61 yyyyyyy .77 00000w0
.64 -677vz0v L0 Sum .10 1000000 .73 zzzzzzz .76 4400000
.82 -683v911 Bal. .20 vvvvvvv Unused : 81, 84 through u7

.01 s .04.04.0.23.31 Clear ( scf for test set )
.00 s .03.04.0.23.31 Clear ( scf for test not set )
.04 . u.05.05.1.26.19 Clear Line 19
.05 s .06.07.1.26.28 Clear AR
.07 . .01.08.0.04.25 Enter delay loop ; zz00000 to ID,1
.08 . .04.11.0.04.20 00000zz to L20,0
.11 . .02.14.1.26.31 Shift ID lbit right
.14 . .04.06.1.25.21 ID,0 to Line21,0
.06 . .04.11.0.31.27 Zero test Line 21 and 20, 0 ; enter above at 11 if zero
.12 s .14.15.0.28.27 -Zero test AR ( Non zero = error ) ; see below for 15

.16 s .u6.02.0.28.19 Sample failure to Line 19, u6
.02 . .08.50.0.04.21 Tag to Line 21, 0 ; 0100000
.50 . .u4.u6.0.21.19 Tag to Line 19, u4
.u6 . .00.15.0.09.31 Type error indication
.15 . .02.03.0.04.28 -zzzzzzz to AR ; enter also from zero test of 12 above
.03 . .06.09.0.23.31 Clear and enter delay loop
.09 . .01.19.0.04.25 zz00000 to ID,1
.19 . .02.40.1.26.31 Shift ID 1 bit right
.40 . .04.41.1.25.21 ID,0 to Line 21,0
.41 . .04.19.0.31.27 Zero test Line 21 and 20,0 ; enter above at 19 if zero
.20 s .02.52.0.04.21 -zzzzzzz to Line 21, 2
.52 . .54.55.0.28.20 AR to Line 20,2
.55 . .58.59.0.30.27 -Test for dropout ; ( Non zero = error ) ; see next page for 59

.60 s .60.60.0.28.31 Test ready
.61 . .u6.10.0.28.19 Sample failure to Line 19, u6
.10 . .12.13.0.04.21 Tag to Line 21,0 ; 0200000

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## AR AND PN

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.13 . .u4.u5.0.21.19 Tag to Line 19,u4
.u5 . .u7.59.0.09.31 Type error indication
.59 . .05.80.0.04.28 uuuuuuu to AR ; enter also from zero test of 55 , prec. page
.80 . .83.92.0.23.31 Clear and enter delay loop
.92 . .01.27.0.04.25 zz00000 to ID,1
.27 . .02.72.1.26.31 ShiftID 1 bit right
.72 . .04.73.1.25.21 ID,0 to Line 21,0
.73 . .76.27.0.31.27 Zero test Line 21 and 20,0 ; enter above at 27 if zero
.28 s .05.17.0.04.21 uuuuuuu to Line 21,1
.17 . .21.22.0.28.20 AR to Line 20,1
.22 . .25.30.0.30.27 -Test for dropout( Non zero = error )

.31 s .33.35.0.03.03 Skip to 35 below for error indication
.30 s .33.84.0.28.21 AR to Line 21,1
.84 . .05.18.0.04.20 uuuuuuu to Line 20,1
.18 . .21.34.0.30.27 -Test for pickup ( Non zero = error ) ; see below for 34

.35 s .35.35.0.28.31 Test ready
.36 . .40.88.0.04.21 Tag to Line 21,0 ; 0300000
.88 . .u4.89.0.21.19 Tag to Line 19,u4
.89 . .u6.32.0.28.19 Sample failure to Line 19,u6
.32 . .34.34.0.09.31 Type error indication
.34 . .37.37.0.23.31 Clear ; enter also from zero test of 18 above
.37 . .39.42.0.04.25 zzzzzz0 to ID,1
.42 . .43.44.0.04.28 -0000000 to AR
.44 . .45.46.0.04.29 -0000000 to AR
.46 . .49.51.0.04.20 -zzzzzzzz to Line 20,1
.51 . .53.54.0.28.21 AR to Line 21,1
.54 . .57.63.0.31.27 Zero test Line 21 and 20,1 ( Non zero = error ) ; below for 63

.64 s .66.96.0.28.21 Sample failure to Line 21,2
.96 . .00.63.0.04.24 8000000 to MQ,0 ( error marker )
.63 . .02.65.1.26.31 Shift 1 bit
.65 . .68.69.1.25.21 ID,0 to Line 21,0
.69 . .72.42.0.31.27 Test for end of test ; enter above at 42 if zero

.43 s .45.47.1.24.27 -End of test ; test for failures ( Non zero = error )

.48 s .52.76.0.04.21 Tag to Line 21,0 ; 0400000
.76 . .76.76.0.28.31 Test ready
.77 . .u4.78.0.21.19 Tag to Line 19,u4
.78 . .u6.79.0.21.19 Sample failure to Line 19,u6
.79 . .u5.45.5.24.19 Frequency marker to Line 19, u5
.45 . .47.47.0.09.31 Type error indication
.47 . .50.53.0.23.31 Clear ; enter also from zero test of 43 above
.53 . .39.74.0.04.25 zzzzzz0 to ID,1
.74 . .43.49.1.04.28 -0000000 to AR +
.49 . .51.57.0.22.31 Test sign ( Negative = error ) ; see below for 57

.58 s .62.81.0.28.21 Sample failure to Line 21,2
.81 . .00.57.0.04.24 8000000 to MQ,0 ( error marker )
.57 . .02.62.1.26.31 1 bit shift

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## AR AND PN

.62 . .64.66.1.25.21 ID,0 to Line 21,0  
.66 . .68.74.0.31.27 Test for end of test ; if zero, reenter at 74 preceding page

.75 s .77.85.1.24.27 -End of test ; test for failures ( Non zero = error )  
Below for 85  
.86 s .86.86.0.28.31 Test ready  
.87 . .u6.29.0.21.19 Sample failure to Line 19,u6  
.29 . .32.56.0.04.21 Tag to Line 21,0 ; 0500000  
.56 . .u4.33.0.21.19 Tag to Line 19,u4  
.33 . .u5.23.5.24.19 Frequency marker to Line 19,u5  
.23 . .25.85.0.09.31 Type error indication  
.85 . .88.90.0.23.31 Clear ; enter also from zero test of 75 above  
.90 . .39.u3.0.04.25 zzzzzz0 to ID,1  
.u3 . .43.67.0.04.28 -0000000 to AR  
.67 . .69.70.0.22.31 Test sign ( Positive = error )

.70 s .74.83.0.28.21 Sample failure to Line 21,2  
.83 . .00.71.0.04.24 8000000 to MQ,0 ( error marker )  
.71 . .02.82.1.26.31 1 bit shift  
.82 . .84.91.1.25.21 ID,0 to Line 21,0  
.91 . .92.u3.0.31.27 Test for end of test ; if zero, reenter at u3 above

.u4 s .01.24.1.24.27 -End of test ; test for failures ( Non zero = error )  
Below for 24  
.25 s .25.25.0.28.31 Test ready  
.26 . .u6.21.0.21.19 Sample failure to Line 19,u6  
.21 . .24.93.0.04.21 Tag to Line 21,0 ; 0600000  
.93 . .u4.94.0.21.19 Tag to Line 19,u4  
.94 . .u5.95.5.24.19 Frequency marker to Line 19,u5  
.95 . .97.24.0.09.31 Type error indication  
.24 . .27.97.0.23.31 Clear ; enter also from zero test of u4 above  
.97 . .39.98.0.04.25 zzzzzz0 to ID,1  
.98 . .u0.u0.1.21.31 Exit to Line 1 at u0  
Following from Line 1 :  
.u0 s .09.10.0.04.28 z0z0uuz to AR  
.10 . .11.12.0.04.29 Add 8yz0uu0 to AR  
.12 . .13.14.0.28.20 AR to Line 20,1  
.14 . .17.18.0.04.21 -7zyl54z to Line 21,1  
.18 . .21.22.0.30.27 Test for dropout ; ( Non zero = error )

.23 s .26.39.0.28.21 Sample failure to Line 21,2 ; skip to 39 below  
.22 s .25.26.0.21.20 -7zyl54z to Line20,1  
.26 . .29.30.0.28.21 AR to Line 21,1  
.30 . .33.35.0.30.27 Test for pickup ; ( Non zero = error )  
Below for 35  
.36 s .38.39.0.28.21 Sample failure to Line 21,2  
.39 . .00.35.0.04.24 8000000 to MQ,0 ( error marker )  
.35 . .02.38.1.26.31 1 bit shift  
.38 . .40.41.1.25.21 ID,0 to Line 21,0  
.41 . .44.u0.0.31.27 Test for end of test ; if zero, reenter at u0 above

.u1 s .u3.u4.1.24.27 -End of test ; test for failures ( Non zero = error )

## AR AND PN

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.u5 s .u5.u5.0.28.31 Test ready
.u6 . .16.52.0.04.21 Tag to Line 21,0 ; 0700000
.52 . .u4.80.0.21.19 Tag to Line 19,u4
.80 . .u5.89.5.24.19 Frequency marker to Line 19,u5
.89 . .u6.02.0.21.19 Sample failure to Line 19,u6
.02 . .04.u4.0.09.31 Type error indication
.u4 . .u7.03.0.23.31 Clear; enter also from zero test of u1, preceding page
.03 . .39.42.0.04.25 zzzzzz0 to ID,1
.42 . .46.47.0.04.28 Clear AR
.47 . u.48.48.0.03.29 Add all Line 3, characteristic 0
.48 . .49.50.0.28.20 AR to Line 20,1
.50 . .53.55.0.04.21 0lu7384 to Line 21,1
.55 . .57.58.0.30.27 Test for dropout ; ( Non zero = error )

.59 s .62.75.0.28.21 Sample failure to Line 21,2 ; skip to 75 below
.58 s .61.62.0.21.20 Line 21,1 to Line 20,1
.62 . .65.66.0.28.21 AR to Line 21,1
.66 . .69.71.0.30.27 Test for pickup ; ( Non zero = error )
Below for 71
.72 s .74.75.0.28.21 Sample failure to Line 21,2
.75 . .00.71.0.04.24 8000000 to MQ,0 ( error marker )
.71 . .02.74.1.26.31 1 bit shift
.74 . .76.77.1.25.21 ID,0 to Line 21,0
.77 . .80.42.0.31.27 Test for end of test ; if zero, reenter at 42 above

.43 s .45.84.1.24.27 -End of test ; test for failures ; ( Non zero = error )
Below for 84
.85 s .85.85.0.28.31 Test ready
.86 . .u5.04.5.24.19 Frequency marker to Line 19,u5
.04 . .20.60.0.04.21 Tag to Line 21,0 ; 0800000
.60 . .u4.61.0.21.19 Tag to Line 19,u4
.61 . .u6.05.0.21.19 Sample failure to Line 19,u6
.05 . .07.84.0.09.31 Type error indication
.84 . .87.92.0.23.31 Clear; enter also from zero test of 43 above
.92 . .39.44.0.04.25 zzzzzz0 to ID,1
.44 . .46.51.0.04.28 Clear AR
.51 . u.52.56.1.03.29 Add all Line 3, characteristic 1
.56 . .57.63.0.28.20 AR to Line 20,1
.63 . .13.15.0.04.21 wu9lw12 to Line 21,1
.15 . .17.19.0.30.27 Test for dropout ; ( Non zero = error )

.20 s .22.40.0.28.21 Sample failure to Line 21,2 ; skip to 40 below
.19 s .21.24.0.21.20 Line 21,1 to Line 20,1
.24 . .25.27.0.28.21 AR to Line 21,1
.27 . .29.31.0.30.27 Test for pickup ; ( Non zero = error )
Below for 31
.32 s .34.40.0.28.21 Sample failure to Line 21,2
.40 . .00.31.0.04.24 8000000 to MQ,0 ( error marker )
.31 . .02.34.1.26.31 1 bit shift
.34 . .36.37.1.25.21 ID,0 to Line 21,0
.37 . .40.44.0.31.27 Test for end of test ; if zero, reenter at 44 above

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## AR AND PN

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.45 s .47.96.1.24.27 -End of test ; test for failures ; ( Non zero = error )
      Below for 96
.97 s .97.97.0.28.31 Test ready
.98 . .u6.06.0.21.19 Sample failure to Line 19,u6
.06 . .28.57.0.04.21 Tag to Line 21,0 ; 0900000
.57 . .u4.76.0.21.19 Tag to Line 19,u4
.76 . .u5.13.5.24.19 Frequency marker to Line 19,u5
.13 . .15.96.0.09.31 Type error indication
.96 . .99.99.0.23.31 Clear ; enter also from zero test of command 45 above
.99 . .39.28.0.04.25 zzzzzz0 to ID,1
.28 . .29.33.0.04.21 -0lu7384 to Line 21,1
.33 . .46.49.0.04.28 Clear AR
.49 . u.50.64.2.03.29 Add all Line 3, characteristic 2
.64 . .65.67.0.28.20 AR to Line 20,1
.67 . .69.78.0.30.27 Test for dropout ; ( Non zero = error )

.79 s .82.u3.0.28.21 Sample failure to Line 21,2 ; skip to u3 below
.78 s .81.82.0.21.20 Line 21,1 to Line 20,1
.82 . .85.87.0.28.21 AR to Line 21,1
.87 . .89.93.0.30.27 Test for pickup ; ( Non zero = error )
      Below for 93
.94 s .98.u3.0.28.21 Sample failure to Line 21,2
.u3 . .00.93.0.04.24 8000000 to MQ,0 ( error marker )
.93 . .02.u2.1.26.31 1 bit shift
.u2 . .u4.07.1.25.21 ID,0 to Line 21,0
.07 . .08.28.0.31.27 Test for end of test ; if zero, reenter at 28 above

.29 s .31.68.1.24.27 -End of test ; test for failures ;(Non zero = error )
      Below for 68
.69 s .69.69.0.28.31 Test ready
.70 . .u5.08.5.24.19 Frequency marker to Line 19,u5
.08 . .36.83.0.04.21 Tag to Line 21,0 ; 1000000
.83 . .u4.88.0.21.19 Tag to Line 19,u4
.88 . .u6.09.0.21.19 Sample failure to Line 19,u6
.09 . .11.68.0.09.31 Type error indication
.68 . .71.73.0.23.31 Clear ; enter also from zero test of command 29 above
.73 . .39.16.0.04.25 zzzzzz0 to ID,1
.16 . .21.25.0.04.21 -356v3yy to Line 21,1
.25 . .46.65.0.04.28 Clear AR
.65 . u.66.91.3.03.29 Add all Line 3 , characteristic 3
.91 . .93.95.0.28.20 AR to Line 20,1
.95 . .97.00.0.30.27 Test for dropout ; ( Non zero = error )

.01 s .02.46.0.28.21 Sample failure to Line 21,2 ; skip to 46 below
.00 s .01.11.0.21.20 Line 21,1 to Line 20,1
.11 . .13.21.0.28.21 AR to Line 21,1
.21 . .25.53.0.30.27 Test for pickup ; ( Non zero = error )
      Below for 53
.54 s .58.46.0.28.21 Sample failure to Line 21,2
.46 . .00.53.0.04.24 8000000 to MQ,0 ( error marker )
.53 . .02.81.1.26.31 1 bit shift
.81 . .84.90.1.25.21 ID,0 to Line 21,0

```

## AR AND PN

Lines 1,3

.90 . .92.16.0.31.27 Test for end of test ; if zero, reenter at 16 preceding page

.17 s .19.19.3.21.31 End of test ; exit to Line 3,19  
Following from Line 3 :

.19 s .21.22.1.24.27 - Test for failures ; ( Non zero = error )  
Below for 22

.23 s .23.23.0.28.31 Test ready

.24 . .44.72.0.04.21 Tag to Line 21,0 ; 1100000

.72 . .u4.u5.0.21.19 Tag to Line 19,u4

.u5 . .u6.73.0.21.19 Sample failure to Line 19,u6

.73 . .u5.u6.5.24.19 Frequency marker to Line 19,u5

.u6 . .00.22.0.09.31 Type error indication

.22 . .25.32.0.23.31 Clear ; enter also from zero test of 19 above

.32 . .39.40.0.04.25 zzzzzz0 to ID,1

.40 . .46.49.4.04.26 Clear PN

.49 . u.50.50.4.03.30 Add all Line 3 to PN , characteristic 0

.50 . .54.56.5.26.20 PN to Line 20,2-3 ; complement if negative

.56 . .58.60.4.04.21 -vzz3z22, -3v6lx3y to Line 21,2-3

.60 . .62.64.4.30.27 Test for dropout ; ( Non zero = error )

.65 s .66.96.5.20.22 Sample failure to Line 22,2-3 ; complement if negative

.64 s .66.68.4.21.20 Line 21, 2-3 to Line 20,2-3

.68 . .70.74.5.26.21 PN to Line 21,2-3 ; complement if negative

.74 . .78.81.4.30.27 Test for pickup ; ( Non zero = error )  
Below for 81

.82 s .86.96.5.21.22 Sample failure to Line 22,2-3; complement if negative

.96 . .00.81.0.04.24 8000000 to MQ,0 ( error marker )

.81 . .02.84.1.26.31 1 bit shift

.84 . .88.89.1.25.21 ID,0 to Line 21,0

.89 . .92.40.0.31.27 Test for end of test ; if zero, reenter at 40 above

.41 s .43.92.1.24.27 -End of test ; test for failures ; ( Non zero = error )  
Below for 92

.93 s .93.93.0.28.31 Test ready

.94 . .u6.28.4.22.19 Sample failure to Line 19,u6-u7

.28 . .48.80.0.04.21 Tag to Line 21,0 ; 1200000

.80 . .u4.83.0.21.19 Tag to Line 19,u4

.83 . .u5.02.5.24.19 Frequency marker to Line 19,u5

.02 . .04.92.0.09.31 Type error indication

.92 . .95.12.0.23.31 Clear ; enter also from zero test of 41 above

.12 . .39.25.0.04.25 zzzzzz0 to ID,1

.25 . .26.36.4.04.21 -0v32v88, 304lx5y to Line 21,2-3

.36 . .46.51.4.04.26 Clear PN

.51 . u.52.52.5.03.30 Add all Line 3 to PN, characteristic 1

.52 . .54.57.5.26.20 PN to Line 20,2-3 ; complement if negative

.57 . .58.61.4.30.27 Test for dropout ; ( Non zero = error )

.62 s .66.69.5.20.22 Sample failure to Line 22,2-3 ; complement if negative

.61 s .62.66.4.21.20 Line 21,2-3 to Line 20,2-3

.66 . .70.75.5.26.21 PN to Line 21,2-3

.75 . .78.05.4.30.27 Test for pickup ; ( Non zero = error )

## AR AND PN

.06 s .10.69.5.21.22 Sample failure to Line 22,2-3 ; complement if negative  
.69 . .00.05.0.04.24 8000000 to MQ,0 ( error marker )  
.05 . .02.08.1.26.31 1 bit shift  
.08 . .12.13.1.25.21 ID,0 to Line 21,0  
.13 . .16.25.0.31.27 Test for end of test ; if zero, reenter at 25 preceding page

.26 s .27.29.1.24.27 - End of test ; test for failures ; ( Non zero = error )  
Below for 29  
.30 s .30.30.0.28.31 Test ready  
.31 . .56.u3.0.04.21 Tag to Line 21,0 ; 1300000  
.u3 . .u4.63.0.21.19 Tag to Line 19,u4  
.63 . .u6.67.4.22.19 Sample failure to Line 19,u6-u7  
.67 . .u5.03.5.24.19 Frequency marker to Line 19,u5  
.03 . .05.29.0.09.31 Type error indication  
.29 . .32.33.0.23.31 Clear ; enter also from zero test of 26 above  
.33 . .39.42.0.04.25 zzzzzz0 to ID,1  
.42 . .46.53.4.04.26 Clear PN  
.53 . u.54.54.6.03.30 Add all Line 3 to PN, characteristic 2  
.54 . .62.70.4.04.21 400wOxy, w49v2w1 to Line 21,2-3  
.70 . .74.76.5.26.20 PN to Line 20,2-3 ; complement if negative  
.76 . .78.85.4.30.27 Test for dropout ; ( Non zero = error )

.86 s .90.u0.5.20.22 Sample failure to Line 22,2-3 ; complement if negative  
.85 s .86.88.4.21.20 Line 21,2-3 to Line 20,2-3  
.88 . .90.95.5.26.21 PN to Line 21,2-3 ; complement if negative  
.95 . .98.u1.4.30.27 Test for pickup ; ( Non zero = error )  
Below for u1  
.u2 s .u6.u0.5.21.22 Sample failure to Line 22,2-3 ; complement if negative  
.u0 . .00.u1.0.04.24 8000000 to MQ,0 ( error marker )  
.u1 . .02.04.1.26.31 1 bit shift  
.04 . .08.09.1.25.21 ID,0 to Line 21,0  
.09 . .12.42.0.31.27 Test for end of test ; if zero, reenter at 42 above

.43 s .45.46.1.24.27 - End of test ; test for failures ; ( Non zero = error )  
Below for 46  
.47 s .47.47.0.28.31 Test ready  
.48 . .60.71.0.04.21 Tag to Line 21,0 ; 1400000  
.71 . .u4.55.0.21.19 Tag to Line 19,u4  
.55 . .u6.07.4.22.19 Sample failure to Line 19,u6-u7  
.07 . .u5.16.5.24.19 Frequency marker to Line 19,u5  
.16 . .18.46.0.09.31 Type error indication  
.46 . .49.87.0.23.31 Clear ; enter also from zero test of 43 above  
.87 . .39.34.0.04.25 zzzzzz0 to ID,1  
.34 . .46.58.4.04.26 Clear PN  
.58 . .66.77.4.04.21 Ov32v88, 3044x5y to Line 21,2-3  
.77 . u.78.78.7.03.30 Add all Line 3 to PN, characteristic 3  
.78 . .82.90.5.26.20 PN to Line 20,2-3 ; complement if negative  
.90 . .94.97.4.30.27 Test for dropout ; ( Non zero = error )

.98 s .u2.59.5.20.22 Sample failure to Line 22,2-3 ; complement if negative  
.97 s .98.u4.4.21.20 Line 21,2-3 to Line 20,2-3  
.u4 . .u6.10.5.26.21 PN to Line 21,2-3 ; complement if negative

## AR AND PN

.10 . .14.17.4.30.27 Test for pickup ; ( Non zero = error )  
Below for 17

.18 s .22.59.5.21.22 Sample failure to Line 22,2-3 ; complement if negative

.59 . .00.17.0.04.24 8000000 to MQ,0 ; ( error marker )

.17 . .02.20.1.26.31 1 bit shift

.20 . .24.27.1.25.21 ID,0 to Line 21,0

.27 . .28.34.0.31.27 Test for end of test ; if zero, reenter at 34 preceding page

.35 s .37.37.1.24.27 - End of test ; test for failures ;(Non zero = error )  
Below for 37

.38 s .38.38.0.28.31 Test ready

.39 . .64.79.0.04.21 Tag to Line 21,0 ; 1500000

.79 . .u4.91.0.21.19 Tag to Line 19,u4

.91 . .u6.21.4.22.19 Sample failure to Line 19,u6-u7

.21 . .u5.11.5.24.19 Frequency marker to Line 19,u5

.11 . .13.37.0.09.31 Type error indication

.37 . .39.44.0.28.28 Skip to 44

.44 . .44.44.0.28.31 Test ready

.45 . .46.00.1.17.31 Ring bell ; test punch switch

.01 s .03.00.0.21.31 Punch switch on ; reenter test at Line 0,00 ; see page 16

.00 s .02.14.0.15.31 Punch switch off ; read tape

.14 . .14.14.0.28.31 Test ready

.15 . .17.00.6.21.31 Exit to Line 19,00

Unused loc. L0 : 38,39,99,u0,u1,u2,u7 ; L1 : u7 ; L3 : u7

Line 4 Constants :

.01 zz00000	.53 04u7384
.04 00000zz	.20 0800000
.08 0100000	.13 wu94w12
.02 -zzzzzzz	.28 0900000
.12 0200000	.29 -04u7384
.05 uuuuuuu	.36 1000000
.40 0300000	.21 -356v3yy
.39 zzzzzz0	.44 1100000
.43 -0000000	.59 -3v64x3y
.45 -0000000	.58 -vzz3z22
.49 -zzzzzzz	.48 1200000
.00 8000000	.27 3044x5y
.52 0400000	.26 -0v32v88
.32 0500000	.56 1300000
.24 0600000	.63 w49v2w1
.09 z0z0uuz	.62 400w0xy
.11 8yz0uu0	.60 1400000
.17 -7zy154z	.67 3044x5y
.16 0700000	.66 0v32v88
.47 0000000	.64 1500000
.46 0000000	

Note : All locations in line 4 not listed  
to left are unused.

## INVERTING GATES

```

.00 s u.01.01.0.19.00 Line 19 to Line 0
.01 . .03.04.0.21.31 Exit to Line 0,04
.04 s .05.06.0.00.28 5555016 to AR
.06 . .03.07.0.00.03 Format to Line 3,3 ; 0000022
.07 . .09.50.0.08.31 Type 5555016
.50 . .52.50.0.28.31 Test ready
.51 . .52.53.3.00.28 Clear and subtract summation of Line 0 from AR
.53 . u.54.54.1.00.29 Add all Line 0
.54 . .59.60.0.00.22 Error format to Line 22,3 ; 6000022
.60 . .03.12.4.22.03 Error format to Line 3,3
.12 . .13.14.0.28.27 Zero test ; ( Non zero = error )
      Below for 14
.15 s .16.17.0.00.28 xxxxxx0 to AR ; summation of Line 0 apparently in error
.17 . .19.13.0.08.31 Type .xxxxxx
.13 . .15.13.0.28.31 Test ready
.14 . .16.80.0.15.31 Read tape ( Line 2 )
.80 . .82.80.0.28.31 Test ready
.81 . u.82.82.0.19.02 Line 19 to Line 2
.82 . .83.84.3.02.28 Clear and subtract summation of Line 2 from AR
.84 . u.85.85.1.02.29 Add all Line 2
.85 . .86.87.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 87
.88 s .89.90.0.00.28 yyyyyy0 to AR ; summation of Line 2 apparently in error
.90 . .92.86.0.08.31 Type .yyyyyy
.86 . .88.86.0.28.31 Test ready
.87 . .89.98.0.15.31 Read tape ( Line 1 )
.98 . .u0.98.0.28.31 Test ready
.99 . u.u0.u6.0.19.01 Line 19 to Line 1
.u6 . .00.27.3.01.28 Clear and subtract summation of Line 1 from AR
.27 . .28.49.4.01.25 f key link to ID,0=1 ; link to 70 below
.49 . .00.02.4.25.00 f key link to Line 0,0=1
.02 . u.03.44.1.01.29 Add all Line 1
.44 . .46.64.0.28.27 -Zero test AR ; ( Non zero = error )
.64 s .67.91.0.23.31 Line 1 summation checks ; clear ; go to 91 below

.65 s .77.78.0.00.28 zzzzzz0 to AR ; summation of Line 1 apparently in error
.78 . .80.70.0.08.31 Type .zzzzzz
.70 . .72.70.0.28.31 Test ready ; enter also from f key
.71 . .74.91.0.23.31 Clear
.91 . u.92.92.1.26.19 Clear Line 19
.92 . .93.94.0.00.25 8000000 to ID,1
.94 . .98.u0.0.01.20 uuuuuu9 to Line 20,2
.u0 . .06.08.1.01.21 -uuuuuuu to Line 21,2 , characteristic 1
.08 . .10.20.0.31.27 Test for pickup ; ( Non zero = error )
      Below for 21
.20 s .22.31.0.21.20 Line 21,2 to Line 20,2
.31 . .70.72.0.01.21 -5555556 to Line 21,2
.72 . .74.23.0.30.27 Test for dropout ; ( Non zero = error )
      See next page for 23
.24 s .26.21.0.20.21 Line 20,2 to Line 21,2
.21 . .22.40.0.00.24 8000000 to MQ,0 ( error marker )
.40 . .42.23.0.21.22 Sample failure to Line 22,2

```



## INVERTING GATES

```

.23 s .02.30.1.26.31 1 bit shift
.30 . .32.94.1.25.27 Test for end of test ; if zero, reenter at 94 preceding page

.95 s .96.u4.5.24.27 -End of test ; test for failures ; ( Non zero = error )
      Below for u4
.u5 s .u7.56.5.24.19 Frequency marker to Line 19,u7
.56 . .57.61.0.00.22 Tag to Line 22,1 ; 1000000
.61 . .u5.67.0.22.19 Tag to Line 19,u5
.67 . .u6.29.0.22.19 Sample failure to Line 19,u6
.29 . .31.u4.0.09.31 Type error indication
.u4 . .u7.32.0.23.31 Clear ; enter also from zero test of command 95 above
.32 . .35.62.0.00.25 8000000 to ID,1
.62 . .86.u2.0.01.20 uuuuuuu to Line 20,2
.u2 . .86.u3.1.01.21 uuuuuuu to Line 21,2 , characteristic 1
.u3 . .u6.10.0.30.27 Test for pickup ; ( Non zero = error )
      Below for 11
.10 s .14.28.0.21.20 Line 21,2 to Line 20,2
.28 . .30.36.0.01.21 uuuuuuu to Line 21,2
.36 . .38.25.0.30.27 Test for dropout ; ( Non zero = error )

.26 s .30.11.0.20.21 Line 20,2 to Line 21,2
.11 . .22.42.0.00.24 8000000 to MQ,0 ( error marker )
.42 . .46.25.0.21.22 Sample failure to Line 22,2
.25 . .02.33.1.26.31 1 bit shift
.33 . .36.62.1.25.27 Test for end of test ; if zero, reenter at 62 above

.63 s .64.73.5.24.27 -End of test ; test for failures ; ( Non zero = error )
      Below for 73
.74 s .76.74.0.28.31 Test ready
.75 . .u7.18.5.24.19 Frequency marker to Line 19,u7
.18 . .37.48.0.00.22 Tag to Line 22,1 ; 2000000
.48 . .u5.09.0.22.19 Tag to Line 19,u5
.09 . .u6.66.0.22.19 Sample failure to Line 19,u6
.66 . .68.73.0.09.31 Type error indication
.73 . .76.76.0.23.31 Clear ; enter also from zero test of command 63 above
.76 . .93.96.0.00.25 8000000 to ID,1
.96 . .06.19.2.01.28 Absolute value of -uuuuuuu to AR
.19 . .22.38.0.28.20 AR to Line 20,2
.38 . .42.43.0.01.21 uuuuuuu to Line 21,2
.43 . .46.68.0.30.27 Test for dropout ; ( Non zero = error )
      Below for 69
.68 s .78.79.0.01.21 -5555555 to Line 21,2
.79 . .82.45.0.31.27 Test for pickup ; ( Non zero = error )
      Below for 45
.46 s .48.69.0.04.04 Skip to 69
.69 . .70.83.0.20.22 Sample failure to Line 22,2
.83 . .22.45.0.00.24 8000000 to MQ,0 ( error marker )
.45 . .02.55.1.26.31 1 bit shift
.55 . .58.96.1.25.27 Test for end of test ; if zero, reenter at 96 above

.97 s .99.99.2.21.31 Exit to Line 2,99

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## INVERTING GATES

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.99 s .u0.u2.5.24.27 -End of test ; test for failures ; ( Non zero = error )
      Below for u2
.u3 s .u5.u3.0.28.31 Test ready
.u4 . .u5.44.0.02.19 Tag to Line 19,u5 ; 3000000
.44 . .u6.60.0.22.19 Sample failure to Line 19,u6
.60 . .u7.04.5.24.19 Frequency marker to Line 19,u7
.04 . .06.u2.0.09.31 Type error indication
.u2 . .u5.52.0.23.31 Clear ; enter also from zero test of 99 above
.52 . .93.94.0.00.25 8000000 to ID,1
.94 . .99.u0.2.01.28 Absolute value of uuuuuuu to AR
.u0 . .u2.56.0.28.20 AR to Line 20,2
.56 . .86.u1.0.01.21 uuuuuuu to Line 21,2
.u1 . .u2.06.0.30.27 Test for dropout ; ( Non zero = error )
      Below for 07
.06 s .10.20.0.01.21 -5555555 to Line 21,2
.20 . .22.41.0.31.27 Test for pickup ; ( Non zero = error )
      Below for 41
.42 s .44.07.0.04.04 Skip to 07
.07 . .10.12.0.20.22 Sample failure to Line 22,2
.12 . .22.41.0.00.24 8000000 to MQ,0 ( error marker )
.41 . .02.43.1.26.31 1 bit shift
.43 . .44.94.1.25.27 Test for end of test ; if zero, reenter at 94 above

.95 s .96.13.5.24.27 -End of test ; test for failures ; ( Non zero = error )
      Below for 13
.14 s .16.14.0.28.31 Test ready
.15 . .17.45.0.02.22 Tag to Line 22,1; 4000000
.45 . .u5.46.0.22.19 Tag to Line 19,u5
.46 . .u6.47.0.22.19 Sample failure to Line 19,u6
.47 . .u7.11.5.24.19 Frequency marker to Line 19,u7
.11 . .13.13.0.09.31 Type error indication
.13 . .16.80.0.23.31 Clear ; enter also from zero test of 95 above
.80 . .93.96.0.00.25 8000000 to ID,1
.96 . .06.08.3.01.28 Clear and subtract -uuuuuuu from AR
.08 . .10.16.0.28.20 AR to Line 20,2
.16 . .42.48.0.01.21 uuuuuuu to Line 21,2
.48 . .50.54.0.30.27 Test for dropout ; ( Non zero = error )
      Below for 55
.54 s .78.79.0.01.20 -5555555 to Line 20,2
.79 . .82.84.0.28.21 AR to Line 21,2
.84 . .86.65.0.31.27 Test for pickup ; ( Non zero = error )
      Below for 65
.66 s .68.55.0.04.04 Skip to 55
.55 . .58.59.0.28.22 Sample failure to Line 22,2
.59 . .62.65.0.02.24 8000000 to MQ,0
.65 . .02.68.1.26.31 1 bit shift
.68 . .70.96.1.25.27 Test for end of test ; if zero, reenter above at 96

.97 s .98.21.5.24.27 -End of test ; test for failures ; ( Non zero = error )
      Next page for 21
.22 s .24.22.0.28.31 Test ready
.23 . .33.34.0.02.22 Tag to Line 22,1 ; 5000000

```

## INVERTING GATES

Lines 2,1

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.34 . .u5.40.0.22.19 Tag to Line 19,u5
.40 . .u6.64.0.22.19 Sample failure to Line 19,u6
.64 . .u7.05.5.24.19 Frequency marker to Line 19,u7
.05 . .07.21.0.09.31 Type error indication
.21 . .24.27.0.23.31 Clear ; enter also from zero test of 97 preceding page
.27 . .93.24.0.00.25 8000000 to ID,1
.24 . .42.49.3.01.28 Clear and subtract uuuuuuu from AR
.49 . .50.58.0.28.20 AR to Line 20,2
.58 . .70.71.0.01.21 -5555556 to Line 21,2
.71 . .74.75.0.30.27 Test for dropout ; ( Non zero = error )
      Below for 76
.75 s .78.82.0.28.21 AR to Line 21,2
.82 . .86.87.0.02.20 uuuuuu9 to Line 20,2
.87 . .90.69.0.31.27 Test for pickup ; ( Non zero = error )
      Below for 69
.70 s .72.76.0.04.04 Skip to 76
.76 . .78.81.0.28.22 Sample failure to Line 22,2
.81 . .22.69.0.00.24 8000000 to MQ,0 ( error marker )
.69 . .02.72.1.26.31 1 bit shift
.72 . .74.24.1.25.27 Test for end of test ; if zero, reenter at 24 above

.25 s .26.29.5.24.27 -End of test ; test for failures ; ( Non zero = error )
      Below for 29
.30 s .32.30.0.28.31 Test ready
.31 . .33.50.0.01.22 Tag to Line 22,1 ; 6000000
.50 . .u6.51.0.22.19 Sample failure to Line 19,u6
.51 . .u7.53.5.24.19 Frequency marker to Line 19,u7
.53 . .u5.09.0.22.19 Tag to Line 19,u5
.09 . .11.29.0.09.31 Type error indication
.29 . .32.32.0.23.31 Clear ; enter also from zero test of 25 above
.32 . .93.98.0.00.25 8000000 to ID,1
.98 . .u0.u0.1.21.31 Exit to Line 1,u0
      Following from Line 1 :
.u0 s u.11.12.3.01.20 uuuuuuu to Line 20,2 ; add via AR
.12 . .30.35.0.01.21 uuuuuuu to Line 21,2
.35 . .38.39.0.30.27 Test for dropout ; ( Non zero = error )
      Below for 40
.39 s .78.79.0.01.21 -5555555 to Line 21,2
.79 . .82.22.0.31.27 Test for pickup ; ( Non zero = error )
.22 s .64.71.0.04.04 Skip to 71 below

.23 s .25.40.0.04.04 Skip to 40
.40 . .62.65.0.02.24 8000000 to MQ,0 ( error marker )
.65 . .66.71.0.20.22 Sample failure to Line 22,2
.71 . .02.74.1.26.31 1 bit shift
.74 . .76.u0.1.25.27 Test for end of test ; if zero, reenter at u0 above

.u1 s .u2.u5.5.24.27 -End of test ; test for failures ; ( Non zero = error )
      Next page for u5
.u6 s .01.16.0.01.22 Tag to Line 22,1 ; 7000000
.16 . .16.16.0.28.31 Test ready
.17 . .u5.32.0.22.19 Tag to Line 19,u5

```

## INVERTING GATES

```

.32 . .u6.62.0.22.19 Sample failure to Line 19,u6
.62 . .u7.66.5.24.19 Frequency marker to Line 19,u7
.66 . .68.u5.0.09.31 Type error indication
.u5 . .00.02.0.23.31 Clear ; enter also from zero test of u1, preceding page
.02 . .03.04.0.01.25 8000000 to ID,1
.04 . u.15.15.3.01.20 -uuuuuuu to Line 20,2 ; add via AR
.15 . .18.19.0.01.21 -5555556 to Line 21,2
.19 . .22.24.0.30.27 Test for dropout ; ( Non zero = error )
      Below for 25
.24 s .26.36.0.01.21 uuuuuu9 to Line 21,2
.36 . .38.75.0.31.27 Test for pickup ; ( Non zero = error )
      Below for 75
.76 s .78.25.0.04.04 Skip to 25
.25 . .26.27.0.20.22 Sample failure to Line 22,2
.27 . .38.75.0.01.24 8000000 to MQ,0 ( error marker )
.75 . .02.80.1.26.31 1 bit shift
.80 . .82.04.1.25.27 Test for end of test ; if zero, reenter at 04 above

.05 s .06.45.5.24.27 -End of test ; test for failures ; ( Non zero = error )
      Below for 45
.46 s .48.46.0.28.31 Test ready
.47 . .49.50.0.01.22 Tag to Line 22,1 ; 8000000
.50 . .u7.61.5.24.19 Frequency marker to Line 19,u7
.61 . .u6.48.0.22.19 Sample failure to Line 19,u6
.48 . .u5.07.0.22.19 Tag to Line 19,u5
.07 . .09.45.0.09.31 Type error indication
.45 . .48.63.0.23.31 Clear ; enter also from zero test of 05 above
.63 . .93.94.0.00.25 8000000 to ID,1
.94 . u.99.u2.2.01.20 -5555555 to Line 20,2 ; transfer via AR
.u2 . .10.14.0.01.21 -5555555 to Line 21,2
.14 . .18.20.0.30.27 Test for dropout ; ( Non zero = error )
.21 s .23.58.0.04.04 Skip to 58
.20 s .30.31.0.01.21 uuuuuuu to Line 21,2
.31 . .34.57.0.31.27 Test for pickup ; ( Non zero = error )
      Below for 57
.58 s .62.68.0.02.24 8000000 to MQ,0 ( error marker )
.68 . .70.57.0.20.22 Sample failure to Line 22,2
.57 . .02.60.1.26.31 1 bit shift
.60 s .62.94.1.25.27 Test for end of test ; if zero, reenter at 94 above

.95 s .96.81.5.24.27 -End of test ; test for failures; ( Non zero = error )
      Below for 81
.82 s .82.82.0.28.31 Test ready
.83 . .85.u4.0.01.22 Tag to Line 22,1 ; 9000000
.u4 . u.u7.84.0.22.19 Tag to Line 19,u5 ; sample failure to Line 19,u6
.84 . .u7.37.5.24.19 Frequency marker to Line 19,u7
.37 . .39.81.0.09.31 Type error indication
.81 . .82.92.1.17.31 Ring bell; test punch switch ; from zero test of 95 also

.92 s .94.51.0.04.04 Punch switch off ; skip to 51
.51 . .53.51.0.28.31 Test ready
.52 . .54.54.0.15.31 Read tape

```

INVERTING GATES

.54 . .56.54.0.28.31 Test ready  
 .55 . .57.00.6.21.31 Exit to Line 19,00  
 .93 s .95.70.0.21.31 Punch switch on ; reenter test at Line 0,70 , page 24

Program constants :

Line 0	Line 1	Line 2
.05 5555016	.00 0xv667x L1 sum	.83 -8vv1z22 L2 Sum
.03 0000022	.08 -0xv667x Neg. sum	.36 8vv1z22 Neg. sum
.52 w86xv51 LO sum	.28 02462vz f link	.u5 3000000
.47 -w86xv51 Neg. sum	.29 03462vz f link	.17 4000000
.59 6000022	.98 uuuuuu9	.62 8000000
.16 xxxxxx0	.06 -uuuuuuu	.33 5000000
.89 yyyyyy0	.70 -5555556	.86 uuuuuu9
.77 zzzzzz0	.86 uuuuuuu	.03 800000x
.93 8000000	.30 uuuuuuu	.02 0000030
.22 8000000	.42 uuuuuuu	.01 8800000
.57 1000000	.78 -5555555	.10 -7xz8zzx Unused
.35 8000000	.99 uuuuuuu	
.37 2000000	.10 -5555555	Unused Loc.
Unused Loc.	.33 6000000	.00 .73
.34	.09 uuuuuuu	.18 .74
.39	.49 8000000	.19 .77
.41	.01 7000000	.26 .78
.58	.03 8000000	.28 .85
.u1	.13 -uuuuuuu	.35 .88
	.18 -5555556	.37 .89
	.26 uuuuuu9	.38 .90
	.38 8000000	.39 .91
	.97 -5555555	.57 .92
	.85 9000000	.61 .93
	.34 -5555555 Unused	.63 .u6
	.96 -uuuuuuu "	.67 .u7
	Unused Loc.	
	.11 .72	
	.41 .73	
	.43 .77	
	.44 .87	
	.53 .88	
	.56 .89	
	.59 .90	
	.64 .91	
	.67 .u3	
	.69 .u7	

## PN ; LOGICAL COMMANDS

```

.00 s u.01.01.0.19.00 Line 19 to Line 0
.01 . .03.04.0.21.31 Exit to Line 0,04
.04 s .06.07.3.00.28 Clear and subtract summation of Line 0 from AR
.07 . u.08.08.1.00.29 Add all Line 0
.08 . .10.12.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 12
.13 s .14.09.0.17.31 Ring bell
.09 . .11.15.0.16.31 Halt
.15 . .17.17.0.06.31 Read back
.17 . .19.17.0.28.31 Test ready
.18 . .20.20.0.15.31 Read tape
.20 . .22.20.0.28.31 Test ready
.21 . .23.00.6.21.31 Exit to Line 19,00

.12 s .14.40.0.15.31 Read tape ( Line 1 )
.40 . .42.40.0.28.31 Test ready
.41 . u.42.42.0.19.01 Line 19 to Line 1
.42 . .38.45.3.01.28 Clear and subtract summation of Line 1 from AR
.45 . u.46.46.1.01.29 Add all Line 1
.46 . .48.49.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 49
.50 s .51.84.0.17.31 Ring bell
.84 . .86.52.0.16.31 Halt
.52 . .54.11.0.06.31 Read back
.11 . .13.11.0.28.31 Test ready ; reenter at 12 above when ready

.49 s .51.80.0.15.31 Read tape ( Line 2 )
.80 . .82.80.0.28.31 Test ready
.81 . u.82.82.0.19.02 Line 19 to Line 2
.82 . .84.85.3.02.28 Clear and subtract summation of Line 2 from AR
.85 . u.86.86.1.02.29 Add all Line 2
.86 . .88.90.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 90
.91 s .92.98.0.17.31 Ring bell
.98 . .u0.93.0.16.31 Halt
.93 . .95.48.0.06.31 Read back
.48 . .50.48.0.28.31 Test ready ; reenter at 49 above when ready

.90 s .93.95.0.23.31 Clear
.95 . .03.u4.0.00.03 AR format to Line 3,3 ; 0000022
.u4 . .11.05.0.01.28 6666016 to AR
.05 . .07.u7.0.08.31 Type AR
.u7 . .08.44.4.01.23 f key link to Line 23,0-1
.44 . .00.76.4.23.00 f key link to Line 0,0-1 ; f = clear and link to 76
.76 . .78.76.0.28.31 Test ready ; enter also from f key
.77 . u.78.94.1.25.19 Clear Line 19
.94 . .98.28.1.25.22 Clear Line 22,2
.28 . .91.92.0.01.22 # of trials to Line 22,3
.92 . .94.96.5.01.26 Clear and add hhhhhhhh , hhhhhhhh to PN,1-0
.96 . .98.u0.5.01.30 Add uuuuuuu-, uuuuuuu to PN,1-0
.u0 . .u1.u3.1.26.28 Clear and add PN-1 to AR
.u3 . .u4.u5.1.26.29 Add PN,0 to AR

```

## PN ; LOGICAL COMMANDS

```

.u5 . .u7.22.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 22
.23 s .26.27.0.22.28 Running tally of failures to AR
.27 . .28.29.0.01.29 Increment failures
.29 . .30.32.0.28.22 Restore
.32 . .34.22.5.26.23 Sample failure to Line 23,2-3
.22 . .23.24.0.22.28 # of remaining trials to AR
.24 . .25.26.3.01.29 Subtract 1
.26 . .27.30.0.28.27 Test for end of test

.31 s .35.92.0.28.22 Restore remaining # of trials and reenter preceding page,92

.30 s .34.35.0.22.27 -End of first test ; test for failures ; ( Non zero = error )
      Below for 35
.36 s .38.39.0.22.28 # of failures to AR
.39 . .40.54.0.01.29 Add Tag ; 0100000
.54 . .u5.25.0.28.19 AR to Line 19,u5
.25 . .u6.10.5.23.19 Sample failure to Line 19,u6-u7
.10 . .12.35.0.09.31 Type error indication
.35 . .42.43.0.01.22 Clear Line 22,2 ; enter also from zero test of 30 above
.43 . .47.60.0.01.22 # of trials to Line 22,3
.60 . .64.u1.5.01.26 Clear and add 5555555 , 5555555 to PN,1-0
.u1 . .64.99.5.01.30 Add      5555555 , 5555555 to PN,1-0
.99 . .u1.u2.1.01.28 Clear and add uuuuuuw to AR
.u2 . u.u5.u6.1.26.29 Add PN,0-1 to AR
.u6 . .00.33.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 33
.34 s .38.55.0.22.28 Running tally of failures to AR
.55 . .28.37.0.01.29 Increment failures
.37 . .38.47.0.28.22 Restore
.47 . .50.33.5.26.23 Sample failure to Line 23,2-3
.33 . .35.53.0.22.28 # of remaining trials to AR
.53 . .54.56.3.01.29 Subtract 1
.56 . .58.61.0.28.27 Test for end of test

.62 s .63.60.0.28.22 Restore remaining # of trials and reenter above at 60

.61 s .62.63.0.22.27 -End of second test ; test for failures ; ( Non zero = error )
      Below for 63
.64 s .66.67.0.22.28 # of failures to AR
.67 . .68.69.0.01.29 Add tag ; 0200000
.69 . .71.69.0.28.31 Test ready
.70 . .u5.68.0.28.19 AR to Line 19,u5
.68 . .u6.02.5.23.19 Sample failure to Line 19,u6-u7
.02 . .04.63.0.09.31 Type error indication
.63 . .42.59.0.01.22 Clear Line 22,2 ; enter also from zero test of 61 above
.59 . .47.58.0.01.22 # of trials to Line 22,3
.58 . .61.65.0.23.31 Clear
.65 . .66.71.1.01.26 Clear and add -0000000 to PN,0
.71 . .72.73.1.01.30 Add -0000000 to PN,0
.73 . .74.78.1.26.27 Zero test PN,0 ; ( Non zero = error )

```

## PN ; LOGICAL COMMANDS

Lines 0,2

```

.79 s .82.83.0.22.28 Running tally of failures to AR
.83 . .28.38.0.01.29 Increment failures
.38 . .42.72.0.28.22 Restore
.72 . .74.78.5.26.23 Sample failure to Line 23,2-3
.78 . .79.87.0.22.28 # of remaining trials to AR
.87 . .25.66.3.01.29 Subtract 1
.66 . .67.97.0.28.22 Restore remaining # of trials
.97 . .99.57.0.28.27 Test for end of test;if non zero,reenter 58 prec. page

.57 s .62.74.0.22.27 -End of third test;test for failures;(Non zero=error)
Below for 74
.75 s .78.88.0.22.28 # of failures to AR
.88 . .88.88.0.28.31 Test ready
.89 . .90.14.0.01.29 Add tag ; 0300000
.14 . .u5.16.0.28.19 AR to Line 19,u5
.16 . .u6.19.5.23.19 Sample failure to Line 19,u6-u7
.19 . .21.74.0.09.31 Type error indication
.74 . .76.76.2.21.31 Exit to Line 2,76;enter also from zero test of 57 above
Following from Line 2:
.76 s .42.43.0.01.22 Clear Line 22,2
.43 . .47.48.0.01.22 # of trials to Line 22,3
.48 . .50.80.5.01.26 Clear and add zzzzzzz-, zzzzzzz to PN,1-0
.80 . u.31.37.0.02.06 Check for illegal appearance of D7 at A of D45(3D294)
.37 . .50.52.5.01.30 Add zzzzzzz-, zzzzzzz to PN,1-0
.52 . .53.54.3.01.28 Clear and subtract 0000003 from AR
.54 . u.57.57.1.26.29 Add PN to AR
.57 . .58.59.0.28.27 Zero test AR; (Non zero = error)
Below for 59
.60 s w.59.88.2.21.31 Mark 59 ; exit to error loop

.88 s .90.63.5.26.23 Sample failure to Line 23,2-3
.63 . .66.67.0.22.28 Running tally of failures to AR
.67 . .28.29.0.01.29 Increment failures
.29 . .30.32.0.28.22 Restore
.32 . .34.33.2.20.31 Return command

.59 s .63.64.0.22.28 # of remaining trials to AR
.64 . .67.68.3.01.29 Subtract 1
.68 . .71.72.0.28.22 Restore remaining # of trials
.72 . .74.47.0.28.27 Test for end of test;if non zero,reenter at 48 above

.47 s .50.69.0.22.27 -End of fourth test;test for failures(Non zero = error)
Next page for 69
.70 s .05.13.0.01.28 Tag to AR; 0400000
.13 . w.69.00.2.21.31 Mark 69 ; exit to error output

.00 s .02.06.0.22.29 Add # of failures
.06 . .06.06.0.28.31 Test ready
.07 . .u5.71.0.28.19 AR to Line 19,u5
.71 . .u6.24.5.23.19 Sample failure to Line 19,u6-u7
.24 . .26.32.0.09.31 Type error indication ; to return command

```



## PN ; LOGICAL COMMANDS

.69 s .42.44.4.01.22 Clear Line 22,2-3;enter also from zero test of 72  
.44 . .47.50.0.01.21 # of trials to Line 21,3  
.50 . .53.53.0.23.31 Clear  
.53 . .54.55.1.26.28 Clear AR  
.55 . .56.58.5.01.30 Add 0000000, 0000000- to PN,1-0(Characteristic 1)  
.58 . u.61.61.1.26.27 Zero test PN ; (Non zero = error)

.62 s w.61.88.2.21.31 Mark 61 ;exit to error loop;see 88 preceding page

.61 s .63.65.0.22.31 Test AR sign ; (Negative = error)  
Below for 65

.66 s w.65.73.2.21.31 Mark 65; exit to error loop

.73 s .74.92.5.28.20 Sample failure to Line 20,2-3  
.92 . .95.u0.0.22.28 Running tally of failures to AR  
.u0 . .28.51.0.01.29 Increment failures  
.51 . .55.32.0.28.22 Restore ; to return command

.65 s .72.96.1.01.24 -0000000 to MQ,0;Check illegal D7 at F of E15(3D292)  
.96 . .98.04.0.22.31 Test AR sign ; (Negative = error )

.05 s w.04.73.2.21.31 Mark 04 ; exit to error loop ; see 73 above

.04 s .56.89.5.01.22 Neg. zero to L22,0-1;Check illegal C5 atV,E14(3D292)  
.89 . u.92.10.1.26.27 Zero test PN, (Non zero = error)

.11 s w.10.88.2.21.31 Mark 10 ;exit to error loop;see 88 preceding page

.10 s .42.90.5.01.26 Add 0000000, 0000000 to PN,1-0  
.90 . u.93.93.1.26.27 Zero test PN ; (Non zero = error)

.94 s w.93.88.2.21.31 Mark 93 ; exit to error loop ; see 88 preceding page

.93 s u.69.12.1.01.28 Check illegal TR at C,E15(3D292);note L1,72=neg. zero  
.12 . .14.21.0.22.31 Test AR sign ; (Negative = error)

.22 s w.21.73.2.21.31 Mark 21 ; exit to error loop ; see 73 above

.21 s .56.19.4.01.26 Neg. zero to PN,Char.0;Check illegal IS atD,E15(3D292)  
.19 . u.22.39.1.26.27 Zero test PN ; (Non zero = error)

.40 s w.39.88.2.21.31 Mark 39 ; exit to error loop ; see 88 preceding page

.39 s .56.u7.5.01.14 Check illegal C6 at E,E14 (3D292)zone 2A  
.u7 . u.02.30.1.26.27 Zero test PN ; (Non zero = error)

.31 s w.30.88.2.21.31 Mark 30 ; exit to error loop ; see 88 preceding page

.30 s .31.74.0.21.28 # of remaining trials to AR  
.74 . .75.77.3.01.29 Subtract 1  
.77 . .79.u4.0.28.21 Restore remaining # of trials  
.u4 . .u6.49.0.28.27 Test for end of test;if non zero,reenter at 50 above

.49 s .54.08.0.22.27 -End of fifth test;test for failures; (Non zero = error)

## PN ; LOGICAL COMMANDS

```

.09 s .13.33.0.01.28 Tag to AR ; 0500000
.33 . w.08.00.2.21.31 Mark 08 ; exit to error output ; see 00, page 32

.08 s .11.14.0.22.27 -Test for failures (sixth test) ; Non zero = error
      Below for 11,
.15 s .20.41.0.01.28 Tag to AR ; 0600000
.41 . .42.45.4.20.23 Sample failure to Line 23,2-3
.45 . w.14.16.2.21.31 Mark 11 ; exit to error output

.16 s .19.06.0.22.29 Add # of failures ; go to 06, page 32

.14 s .42.46.4.01.22 Clear Line 22,2-3 ; enter also from zero test of 08
.46 . .47.u1.0.01.21 # of trials to Line 21,3
.u1 . .58.81.5.01.26 Clear and add uuuuuuu, uuuuuuu to Pn,1-0
.81 . .84.85.7.23.31 PN and L2,82-83 to ID;PN and L2,82-83 to PN; L2,82-83 =
.85 . .98.99.0.01.28 uuuuuuu to AR                uuuuuuu, 5555555
.99 . u.u2.u2.3.26.29 Subtract PN from AR
.u2 . .u4.u5.0.28.27 Zero test AR ; (Non zero = error )

.u6 s w.17.88.2.21.31 Mark 17 ; exit to error loop ; see page 32

.u5 s .u6.17.1.26.27 Zero test PN,0 ; (Non zero = error)

.18 s .20.u6.0.04.04 Skip to u6 above

.17 s .18.20.0.01.28 uuuuuuu to AR
.20 . u.23.23.3.25.29 Subtract ID from AR
.23 . .25.26.0.28.27 Zero test AR ; (Non zero = error)

.27 s .30.36.5.25.20 Sample failure to Line 20,2-3
.36 . w.34.92.2.21.31 Mark 34 ; exit to error loop ; see preceding page,92

.26 s .27.34.1.25.27 Zero test ID,1 ; (Non zero = error)

.35 s .37.27.0.04.04 Skip to 27 above

.34 s .35.38.0.21.28 # of remaining trials to AR
.38 . .54.56.3.01.29 Subtract 1
.56 . .59.75.0.28.21 Restore remaining # of trials
.75 . .77.78.0.28.27 Test for end of test ; zero test = end of test

.79 s .81.u1.0.04.04 Do nothing ; reenter at u1 above

.78 s .82.86.0.22.27 -End of test ; test for failures ( seventh test )

.87 s .96.u3.0.01.28 Tag to AR ; 0700000
.u3 . w.86.00.2.21.31 Mark 86 ; exit to error output ; see page 32

.86 s .91.97.0.22.27 -Test for failures ( eighth test )
      Next page for 97
.98 s .23.25.0.01.28 Tag to AR ; 0800000
.25 . .26.28.4.20.23 Sample failure to Line 23,2-3
.28 . w.97.16.2.21.31 Mark 97 ; exit to error output ; go to 16 above

```

## PN ; LOGICAL COMMANDS

Lines 2,1

```

.97 s .42.91.0.01.22 Clear Line 22,2
.91 . .47.95.0.01.22 # of trials to Line 22,3
.95 . .97.97.1.21.31 Exit to Line 1,97
      Following from Line 1 :
.97 s .98.u0.0.01.20 uuuuuuu to Line 20,2
.u0 . .58.60.0.01.21 uuuuuuu to Line 21,2
.60 . .61.62.0.01.28 5050505 to AR
.62 . .66.69.0.27.23 L20,2 and L21,2 or L20,2 and AR to L23,2
.69 . .70.71.3.01.28 Clear and subtract zuzuzuz from AR
.71 . .74.82.1.23.29 Add Line 23,2 to AR
.82 . .84.73.0.28.27 Zero test AR ; (Non zero = error)
      Below for 73
.74 s .78.u5.1.23.25 Sample failure to ID,0
.u5 . .u6.21.0.22.28 Running tally of failures to AR
.21 . .28.30.0.01.29 Increment failures
.30 . .34.73.0.28.22 Restore
.73 . .75.76.0.22.28 # of remaining trials to AR
.76 . .25.26.3.01.29 Subtract 1
.26 . .27.29.0.28.22 Restore remaining # of trials
.29 . .31.44.0.28.27 Test for end of test ; zero = end of test

.45 s .51.60.0.01.25 Neg. # to ID,1 to check for illegal SX at A,All(3D293),
      zone 2B during execution of 62 above ; go to 60 above
.44 s .46.48.0.22.27 - End of ninth test ; test for failures;(Non zero=error)
      Below for 48
.49 s .50.52.0.22.28 # of failures to AR
.52 . .55.77.0.01.29 Add tag ; 0900000
.77 . .77.77.0.28.31 Test ready
.78 . .u6.00.1.25.19 Sample failure to Line 19,u6
.00 . .u5.12.0.28.19 AR to Line 19,u5
.12 . .14.48.0.09.31 Type error indication
.48 . .42.46.0.01.22 Clear Line 22,2 ; enter also from zero test of 44 above
.46 . .47.81.0.01.22 # of trials to Line 22,3
.81 . .50.63.4.01.20 zzzzzzz, zzzzzzz- to Line 20,2-3
.63 . .66.79.4.29.23 Line 20,2-3 and IR to Line 23,2-3
.79 . .82.84.4.23.27 Zero test Line 23,2-3 ; (Non zero = error)
      Below for 84
.85 s .86.88.5.23.25 Sample failure to ID
.88 . .90.92.0.22.28 Running tally of failures to AR
.92 . .28.31.0.01.29 Increment failures
.31 . .34.84.0.28.22 Restore
.84 . .87.89.0.22.28 # of remaining trials to AR
.89 . .25.27.3.01.29 Subtract 1
.27 . .31.32.0.28.22 Restore remaining # of trials
.32 . .34.80.0.28.27 Test for end of test; if non zero, reenter at 81 above

.80 s .86.u2.0.22.27 - End of tenth test;test for failures;(Non zero = error)
      Next page for u2
.u3 s .u3.u3.0.28.31 Test ready
.u4 . .u6.10.0.22.28 # of failures to AR
.10 . .01.02.0.01.29 Add tag ; 1000000

```

## PN ; LOGICAL COMMANDS

.02 . .u5.u6.0.28.19 AR to Line 19,u5  
.u6 . .u6.19.5.25.19 Sample failure to Line 19,u6-u7  
.19 . .21.u2.0.09.31 Type error indication  
.u2 . .u5.03.0.23.31 Clear ; enter also from zero test of 80,prec. page  
.03 . .03.03.0.28.31 Test ready  
.04 . .05.06.1.17.31 Ring bell ; test punch switch  
  
.06 s .08.16.0.15.31 Punch switch off ; read tape  
.16 . .16.16.0.28.31 Test ready  
.17 . .19.00.6.21.31 Exit to Line 19,00  
  
.07 s .09.76.0.21.31 Reenter test ; go to 76, page 30

## Line 1:

.38 -xlvu933 L1 Sum .67 0000001  
.39 xlvu933 Neg. Sum .05 0400000  
.11 6666016 .56 -0000000  
.08 .03.76.0.23.31 f link .57 0000000  
.09 .04.76.0.23.31 f link .75 0000001  
.91 0000019 .13 0500000  
.94 hhhhhhhh .20 0600000  
.95 hhhhhhhh .58 uuuuuuu  
.98 uuuuuuu .59 uuuuuuu  
.99 -uuuuuuu .18 uuuuuuu  
.28 0001000 .96 0700000  
.25 0000001 .23 0800000  
.40 0100000 .61 5050505  
.47 0000019 .70 zuzuzuz  
.64 5555555 .55 0900000  
.65 5555555 .01 1000000  
.u1 uuuuuuw .86 0000800  
.54 0000001 .83 000000u  
.68 0200000 Unused Loc.  
.42 0000000 .14 .36  
.43 0000000 .15 .37  
.66 -0000000 .22 .41  
.72 -0000000 .24 .87  
.90 0300000 .33 .93  
.51 -zzzzzzz .34 .u7  
.50 zzzzzzz .35  
.53 0000003

## Line 0:

.06 -2z632yz L0 Sum  
.51 2z632yz Neg. Sum  
.03 0000022  
  
Line 2:  
.84 5v05v08 L2 Sum  
.42 -5v05v08 Neg. Sum  
.82 uuuuuuu  
.83 5555555  
.03 800000x  
.02 0000030  
.01 0044000

Unused

## LONG LINES

```

.00 s u.01.01.0.19.00 Line 19 to Line 0
.01 . .03.04.0.21.31 Exit to Line 0,04
.04 s .05.06.3.00.28 Clear and subtract summation of Line 0 from AR ( Loader )
.06 . u.07.07.1.00.29 Add all Line 0
.07 . .08.09.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 09
.10 s .11.11.0.17.31 Ring bell ; probable read-in error
.11 . .13.13.0.16.31 Halt
.13 . .15.15.0.06.31 Read back
.15 . .17.15.0.28.31 Test ready
.16 . .18.54.0.15.31 Read tape
.54 . .56.54.0.28.31 Test ready
.55 . .57.00.6.21.31 Exit to Line 19,00

.09 s .12.12.0.23.31 Clear
.12 . u.13.14.1.26.19 Clear Line 19
.14 . .u7.08.0.00.19 7777145 to Line 19,u7
.08 . .02.17.4.00.02 Format to Line 2,3 ; 0000062
.17 . .19.19.0.09.31 Type 7777145
.19 . u.20.20.1.26.03 Clear Line 3
.20 . u.21.21.1.26.04 Clear Line 4
.21 . u.22.22.1.26.05 Clear Line 5
.22 . u.23.23.1.26.06 Clear Line 6
.23 . u.24.24.1.26.07 Clear Line 7
.24 . u.25.25.1.26.08 Clear Line 8
.25 . u.26.26.1.26.09 Clear Line 9
.26 . u.27.27.1.26.10 Clear Line 10
.27 . u.28.28.1.26.11 Clear Line 11
.28 . u.29.29.1.26.12 Clear Line 12
.29 . u.30.30.1.26.13 Clear Line 13
.30 . u.31.31.1.26.14 Clear Line 14
.31 . u.32.32.1.26.15 Clear Line 15
.32 . u.33.33.1.26.16 Clear Line 16
.33 . u.34.34.1.26.17 Clear Line 17
.34 . u.35.35.1.26.18 Clear Line 18
.35 . .37.35.0.28.31 Test ready
.36 . u.37.41.1.26.02 Clear Line 2
.41 . u.46.46.0.00.21 Commands to Line 21 ; see page 38
.46 . u.51.53.0.00.20 Commands to Line 20 ; see page 38
.53 . .57.58.1.26.22 Clear Line 22,1
.58 . u.63.63.1.26.23 Clear Line 23
.63 . .66.67.1.26.22 Clear Line 22,2
.67 . .69.65.0.12.31 Gate type-in
.65 . .67.65.0.28.31 Test ready
.66 . .68.96.0.23.00 Typed random number to Line 0,68
.96 . u.97.69.0.19.19 Delay
.69 . .71.71.0.15.31 Read tape ( Line 1 )
.71 . .73.71.0.28.31 Test ready
.72 . .73.74.3.00.28 Clear and subtract summation of Line 1 from AR
.74 . u.75.75.1.19.29 Add all Line 19 ( Line 1 )
.75 . .76.77.0.28.27 Zero test AR ; ( Non zero = error )

```

Loader Constants :

```

.05 -10yv55 Loader sum
.u6 10yv55 Neg. sum
.84 -94u98x5 LO sum
.u4 94u98x5 Neg. sum
.73 7wyl87 Ll sum
.u5 -7wyl87 Neg. sum
.u7 7777145
.03 0000062
.50 zz00000
.68 Random #, intermediate

```

Unused Loc.

```

.02 .64
.18 .68
.37 .76
.38 .87
.39 .91
.40 .95
.51 .99
.52 .u0
.56 .u1
.57 .u2
.59 .u3
.60
.61
.62

```

## LONG LINES

.78 s .79.79.0.17.31 Ring bell ; probable read-in error  
.79 . .81.81.0.16.31 Halt  
.81 . .83.93.0.06.31 Read back  
.93 . .95.93.0.28.31 Test ready  
.94 . .97.69.0.23.31 Clear and reenter preceding page, 69

.77 s u.78.80.0.19.01 Line 19 to Line 1  
.80 . .82.82.0.15.31 Read tape ( Line 0 )  
.82 . .84.82.0.28.31 Test ready  
.83 . .84.85.3.00.28 Clear and subtract summation of Line 0 from AR  
.85 . u.86.86.1.19.29 Add all Line 19 ( Line 0 )  
.86 . .87.88.0.28.27 Zero test AR ; ( Non zero = error )  
Below for 88  
.89 s .90.90.0.17.31 Ring bell ; probable read-in error  
.90 . .92.92.0.16.31 Halt  
.92 . .94.97.0.06.31 Read back  
.97 . .99.97.0.28.31 Test ready  
.98 . .u1.80.0.23.31 Clear and reenter at 80 above

.88 s .68.70.0.00.28 Typed random number to AR  
.70 . u.71.32.0.19.00 Line 19 to Line 0 ; see below for 32

Following from Line 23 ; stored in Line 21  
.42 s .00.36.5.26.02 Store random number in Line D, T and T + 1  
.44 s .38.40.0.21.31 Exit to Line 0,40  
.45 s u.58.59.3.02.29 Subtract all Line D from AR ; executed at 57  
.43 s .61.61.0.21.31 Exit to Line 0,61

Following from Line 23 ; stored in Line 20  
.48 s .32.53.0.28.01 Store final summation of Line D in Line 1, 30 + D  
.49 s u.55.55.3.28.28 Negate  
.47 s .50.66.1.28.01 Store negated summation of Line D in Line 1, 48 + D

.32 s u.33.07.1.26.19 Clear Line 19  
.07 . .10.12.4.01.25  $\pi \times 10^{-1} \times 2$  to ID,0-1  
.12 . u.15.15.3.28.26 Clear and subtract random number from PN,0 and PN,1  
.15 . .29.46.1.25.31 Divide for 29 word times ; PN,0 = new random number  
.46 . .48.51.1.26.22 Random number to Line 22,0 ; complement if negative  
.51 . u.56.56.0.21.23 All Line 21 to Line 23  
.56 . .58.62.7.21.31 Exit to Line 23,62 for storage of random number ; see 42 above ;  
return to Line 0 at 40  
.40 s .41.43.1.22.28 Clear and add running summation of Line D to AR  
.43 . .44.47.5.26.26 Complement latest random number if negative  
.47 . u.50.50.1.26.29 Add latest random numbers to AR  
.50 . .53.54.1.28.22 Store new summation of Line D in Line 22,1  
.54 . .56.57.7.21.31 Exit to Line 23, 57 ; see 45 above ; return to Line 0 at 61

.61 s .62.63.0.28.27 Zero test AR ; ( Non zero = error ) ; see page 40 for 64  
.63 s .66.67.0.21.28 Line 21,2 to AR ( Random number store command )

## LONG LINES

.67 . .68.69.0.01.29 Increment T # ; 0200000  
.69 . .70.71.0.28.21 Restore modified command  
.71 . .74.75.0.01.20 zz00000 to Line 20,2  
.75 . .78.79.0.31.28 Extract T # of modified random number store command  
.79 . .80.81.3.01.29 Subtract yv00000 from AR  
.81 . .83.83.0.22.31 -Is T # greater than 107 ?  
.84 s .88.07.0.22.28 T # = 106 or less ; random number to AR ; reenter 07 prec. page  
.83 s .86.87.0.30.28 Placement command ( Line 21,2 ) to AR, less T #  
.87 . .88.89.0.01.29 Add 1 to destination and insert bit in T29  
.89 . .90.91.0.28.21 Restore modified command  
.91 . .93.94.0.21.28 Command ( Line 21,1 ) to AR  
.94 . .95.96.0.01.29 Add 1 to source  
.96 . .97.98.0.28.21 Restore modified command  
.98 . u.u3.u3.0.20.23 All Line 20 to Line 23  
.u3 . .u5.u6.0.22.28 Final summation of Line D to AR  
.u6 . .02.05.0.01.23 Return command to Line 23,2  
.05 . .07.08.7.21.31 Exit to Line 23,08 ; see 48 on preceding page ; return to  
Line 0 at 70 for recheck of long lines  
.70 s .71.72.3.01.28 Clear and subtract summation of Line 0 from AR  
.72 . u.73.73.1.00.29 Add all Line 0  
.73 . .75.76.0.28.27 Zero test AR ; ( Non zero = error )  
Below for 76  
.77 s .78.88.0.01.28 Line 0 failure indication to AR  
.88 . .03.29.1.03.26 Line 3,03 to PN,1 ( temporary storage )  
.29 . .03.26.0.01.03 Error format to Line 3,03 ; 45v7zw02  
.26 . .28.02.0.08.31 Type error indication  
.02 . .02.02.0.28.31 Test ready  
.03 . .04.48.0.28.27 Line 0 or Line 1 error loop ? ; ( Zero = Line 0 error )  
Below for 49  
.48 s .03.76.1.26.03 Restore Line 3,03  
.76 . .77.78.3.01.28 Clear and subtract sum. Line 1 from AR ; enter from zero test  
.78 . u.79.80.1.01.29 Add all Line 1 of 73 also  
.80 . .82.85.0.28.27 Zero test AR ; ( Non zero = error )  
Below for 85  
.86 s .87.88.0.01.28 Line 1 failure indication to AR ; go to 88 above  
.49 s .03.85.1.26.03 From non zero test of 03 ; restore Line 3,03  
.85 . .86.90.0.22.28 Number of long lines tested to AR ; ( Initially zero )  
.90 . .u4.06.0.01.29 Add 0000001  
.06 . .10.16.4.28.22 Store in Line 22,2-3  
.16 . u.21.21.0.01.23 Line 1, 17-18-19-20 to Line 23  
.21 . .23.23.7.21.31 Exit to Line 23,23  
(.23 . .32.50.3.01.28) Clear and subtract summation of Line D from AR  
(.50 . u.51.53.1.02.29) Add all Line D  
(.53 . .55.55.0.21.31) Exit to Line 0,55  
.55 s .56.57.0.28.27 Zero test AR ; ( Non zero = error )  
Next page for 58  
.57 s .59.60.0.22.28 Line 22,3 to AR ( Count of number of rechecks )  
.60 . .79.82.3.01.29 Subtract 1

## LONG LINES

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.82 . .84.92.0.28.27 Test for end of rechecks; ( Zero = end of rechecks )
      Below for 92
.93 s .95.97.0.28.22 Restore remaining number of rechecks
.97 . .98.99.0.23.28 Command ( Line 23,2 ) to AR
.99 . .u0.u4.0.01.29 Add 1 to source
.u4 . .u6.u7.0.28.23 Restore modified command
.u7 . .03.08.0.23.28 Line 23,3 to AR
.08 . .09.10.0.01.29 Add 1 to T #
.10 . .11.21.0.28.23 Restore modified command; reenter preceding page at 21
      Enter error loopout from non zero test of 55:
.58 s .62.62.0.23.28 Line 23,2 to AR
.62 . .03.33.1.03.26 Line 3,03 to PN,1 ( temporary storage )
.33 . .03.09.0.01.03 Error format to Line 3,03 ; 45v7zw02
.09 . .11.13.0.08.31 Type error indication
.13 . .13.13.0.28.31 Test ready
.14 . .03.36.1.26.03 Restore Line 3,03
.36 . .38.45.0.23.28 Line 23,2 to AR
.45 . .47.50.0.31.31 Obey AR ; add all of long line which failed

.53 s .54.u0.3.23.29 Subtract Line 23,2 from AR ; AR = corrected summation of long
.u0 . .u1.u2.1.28.28 Complement AR if negative line
.u2 . u.u5.30.1.28.25 AR to ID,0-1 ; complement if negative
.30 . u.33.34.3.28.26 Corrected summation of long line, negated, to PN,0-1
.34 . .35.u5.0.23.28 Command ( Line 23,3 ) to AR
.u5 . .08.45.0.01.29 Add dummy to AR to effect storage of corrected long line
      summation ; modified command = source 25 , dest.01; to obey AR
.u1 s .05.45.0.01.29 Add 18 to T#, 1 to source ; to obey AR in order to effect
      storage of negated summation of long line ; return at 57 prec.pg.
.92 s .02.11.0.23.28 End of rechecks ; command ( Line 23,2 to AR)
.11 . .15.17.3.01.29 Subtract limit command ( u.51.53.1.19.29 )
.17 . .18.19.0.28.27 Zero test AR ( Zero indicates that Line 19 has been loaded
      with random numbers --i.e. last line ); see below for 19
.20 s .23.39.0.20.28 Command ( Line 20,3 ) to AR
.39 . .09.31.0.01.29 Add 1 to T#
.31 . .35.38.0.28.20 Restore modified command
.38 . .40.44.0.20.28 Command ( Line 20,0 ) to AR
.44 . .09.28.0.01.29 Add 1 to T#
.28 . .32.42.0.28.20 Restore modified command
.42 . .44.52.0.22.28 Latest random number generated to AR
.52 . .55.68.0.23.31 Clear
.68 . .69.04.0.17.31 Ring bell
.04 . .05.07.1.26.22 Clear Line 22,1 ; reenter at 07, page 38

.19 s .21.22.1.21.31 Exit to Line 1,22 ; from zero test of 17 above
      See next page for 22
.64 s .65.66.0.21.28 From non zero test of 61, page 38; Line 21,1 to AR
.66 . .68.57.0.31.31 Obey AR ; subtract Line D from AR

.59 s .61.22.3.21.29 Subtract command(Line 21,1); AR = negated sum of line which failed
.22 . .23.27.1.28.28 Complement AR if negative
.27 . .28.37.3.28.28 Negate AR

```





## LONG LINES ; PHASE 2

```

.00 s u.01.01.0.19.00 Line 19 to Line 0
.01 . .03.04.0.21.31 Exit toLine 0,04
.04 s .05.06.3.00.28 Clear and subtract summation of Line 0 from AR
.06 . u.07.07.1.00.29 Add all Line 0
.07 . .08.10.0.28.27 -Zero test AR ; (Non zero = error)
Below for 10
.11 s .12.41.0.17.31 Ring bell ; apparent read-in error
.41 . .43.u7.0.16.31 Halt .05 w34z700 LO Sum
.u7 . .01.12.0.06.31 Read back .08 -w34z700 Neg. Sum
.12 . .12.12.0.28.31 Test ready .43 0000001
.13 . .15.14.0.15.31 Read tape .78 0000020
.14 . .14.14.0.28.31 Test ready .95 -087y7z6
.15 . .17.00.6.21.31 Exit to Line 19,00 .09 -w47y75z Bal.

.10 s .16.18.4.00.23 f key link to Line 23,0-1
.18 . .00.19.4.23.00 F key link to Line 0,0-1
.16 s (.02.26.0.21.31) F key link to 26 below
.17 s (.03.26.0.21.31) F key link to 26 below
.19 s .20.21.0.00.28 Test identification tag to AR ; -3vvv80u
.21 . .23.24.0.00.23 Format to Line 23,3
.24 . .03.22.0.23.03 Format to Line 3,3 ; 4000002
.22 . .24.25.0.08.31 Type 7777015
.25 . .25.25.0.28.31 Test ready
.26 . u.32.58.0.00.23 Line 0, 28-31 to Line 23
.58 . w.60.36.7.21.31 Exit to Line 23,0
Following from Line 23 :
.28 s u.37.37.0.00.01 At 36 : Line 0 to Line 1 ( Basic store command )
.29 s .40.42.0.23.28 At 37 : Basic store command to AR
.30 s u.44.47.0.00.29 At 42 : Add 1 to destination ;
.31 s .49.49.0.21.31 At 47 : Exit to Line 0,49
Following from Line 0 :
.49 s .52.53.0.28.23 Restore modified store command in Line 23,0
.53 . .54.55.3.00.29 Subtract limit command
.54 s(u.37.37.0.00.20) Limit command
.55 s .56.57.0.28.27 Test for limit ; zero = limit ; go to 58 above
if non zero
.57 s .96.69.4.00.23 Line 0, 96-97 to Line 23,0-1
.69 . .60.63.6.00.25 Enter delay loop ; z000000 to ID,1; clear ID,0
.63 . .02.62.1.26.31 1 bit shift
.62 . .60.50.1.25.27 Zero test ID,0 ; to 51 at exit from delay
.50 s .48.46.4.28.28 Delay
.46 . .42.63.0.28.28 Delay ; go to 63 above
End of delay :
.51 s .53.56.7.21.31 Exit to Line 23,0
Following from Line 23 :
.96 s .70.97.3.00.28 Clear and subtract long line sum from AR ; w47y75z
.97 . u.68.36.0.00.23 Line 0,64-67 to Line 23
.64 s u.37.37.1.00.29 At 36 : Execute basic long line add; start at Line 0
.65 s u.39.42.0.28.27 - At 37 : Zero test AR ; (Non zero = error)
.66 s .44.72.0.21.31 Normal exit to Line 0 ; see next page,72
.67 s .45.45.0.21.31 Error exit to Line 0,45

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## LONG LINES ; PHASE 2

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.45 s .48.52.0.23.28 Error indicator to AR ( i.e. long line add command )
.52 . .80.56.0.00.29 Add dummy ; 00lw00
.56 . .58.71.0.08.31 Type error indication
.71 . .71.71.0.28.31 Test ready
.72 . .76.77.0.23.28 Line 23,0 to AR ( Long line add command )
.77 . .78.79.0.00.29 Add 1 to source
.79 . .80.81.0.28.23 Restore modified command
.81 . .82.83.3.00.29 Subtract limit command from AR; u.37.37.1.20.29
.83 . .84.85.0.28.27 Test for limit ; zero = limit
.86 s .70.58.3.00.28 Clear and subtract long line sum from AR ; go to 58,
    preceding page
.85 s u.92.92.0.00.23 Line 0,88-91 to Line 23 ; clear program
.92 . .95.58.0.23.31 Clear ; exit to Line 23,0 via 58, preceding page
    Following from Line 23 :
.88 s u.37.37.1.26.01 At 36 : Basic clear command ; start at Line 1
.89 s .92.94.0.23.28 Clearing command to AR
.90 s .43.47.0.00.29 Add 1 to destination
.91 s .49.59.0.21.31 Exit to Line 0,59
.59 s .60.61.0.28.23 Restore modified command
.61 . .68.73.3.00.29 Subtract limit command ; u.37.37.1.26.23
.73 . .74.75.0.28.27 Test for limit ; zero = limit
.76 s .78.36.7.21.31 Reenter clear loop ; see 88 above

.75 s u.u4.69.0.00.23 End of clear loop ; check program to Line 23 ; enter
    delay loop ; see 69 preceding page ; return at u0 below
.u0 s .02.05.5.26.03 At 56 : Clear Line 3,2-3 ; i.e. clear format if present
.u1 s u.06.06.0.01.27 -At 05 : Basic zero test command ; start at Line 1
.u2 s .08.37.0.21.31 Normal exit ; go to 37 below
.u3 s .09.27.0.21.31 Error exit to Line 0,27
.27 s .29.32.0.23.28 Error indicator to AR ( i.e. zero test command )
.32 . .33.34.0.00.29 Add dummy ; 00ly000
.34 . .02.35.4.00.03 Format to Line 3,2-3 ; 5v7y200, 8000000
.35 . .37.36.0.08.31 Type error indication
.36 . .36.36.0.28.31 Test ready
.37 . .41.42.0.23.28 Line 23,1 to AR ; ( Zero test command )
.42 . .78.84.0.00.29 Add 1 to source
.84 . .85.87.0.28.23 Restore modified command
.87 . .93.94.3.00.29 Subtract limit command ; u.06.06.0.23.27 -
.94 . .96.98.0.28.27 Test for limit ; zero = limit
.99 s .u1.05.7.21.31 Return to test loop ; see u1 above
.98 s .99.u5.1.17.31 End of test ; ring bell ; test punch switch
.u6 s .00.26.0.21.31 Punch switch on ; reenter test ; see preceding page,26
.u5 s .74.48.3.00.28 Punch switch off ; Clear and subtract 000000u from AR
.48 . .43.44.0.00.29 Add 000000l to AR
.44 . .45.40.0.17.31 Ring bell
.40 . .38.47.0.28.27 Zero test AR; if non zero, return to 48 above
.47 s .49.u4.0.16.31 End of ring bell loop ; halt for mounting of reel 2
.u4 . .u6.38.0.15.31 Read reel 2 loader
.38 . .38.38.0.28.31 Test ready
.39 . .41.04.6.21.31 Exit to Line 19,04 ; see page 97,04

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## "IP" FLIP FLOP AND ASSOCIATED GATES

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.00 s u.01.01.0.19.04 Line 19 to Line 4
.01 . .03.04.4.21.31 Exit to Line 4,04
.04 s .05.06.3.04.28 Clear and subtract summation of loader from AR
.06 . u.07.07.1.04.29 Add all Line 4
.07 . .08.09.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 09
.10 s .11.11.0.17.31 Ring bell ; probable read-in error
.11 . .13.13.0.16.31 Halt
.13 . .15.15.0.06.31 Read back
.15 . .17.15.0.28.31 Test ready
.16 . .18.18.0.15.31 Read tape
.18 . .20.18.0.28.31 Test ready
.19 . .21.00.6.21.31 Exit to Line 19,00

.09 s .u7.12.0.04.28 444400w to AR
.12 . .02.14.4.04.03 Format for test identification to Line 3,2-3 ; 4000004,8000000
.14 . .16.u5.0.08.31 Type identification tag
.u5 . .u7.u5.0.28.31 Test ready
.u6 . .01.08.0.23.31 Clear
.08 . .10.20.0.15.31 Read tape
.20 . .22.20.0.28.31 Test ready
.21 . .22.23.3.04.28 Clear and subtract summation of Line 0 from AR
.23 . u.24.24.1.19.29 Add all Line 19 ( Line 0 )
.24 . .25.26.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 26
.27 s .28.28.0.17.31 Ring bell ; probable read-in error
.28 . .30.30.0.16.31 Halt
.30 . .32.32.0.06.31 Read back
.32 . .34.32.0.28.31 Test ready
.33 . .36.08.0.23.31 Clear ; go to 08 above

.26 s u.27.29.0.19.00 Line 19 to Line 0
.29 . .31.34.0.15.31 Read tape
.34 . .36.34.0.28.31 Test ready
.35 . .36.37.3.04.28 Clear and subtract summation of Line 1 from AR
.37 . u.38.38.1.19.29 Add all Line 19 ( Line 1 )
.38 . .39.40.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 40
.41 s .42.42.0.17.31 Ring bell ; probable read-in error
.42 . .44.44.0.16.31 Halt
.44 . .46.46.0.06.31 Read back
.46 . .48.46.0.28.31 Test ready
.47 . .50.29.0.23.31 Clear ; go to 29 above

.40 s u.41.43.0.19.01 Line 19 to Line 1
.43 . .45.48.0.15.31 Read tape
.48 . .50.48.0.28.31 Test ready
.49 . .50.51.3.04.28 Clear and subtract summation of Line 2 from AR
.51 . u.52.52.1.19.29 Add all Line 19 ( Line 2 )
.52 . .53.54.0.28.27 Zero test AR ; ( Non zero = error )

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## "IP" FLIP FLOP AND ASSOCIATED GATES

```

.55 s .56.56.0.17.31 Ring bell ; probable read-in error
.56 . .58.58.0.16.31 Halt
.58 . .60.60.0.06.31 Read back
.60 . .62.60.0.28.31 Test ready
.61 . .64.43.0.23.31 Clear ; go to 43 on preceding page

.54 s u.55.57.0.19.02 Line 19 to Line 2
.57 . .59.62.0.15.31 Read tape
.62 . .64.62.0.28.31 Test ready
.63 . .64.65.3.04.28 Clear and subtract summation of Line 3 from AR
.65 . u.66.66.1.19.29 Add all Line 19 ( Line 3 )
.66 . .67.68.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 68

.69 s .70.70.0.17.31 Ring bell ; probable read-in error
.70 . .72.72.0.16.31 Halt
.72 . .74.74.0.06.31 Read back
.74 . .76.74.0.28.31 Test ready
.75 . .78.57.0.23.31 Clear ; go to 57 above

.68 s u.69.73.0.19.03 Line 19 to Line 3
.73 . u.74.76.1.26.19 Clear Line 19
.76 . .78.u3.0.21.31 Exit to Line 0,u3
      Following from Line 0 :
.00 s .03.42.0.23.31 scf link ; clear
.01 s .04.42.0.23.31 scf for test set ; clear
.42 s u.43.u3.1.26.19 Clear Line 19
.u3 s .u4.04.1.26.22 Clear Line 22,0 ; begin first test
.04 . .05.06.0.00.22 # of trials to Line 22,1
.06 . .07.08.0.00.25 -000000 to ID,1
.08 . .11.13.5.25.27 Test ID,1 for zero ; ( Non zero = error )
      Below for 13

.14 s w.13.20.0.21.31 Mark 13 ; exit to error loop
      Error loop ;
.20 s .23.25.0.01.28 0000001 to AR
.25 . .28.45.0.22.29 Add running tally of failures
.45 . .48.86.0.28.22 Restore
.86 . .88.87.0.20.31 Return command

.13 s .17.56.0.22.28 # of trials to AR
.56 . .72.80.3.00.29 Subtract 1
.80 . .81.84.0.28.27 Test for end of test

.85 s .88.88.0.23.31 Clear
.88 . .89.06.0.28.22 Restore remaining # of trials ; reenter at 06 above

.84 s .88.46.0.22.27 End of test ; test for failures ; ( Non zero = error )
      Next page for 46
.47 s .94.99.0.00.28 Tag to AR ; 0000100
.99 . w.46.93.0.21.31 Mark 46 ; exit to error output

.93 s .96.35.0.22.29 Add # of failures

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## "IP" FLIP FLOP AND ASSOCIATED GATES

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.35 . .35.35.0.28.31 Test ready
.36 . .u7.09.0.28.19 Error indication to Line 19,u7
.09 . .11.86.0.09.31 Type error indication ; to return command

.46 s .49.95.0.23.31 -Clear ; begin second test
.95 . .96.98.1.26.22 Clear Line 22,0
.98 . .05.10.0.00.22 # of trials to Line 22,1
.10 . .11.22.0.00.25 Negative # to ID,1
.22 . .23.32.1.25.28 ID,1 to AR, characteristic 1
.32 . .34.38.0.22.31 Test sign ; ( Negative = error )

.39 s w.38.20.0.21.31 Mark 38 ; exit to error loop ; see preceding page

.38 s .41.44.0.22.28 # of trials to AR
.44 . .72.92.3.00.29 Subtract 1
.92 . .94.96.0.28.27 Test for end of test

.97 s .u1.u2.0.28.22 Restore remaining # of trials
.u2 . .u5.10.0.23.31 Clear ; reenter at 10 above

.96 s .u0.u4.0.22.27 End of second test ; test for failures ; ( Non zero = error )

.u5 s .51.74.0.00.28 Tag to AR ; 0000200
.74 . w.u4.93.0.21.31 Mark u4 ; exit to error output ; see preceding page, 93

.u4 s .u7.54.0.23.31 -Clear ; begin third test
.54 . .56.57.1.26.22 Clear Line 22,0
.57 . .58.59.0.00.22 # of trials to Line 22,2
.59 . .61.62.0.00.25 Negative # to ID,1
.62 . .63.64.0.00.24 Positive # to MQ,1
.64 . .65.66.0.24.28 MQ,1 to AR
.66 . .68.68.0.22.31 Test sign ; ( Positive = error )
.68 s .70.20.0.21.31 Mark 69 ; exit to error loop ; see preceding page, 20
.69 s .81.81.3.23.31 Check ability of not circle 4 to hold down IP reset
.81 . u.19.19.0.23.23 Check ability of D5 to hold down IP reset
.19 s .16.37.0.27.31 Check ability of S5 to hold down IP reset
.37 . u.52.u0.0.24.25 Check ability of S6 to hold down IP reset
.u0 . .12.24.0.00.00 Check ability of D6 to hold down IP reset
.24 . .61.u1.1.00.24 Check ability of CW to hold down IP reset
.u1 . .u3.16.2.28.24 Check ability of CS + CX to hold down IP reset
.16 . .17.29.0.24.28 MQ,1 to AR
.29 . .31.52.0.22.31 Test sign ; ( Positive = error )

.52 s .54.20.0.21.31 Mark 53 ; exit to error loop ; see preceding page, 20

.53 s .54.71.0.22.28 # of trials to AR
.71 . .72.73.3.00.29 Subtract 1
.73 . .74.75.0.28.27 Test for end of test

.76 s .78.79.0.28.22 Restore remaining # of trials
.79 . .82.59.0.23.31 Clear ; reenter at 59 above

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## "IP" FLIP FLOP AND ASSOCIATED GATES

.75 s .76.77.0.22.27 End of third test ; test for failures ; ( Non zero = error )

.78 s .82.48.0.00.28 Tag to AR ; 0000300

.48 . w.77.93.0.21.31 Mark 77 ; exit to error output ; see page 45

.77 s .79.79.1.21.31 Exit to Line 1,79  
Following from Line 1 :

.79 s .82.82.0.23.31 -Clear ; begin fourth test

.82 . .84.85.1.26.22 Clear Line 22,0

.85 . .05.06.0.00.22 # of trials to Line 22,1

.06 . .11.12.0.00.24 Negative # to MQ,1

.1? . .13.14.0.24.28 MQ,1 to AR

.14 . .16.16.0.22.31 Test sign ; ( Positive = error )  
Below for 17

.16 s .18.21.1.21.31 Mark 17 ; exit to error loop  
Error loop :  
0000001 to AR

.21 s .23.25.0.01.28 Add running tally of failures

.25 . .28.43.0.22.29 Restore

.43 . .44.74.0.28.22 Return command

.74 . .76.75.1.20.31

.17 s .18.49.0.01.28 Check ability of  $\overline{S6}$  to block IP to IB during TS

.49 . .51.54.0.28.27 Zero test AR ; ( Line 1,18 = zero ); Non zero test = error

.55 s w.54.21.1.21.31 Mark 54 ; exit to error loop ; see 21 above

.54 s .56.70.2.24.28 Check ability of CX to block IP to IB during TS

.70 . .72.81.4.26.24 Check ability of  $\overline{DW}$  to block IP to IB during TS

.81 . .83.86.0.22.31 Test sign ; ( Negative = error )

.87 s w.86.21.1.21.31 Mark 86 ; exit to error loop ; see 21 above

.86 s .88.91.1.24.28 MQ,0 to AR ; see command 70 above

.91 . .93.97.0.22.31 Test sign ; ( Negative = error )

.98 s w.97.21.1.21.31 Mark 97 ; exit to error loop ; see 21 above

.97 s .99.u2.2.26.26 Check ability of CX ( A18 E ) to block IP to IB during TS

.u2 . .u4.00.0.22.31 Test sign ; ( Negative = error )

.01 s w.00.21.1.21.31 Mark 00 ; exit to error loop ; see 21 above

.00 s .02.03.0.02.26 Check ability of  $\overline{S6}$  ( A18 F ) to block IP to IB during TS

.03 . .05.11.0.24.26 Check ability of  $\overline{SW}$  ( A18 J ) to block IP to IB during TS

.11 . u.14.57.5.26.27 Zero test PN ; ( Non zero = error )

.58 s w.57.21.1.21.31 Mark 57 ; exit to error loop ; see 21 above

.57 s .58.62.5.24.27 Zero test MQ ; ( Non zero = error )  
Next page for 62

.63 s w.62.21.1.21.31 Mark 62 ; exit to error loop ; see 21 above

## "IP" FLIP FLOP AND ASSOCIATED GATES

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.62 s .65.22.0.22.28 # of trials to AR
.22 . .23.24.3.01.29 Subtract 1
.24 . .25.26.0.28.27 Test for end of test

.27 s .29.30.0.28.22 Restore remaining # of trials
.30 . .33.06.0.23.31 Clear ; reenter at 06 on preceding page

.26 s .28.31.0.22.27 End of fourth test ; test for failures ; ( Non zero = error )
      Below for 31
.32 s .38.72.0.01.28 Tag to AR ; 0000400
.72 . w.31.37.1.21.31 Mark 31 ; exit to error output
      Error output ;
.37 s .40.41.0.22.29 Add # of failures
.41 . .41.41.0.28.31 Test ready
.42 . .u7.04.0.28.19 Error indication to Line 19,u7
.04 . .06.74.0.09.31 Type error indication ; to return command

.31 s .34.34.0.23.31 -Clear ; begin fifth test
.34 . .36.40.1.26.22 Clear Line 22,0
.40 . .58.60.0.00.22 # of trials to Line 22,2
.60 . u.63.64.0.00.25 Negative, then positive # to ID
.64 . .65.66.0.26.28 PN,1 to AR
.66 . .68.68.0.22.31 Test sign ; ( Negative = error )

.69 s w.68.21.1.21.31 Mark 68 ; exit to error loop ; see preceding page

.68 s .70.71.0.22.28 # of trials to AR
.71 . .72.73.3.00.29 Subtract 1
.73 . .74.75.0.28.27 Test for end of test

.76 s .78.80.0.28.22 Restore remaining # of trials
.80 . .83.60.0.23.31 Clear ; reenter at 60 above

.75 s .76.77.0.22.27 End of fifth test ; test for failures ; ( Non zero = error )

.78 s .83.05.0.01.28 Tag to AR ; 0000500
.05 . w.77.37.1.21.31 Mark 77 ; exit to error output ; see 37 above

.77 s .80.90.0.23.31 -Clear ; begin sixth test
.90 . .92.93.1.26.22 Clear Line 22,0
.93 . .05.10.0.00.22 # of trials to Line 22,1
.10 . u.13.13.0.00.26 Two negative #'s to PN
.13 . .14.15.0.26.28 PN,0 to AR
.15 . .17.19.0.22.31 Test sign ; ( Negative = error )

.20 s w.19.21.1.21.31 Mark 19 ; exit to error loop ; see preceding page

.19 s .21.28.0.22.28 # of trials to AR
.28 . .29.33.3.01.29 Subtract 1
.33 . .34.35.0.28.27 Test for end of test

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## "IP" FLIP FLOP AND ASSOCIATED GATES

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.36 s .37.39.0.28.22 Restore remaining # of trials
.39 . .42.10.0.23.31 Clear ; reenter at 10 on preceding page

.35 s .36.44.0.22.27 End of sixth test ; test for failures ; ( Non zero = error )

.45 s .50.07.0.01.28 Tag to AR ; 0000600
.07 . w.44.37.1.21.31 Mark 44 ; exit to error output ; see preceding page

.44 s .47.47.0.23.31 -Clear ; begin seventh test
.47 . .48.53.1.26.22 Clear Line 22,0
.53 . .58.59.0.00.22 # of trials to Line 22,2
.59 . .63.65.0.01.25 Line 1,63 to ID,1
.65 . .06.84.4.26.31 Shift right so that bit exists in T1 of ID,1
.84 . .85.89.0.25.24 ID,1 to MQ,1
.89 . .07.51.0.00.27 Check ability of DX to block set of IP
.51 s .53.92.0.24.28 MQ,1 to AR ( for protection of "test failure" )
.52 s .53.92.0.24.28 MQ,1 to AR
.92 . .94.94.0.22.31 Test sign ; ( Negative = error )

.95 s w.94.21.1.21.31 Mark 94 ; exit to error loop ; see page 47

.94 s .98.99.0.22.28 # of trials to AR
.99 . .u0.u1.3.01.29 Subtract 1
.u1 . .u2.u3.0.28.27 Test for end of test

.u4 s .u6.08.0.28.22 Restore remaining # of trials
.08 . .11.59.0.23.31 Clear ; reenter at 59 above

.u3 s .u4.u5.0.22.27 End of seventh test ; test for failures ; ( Non zero = error )

.u6 s .48.09.0.01.28 Tag to AR ; 0000700
.09 . w.u5.37.1.21.31 Mark u5 ; exit to error output ; see preceding page

.u5 s .00.46.0.23.31 -Clear ; begin eighth test
.46 . .48.56.1.26.22 Clear Line 22,0
.56 . .58.61.0.00.22 # of trials to Line 22,2
.61 . .63.63.2.21.31 Exit to Line 2,63
Following from Line 2 :
.63 s .65.66.5.01.24 Negative # to MQ,1
.66 . .67.68.0.01.25 Negative # to ID,1
.68 . .69.70.0.24.26 MQ,1 to PN,1
.70 . .71.72.1.24.28 Clear and add MQ,1 to AR
.72 . .73.74.1.26.29 Add PN,1 to AR
.74 . .75.76.0.28.27 Zero test AR ; ( Non zero = error )
Below for 76
.77 s .80.81.0.22.28 Running tally of failures to AR
.81 . .u0.u2.0.01.29 Increment
.u2 . .u4.76.0.28.22 Restore
.76 . .78.79.0.22.28 # of trials to AR
.79 . .u0.u1.3.01.29 Subtract 1
.u1 . .u2.u3.0.28.27 Test for end of test

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## "IP" FLIP FLOP AND ASSOCIATED GATES

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.u4 s .u6.14.0.28.22 Restore remaining # of trials
.14 .w .16.63.4.23.31 Clear ; reenter at 63 on preceding page

.u3 s .u4.u5.0.22.27 End of eighth test ; test for failures ; ( Non zero = error )
      Below for u5
.u6 s .00.05.0.22.28 # of failures to AR
.05 . .06.07.0.02.29 Add tag ; 0000800
.07 . .09.07.0.28.31 Test ready
.08 . .u7.09.0.28.19 Error indication to Line 19,u7
.09 . .11.u5.0.09.31 Type error indication
.u5 . .00.04.0.23.31 -Clear ; begin ninth test
.04 . .05.11.0.00.22 # of trials to Line 22,1
.11 . .12.13.1.26.22 Clear Line 22,0
.13 . .14.20.4.02.22 Negative # to Line 22,2-3
.20 . .22.24.4.22.26 Negative # to PN,0-1
.24 . .26.28.4.26.26 PN to PN
.28 . .30.32.7.22.30 Subtract negative # of Line 22,2-3 from PN
.32 . .34.36.5.26.27 Zero test PN ; ( Non zero = error )
      Below for 36
.37 s .40.41.0.22.28 Running tally of failures to AR
.41 . .72.75.0.00.29 Increment
.75 . .76.36.0.28.22 Restore
.36 . .37.38.0.22.28 # of trials to AR
.38 . .72.73.3.00.29 Subtract 1
.73 . .74.82.0.28.27 Test for end of test

.83 s .85.86.0.28.22 Restore remaining # of trials
.86 . .89.13.0.23.31 Clear ; reenter at 13 above

.82 s .84.87.0.22.27 End of ninth test ; test for failures ; ( Non zero = error )
      Below for 87
.88 s .92.93.0.22.28 # of failures to AR
.93 . .94.95.0.02.29 Add tag;0000900
.95 . .97.95.0.28.31 Test ready
.96 . .u7.12.0.28.19 Error indication to Line 19,u7
.12 . .14.87.0.09.31 Type error indication
.87 . .90.90.0.23.31 -Clear ; begin tenth test
.90 . .92.97.1.26.22 Clear Line 22,0
.97 . .05.10.0.00.22 # of trials to Line 22,1
.10 . u.13.15.0.00.25 Two negative #'s to ID
.15 . .17.18.0.25.28 ID,1 to AR
.18 . .20.21.0.22.31 Test sign ; ( Positive = error )
      Below for 22
.21 s .24.25.0.22.28 Running tally of failures to AR
.25 . .29.31.0.01.29 Increment
.31 . .32.22.0.28.22 Restore
.22 . .25.26.0.22.28 # of trials to AR
.26 . .29.30.3.01.29 Subtract 1
.30 . .32.33.0.28.27 Test for end of test

.34 s .37.39.0.28.22 Restore remaining # of trials

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## "IP" FLIP FLOP AND ASSOCIATED GATES

.39 s .42.10.0.23.31 Clear ; reenter at 10 preceding page

.33 s .36.42.0.22.27 End of tenth test ; test for failures ; (Non zero = error)  
Below for 42

.43 s .44.45.0.22.28 # of failures to AR

.45 . .46.47.0.02.29 Add tag; 0001000

.47 . .49.47.0.28.31 Test ready

.48 . .u7.16.0.28.19 Error indication to Line 19,u7

.16 . .18.42.0.09.31 Type error indication

.42 . .45.71.0.23.31 - Clear; begin eleventh test

.71 . .52.53.1.26.22 Clear Line 22,0

.53 . .58.59.0.00.22 # of trials to Line 22,2

.59 . u.69.69.2.02.25 Line 2, 60-68 to ID via AR

.69 . .70.84.1.25.27 Zero test ID,0 ; (Non zero = error)  
Below for 84

.85 s .88.91.0.22.28 Running tally of failures to AR

.91 . .u0.60.0.01.29 Increment

.60 . .64.84.0.28.22 Restore

.84 . .86.89.0.22.28 # of trials to AR

.89 . .15.17.3.00.29 Subtract 1

.17 . .19.49.0.28.27 Test for end of test ; (Zero = end of test)

.50 s .54.59.0.28.22 Restore remaining # of trials; reenter at 59 above

.49 s .52.54.0.22.27 End of eleventh test; test for failures; (Non zero = error)  
Below for 54

.55 s .56.58.0.22.28 # of failures to AR

.58 . .61.64.0.02.29 Add tag; 0001100

.64 . .66.64.0.28.31 Test ready

.65 . .u7.19.0.28.19 Error indication to Line 19,u7

.19 . .21.54.0.09.31 Type error indication

.54 . .57.57.0.23.31 - Clear; begin twelfth test

.57 . .60.67.1.26.22 Clear Line 22,0

.67 . .05.23.0.00.22 # of trials to Line 22,1

.23 . u.29.35.2.02.24 Line 2, 24-28 to MQ via AR

.35 . .40.51.1.24.27 Zero test MQ,0 ; (Non zero = error)  
Below for 51

.52 s .56.62.0.22.28 Running tally of failures to AR

.62 . .72.80.0.00.29 Increment

.80 . .84.51.0.28.22 Restore

.51 . .53.56.0.22.28 # of trials to AR

.56 . .72.78.3.00.29 Subtract 1

.78 . .80.98.0.28.27 Test for end of test; (Zero = end of test)

.99 s .u1.23.0.28.22 Restore remaining # of trials; reenter at 23 above

.98 s .u0.00.0.22.27 End of twelfth test; test for failures; (Non zero = error)  
Next page for 00

.01 s .04.27.0.22.28 # of failures to AR

.27 . .40.44.0.02.29 Add tag; 0001200

.44 . .46.46.3.21.31 Exit to Line 3,46

## "IP" FLIP FLOP AND ASSOCIATED GATES

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.00 .02.03.3.21.31 From Line 2; exit to Line 3,03; see 03 below
.46 s .46.46.0.28.31 Test ready
.47 . .u7.00.0.28.19 Error indication to Line 19,u7
.00 . .02.03.0.09.31 Type error indication
.03 . .58.06.0.00.22 # of trials to Line 22,2; begin thirteenth test
.06 . .09.09.0.23.31 -Clear
.09 . .12.13.1.26.22 Clear Line 22,0
.13 . u.18.18.2.03.26 Line 3, 14-17 to PN via AR
.18 . .20.21.1.26.27 Zero test PN,0 ; (Non zero = error);below for 21
.22 s w.21.25.3.21.31 Mark 21; exit to error loop
.25 s .29.31.0.01.28 0000001 to AR
.31 . .32.41.0.22.29 Add running tally of failures
.41 . .44.50.0.28.22 Restore
.50 . .52.51.3.20.31 Return command
.21 s .22.26.0.22.28 # of trials to AR
.26 . .29.30.3.01.29 Subtract 1
.30 . .31.32.0.28.27 Test for end of test; (Zero = end of test)
.33 s .34.13.0.28.22 Restore remaining # of trials; reenter at 13 above
.32 s .36.37.0.22.27 End of thirteenth test; test for failures;(Non zero=error)
.38 s .42.43.0.03.28 Tag to AR; 0001300
.43 . w.37.74.3.21.31 Mark 37; exit to error output
.74 s .76.93.0.22.29 Add # of failures
.93 . .93.93.0.28.31 Test ready
.94 . .u7.02.0.28.19 AR to Line 19,u7
.02 . .04.50.0.09.31 Type error indication
.37 s .40.40.0.23.31 -Clear; begin fourteenth test
.40 . .44.45.1.26.22 Clear Line 22,0
.45 . .58.59.0.00.22 # of trials to Line 22,2
.59 . .62.64.4.03.25 Load ID
.64 . .66.68.5.26.27 Zero test PN; ( Non zero = error )
.69 s w.68.25.3.21.31 Mark 68; exit to error loop; see 25 above
.68 s .70.71.0.22.28 # of trials to AR
.71 . .72.73.3.00.29 Subtract 1
.73 . .74.75.0.28.27 Test for end of test; (Zero = end of test)
.76 s .78.95.0.28.22 Restore remaining # of trials
.95 . .98.59.4.03.26 Load PN; reenter at 59 above
.75 s .76.78.0.22.27 End of fourteenth test; test for failures;(Non zero=error)
.79 s .81.82.0.03.28 Tag to AR; 0001400
.82 . w.78.74.3.21.31 Mark 78; exit to error output; see 74 above
.78 s .80.83.0.21.31 Exit to Line 0,83
      Following from Line 0:
.83 s .86.87.0.23.31 -Clear; begin fifteenth test
.87 . .88.89.1.26.22 Clear Line 22,0
.89 . .05.18.0.00.22 # of trials to Line 22,1
.18 . .20.23.4.00.26 Line 0, 20-21 to PN; ( positive # )
.23 . .26.28.5.00.25 Any # to ID, characteristic 1
.28 . .20.27.7.00.30 Subtract Line 0, 20-21 from PN
.27 . .30.33.5.26.27 Zero test PN ; ( Non zero = error )
.34 s w.33.20.0.21.31 Mark 33; exit to error loop; see page 45,20
.33 s .37.40.0.22.28 # of trials to AR
.40 . .60.70.3.00.29 Subtract 1
.70 . .72.90.0.28.27 Test for end of test; (Zero = end of test)

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## "IF" FLIP FLOP AND ASSOCIATED GATES

Lines 0,4, 3

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.91 s .93.18.0.28.22 Restore remaining # of trials; reenter 18 prec. pg.
.90 s .92.02.0.22.27 End of fifteenth test;test for failures;Non zero=error
.03 s .21.43.0.00.28 Tag to AR; 0001500
.43 . w.02.93.0.21.31 Mark 02; exit to error output; see page 45,93
.02 s .04.17.4.21.31 Exit to Line 4,17; Following from Line 4:
.17 s .20.25.0.23.31 -Clear; begin sixteenth test
.25 . .28.31.1.26.22 Clear Line 22,0
.31 . .58.59.0.00.22 # of trials to Line 22,2
.59 . .60.67.5.04.26 Positive # to PN, characteristic 1
.67 . .68.71.4.26.26 PN to PN
.71 . .72.87.1.26.28 PN,0 to AR
.87 . .89.99.0.22.31 Test sign; (Negative = error); below for 99
.u0 s .u4.86.0.22.28 Running tally of failures to AR
.86 . .29.53.0.01.29 Increment failures
.53 . .56.99.0.28.22 Restore
.99 . .u2.u3.0.22.28 # of trials to AR
.u3 . .29.45.3.01.29 Subtract 1
.45 . .46.78.0.28.27 Test for end of test; (Zero = end of test)
.79 s .82.88.0.28.22 Restore remaining # of trials
.88 . .91.59.0.23.31 Clear; reenter at 59 above
.78 s .80.97.0.22.27 -End of sixteenth test;test for failures;Non zero=error
.98 s .u0.u1.0.22.28 # of failures to AR
.u1 . .u2.92.0.04.29 Add tag; 0001600
.92 . .92.92.0.28.31 Test ready
.93 . .u7.39.0.28.19 Error indication to Line 19,u7
.39 . .41.97.0.09.31 Type error indication
.97 . .99.16.3.21.31 Exit to Line 3,16; Following from Line 3:
.16 s .19.19.0.23.31 -Clear; begin seventeenth test
.19 . .20.23.1.26.22 Clear Line 22,0
.23 . .58.61.0.00.22 # of trials to Line 22,2
.61 . .64.70.4.03.23 Negative #s to Line 23,0 and Line 23,1
.70 . .72.91.0.23.08 Negative # to Line 8,72 ; see 67 below
.91 . .92.96.0.23.16 Negative # to Line 16,92
.96 . .97.u0.0.23.28 Negative # to AR
.u0 . .u1.u2.0.28.25 AR to ID,1; Check open diode MK of C14,3D292,zone3A
.u2 . .u3.u4.0.25.28 ID,1 to AR; Check open diode UA of B10,3D292,zone1C
.u4 . .u6.04.0.22.31 Test sign; (Positive = error)
.04 s .06.25.3.21.31 Mark 05; exit to error loop; see 25 preceding page
.05 s .08.08.0.23.31 Clear
.08 . .12.14.4.23.26 Line 23,0-1 to PN; additional check of TS = TE
.14 . .15.17.0.26.28 PN,1 to AR
.17 . .18.20.0.26.08 PN,0 to Line 8,18;Check diode MK of C16,3D292,zone3A
.20 . .22.27.0.22.31 Test sign; (Positive = error)
.27 s .29.25.3.21.31 Mark 28; exit to error loop; see 25 preceding page
.28 s .29.36.1.25.20 Clear Line 20,1; see 80 below
.36 . .48.67.0.26.16 PN,0 to Line 16,48;Check diode MK of C15,3D292,zone3A
.67 . .72.77.0.08.25 Line 8,72 to ID,0; Check diode SD of B10,3D292,zone1C
.77 . .78.80.0.25.28 ID,0 to AR
.80 . .81.83.0.27.25 Not Line 20,1 and AR to ID,1;Check RE, B10,3D292,zone1C
.83 . .84.85.0.25.28 ID,0 to AR
.85 . .87.89.0.22.31 Test sign; (Positive = error)
.89 s .91.25.3.21.31 Mark 90; exit to error loop; see 25 preceding page
.90 s .92.97.0.16.25 Line 16,92 to ID,0; Check diode TC of B10,3D292,zone1C

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## "IP" FLIP FLOP AND ASSOCIATED GATES

.97 s .98.u1.0.25.28 ID,0 to AR  
.u1 . .u3.u5.0.22.31 Test sign; (Positive = error)  
.u5 s .u7.25.3.21.31 Mark u6; exit to error loop; see page 52,25  
.u6 s .18.29.0.08.28 Line 8,18 to AR; see 17 preceding page  
.29 . .31.34.0.22.31 Test sign; (Positive = error)  
.34 s .36.25.3.21.31 Mark 35; exit to error loop; see page 52,25  
.35 s .48.51.0.16.28 Line 16,48 to AR; see 28 preceding page  
.51 . .53.53.0.22.31 Test sign; (Positive = error)  
.53 s .55.25.3.21.31 Mark 54; exit to error loop; see page 52,25  
.54 s .56.57.3.03.28 Clear and subtract 1 from AR  
.57 . .58.60.1.22.29 Add # of trials  
.60 . .61.62.0.28.27 Test for end of test; (Zero = end of test)  
.63 s .66.96.0.28.22 Restore remaining # of trials; reenter at 96 prec. pg.  
.62 s .64.87.0.22.27 End of seventeenth test; test for failures; Non zero=error  
.88 s .92.u3.0.03.28 Tag to AR; 0001700  
.u3 . w.87.74.3.21.31 Mark 87; exit to error output; see page 52,74  
.87 s .89.98.0.28.28 Skip to 98  
.98 . .98.98.0.28.31 Test ready  
.99 . .u0.10.1.17.31 Ring bell; test punch switch  
.11 s .14.15.0.23.31 Punch switch on; clear  
.15 . .17.42.0.21.31 Reenter test at Line 0,42; see page 45  
.10 s .12.48.0.15.31 Punch switch off; read tape  
.48 . .48.48.0.28.31 Test ready  
.49 . .51.00.6.21.31 Exit to Line 19,00

Line 4:	Line 0:	Line 1:	Line 2:	Line 3:
.05 x693002 L4	.05 0000019	.23 0000001	.06 0000800	.42 0001300
.80-x693002-L4	.07-0000000	.38 0000400	.94 0000900	.81 0001400
.22 3303w2v L0	.72 0000001	.83 0000500	.46 0001000	.64 Neg. #; see pg.52,64
.81-3303w2v-L0	.94 0000100	.29 0000001	.61 0001100	.65-zuzuzuz; " " 53,61
.36-7xw7v2x L1	.11-5000000	.50 0000600	.40 0001200	.56 0000001
.84 7xw7v2x-L1	.51 0000200	.u0 0000001	.03 zz80022	.92 0001700
.50 uzy5657 L2	.58 0000019	.48 0000700	Bal. .92	.66 Bal.
.83-uzy5657-L2	.61-5000000	.67-5000020	Unused Loc.	Unused Loc.
.64-954349v L3	.63 5000000	Unused Loc.	.02	.01 .55
.82 954349v-L3	.82 0000300	.02	.u0	.07 .58
.u2 0001600	.15 0000001	.18	.u7	.12 .72
Bal.	.60 0000001	.88		.24 .84
96,85,77	.21 0001500	.96		.39 .86
Unused Loc.	.12-ww50000	.u7		.44 .u7
.89 .95	Bal..u6			.52
.90 .94	Unused Loc.			
.91 .u4	.50 .31 .65			
	.17 .41 .67			
	.26 .49 .u7			
	.30 .55			

## SHIFT AND NORMALIZE

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.00 s u.01.01.0.19.00 Line 19 to Line 0
.01 . .03.47.0.21.31 Exit to Line 0,47
.47 s .04.05.3.00.28 Clear and subtract summation of Line 0 from AR
.05 . u.06.06.1.00.29 Add all Line 0
.06 . .07.08.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 08
.09 s .10.10.0.17.31 Ring bell ; probable read-in error
.10 . .12.11.0.16.31 Halt
.11 . .13.52.0.06.31 Read back
.52 . .52.52.0.28.31 Test ready
.53 . .55.38.0.15.31 Read tape
.38 . .38.38.0.28.31 Test ready
.39 . .41.00.6.21.31 Exit to Line 19,00

.08 s .10.24.0.15.31 Read tape ; ( Line 1 )
.24 . .24.24.0.28.31 Test ready
.25 . .26.27.3.00.28 Clear and subtract summation of Line 1 from AR
.27 . u.28.28.0.19.01 Line 19 to Line 1
.28 . u.29.29.1.01.29 Add all Line 1
.29 . .30.31.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 31
.32 s .33.33.0.17.31 Ring bell ; probable read-in error
.33 . .35.34.0.16.31 Halt
.34 . .36.07.0.06.31 Read back
.07 . .07.07.0.28.31 Test ready; go to 08 above when ready

.31 s .33.64.0.15.31 Read tape ; ( Line 2 )
.64 . .64.64.0.28.31 Test ready
.65 . u.66.66.0.19.02 Line 19 to Line 2
.66 . .67.68.3.00.28 Clear and subtract summation of Line 2 from AR
.68 . u.69.69.1.02.29 Add all Line 2
.69 . .70.74.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 74
.75 s .76.43.0.17.31 Ring bell ; probable read-in error
.43 . .45.91.0.16.31 Halt
.91 . .93.30.0.06.31 Read back
.30 . .30.30.0.28.31 Test ready ; go to 31 above when ready

.74 s .03.u5.0.00.03 Test identification format to Line 3,03 ; 0000022
.u5 . .00.35.0.02.28 9999019 to AR
.35 . .37.59.0.08.31 Type 9999019
.59 . .60.62.4.00.25 f key link to ID,0-1 ; link = clear and go to 63 below
.62 . .00.45.4.25.00 F key link to Line 0,0-1
.45 . .45.45.0.28.31 Test ready
.46 . .49.63.0.23.31 Clear
.63 . u.64.71.1.26.19 Clear Line 19
.71 . u.76.76.0.01.22 Clear Line 22,0-1-2 ; # of trials to Line 22,3
.76 . .78.81.4.01.25 uuuuuu, 000000 to ID,1-0
.81 . .82.84.4.01.24 000000, uuuuuu to MQ,1-0
.84 . .85.87.0.01.28 Clear AR
.87 . .58.40.0.26.31 Shift 29 bits under control of T#

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## SHIFT AND NORMALIZE

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.40 . .82.86.5.01.26 0000000, uuuuuuu to PN,1-0
.86 . .88.90.7.25.30 Subtract ID from PN
.90 . .92.94.5.26.27 Zero test PN ; ( Non zero = error )
      Below for 94
.95 s .98.44.5.25.21 Sample failure to Line 21,2-3
.44 . .48.u1.0.22.26 Running tally of failures to PN,0
.u1 . .u2.u3.0.01.30 Increment failures
.u3 . .u4.94.1.26.22 Restore
.94 . .78.80.5.01.26 uuuuuuu, 0000000 to PN,1-0
.80 . .82.88.7.24.30 Subtract MQ from PN
.88 . .90.92.5.26.27 Zero test PN ; ( Non zero = error )
      Below for 92
.93 s .94.96.5.24.23 Sample failure to Line 23,2-3
.96 . .97.u2.0.22.26 Running tally of failures to PN,1
.u2 . .u5.u6.0.01.30 Increment failures
.u6 . .01.92.1.26.22 Restore
.92 . .93.97.3.01.29 Subtract 000001x from AR ; check of shift tally
.97 . .98.99.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 99
.u0 s .93.u4.1.01.29 Add 000001x to AR
.u4 . .u6.02.0.28.20 Sample failure to Line 20,2
.02 . .06.20.0.22.28 Running tally of failures to AR
.20 . .u2.12.0.01.29 Increment failures
.12 . .14.99.0.28.22 Restore
.99 . .u3.13.0.22.28 # of trials to AR
.13 . .14.15.3.01.29 Subtract 1
.15 . .17.36.0.28.27 Test for end of test

.37 s .39.76.0.28.22 Restore remaining # of trials ; reenter at 76,preceding page

.36 s .40.41.0.22.27 Test for failure 1; ( Non zero = error )
      Below for 41
.42 s .u6.14.5.21.19 Sample failure to Line 19,u6-u7
.14 . .16.17.0.22.28 # of failures to AR
.17 . .18.48.0.01.29 Add tag 1 ; 0100000
.48 . .u5.79.0.28.19 AR to Line 19,u5
.79 . .81.41.0.09.31 Type error indication
.41 . .45.49.0.22.27 Test for failure 2; ( Non zero = error )
      Below for 49
.50 s .50.50.0.28.31 Test ready
.51 . .u6.16.5.23.19 Sample failure to Line 19,u6-u7
.16 . .17.18.0.22.28 # of failures to AR
.18 . .19.89.0.01.29 Add tag 2 ; 0200000
.89 . .u5.19.0.28.19 AR to Line 19,u5
.19 . .21.49.0.09.31 Type error indication
.49 . .50.56.0.22.27 Test for failure 3 ; ( Non zero = error )
      Next page for 56
.57 s .57.57.0.28.31 Test ready
.58 . .u6.21.0.20.19 Sample failure to Line 19,u6
.21 . .22.23.0.22.28 # of failures to AR
.23 . .24.55.0.01.29 Add tag 3 ; 0300000

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## SHIFT AND NORMALIZE

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.55 . .u5.22.0.28.19 AR to Line 19,u5
.22 . .24.56.0.09.31 Type error indication
.56 . u.76.78.0.01.22 Clear Line 22,C-1-2 ; # of trials to Line 22,3
.78 . .80.80.2.21.31 Exit to Line 2,80
      Following from Line 2 :
.80 s .84.85.0.22.20 Clear Line 20,0
.85 . .86.60.4.01.25 xxxxxxxx, xxxxxxxx to ID,1-0; clear PN
.60 . .62.72.4.25.24 xxxxxxxx, xxxxxxxx to MQ,1-0
.72 . .74.75.0.01.28 Clear AR
.75 . .v6.84.0.26.31 Shift 58 bits
.84 . .86.09.5.26.27 Zero test PN ; (Non zero = error)
      Below for 09
.10 s .12.45.5.26.23 Sample failure to Line 23,0-1
.45 . .48.66.0.20.26 Running tally of failures to PN,0
.66 . .u2.u7.0.01.30 Increment failures
.u7 . .00.09.0.26.20 Restore
.09 . .12.88.5.25.27 Zero test ID ; (Non zero = error)
      Below for 88
.89 s w.88.35.2.21.31 Mark 88 ; exit to error loop

.35 s .38.92.5.25.21 Sample failure to Line 21,2-3
.92 . .96.38.0.22.26 Running tally of failures to PN,0
.38 . .u2.u3.0.01.30 Increment failures
.u3 . .u4.14.1.26.22 Restore
.14 . .16.15.2.20.31 Return command

.88 s .90.93.5.24.27 Zero test MQ; (Non zero = error)
      Below for 93
.94 s w.93.44.2.21.31 Mark 93 ; exit to error loop
.44 s .46.u0.5.24.23 Sample failure to Line 23,2-3
.u0 . .u1.u4.0.22.26 Running tally of failures to PN,1
.u4 . .u5.04.0.01.30 Increment failures
.04 . .05.14.1.26.22 Restore ; to return command

.93 s .94.95.3.01.29 Subtract 000003u from AR
.95 . .97.05.0.28.27 Zero test AR ; (Non zero = error)
      Below for 05
.06 s .94.96.1.01.29 Add 000003u to AR
.96 . w.05.39.2.21.31 Mark 05 ; exit to error loop
.39 s .42.11.0.28.20 Sample failure to Line 20,2
.11 . .14.15.0.22.28 Running tally of failures to AR
.15 . .u2.u5.0.01.29 Increment failures
.u5 . .u6.14.0.28.22 Restore ; to return command

.05 s .07.12.0.22.28 # of trials to AR
.12 . .14.16.3.01.29 Subtract 1
.16 . .18.64.0.28.27 Test for end of test

.65 s .67.85.0.28.22 Restore remaining # of trials ; reenter at 85 above
.64 s .68.69.0.22.27 Test for failure 4 ; (Non zero = error)

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## SHIFT AND NORMALIZE

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.70 s .57.68.0.02.28 Tag to AR ; 0400000
.68 . .70.07.2.21.31 Mark 69 ; exit to error output
.07 s .07.07.0.28.31 Test ready
.08 . .12.71.0.22.29 Add # of failures
.71 . .u6.40.5.21.19 Sample failure to Line 19,u6-u7
.40 . .u5.u6.0.28.19 AR to Line 19,u5
.u6 . .00.14.0.09.31 Type error indication ; to return command

.69 s .73.76.0.22.27 -Test for failure 5 ; (Non zero = error)
      Below for 76
.77 s .12.67.0.01.28 Tag to AR ; 0500000
.67 . w.76.51.2.21.31 Mark 76 ; exit to error output
.51 s .51.51.0.28.31 Test ready
.52 . .53.78.0.22.29 Add # of failures
.78 . .u6.40.5.23.19 Sample failure to Line 19,u6-u7 ; go to 40 above

.76 s .78.81.0.22.27 -Test for failure 6 ; (Non zero = error)
      Below for 81
.82 s .21.41.0.01.28 Tag to AR ; 0600000
.41 . w.81.28.2.21.31 Mark 81 ; exit to error output
.28 s .28.28.0.28.31 Test ready
.29 . .30.83.0.22.29 Add # of failures
.83 . .u6.40.0.20.19 Sample failure to Line 19,u6-u7

.81 s .84.19.0.20.27 -Test for failure 14
      Below for 19
.20 s .24.32.6.20.22 # of failures to Line 22,1
.32 . u.43.47.2.23.23 Sample failure to Line 23,2-3 ,i.e. 2 word precession L23
.47 . .48.13.0.02.28 Tag to AR ; 1400000
.13 . w.19.51.2.21.31 Mark 19 ; exit to error output ; go to 51 above

.19 s u.76.79.0.01.22 Clear Line 22,0-1-2 ; # of trials to Line 22,3
.79 . .86.42.4.01.25 xxxxxxxx, xxxxxxxx to ID,1-0
.42 . .86.90.4.01.24 xxxxxxxx, xxxxxxxx to ID,1-0
.90 . .93.97.3.01.28 Clear and subtract 000001x from AR
.97 . u.21.21.0.24.04 Check for illegal appearance of D7 at D,A14(3D295),zone2C
.21 . .55.55.0.22.31 Check for illegal appearance of S6 at M,A16(3D295),zone1C
.55 s .82.74.0.26.31 Shift under AR control ; go to 74
.56 s .58.63.0.04.04 Skip
.63 . .82.74.0.26.31 Shift under AR control
.74 . .76.91.5.01.26 000000, xxxxxxxx to PN,1-0
.91 . .92.u2.7.25.30 Subtract ID from PN
.u2 . .u4.17.5.26.27 Zero test PN ; (Non zero = error)

.18 s w.17.35.2.21.31 Mark 17 ; exit to error loop ; see preceding page,35
.17 s .22.23.5.01.26 xxxxxxxx, 000000 to PN,1-0
.23 . .24.26.7.24.30 Subtract MQ from PN
.26 . .28.30.5.26.27 Zero test PN ; (Non zero = error)

.31 s w.30.44.2.21.31 Mark 30 ; exit to error loop ; see preceding page,14
.30 s u.43.43.0.26.04 Check for illegal appearance of DS at V,A46(3D295),zone1C

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## SHIFT AND NORMALIZE

Lines 2,1

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.43 . .98.98.0.22.31 Check for illegal appearance of S6 at M,A46(3D295),zone1C
.98 s .27.27.0.24.31 Check for illegal appearance of G8 at A,A46(3D295),zone1C
.99 s .27.27.0.24.31 " " " " " " " " "
.27 . .32.33.0.28.27 Zero test AR ; (Non zero = error)

.34 s w.33.39.2.21.31 Mark 33 ; exit to error loop ; see 39, page 57
.33 s .35.46.0.22.28 # of trials to AR
.46 . .14.22.3.01.29 Subtract 1
.22 . .23.24.0.28.27 Test for end of test

.25 s .27.79.0.28.22 Restore remaining # of trials ; reenter at 79, preceding page

.24 s .28.36.0.22.27 -Test for failure 7 ; (Non zero = error)
      Below for 36
.37 s .67.73.0.01.28 Tag to AR ; 0700000
.73 . w.36.07.2.21.31 Mark 36 ; exit to error output ; see 07,preceding page
.36 s .37.49.0.22.27 -Test for failure 8 ; (Non zero = error)
      Below for 49
.50 s .88.u1.0.01.28 Tag to AR ; 0800000
.u1 . w.49.51.2.21.31 Mark 49 ; exit to error output ; see 51,preceding page
.49 s .50.53.0.22.27 -Test for failure 9 ; (Non zero = error)
      Below for 53
.54 s .57.58.0.01.28 Tag to AR ; 0900000
.58 . w.53.28.2.21.31 Mark 53 ; exit to error output ; see28,preceding page
.53 s u.76.86.0.01.22 Clear Line 22,0-1-2 ; # of trials to Line 22,3
.86 . .88.89.1.21.31 Exit to Line 1,89
      Following from Line 1 :
.89 s .22.63.0.01.28 Clear AR
.63 . .82.91.4.01.24 000000, uuuuuuu to MQ,1-0
.91 . .82.70.0.27.31 Normalize MQ
.70 . .78.80.5.01.26 uuuuuuu, 0000000 to PN,1-0
.80 . .82.90.7.24.30 Subtract MQ from PN
.90 . .92.96.5.26.27 Zero test PN ; (Non zero = error)
      Below for 96
.97 s .98.u0.5.24.21 Sample failure to Line 21,2-3
.u0 . .u4.u6.0.22.26 Running tally of failures to PN,0
.u6 . .u2.u3.0.01.30 Increment failures
.u3 . .u4.96.1.26.22 Restore
.96 . .93.95.3.01.29 Subtract 0000CLx from AR
.95 . .97.98.0.28.27 Zero test AR ; (Non zero = error)
      Below for 98
.99 s .93.u1.1.01.29 Add 0000CLx to AR
.u1 . .u2.u4.0.28.20 Sample failure to Line 20,2
.u4 . .u5.41.0.22.28 Running tally of failures to AR
.41 . .u2.00.0.01.29 Increment failures
.00 . .01.98.0.28.22 Restore
.98 . .99.11.0.22.28 # of trials to AR
.11 . .14.15.3.01.29 Subtract 1
.15 . .17.25.0.28.27 Test for end of test

.26 s .27.89.0.28.22 Restore remaining # of trials ; reenter at 89 above

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## SHIFT AND NORMALIZE

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.25 s .28.29.0.22.27 - Test for failure 10 ; (Non zero = error)

.30 s .30.30.0.28.31 Test ready
.31 . .u6.01.5.21.19 Sample failure to Line 19,u6-u7
.01 . .04.05.0.22.28 # of failures to AR
.05 . .61.71.0.02.29 Add tag ; 1000000
.71 . .u5.02.0.28.19 AR to Line 19,u5
.02 . .04.29.0.09.31 Type error indication
.29 . .33.34.0.22.27 - Test for failure 11; (Non zero = error)
      Below for 34

.35 s .35.35.0.28.31 Test ready
.36 . .u6.03.0.20.19 Sample failure to Line 19,u6
.03 . .05.06.0.22.28 # of failures to AR
.06 . .62.81.0.02.29 Add tag ; 1100000
.81 . .u5.04.0.28.19 AR to Line 19,u5
.04 . .06.34.0.09.31 Type error indication
.34 . u.76.07.0.01.22 Clear Line 22,0-1-2 ; # of trials to Line 22,3
.07 . .76.09.4.01.24 0000000, xxxxxxxx to MQ,1-0
.09 . .42.52.0.27.31 Normalize under control of T #
.52 . .82.92.5.00.26 =00xxxxx, vu00000 to PN,1-0
.92 . .94.08.7.24.30 Subtract MQ from PN
.08 . .10.16.5.26.27 Zero test PN ; (Non zero = error)
      Below for 16

.17 s .18.20.5.24.21 Sample failure to Line 21,2-3
.20 . .24.27.0.22.28 Running tally of failures to AR
.27 . .u2.10.0.01.29 Increment failures
.10 . .12.16.0.28.22 Restore
.16 . .19.28.0.22.28 # of trials to AR
.28 . .14.32.3.01.29 Subtract 1
.32 . .34.37.0.28.27 Test for end of test

.38 s .39.07.0.28.22 Restore remaining # of trials ; reenter at 07 above

.37 s .40.42.0.22.27 - Test for failure 12 ; (Non zero = error)
      Below for 42

.43 s .43.43.0.28.31 Test ready
.44 . .u6.13.5.21.19 Sample failure to Line 19,u6-u7
.13 . .16.33.0.22.28 # of failures to AR
.33 . .59.69.0.02.29 Add tag ; 1200000
.69 . .u5.39.0.28.19 AR to Line 19,u5
.39 . .41.42.0.09.31 Type error indication
.42 . u.76.40.0.01.22 Clear Line 22,0-1-2 ; # of trials to Line 22,3
.40 . .78.45.4.01.24 uuuuuu, 0000000 to MQ,1-0
.45 . .16.62.0.27.31 Normalize MQ
.62 . .78.46.5.01.26 uuuuuu, 0000000 to PN,1-0
.46 . .48.50.7.24.30 Subtract MQ from PN
.50 . .52.54.5.26.27 Zero test PN ; (Non zero = error)
      Next page for 54

.55 s .58.60.5.24.21 Sample failure to Line 21,2-3
.60 . .64.68.0.22.28 # of failures to AR ( Running tally )
.68 . .u2.51.0.01.29 Increment failures

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## SHIFT AND NORMALIZE

.51 . .52.54.0.28.22 Restore  
 .54 . .55.56.0.22.28 # of trials to AR  
 .56 . .14.53.3.01.29 Subtract 1  
 .53 . .55.58.0.28.27 Test for end of test  
 .59 s .63.40.0.28.22 Restore remaining # of trials ; reenter at 40, preceding page  
 .58 s .60.64.0.22.27 - Test for failure 13  
 Below for 64  
 .65 s .65.65.0.28.31 Test ready  
 .66 . .u6.47.5.21.19 Sample failure to Line 19,u6-u7  
 .47 . .48.49.0.22.28 # of failures to AR  
 .49 . .87.48.0.02.29 Add tag ; 1300000  
 .48 . .u5.61.0.28.19 AR to Line 19,u5  
 .61 . .63.64.0.09.31 Type error indication  
 .64 . .66.72.0.21.31 Exit to Line 0,72  
 Following from Line 0 :  
 .72 s .72.72.0.28.31 Test ready  
 .73 . .74.53.1.17.31 Ring bell ; test punch switch ; see page 55 for com. 53  
 .54 s .57.63.0.23.31 Clear ; reenter test ; see page 55 for com. 63

## Line 0:

.04 0000000 L0 sum  
 .26 -yx8z933 L1 sum  
 .67 -3xy6xz4 L2 sum  
 .03 0000022  
 .60 033z2zz f key  
 .61 043z2zz - key  
 .82 vu00000  
 .83 -00xxxxx  
 .70 464639z Unused  
 .77 wh32606 Bal.  
 Unused Loc.  
 .98  
 .u7

## Line 1:

.72 0000000 .86 xxxxxxxx  
 .73 0000000 .87 xxxxxxxx  
 .74 0000000 .94 000003u  
 .75 0000019 .12 0500000  
 .78 0000000 .21 0600000  
 .79 unuuuuu .76 xxxxxxxx  
 .82 unuuuuu .77 0000000  
 .83 0000000 .22 0000000  
 .85 0000000 .23 xxxxxxxx  
 .u2 0001000 .67 0700000  
 .u5 0001000 .88 0800000  
 .93 000001x .57 0900000  
 .14 0000001 Unused Loc.  
 .18 0100000 .84  
 .19 0200000 .u7  
 .24 0300000

## Line 2:

.00 9999019  
 .57 0400000  
 .48 1400000  
 .61 1000000  
 .62 1100000  
 .59 1200000  
 .87 1300000  
 .03 800000x  
 .02 0000030  
 .01 0044000

## MULTIPLY AND DIVIDE

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.00 s u.01.01.0.19.00 Line 19 to Line 0
.01 . .03.04.0.21.31 Exit to Line 0,04
.04 s .05.06.3.00.28 Clear and subtract summation of Line 0 from AR
.06 . u.07.07.1.00.29 Add all Line 0
.07 . .08.09.0.28.27 Zero test AR ; (Non zero = error)
      Below for 09
.10 s w.14.26.0.21.31 Mark 14 ; exit to error loop

.26 s .27.27.0.17.31 Ring bell
.27 . .29.08.0.16.31 Halt
.08 . .10.12.0.06.31 Read back
.12 . .12.12.0.28.31 Test ready
.13 . .15.14.0.20.31 Return command

.14 s .16.15.0.15.31 Read tape
.15 . .15.15.0.28.31 Test ready
.16 . .18.00.6.21.31 Exit to Line 19,00

.09 s .11.17.0.15.31 Read tape
.17 . .17.17.0.28.31 Test ready
.18 . u.19.19.0.19.01 Line 19 to Line 1
.19 . .20.21.3.00.28 Clear and subtract summation of Line 1 from AR
.21 . u.22.22.1.01.29 Add all Line 1
.22 . .23.24.0.28.27 Zero test AR ; (Non zero = error)

.25 s w.09.26.0.21.31 Mark 09 ; exit to error loop ; see 26 above

.24 s .26.28.0.15.31 Read tape
.28 . .28.28.0.28.31 Test ready
.29 . u.30.30.0.19.02 Line 19 to Line 2
.30 . .31.32.3.00.28 Clear and subtract summation of Line 2 from AR
.32 . u.33.33.1.02.29 Add all Line 2
.33 . .34.35.0.28.27 Zero test AR ; (Non zero = error)

.36 s w.24.26.0.21.31 Mark 24 ; exit to error loop ; see 26 above

.35 s .37.74.0.15.31 Read tape
.74 . .74.74.0.28.31 Test ready
.75 . u.76.84.0.19.03 Line 19 to Line 3
.84 . .85.87.3.00.28 Clear and subtract summation of Line 3 from AR
.87 . u.88.88.1.03.29 Add all Line 3
.88 . .90.92.0.28.27 Zero test AR ; (Non zero = error)

.93 s w.35.26.0.21.31 Mark 35 ; exit to error loop ; see 26 above

.92 s .39.40.0.00.28 uuuu025 to AR
.40 . .03.u1.0.00.03 Format to Line 3,03 ; 0000022
.u1 . .u3.u0.0.08.31 Type test identification tag
.u0 . .u4.53.4.00.25 f key link to ID
.u4 s (.03.45.0.23.31) f key link ( Clear ; go to 45 next page )
.u5 s (.04.45.0.23.31) f " " " " " " " "
.53 s .00.41.4.25.00 f key link to Line 0,0-1

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## MULTIPLY AND DIVIDE

```

.41 . .41.41.0.28.31 Test ready
.42 . .45.45.0.23.31 Clear
.45 . u.46.46.1.26.19 Clear Line 19
.46 . .48.47.2.21.31 Exit to Line 2,47
      Following from Line 2:
.47 s u.53.53.0.00.22 Clear Line 22,0-1-2
.53 . .55.56.0.00.22 # of trials to Line 22,3
.56 . .59.59.0.23.31 Clear
.59 . .60.62.4.00.25 -x37v2yz, z248sv3 to ID,1-0
.62 . .66.69.4.00.24 61z509w, v977lwz to M2,1-0
.69 . .v4.76.0.24.31 Multiply
.76 . .78.80.5.25.27 Zero test ID ; (Non zero = error)
      Below for 80
.81 s .82.84.5.25.20 Sample failure to Line 20,2-3
.84 . .88.89.0.22.28 Running tally of failures to AR
.89 . .90.92.0.00.29 Increment failures
.92 . .96.80.0.28.22 Restore
.80 . .82.85.5.24.27 Zero test M2 ; (Non zero = error)
      Below for 85
.86 s .90.93.5.24.21 Sample failure to Line 21,2-3
.93 . .97.36.0.22.28 Running tally of failures to AR
.36 . .90.94.0.00.29 Increment failures
.94 . .97.85.0.28.22 Restore
.85 . .86.87.3.00.28 Clear and subtract v178lpw from AR
.87 . .88.95.1.26.29 Add PN,0 to AR
.95 . .96.97.0.28.27 Zero test AR ; (Non zero = error)
      Below for 98
.97 s .98.99.3.00.28 Clear and subtract 50ywl9w from AR
.99 . .u1.u2.1.26.29 Add PN,1 to AR
.u2 . .u4.66.0.28.27 Zero test AR ; (Non zero = error)
      Below for 66
.98 s .u0.67.0.28.28 Skip
.67 . .u6.06.5.26.23 Sample failure to Line 23,2-3
.06 . .10.11.0.22.28 Running tally of failures to AR
.11 . .90.96.0.00.29 Increment failures
.96 . .98.66.0.28.22 Restore
.66 . .67.u4.0.22.28 # of trials to AR
.u4 . .83.88.3.00.29 Subtract 1
.88 . .90.08.0.28.27 Test for end of test ; zero = end of test

.09 s .11.56.0.28.22 Restore remaining # of trials; reenter at 56 above

.08 s .12.13.0.22.27 -End of test ; test for failure 1; (Non zero = error)
      Below for 13
.14 s .14.14.0.28.31 Test ready
.15 . .u6.16.5.20.19 Sample failure to Line 19,u6-u7
.16 . .20.24.0.22.28 # of failures to AR
.24 . .44.64.0.00.29 Add tag ; 0100000
.64 . .u5.07.0.28.19 AR to Line 19,u5
.07 . .09.13.0.09.31 Type error indication
.13 . .17.21.0.22.27 -Test for failure 2 ; (Non zero = error)

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## MULTIPLY AND DIVIDE

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.22 s .22.22.0.28.31 Test ready
.23 . .u6.28.5.21.19 Sample failure to Line 19,u6-u7
.28 . .29.52.0.22.28 # of failures to AR
.52 . .34.61.0.00.29 Add tag ; 0200000
.61 . .u5.10.0.28.19 AR to Line 19,u5
.10 . .12.21.0.09.31 Type error indication
.21 . .22.25.0.22.27 -Test for failure 3 ; (Non zero = error)
      Below for 25
.26 s .26.26.0.28.31 Test ready
.27 . .u6.37.5.23.19 Sample failure to Line 19,u6-u7
.37 . .38.45.0.22.28 # of failures to AR
.45 . .64.68.0.00.29 Add tag ; 0300000
.68 . .u5.17.0.28.19 AR to Line 19,u5
.17 . .19.25.0.09.31 Type error indication
.25 . u.53.54.0.00.22 Clear Line 22,0-1-2 ; # of trials to Line 22,3
.54 . .57.57.0.23.31 Clear
.57 . .58.63.0.00.26 xxxxxxxx to PN,0
.63 . .58.29.1.25.31 Divide by zero
.29 . .30.32.5.25.27 Zero test ID ; (Non zero = error)
      Below for 32
.33 s .34.38.5.25.20 Sample failure to Line 20,2-3
.38 . .40.41.0.22.28 Running tally of failures to AR
.41 . .90.18.0.00.29 Increment failures
.18 . .20.32.0.28.22 Restore
.32 . .58.65.0.00.28 xxxxxxxx to AR
.65 . .67.70.3.26.29 Subtract PN,1 from AR
.70 . .71.72.0.28.27 Zero test AR ; (Non zero = error)

.72 s .74.77.1.26.27 Zero test PN,0 ; (Non zero = error)
      Below for 77
.73 s .75.78.0.28.28 Skip
.78 . .82.u0.5.26.21 Sample failure to Line 21,2-3
.u0 . .u1.19.0.22.28 Running tally of failures to AR
.19 . .90.30.0.00.29 Increment failures
.30 . .33.77.0.28.22 Restore
.77 . .78.79.0.00.28 uuuuuuv to AR
.79 . .80.82.3.24.29 Subtract MQ,0 from AR
.82 . .84.34.0.28.27 Zero test AR ; (Non zero = error)

.34 s .35.50.1.24.27 Zero test MQ,1 ; (Non zero = error)

.35 s .37.51.0.28.28 Skip
.51 . .54.58.5.24.23 Sample failure to Line 23,2-3
.58 . .62.71.0.22.28 Running tally of failures to AR
.71 . .90.u3.0.00.29 Increment failures
.u3 . .u6.50.0.28.22 Restore
.50 . .51.55.0.22.28 # of trials to AR
.55 . .83.u5.3.00.29 Subtract 1
.u5 . .u7.74.0.28.27 Zero test AR ; zero = end of test

.75 s .79.54.0.28.22 Restore remaining # of trials ; reenter at 54 above
.74 s .76.76.3.21.31 Exit to Line 3,76

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## MULTIPLY AND DIVIDE

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.76 s .80.82.0.22.27 -Test for failure 4 ; (Non zero = error)
      Below for 82
.83 s .83.83.0.28.31 Test ready
.84 . .u6.00.5.20.19 Sample failure to Line 19,u6-u7
.00 . .04.40.0.22.28 # of failures to AR
.40 . .48.72.0.00.29 Add tag ; 0400000
.72 . .u5.u6.0.28.19 AR to Line 19,u5
.u6 . .00.82.0.09.31 Type error indication
.82 . .85.86.0.22.27 -Test for failure 5 ; (Non zero = error)
      Below for 86
.87 s .87.87.0.28.31 Test ready
.88 . .u6.01.5.21.19 Sample failure to Line 19,u6-u7
.01 . .05.41.0.22.28 # of failures to AR
.41 . .43.73.0.00.29 Add tag ; 0500000
.73 . .u5.u7.0.28.19 AR to Line 19,u5
.u7 . .01.86.0.09.31 Type error indication
.86 . .90.91.0.22.27 -Test for failure 6
      Below for 91
.92 s .92.92.0.28.31 Test ready
.93 . .u6.02.5.23.19 Sample failure to Line 19,u6-u7
.02 . .06.42.0.22.28 # of failures to AR
.42 . .u6.74.0.00.29 Add tag ; 0600000
.74 . .u5.52.0.28.19 AR to Line 19,u5
.52 . .54.91.0.09.31 Type error indication
.91 . u.53.53.0.00.22 Clear Line 22,0-1-2 ; # of trials to Line 22,3
.53 . .56.57.0.23.31 Clear
.57 . .58.61.4.00.25 xxxxxxx, xxxxxx to ID,1-0
.61 . .02.75.1.25.31 Divide for 2 word times
.75 . .76.77.0.00.28 llllllll6 to AR
.77 . .78.79.3.26.29 Subtract PN,0 from AR
.79 . .81.89.0.28.27 Zero test AR ; (Non zero = error)
      Below for 90
.89 s .91.94.0.00.28 llllllll5 to AR
.94 . .95.96.3.26.29 Subtract PN,1 from AR
.96 . .97.98.0.28.27 Zero test AR ; (Non zero = error)
      Below for 98
.90 s .92.99.0.28.28 Skip
.99 . .u2.u4.5.26.20 Sample failure to Line 20,2-3
.u4 . .00.04.0.22.28 Running tally of failures to AR
.04 . .90.95.0.00.29 Increment failures
.95 . .96.98.0.28.22 Restore
.98 . .99.43.0.22.28 # of trials to AR
.43 . .83.08.3.00.29 Subtract 1
.08 . .10.12.0.28.27 Zero test AR ; zero = end of test

.13 s .15.53.0.28.22 Restore remaining # of trials ; reenter at 53 above

.12 s .16.17.0.22.27 -Test for failure 7 ; (Non zero = error)
      Next page for 17
.18 s .18.18.0.28.31 Test ready
.19 . .u6.05.5.20.19 Sample failure to Line 19,u6-u7
.05 . .08.44.0.22.28 # of failures to AR

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## MULTIPLY AND DIVIDE

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.44 . .63.78.0.00.29 Add tag ; 0700000
.78 . .u5.06.0.28.19 AR to Line 19,u5
.06 . .08.17.0.09.31 Type error indication
.17 . u.53.54.0.00.22 Clear Line 22,0-1-2
.54 . .55.56.0.00.22 # of trials to Line 22,3
.56 . .59.59.0.23.31 Clear
.59 . .60.62.4.00.25 -x37v2yz, z248wv3 to ID,1-0
.62 . .66.69.4.00.26 6lz509w, v9774wz to PN,1-0
.69 . .v6.80.1.25.31 Divide
.80 . .82.97.3.00.28 Clear and subtract lywx9w4 from AR
.97 . u.u0.u0.1.25.29 Add ID to AR
.u0 . .u1.u2.0.28.27 Zero test AR ; (Non zero = error)
      Below for u2
.u3 s .u6.09.5.25.20 Sample failure to Line 20,2-3
.09 . .12.14.0.22.28 Running tally of failures to AR
.14 . .90.u1.0.00.29 Increment failures
.u1 . .u4.u2.0.28.22 Restore
.u2 . .u3.10.3.00.28 Clear and subtract -ul2w9y0 from AR
.10 . u.13.15.1.26.29 Add PN to AR
.15 . .17.20.0.28.27 Zero test AR ; (Non zero = error)
      Below for 20
.21 s .22.24.5.26.21 Sample failure to Line 21,2-3
.24 . .25.26.0.22.28 Running tally of failures to AR
.26 . .90.u5.0.00.29 Increment failures
.u5 . .01.20.0.28.22 Restore
.20 . .54.55.3.00.28 Clear and subtract -4zxl637 from AR
.55 . u.58.58.1.24.29 Add MQ to AR
.58 . .60.63.0.28.27 Zero test AR ; (Non zero = error)
      Below for 63
.64 s .66.68.5.24.23 Sample failure to Line 23,2-3
.68 . .70.81.0.22.28 Running tally of failures to AR
.81 . .90.07.0.00.29 Increment failures
.07 . .10.63.0.28.22 Restore
.63 . .67.70.0.22.28 # of trials to AR
.70 . .83.85.3.00.29 Subtract 1
.85 . .87.22.0.28.27 Test for end of test ; zero = end of test

.23 s .27.56.0.28.22 Restore remaining # of trials ; reenter at 56 above

.22 s .24.27.0.22.27 -Test for failure 8 ; (Non zero = error)
      Below for 27
.28 s .28.28.0.28.31 Test ready
.29 . .32.60.0.22.28 # of failures to AR
.60 . .56.65.0.00.29 Add tag ; 0800000
.65 . .u6.66.5.20.19 Sample failure to Line 19,u6-u7
.66 . .u5.11.0.28.19 AR to Line 19,u5
.11 . .13.27.0.09.31 Type error indication
.27 . .29.30.0.22.27 -Test for failure 9 ; (Non zero = error)
      Next page for 30
.31 s .31.31.0.28.31 Test ready
.32 . .33.67.0.22.28 # of failures to AR
.67 . .57.16.0.00.29 Add tag ; 0900000

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## MULTIPLY AND DIVIDE

Lines 3,1

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.16 . .u5.71.0.28.19 AR to Line 19,u5
.71 . .u6.25.5.21.19 Sample failure to Line 19,u6-u7
.25 . .27.30.0.09.31 Type error indication
.30 . .34.35.0.22.27 -Test for failure 10 ; (Non zero = error)
      Below for 35
.36 s .36.36.0.28.31 Test ready
.37 . .38.45.0.22.28 # of failures to AR
.45 . .65.38.0.00.29 Add tag ; 1000000
.38 . .u5.39.0.28.19 AR to Line 19,u5
.39 . .u6.33.5.23.19 Sample failure to Line 19,u6-u7
.33 . .35.35.0.09.31 Type error indication
.35 . .37.48.1.21.31 Exit to Line 1,48
      Following from Line 1 :
.48 s u.53.53.0.00.22 Clear Line 22,0 ; # of trials to Line 22,3
.53 . .54.61.6.01.25 -zuz56v2 to ID,1 ; clear ID,0 and PN,0-1
.61 . .63.64.6.25.25 * Added test of UE at J of B13(3D292),zone 2A ; also
.64 . u.66.68.6.25.25 * additional check of sign circuitry
.68 . u.94.98.0.24.24 * Check for illegal DS at various points (3D294)
.98 . .04.04.0.22.31 * Check for illegal SX at D of C43(3D294),zone2C
.04 s .08.11.6.01.24 vu8z35y to MQ,1
.05 s .08.11.6.01.24 " " "
.11 . .32.46.0.24.31 16 bit multiply
.46 . u.51.51.0.23.23 * Check for illegal DS at A of C43(3D294),zone2C
.51 . u.59.59.0.06.06 * Check for illegal D7 at A of D45(3D294),zone3A
.59 . .08.70.0.24.31 4 bit multiply
.70 . u.80.83.0.01.09 * Check for illegal D6 at S of D46(3D294),zone3C
.83 . .12.u0.0.24.31 6 bit multiply
.u0 . u.06.12.0.01.27 * Check for illegal DU,DV,DW at MQ,ID,PN dest. gates
.12 s .18.18.0.22.31
.13 s .18.18.0.22.31 * Check for illegal S6 at S of B43(3D294),zone1B
.18 s .20.23.5.26.26 Check signal at L of D44(3D294),zone 3C ; also,
.19 s .20.23.5.26.26 * additional check of illegal UW at F of A14(3D293)zone2C
.23 . .27.27.1.31.31 * Check for illegal DW at D of D45(3D294),zone3A
.27 . .06.34.0.24.31 3 bit multiply
.34 . .36.66.5.24.27 Zero test MQ ; (Non zero = error)
      Below for 66
.67 s w.06.10.1.21.31 Mark O6 ; exit to error loop ; return at O6 next page

.10 s .14.16.4.24.20 MQ to Line 20,2-3 (sign from IP)
.16 . .18.20.4.25.21 ID to Line 21,2-3 " " "
.20 . .22.52.4.26.23 PN to Line 23,2-3 " " "
.52 . .56.60.0.22.28 Running tally of failures to AR
.60 . .90.95.0.00.29 Increment failures
.95 . .96.u1.0.28.22 Restore
.u1 . .u3.u2.1.20.31 Return command

.66 s .68.71.4.25.20 ID to Line 20,0-1
.71 . .72.74.4.01.21 0000000, -zuz56v2 to Line 21,1-0
.74 . .76.78.4.30.27 Test for dropout ; (Non zero = error)

.79 s w.06.10.1.21.31 Mark O6 ; exit to error loop ; return at O6 next page

.78 s .80.82.4.21.20 0000000, -zuz56v2 to Line 20,1-0

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## MULTIPLY AND DIVIDE

.82 . .84.87.4.25.21 ID to Line 21,0-1  
.87 . .88.90.4.30.27 Test for pickup ; (Non zero = error)

.91 s w.06.10.1.21.31 Mark 06 ; exit to error loop ; see preceding page,10 ;  
return at 06 below  
.90 s .92.94.4.26.20 PN to Line 20,0-1  
.94 . .96.99.4.01.21 -v6y2v3v , -8z996v8 to Line 21,1-0  
.99 . .u0.u2.4.30.27 Test for dropout ; (Non zero = error)

.u3 s w.06.10.1.21.31 Mark 06 ; exit to error loop ; see preceding page,10 ;  
return at 06 below  
.u2 s .u4.u6.4.21.20 -v6y2v3v , -8z996v8 to Line 20,1-0  
.u6 . .00.02.4.26.21 PN to Line 21,0-1  
.02 . .04.06.4.30.27 Test for pickup ; (Non zero = error)

.07 s w.06.10.1.21.31 Mark 06 ; exit to error loop ; see preceding page,10

.06 s .07.17.0.22.28 # of trials to AR  
.17 . .83.88.3.00.29 Subtract 1  
.88 . .90.92.0.28.27 Test for end of test ; zero = end of test

.93 s .95.45.0.28.22 Restore remaining # of trials  
.45 . .48.53.4.01.26 Load PN ( any # ) ; reenter at 53, preceding page

.92 s .96.24.0.22.27 - End of test ; Test for failure 11 ; (Non zero = error)  
Below for 24  
.25 s .68.69.0.00.28 Tag to AR ; 1100000  
.69 . .72.75.0.22.29 Add # of failures  
.75 . w.89.80.1.21.31 Mark 89 ; exit to error output

.80 s .80.80.0.28.31 Test ready  
.81 . .u6.63.4.20.19 Sample failure to Line 19,u6-u7  
.63 . .u5.03.0.28.19 AR to Line 19,u5  
.03 . .05.u1.0.09.31 Type error indication ; to return command

.89 s .90.09.4.21.20 Line 21,2-3 to Line 20,2-3  
.09 . w.39.80.1.21.31 Mark 39 ; exit to error output ; go to 80 above

.39 s .42.47.4.23.20 Line 23,2-3 to Line 20,2-3  
.47 . w.24.80.1.21.31 Mark 24 ; exit to error output ; see 80 above

.24 s u.53.22.0.00.22 Clear Line 22,0 ; # of trials to Line 22,3  
.22 . .28.33.6.01.25 -y35y4v7 to ID,1 ; clear ID,0  
.33 . .36.38.6.01.26 4v3x5z9 to PN,1 ; clear PN,0  
.38 . u.44.44.2.24.24 Clear MQ  
.44 . u.56.65.1.25.25 \*Check illegal DS at F,C43(3D294),also CW at J,D42(3D294)  
.65 . .20.86.1.27.31 \*Check illegal SV at J,C43(3D294), zone 1C  
.86 . .00.01.1.21.31 \*Check illegal S6 at K, " " " "  
.01 s .57.62.1.25.31 Divide  
.62 . .76.76.0.22.31 \*Check illegal S6 at S,B43(3D294),zone 1B  
.76 s u.u4.u4.0.08.08 \*Check illegal D6 at S,B42(3D294),zone 1C  
.77 s u.u4.u4.0.08.08 " " " "  
.u4 . u.00.00.0.09.09 \*Check illegal D6 at S,D46(3D294),zone 3C

## MULTIPLY AND DIVIDE

.00 . u.14.14.0.10.10 Check illegal D6 at S,D44(3D294)zone 3C  
.14 . .16.35.4.24.20 MQ to Line 20,0-1  
.35 . .40.56.4.01.21 0000000, -54v6y33 to Line 21,1-0  
.56 . .60.84.4.30.27 Test for dropout ; (Non zero = error)

.85 s w.32.10.1.21.31 Mark 32 ; exit to error loop ; see 10, page 67 ;  
return at 32 below  
.84 s .88.u5.4.21.20 0000000, -54v6y33 to Line 20,1-0  
.u5 . .00.15.4.24.21 MQ to Line 21,0-1  
.15 . .16.30.4.30.27 Test for pickup ; (Non zero = error)

.31 s .33.10.1.21.31 Mark 32 ; exit to error loop ; see 10, page 67 ;  
return at 32 below  
.30 s .32.37.4.25.20 ID to Line 20,0-1  
.37 . .96.50.4.00.21 y35y4v7, -0000000 to Line 21,1-0  
.50 . .52.57.4.30.27 Test for dropout ; (Non zero = error)

.58 s w.32.10.1.21.31 Mark 32 ; exit to error loop ; see 10, page 67 ;  
return at 32 below  
.57 s .59.60.2.21.31 Exit to Line 2,60

.32 s .34.48.2.21.31 Exit to Line 2,48 ; see below for 48  
Following from Line 2 ;  
.60 s .64.83.4.21.20 y35y4v7, -0000000 to Line 20,1-0  
.83 . .84.00.4.25.21 ID to Line 21,0-1  
.00 . .04.42.4.30.27 Test for pickup ; (Non zero = error)

.43 s w.32.10.1.21.31 Mark 32 ; exit to error loop ; see 10, page 67 ;  
return at 32 above  
.42 s .72.12.4.00.21 w95v242, -0000000 to Line 21,1-0  
.12 . .16.31.4.26.20 PN to Line 20,0-1  
.31 . .36.90.4.30.27 Test for dropout ; (Non zero = error)

.91 s w.32.10.1.21.31 Mark 32 ; exit to error loop ; see 10, page 67 ;  
return at 32 above  
.90 s .92.20.4.21.20 w95v242, -0000000 to Line 20,1-0  
.20 . .24.39.4.26.21 PN to Line 21,0-1  
.39 . .40.48.4.30.27 Test for pickup ; (Non zero = error)

.49 s w.32.10.1.21.31 Mark 32 ; exit to error loop ; see 10, page 67 ;  
return at 32 above  
.48 s .51.44.0.22.28 # of trials to AR  
.44 . .83.u1.3.00.29 Subtract 1  
.u1 . .u3.u6.0.28.27 Test for end of test ; zero = end of test

.u7 s .03.40.0.28.22 Restore remaining # of trials  
.40 . .42.22.1.21.31 Reenter test at 22 on preceding page

.u6 s .00.04.0.22.27 -End of test ; test for failure 12 ; (Non zero = error)

.05 .07.11.0.21.31 Exit to Line 0,11  
.04 s .06.48.3.21.31 Exit to Line 3,48

## MULTIPLY AND DIVIDE

Lines 0,1,3

.11 s .69.70.0.00.28 Tag to AR ; 1200000  
 .70 . .72.77.0.22.29 Add # of failures  
 .77 . w.21.80.1.21.31 Mark 21 ; exit to error output ; see 80, page 68  
 Following from Line 1 :  
 .21 s .22.26.4.21.20 Line 21,2-3 to Line 20,2-3  
 .26 . w.49.80.1.21.31 Mark 49 ; exit to error output ; see page 68  
 .49 s .50.55.4.23.20 Line 23,2-3 to Line 20,2-3  
 .55 . w.42.80.1.21.31 Mark 42 ; exit to error output ; see page 68  
 .42 s .44.48.3.21.31 Exit to Line 3,48  
 Following from Line 3 :  
 .48 s .48.48.0.28.31 Test ready  
 .49 . .50.46.1.17.31 Ring bell ; test punch switch  
 .47 s .49.41.0.21.31 Punch switch on ; reenter test ; see page 63  
 .46 s .48.50.0.15.31 Punch switch off ; read tape  
 .50 . .50.50.0.28.31 Test ready  
 .51 . .53.00.6.21.31 Exit to Line 19,00

Line 0:		Line 1:	Line 2:
.05	0000000 L0 Sum .76	4444446	.54 -zuz56v2 .03 800000x
.20	luv0Zu L1 Sum .91	4444445	.08 vu8z35y .02 0000030
.31	lyv38y3 L2 Sum .63	0700000	.72 -zuz56v2 .01 0008800
.85	zxx9zw7 L3 Sum .82	lywx9w4	.73 0000000 Unused Loc.
.39	uuuu025 .u3	-u12w9y0	.96 -8z996v8 .46
.03	0000022 .54	-4zxl637	.97 -v6y2v3v
.49	0000000 .56	0800000	.28 -y35ylv7
.50	0000000 .57	0900000	.36 4v3x5z9
.52	0000000 .65	1000000	.40 -5lv6y33 Line 3: Unused Loc.
.55	0000032 .68	1100000	.41 0000000 .03
.60	z248wv3 .96	-0000000	Unused Loc. .34
.61	-x37v2yz .97	y35ylv7	.29
.66	v977lwz .72	-0000000	.43
.67	61z509w .73	w95v242	.u7
.90	0000100 .69	1200000	
.86	v1784pxw .u2	-9z51133 Bal.	
.98	50yw19w .02	w1817lw Bal.	
.83	0000001 .23	171739z Unused	
.44	0100000 .u7	0700000 "	
.34	0200000 .38	28170xz "	
.64	0300000 .62	-0000000 "	
.51	0000019 .71	4444446 "	
.58	xxxxxxxx .80	xxxxxxxx "	
.78	uuuuuuu .81	xxxxxxxx "	
.48	0400000	Unused Loc.	
.43	0500000 .37	.95	
.u6	0600000 .47	.99	
.59	xxxxxxxx .94		

## OVERFLOW

```

.00 s u.01.01.0.19.00 Line 19 to Line 0
.01 . .03.04.0.21.31 Exit to Line 0,04
.04 . .06.06.1.00.28 Clear and add L0,06 to AR
.06 . u.06.07.1.00.29 Add L0, 07 through 05 to AR
.07 . .08.09.0.28.27 Zero test AR ; ( Non zero = error )
      Below for 09
.10 s w.76.23.0.21.31 Probable read-in error ; mark 76 ; exit to error loop

.23 s .24.08.0.17.31 Ring bell
.08 . .10.34.0.16.31 Halt
.34 . .36.13.0.06.31 Read back
.13 . .13.13.0.28.31 Test ready
.14 . .16.15.0.20.31 Return command

.76 s .78.15.0.15.31 Read tape
.15 . .15.15.0.28.31 Test ready
.16 . .18.00.6.21.31 Exit to Line 19,00

.09 s .11.17.0.15.31 Read tape ; ( Line 1 )
.17 . .17.17.0.28.31 Test ready
.18 . u.19.19.0.19.01 Line 19 to Line 1
.19 . .44.21.3.01.28 Clear and subtract summation of Line 1 from AR
.21 . u.22.22.1.01.29 Add all Line 1
.22 . .23.24.0.28.27 Zero test AR ; ( Non zero = error )

.25 s w.09.23.0.21.31 Mark 09 ; exit to error loop ; go to 23 above

.24 s .26.28.0.15.31 Read tape ; ( Line 2 )
.28 . .28.28.0.28.31 Test ready
.29 . u.30.30.0.19.02 Line 19 to Line 2
.30 . .31.32.3.01.28 Clear and subtract summation of Line 2 from AR
.32 . u.33.33.1.02.29 Add all Line 2
.33 . .34.35.0.28.27 Zero testAR ; ( Non zero = error )

.36 s w.24.23.0.21.31 Mark 24 ; exit to error loop ; go to 23 above

.35 s .37.11.0.15.31 Read tape ; ( Line 3 )
.11 . .11.11.0.28.31 Test ready
.12 . u.13.20.0.19.03 Line 19 to Line 3
.20 . .26.55.3.01.28 Clear and subtract summation of Line 3 from AR
.55 . u.56.86.1.03.29 Add all Line 3
.86 . .88.77.0.28.27 Zero test AR ; ( Non zero = error )

.78 s w.35.23.0.21.31 Mark 35 ; exit to error loop ; go to 23 above

.77 s .78.98.0.15.31 Read tape ; ( Line 4 )
.98 . .98.98.0.28.31 Test ready
.99 . u.u0.u0.0.19.04 Line 19 to line 4 )
.u0 . .06.27.3.01.28 Clear and subtract summation of Line 4 from AR
.27 . u.28.89.1.04.29 Add all Line 4
.89 . .91.37.0.28.27 Zero test AR ; ( Non zero = error )

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## OVERFLOW

.38 s w.77.23.0.21.31 Mark 77 ; exit to error loop ; go to 23 on preceding page

.37 s .38.80.4.01.25 f key link to ID,0-1  
.80 . .00.39.4.25.00 f key link to Line 0,0-1 f key to Line 4,76 ; see page 81  
.39 . .42.41.0.01.28 vvvv026 to AR  
.40 . .03.41.0.00.03 Test identification format to Line 3,03  
.41 . .43.42.0.08.31 Type vvvv026  
.42 . .42.42.0.28.31 Test ready  
.43 . .46.46.0.23.31 Clear  
.46 . u.47.47.1.26.19 Clear Line 19  
.47 . u.52.52.1.26.20 Clear Line 20  
.52 . u.57.57.1.26.21 Clear Line 21  
.57 . u.62.62.1.26.22 Clear Line 22  
.62 . u.67.67.1.26.23 Clear Line 23  
.67 . .69.69.0.29.31 Reset overflow  
.69 s .71.72.0.01.28 5/8 to AR  
.70 s .71.72.0.01.28 5/8 to AR  
.72 . .80.81.0.01.29 Add 5/8 to AR  
.81 . .83.83.0.29.31 Test overflow ; ( No overflow = error )  
Below for 84

.83 s .84.85.0.20.28 Running tally of failures to AR  
.85 . .86.87.0.01.29 Increment failures  
.87 . .88.84.0.28.20 Restore  
.84 . .91.93.0.01.28 1/2 to AR  
.93 . u0.u1.1.01.29 Add 1/2 to AR  
.u1 . .u3.u3.0.29.31 Test overflow ; ( No overflow = error )  
Below for u4 )

.u3 s .u5.44.0.20.28 Running tally of failures to AR  
.44 . .86.90.0.01.29 Increment failures  
.90 . .93.u4.0.28.20 Restore  
.u4 . .51.53.0.01.28 1/4 to AR  
.53 . .91.94.1.01.29 Add 1/2 to AR  
.94 . .96.96.0.29.31 Test overflow ; ( Overflow = error )  
Below for 96

.97 s .98.45.0.20.28 Running tally of failures to AR  
.45 . .86.88.0.01.29 Increment failures  
.88 . .90.96.0.28.20 Restore  
.96 . .u1.u2.0.01.28 3/4 to AR  
.u2 . .u3.u5.3.01.29 Subtract 1/2 from AR  
.u5 . .u7.50.0.29.31 Test overflow ; ( Overflow = error )  
Below for 50

.51 s .55.56.0.20.28 Running tally of failures to AR  
.56 . .86.91.0.01.29 Increment failures  
.91 . .95.50.0.28.20 Restore  
.50 . .57.82.0.01.28 3/4 to AR  
.82 . .u1.u6.3.01.29 Subtract 3/4 from AR

.u6 . u.u7.05.1.03.09 Test for illegal appearance of D7\* at F of E17, 3D293, Zone 1A  
.05 . .06.40.4.00.26 Load PN (any #); used for check of illegal appearance of DW at  
T of E20, 3D293, Zone 1C; check takes place during microtest 12.

.40 . .42.58.0.29.31 Test Overflow Next page for 58  
.59 s .60.63.0.21.28 Running tally of failures to AR  
.63 . .86.95.0.01.29 Increment Failures  
.95 . .96.58.0.28.21 Restore



## OVERFLOW

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.58 . .67.71.0.01.28 1/4 to AR
.71 . .u1.26.3.01.29 Subtract 3/4 from AR
.26 . .28.60.0.29.31 Test overflow ; ( Overflow = error )
                          Below for 60
.61 s .65.66.0.21.28 Running tally of failures to AR
.66 . .86.31.0.01.29 Increment failures
.31 . .33.60.0.28.21 Restore
.60 . .91.02.3.01.28 Clear and subtract 1/2 from AR
.02 . .57.68.1.01.29 Add 3/4 to AR
.68 . .70.73.0.29.31 Test overflow ; ( Overflow = error )
                          Below for 73
.74 s .78.79.0.21.28 Running tally of failures to AR
.79 . .86.48.0.01.29 Increment failures
.48 . .50.73.0.28.21 Restore
.73 . .u1.49.3.01.28 Clear and subtract 3/4 from AR
.49 . .u1.54.1.01.29 Add 3/4 to AR
.54 . .56.64.0.29.31 Test overflow ; ( Overflow = error )
                          Below for 64
.65 s .67.75.0.21.28 Running tally of failures to AR
.75 . .86.92.0.01.29 Increment failures
.92 . .95.64.0.28.21 Restore
.64 . .66.12.2.21.31 Exit to Line 2,12
                          Following from Line 2 :
.12 s .57.62.3.01.28 Clear and subtract 3/4 from AR
.62 . .71.76.1.01.29 Add 5/8 to AR
.76 . .78.78.0.29.31 Test overflow ; ( Overflow = error )
                          Below for 78
.79 s .80.84.0.22.28 Running tally of failures to AR
.84 . .86.40.0.01.29 Increment failures
.40 . .44.78.0.28.22 Restore
.78 . .01.04.3.01.28 Clear and subtract 3/4 from AR
.04 . .05.06.1.01.29 Add -0000000 to AR
.06 . .08.08.0.29.31 Test overflow ; ( Overflow = error )
                          Below for 08
.09 s .13.14.0.22.28 Running tally of failures to AR
.14 . .86.92.0.01.29 Increment failures
.92 . .93.08.0.28.22 Restore
.08 . .51.60.3.01.28 Clear and subtract 1/4 from AR
.60 . .71.77.3.01.29 Subtract 5/8 from AR
.77 . .79.85.0.29.31 Test overflow ; ( Overflow = error )
                          Below for 85
.86 s .90.41.0.22.28 Running tally of failures to AR
.41 . .86.42.0.01.29 Increment failures
.42 . .46.85.0.28.22 Restore
.85 . .91.93.3.01.28 Clear and subtract 1/2 from AR
.93 . .u0.u1.3.01.29 Subtract 1/2 from AR
.u1 . .u3.u3.0.29.31 Test overflow ; ( No overflow = error )
                          Next page for u4
.u3 s .u7.43.0.22.28 Running tally of failures to AR
.43 . .86.90.0.01.29 Increment failures
.90 . .91.u4.0.28.22 Restore

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## OVERFLOW

.u4 . .57.58.3.01.28 Clear and subtract 3/4 from AR  
.58 . .71.83.3.01.29 Subtract 5/8 from AR  
.83 . .85.94.0.29.31 Test overflow ; ( No overflow = error )  
Below for 95  
.94 s .96.44.0.23.28 Running tally of failures to AR  
.44 . .86.91.0.01.29 Increment failures  
.91 . .92.95.0.28.23 Restore  
.95 . .u1.u5.0.01.28 3/4 to AR  
.u5 . .01.05.1.01.29 Add 3/4 to AR  
.05 . .07.15.0.29.31 Test overflow ; ( No overflow = error )  
.15 s .17.18.0.28.28 Skip to 18 below ( Command 16 test meaningless )  
.16 s .18.18.0.29.31 Test overflow ; ( Overflow = error )  
Below for 18  
.19 s .21.45.0.23.28 Running tally of failures to AR  
.45 . .86.97.0.01.29 Increment failures  
.97 . .u1.18.0.28.23 Restore  
.18 . .20.21.0.01.28 # of trials to AR  
.21 . .22.23.3.01.29 Subtract 1  
.23 . .24.25.0.28.27 Test for end of test  
26 s .20.22.0.28.01 Restore remaining # of trials  
22 . .24.67.0.21.31 Reenter test at Line 0,67 ; see page 72  
.25 s .03.32.0.02.03 End of AR overflow tests ; error format to Line 3,03  
.32 . .36.27.0.20.27 -Test for failure 1 ; ( Non zero = error )  
Below for 27  
.28 s .32.33.0.20.28 # of failures to AR  
.33 . .34.35.0.01.29 Add tag 1  
.35 . w.27.46.2.21.31 Mark 27 ; exit to error output  
.46 s .48.47.0.08.31 Type error indication  
.47 . .47.47.0.28.31 Test ready  
.48 . .50.49.2.20.31 Return command  
.27 s .29.30.0.20.27 -Test for failure 2 ; ( Non zero = error )  
Below for 30  
.31 s .33.34.0.20.28 # of failures to AR  
.34 . .35.36.0.01.29 Add tag 2  
.36 . w.30.46.2.21.31 Mark 30 ; exit to error output ; see 46 above  
.30 s .34.37.0.20.27 -Test for failure 3 ; ( Non zero = error )  
Below for 37  
.38 s .42.49.0.20.28 # of failures to AR  
.49 . .50.51.0.01.29 Add tag 3  
.51 . w.37.46.2.21.31 Mark 37 ; exit to error output ; see 46 above  
.37 s .39.52.0.20.27 -Test for failure 4 ; ( Non zero = error )  
Next page for 52  
.53 s .55.59.0.20.28 # of failures to AR

## OVERFLOW

.59 . .60.61.0.01.29 Add tag 4  
.61 . w.52.46.2.21.31 Mark 52 ; exit to error output ; see 46, preceding page

.52 s .56.63.0.21.27 Test for failure 5; ( Non zero = error )  
Below for 63  
.64 s .68.71.0.21.28 # of failures to AR  
.71 . .72.u6.0.01.29 Add tag 5  
.u6 . w.63.46.2.21.31 Mark 63 ; exit to error output ; see 46, preceding page

.63 s .65.66.0.21.27 Test for failure 6 ; ( Non zero = error )  
Below for 66  
.67 s .69.u0.0.21.28 # of failures to AR  
.u0 . .u2.00.0.01.29 Add tag 6  
.00 . w.66.46.2.21.31 Mark 66 ; exit to error output ; see 46, preceding page

.66 s .70.98.0.21.27 Test for failure 7 ; ( Non zero = error )  
Below for 98  
.99 s .u2.u7.0.21.28 # of failures to AR  
.u7 . .02.17.0.01.29 Add tag 7  
.17 . w.98.46.2.21.31 Mark 98 ; exit to error output ; see 46, preceding page

.98 s .99.54.0.21.27 Test for failure 8 ; ( Non zero = error )  
Below for 54  
.55 s .59.65.0.21.28 # of failures to AR  
.65 . .66.01.0.01.29 Add tag 8  
.01 . w.54.46.2.21.31 Mark 54; exit to error output ; see 46, preceding page

.54 s .56.68.0.22.27 Test for failure 9 ; ( Non zero = error )  
Below for 68  
.69 s .72.24.0.22.28 # of failures to AR  
.24 . .25.29.0.01.29 Add tag 9  
.29 . w.68.46.2.21.31 Mark 68 ; exit to error output ; see 46, preceding page

.68 s .69.74.0.22.27 Test for failure 10 ; ( Non zero = error )  
Below for 74  
.75 s .77.39.0.22.28 # of failures to AR  
.39 . .79.81.0.01.29 Add tag 10  
.81 . w.74.46.2.21.31 Mark 74 ; exit to error output ; see 46, preceding page

.74 s .78.56.0.22.27 Test for failure 11 ; ( Non zero = error )  
Below for 56  
.57 s .58.82.0.22.28 # of failures to AR  
.82 . .93.96.0.01.29 Add tag 11  
.96 . w.56.46.2.21.31 Mark 56 ; exit to error output ; see 46, preceding page

.56 s .59.88.0.22.27 Test for failure 12 ; ( Non zero = error )  
Below for 88  
.89 s .91.07.0.22.28 # of failures to AR  
.07 . .u5.50.0.01.29 Add tag 12  
.50 . w.88.46.2.21.31 Mark 88 ; exit to error output ; see 46, preceding page

## OVERFLOW

.88 s .92.10.0.23.27 -Test for failure 13; (Non zero = error)  
Below for 10

.11 s .12.20.0.23.28 # of failures to AR

.20 . .97.02.0.01.29 Add tag 13

.02 . w.10.46.2.21.31 Mark 10; exit to error output; see 46, page 74

.10 s .13.72.0.23.27 -Test for failure 14  
Below for 72

.73 s .77.80.0.23.28 # of failures to AR

.80 . .11.70.0.01.29 Add tag 14

.70 . w.72.46.2.21.31 Mark 72; exit to error output; see 46, page 74

.72 s .74.08.3.21.31 Exit to Line 3,08 for beginning of PN Overflow Test  
Following from Line 3:

.08 s .11.11.0.23.31 Clear

.11 . u.16.16.1.26.20 Clear Line 20

.16 . u.21.21.1.26.21 Clear Line 21

.21 . u.26.26.1.26.22 Clear Line 22

.26 . u.31.31.1.26.23 Clear Line 23

.31 . .33.33.0.29.31 Reset Overflow

.33 s .56.60.5.01.26  $3/4$  to PN

.34 s .56.60.5.01.26  $3/4$  to PN

.60 . .70.72.5.01.30 Add  $5/8$  to PN

.72 . .74.74.0.29.31 Test overflow; (No overflow = error)  
Below for 75

.74 s .76.80.0.20.28 Running tally of failures to AR

.80 . .86.87.0.01.29 Increment failures

.87 . .88.75.0.28.20 Restore

.75 . .90.36.5.01.26  $1/2$  to PN

.36 . .90.92.5.01.30 Add  $1/2$  to PN

.92 . .94.94.0.29.31 Test overflow; (No overflow = error)  
Below for 95

.94 s .97.98.0.20.28 Running tally of failures to AR

.98 . .86.88.0.01.29 Increment failures

.88 . .89.95.0.28.20 Restore

.95 . .08.10.5.01.26  $1/4$  to PN

.10 . u.53.53.1.03.10 Check for illegal appearance of D7\* at F of E18, 3D293, Zone 1A

.53 . .90.93.5.01.30 Add  $1/2$  to PN

.93 . .95.96.0.29.31 Test overflow; (overflow = error)  
Below for 96

.97 s .98.u1.0.20.28 Running tally of failures to AR

.u1 . .86.89.0.01.29 Increment failures

.89 . .90.96.0.28.20 Restore

.96 . .56.58.5.01.26  $3/4$  to PN

.58 . .08.12.7.01.30 Subtract  $1/4$  from PN

.12 . .14.14.0.29.31 Test overflow; (Overflow = error)  
Below for 14

.15 s .19.20.0.20.28 Running tally of failures to AR

.20 . .86.90.0.01.29 Increment failures

.90 . .91.14.0.28.20 Restore

.14 . .90.40.5.01.26  $1/2$  to PN

.40 . .90.00.7.01.30 Subtract  $1/2$  from PN

## OVERFLOW

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.00 . .02.04.0.29.31 Test overflow ; ( Overflow = error )
      Below for 04
.05 s .08.37.0.21.28 Running tally of failures to AR
.37 . .86.91.0.01.29 Increment failures
.91 . .92.04.0.28.21 Restore
.04 . .08.41.5.01.26 1/4 to PN
.41 . .56.59.7.01.30 Subtract 3/4 from PN
.59 . .61.61.0.29.31 Test overflow ; ( Overflow = error )
      Below for 61
.62 s .65.68.0.21.28 Running tally of failures to AR
.68 . .86.u4.0.01.29 Increment failures
.u4 . .u5.61.0.28.21 Restore
.61 . .68.u3.5.01.26 1/2 from PN
.u3 . .00.19.5.01.30 Add 3/4 to PN
.19 . .21.22.0.29.31 Test overflow ; ( Overflow = error )
      Below for 22
.23 s .26.35.0.21.28 Running tally of failures to AR
.35 . .86.09.0.01.29 Increment failures
.09 . .10.22.0.28.21 Restore
.22 . .68.70.5.01.26 1/2 from PN
.70 . .90.u5.5.01.30 Add 1/2 to PN
.u5 . .u7.01.0.29.31 Test overflow ; ( Overflow = error )
      Below for 01
.02 s .03.69.0.21.28 Running tally of failures to AR
.69 . .86.u6.0.01.29 Increment failures
.u6 . .u7.01.0.28.21 Restore
.01 . .40.42.5.01.26 3/4 from PN
.42 . .90.13.5.01.30 Add 1/2 to PN
.13 . .15.29.0.29.31 Test overflow ; ( Overflow = error )
      Below for 29
.30 s .32.73.0.22.28 Running tally of failures to AR
.73 . .86.u7.0.01.29 Increment failures
.u7 . .00.29.0.28.22 Restore
.29 . .68.71.5.01.26 1/2 from PN
.71 . .76.81.7.01.30 Subtract -0000000 , 000000G from PN
.81 . .83.83.0.29.31 Test overflow ; ( Overflow = error )
      Below for 83
.84 s .86.32.0.01.28 0001000 to AR
.32 . .33.43.0.22.29 Add running tally of failures
.43 . .45.83.0.28.22 Restore
.83 . .68.76.5.01.26 1/2 from PN
.76 . .08.46.7.01.30 Subtract 1/4 from PN
.46 . .48.48.0.29.31 Test overflow ; ( Overflow = error )
      Below for 48
.49 s .50.79.0.22.28 Running tally of failures to AR
.79 . .86.47.0.01.29 Increment failures
.47 . .50.48.0.28.22 Restore
.48 . .68.65.5.01.26 1/2 from PN
.65 . .68.82.5.01.30 Add -1/2 to PN
.82 . .84.85.0.29.31 Test overflow ; ( No overflow = error )

```

## OVERFLOW

```

.85 s .86.52.0.01.28 Running tally of failures to AR
.52 . .55.57.0.22.29 Increment failures
.57 . .59.86.0.28.22 Restore
.86 . .40.44.5.01.26 3/4 from PN
.44 . .40.45.5.01.30 Add -3/4 to PN
.45 . .47.50.0.29.31 Test overflow ; ( No overflow = error )
      Below for 51
.50 s .52.63.0.23.28 Running tally of failures to AR
.63 . .86.99.0.01.29 Increment failures
.99 . .u0.51.0.28.23 Restore
.51 . .52.64.0.01.28 # of trials to AR
.64 . .22.24.3.01.29 Subtract 1
.24 . .26.27.0.28.27 Test for end of test

.28 s .52.31.0.28.01 Restore remaining # of trials ; reenter at 31, page 76

.27 s .28.38.0.20.27 -Test for failure 15 ; ( Non zero = error )
      Below for 38
.39 s .40.07.0.20.28 # of failures to AR
.07 . .53.54.0.01.29 Add tag 15
.54 . w.38.17.3.21.31 Mark 38 ; exit to error output

.17 s .19.55.0.08.31 Type error indication
.55 . .55.55.0.28.31 Test ready
.56 . .58.57.3.20.31 Return command

.38 s .41.66.0.20.27 -Test for failure 16 ; ( Non zero = error )
      Below for 66
.67 s .69.u0.0.20.28 # of failures to AR
.u0 . .u4.25.0.01.29 Add tag 16
.25 . w.66.17.3.21.31 Mark 66 ; exit to error output ; see 17 above

.66 s .70.77.0.20.27 - Test for failure 17 ; ( Non zero = error )
      Below for 77
.78 s .82.u2.0.20.28 # of failures to AR
.u2 . .u6.06.0.01.29 Add tag 17
.06 . w.77.17.3.21.31 Mark 77 ; exit to error output ; see 17 above

.77 s .79.79.4.21.31 Exit to Line 4,79
      Following from Line 4:
.79 s .83.84.0.20.27 -Test for failure 18 ; ( Non zero = error )
      Below for 84
.85 s .87.88.0.20.28 # of failures to AR
.88 . .54.55.0.01.29 Add tag 18
.55 . w.84.90.4.21.31 Mark 84 ; exit to error output ; see 90, next page

.84 s .88.94.0.21.27 -Test for failure 19 ; ( Non zero = error )
      Next page for 94
.95 s .96.97.0.21.28 # of failures to AR
.97 . .98.99.0.01.29 Add tag 19
.99 . w.94.90.4.21.31 Mark 94 ; exit to error output ; see 90, next page

```

## OVERFLOW

```

.94 s .97.u0.0.21.27 -Test for failure 20 ; ( Non zero = error )
      Below for u0
.u1 s .u5.u6.0.21.28 # of failures to AR
.u6 . .03.04.0.01.29 Add tag 20
.04 . w.u0.90.4.21.31 Mark u0 ; exit to error output

.90 s .92.92.0.08.31 Type error indication
.92 . .92.92.0.28.31 Test ready
.93 . .95.94.4.20.31 Return command

.u0 s .u2.u3.0.21.27 -Test for failure 21 ; ( Non zero = error )
      Below for u3
.u4 s .u6.u7.0.21.28 # of failures to AR
.u7 . .04.05.0.01.29 Add tag 21
.05 . w.u3.90.4.21.31 Mark u3 ; exit to error output ; see 90 above

.u3 s .u7.00.0.21.27 -Test for failure 22 ; ( Non zero = error )
      Below for 00
.01 s .03.06.0.21.28 # of failures to AR
.06 . .07.08.0.01.29 Add tag 22
.08 . w.00.90.4.21.31 Mark 00 ; exit to error output ; see 90 above

.00 s .04.09.0.22.27 -Test for failure 23 ; ( Non zero = error )
      Below for 09
.10 s .12.13.0.22.28 # of failures to AR
.13 . .14.15.0.01.29 Add tag 23
.15 . w.09.90.4.21.31 Mark 09 ; exit to error output ; see 90 above

.09 s .13.16.0.22.27 -Test for failure 24 ; ( Non zero = error )
      Below for 16
.17 s .21.22.0.22.28 # of failures to AR
.22 . .23.24.0.01.29 Add tag 24
.24 . w.16.90.4.21.31 Mark 16 ; exit to error output ; see 90 above

.16 s .18.20.0.22.27 -Test for failure 25 ; ( Non zero = error )
      Below for 20
.21 s .22.23.0.22.28 # of failures to AR
.23 . .24.25.0.01.29 Add tag 25
.25 . w.20.90.4.21.31 Mark 20 ; exit to error output ; see 90 above

.20 s .23.26.0.22.27 -Test for failure 26 ; ( Non zero = error )
      Below for 26
.27 s .31.32.0.22.28 # of failures to AR
.32 . .33.34.0.01.29 Add tag 26
.34 . w.26.90.4.21.31 Mark 26 ; exit to error output ; see 90 above

.26 s .28.29.0.23.27 -Test for failure 27 ; ( Non zero = error )
      Next page for 29
.30 s .32.33.0.23.28 # of failures to AR
.33 . .36.37.0.01.29 Add tag 27
.37 . w.29.90.4.21.31 Mark 29 ; exit to error output ; see 90 above

```

## OVERFLOW

```

.29 s .31.38.0.29.31 Reset overflow
.38 s .41.42.0.23.31 Clear
.39 s .42.42.0.23.31 Clear
.42 . u.47.47.1.26.20 Clear Line 20
.47 . .67.68.0.01.25 1/4 to ID,1
.68 . .75.77.0.01.26 3/4 to PN,1
.77 . .57.28.1.25.31 Divide
.28 . .30.40.0.29.31 Test overflow ; ( No overflow = error )
      Below for 41
.40 s .44.45.0.20.28 Running tally of failures to AR
.45 . .86.87.0.01.29 Increment failures
.87 . .88.41.0.28.20 Restore
.41 . .44.46.0.23.31 Clear
.46 . .51.54.0.01.25 1/4 to ID,1
.54 . .56.59.4.01.26 3/4 to PN,0-1
.59 . .55.12.1.25.31 Divide ( T# = 55 )
.12 . .14.18.0.29.31 Test overflow ( Overflow = error )
      Below for 18
.19 s .21.48.0.20.28 Running tally of failures to AR
.48 . .86.89.0.01.29 Increment failures
.89 . .93.18.0.28.20 Restore
.18 . .40.44.4.01.25 -3/4 to ID,0-1
.44 . .90.91.4.01.26 1/2 to PN,0-1
.91 . .v6.14.1.25.31 Divide
.14 . .16.50.0.29.31 Test overflow ; ( Overflow = error )
      Below for 50
.51 s .54.56.0.20.28 Running tally of failures to AR
.56 . .86.96.0.01.29 Increment failures
.96 . .98.50.0.28.20 Restore
.50 . .58.60.0.01.28 # of trials to AR
.60 . .22.31.3.01.29 Subtract 1
.31 . .33.52.0.28.27 Test for end of test

.53 s .58.61.0.28.01 Restore remaining # of trials
.61 . .64.47.0.23.31 Clear ; reenter at 47 above

.52 s .56.62.0.20.27 -Test for failure 28 ; ( Non zero = error )
      Below for 62
.63 s .64.65.0.20.28 # of failures to AR
.65 . .74.82.0.01.29 Add tag 28
.82 . w.62.90.4.21.31 Mark 62 ; exit to error output ; see 90 preceding page

.62 s .65.66.0.20.27 -Test for failure 29 ; ( Non zero = error )
      Below for 66
.67 s .69.78.0.20.28 # of failures to AR
.78 . .82.86.0.01.29 Add tag 29
.86 . w.66.90.4.21.31 Mark 66 ; exit to error output ; see 90 preceding page

.66 s .70.73.0.20.27 -Test for failure 30 ; ( Non zero = error )
      Next page for 73
.74 s .78.98.0.20.28 # of failures to AR

```



OVERFLOW

```
.98 . .99.u2.0.01.29 Add tag 30
.u2 . w.73.90.4.21.31 Mark 73 ; exit to error output ; see 90, page 79

.73 s .74.75.1.17.31 Ring bell ; test punch switch

.75 s .77.80.0.15.31 Punch switch off ; read tape
.80 . .80.80.0.28.31 Test ready
.81 . .83.00.6.21.31 Exit to Line 19,00

.76 s .78.u5.0.01.28 Punch switch on ; 0000019 to AR
.u5 . .20.35.0.28.01 Initialize # of trials ; ( AR overflow )
.35 . .52.03.0.28.01      "      "      "      ( PN      "      )
.03 . .58.02.0.28.01      "      "      "      ( Divide overflow )
.02 . .04.42.0.21.31 Reenter test at Line 0, 42 ; see page 72
```

Line 0:	Line 2:	Line 3:	Line 4:
.05 0000000	.03 000zzu2	.03 0000022 Format	Unused loc.
.03 0000022	Unused Loc.	for test ID	.07 .11 .36 .43 .49 .57 .58
.u7 829xvw6 Bal.	.13 .87 .u2	.18 -353548w Bal.	.64 .69 .70 .71 .72 .83

Line 1:

	1700000	1200000	1600000
8000000	600000	w000000	8000000
3000000	1900000	1300000	
		1100000	
8000000	0000000		
	1000		
	2900000		u000000
1000000	19	0000000	-
w000000	2800000		500000
u000000	0000000	8000000	-
4000000	800000		
			400000
	19	w000000	0000000
	1800000	1500000	19
4000000	300000		
		-z7vy2zw	z7vy2zw
	vvvv026	w000000	-
- 34w2vz	- 24w2vz		2700000
200000	100000	2600000	
z0860u6			
	55940v9	900000	2500000
2400000	1		19
	2300000		
1400000		4000000	0000000
2200000	u480690	-	2100000
2000000	700000	w000000	0000000

Note: All blank locations are unused; zero entries have been typed where zero is used by program.

## AR AS SOURCE OF COMMAND

```

.00 s u.01.01.0.19.00 Line 19 to Line 0
.01 . .03.04.0.21.31 Exit to Line 0,04
.04 s .05.06.3.00.28 Clear and subtract summation of Line 0 from AR
.06 . u.07.07.1.00.29 Add all Line 0
.07 . .08.09.0.28.27 Zero test AR; ( Non zero = error )
      Below for 09
.10 s .12.13.0.06.31 Read back
.13 . .13.13.0.28.31 Test ready
.14 . .16.15.0.15.31 Read tape
.15 . .15.15.0.28.31 Test ready
.16 . .18.00.6.21.31 Exit to Line 19,00

.09 s .98.u0.4.00.25 f key link to ID,0-1
.u0 . .00.u1.4.25.00 F key link to Line 0,0-1
.98 s ( .02.18.0.21.31 ) f key link to 18 below
.99 s ( .03.18.0.21.31 ) F key link to 18 below
.u1 s .17.60.0.00.28 www012 to AR
.60 . .03.11.0.00.03 Format to L3,03
.11 . .13.18.0.08.31 Type test tag
.18 . .18.18.0.28.31 Test ready
.19 . .20.21.0.00.21 # of trials to Line 21,0
.21 . .22.25.0.00.21 Test command to Line 21,2
.22 s (u.64.72.0.02.27 ) Test command
.25 s .28.28.0.23.31 Clear
.28 . u.33.33.1.26.22 Clear Line 22
.33 . .34.35.0.00.28 zzzzzzz to AR
.35 . u.36.36.0.28.02 Fill Line 2 with z's
.36 . .37.38.0.00.28 Command to AR
.38 . .40.02.0.31.31 -Obey AR; see below for 63 and proper return from AR
.37 s (u.64.63.1.26.02 ) From AR at 02; clear Line 2, 03 through 63
      Enter error loop; control not transferred to AR;
.02 s .04.08.0.22.28 running tally of failures to AR
.08 . .24.26.0.00.29 Increment failures
.26 . .28.30.0.28.22 Restore
.30 . .32.40.0.21.28 # of trials to AR
.40 . .41.42.3.00.29 Subtract 1
.42 . .43.44.0.28.27 Test for end of test; zero = end of test
      Next page for 144
.45 s .48.50.0.28.21 Restore remaining # of trials
.50 . .54.64.0.00.20 Command (Line 0,54) to Line 20,2
.54 s ( .04.08.0.22.28 ) Same as 02 above
.64 s .02.33.0.20.00 Reinsert command 02; reenter at 33 above

.63 s .02.02.0.21.00 Proper return from AR; Line 21,2 to Line 0,02; see
      22 above; zero test Line 2, 03-63; (Non zero=error)
.73 s .77.78.0.22.28 Running tally of failures to AR
.78 . .24.46.0.00.29 Increment failures
.46 . .49.72.0.28.22 Restore
.72 . u.73.29.0.02.27 Zero test all Line 2; ( Zero = error ); to 30 above
      if non zero
.29 s .31.81.0.22.28 Running tally of failures to AR

```

## AR AS SOURCE OF COMMAND

```

.81 . .24.31.0.00.29 Increment failures
.31 . .35.30.0.28.22 Restore; go to 30, preceding page

.44 s .47.51.0.00.23 End of test; error format to Line 23,3
.51 . .03.32.0.23.03 Error format to Line 3,03
.32 . .36.52.0.22.27 -Test for failure 1; ( Non zero = error )
      Below for 52
.53 s .56.57.0.22.28 # of failures to AR
.57 . .58.59.0.00.29 Add tag 1
.59 . .61.65.0.08.31 Type error indication
.65 . .65.65.0.28.31 Test ready
.66 . .68.52.0.28.28 Skip to 52
.52 . .53.76.0.22.27 -Test for failure 2; ( Non zero = error )
      Below for 76
.77 s .81.82.0.22.28 # of failures to AR
.82 . .83.67.0.00.29 Add tag 2
.67 . .69.75.0.08.31 Type error indication
.75 . .75.75.0.28.31 Test ready
.76 . .79.85.0.22.27 -Test for failure 3; ( Non zero = error )
      Below for 85
.86 s .87.91.0.22.28 # of failures to AR
.91 . .u6.55.0.00.29 Add tag 3
.55 . .57.84.0.08.31 Type error indication
.84 . .84.84.0.28.31 Test ready
.85 . .86.96.1.17.31 Ring bell; test punch switch

.97 s .99.18.0.21.31 Punch switch on; reenter at 18 preceding page

.96 s .98.15.0.15.31 Punch switch off; read tape; go to 15 preceding page

.05 -uz98yy8 LO Sum          Unused Loc.
.12 uz98yy8 Neg. Sum        .23 .80
.17 wwww012                .27 .87
.03 0000022                .39 .88
.20 0000032                .43 .89
.34 zzzzzzz                .48 .90
.41 0000001                .49 .92
.24 0001000                .56 .93
.47 0004400                .61 .94
.58 1000000                .62 .95
.83 2000000                .68 .u2
.u6 3000000                .69 .u3
.74 0010001 Bal.          .70 .u4
                          .71 .u5
                          .79 .u7

```

## MARK EXIT

```

.00 s u.01.01.0.19.00 Line 19 to Line 0
.01 . .03.04.0.21.31 Exit to Line 0,04
.04 s .05.06.3.00.28 Clear and subtract summation of Line 0 from AR
.06 . u.07.07.1.00.29 Add all Line 0
.07 . .08.09.0.28.27 Zero test AR ; (Non zero = error)
      Below for 09
.10 s .12.11.0.06.31 Read back
.11 . .11.11.0.28.31 Test ready
.12 . .14.13.0.15.31 Read tape
.13 . .13.13.0.28.31 Test ready
.14 . .16.00.6.21.31 Exit to Line 19,00

.09 s u.10.15.0.05.06 Line 5 to Line 6 ; ( Interrogator routine )
.15 . .41.02.0.00.28 xxxx010 to AR ; (Test identification)
.02 . .03.08.0.00.03 Format to Line 3,03 ; 0000022
.08 . .10.16.0.08.31 Type xxxx010
.16 . .16.16.0.28.31 Test ready
.17 . .19.18.0.15.31 Read tape
.18 . .19.20.3.00.28 Clear and subtract summation of Line 10 from AR
.20 . .20.20.0.28.31 Test ready
.21 . u.22.22.0.19.10 Line 19 to Line 10
.22 . u.23.23.1.10.29 Add all Line 10
.23 . .24.25.0.28.27 Zero test AR ; (Non zero = error)

.26 s .28.16.0.06.31 Read back ; go to 16 above

.25 s .27.27.0.15.31 Read tape
.27 . .28.29.3.00.28 Clear and subtract summation of Line 8 from AR
.29 . .29.29.0.28.31 Test ready
.30 . u.31.31.0.19.08 Line 19 to Line 8
.31 . u.32.32.1.08.29 Add all Line 8
.32 . .33.34.0.28.27 Zero test AR ; (Non zero = error)
      Below for 34
.35 s .37.24.0.06.31 Read back
.24 . .24.24.0.28.31 Test ready ; go to 25 above

.34 s .36.36.0.15.31 Read tape
.36 . .36.36.0.28.31 Test ready
.37 . .38.39.3.00.28 Clear and subtract summation of Line 19 from AR
.39 . u.40.40.1.19.29 Add all Line 19
.40 . .41.42.0.28.27 Zero test AR ; (Non zero = error)
      Below for 42
.43 s .45.33.0.06.31 Read back
.33 . .33.33.0.28.31 Test ready ; go to 34 above

.42 s u.43.44.0.19.01 Line 19 to Line 1
.44 . u.45.45.0.19.02 Line 19 to Line 2
.45 . u.46.46.0.19.03 Line 19 to Line 3
.46 . u.47.47.0.19.04 Line 19 to Line 4
.47 . u.48.48.0.19.05 Line 19 to Line 5
.48 . u.49.49.0.19.09 Line 19 to Line 9 ( Temporary Line 0 storage )

```

## MARK EXIT

.49 . .u5.50.0.08.19  
.50 . .05.51.0.08.19  
.51 . .07.52.0.08.09  
.52 . .09.53.0.08.01  
.53 . .14.54.0.08.02  
.54 . .16.55.0.08.03  
.55 . .21.56.0.08.03  
.56 . .23.57.0.08.04  
.57 . .25.58.0.08.05  
.58 . .30.59.0.08.19  
.59 . .35.60.0.08.19  
.60 . .40.61.0.08.05  
.61 . .42.62.0.08.04  
.62 . .47.63.0.08.03  
.63 . .52.64.0.08.03  
.64 . .54.65.0.08.02  
.65 . .56.66.0.08.01  
.66 . .59.67.0.08.09  
.67 . .61.68.0.08.19  
.68 . .66.69.0.08.19  
.69 . .68.70.0.08.19  
.70 . .70.71.0.08.01  
.71 . .73.72.0.08.01  
.72 . .75.73.0.08.03  
.73 . .80.74.0.08.03  
.74 . .82.75.0.08.03  
.75 . .84.76.0.08.05  
.76 . .87.77.0.08.05  
.77 . .89.78.0.08.19  
.78 . .94.79.0.08.19  
.79 . .96.80.0.08.02  
.80 . .98.81.0.08.02  
.81 . .u1.82.0.08.04  
.82 . .u3.83.0.08.04  
.83 . .10.84.0.08.04  
.84 . .17.85.0.08.09  
.85 . .22.86.0.08.09  
.86 . .31.87.0.08.09  
.87 . .33.88.0.08.02  
.88 . .36.89.0.08.05  
.89 . .38.90.0.08.09  
.90 . .43.91.0.08.03  
.91 . .48.92.0.08.03  
.92 . .53.93.0.08.01  
.93 . .55.94.0.08.04  
.94 . .60.95.0.08.19  
.95 . .71.96.0.08.19  
.96 . .74.97.0.08.03  
.97 . .76.98.0.08.19  
.98 . .79.99.0.08.04  
.99 . .81.u0.0.08.09  
.u0 . .86.u1.0.08.09

All commands of this sequence are for placement  
of commands used in mark exit test ; documentation  
of the commands involved begins with 91 on next page.

## MARK EXIT

.u1 . .88.u2.0.08.04  
 .u2 . .90.u3.0.08.01  
 .u3 . .93.u4.0.08.05  
 .u4 . .95.u5.0.08.01  
 .u5 . .u0.u6.0.08.01  
 .u6 . u.u7.01.0.08.00

.01 s .u4.02.0.08.02  
 .02 . .03.04.0.08.03  
 .04 . .13.15.0.08.03  
 .15 . .18.06.0.08.09  
 .06 . .20.26.0.08.05  
 .26 . .27.39.0.08.02  
 .39 . .41.51.0.08.19  
 .51 . .57.08.0.08.19  
 .08 . .62.63.0.08.05  
 .63 . .64.65.0.08.03  
 .65 . .67.11.0.08.01  
 .11 . .69.72.0.08.19  
 .72 . .77.12.0.08.19  
 .12 . .83.85.0.08.09  
 .85 . .92.28.0.08.04  
 .28 . .u6.99.0.08.02  
 .99 . .19.29.0.08.02  
 .29 . .24.32.0.08.09  
 .32 . .44.50.4.08.09  
 .50 . .58.34.0.08.09  
 .34 . .78.37.0.08.09  
 .37 . .91.97.0.08.09  
 .97 . .u2.49.0.08.09  
 .49 . .59.46.0.10.22  
 .46 . u.47.91.0.09.00

All commands of this sequence are for placement  
 of commands used in mark exit test ; documentation  
 of the commands involved begins with 91 below

---

.91 . .u1.u2.0.10.23 From L0 ; error lockup command to Line 23,1  
 .u2 . .u4.u5.6.21.31 From L0 ; exit to Line 19,u5  
 .u5 s u.05.05.0.10.23 From L19 ; error lockup commands to Line 23  
 .05 . .07.07.0.21.31 From L19 ; exit to Line 0,07  
 .07 s .09.09.1.21.31 From L0 ; exit to Line 1,09  
 .09 s .11.14.2.21.31 From L1 ; exit to Line 2,14  
 .14 s .16.16.3.21.31 From L2 ; exit to Line 3,16  
 .16 s u.21.21.0.10.23 From L3 ; error lockup commands to Line 23+ return com.  
 .21 . .23.23.4.21.31 From L3 ; exit to Line 4,23  
 .23 s .25.25.5.21.31 From L4 ; exit to Line 5,25  
 .25 s .27.28.7.21.31 From L5 ; exit to Line 23,28  
 .28 ( .30.30.6.21.31) From L23 ; exit to Line 19,30  
 .30 s u.35.35.0.10.23 From L19 ; error lockup commands to Line 23+ return com.  
 .35 . .37.37.7.21.31 From L19 ; exit to Line 23,37  
 .37 ( .39.40.5.21.31) From L23 ; exit to Line 5,40  
 .40 s .42.42.4.21.31 From L5 ; exit to Line 4,42  
 .42 s .44.47.3.21.31 From L4 ; exit to Line 3,47  
 .47 s u.52.52.0.10.23 From L3 ; error lockup commands to Line 23  
 .52 . .54.54.2.21.31 From L3 ; exit to Line 2,54

## MARK EXIT

```

.54 s .56.56.1.21.31 From L2 ; exit to Line 1,56
.56 s .58.59.0.21.31 From L1 ; exit to Line 0,59
.59 s .61.61.6.21.31 From L0 ; exit to Line 19,61
.61 s u.66.66.0.10.23 From L19 ; error lockup commands to Line 23
.66 . .68.68.6.21.31 From L19 ; exit to Line 19,68
.68 s .70.70.1.21.31 From L19 ; exit to Line 1,70
.70 s .72.73.1.21.31 From L1 ; exit to Line 1,73
.73 s .75.75.3.21.31 From L1 ; exit to Line 3,75
.75 s u.80.80.0.10.23 From L3 ; error lockup commands to Line 23
.80 . .82.82.3.21.31 From L3 ; exit to Line 3,82
.82 s .84.84.5.21.31 From L3 ; exit to Line 5,84
.84 s .86.87.5.21.31 From L5 ; exit to Line 5,87
.87 s .89.89.6.21.31 From L5 ; exit to Line 19,89
.89 s u.94.94.0.10.23 From L19 ; error lockup commands to Line 23
.94 . .96.96.2.21.31 From L19 ; exit to Line 2,96
.96 s .98.98.2.21.31 From L2 ; exit to Line 2,98
.98 s .u0.u1.4.21.31 From L2 ; exit to Line 4,u1
.u1 s .u3.u3.4.21.31 From L4 ; exit to Line 4,u3
.u3 s u.09.10.0.10.23 From L4 ; error lockup commands + return com. to L23
.10 . .12.12.7.21.31 From L4 ; exit to Line 23,12
.12 ( .14.15.7.21.31)From L23 ; exit to Line 23,15
.15 ( .17.17.0.21.31)From L23 ; exit to Line 0,17
.17 s .19.22.0.21.31 From L0 ; exit to Line 0,22
.22 s u.31.31.0.10.23 From L0 ; error lockup commands to Line 23
.31 . .33.33.2.21.31 From L0 ; exit to Line 2,33
.33 s .35.36.5.21.31 From L2 ; exit to Line 5,36
.36 s .38.38.0.21.31 From L5 ; exit to Line 0,38
.38 s .40.43.3.21.31 From L0 ; exit to Line 3,43
.43 s u.48.48.0.10.23 From L3 ; error lockup commands + return com. to L23
.48 . .50.50.7.21.31 From L3 ; exit to Line 23,50
.50 ( .52.53.1.21.31)From L23 ; exit to Line 1,53
.53 s .55.55.4.21.31 From L1 ; exit to Line 4,55
.55 s .57.60.6.21.31 From L4 ; exit to Line 19,60
.60 s u.70.71.0.10.23 From L19 ; error lockup commands to Line 23
.71 . .73.74.3.21.31 From L19 ; exit to Line 3,74
.74 s .76.76.6.21.31 From L3 ; exit to Line 19,76
.76 s .78.79.4.21.31 From L19 ; exit to Line 4,79
.79 s .81.81.0.21.31 From L4 ; exit to Line 0,81
.81 s u.86.86.0.10.23 From L0 ; error lockup commands to Line 23
.86 . .88.88.4.21.31 From L0 ; exit to Line 4,88
.88 s .90.90.1.21.31 From L4 ; exit to Line 1,90
.90 s .92.93.5.21.31 From L1 ; exit to Line 5,93
.93 s .95.95.1.21.31 From L5 ; exit to Line 1,95
.95 s u.u0.u0.0.10.23 From L1 ; error lockup commands + return com. to L23
.u0 . .u2.u2.7.21.31 From L1 ; exit to Line 23,u2
.u2 ( .u4.u4.2.21.31)From L23 ; exit to Line 2,u4
.u4 s .u6.01.7.21.31 From L2 ; exit to Line 23,01
.u01 ( .03.03.3.21.31)From L23 ; exit to Line 3,03
.03 s u.13.13.0.10.23 From L3 ; error lockup commands to Line 23
.13 . .15.18.0.21.31 From L3 ; exit to Line 0,18
.18 s .20.20.5.21.31 From L0 ; exit to Line 5,20
.20 s .22.27.2.21.31 From L5 ; exit to Line 2,27

```

## MARK EXIT

.27 s .29.41.6.21.31 From L2 ; exit to Line 19,41  
.41 s u.56.57.0.10.23 From L19 ; error lockup commands to Line 23  
.57 . .59.62.5.21.31 From L19 ; exit to Line 5,62  
.62 s .64.64.3.21.31 From L5 ; exit to Line 3,64  
.64 s .66.67.1.21.31 From L3 ; exit to Line 1,67  
.67 s .69.69.6.21.31 From L1 ; exit to Line 19,69  
.69 s u.74.77.0.10.23 From L19 ; error lockup commands + return com. to L23  
.77 . .79.83.0.21.31 From L19 ; exit to Line 0,83  
.83 s .85.85.7.21.31 From L0 ; exit to Line 23,85  
.85 ( .87.92.4.21.31) From L23 ; exit to Line 4,92  
.92 s .94.u6.2.21.31 From L4 ; exit to Line 2,u6  
.u6 s u.17.19.0.10.23 From L2 ; error lockup command to Line 23,0  
.19 . .21.24.0.21.31 From L2 ; exit to Line 0,24  
.24 s .27.44.0.22.27 -From L0 ; test for end of test ; zero = end of test  
Below for 44  
.45 s .47.58.0.22.28 # of trials to AR  
.58 . .74.78.3.10.29 Subtract 1  
.78 . .79.91.0.28.22 Restore remaining # of trials ; reenter at 91, page 86

.44 s u.45.56.0.10.00 End of test ; Line 10 to L0

.56 s .57.57.1.17.31 Ring bell ; test punch switch

.58 s .59.75.0.10.22 Punch switch on ; initialize # of trials  
.75 . u.76.45.0.09.00 Line 9 to Line 0 ; reenter at 45 above

.57 s u.58.86.0.06.05 Punch switch off ; reestablish Interrogator in L5  
.86 . .88.60.0.15.31 Read tape  
.60 . .60.60.0.28.31 Test ready  
.61 . .63.00.6.21.31 Exit to Line 19,00

Note: Error lockup commands not documented; see text



## RETURN EXIT

```

.00 s u.01.01.0.19.00 Line 19 to Line 0
.01 . .03.04.0.21.31 Exit to Line 0,04
.04 s .05.06.3.00.28 Clear and subtract summation of Line 0 from AR
.06 . u.07.07.1.00.29 Add all Line 0
.07 . .08.09.0.28.27 Zerotest AR; ( Non zero = error )
      Below for 09
.10 s .12.11.0.06.31 Read back
.11 . .11.11.0.28.31 Test ready
.12 . .14.13.0.15.31 Read tape
.13 . .13.13.0.28.31 Test ready
.14 . .16.00.6.21.31 Exit to Line 19,00

.09 s .72.u0.4.00.25 f key link to ID,0-1
.u0 . .00.u1.4.25.00 f key link to Line 0,0-1
.72 s (.02.17.0.21.31) f key link to 17 below
.73 s (.03.17.0.21.31) f key link to 17 below
.u1 s .u7.16.0.00.28 yyyO10 to AR
.16 . .03.08.0.00.03 Format to Line 3,03
.08 . .10.17.0.08.31 Type test tag
.17 . .17.17.0.28.31 Test ready
.18 . .19.60.0.00.22 Error format to Line 22,3
.60 . .03.20.0.22.03 Error format to Line 3,03
.20 . u.24.24.0.00.22 Clear Line 22,1-2; # of trials to Line 22,3
.24 . .25.26.0.00.28 Error link to AR
.25 s (.00.30.0.21.31) Error link ( Exit to error loop )
.26 s u.27.27.0.28.01 Error link to all Line 1
.27 . .28.29.0.00.28 Mark exit command to AR
.28 s (w.40.50.0.21.31) -Mark exit command
.29 s .40.41.0.28.01 Insert mark exit command in Line 1,40
.41 . w.40.50.0.21.31 -Mark 40; exit to Line 0,50

.50 s .47.46.0.22.28 # of trials to AR
.46 . .45.44.3.00.29 Subtract 1
.44 . .46.42.0.28.27 Test for end of test; zero = end of test
      Below for 42
.43 s .47.34.0.28.22 Restore remaining # of trials
.34 . .36.35.1.20.31 Return command; control should transfer to Line 1,40
      Line 1,40 = w.40.50.0.21.31; reenter LO at 50 above
.30 s .34.35.0.22.28 Line 1 entered at incorrect point; tally of errors to AR
.35 . .36.37.0.00.29 Increment failures
.37 . .38.41.0.28.22 Restore; go to 41 above
      Control retained by Line 0 when return command given:
.40 s .41.54.0.22.28 Running tally of failures to AR
.54 . .36.48.0.00.29 Increment failures
.48 . .49.41.0.28.22 Restore; go to 41 above

.42 s .46.52.0.22.27 -End of test; test for Failure 1; (Non zero=error)
      Next page for 52
.53 s .54.55.0.22.28 # of failures to AR
.55 . .56.57.0.00.29 Add tag 1

```

## RETURN EXIT

```

.57 . .59.51.0.08.31 Type error indication
.51 . .51.51.0.28.31 Test ready
.52 . .53.62.0.22.27 -Test for Failure 2; ( Non zero = error )
      Below for 62
.63 s .65.66.0.22.28 # of failures to AR
.66 . .67.68.0.00.29 Add tag 2
.68 . .70.61.0.08.31 Type error indication
.61 . .61.61.0.28.31 Test ready
.62 . .63.70.1.17.31 Ring bell; test punch switch

.71 s .73.17.0.21.31 Punch switch on; reenter at 17, preceding page

.70 s .72.13.0.15.31 Punch switch off; read tape; go to 13, preceding page

.05 -790y247 LO Sum      Unused Loc.
.80 790y247 Neg. Sum    .02 .58
.u7 yyyy010           .15 .59
.03 0000022          .31 .64
.19 0004400          .32 .65
.21 0000000          .33 .69
.22 0000000          .38 .74-.79
.23 0000032          .39 .81-.99
.45 0000001          .47 .u2-.u6
.36 0001000          .49
.56 1000000
.67 2000000

```

Note: All unused locations  
have halt commands.

## CONTROL SWITCH

```

.00 s u.01.01.0.19.00 Line 19 to Line 0
.01 . .03.57.0.21.31 Exit to Line 0,57
.57 s .59.61.0.00.28 zzzz0h3 to AR
.61 . .03.81.0.00.03 AR format to L3,03
.81 . .83.85.0.08.31 Type test tag
.85 . .86.90.4.00.25 f key link to ID,0-1
.90 . .90.90.0.28.31 Test ready
.91 . u.92.92.1.00.29 Add all Line 0
.92 . .00.63.4.25.00 f key link to Line 0,0-1
.86 s (.02.94.0.21.31)f key link to 94 below
.87 s (.03.94.0.21.31)f key link to 94 below
.63 s .66.71.4.00.25 Error format to ID,0-1
.71 . .02.88.4.25.03 Error format to L3,2-3
.88 . .90.94.0.28.27 Zero test AR; ( Non zero = error )
      Below for 94
.95 s .97.98.0.08.31 Type erroneous summation of Line 0
.98 . .99.99.0.17.31 Ring bell
.99 . .u1.u0.0.16.31 Halt
.u0 . .u2.u1.0.06.31 Read back
.u1 . .u1.u1.0.28.31 Test ready
.u2 . .u4.00.6.21.31 Exit to Line 19,00

.94 s u.00.08.0.00.20 00003y0 to Line 20,0; 000001z to Line 20,2
.08 . u.23.80.0.00.21 Basic transfer commands to Line 21,0 and Line 21,2
.20 s (.55.02.1.00.00)Basic command; Bi(0,26) to Ai(0,26) at 55 + T2i(0,26)
.22 s (.55.41.1.00.00)Basic command; Ai(0,26) to Bi(0,26) at 55 + T2i(0,26)
.80 s u.35.44.0.00.23 Argument store command to L23,0; return com. to L23,2
.32 s (.55.02.4.28.00)Store command for argument
.34 s (.04.49.0.21.31)Return command
.44 s .48.50.0.00.28 Argument to AR ;
.50 . .52.52.7.21.31 Exit to Line 23,52 for storage of argument; return at 49

.49 s .50.51.0.21.28 Command to AR; Ai to Bi
.51 . .53.53.0.31.31 Obey AR

.41 s .42.43.0.00.29 B + 1
.43 . .46.47.0.28.21 Restore modified command
.47 . .48.51.0.21.28 Command to AR; Bi to Ai ; to obey AR at 51 above

.02 s .04.05.0.00.29 B + 1
.05 . .08.09.0.28.21 Restore modified command
.09 . .10.13.0.31.28 Extract B ; store in AR; ( B as destination)
.13 . .14.15.3.00.29 Subtract 0000005 from AR
.15 . .16.23.0.28.27 Is B = 5 ? ; see below for 23

.24 s .25.26.3.00.29 Subtract 0000016 from AR
.26 . .28.29.0.28.27 Test for limit; next page for 29

.30 s .32.49.0.28.28 Return to 49 above

.23 s .24.27.0.21.28 B = 5; Line 21,0 to AR

```

## CONTROL SWITCH

```

.27 . .28.35.0.00.29 B + 1 ( Source )
.35 . .36.37.0.28.21 Restore modified command
.37 . .38.39.0.21.28 Line 21,2 to AR
.39 . .42.45.0.00.29 B + 1 ( Destination )
.45 . .46.49.0.28.21 Restore modified command

.29 s .31.33.0.00.28 0200020 to AR
.33 . .34.36.0.30.29 Ai + 1 to B0 at 55 + T2(i + 1)
.36 . .38.40.0.28.21 Restore modified command
.40 . .56.60.0.30.28 Extract command less B
.60 . .62.66.0.00.29 B0 to Ai + 1 at 55 + T2(i + 1)
.66 . .68.70.0.28.21 Restore modified command
.70 . .72.74.0.00.28 0200001 to AR
.74 . .76.78.0.23.29 Modify argument store command; T + 2; D + 1
.78 . .80.96.0.28.23 Restore modified command
.96 . .19.21.1.00.29 Add limit command to AR; 65.02.1.28.05
.21 . .22.52.3.28.27 Test neg. zero; test for destination 5

.52 s .31.33.0.00.28 Dest. = 5 at T = 65; 0200020 to AR; go to 33 above

.53 s .54.56.1.00.29 Add dummy; -2w00016
.56 . .57.64.3.28.27 Test neg. zero; i.e. test for dest. 27 at u9
      At limit (neg. zero), go to 64 below
.65 s .67.68.1.26.28 Argument to AR; complement if negative
.68 . .70.72.7.21.31 Exit to placement of argument; see 32' preceding pg.

.64 s .65.76.1.26.28 All transfers completed; argument to AR
.76 . .48.82.3.00.29 Subtract initial value of argument
.82 . .84.10.0.28.27 Zero test AR; ( Non zero = error )
      Below for 10
.11 s .13.16.4.26.28 Erroneous argument to AR
.16 . .18.06.0.08.31 Type error indication
.06 . .06.06.0.28.31 Test ready
.07 . .09.10.0.28.28 Skip
.10 . .11.17.1.17.31 Ring bell; test punch switch

.18 s .20.94.0.00.00 Punch switch on; reenter at 94 preceding page

.17 s .19.17.0.16.31 Punch switch off; halt

.59 zzzz043 Test tag          .11 0000005          .12
.03 0000022                  .25 0000016          .38
.66 w446395 (1'st bit=format) .28 0000020          .46
.67 8000004                  .31 0200020          .58
.u4 00003y0                  .62 0200001          .84
.u6 000001z                  .72 0200001
.48 zu0zu0z                  .54 -2w00016
.42 0000001                  .97 33u9wux Bal.
.04 0000020

```

Unused Loc.

## PHOTO READER

```

.00 s u.01.02.0.19.00 Line 19 to Line 0
.01 s u.02.02.0.19.00 Line 19 to Line 0
.02 . .16.04.0.21.31 Exit to Line 0,04
.04 s .07.07.0.23.31 Clear
.07 . .08.09.1.25.28 Clear AR
.09 . u.10.10.1.00.29 Add all Line 0
.10 . .11.12.0.28.27 -Zero test AR ; ( Non zero = error )
                          Below for 12
.13 s .14.06.0.17.31 Ring bell ; probable read-in error
.06 . .08.14.0.16.31 Halt
.14 . .16.15.0.06.31 Read back
.15 . .15.15.0.28.31 Test ready
.16 . .18.17.0.15.31 Read tape
.17 . .17.17.0.28.31 Test ready
.18 . .20.00.6.21.31 Exit to Line 19,00

.12 s .19.20.0.00.28 Test identification tag to AR ; 0000009
.20 . .02.05.4.00.03 Format to Line 3,2-3 ; -8w00000, 10042vz
.05 . .07.08.0.08.31 Type.0000009
.08 . .22.50.4.00.25 f key link to ID
.50 . .00.24.4.25.00 F key link to Line 0,0-1
.22 s ( .02.24.0.21.31 ) F key link to 24
.23 s ( .03.24.0.21.31 ) F key link to 24
.24 s .24.24.0.28.31 Test ready
.25 . .28.28.0.23.31 Clear
.28 . .32.33.1.25.23 Clear Line 23,0
.33 . .35.51.0.12.31 Gate type-in
.51 . .53.51.0.28.31 Test ready
.52 . .52.57.0.23.27 Zero test Line 23,0

.57 s u.64.88.0.00.21 Format 1 to Line 21 ; ( 29 digit , CR )

.58 s u.72.88.0.00.21 Format 2 to Line 21 ; ( 7 digit tab etc. )
.88 . u.04.26.0.21.02 Format to Line 2,0-3
.26 . u.31.27.1.25.23 Clear Line 23
.27 . u.28.21.1.25.19 Clear Line 19 ; note delay
.21 . .23.38.0.15.31 Read tape
.38 . .38.38.0.28.31 Test ready
.39 . u.40.41.0.19.16 Line 19 to Line 16
.41 . .42.43.1.25.28 Clear AR
.43 . u.44.48.1.16.29 Add all Line 16
.48 . .02.44.4.00.03 Format to Line 3,2-3
.44 . .46.46.0.08.31 -Type check sum
.46 . .46.46.0.28.31 Test ready
.47 . .49.92.0.06.31 Read back
.92 . .92.92.0.28.31 Test ready
.93 . u.94.94.1.25.19 Clear Line 19
.94 . u.99.u6.1.25.23 Clear Line 23
.u6 . .00.80.0.15.31 Read tape
.80 . .80.80.0.28.31 Test ready
.81 . u.82.82.0.19.17 Line 19 to Line 17
.82 . .84.84.0.06.31 Read back

                          Constants:      Unused Loc.
.19 0000009      .36
.03 -8w00000     .37
.02 10042vz     .75
.63 0000000     .78
.62 0000000     .79
.61 0000000     .87
.60 4400000     .97
.71 800000x
.70 0000034
.69 00000x0
.68 0000110
.u4 0001021
.56 0110000
.35 1400000
.66 0400000
.u2 9124774 (Balancing Constant)

```

## PHOTO READER

```

.84 . .86.90.0.00.26 Basic pickup command to PN,0
.90 . .92.u5.1.26.28 Basic pickup command to AR
.86 ( u.24.w0.0.16.20 )Basic pickup ; Line 16 to Line 20 ; start 0-3
.u5 s .u7.u7.0.31.31 Execute pickup command from AR

.u0 s .u4.u5.0.00.29 Modify pickup command ; N+1, S+1 , D+1 ; to obey AR

.u1 s u.u6.29.0.30.27 Test for pickup ; ( Non zero = error )

.30 s u.35.36.0.20.22
.36 s u.41.55.0.21.20 Skip to error program below at 55
.29 s u.34.34.0.20.22 Line 20 to Line 22
.34 . u.39.40.0.21.20 Line 21 to Line 20
.40 . u.45.45.0.22.21 Line 22 to Line 21
.45 . u.50.54.0.30.27 Test for dropout ; ( Non zero = error )

.55 s .56.53.1.17.31 Ring bell; test punch switch ; if punch switch on,
skip error typeout; go to 54 below
.53 s .56.76.0.00.28 Format to AR ; 0110000
.76 . .76.76.0.28.31 Test ready
.77 . .03.11.0.28.03 Format to Line 3,03
.11 . .12.31.1.26.28 Pickup command to AR ; see 86 above
.31 . .35.42.3.00.29 Subtract 1400000
.42 . .44.49.0.08.31 Type T # ( Tag )
.49 . w.83.98.0.21.31 Mark 83 ; exit to output routine

.98 s .98.98.0.28.31 Test ready
.99 . u.u0.u3.1.25.19 Clear Line 19
.u3 . u.00.32.0.22.19 Line 22 to Line 19, u4-u7, i.e. standard or erratic inf.
.32 . .34.59.0.09.31 Type standard information on first pass and erratic
.59 . .61.60.0.20.31 Return command on second pass .

.83 s u.88.91.0.20.22 Line 20 to Line 22 ; i.e. erratic information
.91 . w.54.98.0.21.31 Mark 54 ; exit to output routine ; see 98 above

.54 s .55.64.1.26.27 Test flag , PN,1 ; see below for 65

.64 s .66.67.1.00.30 Increment pickup command ; + 0400000
.67 . .68.72.1.26.28 Modified command to AR
.72 . .73.74.3.00.29 Subtact limit command ; ( .00.w0.0.16.20 )
.74 . .75.89.0.28.27 Test for limit ; go to 90 above if non zero

.89 s .93.95.0.00.26 Flag to PN,1
.95 . .96.u5.0.00.28 Last pickup command to AR ; u.20.w0.0.16.20
execute pickup ; see u5 above

.65 s .68.92.0.23.31 End of test loop ; clear and go to 92 for next pass ;
see preceding page for 92

```

## TYPEWRITER

```

.00 s u.01.01.0.19.04 Line 19 to Line 4
.01 . .02.04.4.21.31 Exit to Line 4,04
.04 s .11.05.0.04.28 f key link to AR ; see 11 below
.05 . .00.06.0.28.04 f key link to Line 4,00
.11 s(u.16.16.0.04.22) Line 19 format to Line 22; go to 16 below
.06 s .02.07.4.04.03 AR format to Line 3,2-3 ; -8w00000, 1000000
.07 . .08.09.0.04.28 0000008 to AR
.09 . .11.10.0.08.31 Type .0000008
.10 . .10.10.0.28.31 Test ready ; to 11 above when ready

.16 s .43.17.0.04.28 CR format to AR ; 4400000
.17 . .03.18.0.28.03 CR format to Line 3,3
.18 . .19.19.0.17.31 Ring bell
.19 . u.20.21.0.04.19 Line 4 to Line 19
.21 . .23.22.6.21.31 Exit to Line 19,22
      From Line 19 ;
.22 s u.27.23.0.29.23 Clear Line 23
.23 . .25.24.0.12.31 Gate type-in
.24 . .24.24.0.28.31 Test ready ; see below for 20 ; i.e. slash entry
.25 . .26.44.4.21.31 Exit to Line 4,44
      From Line 4 ;
.44 s .46.45.0.08.31 Type Carriage return
.45 . .45.45.0.28.31 Test ready
.46 . .00.26.0.00.00 Idle
.26 . u.27.u3.0.29.19 Clear Line 19
.u3 . u.00.27.0.23.19 Line 23 to Line 19, u4-u7
.27 . u.04.28.0.22.02 Line 19 format to Line 2,0-3
.28 . .30.u2.0.09.31 Type Line 19
.u2 . .u2.u2.0.28.31 Test ready ; reenter at u3 above when ready
      Enter here when slash typed from 24 above ;
.20 s .22.29.4.21.31 Exit to Line 4,29
      From Line 4 ;
.29 s .31.39.0.00.31 Set ready
.39 . .41.40.0.08.31 Type carriage return
.40 . .40.40.0.28.31 Test ready
.41 . .00.30.0.00.00 Idle
.30 . u.31.31.0.29.19 Clear Line 19
.31 . u.04.32.0.22.02 Line 19 format to Line 2,0-3
.32 . .33.34.0.04.28 Command to AR ; see 33 below
.34 . .36.u3.0.31.31 Obey AR
.33 s(u.00.35.0.23.19) From AR at u3 ; Line 23 to Line 19, u4-u7
.35 . .37.36.0.09.31 Type Line 19
.36 . .36.36.0.28.31 Test ready
.37 . u.38.38.0.04.19 Line 4 to Line 19
.38 . .39.23.6.21.31 Exit to Line 19,23 ; go to 23 above

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## BLOCK SELECTION - REEL 2

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.00 s u.01.02.0.19.00 Line 19 to Line 0
.02 . .04.05.0.21.31 Exit to Line 0,05
.01 s u.02.02.0.19.00 Line 19 to Line 0 ; (Test set on entry)
.05 s .06.07.0.00.25 Return command to ID,0
.06 s (.24.25.0.00.25)Return command; from LO at 22
.07 s .20.21.3.00.28 Enter loader check ; subtract summation loader from AR
.21 . u.22.91.1.00.29 Add all Line 0 (Loader)
.91 . u.00.08.3.00.29 Subtract Line 0, 92-u7 (Unused locations)
.08 . .09.10.0.28.27 Zero test AR ; ( Non zero = error )
      Below for LO
.11 s .12.13.0.00.28 xxxxxx0 to AR
.13 . w.19.16.0.21.31 Mark 19 ; exit to error output

.16 s .03.09.0.00.03 AR format to L3,03
.09 . .11.17.0.08.31 Type error indication
.17 . .17.17.0.28.31 Test ready
.18 . .20.19.0.20.31 Return command

.19 s .21.19.0.16.31 Halt ; Incorrect read-in of block selection routine

.10 s .22.22.0.25.00 Read-in checks ; return command to Line 0,22; execute
      return command
.24 s (.27.36.0.23.31)Return command; from LO at 22 ; clear; this command
      placed in ID,0 via O6 above
.25 s .27.27.0.15.31 Read tape (Interrogator routine)
.27 . .28.14.3.00.28 Clear and subtract summation of Interrogator from AR
.14 . .14.14.0.28.31 Test ready
.15 . u.16.23.0.19.05 Line 19 to Line 5
.23 . u.24.26.1.05.29 Add all Line 5
.26 . .28.29.0.28.27 Zero test AR; ( Non zero = error )
      Below for 29
.30 s .31.32.0.00.28 yyyyyy0 to AR
.32 . .34.16.0.21.31 Mark 33; exit to error output; see 16 above

.33 s .34.34.0.17.31 Ring bell
.34 . .36.35.0.06.31 Read back
.35 . w.25.17.0.21.31 Mark 25; exit to test ready; return at 25 above

.29 s .22.22.0.25.00 Return command to LO,22; execute return command

.36 s .40.41.1.26.23 Clear Line 23,0
.41 . .43.37.0.12.31 Gate type-in
.37 . .37.37.0.28.31 Test ready
.38 . .40.42.0.23.28 Line 23,0 to AR
.42 . .43.44.3.00.29 Subtract 0000010 from AR
.44 . .46.46.0.22.31 Test sign

.46 s .47.36.0.17.31 Ring bell; improper input; return to 36 above

.47 s .48.49.1.00.29 Add 0000008 to AR
.49 . .51.51.0.22.31 Test sign

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## BLOCK SELECTION - REEL 2

.52 s .53.36.0.17.31 Ring bell; improper input; return to 36 prec. page

.51 s .52.83.0.23.28 Typed test selection # to AR

.83 . u.96.64.2.28.29 Shift AR 12 bits left; i.e. test # to N# position

.64 . .65.74.0.00.29 Add dummy ; 002x000 ; N# = test # + 45

.74 . .22.22.0.28.00 AR to Line 0,22 ; execute do nothing from LO,22;  
branch to test selection

.53 s .87.69.3.00.28 Test 8 selected; clear and subtract 0000001 from AR

.69 . .71.71.0.15.31 Read tape

.71 . .87.72.1.00.29 Add 0000001 to AR

.72 . .72.72.0.28.31 Test ready

.73 . .75.68.0.28.27 Zero test AR ; ( Zero = end of search); if non zero,  
reenter at 69 above

.68 s .70.00.6.21.31 Exit to Line 19,00

.54 s .61.69.3.00.28 Test 9; subtract 0000006 from AR; go to 69 above

.55 s .62.69.3.00.28 Test u; subtract 0000009 from AR; go to 69 above

.56 s .63.69.3.00.28 Test v; subtract 000000x from AR; go to 69 above

.57 s .66.69.3.00.28 Test w; subtract 0000012 from AR; go to 69 above

.58 s .67.69.3.00.28 Test x; subtract 0000013 from AR; go to 69 above

.59 s .70.69.3.00.28 Test y; subtract 0000017 from AR; go to 69 above

.60 s .88.69.3.00.28 Test z; subtract 0000018 from AR; go to 69 above  
Enter at 04 from Diaper Reel 1 :

.04 s u.05.22.0.19.00 Line 19 to Line 0

.22 . .24.75.0.21.31 Exit to Line 0,75

.75 s .40.07.0.00.25 Return command to ID,0; see preceding page,07

.40 s (.50.25.0.00.25) From IO at 22 ; return command to ID,0; see 25 prec. pg.

.50 s(u.80.86.0.00.23) Commands to Line 23

.86 . .88.89.7.21.31 Exit to Line 23,89 ; begin memory conditioning

.77 s(u.90.90.2.05.06) From L23 at 89; basic transfer via AR command

.78 s(.93.95.0.23.26) From L23 at 90; Line 23,1 to PN,1

.79 s(.39.40.0.00.30) From L23 at 95; + 1 to S and + 1 to D

.76 s(.42.45.0.21.31) From L23 at 40; exit to Line 0,45

.45 s .49.80.1.26.23 Modified transfer via AR command to Line 23,1

.80 . .81.82.3.00.30 Subtract limit command from PN,1

.82 . .83.85.0.26.27 Zero test PN,1 ; ( PN,1 = -0000000 at limit ); to 86 if

.81 s(u.90.90.2.17.18) Limit command non zero; see above

.85 s .87.69.3.00.28 Clear and subtract 0000001 from AR ; go to 69 above  
for Test 8 search