

NO. 2172333  
SHEET 0  
OF 52

# DIAGNOSTIC TEST

DIPAL NAME IS DX02

TITLE CPU Test - DTX-02  
MACH. TYPE 1620-I BY HNJ APPR.        DATE       

## ENGINEERING CHANGE HISTORY

E/C NO.	DATE	SHEETS AFFECTED
404980	5-7-64	1 - 52

E/C NO.	404980						
DATE	5-7-64						

DT X02  
1620-1 CPU TEST

PROGRAM DESCRIPTION

DIPAL NAME DX02

1. Purpose

This program tests the circuitry used by the following operations:

BI/BN1 OVERFLOW INDICATOR  
BI/BN1 H1/PLUS INDICATOR  
BI/BN1 EQUAL/ZERO INDICATOR  
BI/BN1 H1/PLUS OR EQUAL/ZERO  
BTM  
BT  
CM  
C  
AM  
A  
SM  
S  
MM  
M  
LDM  
LD  
DM  
D

In addition, it tests the Sense/Branch Decoders for decoding Branch Modifiers, and Add Table Addressing.

2. Test Method

This program is a fault detection test, and is written in short, independent routines. There are three types of routines. The program deck is in standard SPS format and uses a standard loader. A listing and description of the loader is included.

a). Branch Tests

The Branch and Transmit operation and H/P, E/Z and OFLO conditional branches are tested. An error will cause an exit to a common error routine which will, if Switches 1 and 3 are off, type the address of the error exit.

b). Add Table Addressing

This section tests the Add operation for correct add table addressing for all digit combinations. A table lookup routine is used to check for correct results. The error routine will type the error exit, P and Q digits, and computed sum if Switches 1 and 3 are off.

c). Arithmetic Tests

A common test and error routine checks the results of all arithmetic operations, including Compare, for correct indicator conditions and arithmetic results. The error typeout gives the location of the routine, computed results and indicators, and expected results and indicators.

3. Modifications - This program cannot be independently loaded by DIPAL. It must be preceded by DTX01, and the two programs will be loaded as one. The operation from file will be the same as from cards.

4. Units of System Required

This program requires the 1620 CPU and 1622 reader or 1621 Paper Tape reader.

5. E/C Level

1620-1 E Suffix and above. A test for the optional feature Divide is included, but it may be bypassed.

LOADING INSTRUCTIONS

1. Clear Core by inserting 31 00003 00002.  
Release/Start
2. Load test deck from 1622 by pushing LOAD button.  
  
The program may also be loaded by turning Console Switch 4 off while running the 1620-1 Header test. In this case, both the Header test and DT X02 will operate as one program after DT X02 is loaded.
3. If Paper Tape reader is used DTX02 was loaded with DTX01.
4. Program will halt with 00011 in MAR after completion of loading. Set Console switches to the desired position and press START.

OPERATING INSTRUCTIONS

1. The Load Dividend and Divide tests may be bypassed by removing the eighth card from the end of the deck (Card No. 307).
2. No manual intervention other than the setting of the console switches is required for normal operation.
3. Console Program Switches

The Switches have the following functions in this program:

Switch 1	ON	Bypass all error routines
	OFF	Test Switch 3 on error
Switch 2	ON	Loop in test routine
	OFF	Continue to next routine
Switch 3	ON	Halt on error if Switch 1 OFF
	OFF	Typeout on error Switch 1 OFF
Switch 4	ON	Repeat program
	OFF	Load next program from 1622

4. Every 100 passes, the program will typeout the test name and total number of passes complete. At the completion of any pass and Switch 4 OFF, the test name and number of passes complete will be typed out, and the card reader will be selected.

5. Data Check Switches

The program assumes all data check switches are off, and monitors the check indicators for error checks.

6. Normal Program Halts

The only normal halt is at location 00000 in the SPS loader. Press start to execute the program.

ERROR INFORMATION

1. Error Halts

There are three error Halts in the program.

17356 Error in the Branch Test section. Display 1R2 for the location +12 of the error exit.

17550 Error in the Add Table Addressing test. The routine starts at 10630, and the error exit is at 10726.

16686 Error in the Arithmetic Test section. Display 1R2 for the location +12 of the error exit.

2. Error Typeouts

Explanations and examples of the error typeouts are given on Pages

ERROR TYPEOUTS

Example 1

This is a failure in the branch test section where there are no arithmetic results. The location refers to the error exit following an unsuccessful test.

Example 3

This is the error typeout for the add table addressing test. 09 + 09 are the highest values used. The typeout shows the "P" digit, "Q" digit and the computed sum.

Examples 2 and 4 - 7

This is the error typeout for the arithmetic operations, (compare, add, subtract, multiply and divide).

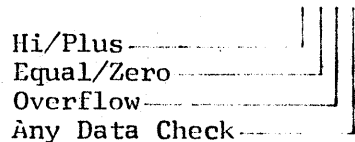
The first line gives the location of the first instruction in the test routine. The second line is the correct indicator conditions and arithmetic results. The third line is the indicators and arithmetic results of the operation being tested.

For a compare operation, only the indicators are typed out, since there are no arithmetic results. For a divide operation, the arithmetic results will be in two fields. The left most field is the quotient, the other is the remainder. It is in the same format as it would appear in the product area.

Line 1: ERROR IN ROUTINE AT  $\bar{1}1338$

The first instruction of the failing routine is at memory location 11338.

Line 2:                   0000                    $\bar{0}10816187\bar{5}$



This is what the results should be. The first four digits represent the indicator conditions. A one says the indicator should be on, a zero says it should be off. In this example, all indicators should be off. The second number is what the arithmetic result should be.

Line 3:                    $\bar{1}000$                     $\bar{0}87108827$

This is the actual results of the operation. The Hi/Plus indicator is wrong, as well as the numeric answer.

EXAMPLES:

For the details of the test routine causing any error typeout, refer to the program listing.

1. ERROR AT LOCATION 08024. See location 08024 of listing. The BV operation preceding the BTM did not branch.

2. ERROR IN ROUTINE AT 09844

1000 Correct indicators

1010 Incorrect indicators

A compare operation turned on the overflow indicator in error. The data field is blank, since there was no arithmetic results from the operation.

3. ERROR AT LOCATION 10726 1620 SAYS 8 + 8 = 15

This is an error in the add table addressing test. The first digit is the "P" digit, the second digit is the "Q" digit, and the last two digits are the computed sum.

4. ERROR IN ROUTINE AT 11338

0000 0108161875 Correct

1000 0887108927 Incorrect

Hi/Plus Indicator Wrong

5. ERROR IN ROUTINE AT 11640

0000 2899448 Correct

0000 4780508 Incorrect

6. ERROR IN ROUTINE AT 12978

1000 2000 Correct

1000 02000 Incorrect

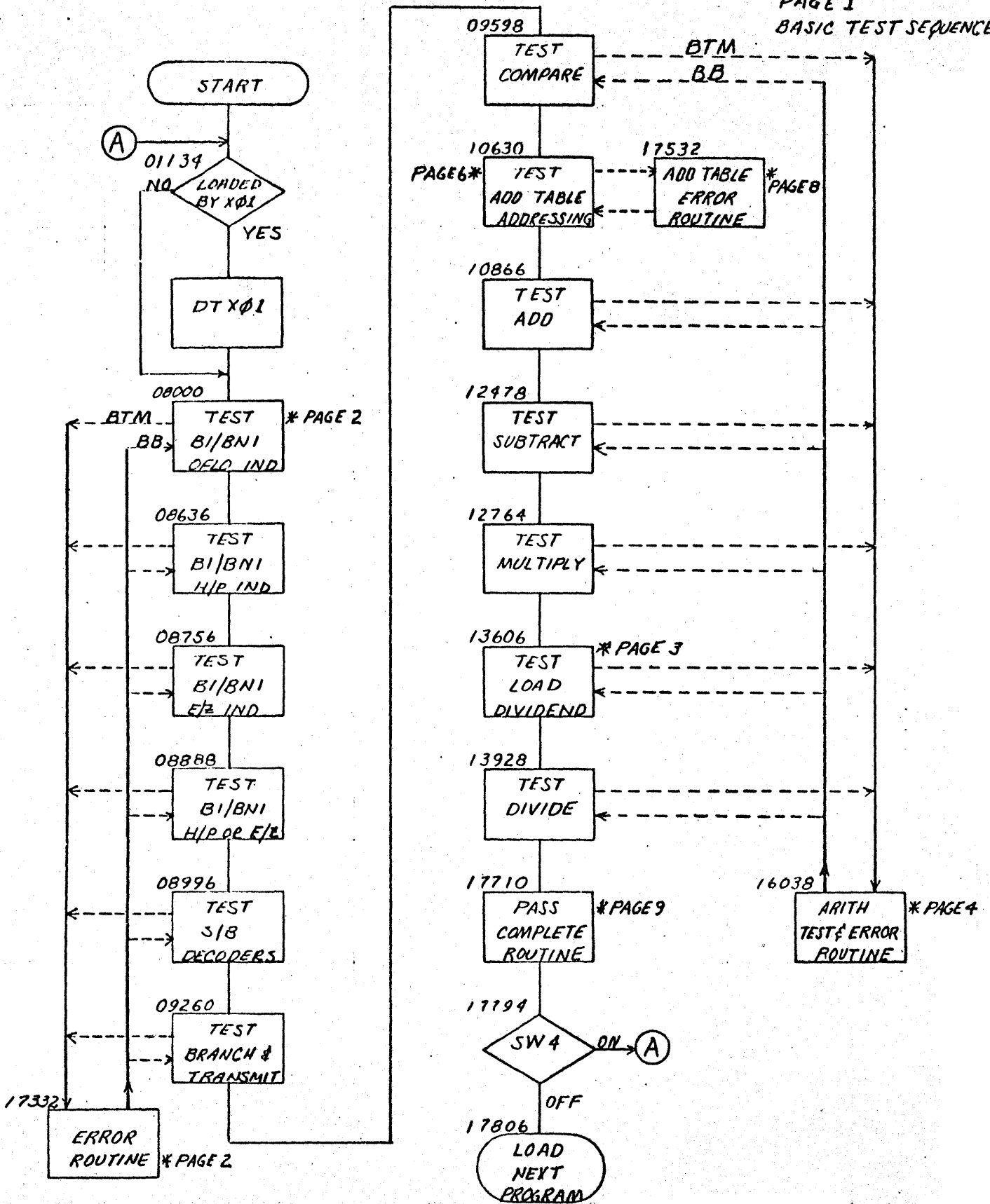
Wrong field length

7. ERROR IN ROUTINE AT 14916

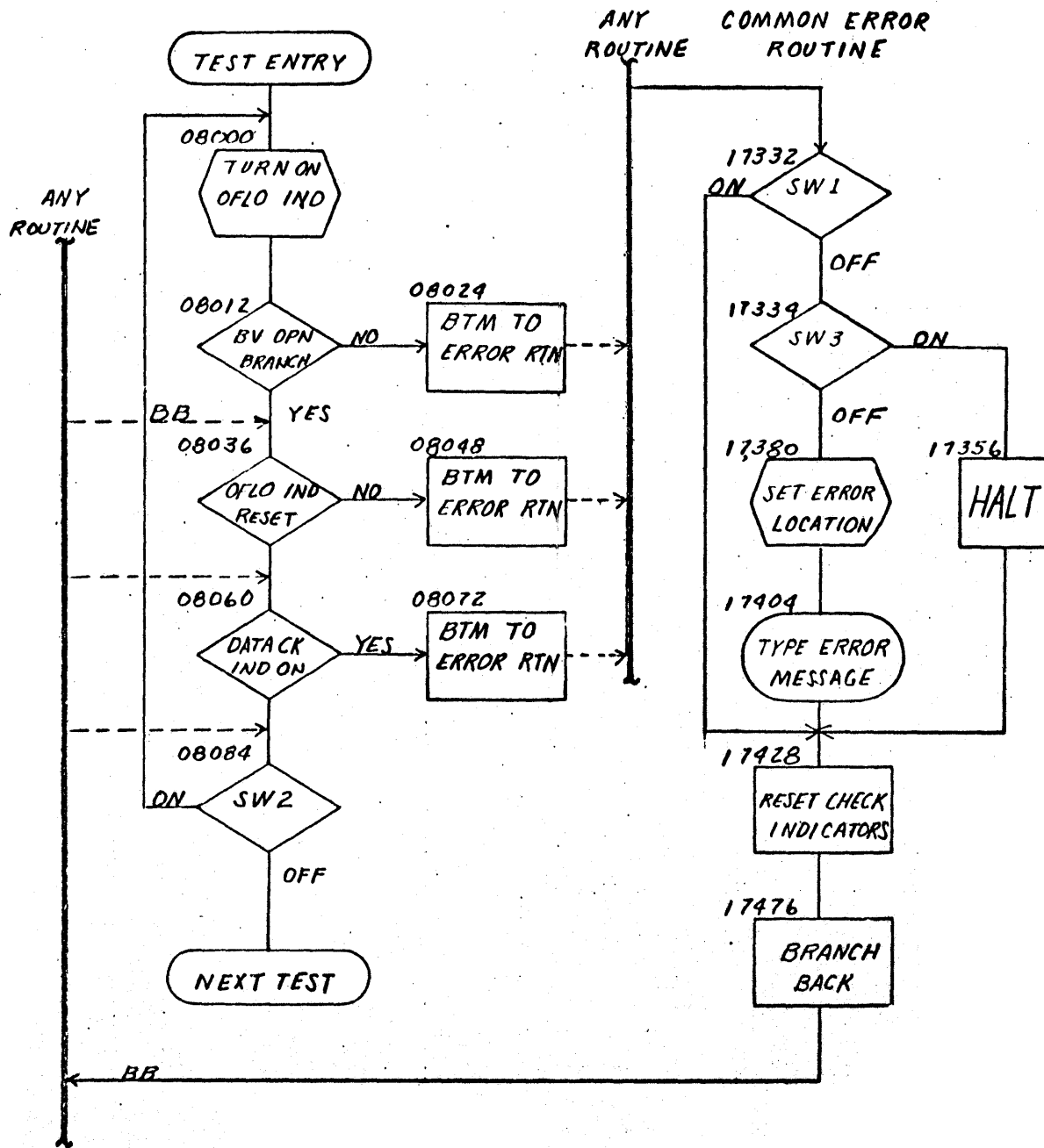
1000 000005969253182811876674033050 Correct

1000 000004969253182811876674033050 Incorrect

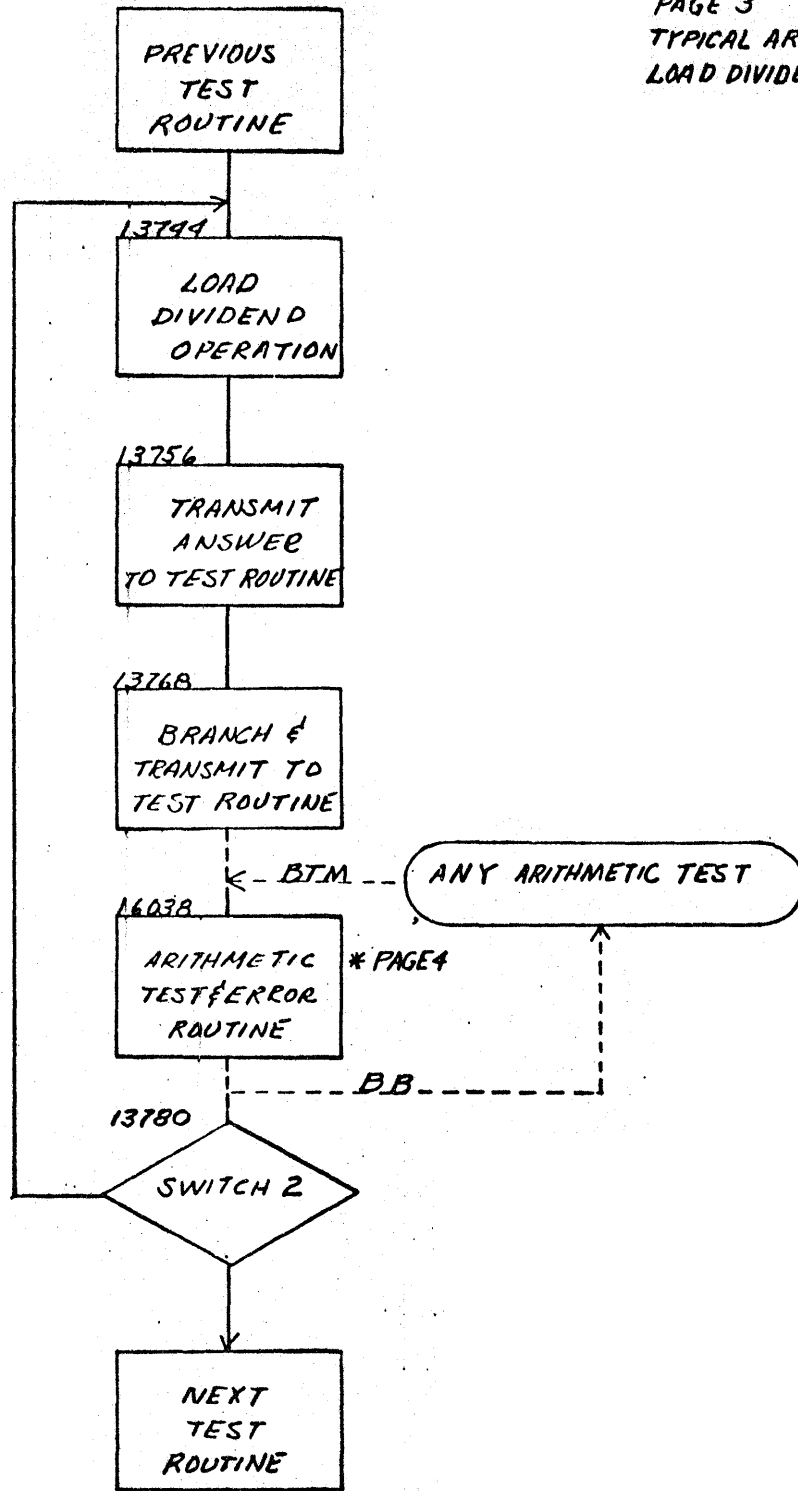
Quotient Remainder



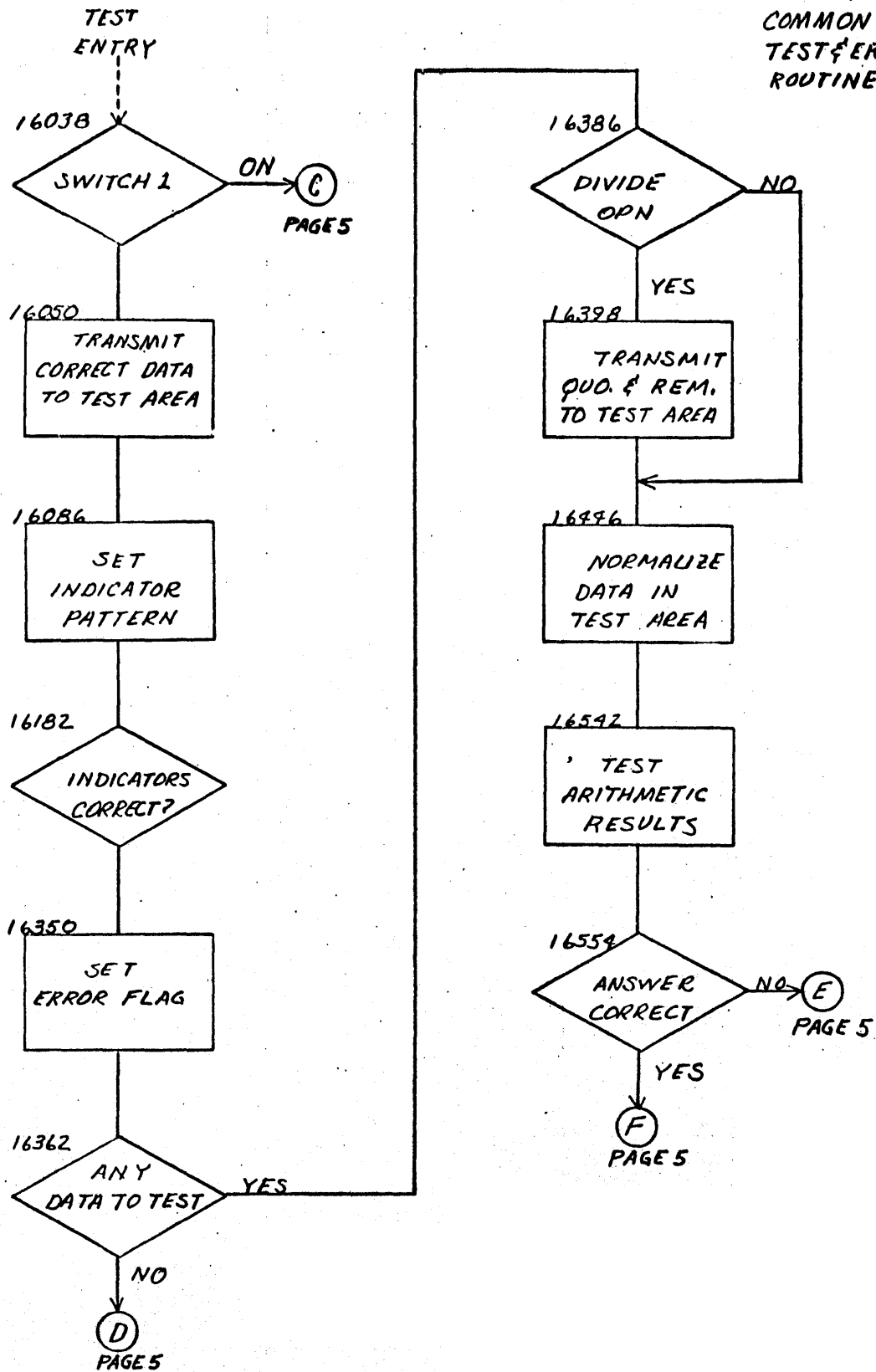
DTX02 FLOW CHART  
 PAGE 2  
 TYPICAL BRANCH TEST  
 ROUTINE AND  
 COMMON ERROR  
 ROUTINE

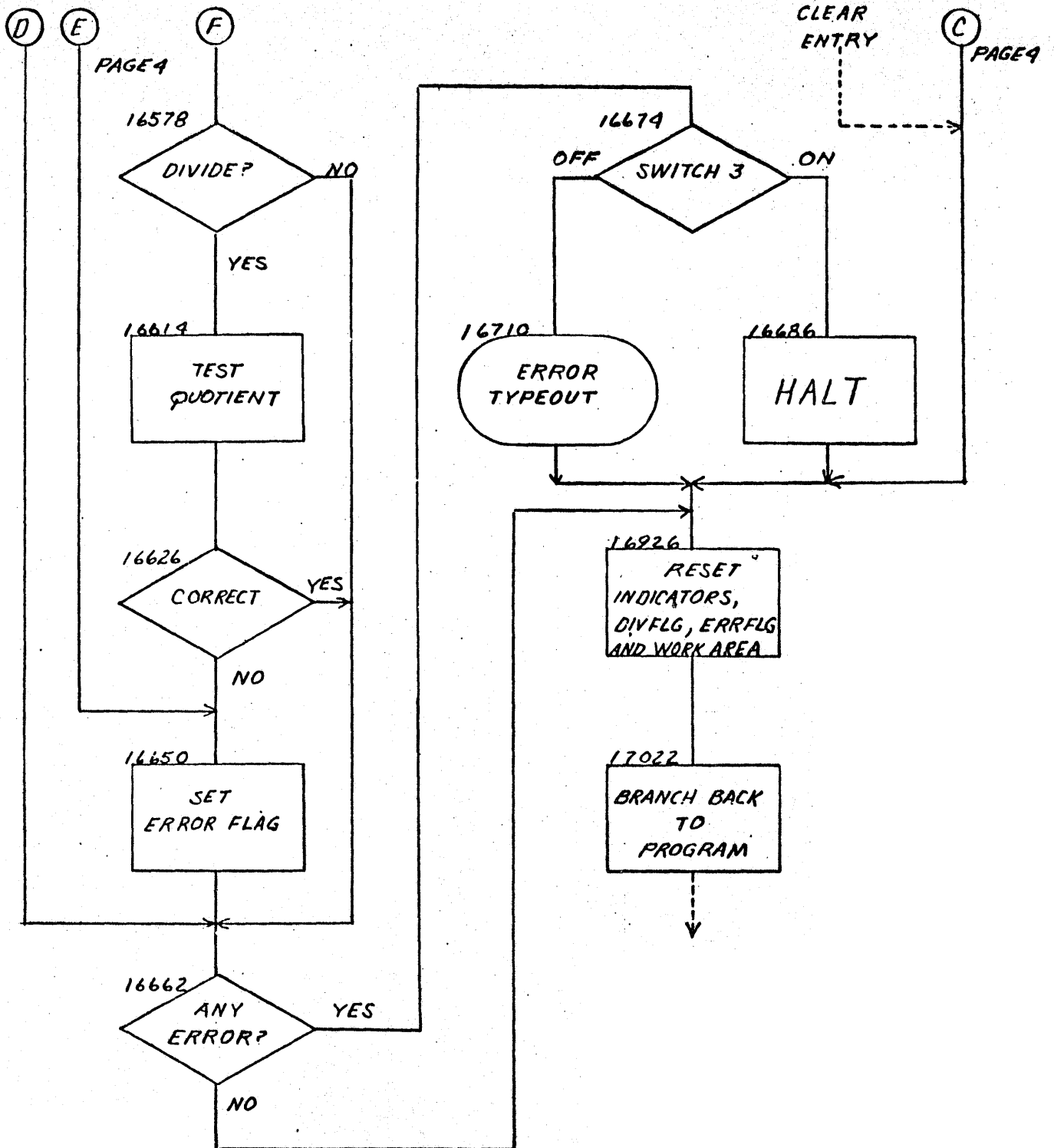




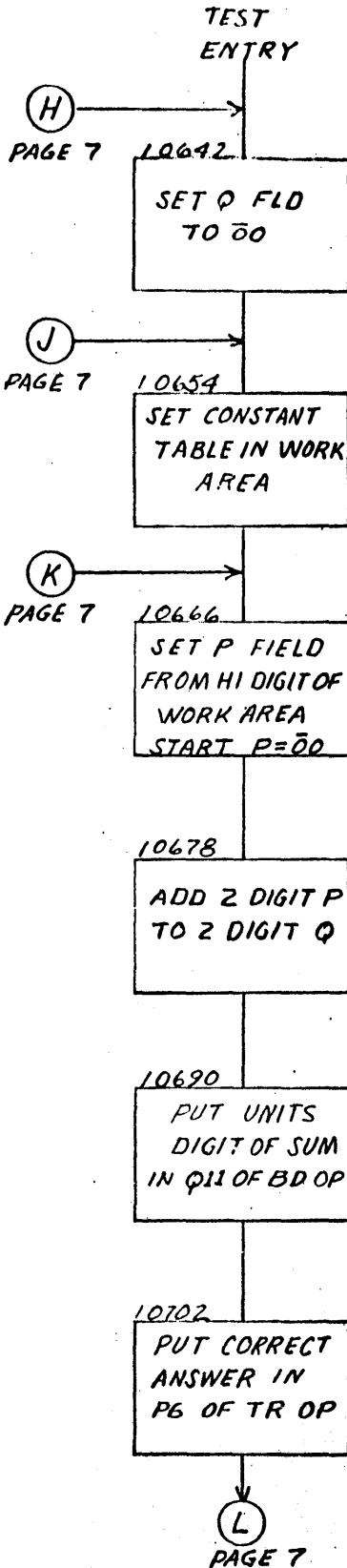


DTX02 FLOW CHART  
 PAGE 4  
 COMMON ARITH.  
 TEST & ERROR  
 ROUTINE





EXAMPLE



CONSTANT TABLE

0123456789012345678\*

1<sup>st</sup> PASS P=00. 00123456789012345678\* } WORK  
 2<sup>nd</sup> PASS P=03. 03456789012345678\*\*\* } AREA

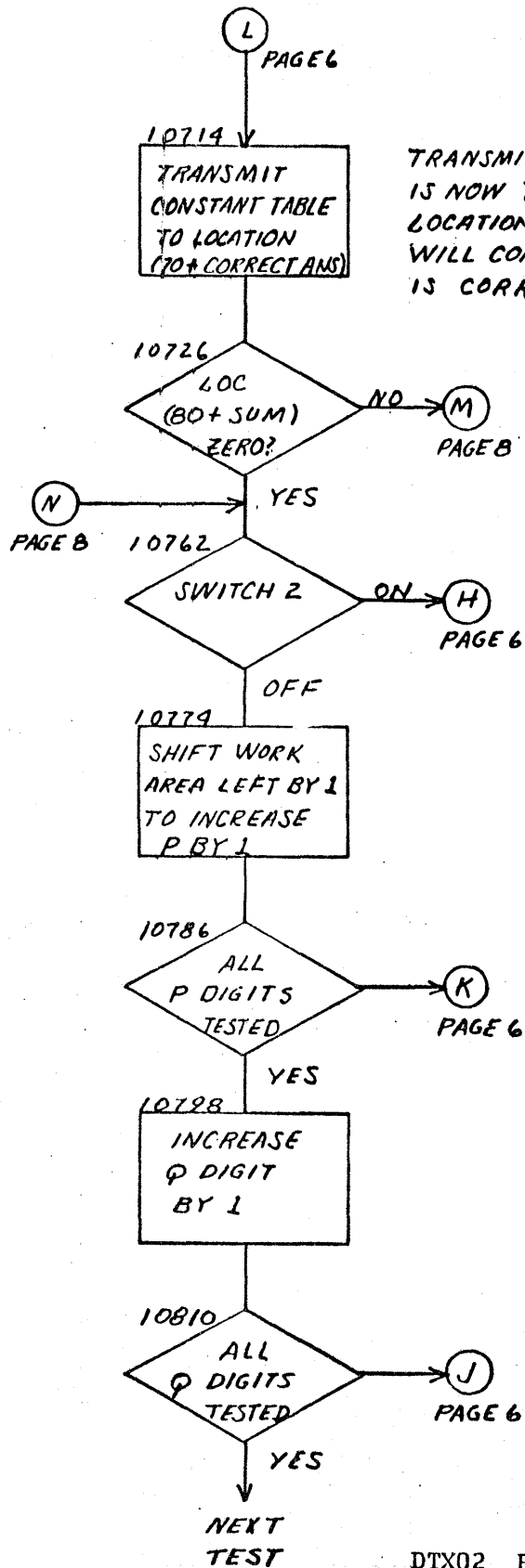
Q=00, P=00 0123456789012345678\*  
 Q=05, P=00 0123456789012345678\*  
 Q=05, P=03 0123456789012345678\*

ADD 05+03=08. ADJUSTED TR ADDRESS IS TR 00078, 10839 (PADR IS 70+CORRECT SUM). ADJUSTED BD ADDRESS IS BD 17532, 00088 (Q ADR IS 80+THE COMPUTED SUM). ANSWER IS CORRECT AND 88 CONTAINS ZERO.

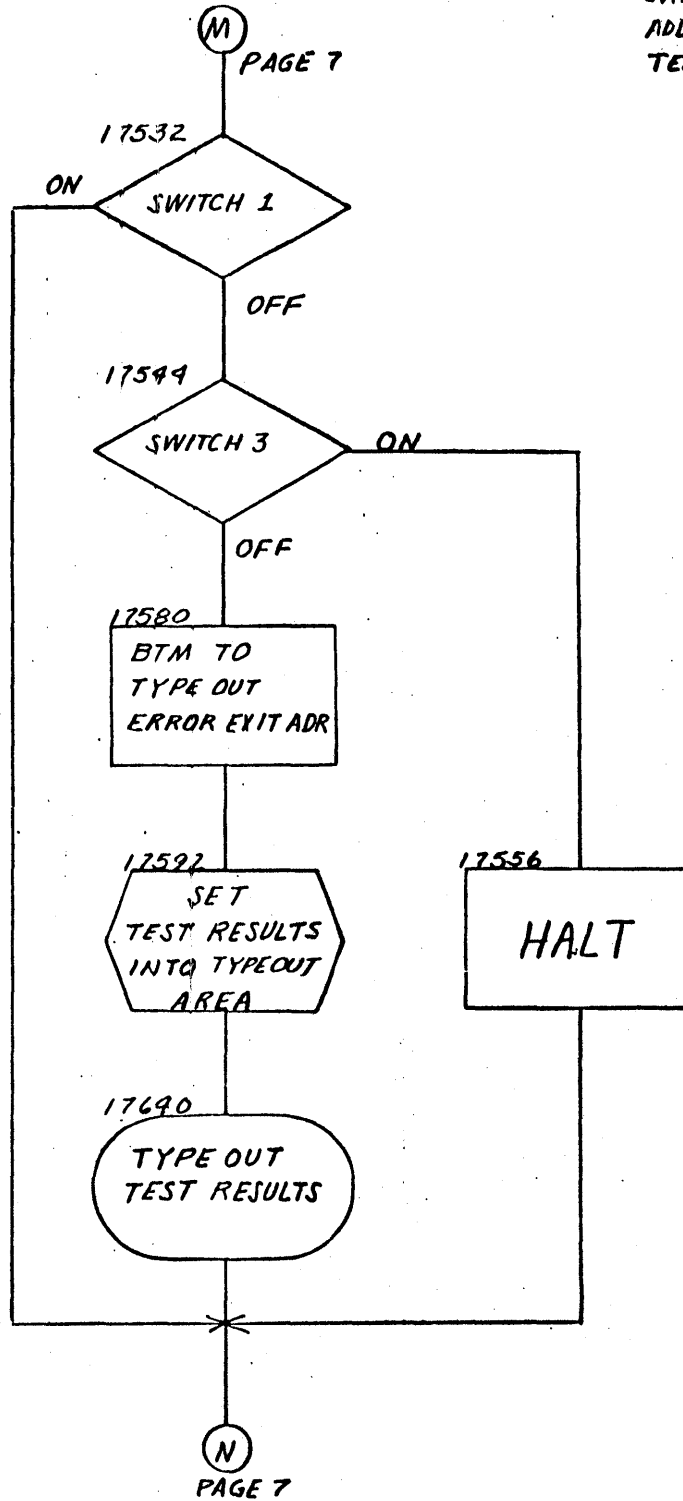
BD INST WILL BE BD 17532, (80+SUM)

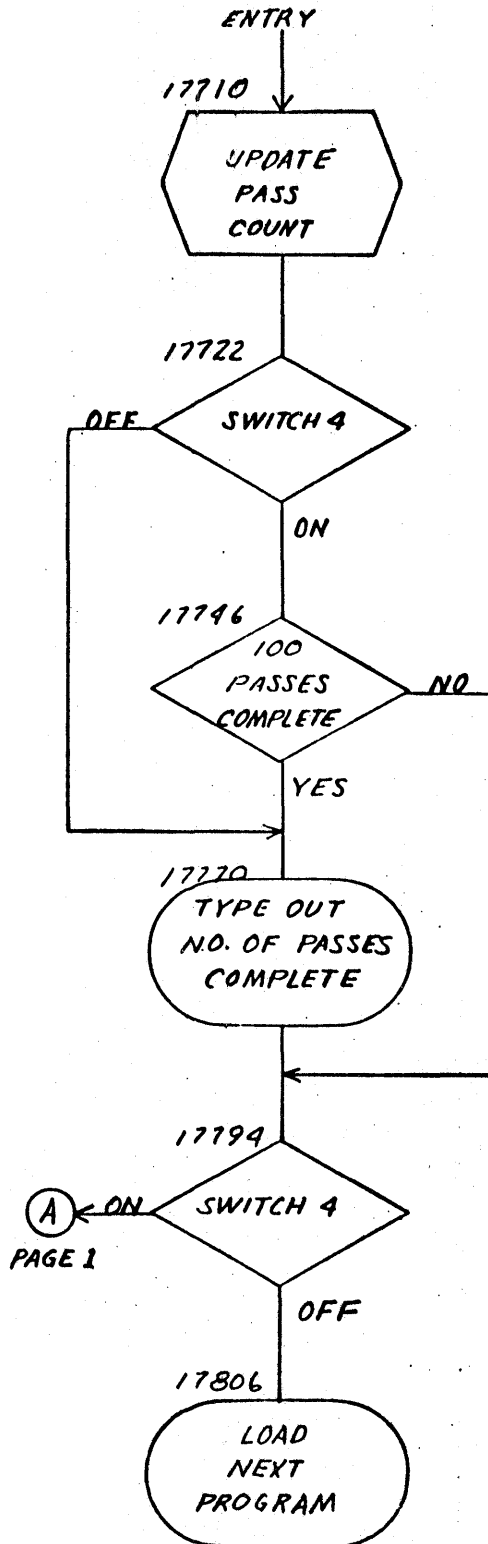
CORRECT ANSWER WILL BE IN LOC. (17100+Q DIGIT)

DTX02 FLOW CHART  
 PAGE 7  
 ADD TABLE ADDRESS  
 TEST



TRANSMIT RECORD INSTRUCTION IS NOW TR(70+COR.ANS.), 10839; LOCATION (80+COMPUTEDSUM) WILL CONTAIN ZERO IF SUM IS CORRECT.





SPS LOADER

<u>LOC</u>	<u>OPER</u>	<u>P</u>	<u>Q</u>	<u>REMARKS</u>
00000	RNCD	00072	00500	READ SECOND LOAD CARD
00012	RNCD	00201	00500	READ FIRST PROGRAM CARD INTO 201→280
00024	BNF	00012	00276	IGNORE CARD IF NO FLG IN COL 76
00036	TF	00059	00274	LOC OF LAST POSITION +1; A RM ON CARD
00048	TD	00011	00000	SAVE DIGIT THAT IS ALREADY IN LAST POSITION +1
00060	TF	00090	00269	269 HAS LOC FIRST INSTRUCTION TO BE STORED IN
00072	TF	00095	00264	LOC (01) IF A PROG CARD; (08 IF THIRD LOAD CARD)
00084	TR	00000	00200	RECORD FROM 201→272 TO LOCATION SPECIFIED BY CD
00096	TF	00114	00274	LAST LOCATION +1; HAS A RM
00108	TD	00000	00011	REPLACE RM WITH DIGIT SAVED IN LOC 11
00120	B	00012	00000	GO TO READ NEXT CARD
00096	RNCD	00000	00500	CARDS THREE AND FOUR REPLACE LOC 00000→00119
00108	B	00000		READS LOAD CARD FOUR AND PUTS IN LOC 00000
				NEXT INSTRUCTION COMES FROM CARD FOUR
00000	RNCD	00100	00500	(READ CARDS FIVE, SIX, SEVEN AND EIGHT)
00012	RNCD	00172	00500	( CONTAINS ADD AND MULTIPLY TABLES
00024	RNCD	00244	00500	(
00036	RNCD	00316	00500	(
00048	RNCD	00000	00500	READ CARD NINE INTO 00000, NEXT INST. COMES FROM LOC 60
				OF CARD NINE
00000	H	00000	00000	
00012	B	LOCX		BRANCH TO FIRST PROGRAM LOCATION
00019	z7	90123	43678	LAST TWELVE POSITIONS OF ADD TABLE
00031	#b	bbb		
00036	TR	00388	00019	TAKE LAST TWELVE POS OF ADD TABLE TO CORRECT LOCATION
00048	B	00000	00000	GO TO 00 FOR PROG HALT
00060	B	00036	00000	GO TO MOVE ADD TABLE



## SPS ASSEMBLED PROGRAM

The Symbolic Programming System permits the programmer to code in a symbolic language that is more meaningful and easy to handle than numerical machine language. SPS converts the symbolic instructions to machine language, assigns and keeps a record of storage locations, checks for coding errors, and punches out a machine language program deck or tape. It also allows additions, deletions and re-location of the program to be made quickly and easily.

### SAMPLE SPS LISTING

	Machine Language					Same as Source Card		
	Storage	Op	P	Q	Op			
	Adr	Code	Address	Address	Label	Code	Operands	Comments
Line 1	04806	26	19030	04868	AD6	TF	WORK,AP6,,	SET P
Line 2	04818	21	19030	04874		A	WORK,AQ6,,	ADD 3 DIGIT P TO 6 DIGIT Q
Line 3	04830	17	18038	-4875		BTM	TEST,CAD6-4,,	TEST SUM AND INDICATORS
Line 4	04842	46	04806	00200		BC2	AD6,,,	LOOP IF SW2 ON
Line 5	04854	49	04890	00000		B	AD7	
Line 6	04868		00003		AP6	DC	3,636,,	P
Line 7	04874		00006		AQ6	DC	6,999347,,	Q
Line 8	04879		00005	-4806	CAD6	DSA	AD6	
Line 9	04883		00004			DC	4,1010,,	INDICATORS
Line 10	04885		00002			DC	2,03,,	FLD LENGTH OF ANSWER
Line 11	04888		00003			DC	3,983,,	ANSWER
Line 12	04889		00001			DC	1,',,	RECORD MARK

This sample program listing from the diagnostic was assembled by the 1620/1710 SPS Programming System and listed on the 407. Since the 407 cannot print a flag, a flagged digit will be listed as alphabetic characters; flag zero as -, and flags 1-9 as J-R.

The following terms refer to the various fields of the symbolic instructions as they are written by the programmer:

**Label** - The symbolic storage address of data or instructions. It is assigned a numerical value during the assembly process. The symbols are arbitrarily chosen by the programmer and have no significance in other programs.

**Op Code** - The mnemonic representation of a two-digit operation code.

**Operands** - Either a symbolic or numerical value to define the information to be operated upon. They are used to define the P and Q fields, and positions of flags, if any, of a 1620 operation. Their use in a pseudo-instruction will be explained later.

**Comments** - The programmer may use this field for any comments he wishes to make. Comments have no effect on the assembled program. If an asterisk (\*) is placed in column 6 of the source card, columns 7 - 75 may be used for comments and will not affect the object program.

There are a number of operations in the SPS language which are not machine operations. These are sometimes referred to as Pseudo-ops or Pseudo-instructions. These pseudo-instructions are instructions to the SPS processor to perform certain functions. One class of these pseudo-instructions are termed "Declarative Operation Codes". These Op Codes provide the object program with Input/Output areas, work areas and constants. They do not produce instructions which are executed in the object program. For further information see the Reference Manual for 1620/1710 SPS, Form #C26-5600-0.

An explanation of each line of the sample arithmetic test listing follows:

Line 1 - AD6 is the symbolic location of the instruction, and is assigned the value 04806. TF is the mnemonic Op Code for Op 26. WORK is the symbolic P address and is assigned the value 19030. AP6 is the symbolic Q address and is assigned the value 04868. The absence of a third operand indicates that the programmer did not desire to place any flags in the assembled instruction. The comment "SET P" is a programmer note.

Line 2 - Same as Line 1

Line 3 - Same as Line 1 except this is an Immediate Op Code and the assembler automatically places a flag over Q7, unless otherwise instructed. The actual Q address is 04875, but the 407 lists it as -4875.

Line 4 - The assembler recognizes that the mnemonic Op BC2 requires a Q address of 00200, so the programmer does not have to define the Q address. The same machine instruction would have been assembled by writing BI AD6, 00200,, or 46 AD6,00200,,.

Line 5 - Same as above.

Line 6 - The pseudo-Op "DC" means define constant. The first operand, 3, says the constant field is to be 3 digits long. The second operand, 636, is the actual constant. A third operand would instruct the assembler the location to assign to the constant, but since it is missing, the assembler assigns an address. The label, AP6, is assigned the value of the address of the low order digit. In this example, AP6 is 04868, and the constant is located at 04866 through 04868. The comment "P" is a note indicating that 636 will be the P field for the arithmetic operation. The constant itself does not appear in the machine language listing, only the field length. From the machine language listing, we see that at address 04868, there is a 3 digit field.

Line 7 - Same as Line 6. A 6 digit field is stored at 04869-04874.

Line 8 - The pseudo-Op "DSA" means define symbolic address. In Line 1, AD6 was assigned the value 04806. DSA causes the 5 digit constant, 04806, to be stored at address 04879, and the label "CAD6" is assigned the value 04879.

Lines 9, 10, 11 - Same as Line 6 except there is no label.

Line 12 - The special character ' causes a record mark to be placed in the object program at location 04889.

## FORMAT OF THE OUTPUT DECK

The object program is preceded by two loader cards and followed by seven cards that perform the following:

1. Interrupt the loading sequence of the object program.
2. Load the arithmetic tables.
3. Branch to a Halt at completion of loading. Following the Halt will be a Branch to the start of the object program.

There are two card formats in the object program, one for instructions and one for constants.

Cards containing instructions:

They may contain from 1 to 5 instructions, or 12 to 60 characters. The last instruction is followed by a record mark.

Columns:	1-60	From 1 to 5 instructions
	61	‡ (record mark) if less than 5 instructions will follow last instruction
	62	0
	63-64	01
	65-69	Left most address where instructions are to be loaded.
	70-74	Right most address plus one, where instructions are to be loaded
	76	Flag only
	77-80	Card number

Cards containing constants:

They may contain from 1 to 60 characters followed immediately by a record mark.

Columns:	1-60	Constant
	61	‡ (record mark) if less than 60 characters, will follow last character.
	62	1
	63	01
	65-69	Left most address where constants are to be loaded
	70-74	Right most address plus one, where constants are to be loaded
	76	Flag only
	77-80	Card number

ADH/pvb  
3/20/63

OPERATION	OPERATION CODES		OPERANDS		Indicators Tested
	Numeric	Actual	P Address	Q Address	
Add	A	21	P Field Address	Q Field Address	
Add Immediate	AM	11	P Field Address	Data	
Branch	B	49	Branch to Address	Not Used	
Branch Any Data Check	BA	46	Branch to Address	01900	All Data Check Indicators
Branch Back	BB	42	Not Used	Not Used	
Branch Console Switch 1 ON	BC1	46	Branch to Address	00100	
Branch Console Switch 2 ON	BC2	46	Branch to Address	00200	
Branch Console Switch 3 ON	BC3	46	Branch to Address	00300	
Branch Console Switch 4 ON	BC4	46	Branch to Address	00400	
Branch On Digit	BD	43	Branch to Address	Location Tested	
Branch Equal	BE	46	Branch to Address	01200	E/Z
Branch High	BH	46	Branch to Address	01100	H/P
Branch Low	BL	47	Branch to Address	01300	H/P & E/Z
Branch Last Card	BLC	46	Branch to Address	00900	Last Card
Branch Negative	BN	47	Branch to Address	01300	H/P & E/Z
Branch Not Any Data Check	BNA	47	Branch to Address	01900	All Data Check Indicators
Branch Console Switch 1 OFF	BNC1	47	Branch to Address	00100	
Branch Console Switch 2 OFF	BNC2	47	Branch to Address	00200	
Branch Console Switch 3 OFF	BNC3	47	Branch to Address	00300	
Branch Console Switch 4 OFF	BNC4	47	Branch to Address	00400	
Branch Not Equal	BNE	47	Branch to Address	01200	E/Z
Branch No Flag	BNF	44	Branch to Address	Location Tested	

OPERATION	OPERATION CODES		OPERANDS		Indicators Tested
	Numeric	Actual	P Address	Q Address	
Branch Not High	BNH	47	Branch to Address	01100	H/P
Branch Not Low	BNL	46	Branch to Address	01300	H/P & E/Z
Branch Not Last Card	BNLC	47	Branch to Address	00900	Last Card
Branch Not Negative	BNN	46	Branch to Address	01300	H/P & E/Z
Branch Not Positive	BNP	47	Branch to Address	01100	H/P
Branch No Record Mark	BNR	45	Branch to Address	Location Tested	
Branch No Overflow	BNV	47	Branch to Address	01400	Overflow
Branch Not Zero	BNZ	47	Branch to Address	01200	E/Z
Branch Positive	BP	46	Branch to Address	01100	H/P
Branch and Transmit	BT	27	Branch to Address	Address of Field to be Transmitted	
Branch and Transmit Immediate	BTM	17	Branch to Address	Data to be Transmitted	
Branch Overflow	BV	46	Branch to Address	01400	Overflow
Branch Zero	BZ	46	Branch to Address	01200	E/Z
Compare	C	24	P Field Address	Q Field Address	
Clear Flag	CF	33	Location to be Cleared	Not Used	
Compare Immediate	CM	14	P Field Address	Data	
Divide	D	29	P Field Address	Q Field Address	
Divide Immediate	DM	19	P Field Address	Data	
Halt	H	48	Not Used	Not Used	
Load Dividend	LD	28	P Field Address	Q Field Address	
Load Dividend Immediate	LDM	18	P Field Address	Data	
Multiply	M	23	P Field Address	Q Field Address	
Multiply Immediate	MM	13	P Field Address	Data	

OPERATION	OPERATION CODES		OPERANDS		Indicators Tested
	Numeric	Actual	P Address	Q Address	
No Operation	NOP	41	Not Used	Not Used	
Subtract	S	22	P Field Address	Q Field Address	
Set Flag	SF	32	Location to be Set	Not Used	
Subtract Immediate	SM	12	P Field Address	Data	
Transmit Digit	TD	25	Transmit to Address	Transmit from Address	
Transmit Digit Immediate	TDM	15	Transmit to Address	Digit at Q11	
Transmit Field	TF	26	Transmit to Address	Transmit from Address	
Transmit Field Immediate	TFM	16	Transmit to Address	Data	
Transmit Record	TR	31	Transmit to Address	Transmit from Address	
Dump Numerically Card	DNCD	35	Data Address	00400	
Dump Numerically Paper Tape	DNPT	35	Data Address	00200	
Dump Numerically Typewriter	DNTY	35	Data Address	00100	
Return Carriage Typewriter	RCTY	34	Not Used	00102	
Space Typewriter	SPTY	34	Not Used	00101	
Tabulate Typewriter	TBTY	34	Not Used	00108	
Read Alphamerically Card	RACD	37	Input Data Address	00500	
Read Alphamerically Paper Tape	RAPT	37	Input Data Address	00300	
Read Alphamerically Typewriter	RATY	37	Input Data Address	00100	
Read Numerically Card	RNCD	36	Input Data Address	00500	
Read Numerically Paper Tape	RNPT	36	Input Data Address	00300	

OPERATION	OPERATION CODES		OPERANDS		Indicators Tested
	Numeric	Actual	P Address	Q Address	
Read Numerically Typewriter	RNTY	36	Input Data Address	00100	
Write Alphamerically Card	WACD	39	Output Data Address	00400	
Write Alphamerically Paper Tape	WAPT	39	Output Data Address	00200	
Write Alphamerically Typewriter	WATY	39	Output Data Address	00100	
Write Numerically Card	WNCD	38	Output Data Address	00400	
Write Numerically Paper Tape	WNPT	38	Output Data Address	00200	
Write Numerically Typewriter	WNTY	38	Output Data Address	00100	

ADH/pvb

3/18/63

\*  
\*  
\*  
\*  
\*  
DT X02  
BASIC 1620-1 CPU TEST

LINKAGE TO DTX01

01184  
01192 00009  
04208  
04208 49 08000 00000  
07900

DORG 1184  
DC 9,4904208Q',, WILL BE THROWN AWAY IF LOADED BY DTX01  
DORG 4208  
B 8000  
DORG 7900

\*  
\*  
\*  
\*  
\*  
DIPAL LINKAGE

07901 00004  
07912 00005 J7998  
07914 45 07938 18117  
07926 49 07962 00000  
07938 45 01184 07961  
07950 49 00440 00000  
07962 15 07961 00000  
07973 00001  
07974 49 18000 00000

LINK

DAC 4,DX02,  
DSA 17998  
BNR \*\*24,18117  
B \*\*36  
BNR T24.5,\*\*23  
B 440  
TDM \*-1,,,  
DC 1,',\*  
B 18000  
SET FLAG TO INEN DISK INPUT

08000

DORG 8000  
TEST THE BRANCH ON OVERFLOW AND BRANCH NO OVERFLOW  
OPERATION. THE OVERFLOW INDICATOR IS TURNED ON BY  
A COMPARE OPERATION USING A 2 DIGIT P AND A 3 DIGIT Q.

08000 14 08008 -0-00  
08012 46 08036 01400  
08024 17 17332 -8024  
08036 47 08060 01400  
08048 17 17332 -8048  
08060 47 08084 01900  
08072 17 17332 -8072  
08084 46 08000 00200

BV1

CM \*\*8,0,79, TURN ON OFLO IND  
BV \*\*24,,,  
BTM ERROR,,,  
BNV \*\*24,,,  
BTM ERROR,,,  
BNA \*\*24,,,  
BTM ERROR,,,  
BC2 BV1,,,  
OFLO ON, SHOULD BRANCH  
BV SHOULD HAVE BRANCHED  
OFLO SHOULD HAVE BEEN RESET  
BNV SHOULD HAVE BRANCHED  
TEST ANY DATA CHECK  
DATA CHECK ERROR  
LOOP IF SW2 ON

08096 14 08104 -0-00  
08108 47 08132 01400  
08120 49 08144 00000  
08132 17 17332 -8132  
08144 46 08168 01400  
08156 49 08180 00000  
08168 17 17332 -8168  
08180 47 08204 01900  
08192 17 17332 -8192  
08204 46 08096 00200

BV2

CM \*\*8,0,79, TURN ON OFLO IND  
BNV \*\*24,,,  
B \*\*24,,,  
BTM ERROR,,,  
BV \*\*24,,,  
B \*\*24,,,  
BTM ERROR,,,  
BNA \*\*24,,,  
BTM ERROR,,,  
BC2 BV2,,,  
OFLO ON, SHOULD NOT BRANCH  
GOOD  
BNV SHOULD NOT HAVE BRANCHED  
OFLO SHOULD HAVE BEEN RESET  
GOOD  
BV SHOULD NOT HAVE BRANCHED  
TEST ANY DATA CHECK  
DATA CHECK ERROR  
LOOP IF SW2 ON

\*  
\*  
\*  
\*  
\*  
THE NEXT SEQUENCE CHECKS THE SENSE/BRANCH DECODERS  
THAT ONLY BV AND BNV OPERATIONS WILL RESET THE  
OVERFLOW INDICATOR.

08216 14 08224 -0-00  
08228 46 08240 01100  
08240 46 08264 01400  
08252 17 17332 -8252  
08264 47 08288 01900  
08276 17 17332 -8276

BV3

CM \*\*8,0,79, TURN ON OFLO IND  
BI \*\*12,1100,, SHOULD NOT RESET OFLO IND  
BV \*\*24,,,  
BTM ERROR,,,  
BNA \*\*24,,,  
BTM ERROR,,,  
OFLO SHOULD BE ON  
BV SHOULD HAVE BRANCHED  
TEST ANY DATA CHECK  
DATA CHECK ERROR



08288 46 08216 00200

BC2 BV3,,, LCOP IF SW2 ON

08300 14 08308 -0-00  
08312 46 08324 01500  
08324 46 08348 01400  
08336 17 17332 -8336  
08348 47 08372 01900  
08360 17 17332 -8360  
08372 46 08300 00200

\*  
\*  
BV4 CM \*\*8,0,79, TURN ON OFLO IND  
SI \*\*12,1500,, SHOULD NOT RESET OFLO IND  
BV \*\*24,,, OFLO SHOULD BE ON  
BTM ERROR,,, BV SHOULD HAVE BRANCHED  
BNA \*\*24,,, TEST ANY DATA CHECK  
BTM ERROR,,, DATA CHECK ERROR  
BC2 BV4,,, LOOP IF SW2 ON

08384 14 08392 -0-00  
08396 46 08408 01700  
08408 46 08432 01400  
08420 17 17332 -8420  
08432 47 08456 01900  
08444 17 17332 -8444  
08456 46 08384 00200

\*  
\*  
BV5 CM \*\*8,0,79, TURN ON OFLO IND  
BI \*\*12,1700,, SHOULD NOT RESET OFLO  
BV \*\*24,,, OFLO SHOULD BE ON  
BTM ERROR,,, BV SHOULD HAVE BRANCHED  
BNA \*\*24,,, TEST ANY DATA CHECK  
BTM ERROR,,, DATA CHECK ERROR  
BC2 BV5,,, LCOP IF SW2 ON

08468 14 08476 -0-00  
08480 46 08492 02400  
08492 46 08516 01400  
08504 17 17332 -8504  
08516 47 08540 01900  
08528 17 17332 -8528  
08540 46 08468 00200

\*  
\*  
BV6 CM \*\*8,0,79, TURN ON OFLO IND  
BI \*\*12,2400,, SHOULD NOT RESET OFLO  
BV \*\*24,,, OFLO SHOULD BE ON  
BTM ERROR,,, BV SHOULD HAVE BRANCHED  
BNA \*\*24,,, TEST ANY DATA CHECK  
BTM ERROR,,, DATA CHECK ERROR  
BC2 BV6,,, LOOP IF SW2 ON

08552 14 08560 -0-00  
08564 25 01400 01400  
08576 46 08600 01400  
08588 17 17332 -8588  
08600 47 08624 01900  
08612 17 17332 -8612  
08624 46 08552 00200

\*  
\*  
BV7 CM \*\*8,0,79, TURN ON OFLO IND  
TD 1400,1400,, SHOULD NOT RESET OFLO  
BV \*\*24,,, OFLO SHOULD BE ON  
BTM ERROR,,, BV SHOULD HAVE BRANCHED  
BNA \*\*24,,, TEST ANY DATA CHECK  
BTM ERROR,,, DATA CHECK ERROR  
BC2 BV7,,, LOOP IF SW2 ON

\*  
\*  
\* THE FOLLOWING SECTION TESTS BI AND BNI OPERATION  
\* USING THE HI/PLUS AND EQUAL/ZERO INDICATORS. THESE  
\* INDICATORS ARE SET AND RESET WITH COMPARE IMMEDIATE  
\* OPERATIONS.  
\*

08636 14 08645 0J1J0  
08648 46 08672 01100  
08660 17 17332 -8660  
08672 46 08696 01300  
08684 17 17332 -8684  
08696 47 08720 01200  
08708 17 17332 -8708  
08720 47 08744 01900  
08732 17 17332 -8732  
08744 46 08636 00200

\*  
\*  
\* HZ1 CM \*\*9,1110,810, TURN H/P ON AND E/Z OFF  
BP \*\*24,,, SHOULD BRANCH ON H/P ON  
BTM ERROR,,, BP SHOULD HAVE BRANCHED  
BNL \*\*24,,, BRANCH ON H/P OR E/Z ON  
BTM ERROR,,, BNL SHOULD HAVE BRANCHED  
BNZ \*\*24,,, BRANCH ON E/Z OFF  
BTM ERROR,,, BNZ SHOULD HAVE BRANCHED  
BNA \*\*24,,, TEST ANY DATA CHECK  
BTM ERROR,,, DATA CHECK ERROR  
BC2 HZ1,,, LOOP IF SW2 ON

08756 14 08765 0-0-0  
08768 46 08792 01200  
08780 17 17332 -8780

\*  
\*  
\* HZ2 CM \*\*9,0,810, TURN H/P OFF AND E/Z ON  
BZ \*\*24,,, BRANCH ON E/Z ON  
BTM ERROR,,, BZ SHOULD HAVE BRANCHED

08792 46 08816 01300  
 08804 17 17332 -8804  
 08816 46 08840 01100  
 08828 49 08852 00000  
 08840 17 17332 -8840  
 08852 47 08876 01900  
 08864 17 17332 -8864  
 08876 46 08756 00200

BNL \*\*24,,, BRANCH ON H/P OR E/Z ON  
 BTM ERROR,,, BNL SHOULD HAVE BRANCHED  
 BP \*\*24,,, H/P OFF,BP SHOULDN'T BRANCH  
 B \*\*24,,, GOOD  
 BTM ERRDR,,, BP SHOULDN'T HAVE BRANCHED  
 BNA \*\*24,,, TEST ANY DATA CHECK  
 BTM ERROR,,, DATA CHECK ERROR  
 BC2 HZ2,,, LOOP IF SW2 ON

08888 14 08897 0J0J1  
 08900 47 08924 01300  
 08912 17 17332 -8912  
 08924 46 08948 01300  
 08936 49 08960 00000  
 08948 17 17332 -8948  
 08960 47 08984 01900  
 08972 17 17332 -8972  
 08984 46 08888 00200

HZ3

CM \*\*9,1011,810, TURN BOTH H/P AND E/Z OFF  
 BL \*\*24,,, BRANCH ON H/P AND E/Z OFF  
 BTM ERROR,,, BL SHOULD HAVE BRANCHED  
 BNL \*\*24,,, H/P AND E/Z OFF,SHOULDN'T BRANCH  
 B \*\*24,,, GOOD  
 BTM ERROR,,, BNL SHOULDN'T HAVE BRANCHED  
 BNA \*\*24,,, TEST ANY DATA CHECK  
 BTM ERROR,,, DATA CHECK ERROR  
 BC2 HZ3,,, LOOP IF SW2 ON

THE NEXT SEQUENCE OF TESTS CHECK MORE OF THE  
 SENSE/BRANCH DECODERS.

08996 14 09005 0J1J0  
 09008 47 09032 01700  
 09020 17 17332 -9020  
 09032 47 09056 01800  
 09044 17 17332 -9044  
 09056 47 09080 02100  
 09068 17 17332 -9068  
 09080 47 09104 02300  
 09092, 17 17332 -9092  
 09104 47 09128 01900  
 09116 17 17332 -9116  
 09128 46 08996 00200

DEC1

ALL OF THE FOLLOWING BNI OPERATIONS SHOULD BRANCH  
 CM \*\*9,1110,810, TURN H/P ON AND E/Z OFF  
 BNI \*\*24,1700  
 BTM ERROR,,,  
 BNI \*\*24,1800  
 BTM ERRDR,,,  
 BNI \*\*24,2100  
 BTM ERRDR,,,  
 BNI \*\*24,2300  
 BTM ERRDR,,,  
 BNA \*\*24,,, TEST ANY DATA CK  
 BTM ERROR,,, DATA CHECK ERROR  
 BC2 DEC1,,, LOOP IF SW2 ON

09140 14 09149 0-0-0  
 09152 47 09176 01500  
 09164 17 17332 -9164  
 09176 47 09200 01600  
 09188 17 17332 -9188  
 09200 47 09224 02200  
 09212 17 17332 -9212  
 09224 47 09248 01900  
 09236 17 17332 -9236  
 09248 46 09140 00200

DEC2

THE FOLLOWING BNI OPERATIONS SHOULD BRANCH  
 CM \*\*9,0,810, TURN H/P OFF AND E/Z ON  
 BNI \*\*24,1500  
 BTM ERROR,,,  
 BNI \*\*24,1600  
 BTM ERROR,,,  
 BNI \*\*24,2200  
 BTM ERROR,,,  
 BNA \*\*24,,, TEST ANY DATA CHECK  
 BTM ERROR,,, DATA CHECK ERROR  
 BC2 DEC2,,, LOOP IF SW2 ON

09260 17 09284 000-0  
 09272 41 00000 0C000  
 09284 17 09308 000-0  
 09296 49 09320 00000  
 09308 42 00000 00000  
 09320 47 09344 01900

BT1

BTM \*\*24,0,10, TWO SUCCESSIVE BTM OPNS TO CHECK  
 NOP,,, THAT IR2 IS CLEARED BY BT  
 BTM \*\*24,0,10, IF NOT THERE SHOULD BE A MAR CHECK  
 B \*\*24,,, GO AHEAD,IT LOOKS GOOD  
 BB  
 BNA \*\*24

09332 17 17332 -9332  
09344 46 09260 00200

BTM ERROR,\*,,  
BC2 BT1,,, LOOP IF SW2 ON

09356 26 09427 09579  
09368 27 09428 09585  
09380 43 09404 09421  
09392 17 17332 -9392  
09404 49 09524 00000  
09416 41 00000 00000

\*  
\*  
\*  
\*  
BT2 TF NOP+11,OHS,, CLEAR XMIT AREA  
BT NOP+12,RM,, TEST BT, 5 DIGITS AND RM  
BD \*\*24,NOP+5  
BTM ERROR,\*,,  
B ET,,, BT TEST COMPLETE  
NOP NOP

09428 45 09476 09427  
09440 43 09464 09426  
09452 49 09476 00000  
09464 43 09500 09422  
09476 17 17332 -9476  
09488 49 09524 00000  
09500 25 09421 09424  
09512 42 00000 00000  
09524 47 09548 01900  
09536 17 17332 -9536  
09548 46 09356 00200  
09560 49 09586 00000

\*  
\* BT BRANCHED HERE. TEST THE TRANSMISSION AND  
\* SET UP THE DIGIT TO BE TESTED AFTER BRANCH BACK  
\*  
BNR \*\*48,NOP+11,, CHECK RM  
BD \*\*24,NOP+10,, CHECK LO POSITION  
B \*\*24,,,  
BD \*\*36,NOP+6,, CHECK HI POSITION  
BTM ERROR,\*,,  
B ET,,, SKIP REST OF TEST  
TD NOP+5,NOP+8,, SET UP DIGIT TO BE TESTED AFTER BB  
BB  
ET BNA \*\*24  
BTM ERROR,\*,,  
BC2 BT2,,, LOOP  
B COMO-12

09579 00008  
09584 00005  
09585 00001

\*  
\* DATA FOR BRANCH AND TRANSMIT TESTS  
\*  
OHS DC 8,0,, B ZEROS  
DC 9,19375  
RM DC 1,'

09586 17 16926 -9586  
09598 16 17130 K089J  
09610 16 09686 K089J  
09622 14 17130 K089J  
09634 24 09686 17130  
09646 17 16038 -9687  
09658 46 09598 00200  
09670 49 09700 00000

\*  
\* IF WE REACHED THIS POINT WITHOUT AN ERROR, ALL  
\* TRANSMIT AND BRANCH OPERATIONS WORKED CORRECTLY.  
\* THEREFORE WE PROCEED INTO THE ARITHMETIC TEST USING  
\* THE AFOREMENTIONED OPERATIONS TO CHECK FOR CORRLCT  
\* RESULTS  
\*  
\* THIS SECTION TESTS THE COMPARE OPERATION FOR CORRECT  
\* OPERATION OF ALL PROGRAMMABLE INDICATORS.  
\*  
BTM CLEAR,\*,, GO TO RESET ALL INDICATORS  
\* TEST COMPARE OPERATION  
COMO TFM WORK,20891,711,SET P FLD FOR FIRST COMPARE  
TFM COMW,20891,711,SET P FLD FOR SECOND COMPARE  
CM WORK,20891,711,COMPARE EQUALS  
C COMW,WORK,, SEE IF P FIELD WAS MODIFIED  
BTM TEST,CCOMO-4,, GO TEST INDICATORS  
BC2 COMO,,, LOOP IF SW2 ON  
B COM1,,,

09686 00005

\* TESTDATA  
COMW DC 5,0,, P FIELD FOR SECOND COMPARE

09691 00005 -9598  
09695 00004  
09697 00002  
09698 00001

CCOMO DSA COMO  
DC 4,0100,, INDICATORS  
DC 2,00,, FLD LENGTH OF ANSWER  
DC 1,, RECORD MARK

09700 16 17130 000-0  
09712 14 17130 000-0  
09724 17 16038 -9760  
09736 46 09700 00200  
09748 49 09772 00000

\*  
\*  
\* TEST COMPARE OPERATION  
COM1 TFM WORK,0,10, SET P FLD  
CM WORK,0,10, COMPARE 00 AND 00  
BTM TEST,CCOM1-4,, GO TO TEST INDICATORS  
BC2 COM1,,, LOOP IF SW2 ON  
B COM1A

09764 00005 -9700  
09768 00004  
09770 00002  
09771 00001

\*  
\* TESTDATA  
CCOM1 DSA COM1  
DC 4,0100,, INDICATOR  
DC 2,0,, FLD LENGTH OF ANSWER  
DC 1,, RECORD MARK

09772 16 17130 000--  
09784 14 17130 00-00  
09796 17 16038 -9832  
09808 46 09772 00200  
09820 49 09844 00000

\*  
\* TEST COMPARE OPERATION  
COM1A TFM WORK,0,1011, SET P FLD  
CM WORK,0,9, COMPARE -00 AND +000  
BTM TEST,CCOM1A-4,, GO TEST INDICATORS  
BC2 COM1A,,, LOOP IF SW2 ON  
B COM2

09836 00005 -9772  
09840 00004  
09842 00002  
09843 00001

\*  
\* TESTDATA  
CCOM1A DSA COM1A  
DC 4,0110,, INDICATORS  
DC 2,00,, FLD LENGTH OF ANSWER  
DC 1,, RECORD MARK

09844 26 17130 09905  
09856 24 17130 09908  
09868 17 16038 -9909  
09880 46 09844 00200  
09892 49 09922 00000

\*  
\* TEST COMPARE OPERATION  
COM2 TF WORK,CP2,, SET P FLD  
C WORK,CQ2,, COMPARE +10 AND -000, RESET D/RM AT TRI  
BTM TEST,CCOM2-4,, GO TEST INDICATORS  
BC2 COM2,,, LOOP IF SW2 ON  
B COM3

09905 00002  
09908 00003  
09913 00005 -9844  
09917 00004  
09919 00002  
09920 00001

\*  
\* TESTDATA  
CP2 DC 2,10,, P  
CQ2 DC 3,-000,, Q  
CCOM2 DSA COM2  
DC 4,1000,, INDICATORS  
DC 2,0,, FLD LENGTH OF ANSWER  
DC 1,, RECORD MARK

09922 26 17130 09983  
09934 24 17130 09986  
09946 17 16038 -9987  
09958 46 09922 00200  
09970 49 10000 00000

\*  
\* TEST COMPARE OPERATION  
COM3 TF WORK,CP3,, SET P FLD  
C WORK,CQ3,, COMPARE -00 AND +010, RESET D/RM AT TRI  
BTM TEST,CCOM3-4,, GO TEST INDICATORS  
BC2 COM3,,, LOOP IF SW2 ON  
B COM4

09983 00002

\*  
\* TESTDATA  
CP3 DC 2,-00,, P

09986 00003  
09991 00005 -9922  
09995 00004  
09997 00002  
09998 00001

CQ3 DC 3,010,, Q  
CCOM3 DSA COM3  
DC 4,0000,, INDICATORS  
DC 2,0,, FLD LENGTH OF ANSWER  
DC 1,, RECORD MARK

\*

\*

\*

TEST COMPARE OPERATION

10000 26 17130 10062  
10012 24 17130 10064  
10024 17 16038 J0065  
10036 46 10000 00200  
10048 49 10078 00000

COM4 TF WORK,CP4,, SET P FLD  
C WORK,CQ4,, COMPARE-100 AND +00  
BTM TEST,CCOM4-4,, GO TEST INDICATORS  
BC2 COM4,, LOOP IF SW2 ON  
B COM5

\*

\* TESTDATA

10062 00003  
10064 00002  
10069 00005 J0000  
10073 00004  
10075 00002  
10076 00001

CP4 DC 3,-100,, P  
CQ4 DC 2,00,, Q  
CCOM4 DSA COM4  
DC 4,0000,, INDICATORS  
DC 2,0,, FLD LENGTH OF ANSWER  
DC 1,, RECORD MARK

\*

\*

\*

TEST COMPARE OPERATION

10078 26 17130 10140  
10090 24 17130 10143  
10102 17 16038 J0144  
10114 46 10078 00200  
10126 49 10156 00000

COM5 TF WORK,CP5,, SET P FLD-  
C WORK,CQ5,, COMPARE -383 AND -372  
BTM TEST,CCOM5-4,, GO TEST INDICATORS  
BC2 COM5,, LOOP IF SW2 ON  
B COM6

\*

\* TESTDATA

10140 00003  
10143 00003  
10148 00005 J0078  
10152 00004  
10154 00002  
10155 00001

CP5 DC 3,-383,, P  
CQ5 DC 3,-372,, Q  
CCOM5 DSA COM5  
DC 4,0000,, INDICATORS  
DC 2,0,, FLD LENGTH OF ANSWER  
DC 1,, RECORD MARK

\*

\*

\*

TEST COMPARE OPERATION

10156 26 17130 10217  
10168 24 17130 10220  
10180 17 16038 J0221  
10192 46 10156 00200  
10204 49 10234 00000

COM6 TF WORK,CP6,, SET P FLD  
C WORK,CQ6,, +10 AND -372, END OP TR12 ON SECOND CYCLE  
BTM TEST,CCOM6-4,, GO TEST INDICATORS  
BC2 COM6,, LOOP IF SW2 ON  
B COM7

\*

\* TESTDATA

10217 00002  
10220 00003  
10225 00005 J0156  
10229 00004  
10231 00002  
10232 00001

CP6 DC 2,10,, P  
CQ6 DC 3,-372,, Q  
CCOM6 DSA COM6  
DC 4,1000,, INDICATORS  
DC 2,0,, FLD LENGTH OF ANSWER  
DC 1,, RECORD MARK

\*

\*

\*

TEST COMPARE OPERATION

10234 26 17130 10295  
10246 24 17130 10297  
10258 17 16038 J0298

COM7 TF WORK,CP7,, SET P FLD  
C WORK,CQ7,, COMPARE +50 AND -50  
BTM TEST,CCOM7-4,, GO TEST INDICATORS

10270 46 10234 00200  
10282 49 10310 00000

BC2 COM7,,, LOOP IF SW2 ON  
B COM8

10295 00002  
10297 00002  
10302 00005 J0234  
10306 00004  
10308 00002  
10309 00001

\*  
\* TESTDATA  
CP7 DC 2,50,, P  
CQ7 DC 2,-50,, Q  
CCOM7 DSA COM7  
DC 4,1000,, INDICATORS  
DC 2,0,, FLD LENGTH OF ANSWER  
DC 1,',, RECORD MARK

10310 26 17130 10371  
10322 24 17130 10374  
10334 17 16038 J0375  
10346 46 10310 00200  
10358 49 10388 00000

\*  
\* TEST COMPARE OPERATION  
COM8 TF WORK,CP8,, SET P FLD  
C WORK,CQ8,, COMPARE -70 AND -770  
BTM TEST,CCOM8-4,, GO TEST INDICATORS  
BC2 COM8,,, LOOP IF SW2 ON  
B COM9

10371 00002  
10374 00003  
10379 00005 J0310  
10383 00004  
10385 00002  
10386 00001

\*  
\* TESTDATA  
CP8 DC 2,-70,, P  
CQ8 DC 3,-770,, Q  
CCOM8 DSA COM8  
DC 4,0110,, INDICATORS  
DC 2,0,, FLD LENGTH OF ANSWER  
DC 1,',, RECORD MARK

10388 26 17130 10449  
10400 24 17130 10452  
10412 17 16038 J0453  
10424 46 10388 00200  
10436 49 10466 00000

\*  
\* TEST COMPARE OPERATION  
COM9 TF WORK,CP9,, SET + FLD  
C WORK,CQ9,, COMPARE-70 AND -760  
BTM TEST,CCOM9-4,, GO TEST INDICATORS  
BC2 COM9,,, LOOP IF SW2 ON  
B COM10

10449 00002  
10452 00003  
10457 00005 J0388  
10461 00004  
10463 00002  
10464 00001

\*  
\* TESTDATA  
CP9 DC 2,-70,, P  
CQ9 DC 3,-760,, Q  
CCOM9 DSA COM9  
DC 4,0010,, INDICATORS  
DC 2,0,, FLD LENGTH OF ANSWER  
DC 1,',, RECORD MARK

10466 26 17130 10535  
10478 24 17130 10535  
10490 17 16038 J0536  
10502 46 10466 00200  
10514 49 10548 00000

\*  
\* TEST COMPARE OPERATION  
COM10 TF WORK,CPQ10,, SET P FLD  
C WORK,CPQ10,, TEST THAT ALL DIGITS WILL COMPARE EQUAL  
BTM TEST,CCOM10-4,, GO TEST INDICATORS  
BC2 COM10,,, LOOP IF SW2 ON  
B COM11

10535 00010  
10540 00005 J0466  
10544 00004  
10546 00002  
10547 00001

\*  
\* TESTDATA  
CPQ10 DC 10,0123456789,, P AND Q FLDS  
CCOM10 DSA COM10  
DC 4,0100,, INDICATORS  
DC 2,0,, FLD LENGTH OF ANSWER  
DC 1,',, RECORD MARK

10548 26 17130 10612  
 10560 24 17130 10617  
 10572 17 16038 J0618  
 10584 46 10548 00200  
 10596 49 10630 00000

10612 00005  
 10617 00005  
 10622 00005 J0548  
 10626 00004  
 10628 00002  
 10629 00001

10630 17 16926 J0630  
 10642 16 10713 000-0  
 10654 31 17100 10834  
 10666 26 10701 17100  
 10678 21 10701 10713

10690 15 10737 00000  
 10701 00002  
 10702 25 10720 17100  
 10713 00002  
 10714 31 00070 10834  
 10726 43 17532 00080  
 10738 47 10762 01900  
 10750 17 17332 J0750  
 10762 46 10666 00200

10774 31 17100 17101  
 10786 45 10666 17109  
 10798 11 10713 000-1  
 10810 43 10654 10713  
 10822 49 10854 00000  
 10834 00020

\* TEST COMPARE OPERATION  
 COM11 TF WORK,CP11,, SET P FLD  
 C WORK,CQ11,, COMPARE +69530 AND +96305  
 BTM TEST,CCOM11-4,,GO TEST INDICATORS  
 BC2 COM11,,, LOOP IF SW2 ON  
 B ADTBL-12,,, GO TO ADD TABLE TEST

\* TESTDATA  
 CP11 DC 5,69530,, P  
 CQ11 DC 5,9630,, Q  
 CCOM11 DSA COM11  
 DC 4,0000,, INDICATORS  
 DC 2,0,, FLD LENGTH OF ANSWER  
 DC 1,, RECORD MARK

ADD TABLE TEST

THIS ROUTINE TESTS ALL THE POSITIONS OF THE ADD TABLE FOR CORRECT DIGITS AND ADDRESSING. IT DOES NOT CHECK FOR FLAGS, THAT IS DONE IN A LATER TEST.

BTM CLEAR,,, CLEAR WORK AREA  
 ADTBL TFM Q,0,10, START WITH Q=00  
 TR 17100,TBL,, PUT CONSTANT TABLE IN 17100-17118  
 SETP TF P,17100,, SET P FIELD FROM HI ORDER POS OF CONSTANT  
 A P,Q,, TEST THE ADD OPERATION

THE NEXT 4 INSTRUCTIONS PERFORM A TABLE LOOKUP FUNCTION TO CHECK FOR CORRECT SUM.

TOM TSUM+11,0,, TRANSMIT UNITS POS OF SUM TO Q11 OF BD INST  
 P DC 2,0,, USE Q10,11 OF TOM AS P FLD  
 TD DEF+6,17100,, TRANS Q DIGIT TO P6 OF TR INSTRUCTION  
 Q DC 2,0,, USE Q10,11 OF TD AS Q FLD  
 DEF TR 70,TBL,, TRANSMIT CONSTANT TABLE TO LOC(70+Q DIGIT)  
 TSUM BD WRONG,80,, WILL BE ZERO IF SUM CORRECT

BNA \*\*24,,, TEST FOR DATA CHECK  
 BTM ERROR,,, DATA CHECK ERROR  
 BC2 SETP,,, LOOP IF SW2 ON

THE CONSTANT TABLE IS SHIFTED LEFT ONE POSITION TO INCREASE P BY 1. AFTER P IS INCREASED FROM 0-9, Q IS INCREASED BY ONE AND P GOES FROM 0-9 AGAIN.

TR 17100,17101,,SHIFT IN NEXT DIGIT TO TEST  
 BNR SETP,17109,, RM SAYS FINISHED FOR THIS Q DIGIT  
 AM Q,1,10, INCREASE Q DIGIT BY 1  
 BD ADTBL+12,0,, START OVER WITH NEW Q DIGIT,UNTIL Q EXCEEDS  
 B AD1-12  
 TBL DSC 20,0123456789012345678,, CONSTANTS FOR TEST

\* THIS SECTION TESTS THE E TIME AND AUX TRIGGER CIRCUITRY ASSOCIA  
 \* WITH OP CODES 11 AND 21.

10854 17 16926 J0854  
 10866 16 17130 000-0  
 10878 11 17130 000-0  
 10890 17 16038 J0926  
 10902 46 10866 00200  
 10914 49 10940 00000

BTM CLEAR,,, RESET INDICATORS AND CLEAR WORK AREA  
 \* TEST ADD OPERATION  
 AD1 TFM WORK,0,10, SET P  
 AM WORK,0,10, ADD ZERO TO ZERO  
 BTM TEST,CAD1-4,, TEST SUM AND INDICATORS  
 BC2 AD1,,, LOOP IF SW 2 ON  
 B AD2

10930 00005 J0866  
 10934 00004  
 10936 00002  
 10938 00002  
 10939 00001

\* TESTDATA  
 CAD1 DSA AD1  
 DC 4,0100,, INDICATOR PATTERN  
 DC 2,02,, FLD LENGTH OF ANSWER  
 DC 2,00,, ANSWER  
 DC 1,,',, RECORD MARK

10940 16 17130 000N0  
 10952 11 17130 000N0  
 10964 17 16038 J1000  
 10976 46 10940 00200  
 10988 49 11014 00000

\* TEST ADD OPERATION  
 AD2 TFM WORK,50,10, SET P  
 AM WORK,50,10, 50+50 SHOULD BE ZERO WITH OVERFLOW  
 BTM TEST,CAD2-4,, TEST SUM AND INDICATORS  
 BC2 AD2,,, LOOP IF SW2 ON  
 B AD3

11004 00005 J0940  
 11008 00004  
 11010 00002  
 11012 00002  
 11013 00001

\* TESTDATA  
 CAD2 DSA AD2  
 DC 4,0110,, INDICATORS  
 DC 2,02,, FLD LENGTH OF ANSWER  
 DC 2,00,, ANSWER  
 DC 1,,',, RECORD MARK

11014 16 17130 000N0  
 11026 11 17130 000N0  
 11038 11 17130 000N0  
 11050 17 16038 J1086  
 11062 46 11014 00200  
 11074 49 11100 00000

\* TEST ADD OPERATION  
 AD3 TFM WORK,50,10, SET P  
 AM WORK,50,10, 50+50+50 EQUALS 50 WITH OVERFLOW  
 AM WORK,50,10,  
 BTM TEST,CAD3-4,, TEST SUM AND INDICATORS  
 BC2 AD3,,, LOOP IF SW2 ON  
 B AD4

11090 00005 J1014  
 11094 00004  
 11096 00002  
 11098 00002  
 11099 00001

\* TESTDATA  
 CAD3 DSA AD3  
 DC 4,1010,, INDICATORS  
 DC 2,02,, FLD LENGTH OF ANSWER  
 DC 2,50,, ANSWER  
 DC 1,,',, RECORD MARK

11100 16 17130 00J00  
 11112 11 17130 00K00  
 11124 17 16038 J1160  
 11136 46 11100 00200  
 11148 49 11176 00000

\* TEST ADD OPERATION  
 AD4 TFM WORK,100,9, SET P  
 AM WORK,200,9, ADD 100 + 200 = 300  
 BTM TEST,CAD4-4,, TEST SUM AND INDICATORS  
 BC2 AD4,,, LOOP IF SW2 ON  
 B AD5

11164 00005 J1100  
 11168 00004

\* TESTDATA  
 CAD4 DSA AD4  
 DC 4,1000,, INDICATORS



11170 00002  
11173 00003  
11174 00001

DC 2,03,, FLD LENGTH OF ANSWER  
DC 3,300,, ANSWER  
DC 1,',, RECORD MARK

11176 16 17130 R7531  
11188 11 17130 R753J  
11200 17 16038 J1236  
11212 46 11176 00200  
11224 49 11254 00000

\*  
\*  
\* TEST ADD OPERATION  
AD5 TFM WORK,97531,, SET P  
AM WORK,97531,711, SHOULD GET ZERO ANSWER  
BTM TEST,CAD5-4,, TEST SUM AND INDICATORS  
BC2 AD5,, LOOP IF SW2 ON  
B AD6

11240 00005 J1176  
11244 C0004  
11246 00002  
11251 00005  
11252 00001

\* TESTDATA  
CAD5 DSA AD5  
DC 4,0100,, INDICATORS  
DC 2,05,, FLD LENGTH OF ANSWER  
DC 5,00000,, ANSWER  
DC 1,',, RECORD MARK

11254 26 17130 11316  
11266 21 17130 11322  
11278 17 16038 J1323  
11290 46 11254 00200  
11302 49 11338 00000

\*  
\* TEST ADD OPERATION  
AD6 TF WORK,AP6,, SET P  
A WORK,AQ6,, ACD 3 DIGIT P TO 6 DIGIT Q  
BTM TEST,CAD6-4,, TEST SUM AND INDICATORS  
BC2 AD6,, LOOP IF SW2 ON  
B AD7

11316 00003  
11322 00006  
11327 00005 J1254  
11331 00004  
11333 00002  
11336 00003  
11337 00001

\* TESTDATA  
AP6 DC 3,636,, P  
AQ6 DC 6,999347,, Q  
CAD6 DSA AD6  
DC 4,1010,, INDICATORS  
DC 2,03,, FLD LENGTH OF ANSWER  
DC 3,983,, ANSWER  
DC 1,',, RECORD MARK

11338 26 17130 11407  
11350 21 17130 11417  
11362 17 16038 J1418  
11374 46 11338 00200  
11386 49 11440 00000

\*  
\* TEST ADD OPERATION  
AD7 TF WORK,AP7,, SET P  
A WORK,AQ7,, -P,+Q NO RECOMP CYCLE  
BTM TEST,CAD7-4,, TEST SUM AND INDICATORS  
BC2 AD7,, LOOP IF SW2 ON  
B AD8

11407 00010  
11417 00010  
11422 00005 J1338  
11426 00004  
11428 00002  
11438 00010  
11439 00001

\* TESTDATA  
AP7 DC 10,-0497635401,, P FLD  
AQ7 DC 10,0389473526,, Q FLD  
CAD7 DSA AD7  
DC 4,0000,, INDICATORS  
DC 2,10,, FLD LENGTH OF ANSWER  
DC 10,-0108161875,, ANSWER  
DC 1,',, RECORD MARK

11440 26 17130 11509  
11452 21 17130 11519  
11464 17 16038 J1520  
11476 46 11440 00200

\*  
\* TEST ADD OPERATION  
AD8 TF WORK,AP8,, SET P  
A WORK,AQ8,, -P,+Q TAKE A RECOMP CYCLE  
BTM TEST,CAD8-4,, TEST SUM AND INDICATORS  
BC2 AD8,, LOOP IF SW2 ON

11488 49 11542 00000

B AD9

\* TESTDATA

11509 00010  
11519 00010  
11524 00005 J1440  
11528 00004  
11530 00002  
11540 00010  
11541 00001

AP8 DC 10,-4793853206,, P FLD  
AQ8 DC 10,6375944001,, Q FLD  
CAD8 DSA AD8  
DC 4,1000,, INDICATORS  
DC 2,10,, FLD LENGTH OF ANSWER  
DC 10,1582090795,, ANSWER  
DC 1,',, RECORD MARK

\* TEST ADD OPERATION

11542 26 17130 11610  
11554 21 17130 11617  
11566 17 16038 J1618  
11578 46 11542 00200  
11590 49 11640 00000

AD9 TF WORK,AP9,, SET P  
A WORK,AQ9,, USES ALL COMBINATIONS FOR CARRY IN  
BTM TEST,CAD9-4,, AND CARRY OUT CIRCUITS  
BC2 AD9,,, LCOP IF SW2 ON  
B AD10,,,

\* TESTDATA

11610 00009  
11617 00007  
11622 00005 J1542  
11626 00004  
11628 00002  
11637 00009  
11638 00001

AP9 DC 9,005176448,, P FLD  
AQ9 DC 7,6063454,, QFLD  
CAD9 DSA AD9  
DC 4,1000,, INDICATORS  
DC 2,09,, FLD LENGTH OF ANSWER  
DC 9,011239902,, ANSWER  
DC 1,',, RECORD MARK

\* TEST ADD OPERATION

11640 26 17130 11706  
11652 21 17130 11713  
11664 17 16038 J1714  
11676 46 11640 00200  
11688 49 11734 00000

AD10 TF WORK,AP10,, SET P  
A WORK,AQ10,, +P,-Q TAKE RECUMP CYCLE  
BTM TEST,CAD10-4,, TEST SUM AND INDICATORS  
BC2 AD10,,, LOOP IF SW2 ON  
B AD11,,,

\* TESTDATA

11706 00007  
11713 00007  
11718 00005 J1640  
11722 00004  
11724 00002  
11731 00007  
11732 00001

AP10 DC 7,0940530,, P FLD  
AQ10 DC 7,-3839978,, Q FLD  
CAD10 DSA AD10  
DC 4,0000,, INDICATORS  
DC 2,07,,, FLD LENGTH OF ANSWER  
DC 7,-2899448,, ANSWER  
DC 1,',, RECORD MARK

\* TEST ADD OPERATION

11734 26 17130 11803  
11746 21 17130 11813  
11758 17 16038 J1814  
11770 46 11734 00200  
11782 49 11836 00000

AD11 TF WORK,AP11,, SETP  
A WORK,AQ11,, +P,+Q NO OVERFLOW  
BTM TEST,CAD11-4,, TEST SUM AND INDICATORS  
BC2 AD11,,, LOOP IF SW2 ON  
B AD12

\* TESTDATA

11803 00010  
11813 00010  
11818 00005 J1734  
11822 00004  
11824 00002

AP11 DC 10,1357924680,, P FLD  
AQ11 DC 10,7460135829,, Q FLD  
CAD11 DSA AD11  
DC 4,1000,, INDICATORS  
DC 2,10,, FLD LENGTH OF ANSWER

11834 00010  
11835 00001

DC 10,8818060509,, ANSWER  
DC 1,,',, RECORD MARK

11836 26 17130 11905  
11848 21 17130 11911  
11860 17 16038 J1912  
11872 46 11836 00200  
11884 49 11934 00000

\*  
\*  
\* TEST ADD OPERATION  
AD12 TF WORK,AP12,, SET P  
A WORK,AQ12,, -P,-Q P FLD GREATER  
BTM TEST,CAD12-4,, TEST SUM AND INDICATORS  
BC2 AD12,,, LOOP IF SW2 ON  
B AD13,,,

11905 00010  
11911 00006  
11916 00005 J1836  
11920 00004  
11922 00002  
11932 00010  
11933 00001

\* TESTDATA  
AP12 DC 10,-2148105219,, P  
AQ12 DC 6,-362718,, Q  
CAD12 DSA AD12  
DC 4,0000,, INDICATORS  
DC 2,10,, FLD LENGTH OF ANSWER  
DC 10,-2148467937,, ANSWER  
DC 1,,',, RECORD MARK

11934 26 17130 11999  
11946 21 17130 12005  
11958 17 16038 J2006  
11970 46 11934 00200  
11982 49 12024 00000

\*  
\*  
\* TEST ADD OPERATION  
AD13 TF WORK,AP13,, SET P  
A WORK,AQ13,, +P,-Q NO RECOMP CYCLE  
BTM TEST,CAD13-4,, TEST SUM AND INDICATORS  
BC2 AD13,,, LOOP IF SW2 ON  
B AD14

11999 00006  
12005 00006  
12010 00005 J1934  
12014 00004  
12016 00002  
12022 00006  
12023 00001

\* TESTDATA  
AP13 DC 6,831246,, P  
AQ13 DC 6,-652739,, Q  
CAD13 DSA AD13  
DC 4,1000,, INDICATORS  
DC 2,06,, FLD LENGTH OF ANSWER  
DC 6,178507,, ANSWER  
DC 1,,',, RECORD MARK

12024 26 17130 12098  
12036 21 17130 12113  
12048 17 16038 J2114  
12060 46 12024 00200  
12072 49 12142 00000

\*  
\*  
\* THE NEXT 3 ROUTINES TESTS THE ADD TABLE TO  
\* MAKE SURE ALL THE FLAGS ARE THERE  
\*  
AD14 TF WORK,AP14,, SET P  
A WORK,AQ14,, ADD TABLE POS 382-399,EXCEPT 388,389  
BTM TEST,CAD14-4,, TEST SUM AND INDICATORS  
BC2 AD14,,, LOOP IF SW2 ON  
B AD15

12098 00015  
12113 00015  
12118 00005 J2024  
12122 00004  
12124 00002  
12139 00015  
12140 00001

\* TESTDATA  
AP14 DC 15,123456789234567,, P  
AQ14 DC 15,888888888777778,, Q  
CAD14 DSA AD14  
DC 4,1010,, INDICATORS  
DC 2,15,, FLD LENGTH OF ANSWER  
DC 15,012345678012345,, ANSWER  
DC 1,,',, RECORD MARK

\*  
\*  
\* TEST ADD OPERATION

12142 26 17130 12216  
12154 21 17130 12231  
12166 17 16038 J2232  
12178 46 12142 00200  
12190 49 12260 00000

AD15 TF WORK,AP15,, SET P  
A WORK,AQ15,, ADD TABLE 364-379  
BTM TEST,CAD15-4,, TEST SUM AND INDICATORS  
BC2 AD15,,, LOOP IF SW2 ON  
B AD16

12216 00015  
12231 00015  
12236 00005 J2142  
12240 00004  
12242 00002  
12257 00015  
12258 00001

\* TESTDATA  
AP15 DC 15,893456789456789,, P  
AQ15 DC 15,776666666555556,, Q  
CAD15 DSA AD15  
DC 4,1010,, INDICATORS  
DC 2,15,, FLD LENGTH OF ANSWER  
DC 15,670123456012345,, ANSWER  
DC 1,'', RECORD MARK

12260 26 17130 12334  
12272 21 17130 12349  
12284 17 16038 J2350  
12296 46 12260 00200  
12308 49 12378 00000

\* TEST ADD OPERATION  
AD16 TF WORK,AP16,, SET P  
A WORK,AQ16,, ADD TABLE POS 319-359  
BTM TEST,CAD16-4,, TEST SUM AND INDICATORS  
BC2 AD16,,, LCOP IF SW2 ON  
B AD17

12334 00015  
12349 00015  
12354 00005 J2260  
12358 00004  
12360 00002  
12375 00015  
12376 00001

\* TESTDATA  
AP16 DC 15,567896789789899,, P  
AQ16 DC 15,444443333222111,, Q  
CAD16 DSA AD16  
DC 4,1010,, INDICATORS  
DC 2,15,, FLD LENGTH OF ANSWER  
DC 15,012340123012010,, ANSWER  
DC 1,'', RECORD MARK

12378 26 17130 12454  
12390 21 17130 12459  
12402 21 17130 12459  
12414 17 16038 J2460  
12426 46 12378 00200  
12438 49 12478 00000

\* TEST THAT RECOMP CONTROL IS RESET BEFORE  
NEXT OPERATION  
AD17 TF WORK,CP17,, SET P  
A WORK,CQ17,, ADD WITH RECOMP  
A WORK,CQ17,, AGAIN WITH NO RECOMP  
BTM TEST,CAD17-4,, TEST SUM AND INDICATORS  
BC2 AD17,,, LCOP IF SW2 ON  
B SUB1

12454 00005  
12459 00005  
12464 00005 J2378  
12468 00004  
12470 00002  
12475 00005  
12476 00001

\* TESTDATA  
CP17 DC 5,-31645,, P  
CQ17 DC 5,54673,, Q  
CAD17 DSA AD17  
DC 4,1000,, INDICATORS  
DC 2,5,, FLD LENGTH OF ANSWER  
DC 5,77701,, ANSWER  
DC 1,'', RECORD MARK

ONLY THREE SUBTRACT TESTS ARE MADE,SINCE ALL OF THE  
CIRCUITRY EXCEPT THE E CYCLE ENTRY SET OF THE T/C TRIGGER  
IS THE SAME AS THAT OF ADD

12478 26 17130 12547  
12490 22 17130 12557  
12502 17 16038 J2558  
12514 46 12478 00200  
12526 49 12580 00000

SUB1 TF WORK,SP1,, SET P  
S WORK,SQ1,, +P GREATER THAN +Q  
BTM TEST ,CSUB1-4,, TEST DIFFERENCE AND INDICATORS  
BC2 SUB1,,, LOOP IF SW2 ON  
B SUB2

\* TESTDATA

12547 00010  
12557 00010  
12562 00005 J2478  
12566 00004  
12568 00002  
12578 00010  
12579 00001

SP1 DC 10,5833290764,, P  
SQ1 DC 10,4945070316,, Q  
CSUB1 DSA SUB1  
DC 4,1000,, INDICATORS  
DC 2,10,, FLD LENGTH OF ANSWER  
DC 10,0888220448,, ANSWER  
DC 1,',, RECORD MARK

\* TEST SUBTRACT OPERATION

12580 26 17130 12644  
12592 12 17130 K9476  
12604 17 16038 J2645  
12616 46 12580 00200  
12628 49 12662 00000

SUB2 TF WORK,SP2,, SETP  
SM WORK,29476,, -P,+Q ANSWER OVERFLOWS  
BTM TEST,CSUB2-4,, TEST DIFFERENCE AND INDICATORS  
BC2 SUB2,,, LOOP IF SW2 ON  
B SUB3

\* TESTDATA

12644 00005  
12649 00005 J2580  
12653 00004  
12655 00002  
12660 00005  
12661 00001

SP2 DC 5,-78516,, P  
CSUB2 DSA SUB2  
DC 4,0010,, INDICATORS  
DC 2,05,, FLD LENGTH OF ANSWER  
DC 5,-07992,, ANSWER  
DC 1,',, RECORD MARK

\* TEST SUBTRACT OPERATION

12662 26 17130 12731  
12674 22 17130 12741  
12686 17 16038 J2742  
12698 46 12662 00200  
12710 49 12764 00000

SUB3 TF WORK,SP3,, SET P FIELD  
S WORK,SQ3,, TEST CARRY CKTS FOR CARRY IN AND ALL DIGITS  
BTM TEST,CSUB3-4,, TEST DIFFERENCE AND INDICATORS  
BC2 SUB3,,, LOOP IF SW2 ON  
B M1

\* TESTDATA

12731 00010  
12741 00010  
12746 00005 J2662  
12750 00004  
12752 00002  
12762 00010  
12763 00001

SP3 DC 10,9999999999,, P  
SQ3 DC 10,0123456789,, Q  
CSUB3 DSA SUB3  
DC 4,1000,, INDICATORS  
DC 2,10,, FLD LENGTH OF ANSWER  
DC 10,9876543210,, ANSWER  
DC 1,',, RECORD MARK

THIS SECTION TESTS ALL THE CIRCUITS AND TRIGGERS ASSOCIATED WITH MULTIPLY. IT SAYS HERE.

TEST THAT PRODUCT AREA IS CLEARED AND E/Z TRIGGER IS OK

12764 16 00080 00007

M1 TFM 80,87,10, PUT A 7 IN 80 AND FLG8 IN 79, THE 7 SHOULD CLEAR BUT NOT THE 8

12776 13 12787 000-0  
 12788 43 12824 00080  
 12800 44 12824 00079  
 12812 49 12836 00000  
 12824 17 12332 J2824  
 12836 26 17130 00099  
 12848 17 16038 J2884  
 12860 46 12764 00200  
 12872 49 12900 00000

MM \*+11,0,10, 00 X 00 = 0000  
 BD \*+36,80,, TEST LOCATION 80  
 BNF \*+24,79,, TEST LOCATION 79  
 B \*+24,,, 79 AND 80 BOTH GOOD  
 BTM ERROR,\*,,  
 TF WORK,99,, MOVE ANSWER SO IT CAN BE TESTED  
 BTM TEST,CM1-4,, NOW GO TEST THE ANSWER AND INDICATOR  
 BC2 M1,,, LOOP IF SW2 ON  
 B M2

\*  
 \* TESTDATA

12888 00005 J2764  
 12892 00004  
 12894 00002  
 12898 00004  
 12899 00001

CM1 DSA M1  
 DC 4,0100,, INDICATORS  
 DC 2,04,, FLD LENGTH OF ANSWER  
 DC 4,0000,, ANSWER  
 DC 1,,',, RECORD MARK

\*  
 \*

TEST MULTIPLY OPERATION

12900 13 12961 000-2  
 12912 26 17130 00099  
 12924 17 16038 J2962  
 12936 46 12900 00200  
 12948 49 12978 00000

M2 MM MP2,2,10, 2X3=6, RESET E/Z AT TR37  
 TF WORK,99,, MOVE ANSWER  
 BTM TEST,CM2-4,, TEST PROD AND INDICATORS  
 BC2 M2,,, LOOP IF SW2 ON  
 B M3

\*  
 \*

\* TESTDATA

12961 00002  
 12966 00005 J2900  
 12970 00004  
 12972 00002  
 12976 00004  
 12977 00001

MP2 DC 2,3,, P  
 CM2 DSA M2  
 DC 4,1000,, INDICATORS  
 DC 2,04,, FLD LENGTH OF ANSWER  
 DC 4,0006,, ANSWER  
 DC 1,,',, RECORD MARK

\*  
 \*

TEST MULTIPLY OPERATION

12978 13 13039 000M0  
 12990 26 17130 00099  
 13002 17 16038 J3040  
 13014 46 12978 00200  
 13026 49 13056 00000

M3 MM MP3,40,10, 40X50, RESET E/Z AT TR 40  
 TF WORK,99,, MOVE ANSWER  
 BTM TEST,CM3-4,, TEST PROD AND IND  
 BC2 M3,,, LOOP IF SW2 ON  
 B M4

\*  
 \*

\* TESTDATA

13039 00002  
 13044 00005 J2978  
 13048 00004  
 13050 00002  
 13054 00004  
 13055 00001

MP3 DC 2,50,, P  
 CM3 DSA M3  
 DC 4,1000,, INDICATORS  
 DC 2,04,, FLD LENGTH OF ANSWER  
 DC 4,2000,, ANSWER  
 DC 1,,',, RECORD MARK

\*  
 \*

ROUTINE M4 TESTS THE MULTIPLY TABLE FOR  
 CONTENTS AND ADDRESSING

13056 23 13125 13125  
 13068 26 17130 00099  
 13080 17 16038 J3126  
 13092 46 13056 00200  
 13104 49 13158 00000

M4 M MP4,MP4,, CHECK ALL POSITIONS OF MULT TABLE  
 TF WORK,99,, MOVE ANSWER  
 BTM TEST,CM4-4,, TEST PROD AND IND  
 BC2 M4,,, LOOP IF SW4 ON  
 B M5

\*  
 \*

\* TESTDATA

13125 00010  
 13130 00005 J3056

MP4 DC 10,0123456789,, USED FOR BOTH P AND Q  
 CM4 DSA M4

13134 00004  
13136 00002  
13156 00020  
13157 00001

DC 4,1000,, INDICATORS  
DC 2,20,, FLD LENGTH OF ANSWER  
DC 20,15241578750190521,, ANSWER  
DC 1,',, RECORD MARK

\*  
\* THE FOLLOWING ROUTINES USE DATA TO TEST ALL TRIGGERS  
\* AND CONTROL CIRCUITRY ASSOCIATED WITH MULTIPLY

13158 23 13227 13237  
13170 26 17130 00099  
13182 17 16038 J3238  
13194 46 13158 00200  
13206 49 13270 00000

M5 M MP5,MQ5,, JUST MULTIPLY +PX+Q  
TF WORK,99,, MOVE ANSWER  
BTM TEST,CM5-4,, TEST PROD AND IND  
BC2 M5,,, LOOP IF SW2 ON  
B M6

\*  
\* TESTDATA

13227 00010  
13237 00010  
13242 00005 J3158  
13246 00004  
13248 00002  
13268 00020  
13269 00001

MP5 DC 10,8463166491,, P  
MQ5 DC 10,4184169621,, Q  
CM5 DSA M5  
DC 4,1000,, INDICATORS  
DC 2,20,, FLD LENGTH OF ANSWER  
DC 20,35411324129107369911,, ANSWER  
DC 1,',, RECORD MARK

\*  
\* TEST MULTIPLY OPERATION

13270 23 13339 13349  
13282 26 17130 00099  
13294 17 16038 J3350  
13306 46 13270 00200  
13318 49 13382 00000

M6 M MP6,MQ6,, MULTIPLY -PX+Q  
TF WORK,99,, MOVE ANSWER  
BTM TEST,CM6-4,, TEST PROD AND IND  
BC2 M6,,, LOOP IF SW2 ON  
B M7

\*  
\* TESTDATA

13339 00010  
13349 00010  
13354 00005 J3270  
13358 00004  
13360 00002  
13380 00020  
13381 00001

MP6 DC 10,-8966666234,, P  
MQ6 DC 10,4607518333,, Q  
CM6 DSA M6  
DC 4,0000,, INDICATORS  
DC 2,20,, FLD LENGTH OF ANSWER  
DC 20,-41314079059047067922,, ANSWER  
DC 1,',, RECORD MARK

\*  
\* TEST MULTIPLY OPERATION

13382 23 13451 13461  
13394 26 17130 00099  
13406 17 16038 J3462  
13418 46 13382 00200  
13430 49 13494 00000

M7 M MP7,MQ7,, MULTIPLY +PX-Q  
TF WORK,99,, MOVE ANSWER  
BTM TEST,CM7-4,, TEST PROD AND IND  
BC2 M7,,, LOOP IF SW2 ON  
B M8

\*  
\* TESTDATA

13451 00010  
13461 00010  
13466 00005 J3382  
13470 00004  
13472 00002  
13492 00020  
13493 00001

MP7 DC 10,1976138156,, P  
MQ7 DC 10,-2836292471,, Q  
CM7 DSA M7  
DC 4,0000,, INDICATORS  
DC 2,20,, FLD LENGTH OF ANSWER  
DC 20,-05604905773518623476,, ANSWER  
DC 1,',, RECORD MARK

\*  
\* TEST MULTIPLY OPERATION

13494 23 13563 13573  
13506 26 17130 00099

M8 M MP8,MQ8,, MULTIPLY -PX-Q  
TF WORK,99,, MOVE ANSWER

13518 17 16038 J3574  
13530 46 13494 00200  
13542 49 17710 00000

BTM TEST,CM8-4,, TEST PROD AND IND  
BC2 M8,,, LOOP IF SW2 ON  
B FINISH,,, IF THE DIVIDE DECK IS IN, THIS WILL  
BE REPLACED WITH A BRANCH TO LDV1-12.

13563 00010  
13573 00010  
13578 00005 J3494  
13582 00004  
13584 00002  
13604 00020  
13605 00001

\* TESTDATA  
MP8 DC 10,-3428461753,, P  
MQ8 DC 10,-9200185479,, Q  
CM8 DSA M8  
DC 4,1000,, INDICATORS  
DC 2,20,, FLD LENGTH OF ANSWER  
DC 20,31542484035257484687,, ANSWER  
DC 1,0,, RECORD MARK

13606 17 16926 J3606

THIS SECTION TESTS THE CIRCUITRY ASSOCIATED WITH  
LOAD DIVIDEND OPERATION  
BTM CLEAR,,, CLEAR WORK AREA  
\* TEST LOAD DIVIDEND OPERATION  
LDV1 TF 99,DLDV1,, LOAD 79-99 WITH 20 DIGITS AND A RECORD MARK  
LDM \*+11,0,10, LDM SHOULD CLEAR 80 THRU 99, BUT WILL  
TRANSMIT NO DATA TO PRODUCT AREA.  
\* TF WORK,99,, MOVE 79-99 FOR TESTING  
BTM TEST,CLDV1-4,, TEST THE RESULTS  
BC2 LDV1,,, LOOP IF SW2 ON  
B LDV2

13642 26 17130 00099  
13654 17 16038 J3711  
13666 46 13618 00200  
13678 49 13744 00000

\* TESTDATA  
DLDV1 DC 21,901234567890123456789,, TO PUT IN PRODUCT AREA  
CLDV1 DSA LDV1  
DC 4,0000,, INDICATORS  
DC 2,21,, FLD LENGTH OF ANSWER  
DC 21,90000000000000000000,, 79-98 CONTENTS AFTER LDM OPN  
DC 1,0,, RECORD MARK

13744 28 00089 13813  
13756 26 17130 00099  
13768 17 16038 J3814  
13780 46 13744 00200  
13792 49 13846 00000

TEST LOAD DIVIDE OPERATION  
LDV2 LD 89,DLDV2,, LOAD A TEN DIGIT FIELD  
TF WORK,99,, MOVE PRODUCT AREA TO TEST AREA  
BTM TEST,CLDV2-4,, TEST THE RESULT  
BC2 LDV2,,, LOOP IF SW2 ON  
B LDV3

13813 00010  
13818 00005 J3744  
13822 00004  
13824 00002  
13844 00020  
13845 00001

\* TESTDATA  
DLDV2 DC 10,-0123456789,, DIVIDEND  
CLDV2 DSA LDV2  
DC 4,0000,, INDICATORS  
DC 2,20,, FLD LENGTH OF ANSWER  
DC 20,-01234567890000000000,, PROD AREA AFTER LD  
DC 1,0,, RECORD MARK

13846 18 00094 R4053  
13858 26 17130 00099  
13870 17 16038 J3906  
13882 46 13846 00200  
13894 49 13928 00000

TEST LOAD DIVIDE OPERATION  
LDV3 LDM 94,94053,, TEST LOAD IMMEDIATE  
TF WORK,99,, MOVE TO TEST AREA  
BTM TEST,CLDV3-4,, NOW LETS TEST  
BC2 LDV3,,, LOOP IF SW2 ON  
B DIV1



13910 00005 J3846  
 13914 00004  
 13916 00002  
 13926 00010  
 13927 00001

```
*
* TESTDATA
CLDV3 DSA LDV3
DC 4,0000,, INDICATORS
DC 2,10,, FLD LENGTH OF ANSWER
DC 10,9405300000,, WHAT THE PRODUCT AREA IS GONNA B
DC 1,, RECORD MARK
```

ALL OF THE DIVIDE CIRCUITRY IS TESTED WITH THE FOLLOWING ROUTINES.

13928 28 00097 14006  
 13940 19 00094 000-0  
 13952 26 17130 00099  
 13964 17 16038 J4007  
 13976 46 13928 00200  
 13988 49 14028 00000

```
DIV1 LD 97,DD1,, LOAD DIVIDEND
DM 94,0,10,, DIVIDE BY 00,SET CFLO, END OP 1ST CYCLE
TF WORK,99,, MOVE ANSWER TO BE TESTED
BTM TEST,CDIV1-4,, GO TO TEST
BC2 DIV1,,, LOOP IF SW2 ON
B DIV2
```

14006 00007  
 14011 00005 J3928  
 14015 00004  
 14017 00002  
 14026 00009  
 14027 00001

```
* TESTDATA
DD1 DC 7,0012345,, DIVIDEND
CDIV1 DSA DIV1
DC 4,0110,, INDICATORS
DC 2,08,, FLD LENGTH OF ANSWER
DC 9,001234500,, PROD FIELD AFTER DIV BY ZERO
DC 1,, RECORD MARK
```

TEST LOAD DIVIDE OPERATION

14028 18 00094 L5094  
 14040 19 00093 000KM  
 14052 25 17130 00099  
 14064 17 16038 J4100  
 14076 46 14028 00200  
 14088 49 14122 00000

```
DIV2 LDM 94,35094,, LOAD QUOTIENT AREA
DM 93,24,1011, DIV BY -24, SHOULD TAKE 10 SUB CYCLES,OFLO
TF WORK,99,, MOVE RESULT TO BE TESTED
BTM TEST,CDIV2-4,, GO TEST RESULT
BC2 DIV2,,, LOOP IF SW2 ON
B DIV3
```

14104 00005 J4028  
 14108 00004  
 14110 00002  
 14120 00010  
 14121 00001

```
* TESTDATA
CDIV2 DSA DIV2
DC 4,0110,, INDICATORS
DC 2,10,, FLD LENGTH OF ANSWER
DC 10,3269400000,, RESULTS
DC 1,, RECORD MARK
```

TEST DIVIDE OPERATION

14122 28 00099 14234  
 14134 29 00090 14203  
 14146 16 17097 000J0  
 14158 17 16038 J4204  
 14170 46 14122 00200  
 14182 49 14236 00000

```
DIV3 LD 99,DR,, LOAD DIVIDEND
D 90,DS3,, QUOTIENT OF ZERO,DIVIDEND BECOMES REMAINDER
TFM DIVFLG,10,10, SET DIVIDE FLAG AND QUO FLD LENGTH
BTM TEST,CDIV3-4,, GO TEST
BC2 DIV3,,, LOOP IF SW2 ON
B DIV4
```

14203 00010  
 14208 00005 J4122  
 14212 00004  
 14214 00002

```
* TESTDATA
DS3 DC 10,8736542379,,DIVISOR
CDIV3 DSA DIV3
DC 4,0100,, INDICATORS
DC 2,20,, LENGTH OF QUO AND REM
```

14224 00010  
14234 00010  
14235 00001

DC 10,0,, QUOTIENT  
DR DC 10,4906279845,,REMAINDER,SAME AS DIVIDEND  
DC 1,',, RECORD MARK

14236 28 00097 14317  
14248 19 00090 000M9  
14260 16 17097 000JO  
14272 17 16038 J4318  
14284 46 14236 00200  
14296 49 14342 00000

\*  
\*  
\* TEST DIVIDE OPERATION  
DIV4 LD 97,DD4,, SET DIVIDEND  
DM 90,49,10,, TEST DIVIDE IMMED  
TFM DIVFLG,10,10,, SET DIV FLG  
BTM TEST,CDIV4-4,, TEST RESULT  
BC2 DIV4,, LOOP IF SW2 ON  
B DIV5

14317 00010  
14322 00005 J4236  
14326 00004  
14328 00002  
14338 00010  
14340 00002  
14341 00001

\*  
\* TESTDATA  
DD4 DC 10,0386574912,,DIVIDEND  
CDIV4 DSA DIV4  
DC 4,1000,, INDICATORS  
DC 2,12,, FLD LENGTH OF QUO AND REM  
DC 10,0788928391,, QUOTIENT  
DC 2,41,, REMAINDER  
DC 1,',, RECORD MARK

14342 28 00099 14420  
14354 19 00094 000M3P  
14366 16 17097 000-6  
14378 17 16038 J4421  
14390 46 14342 00200  
14402 49 14442 00000

\*  
\* TEST DIVIDE OPERATION  
DIV5 LD 99,DD5,, LOAD DIVIDEND  
DM 94,437,911,, DIVIDE BY -437  
TFM DIVFLG,6,10,, SET DIVIDE FLG  
BTM TEST,CDIV5-4,, TEST ANSWER  
BC2 DIV5,, LOOP IF SW2 ON  
B DIV6

14420 00007  
14425 00005 J4342  
14429 00004  
14431 00002  
14437 00006  
14440 00003  
14441 00001

\*  
\* TESTDATA  
DD5 DC 7,5394765,, DIVIDEND  
CDIV5 DSA DIV5  
DC 4,0000,, INDICATORS  
DC 2,09,, FLD LENGTH OF QUO AND REM  
DC 6,-012345,, QUOTIENT  
DC 3,000,, REMAINDER  
DC 1,',, RECORD MARK

14442 28 00099 14521  
14454 19 00092 000Q3  
14466 16 17097 000-8  
14478 17 16038 J4522  
14490 46 14442 00200  
14502 49 14544 00000

\*  
\* TEST DIVIDE OPERATION  
DIV6 LD 99,DD6,, GET READY  
DM 92,83,10,, DIVIDE BY 83  
TFM DIVFLG,8,10,, SET DIVIDE FLAG  
BTM TEST,CDIV6-4,, TEST ANSWER  
BC2 DIV6,, LOOP IF SW2 ON  
B DIV7

14521 00008  
14526 00005 J4442  
14530 C3004  
14532 00002  
14540 00008  
14542 00002  
14543 00001

\*  
\* TESTDATA  
DD6 DC 8,-56348769,, DIVIDEND  
CDIV6 DSA DIV6  
DC 4,0000,, INDICATORS  
DC 2,10,, FLD LENGTH OF QUO AND REM  
DC 8,-00678900,, QUOTIENT  
DC 2,-69,, REMAINDER  
DC 1,',, RECORD MARK

14544 28 00090 14625  
14556 29 00090 14635  
14568 16 17097 000J0  
14580 17 16038 J4636  
14592 46 14544 00200  
14604 49 14668 00000

\* TEST DIVIDE OPERATION  
DIV7 LD 90,DD7,, GET PREPARED  
D 90,DS7,, NOW DIVIDE  
TFM DIVFLG,10,10, SET DIVIDE FLAG  
BTM TEST,CDIV7-4,, TEST THE ANSWER NOW  
BC2 DIV7,,, LOOP IF SW2 ON  
B DIV8

14625 00010  
14635 00010  
14640 00005 J4544  
14644 00004  
14646 00002  
14656 00010  
14666 00010  
14667 00001

\* TESTDATA  
DD7 DC 10,-3957741568,, DIVIDEND  
DS7 DC 10,4180204239,, DIVISOR  
CDIV7 DSA DIV7  
DC 4,0000,, INDICATORS  
DC 2,20,, FLD LENGTH OF QUO AND REM  
DC 10,-0946781865,, QUOTIENT  
DC 10,-2518674265,, REMAINDER  
DC 1,',, RECORD MARK

14668 28 00090 14749  
14680 29 00090 14759  
14692 16 17097 000J0  
14704 17 16038 J4760  
14716 46 14668 00200  
14728 49 14792 00000

\* TEST DIVIDE OPERATION  
DIV8 LD 90,DD8,, LOAD  
D 90,DS8,, GO  
TFM DIVFLG,10,10, SET FLAG  
BTM TEST,CDIV8-4,, TEST  
BC2 DIV8,,, LOOP IF SW2 ON  
B DIV9

14749 00010  
14759 00010  
14764 00005 J4668  
14768 00004  
14770 00002  
14780 00010  
14790 00010  
14791 00001

\* TESTDATA  
DD8 DC 10,6157148239,, DIVIDEND  
DS8 DC 10,-2166739812,, DIVISOR  
CDIV8 DSA DIV8  
DC 4,0000,, INDICATORS  
DC 2,20,, FLD LENGTH OF QUO AND REM  
DC 10,-2841664792,, QUOTIENT  
DC 10,1814900896,, REMAINDER  
DC 1,',, RECORD MARK

14792 28 00090 14873  
14804 29 00090 14883  
14816 16 17097 000J0  
14828 17 16038 J4884  
14840 46 14792 00200  
14852 49 14916 00000

\* TEST DIVIDE OPERATION  
DIV9 LD 90,DD9,, LOAD DIVIDEND  
D 90,DS9,, DIVIDE IT NOW  
TFM DIVFLG,10,10, SET THE FLAG FOR TEST PURPOSES  
BTM TEST,CDIV9-4,, AND TEST THE ANSWER  
BC2 DIV9,,, LOOP IF SW2 ON  
B DIV10

14873 00010  
14883 00010  
14888 00005 J4792  
14892 00004  
14894 00002  
14904 00010  
14914 00010  
14915 00001

\* TESTDATA  
DD9 DC 10,-6778463482,, DIVIDEND  
DS9 DC 10,-6884175503,, DIVISOR  
CDIV9 DSA DIV9  
DC 4,1000,, INDICATORS  
DC 2,20,, FLD LENGTH OF QUO AND REM  
DC 10,0984644200,, QUOTIENT  
DC 10,-1188967400,, REMAINDER  
DC 1,',, RECORD MARK

14916 28 00086 14999

\* TEST DIVIDE OPERATION  
DIV10 LD 86,DD10,, LOAD THE DIVIDEND

14928 29 00076 15005  
 14940 16 17097 000K4  
 14952 17 16038 J5006  
 14964 46 14916 00200  
 14976 49 17710 00000

D 76,DS10,, DIVIDE AND GET A LONG ANSWER  
 TFM DIVFLG,24,10, SET THE DIVIDE FLAG  
 BTM TEST,CD,V10-4,,TEST THE ANSWER  
 BC2 DIV10,, LOOP IF SW2 ON  
 B FINISH,, END OF THE TEST

\*  
 \* TESTDATA

14999 00012  
 15005 00006  
 15010 00005 J4916  
 15014 00004  
 15016 00002  
 15040 00024  
 15046 00006  
 15047 00001

DD10 DC 12,261856213997,, DIVIDEND  
 DS10 DC 6,438675,, DIVISOR  
 CDIV10 DSA DIV10  
 DC 4,1000,, INDICATORS  
 DC 2,30,, FLD LENGTH OF QUO AND REM  
 DC 24,000005969253182811876674,, QUOTIENT  
 DC 6,033050,, REMAINDER  
 DC 1,',, RECORD MARK

\*  
 \*  
 \*  
 \*  
 \*  
 \*  
 \*

COMMON TEST AND ERROR ROUTINE FOR ARITHMETIC TESTS.

15990  
 15990 00005  
 15995 00004  
 15999 00002  
 16001 00030  
 16031 00006

DORG 15990  
 DSC 5,0,, LOCATION OF ROUTINE BEING TESTED  
 CKI DSC 4,0,, CORRECT INDICATOR PATTERN  
 CKL DSC 2,0,, FIELD LENGTH OF ANSWER  
 CKD DSC 30,0,, CORRECT ANSWER  
 DSC 6,0,, TEST INFORMATION ADDRESS

\*  
 \*  
 \*  
 \*  
 \*  
 \*

16038 46 16926 00100  
 16050 26 16073 16037  
 16062 31 15990 00000  
 16074 16 17183 0-000

TEST BC1 CLEAR,,, TEST ENTRY,BYPASS TEST IF SW1 ON  
 TF \*\*23,TEST-1,, SET ADR OF TEST INFO INTO TR INSTRUCTIO  
 TR CKR,0,, BRING IN TEST DATA  
 TFM IND,0,8, CLEAR INDICATOR FIELD

16086 47 16110 01100  
 16098 15 17180 0000J  
 16110 47 16134 01200  
 16122 15 17181 00001  
 16134 47 16158 01400  
 16146 15 17182 00001  
 16158 47 16182 01900  
 16170 15 17183 00001

BNP \*\*24,,, SET UP INDICATOR PATTERN, TEST H/P FIRST  
 TDM IND-3,1,11,  
 BNE \*\*24,,, TEST E/O  
 TDM IND-2,1,,  
 BNV \*\*24,,, TEST OFLO  
 TDM IND-1,1,,  
 BNA \*\*24,,, TEST ANY DATA CHECK  
 TDM IND,1,,

\*  
 \*

THE FOLLOWING ROUTINE IS USED INSTEAD OF A COMPARE OPN  
 TO TEST FOR A CORRECT INDICATOR PATTERN.

16182 25 16229 15995  
 16194 25 16228 17180  
 16206 33 16229 00000  
 16218 43 16350 17201  
 16230 25 16265 15996  
 16242 25 16264 17181  
 16254 43 16350 17201  
 16266 25 16301 15997  
 16278 25 16300 17182  
 16290 43 16350 17201  
 16302 25 16337 15998  
 16314 25 16336 17183

TD HPT+11,CKI,, CHECK CORRECT  
 TD HPT+10,IND-3,,H/P WITH ACTUAL  
 CF HPT+11,,, CLEAR FLAG FROM Q UNITS TO PREVENT IA  
 HPT BD SF,XXX00,, WILL BRANCH IF WRONG  
 TD EO+11,CKI+1,, CHECK E/O  
 TD EO+10,IND-2,,  
 EO BD SF,XXX00,, WILL BRANCH IF WRONG  
 TD OV+11,CKI+2,, CHECK OVERFLOW  
 TD OV+10,IND-1,,  
 OV BD SF,XXX00,, WILL BRANCH IF WRONG  
 TD AN+11,CKI+3,, TEST ANY DATA CHECK  
 TD AN+10,IND,,

16326 43 16350 17201  
16338 49 16362 00000  
16350 32 17098 00000

16362 45 16386 16001  
16374 49 16662 00000  
16386 44 16458 17096  
16398 15 00100 00000  
16409 00001  
16410 31 17101 00070  
16422 15 00100 00000  
16434 49 16458 00000

16446 31 17101 17102  
16458 45 16506 17102  
16470 34 00000 00102  
16482 39 17255 00100  
16494 49 16650 00000  
16506 44 16446 17101  
16518 26 16548 16000  
16530 26 16553 16000  
16542 24 16000 17100  
16554 47 16650 01200  
16566 46 16650 01400  
16578 44 16662 17096

16590 26 16620 17097  
16602 26 16625 17097  
16614 24 16000 17100  
16626 47 16650 01200  
16638 47 16662 01400  
16650 32 17098 00000  
16662 44 16926 17098

16674 47 16710 00300  
16686 48 00000 00000  
16698 49 16926 00000

16710 26 17172 15994  
16722 34 00000 00102  
16734 39 17213 00100  
16746 38 17168 00100  
16758 34 00000 00102  
16770 26 17172 15998  
16782 38 17169 00100  
16794 39 17175 00100  
16806 45 16830 16001  
16818 49 16842 00000  
16830 38 16001 00100  
16842 34 00000 00102  
16854 38 17180 00100  
16866 39 17175 00100

AN BD SF,XXX00,, WILL BRANCH IF WRONG  
B DAT,,, NO INDICATOR ERROR  
SF SF ERRFLG,,, SET ERROR FLAG FOR INDICATOR ERROR  
\*  
\*  
DAT BNR \*\*24,CKD,, SEE IF ANY DATA TO CHECK  
B TESTER,,, GO SEE IF THERE WAS AN IND ERROR  
BNF NOR,DIVFLG-1,, WAS IT A DIVIDE OPERATION  
TDM 100,,, YES,NOW PUT A R/M IN 100 SO A TR WILL WORK  
DC 1,'\*, R/M  
TR WORK-29,70,, BRING DATA FROM PRODUCT AREA TO WORK AREA  
TDM 100,0,, RESTORE 100  
B NOR  
\* SHIFT COMPUTED ANSWER LEFT UNTIL HI ORDER DIGIT  
\* IS IN LOCATION 17101.  
TR WORK-29,WORK-28,,SHIFT COMPUTED ANS LEFT ONE PLACE  
NOR BNR \*\*48,WORK-28,,R/M INDICATES COMPUTED ANSWER LOST  
RCTY  
WATY LOST  
B SF2,,, SET ERROR FLAG,ANSWER LOST  
BNF NOR-12,WORK-29,,GO SHIFT LEFT AGAIN IF NO FLAG  
TF COMP1+6,CKL+1,,SET ADDRESS OF CORRECT ANSWER  
TF COMP1+11,CKL+1,,SET ADDRESS OF COMPUTED ANSWER  
COMPI C 16000,17100,, COMPARE COMPUTED WITH EXPECTED RESULTS  
BNE SF2,,, SEE IF EQUAL  
BV SF2,,, SEE IF CORRECT FIELD LENGTH  
BNF TESTER,DIVFLG-1,, WAS IT A DIVIDE  
\*  
\*  
TF COMP2+6,DIVFLG,, SET CORRECT QUOTIENT ADDRESS  
TF COMP2+11,DIVFLG,, SET COMPUTED QUOTIENT ADDRESS  
CUMP2 C 16000,17100,, COMPARE COMPUTED WITH EXPECTED QUOTIENT  
BNE SF2  
BNV \*\*24,,, CHECK FIELD LENGTH  
SF2 SF ERRFLG  
TESTER BNF CLEAR,ERRFLG,, SEE IF ANY ERROR  
\*  
\*  
BNC3 TY  
H,,, ERROR STOP, IR2 HAS LOC+12 OF ERROR EXIT  
B CLEAR,,, CONTINUE PROGRAM  
\*  
\*  
\* ERROR TYPE OUT ROUTINE  
\*  
TY TF ER2+4,CKR+4,, PUT ROUTINE LOCATION IN TYPEOUT AREA  
RCTY  
WATY ER1,,, TYPE OUT ERROR LOCATION  
WNTY ER2  
RCTY  
TF ER2+4,CKI+3,, SET UP CORRECT DATA FOR TYPEOUT  
WNTY ER2+1,,, INDICATORS  
WATY BL,,, SPACE  
BNR \*\*24,CKD,, IS THERE AN ANSWER TO TYPEOUT  
B \*\*24,,, NO  
WNTY CKD,,, DATA  
RCTY  
WNTY IND-3,,, TYPE  
WATY BL,,, SPACE

16878 45 16902 16001  
 16890 49 16914 00000  
 16902 38 17101 00100

BNR \*\*24,CKD,, IS THERE AN ANSWER TO TYPEDOUT  
 B \*\*24,,, NO  
 WNTY WORK-29,,, TYPE OUT COMPUTED ANSWER

16914 41 00000 00000  
 16926 31 17096 17132  
 16938 26 00079 17145  
 16950 47 16962 01400  
 16962 14 16971 0-0-1  
 16974 46 16986 00700  
 16986 46 16998 00800  
 16998 46 17010 01600  
 17010 46 17022 01700  
 17022 42 00000 00000

NOP  
 CLEAR TR DIVFLG-1,REC,, CLEAR WORK AREA, DIVIDE FLAG, AND ERROR FI  
 TF 79,REC+13,, CLEAR 69-79 FOR DIVIDE TESTS  
 BNV \*\*12,,, RESET OFLO TGR  
 CM \*\*9,1,810,, RESET H/P AND E/Z TRIGGERS  
 BI \*\*12,700,, RESET WRITE CHECK  
 BI \*\*12,800,, RESET MAR CK  
 BI \*\*12,1600,, RESET MBRE CK  
 BI \*\*12,1700,, RESET MBRO CK  
 BB,,, RETURN TO NEXT TEST

WORK AREA AND INITIALIZATION DATA

17096  
 17097 00002  
 17098 00001  
 17130 00032  
 17131 00001  
 17132 00003  
 17167 00033  
 17168 00005  
 17173 00001  
 17175 00003  
 17183 00004  
 17184 00001  
 17201 00002  
 17211 00002  
 17212  
 17213 00021  
 17255 00036

DORG 17096  
 DIVFLG DC 2,0,, LOCATION OF DIVIDE FLAG  
 ERRFLG DSC 1,0,, LOCATION OF ERROR FLAG  
 WORK DC 32,0,, COMMON WORK AREA  
 DC 1,'  
 REC DSC 3,0,, THIS IS USED TO CLEAR ALL FLAGS  
 DC 33,0',,, AND THE WORK AREA  
 ER2 DSC 5,0,  
 DC 1,'  
 BL DAC 3, '  
 IND DC 4,0,,  
 DC 1,'  
 XXX00 DC 2,01,17201,, COMPARE LOOKUP TABLE  
 DC 2,10,17211  
 DORG 17212  
 ER1 DAC 21,ERROR IN ROUTINE AT '  
 LOST DAC 36,COMPUTED ANSWER LOST FROM WORK AREA'

THIS IS THE ERROR ROUTINE FOR THE BRANCH TEST SECTION

17330 00005  
 17332 46 17428 00100  
 17344 47 17380 00300  
 17356 48 00000 00000  
 17368 49 17428 00000  
 17380 26 17530 17331

ERROR DC 5,0,  
 BC1 XT  
 BNC3 \*\*36,,, TYPE OUT IF SW3 OFF  
 H,,, IR2 CONTAINS LOC+12 OF ERROR EXIT  
 B XT,,, RESET AND RETURN  
 TF NUM+4,ERROR-1,,

ERROR TYPE OUT

17392 34 00000 00102  
 17404 39 17489 00100  
 17416 38 17526 00100  
 17428 46 17440 00800  
 17440 46 17452 01600  
 17452 46 17464 01700  
 17464 46 17476 00700  
 17476 42 00000 00000  
 17489 00019  
 17526 00006

RCTY  
 WATY ALPHA  
 WNTY NUM  
 XT BI \*\*12,800,, RESET MAR CK  
 BI \*\*12,1600,, RESET MBRE CK  
 BI \*\*12,1700,, RESET MBRO CK  
 BI \*\*12,700,, RESET WRITE CHECK  
 BB,,, RETURN TO PROGRAM  
 ALPHA DAC 19,ERROR AT LOCATION '  
 NUM DSC 6,0'

\* THIS IS THE ERROR ROUTINE FOR THE ADD TABLE TEST

```

*
*
WRONG BC1 TSUM+12
      BNC3 **36
      H ,,, ERROR IN ADD TABLE TEST
      B TSUM+12
      BTM ERROR,TSUM,, GO TO TYPE OUT LOCATION
      TD MSG+20,17100,,SET P
      TD MSG+24,Q,, SET Q
      TD MSG+28,P-1,, SET SUM TENS
      TD MSG+30,P,, SET SUM TENS
      RCTY
      WATY MSG,,, TYPE ERROR MESSAGE
      B TSUM+12
MSG DAC 17,1620 SAYS 0+0=00'
*
*
*

```

\* PASS COMPLETE AND LOAD CARD ROUTINE

```

FINISH AM CT,1,, UPDATE PASS COUNT
      BNC4 **48
      BD T24.5,CT,, CHECK FOR 100 PROGRAM PASSES
      BD T24.5,CT-1,,
      B **36
      BNR **24,18117
      B 18000
      RCTY
      WNTY CT-4,,, TYPE OUT PASS COUNT
      WATY JAZZ
      BC4 T24.5
      RNCD 0,,, LOAD NEXT PROGRAM IF SW4 OFF
      B 0
CT DC 5,0,, PASS COUNT
      DC 1,'
JAZZ DAC 23, PASSES COMPLETE DTX02'
      DORG 13542
      B 13606,,, LINKAGE TO DIVIDE TESTS
T24.5 DS ,1184
      DEND LINK

```

```

17532 46 10738 00100
17544 47 17580 00300
17556 48 00000 00000
17568 49 10738 00000
17580 17 17332 J0726
17592 25 17697 17100
17604 25 17701 10713
17616 25 17705 10700
17628 25 17707 10701
17640 34 00000 00102
17652 39 17677 00100
17664 49 10738 00000
17677 00017

```

```

17710 11 17870 -0001
17722 47 17770 00400
17734 43 01184 17870
17746 43 01184 17869
17758 49 17794 00000
17770 45 17794 18117
17782 49 18000 00000
17794 34 00000 00102
17806 38 17866 00100
17818 39 17873 00100
17830 46 01184 00400
17842 36 00000 00500
17854 49 00000 00000
17870 00005
17871 00001
17873 00023
13542
13542 49 13606 00000
01184 00000
07914

```

DT X02 80/80 LIST

360007200500360020100500440001200276260005900274250001100000260009000269 -0000  
26000950026431000000020026001140027425000000011490001200000 -0001  
M9042080+ 1-1-1184-1193 -0002  
490800000000+ 0-1-4208-4220 -0003  
M4677072+ 1-1-7900-7908 -0004  
J7998+ 1-1-7908-7913 -0005  
450793818117490796200000450118407961490044000000150796100000+0-1-7914-7974 -0006  
+ 1-1-7973-7974 -0007  
491800000000+ 0-1-7974-7986 -0008  
1408008-0-004608036014001717332-80244708060014001717332-8048+0-1-8000-8060 -0007  
4708084019001717332-80724608000002001408104-0-00470813201400+0-1-8060-8120 -0008  
4908144000001717332-81324608168014004908180000001717332-8168+0-1-8120-8180 -0009  
4708204019001717332-81924608096002001408224-0-00460824001100+0-1-8180-8240 -0010  
4608264014001717332-82524708288019001717332-8276460821600200+0-1-8240-8300 -0011  
1408308-0-004608324015004608348014001717332-8336470837201900+0-1-8300-8360 -0012  
1717332-83604608300002001408392-0-00460840801700460843201400+0-1-8360-8420 -0013  
1717332-84204708456019001717332-84444608384002001408476-0-00+0-1-8420-8480 -0014  
4608492024004608516014001717332-85044708540019001717332-8528+0-1-8480-8540 -0015  
4608468002001408560-0-002501400014004608600014001717332-8588+0-1-8540-8600 -0016  
4708624019001717332-861246085520020014086450J1J0460867201100+0-1-8600-8660 -0017  
1717332-86604608696013001717332-86844708720012001717332-8708+0-1-8660-8720 -0018  
4708744019001717332-873246086360020014087650-0-0460879201200+0-1-8720-8780 -0019  
1717332-87804608816013001717332-8804460884001100490885200000+0-1-8780-8840 -0020  
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