

ARITHMETIC TEST

This program checks the arithmetic section of the 1219B computer by a series of short tests which are controlled by an executive routine. All inter-register addresses, modifiers and other transmission paths within the specified arithmetic area are tested with multiple test patterns to determine operational capability. The tests will be executed in the following sequence, unless the sequence is altered by operator intervention:

- 1) AUT--A Upper Test
- 2) ALI--A Lower Test
- 3) LSAL--Left Shift A Test
- 4) RSAL--Right Shift A Test
- 5) ADER--Arithmetic Adder Test
- 6) KI--Shift Counter Test
- 7) CPAL--Complement A Test
- 8) ADD--Double Length Add/Subtract Test
- 9) MUL--Multiply Test
- 10) DIV--Divide Sign Test
- 11) DVT--Divide Test

The operator has the option of selecting either or both an error timeout or a computer console error display.

If PROGRAM SKIP 4 is not set Timeout Subroutines will provide the operator with a timeout of the status of the Arithmetic Test. If an error is detected, and PROGRAM SKIP 4 is not set, the title of the failing subtest and the correct and incorrect patterns will be buffered out in an error message, via channel 0, in field data code. However, in the Divide tests and the Arithmetic Adder Test, the error message format differs slightly. If PROGRAM STOP 0 is set and an error is detected, the test will stop with an error display in the AU and AL registers. The value in the P register along with the following Arithmetic Error Display Table are to be used to locate the failing subtest.

ARITHMETIC ERROR DISPLAY

If the Computer comes to a PROGRAM STOP 0 during the Arithmetic Test, an error has been detected. By referencing the address in P, this table will assist in determination of the error displayed.

P EQUALS	TESTING	AU	AL
10710	ENTER AU	PATTERN	SAME
10750	ENTER AL	CORRECT	INCORRECT
11014	LSH AL	CORRECT	INCORRECT
11045 11042?	LSH AU	INCORRECT	CORRECT
11075	LSH A	(AU & AL SAME)	
11132	RSH AL	CORRECT	INCORRECT
11164	RSH AU	INCORRECT	CORRECT
11230	RSH A	CORRECT	INCORRECT
11263	SEL COMP	CORRECT	INCORRECT
11371	ADDER	CORRECT	INCORRECT
11401	ADDER	CORRECT	INCORRECT
11407	ADDER	777777	SEE NOTE 1
11460	SHIFT COUNTER	CORRECT	INCORRECT
11536	COMPAL	CORRECT	INCORRECT
11565	COMPAU	CORRECT	INCORRECT
11620	COMP A	CORRECT	INCORRECT
11702	BORROW	(SUM OR DIFF IN A)	
11736	MULT SIGN	(PRODUCT IN A)	
11756	DIV SIGN	000001	000001
11755	DIV SIGN	000001	777776
12017	DIV SIGN	777776	777776
12036	DIV SIGN	777776	000001
12067	DIVIDE	REMAINDER	000000
12112	DIVIDE	NONE	SEE NOTE 2

NOTE 1: AL=N where N=22--the number of shifts done on the tables that are added.

NOTE 2: If AL=000777 Trouble is between AL and X
 If AL=777000 Trouble is between AU and D
 If AL=777777 Trouble is between B17 and A0

The Arithmetic Test may be run separately or as a part of the Integrated Command-Arithmetic Test. If it is run separately PROGRAM SKIP 2 must be set to remain in the Arithmetic Test.

The following is the operating procedure for the ARITHMETIC TEST.

- Disconnect the RIC. TEST PROGRAM of the INTEGRATED TEST PROGRAM. The jumps and stops for this program are as shown in the following table.
- Load the ARITHMETIC TEST PROGRAM or the INTEGRATED TEST PROGRAM. The jumps and stops for this program are as shown in the following table.

PROGRAM SWITCH

PROGRAM ACTION

PROGRAM SKIP 0	Set to recycle current subroutine upon error detection
PROGRAM SKIP 1	Set to recycle the executive routine (EXEC) without referencing the monitor ARITH.
PROGRAM SKIP 2	Set to remain in the ARITHMETIC TEST
PROGRAM SKIP 4	Set to suppress typeouts
PROGRAM STOP 0	Set for computer console error display
PROGRAM STOP 1	Set to end ARITHMETIC TEST (see Note)
PROGRAM STOP 2	Set to stop after error typeout

NOTE: With typeouts the test will end after a selected number of cycles (the number in address NYMB). Without typeouts the test will end after completion of the current cycle.
NYMB=10361.

- c. Set PROGRAM SKIPS and STOPS as desired according to the above table.
- d. Master Clear the Computer.
- e. Set the 1232/1532 channel number in AL bits 6 to 3.
- f. Set AL bit 8 if the I/O Console is a 1532.
- g. Set AL bits 17-15 as follows:
 - Set bit 17 if computer is in 1218 normal mode.
 - Set bit 16 if computer is in 1218 NTDS mode.
 - Set bit 15 if computer is in 1219 normal mode.
- h. Insert (if necessary) the plug-in printed wiring assembly 7104010 in the location specified as follows:
 - A4ALJ5G if computer is in 1218 normal mode.
 - A4ALJ5F if computer is in 1218 NTDS mode.
 - A4ALJ4G if computer is in 1219 normal mode.
- i. Set P=10300.
- j. Start the computer.

SPECIFICATION SYMBOL: SB-10163

TITLE: ARITH - 1219B ARITHMETIC TEST

DECK IDENTIFIER: FACT

CSP LABEL: ARITH KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 December 1967

NUMBER OF OUTPUT INSTRUCTIONS: 51

DESCRIPTION:

This routine, ARITH, monitors the arithmetic test.

This routine is referenced by the Main Executive routine when ARITH is run as part of the integrated Command, Arithmetic, and Control Memory tests. When run as a separate program ARITH is referenced by routine EXEC.

When ARITH is entered, PROGRAM SKIP 4 is referenced. If set, typeouts are suppressed, and subroutine EXEC is return jumped to. This procedure continues until PROGRAM STOP 1 is set to end the test. If PROGRAM SKIP 4 is not set ARITHMETIC TEST is typed and EXEC is return jumped to. Upon the return from EXEC the cycle count is incremented and compared to a number N stored in address NYMB. If N cycles are completed an error flag is checked. If no errors occurred END CYCLES is typed. If errors occurred RECYCLE is typed. After these typeouts PROGRAM STOP 1 is referenced to end the test. Then PROGRAM SKIP 2 is referenced. If set an exit is made from ARITH to the Main Executive program. If not set the process of counting N test cycles is repeated.

SPECIFICATION SYMBOL

SB-10163

TITLE: ARITH - 1219B ARITHMETIC TEST

INPUT PARAMETERS (Listed Sequentially):

EFLG - error flag

OUTPUT PARAMETERS (Listed Sequentially):

Buffers:

NAME - NAME1+3
END - END+5
BUN - BUN+3

ABNORMAL EXITS (Listed Sequentially):

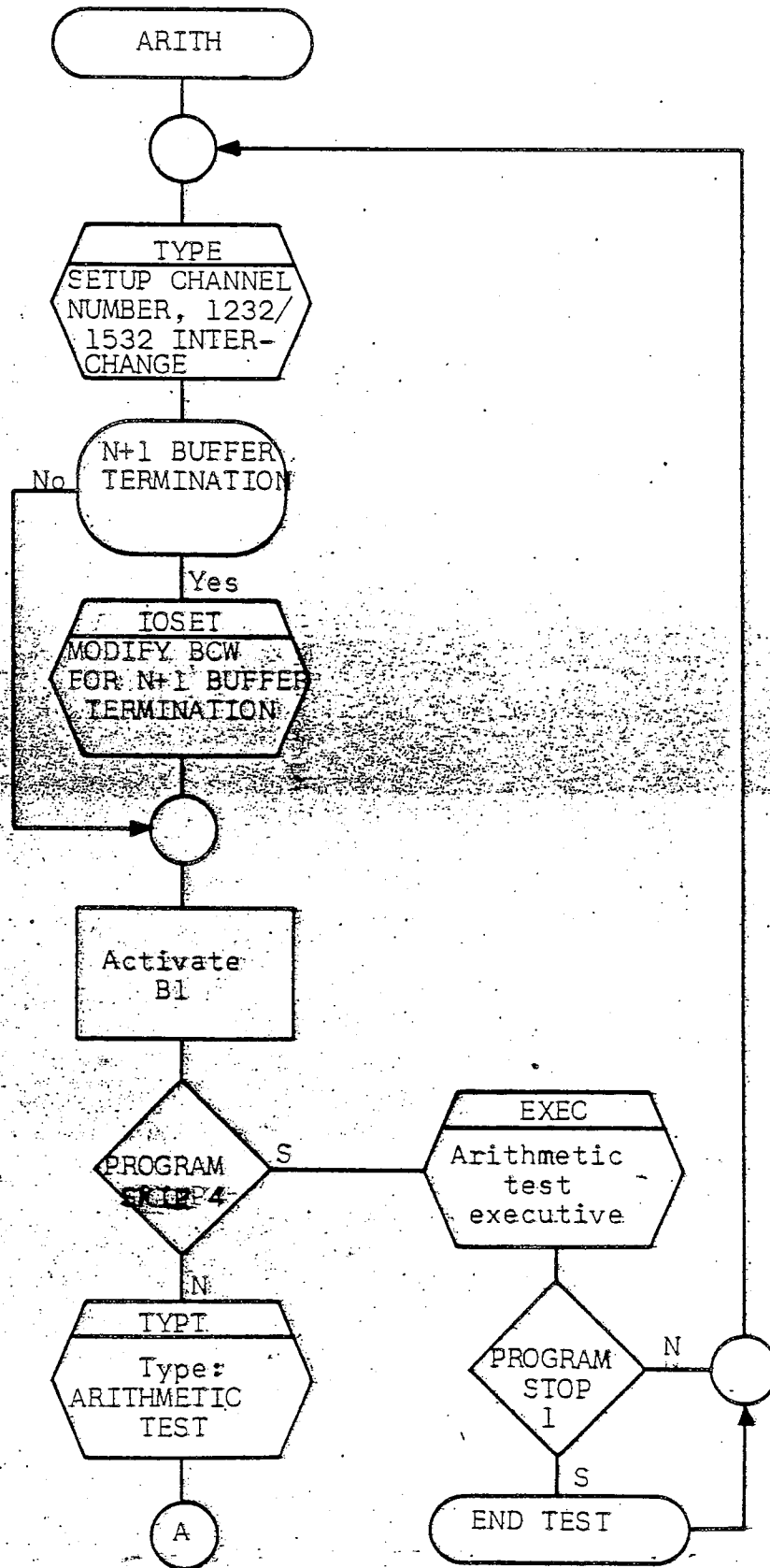
NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

EXEC
MEXEC
TYPE
IOSET

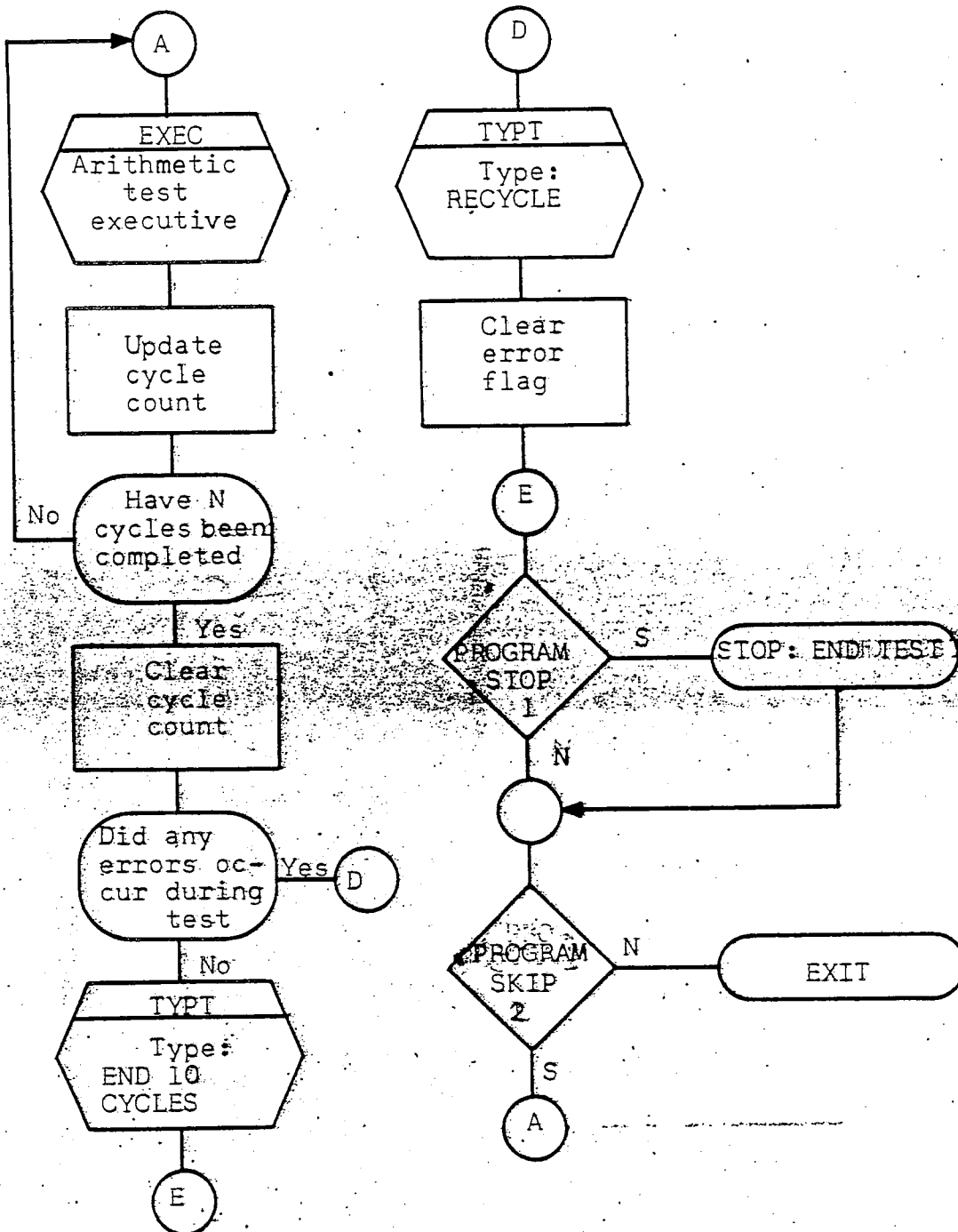
SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

PROGRAM SKIP 4 - Set to suppress typeouts
Not set for typeoutsPROGRAM STOP 1 - Set to end test
Not set to continuePROGRAM SKIP 2 - Set to remain in ARITH
Not set to exit from ARITH



ARITH - 1219B
ARITHMETIC TEST



ARITH - 1219B ARITHMETIC TEST

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SPECIFICATION SYMBOL
SB-10163

TITLE: ERMSG - ERROR TYPEOUT

DECK IDENTIFIER: FACT

CS-1 LABEL: ERMSG KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: HWM. modified by TLR. DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 43

DESCRIPTION:

This subroutine, ERMSG, types out the error indication if PROGRAM SKIP 4 is not set.

This routine is referenced by each of the tests within the ARITHMETIC TEST.

When ERMSG is entered subroutine MTITLE is referenced to print the title of the failing test. Then, if the test is not a divide test, title of the failing test is printed. If

ERROR
CORRECT INCORRECT

is typed by referencing subroutine TYPT. Then the correct and incorrect values are typed below the appropriate headers. If the test is a divide test only the "correct" and "incorrect" values corresponding to AU and AL are typed. After the typeouts, PROGRAM STOP 2 is referenced to stop the tests. If not set an exit is made from ERMSG.

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SPECIFICATION SYMBOL

SB-10163

TITLE: ERMSG - ERROR TYPEOUT

INPUT PARAMETERS (Listed Sequentially):

PTN 1
PTN 2

OUTPUT PARAMETERS (Listed Sequentially):

Buffers: ERR - ERR 2++ 5
 BUN + 2

PTN 1
PTN 2

ABNORMAL EXITS (Listed Sequentially):

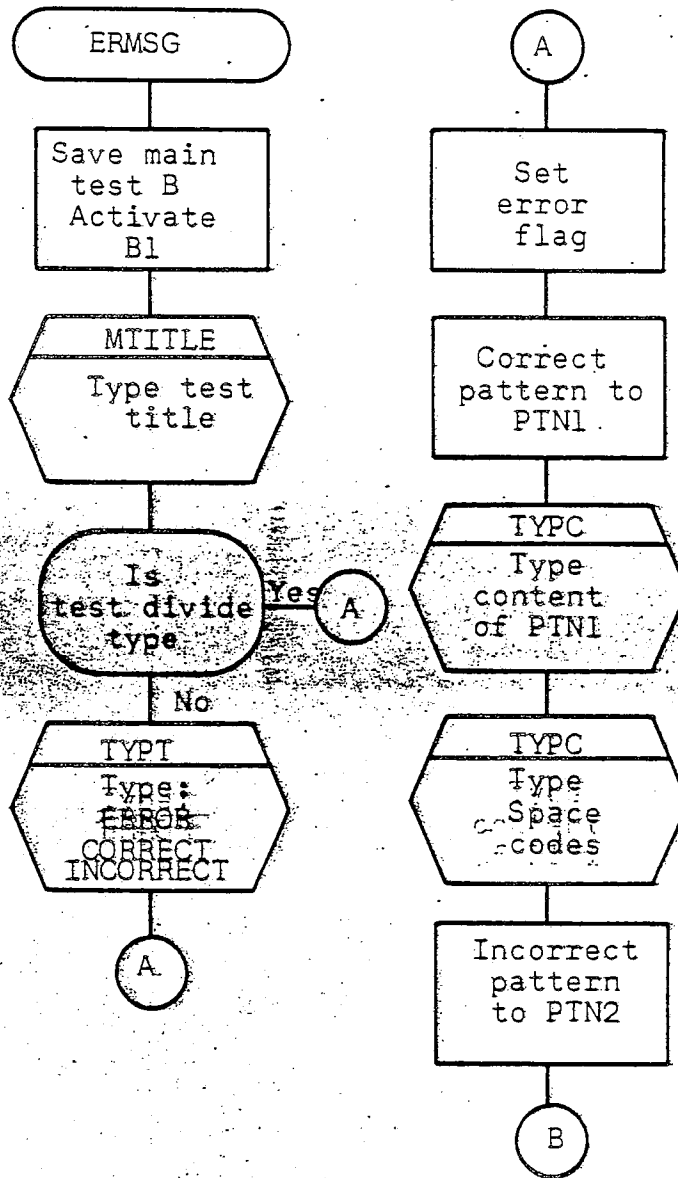
NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

MTITLE
TYPT

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

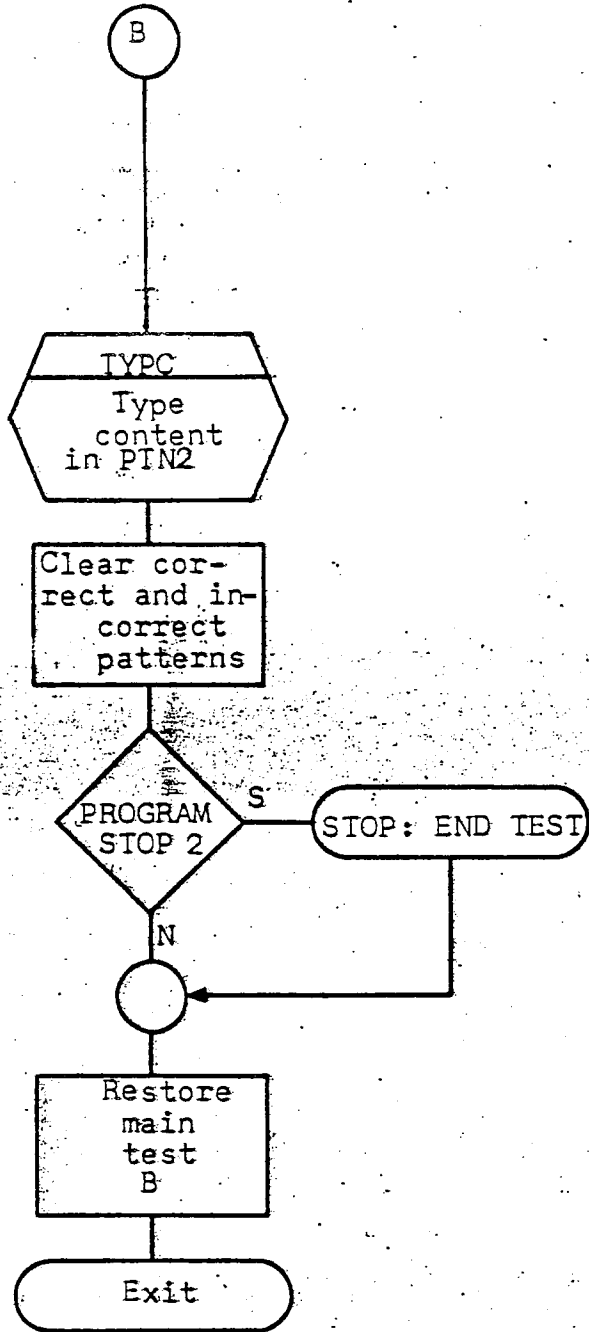
PROGRAM STOP 2 - Set to stop after typeout.
 Not set to continue tests.



ERMSG - ERROR TYPEOUT

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SPECIFICATION SYMBOL SB-10163



ERMSG - ERROR TYPEOUT

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SPECIFICATION SYMBOL
SB-10163

TITLE: TYPE - SETUP CHANNEL NUMBER, 1232/1532 INTERCHANGE

DECK IDENTIFIER: FACT

CS-1 LABEL: TYPE KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: _____ TLR _____ DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 43

DESCRIPTION:

This subroutine inserts the 1232/1532 channel number in all I/O instructions. It also modifies the TYPT and TYPC sub-routines so as to accept either 1232 or 1532 coded data.

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SPECIFICATION SYMBOL

SB-10163

TITLE: _____ TYPE _____

INPUT PARAMETERS (Listed Sequentially):

ALPARM - Initial AL input parameter

OUTPUT PARAMETERS (Listed Sequentially):

IS1	IS\$1	} I/O instructions with channel number inserted
IS2	IS\$2	
IS3	IS\$3	
IS4	IS\$4	

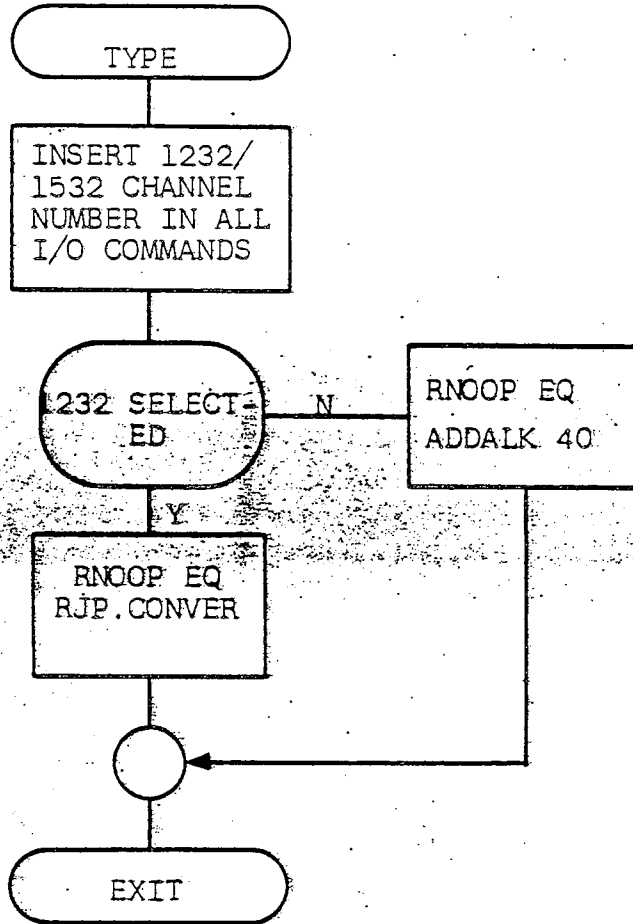
RNOOP [RJP-CONVER if 1232 selected
 [ADDALK-40 if 1532 selected

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:



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SPECIFICATION SYMBOL

SB-10163

TITLE: IOSET

DECK IDENTIFIER: IOSET

CS-1 LABEL: IOSET KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: _____ TLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 14

DESCRIPTION:

This subroutine modifies output and external function buffers for N+1 termination.

SPECIFICATION SYMBOL
SB-10163

TITLE: IOSET

INPUT PARAMETERS (Listed Sequentially):

T\$1+2
T\$2+2

OUTPUT PARAMETERS (Listed Sequentially):

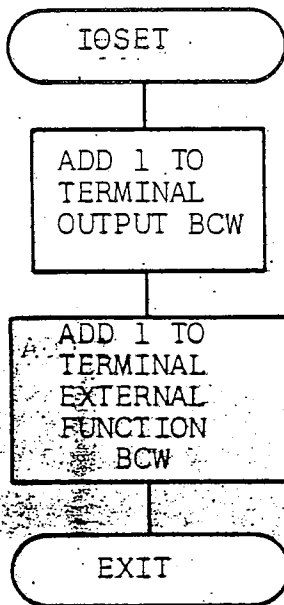
T\$1+1
T\$2+1

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:



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SPECIFICATION SYMBOL
SB-10163TITLE: MTITLE - TYPE TEST TITLEDECK IDENTIFIER: FACTCS-1 LABEL: MTITLE KEY: _____ IS LABEL DUPLICATE? NoPROGRAMMER: HWM modified by TLR DATE: 8 December 1967NUMBER OF L₄ OUTPUT INSTRUCTIONS: 54

DESCRIPTION:

This subroutine, MTITLE, types the title of the tests that fail during the Arithmetic test.

This subroutine is referenced by subroutine ERMSG.

When MTITLE is entered error flags are checked to determine the failing test, then the test title is typed and an exit is made to ERMSG.

SPECIFICATION SYMBOL
SB-10163TITLE: MTITLE - TYPE TEST TITLE

INPUT PARAMETERS (Listed Sequentially):

The error flags FLAG - FLAG+12

OUTPUT PARAMETERS (Listed Sequentially):

Test titles
TAUT - TDVT

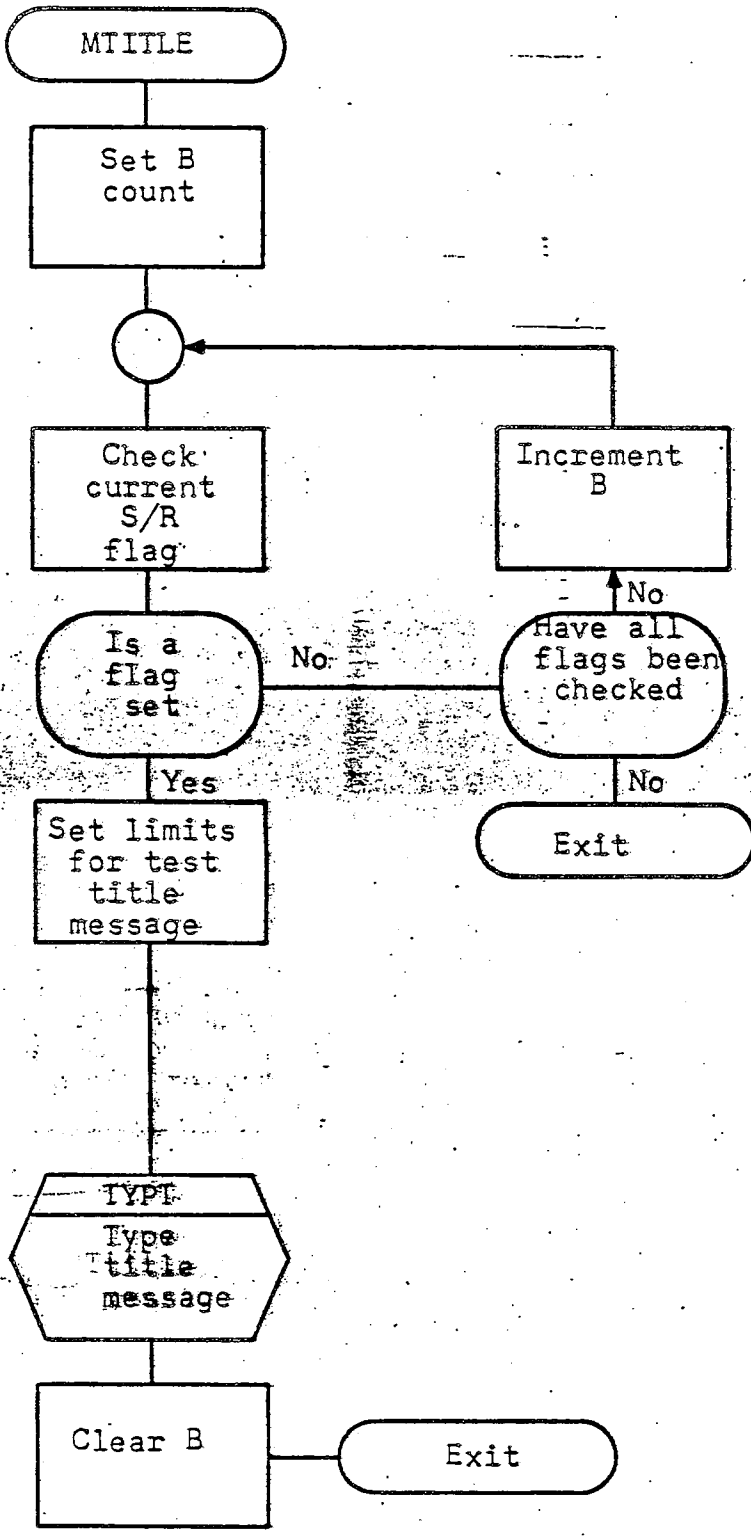
ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

TYPT

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:



MTITLE - TYPE S/R TITLE

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SPECIFICATION SYMBOL
SB-10163

TITLE: EXEC - ARITHMETIC TEST EXECUTIVE

DECK IDENTIFIER: FACT

CS-1 LABEL: EXEC KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 82

DESCRIPTION:

This subroutine, EXEC, controls the testing portion of the Arithmetic test through a series of return jumps. There are 11 different arithmetic subroutine tests that can be run sequentially or individually by the use of various PROGRAM SKIP settings.

This subroutine is referenced by routine ARITH.

EXEC is entered from ARITH and return jumps to the various test subroutines. Upon returning to EXEC after a test subroutine PROGRAM SKIP 0 is referenced. If set the test subroutine just run will be entered again. If not set the next sequential test subroutine will be entered. After all test subroutines have been run PROGRAM SKIP 1 is referenced. If set control is returned to ARITH. If not set the series of test subroutines will be run through again. Before each test subroutine is entered a title flag is set. Upon returning the flag is cleared.

SPECIFICATION SYMBOL
SB-10163TITLE: EXEC - ARITHMETIC TEST EXECUTIVE

INPUT PARAMETERS (Listed Sequentially):

OUTPUT PARAMETERS (Listed Sequentially):

Title flags
FLAG thru FLAG+12

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

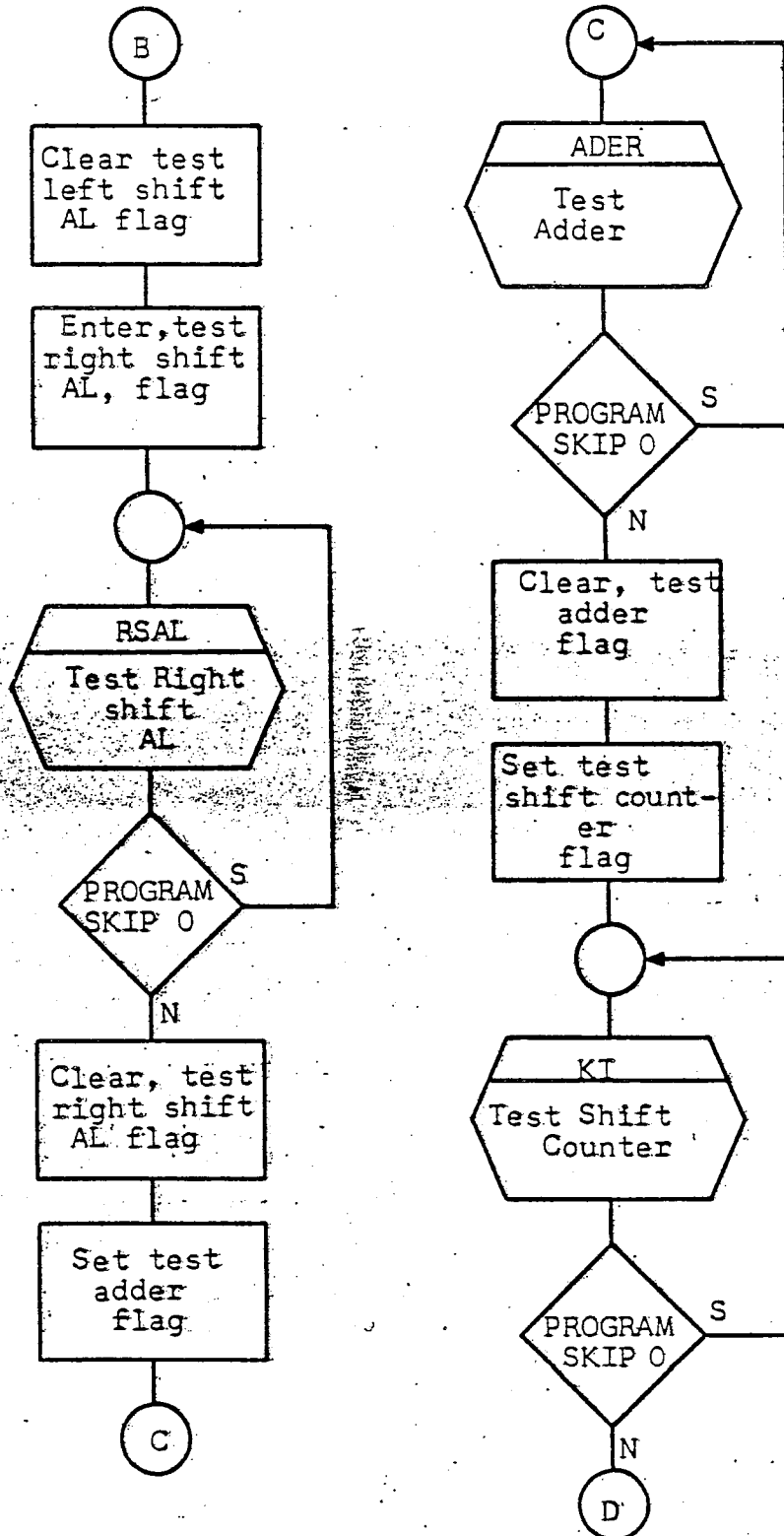
Test Subroutines:

AUT, ALT, LSAL, RSAL, ADER, KT,
CPAL, ADD, MUL, DIV, and DVT

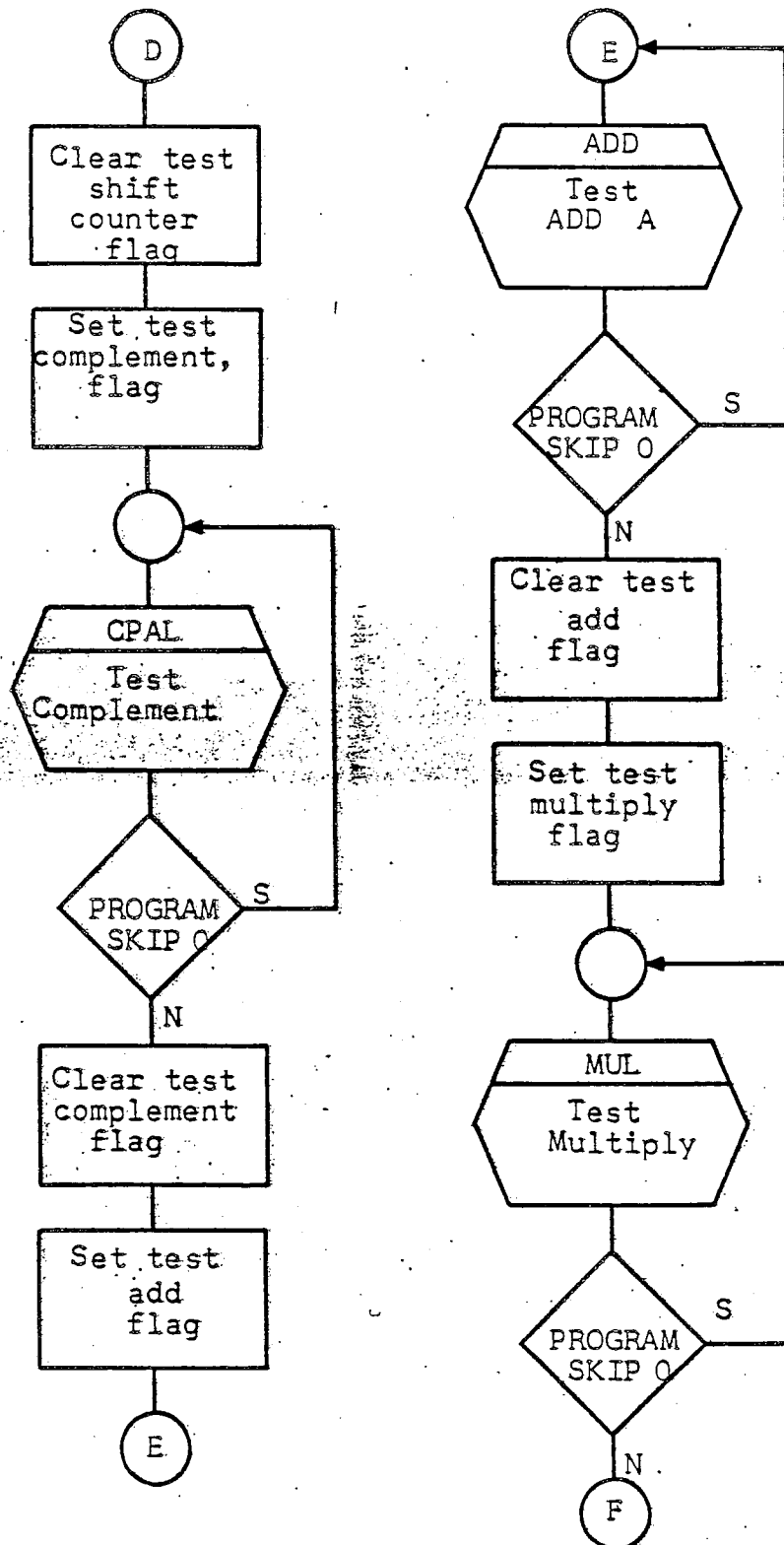
SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

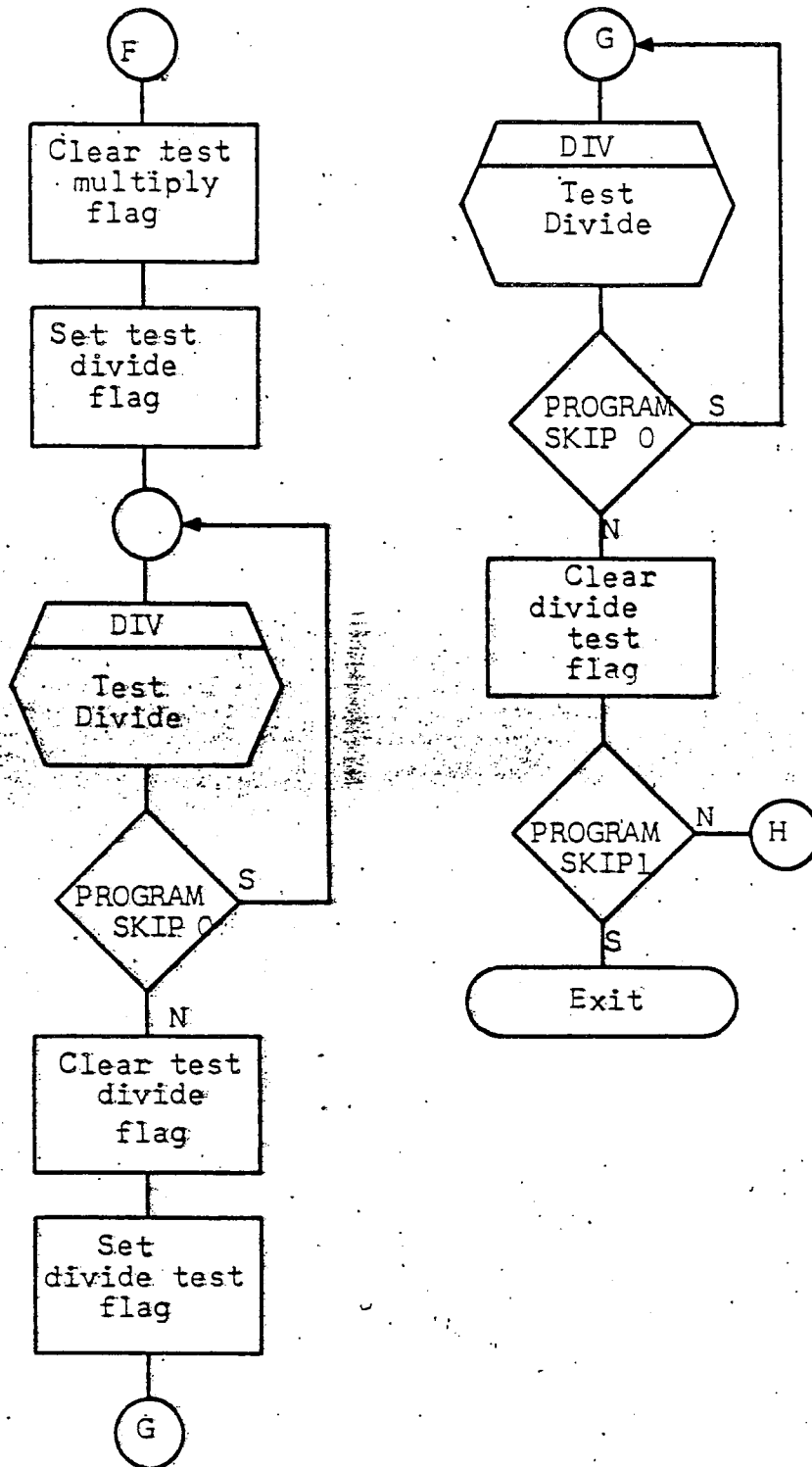
PROGRAM SKIP 0 - Set to recycle a test subroutine
Not set to enter next sequential test subroutinePROGRAM SKIP 1 - Set to return control to ARITH
Not set to remain in EXEC.



EXEC - ARITHMETIC TEST EXECUTIVE



EXEC - ARITHMETIC TEST EXECUTIVE



EXEC - ARITHMETIC TEST EXECUTIVE

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SPECIFICATION SYMBOL
SB-10163TITLE: AUT - TEST AU REGISTERDECK IDENTIFIER: FACTCS-1 LABEL: AUT KEY: _____ IS LABEL DUPLICATE? NoPROGRAMMER: HWM modified by TLR DATE: 8 December 1967NUMBER OF L₄ OUTPUT INSTRUCTIONS: 39

DESCRIPTION:

This subroutine, AUT, tests the AU Register by entering a pattern into this register, storing the contents at a common memory location, and entering this memory location into AL. Then it checks for an error by using a check table.

This subroutine is referenced by subroutine EXEC.

AUT goes through the entering-storing-entering process until an error occurs or the test is completed successfully. If an error occurs and PROGRAM STOP 0 is set and AU is equal to AL, the enter AU portion of this subroutine failed. If AU is not equal to AL, either the store AU or enter AL functions failed. Then PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set an exit is made from AUT.

SPECIFICATION SYMBOL
SB-10163TITLE: AUT - TEST AU REGISTER

INPUT PARAMETERS (Listed Sequentially):

TPAT1 = 000000
TPCK = WORKING STORAGE
TPAT2 = 000000
TPAT1+1 = 777777
TPAT2+1 = 777777
TPAT1+2 = 252525
TPAT1+3 = 525252
TPAT1+4 = 707070
TPAT1+5 = 070707

OUTPUT PARAMETERS (Listed Sequentially):

PTN1
PTN2

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

ERMSG

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

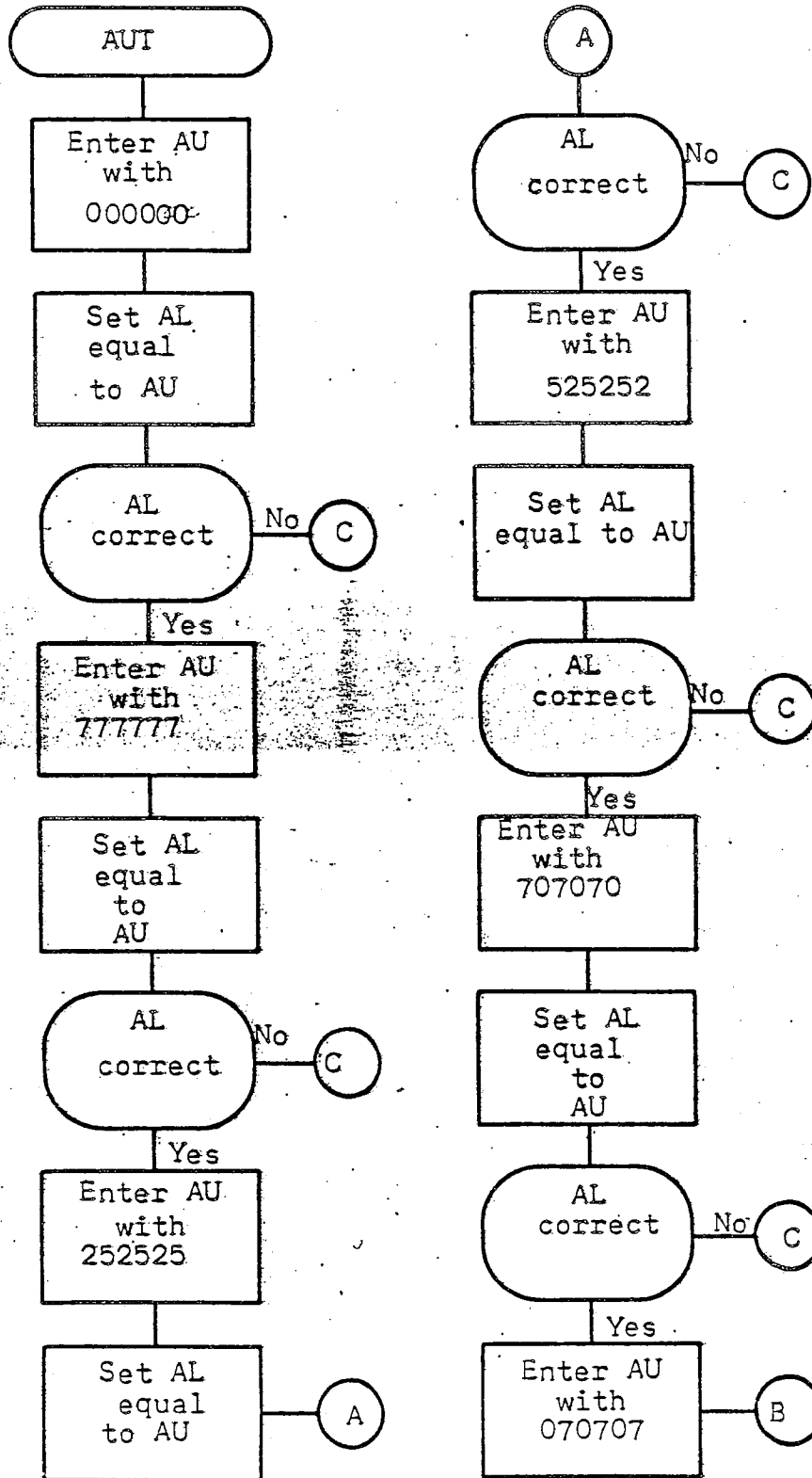
PROGRAM SKIP 4 - Set to suppress error typeouts
Not set for error typeouts

PROGRAM STOP 0 - Set for computer console error display upon stop

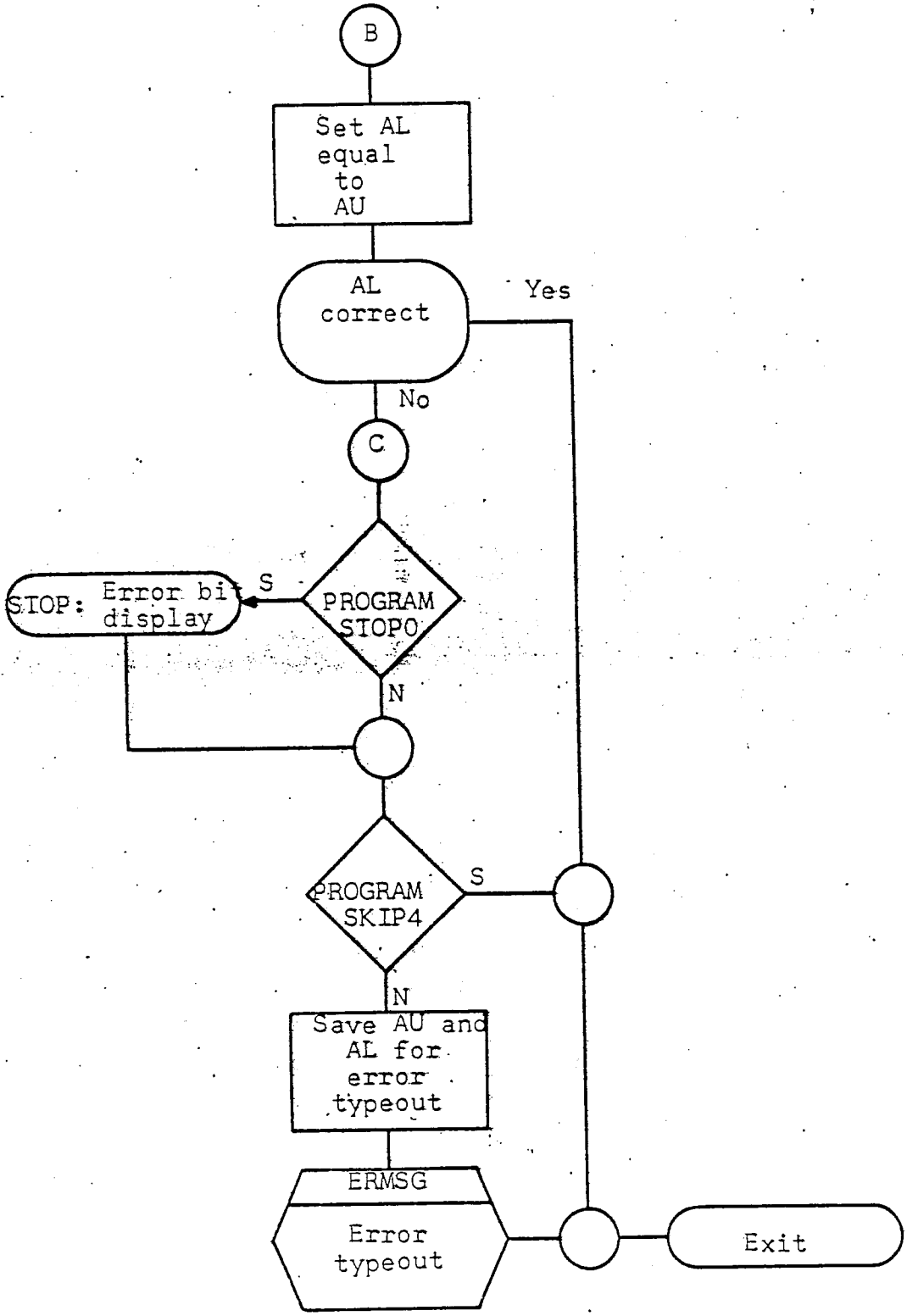
P = 10710

AU = Pattern entered into AU

AL = Pattern stored from AU



AUT - TEST AU REGISTER



AUT - TEST AU REGISTER

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163TITLE: ALT - TEST AL REGISTERDECK IDENTIFIER: FACTCS-1 LABEL: ALT KEY: _____ IS LABEL DUPLICATE? NoPROGRAMMER: HWM modified by TLR DATE: 8 December 1967NUMBER OF L₄ OUTPUT INSTRUCTIONS: 32**DESCRIPTION:**

This subroutine, ALT, tests the AL register by entering a pattern into this register and checking its contents against a check table.

ALT is referenced by subroutine EXEC.

ALT goes through the entering-checking process until an error occurs or the test is completed successfully. If an error occurs PROGRAM STOP 0 is referenced. If set the computer stops with the correct in AU and incorrect in AL. If not set or upon restarting PROGRAM SKIP 4 is referenced. If set an exit is made from ALT. If not set an error typeout occurs then an exit is made from ALT.

TITLE: ALT - TEST AL REGISTER

INPUT PARAMETERS (Listed Sequentially):

TPAT1 = 000000	TPAT1+5 = 070707
TPAT1+1 = 777777	TPAT2+5 = 070707
TPAT2+1 = 777777	
TPAT1+2 = 252525	
TPAT2+2 = 252525	
TPAT1+3 = 525252	
TPAT2+3 = 525252	
TPAT1+4 = 707070	
TPAT2+4 = 707070	

OUTPUT PARAMETERS (Listed Sequentially):

PTN1
PIN2

ABNORMAL EXITS (Listed Sequentially):

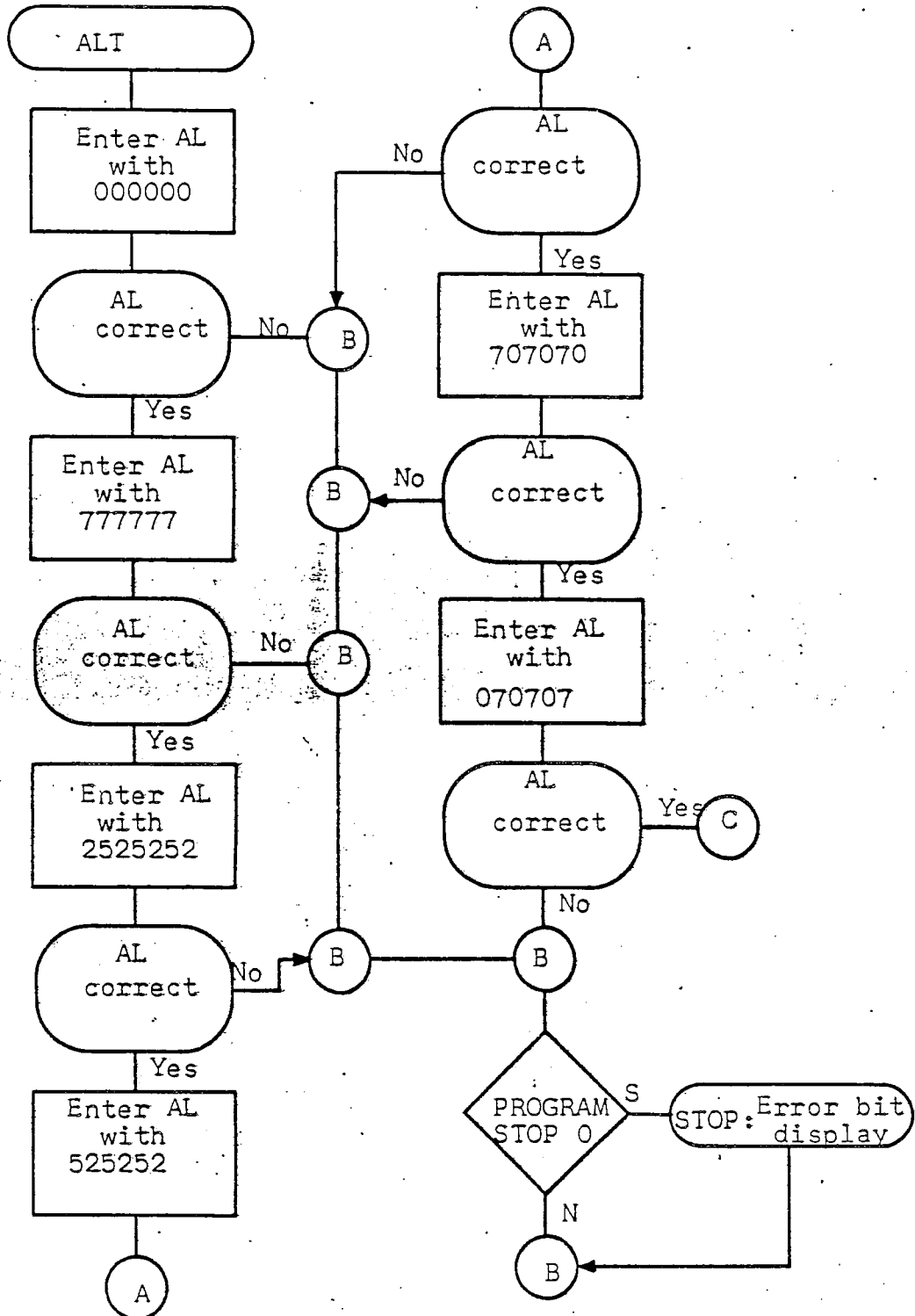
NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

ERMSG

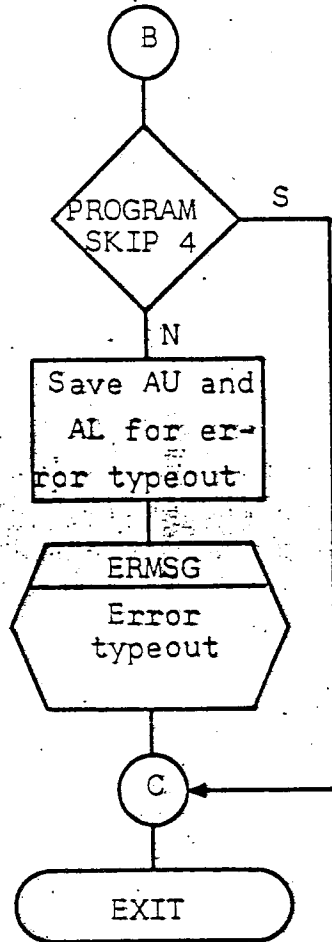
SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

PROGRAM SKIP 4 - Set to suppress error typeouts
 Not set for error typeouts
PROGRAM STOP 0 - Set for computer console error display upon stop:
 P = 10750
 AU = correct pattern
 AL = incorrect pattern



ALT - TEST AL REGISTER



ALT - TEST AL REGISTER

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SPECIFICATION SYMBOL
SB-10163TITLE: LSAL - LEFT SHIFT AU, AL, AND ADECK IDENTIFIER: FACTCS-1 LABEL: LSAL KEY: _____ IS LABEL DUPLICATE? NoPROGRAMMER: HWM modified by TLR DATE: 8 December 1967NUMBER OF L OUTPUT INSTRUCTIONS: 87

DESCRIPTION:

This subroutine, LSAL, tests the left shift capabilities of the registers. The AL Register is tested first by loading various patterns, shifting, and verifying. The AU Register is tested next, using similar patterns, and finally the A Register is tested.

LSAL is referenced by subroutine EXEC.

The three portions of this subroutine are run sequentially. Upon successful completion control is returned to EXEC after the A register is tested. If an error occurs PROGRAM STOP 0 is referenced. If set the computer stops with an error display in AU and AL. If not set or upon restarting PROGRAM SKIP 4 is referenced. If not set an error timeout occurs. If set or after the timeout the next sequential portion of LSAL is run. However, if the error occurs in the test A portion an exit is made to EXEC.

TITLE: LSAL - LEFT SHIFT AU, AL, AND A

INPUT PARAMETERS (Listed Sequentially):

TPAT1 = 000000
 TPAT2 = 000000
 TPAT1+1 = 777777
 TPAT2+1 = 777777
 TPAT1+2 = 252525
 TPAT2+3 = 525252
 TPAT2+2 = 252525
 TPAT1+4 = 707070
 TPAT2+5 = 070707
 TPAT2+4 = 707070

OUTPUT PARAMETERS (Listed Sequentially):

PTN1
 PTN2

ABNORMAL EXITS (Listed Sequentially):

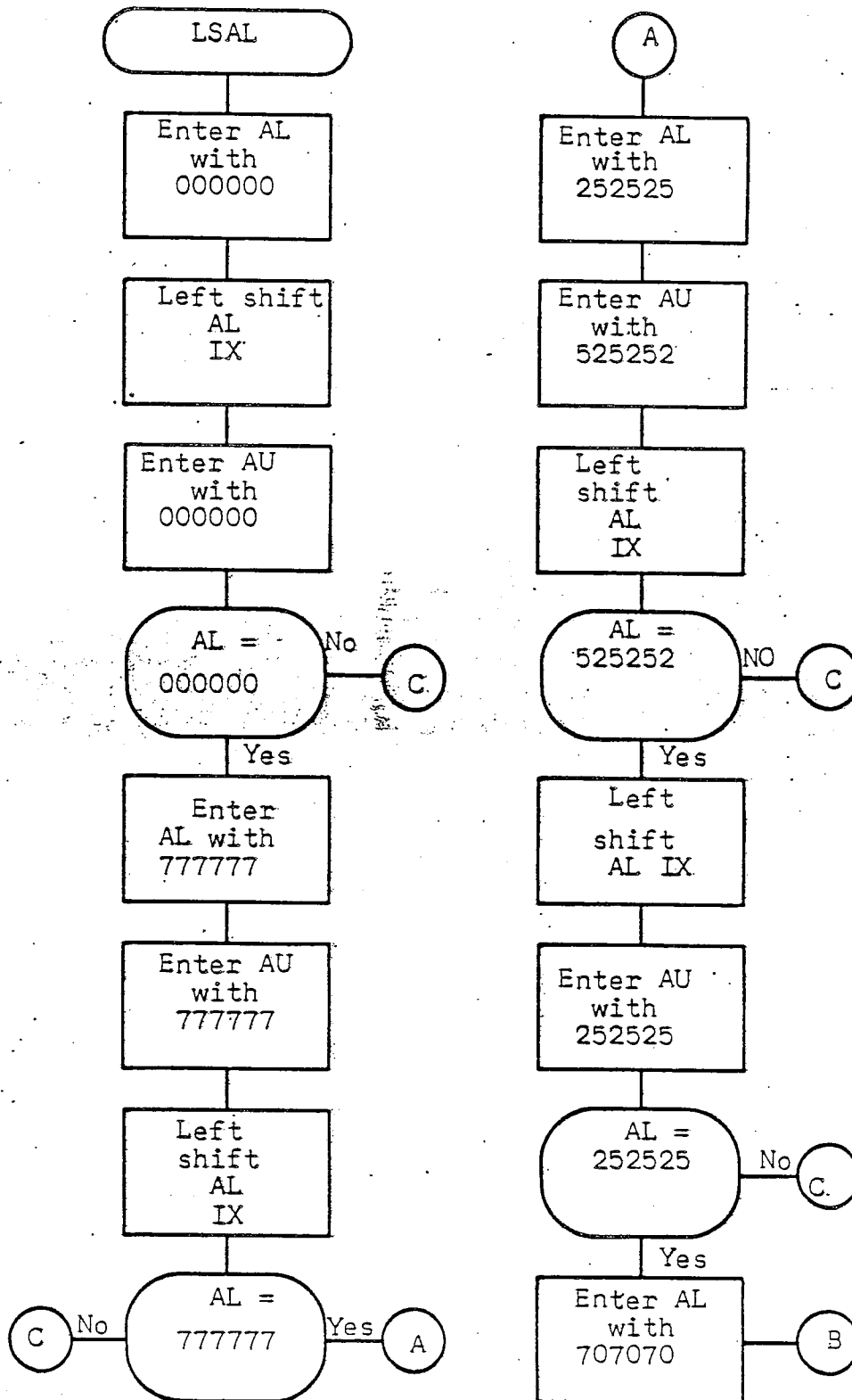
NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

ERMSG

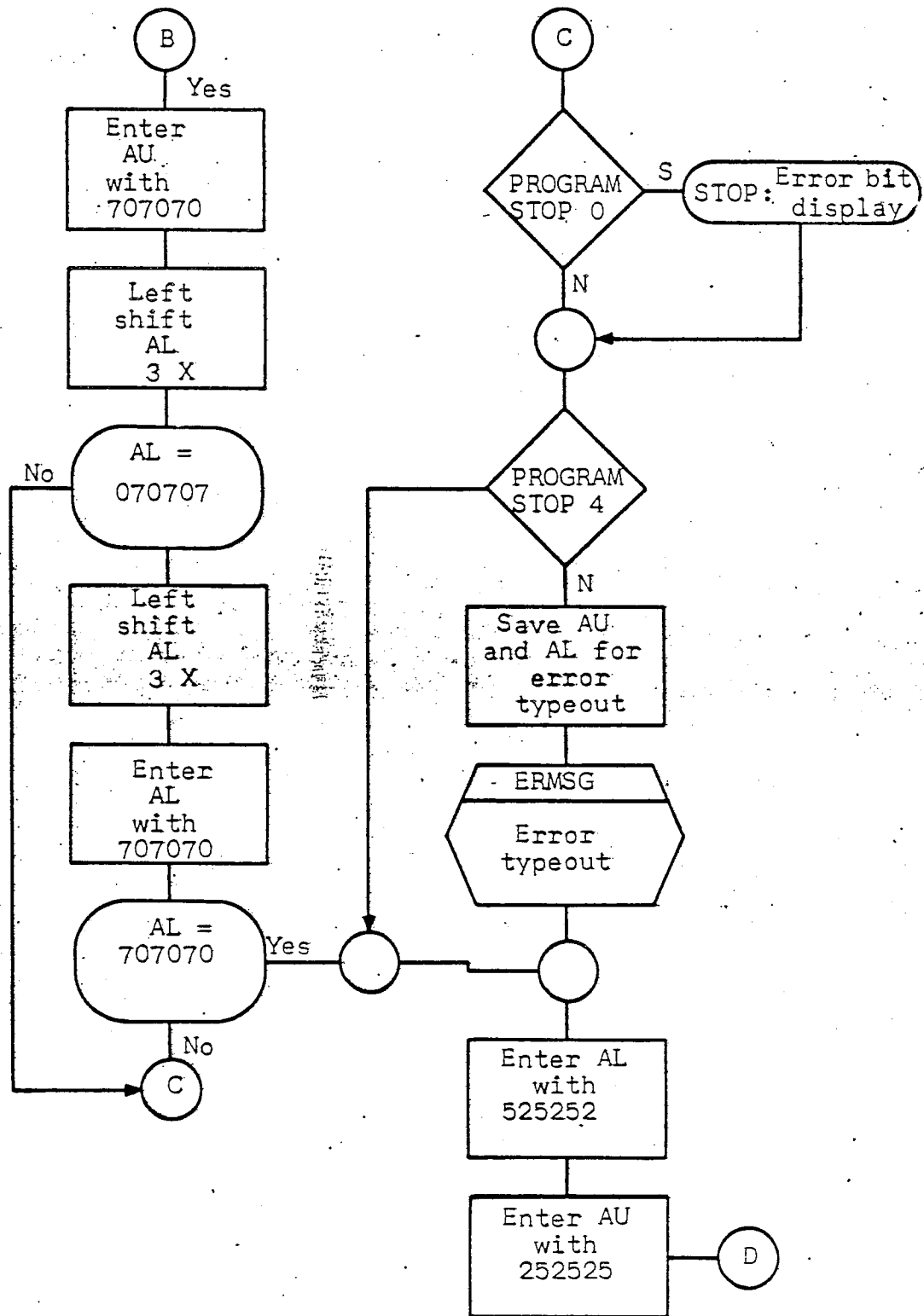
SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

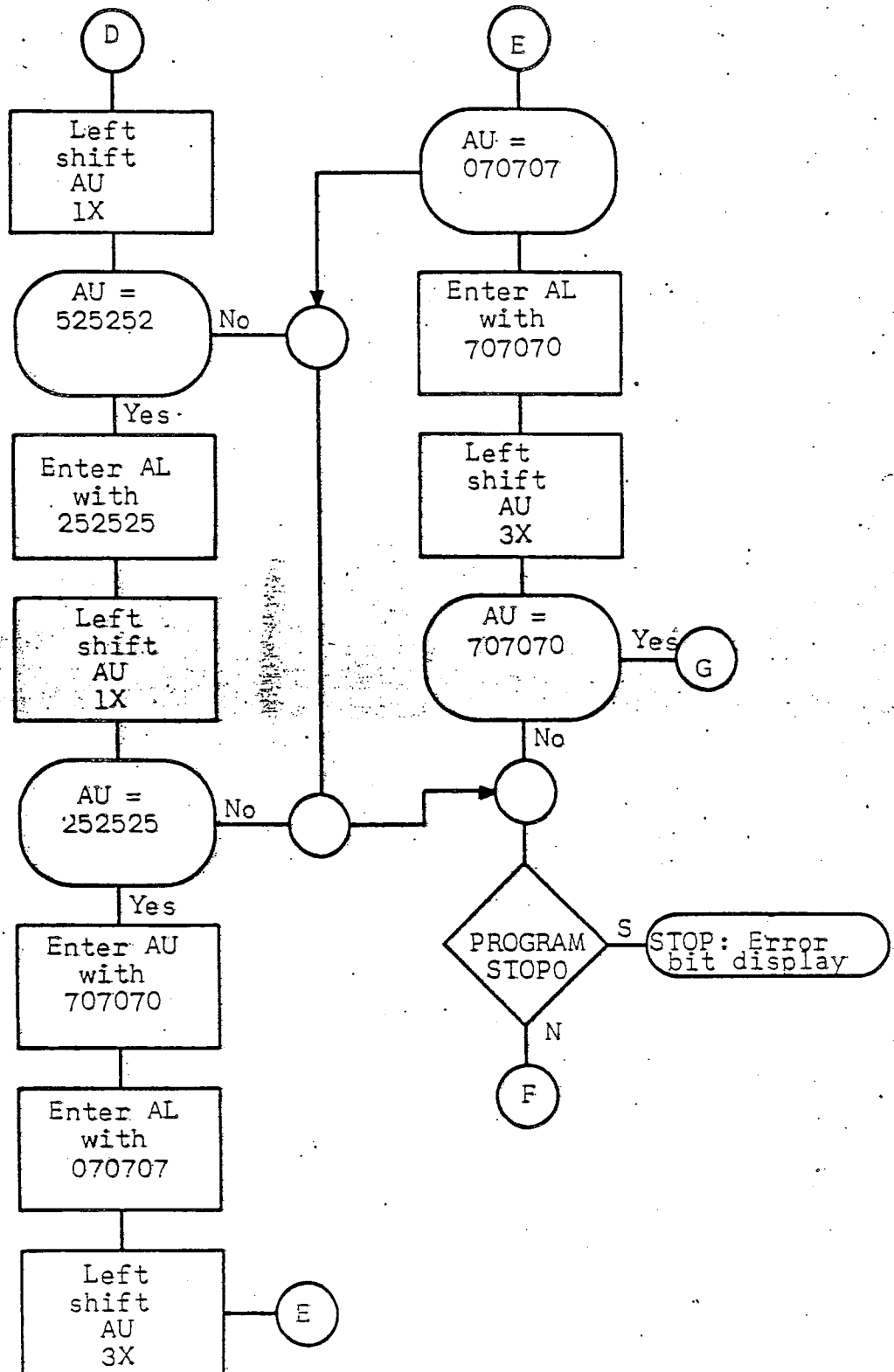
PROGRAM SKIP 4 - Set to suppress error typeouts
 Not set for error typeouts
 PROGRAM STOP 0 - Set for computer console error display upon stop:
 P = 11014
 AU = correct pattern
 AL = incorrect pattern
 P = 11045
 AU = incorrect pattern
 AL = correct pattern
 P = 11076
 AU and AL should be equal



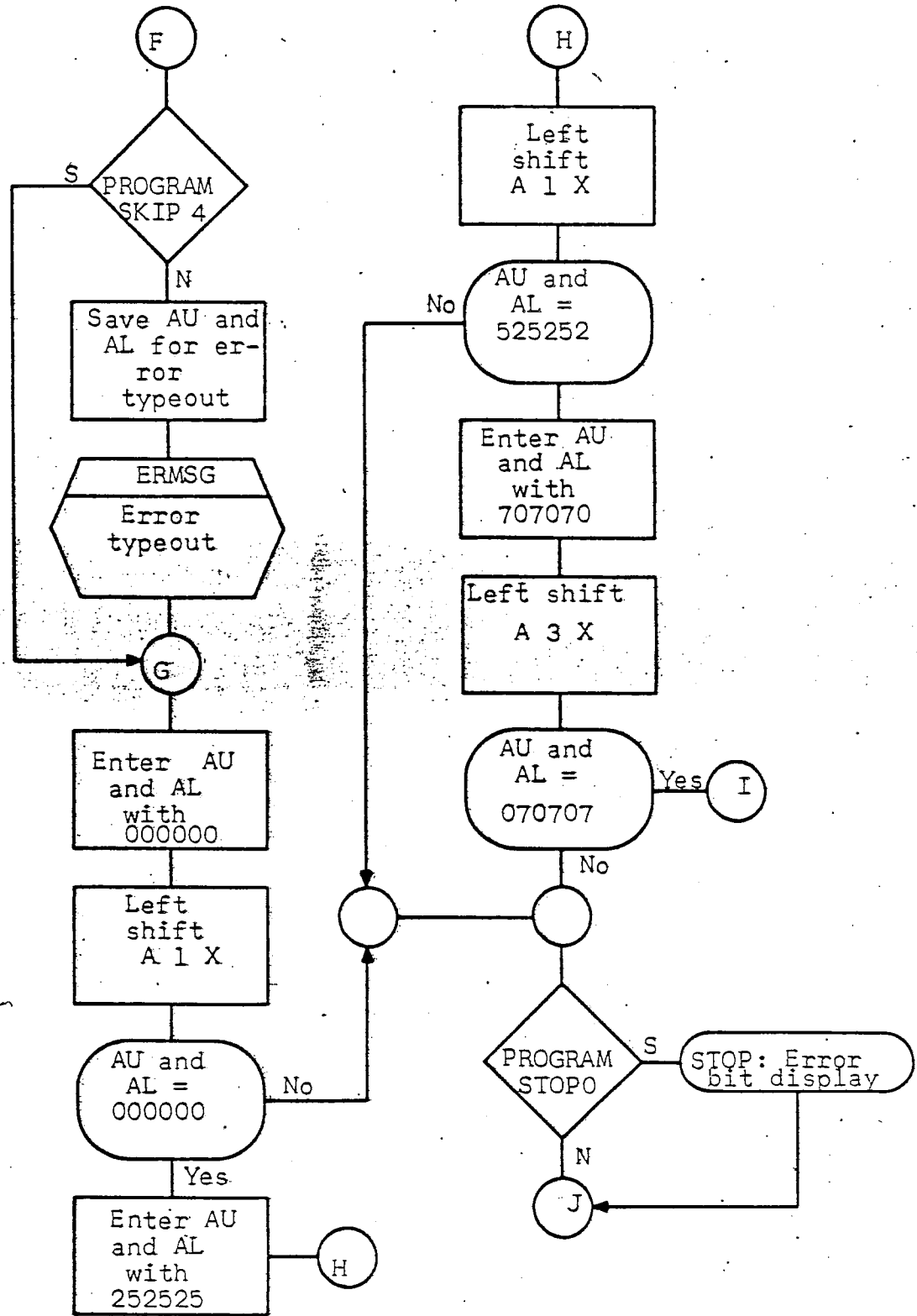
LSAL - LEFT SHIFT AU, AL & A.



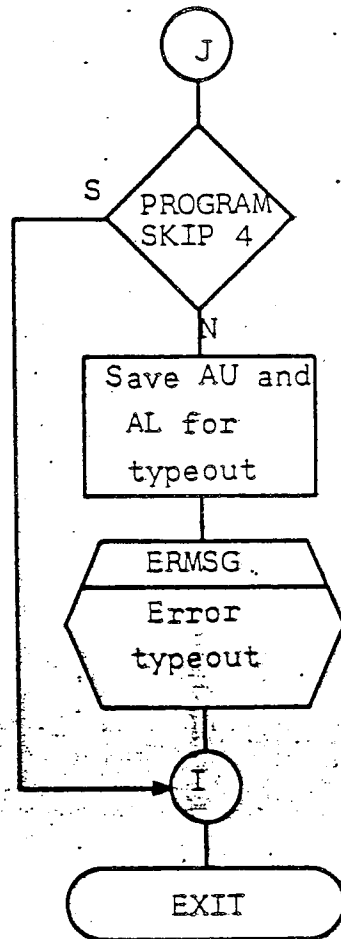
LSAL - LEFT SHIFT AU, AL & A



LSAL - LEFT SHIFT AU, AL & A



LSAL - LEFT SHIFT AU, AL & A



LSAL - LEFT SHIFT AU, AL & A

TITLE: RSAL - RIGHT SHIFT AL, AU, AND ADECK IDENTIFIER: FACTCS-1 LABEL: RSAL KEY: _____ IS LABEL DUPLICATE? NoPROGRAMMER: HWM modified by TLR DATE: 8 December 1967NUMBER OF L OUTPUT INSTRUCTIONS: 91

DESCRIPTION:

This subroutine, RSAL, tests the right shift capabilities of the registers. The AL Register is tested first by loading various patterns, shifting, and verifying. The AU Register is tested next, using similar patterns, and finally the A Register is tested.

RSAL is referenced by subroutine EXEC.

The three portions of this subroutine are run sequentially. Upon successful completion control is returned to EXEC after the A register is tested. If an error occurs PROGRAM STOP 0 is referenced. If set the computer stops with an error display in AU and AL. If not set or upon restarting PROGRAM SKIP 4 is referenced. If not set an error timeout occurs. If set or after the timeout the next sequential portion of RSAL is run. However, if the error occurs in the test A portion an exit is made to EXEC.

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SPECIFICATION SYMBOL

SB-10163

TITLE: RSAL - RIGHT SHIFT AL, AU, AND A**INPUT PARAMETERS (Listed Sequentially):**

TPAT1 = 000000
TPAT1+1 = 777777
TPAT3 = 125252
TPAT1+2 = 252525
TPAT3+1 = 652525
TPAT1+3 = 525252
TPAT2+3 = 525252
TPAT2+2 = 252525

OUTPUT PARAMETERS (Listed Sequentially):

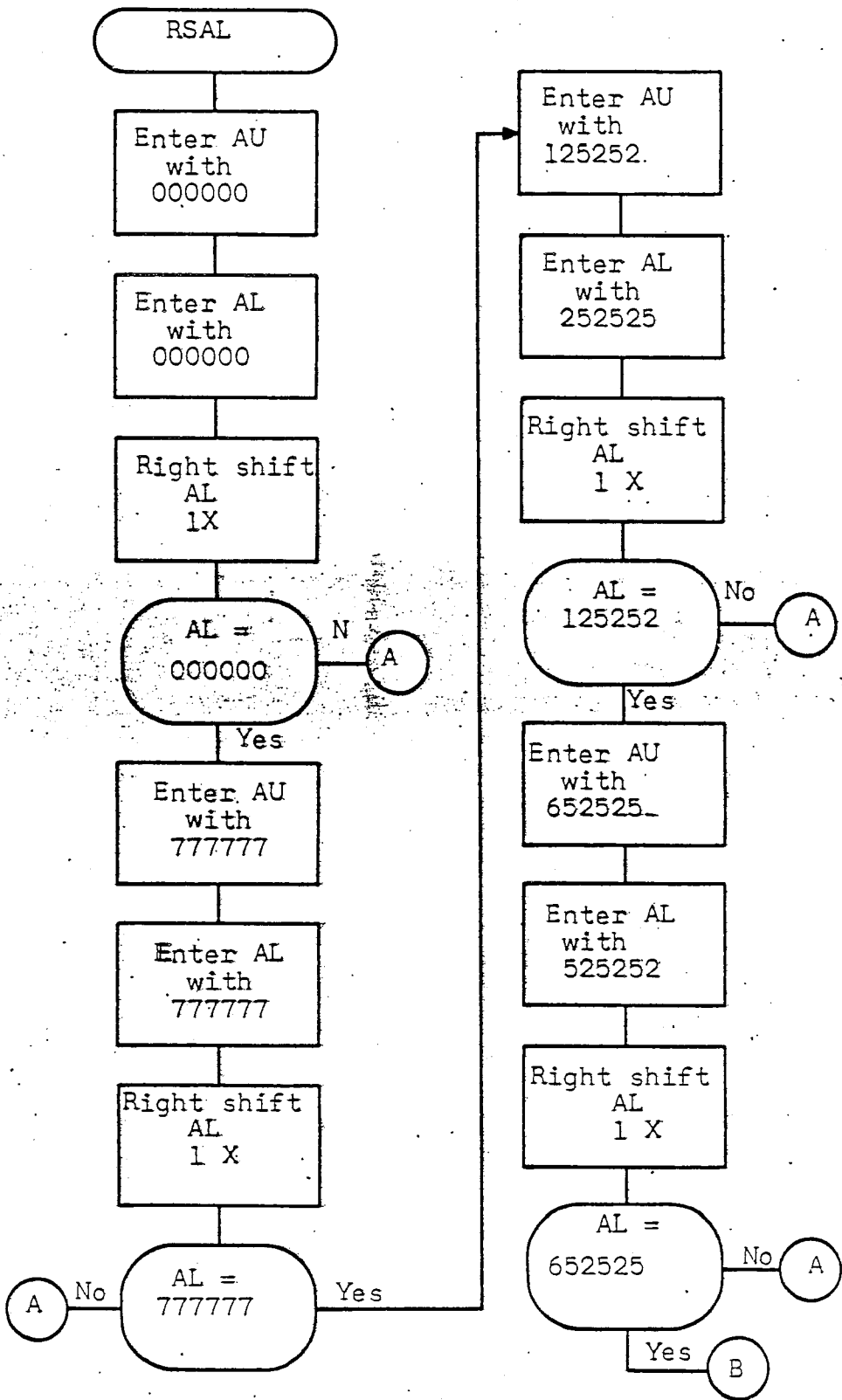
PTN1
PTN2

ABNORMAL EXITS (Listed Sequentially):**NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):**

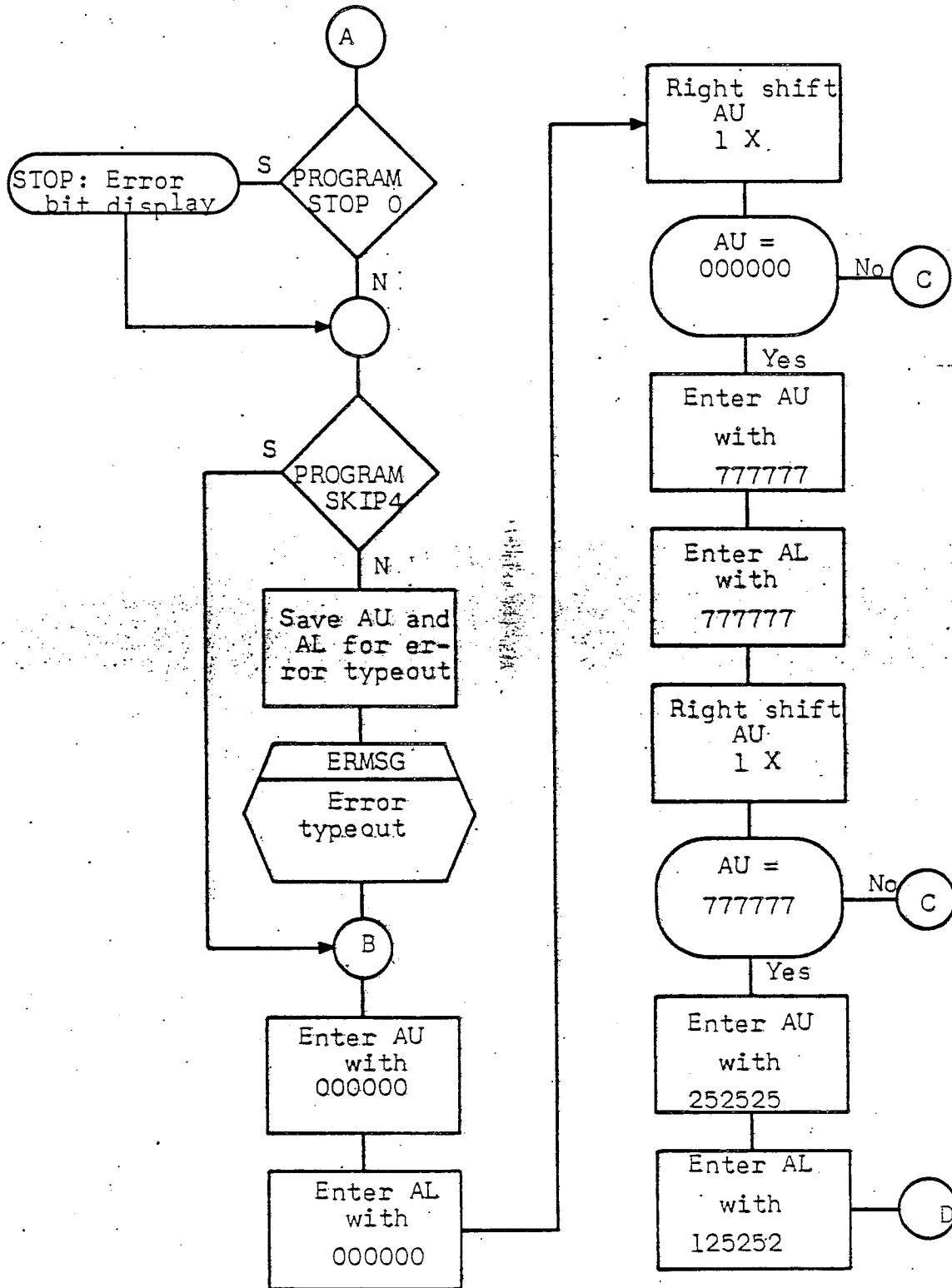
ERMSG

SYSTEM DATA REFERENCES:**ALARMS AND/OR REMARKS:**

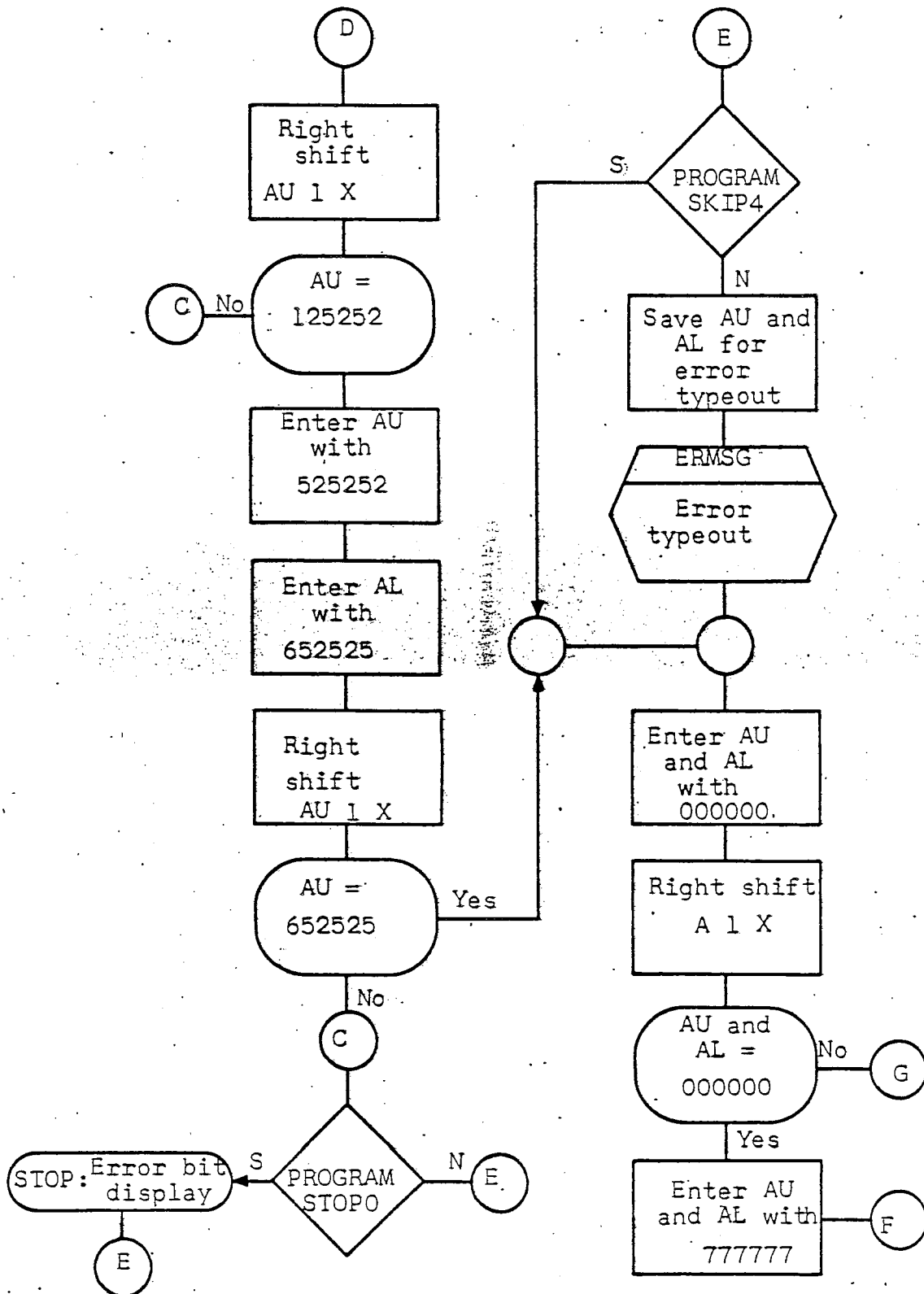
PROGRAM SKIP 4 - Set to suppress error typeouts
Not set for error typeouts
PROGRAM STOP 0 - Set for computer console error display upon stop:
P = 11132
AU = correct pattern
AL = incorrect pattern
P = 11164
AU = incorrect pattern
AL = correct pattern
P = 11230
AU and AL = shifted pattern



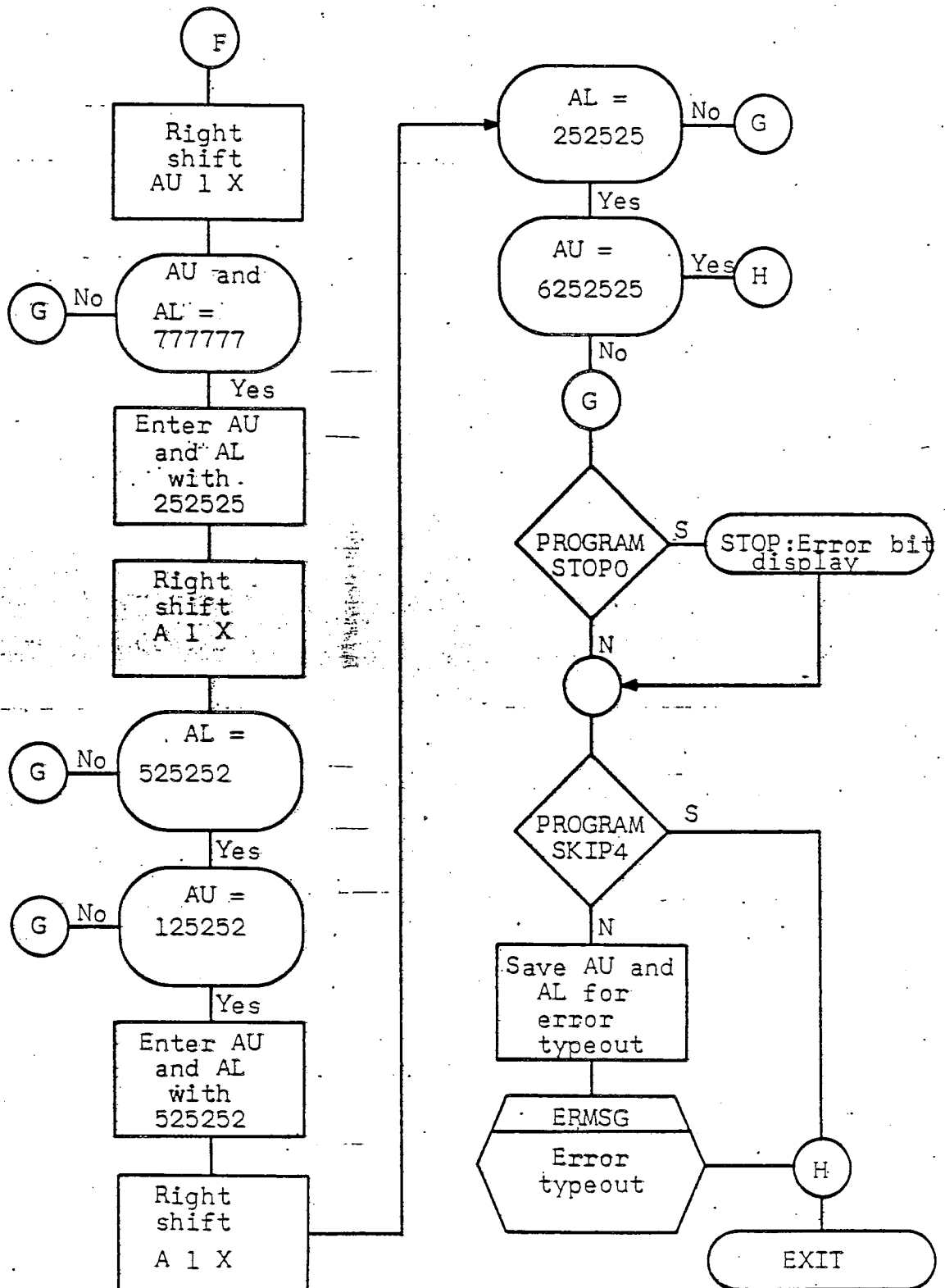
RSAL - RIGHT SHIFT AL, AU, & A



RSAL - RIGHT SHIFT AL, AU & A



RSAL - RIGHT SHIFT AL, AU & A



RSAL - RIGHT SHIFT AL, AU & A

TITLE: ADER - ADDER TESTDECK IDENTIFIER: FACTCS-1 LABEL: ADER KEY: _____ IS LABEL DUPLICATE? NoPROGRAMMER: HWM modified by ILR DATE: 8 December 1967NUMBER OF L₄ OUTPUT INSTRUCTIONS: 134

DESCRIPTION:

This subroutine, ADER, exercises the Adder. First a series of selective complements is performed then two series of patterns are shifted through, added, and the answers verified. ADER is referenced by subroutine EXEC.

During the series of selective complements AL is selective complemented and checked. If an error occurs PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set, or upon restarting PROGRAM SKIP 4 is referenced. If not set an error timeout occurs. If set, or after the timeout, the first of the add tests is entered. During the first of the add tests two numbers are left shifted by one, added together, and checked. If an error occurs an error display similar to the one above occurs. Then the second add test is entered. During the second add test two tables are shifted, added together, and the result is checked. If an error occurs an error display similar to the one above. However, for this portion of the test there is a second PROGRAM STOP 0. Upon the stop AU = 777777 and AL = N where N = 22- the number of shifts done on the tables that are added. The timeout corresponding to this portion of the error display is: ? \bar{X} where \bar{X} is equal to the number of shifts done on the tables that are added. After an error display or upon successful completion of the test an exit is made to EXEC.

TITLE: ADER - ADDER TEST

INPUT PARAMETERS (Listed Sequentially):

IPAT1 = 000000	TAB3 = Table+B
IPAT1+1 = 777777	INDEX = 000021
IPAT1+2 = 252525	TAB4 = Table+B
IPAT1+3 = 525252	TAB5 = Storage Table+B
IPAT1+5 = 070707	INST1 = ENTAUB•TAB3
IPAT2+1 = 777777	INDEX2 = Working Index
TWD1 = 377777	INDEX1 = 000001
TWD2 = 377776	
SHWD1 = Working Storage	
SHWD2 = Working Storage	

OUTPUT PARAMETERS (Listed Sequentially):

PTN1
 PIN2
 Cycle count ADER 33 + X X = 0 - 228

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

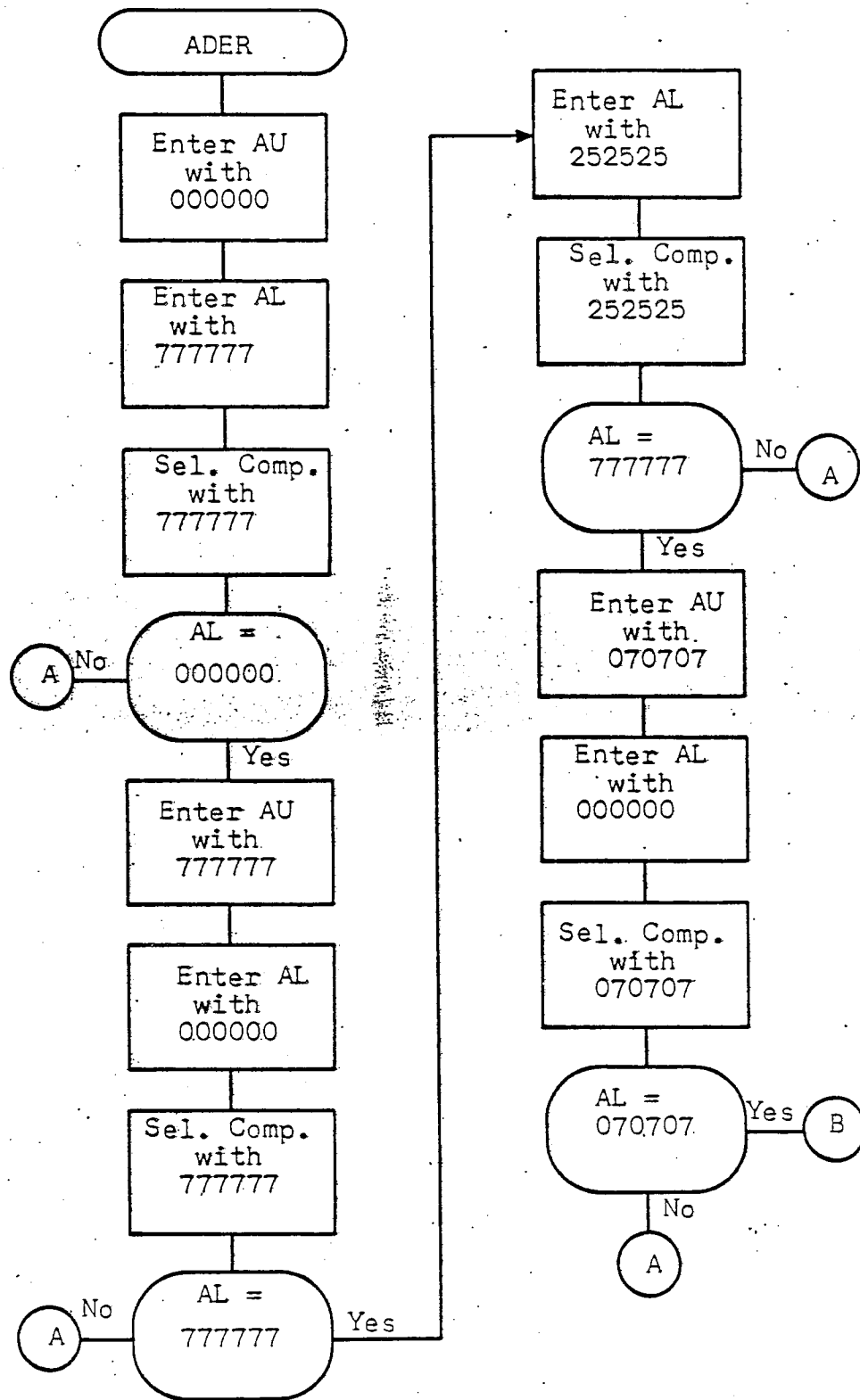
ERMSG
 TYP A

SYSTEM DATA REFERENCES:

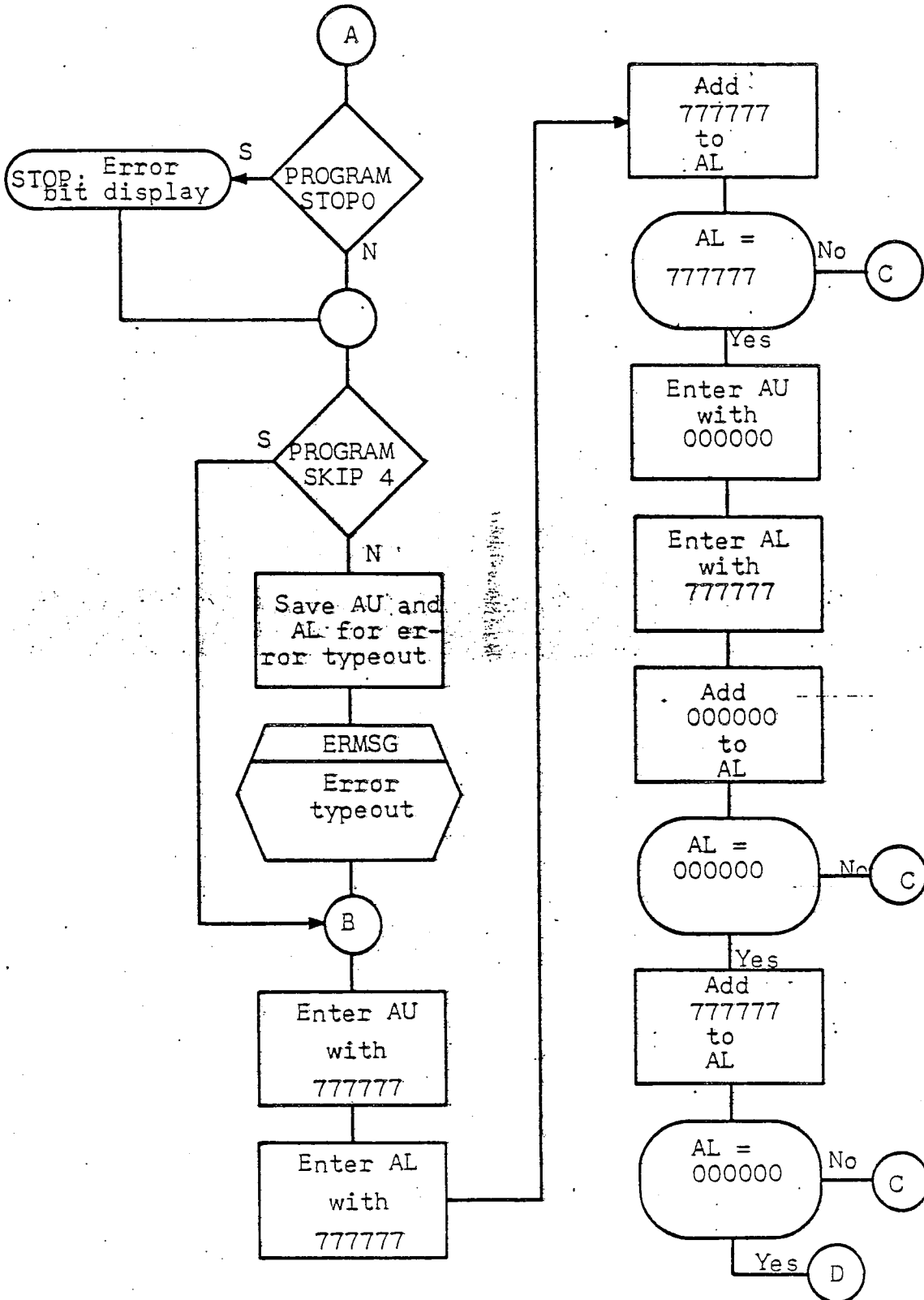
ALARMS AND/OR REMARKS:

PROGRAM SKIP 4 - Set to suppress
 PROGRAM STOP 0 - Set for computer console error display upon stop:

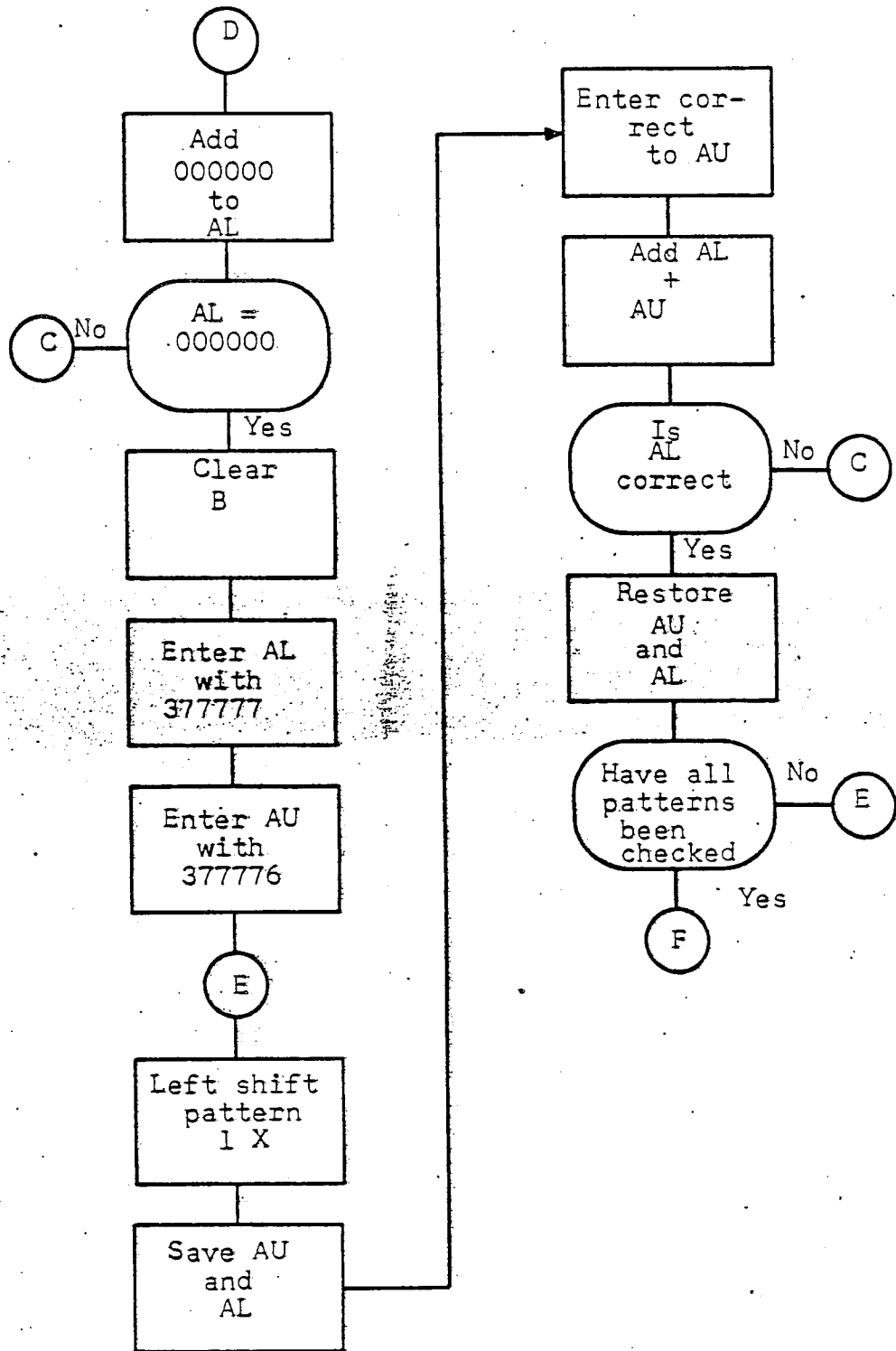
p = 11263	p = 11401
AU = correct pattern	AU = correct pattern
AL = incorrect pattern	AL = correct pattern
p = 11371	p = 11407
AU = correct pattern	AU = 777777
AL = incorrect pattern	AL = 22 - no. of shifts



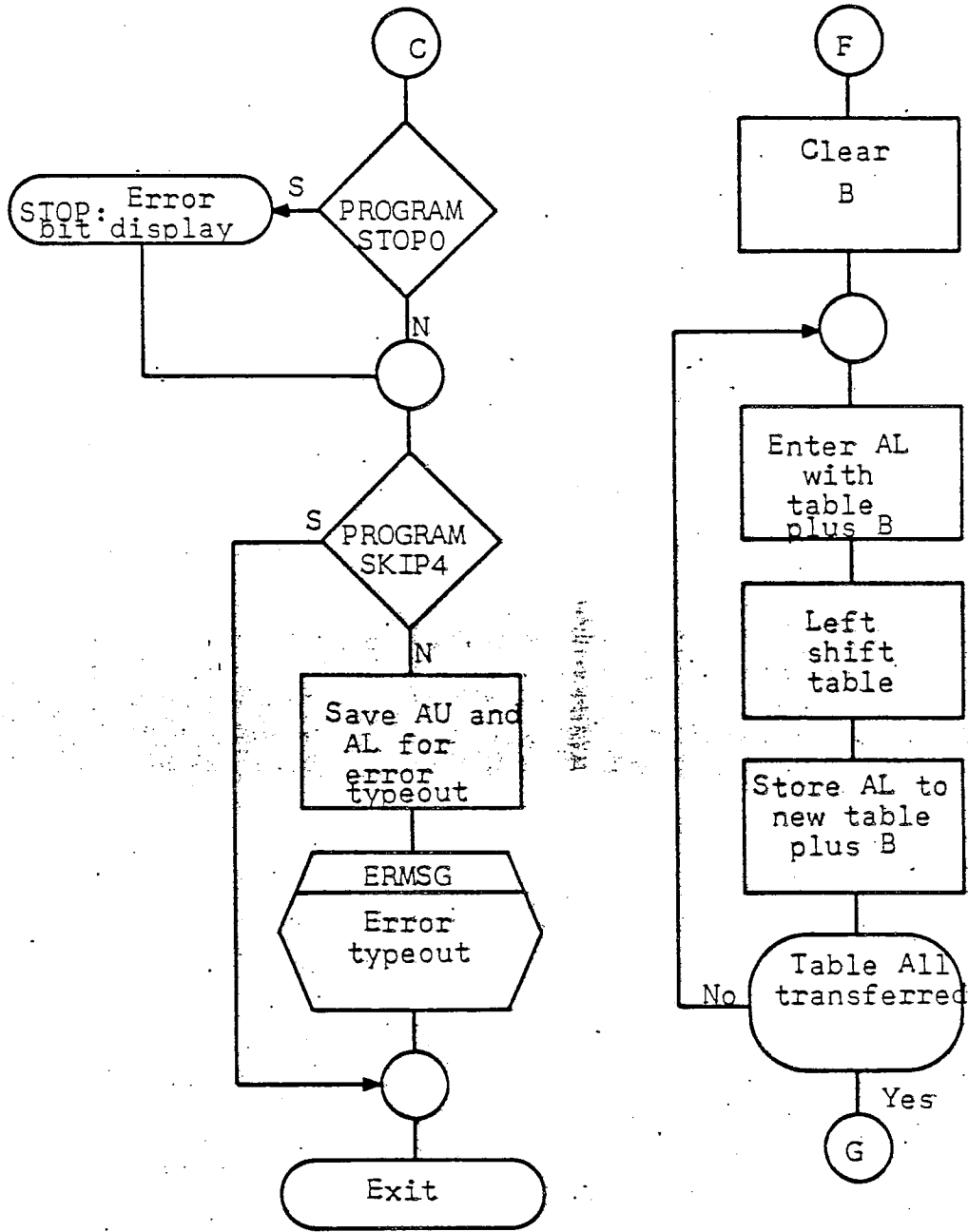
ADER - ADDER TEST



ADER - ADDER TEST

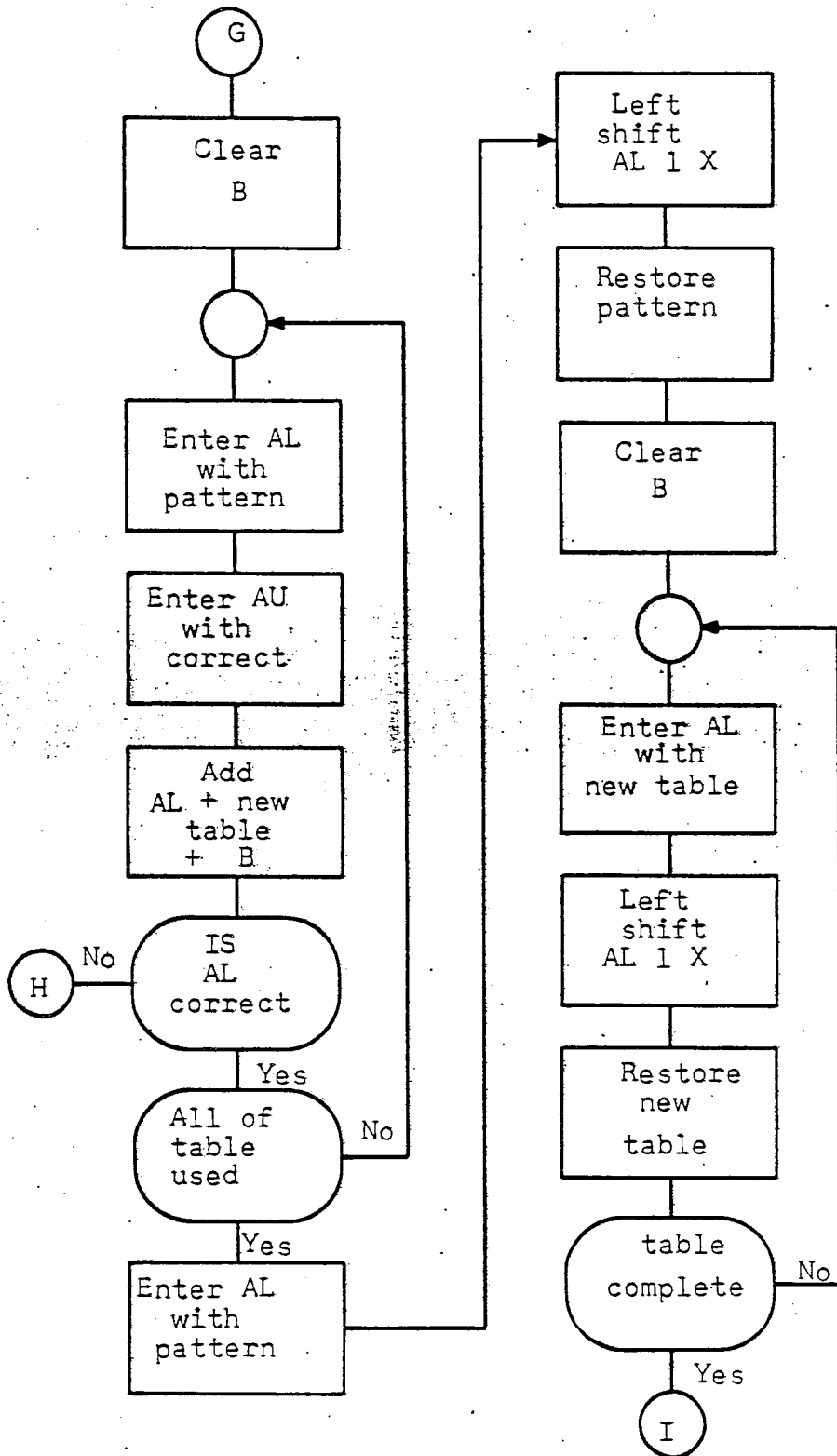


ADER - ADDER TEST



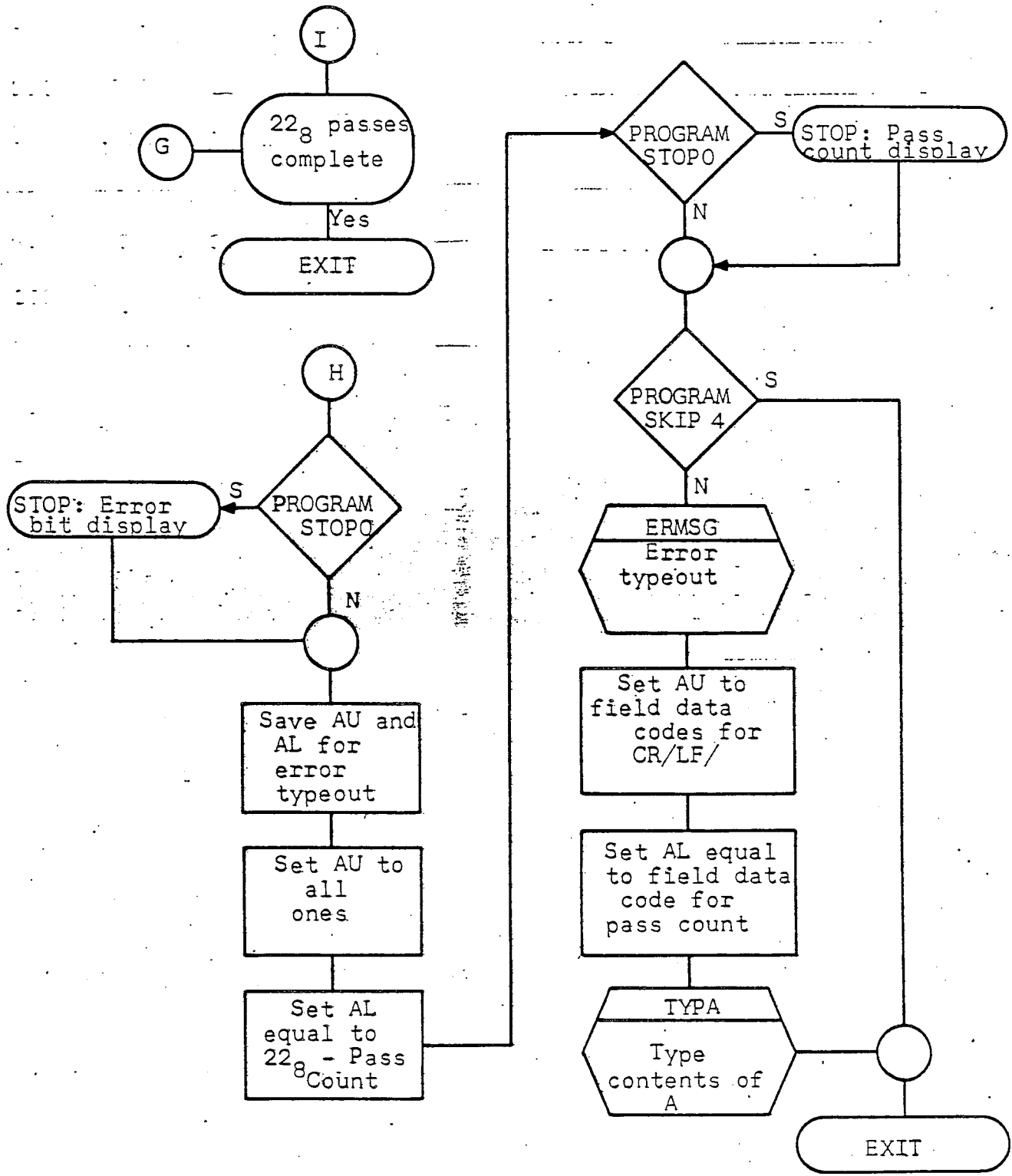
ADER - ADDER TEST

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ADER - ADDER TEST

SHEET : 597	REVISION
SPECIFICATION SYMBOL SB-10163	



ADER - ADDER TEST

PROGRAM DATA PAGE

SHEET 598

REVISION SPECIFICATION SYMBOL
SB-10163TITLE: KT - SHIFT COUNTER TESTDECK IDENTIFIER: FACTCS-1 LABEL: KT KEY: IS LABEL DUPLICATE? NoPROGRAMMER: KWM modified by: ILR DATE: 8 December 1967NUMBER OF L OUTPUT INSTRUCTIONS: 48

DESCRIPTION:

This subroutine, KT, test the K Register as used in a shifting operation.

KT is referenced by subroutine EXEC.

This subroutine tests the K register for left shift of A of 44 and 66 times and for right shifts of A of 42 times and AL of 20 times. Upon an error detection, PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set, or upon restarting, PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set or upon completion of the typeout an exit is made to subroutine EXEC. An exit is also made to EXEC upon successful completion of the test.

TITLE: KT - SHIFT COUNTER TEST

INPUT PARAMETERS (Listed Sequentially):

TPAT1+4 = 707070
TPCK = Working Storage
TPAT3 = 125252
TPAT3+1 = 652525
TPAT1+1 = 777777
TPAT1 = 000000

OUTPUT PARAMETERS (Listed Sequentially):

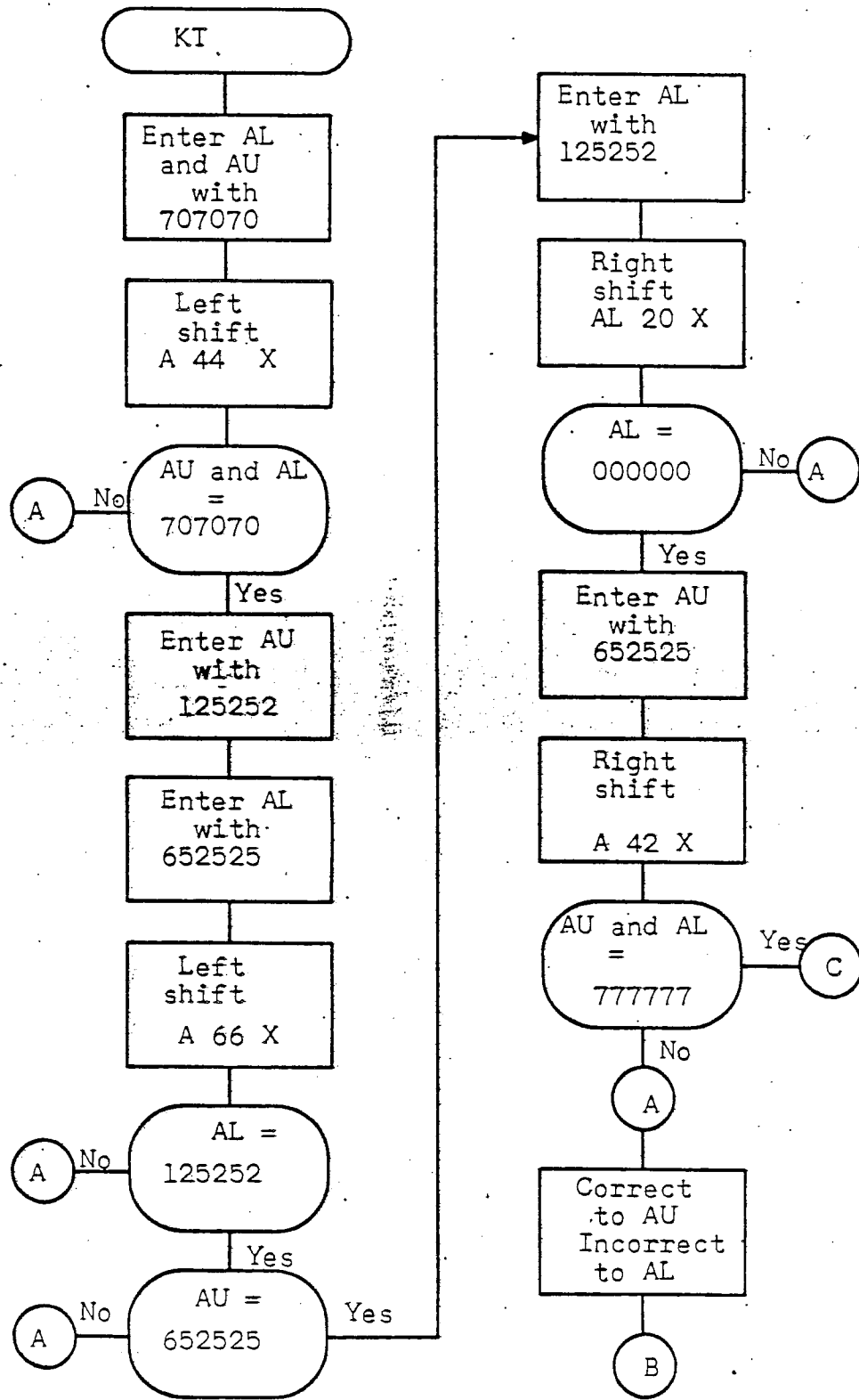
PTN1
PTN2

ABNORMAL EXITS (Listed Sequentially):**NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):**

ERMSG

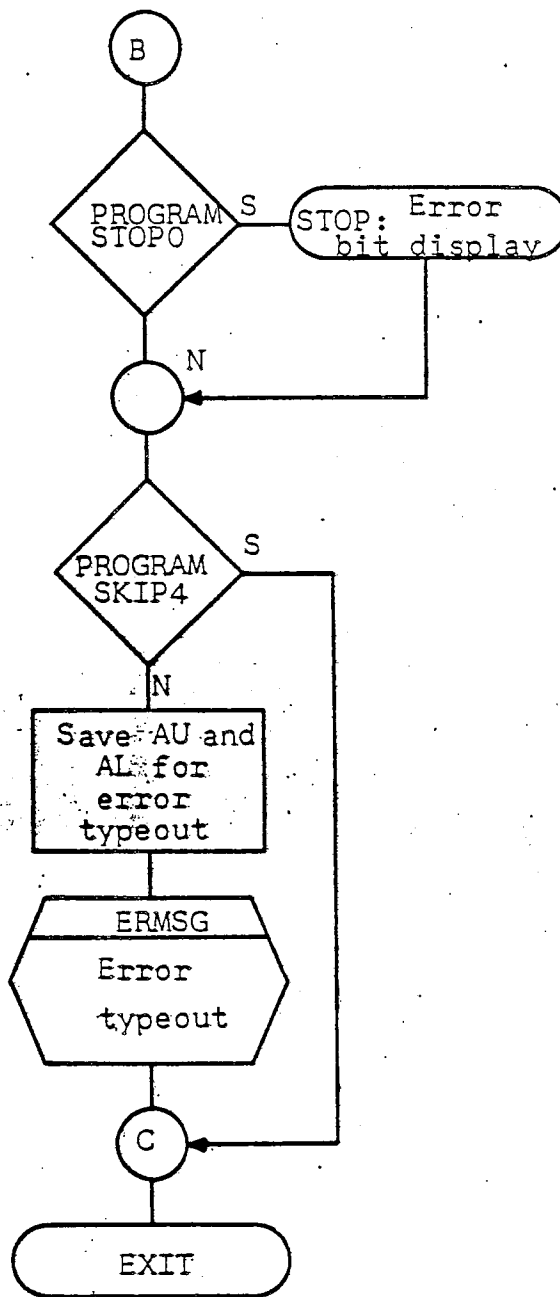
SYSTEM DATA REFERENCES:**ALARMS AND/OR REMARKS:**

PROGRAM SKIP 4 - Set to suppress typeouts
PROGRAM STOP 0 - Set for computer console error display upon stop:
P = 11460
AU = correct pattern
AL = incorrect pattern



KI - SHIFT COUNTER TEST

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SPECIFICATION SYMBOL SB-10163	



KT - SHIFT COUNTER TEST

PROGRAM DATA PAGE

SHEET 602

REVISION —

SPECIFICATION SYMBOL
SB-10163TITLE: CPAL - COMPLEMENT TESTDECK IDENTIFIER: FACTCS-1 LABEL: CPAL KEY: _____ IS LABEL DUPLICATE? NoPROGRAMMER: HWM modified by ILR DATE: 8 December 1967NUMBER OF L_4 OUTPUT INSTRUCTIONS: 89**DESCRIPTION:**

This subroutine, CPAL, checks the complementing circuitry of the arithmetic section.

CPAL is referenced by subroutine EXEC.

The registers are checked by entering various patterns, complementing, and verifying. The registers are checked sequentially in the order: AL, AU, and A. Upon an error detection, PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set, or upon restarting, PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set or upon completion of the typeout an exit is made to EXEC. An exit is also made to EXEC upon successful completion of the test.

PROGRAM DATA PAGE (Cont)

SHEET 603

REVISION --

SPECIFICATION SYMBOL
SB-10163TITLE: CPAL - COMPLEMENT TEST**INPUT PARAMETERS (Listed Sequentially):**

TPAT1 = 000000
TPAT1+3 = 525252
TPAT1+2 = 252525
TPAT1+5 = 070707
TPAT1+4 = 707070
TPAT1+1 = 777777

OUTPUT PARAMETERS (Listed Sequentially):

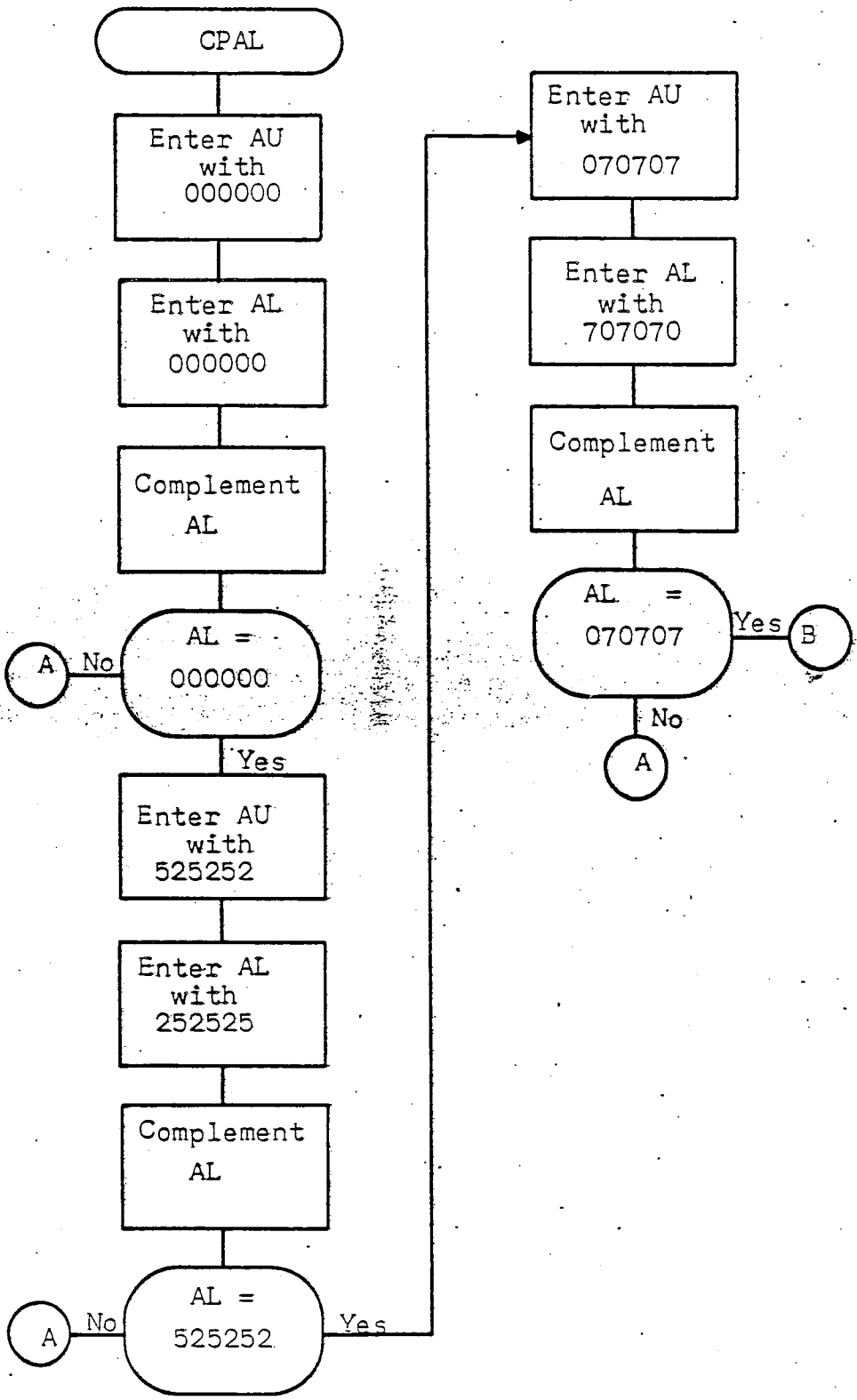
PTN1
PTN2

ABNORMAL EXITS (Listed Sequentially):**NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):**

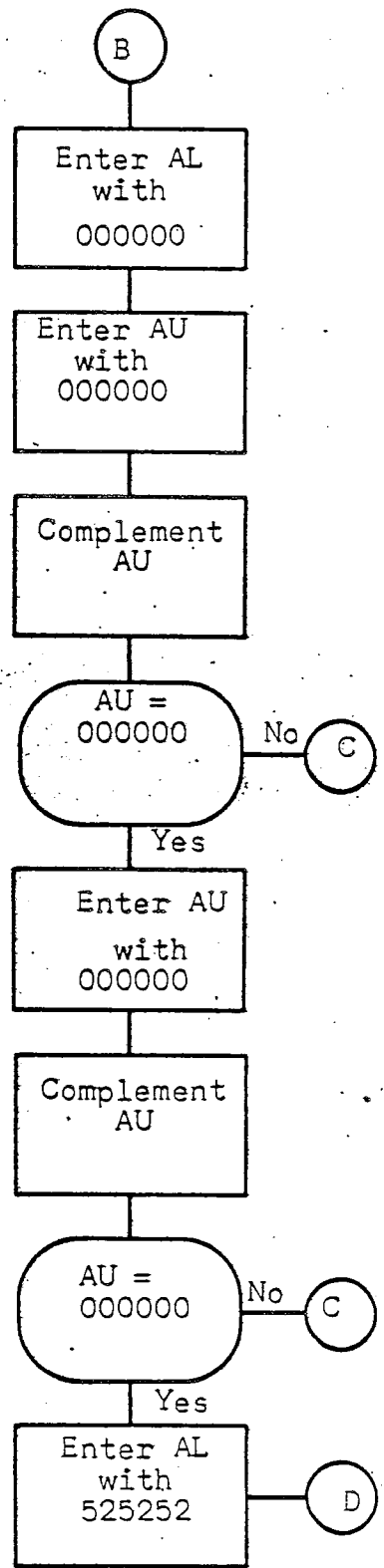
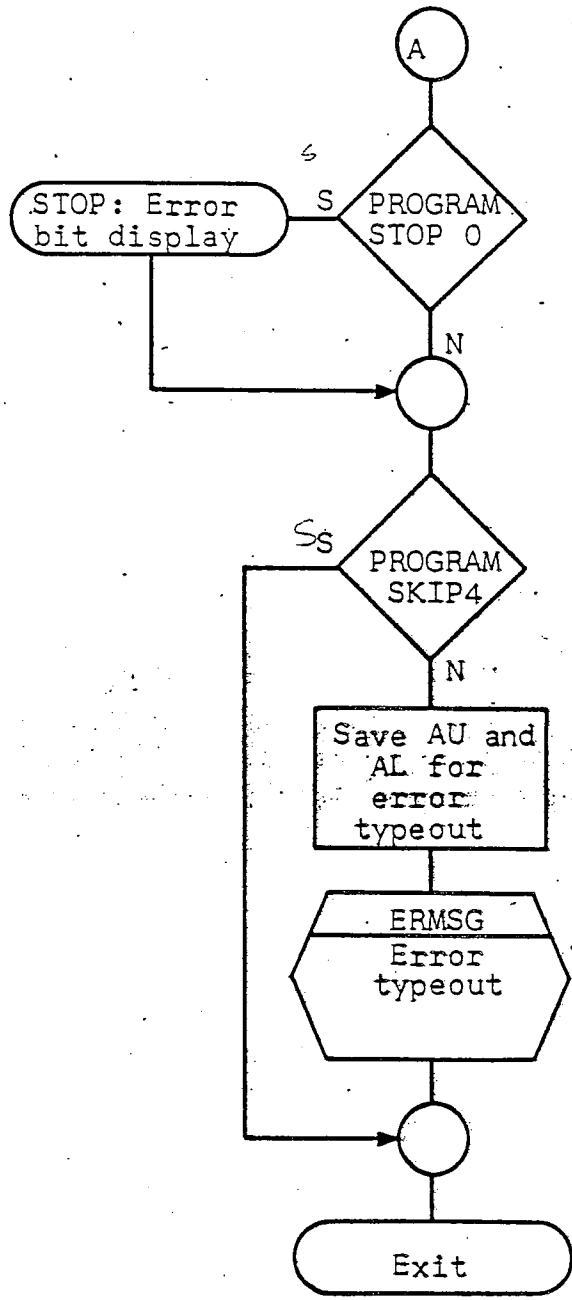
ERMSG

SYSTEM DATA REFERENCES:**ALARMS AND/OR REMARKS:**

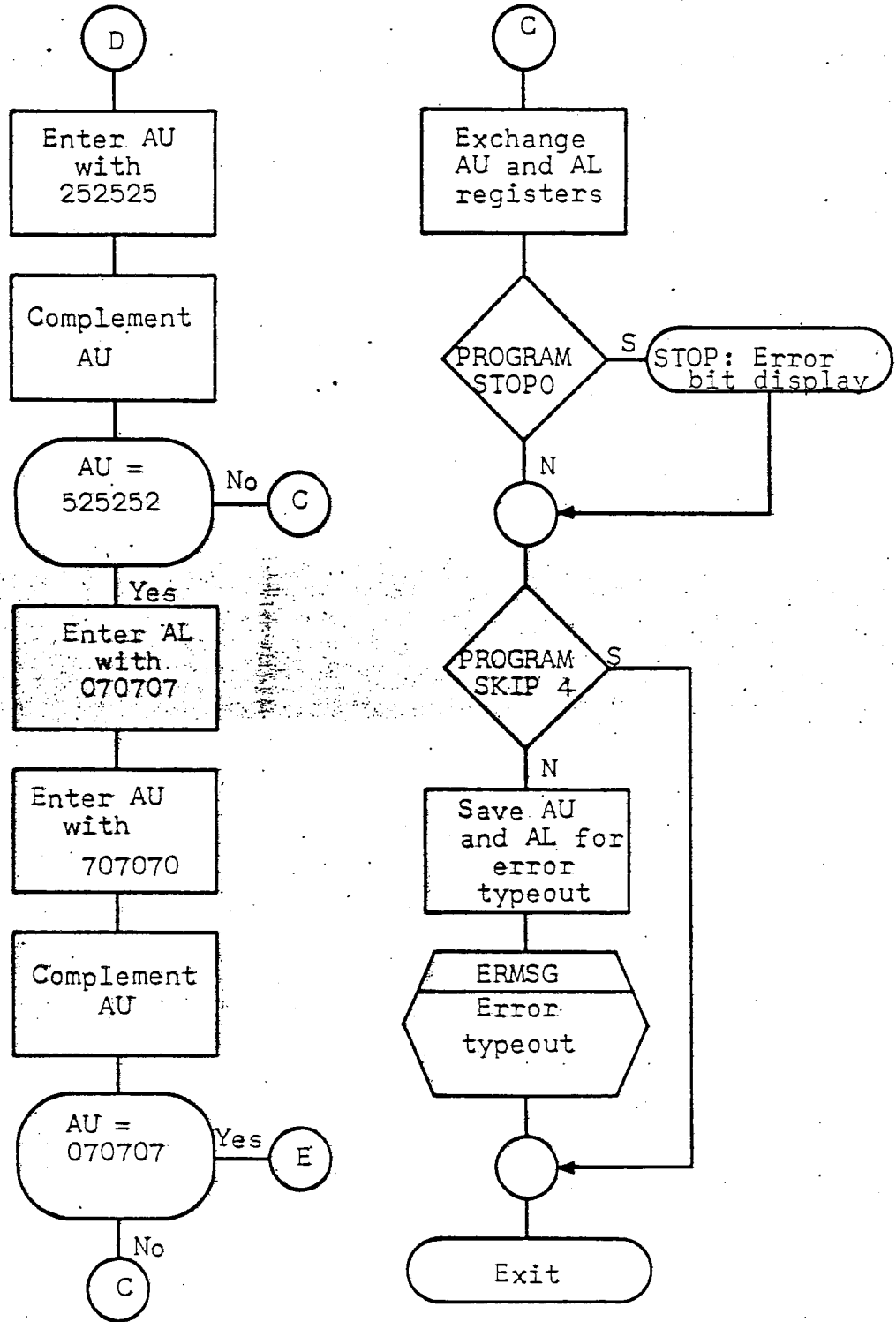
PROGRAM SKIP 4 - Set to suppress typeouts
PROGRAM STOP 0 - Set for computer console error display.
Upon stop: P = 11536 Testing AL P = 11620 Testing A
AU = correct pattern AU = correct pattern
AL = incorrect pattern AL = incorrect pattern
P = 11565 Testing AU
AU = correct pattern
AL = incorrect pattern



CPAL - COMPLEMENT TEST

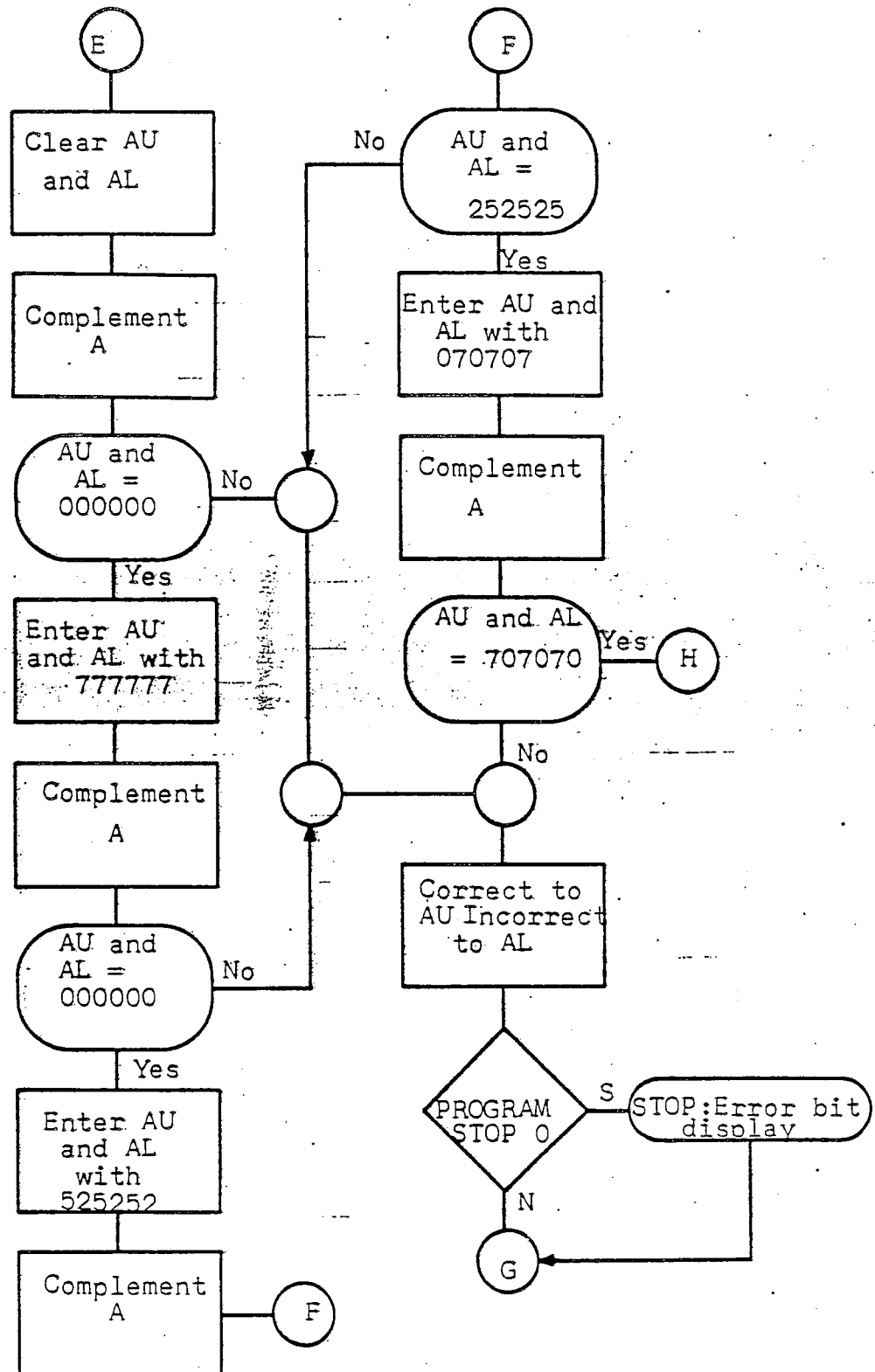


CPAL - COMPLEMENT TEST

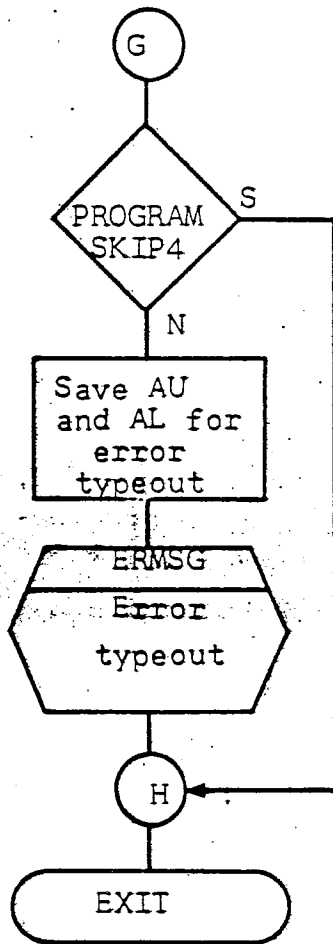


CPAL - COMPLEMENT TEST

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SPECIFICATION SYMBOL SB-10163	



CPAL - COMPLEMENT TEST



CPAL - COMPLEMENT TEST

TITLE: ADD - TEST BORROW TEST

DECK IDENTIFIER: FACT

CS-1 LABEL: ADD KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 29

DESCRIPTION:

This subroutine, ADD, checks the Borrow condition generated during a double add or subtract function.

ADD is referenced by subroutine EXEC.

This subroutine, ADD, consists of two adds and one subtract. After the first test Add, a borrow should occur and the program should not skip. After the next add a no borrow should occur, causing the program to skip an instruction. At this time a subtract is performed that requires borrow, no program skip should occur. Upon successful completion of this test an exit is made to subroutine EXEC. If an error occurs PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set or upon restarting PROGRAM SKIP 4 is referenced. If not set an error timeout occurs. If set or upon completion of the timeout an exit is made to subroutine EXEC.

SPECIFICATION SYMBOL
SB-10163TITLE: ADD - TEST BORROW TEST

INPUT PARAMETERS (Listed Sequentially):

OUTPUT PARAMETERS (Listed Sequentially):

PTN1
PTN2

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

ERMSG

SYSTEM DATA REFERENCES:

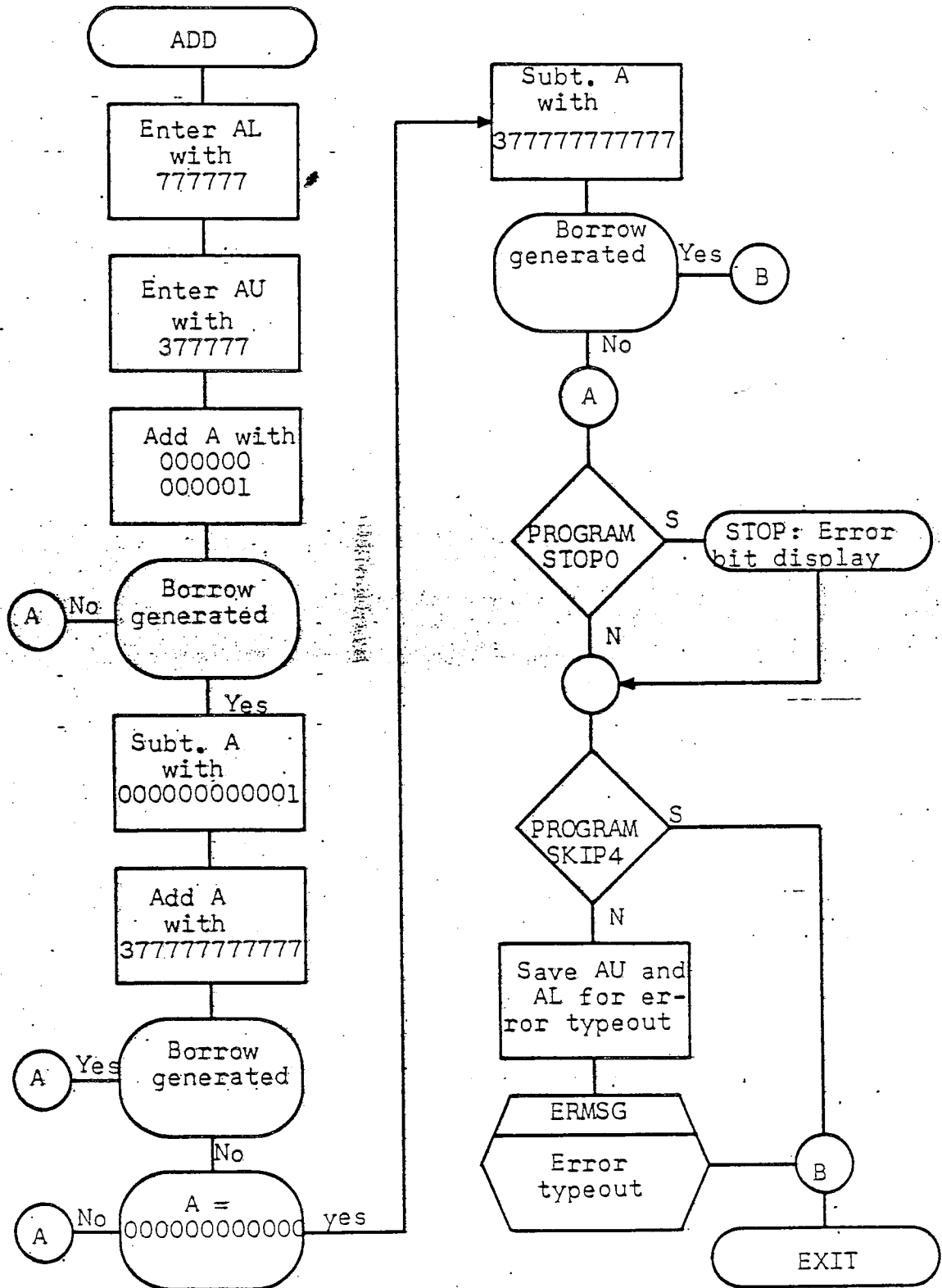
ALARMS AND/OR REMARKS:

PROGRAM SKIP 4 - Set to suppress typeouts

PROGRAM STOP 0 - Set for computer console error display.

Upon stop P = 11702

AU and AL = sum or difference of double add or
subtract



ADD - TEST BORROW TEST

PROGRAM DATA PAGE

SHEET 612

REVISION

SPECIFICATION SYMBOL
SB-10163

TITLE: MUL - MULTIPLY SIGN TEST

DECK IDENTIFIER: FACT

CS-1 LABEL: MUL KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 25

DESCRIPTION:

This subroutine, MUL, checks the multiply instruction using various signs and verifies the sign of the answer.

MUL is referenced by subroutine EXEC.

The order in which the various signs are used is:

	<u>MULTIPLICAND</u>	<u>MULTIPLIER</u>	<u>SIGN OF PRODUCT</u>
a)	+	+	+
b)	+	-	-
c)	-	-	+
d)	-	+	-

Upon error detection PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set, or upon re-starting, PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set or upon completion of the typeout an exit is made to subroutine EXEC. Successful completion of the test also results in an exit to subroutine EXEC.

PROGRAM DATA PAGE (Cont)

SHEET

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REVISION

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SPECIFICATION SYMBOL
SB-10163TITLE: MUL - MULTIPLY SIGN TEST

INPUT PARAMETERS (Listed Sequentially):

OUTPUT PARAMETERS (Listed Sequentially):

PTN1
PTN2

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

ERMSG

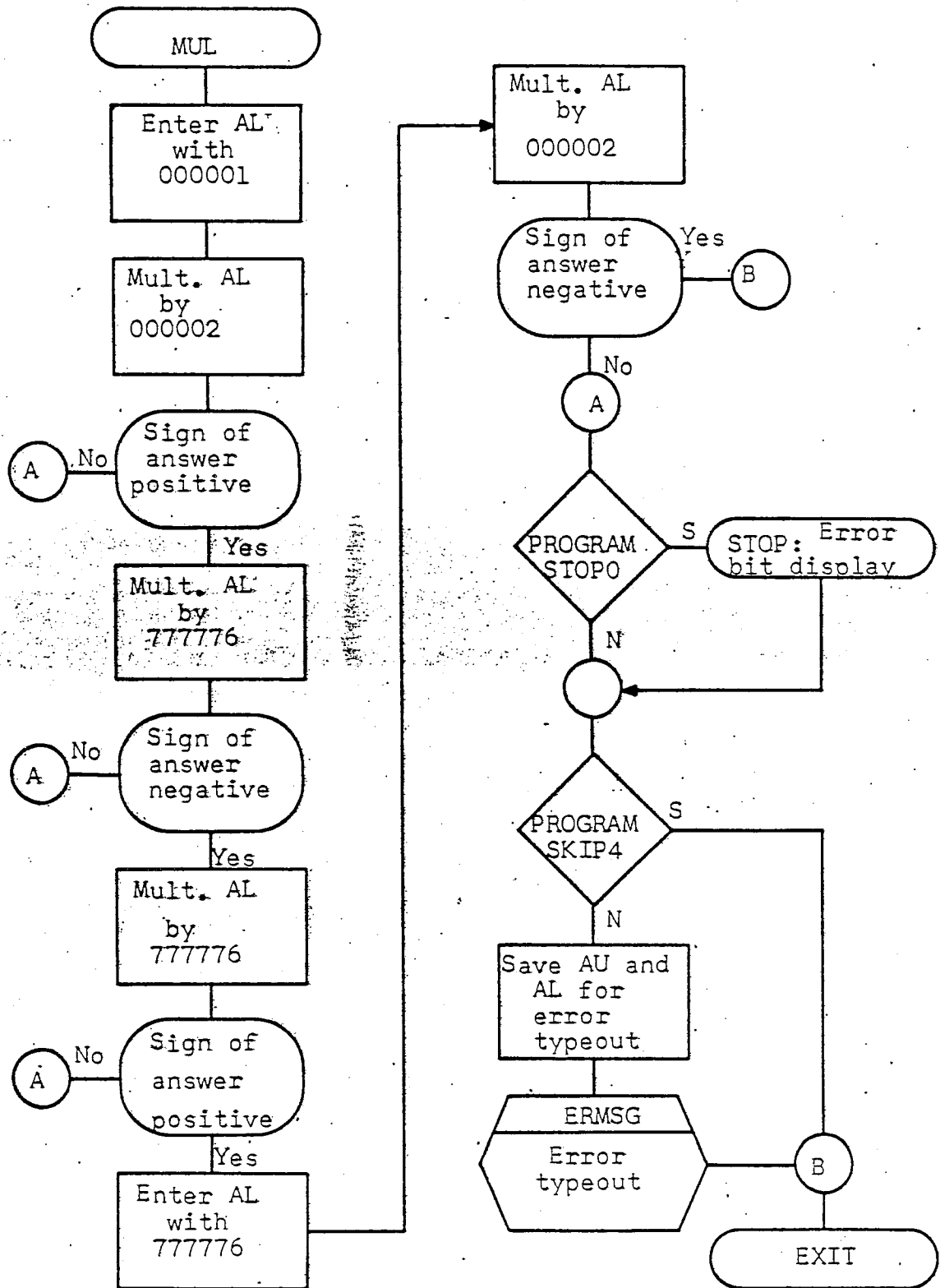
SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

PROGRAM SKIP 4 - Set to suppress typeouts

PROGRAM STOP 0 - Set for computer console error display
Upon stop P = 11736

AU and AL contain product of multiply.



MUL - MULTIPLY SIGN TEST

PROGRAM DATA PAGE

SHEET	615	REVISION	
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SPECIFICATION SYMBOL	SB-10163
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TITLE: DIV - DIVIDE SIGN TEST

DECK IDENTIFIER: FACT

CS-1 LABEL: DIV KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 72

DESCRIPTION:

This subroutine, DIV, checks divide instructions using various signs and verifies the sign of the answer.

DIV is referenced by subroutine EXEC.

The order in which the various signs are used is:

	<u>DIVIDEND</u>	<u>DIVISOR</u>	<u>QUOTIENT</u>	<u>REMAINDER</u>	<u>ERROR STOP</u>
a)	+	+	+	+	P = 11756
b)	+	-	-	+	P = 11775
c)	-	+	-	-	P = 12017
d)	-	-	+	-	P = 12036

Upon error detection PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set, or upon restarting, PROGRAM SKIP 4 is referenced. If not set an error timeout occurs. If set or upon completion of the timeout an exit is made to subroutine EXEC. Successful completion of the test also results in an exit to subroutine EXEC.

PROGRAM DATA PAGE (Cont)

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REVISION —

SPECIFICATION SYMBOL
SB-10163**TITLE:** DIV - DIVIDE SIGN TEST**INPUT PARAMETERS (Listed Sequentially):**IPAT1+1 = 777777
DVT12 = 777777**OUTPUT PARAMETERS (Listed Sequentially):**PTN1
PTN2**ABNORMAL EXITS (Listed Sequentially):****NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):**

ERMSG

SYSTEM DATA REFERENCES:**ALARMS AND/OR REMARKS:**

PROGRAM SKIP 4 - Set to suppress error typeouts

PROGRAM STOP 0 - Set for computer console error display.

Upon stop P = 11756

AU and AL = incorrect result of divide

P = 11775

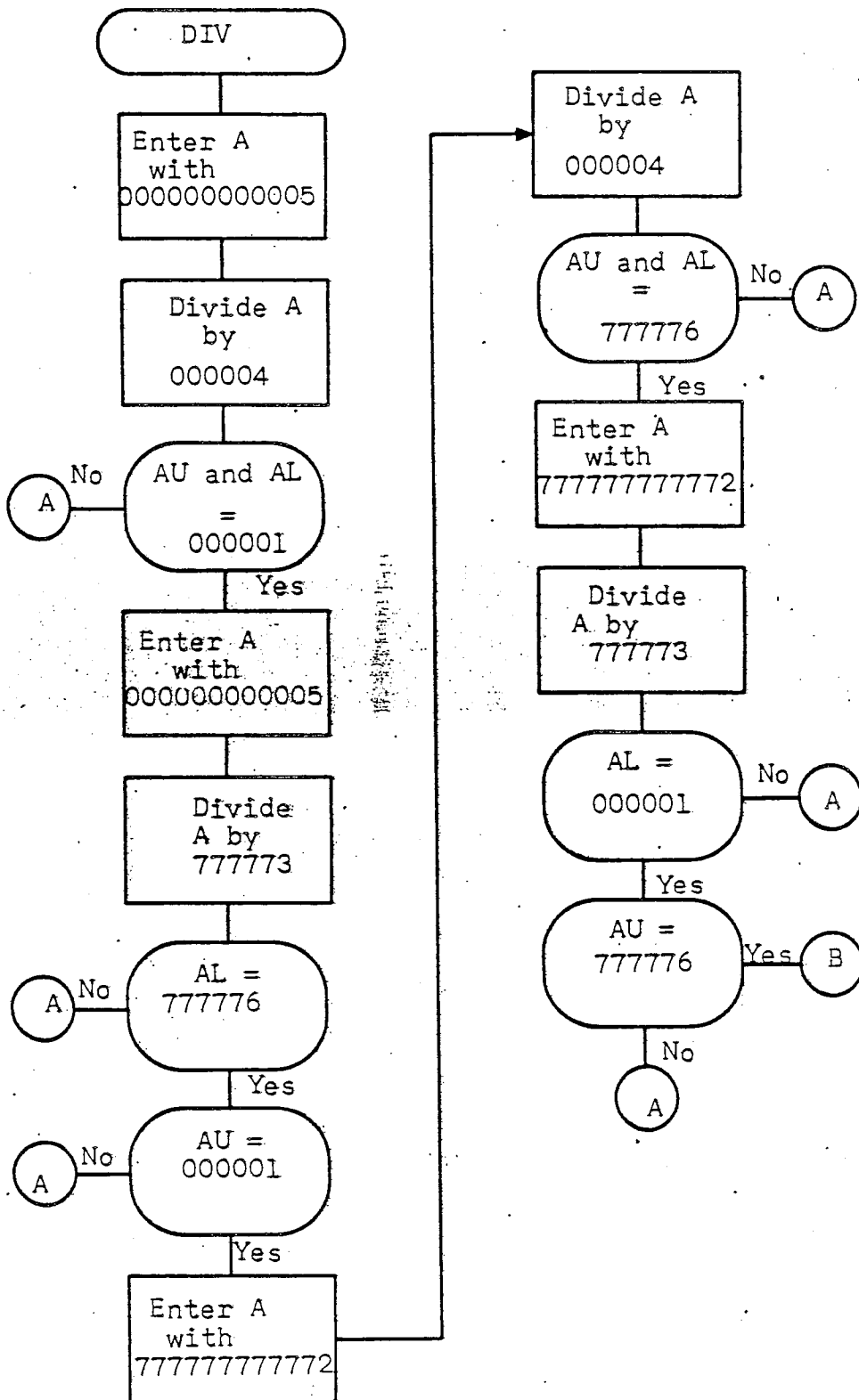
AU and AL = incorrect result of divide

P = 12017

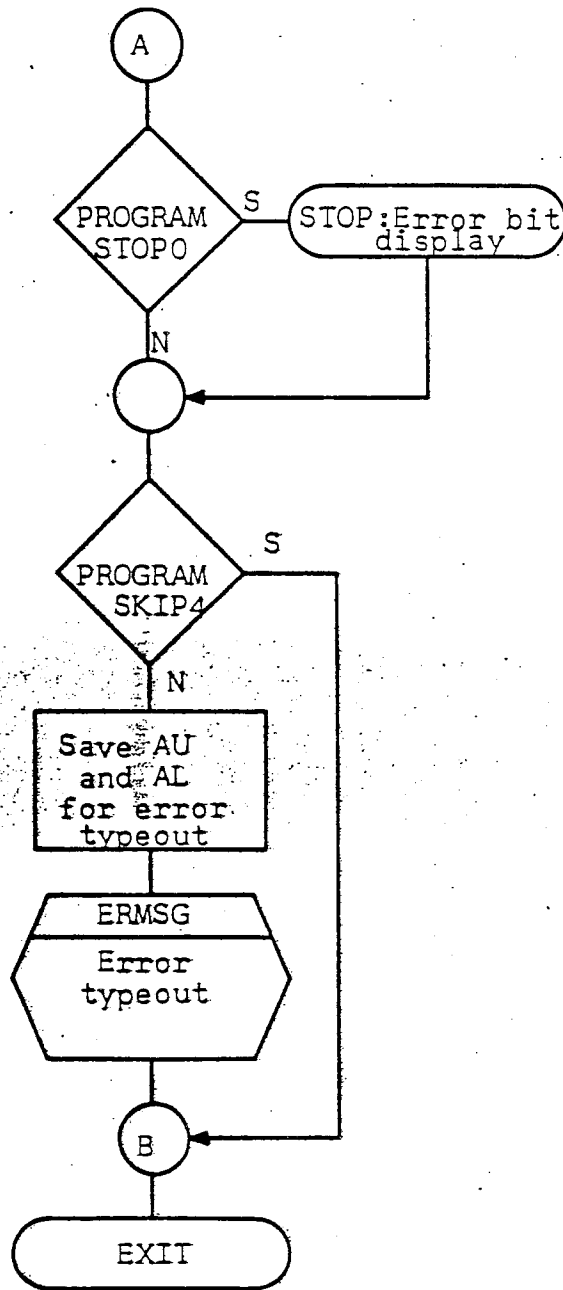
AU and AL = incorrect result of divide

P = 12036

AU and AL = incorrect result of divide



DIV - DIVIDE SIGN TEST



DIV - DIVIDE SIGN TEST

TITLE: DVT - DIVIDE TESTDECK IDENTIFIER: FACTCS-1 LABEL: DVT KEY: _____ IS LABEL DUPLICATE? NoPROGRAMMER: HWM modified by TLR DATE: 8 December 1967NUMBER OF L_4 OUTPUT INSTRUCTIONS: 35

DESCRIPTION:

This subroutine, DVT, tests the Divide portion of the arithmetic section.

DVT is referenced by subroutine EXEC.

This subroutine goes through a series of divides, checking the quotient in AL and verifying the remainder in AU. If a quotient error is detected PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set, or upon restarting, PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set, or upon completion of the typeout an exit occurs to EXEC. The bit errors that occur in the remainder are accumulated during the test, if any occur at all, by selective setting them in a memory location. If any such error occurred PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set or upon restarting PROGRAM SKIP 4 is referenced. If not set an error typeout showing the failing bits occurs. If set or upon completion of the typeout an exit is made to subroutine EXEC. An exit to EXEC is also made upon successful completion of this test.

TITLE: DVT - DIVIDE TEST

INPUT PARAMETERS (Listed Sequentially):

DT3 = Error Bit Storage
DT1 = Pattern Table+B
DT2 = Table+B
TPAT1+1 = 777777
DT4 = Error Bit Table+B
DVT13 = 000020

OUTPUT PARAMETERS (Listed Sequentially):

PIN1
PIN2

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

ERMSG

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

PROGRAM SKIP - Set to suppress error typeouts

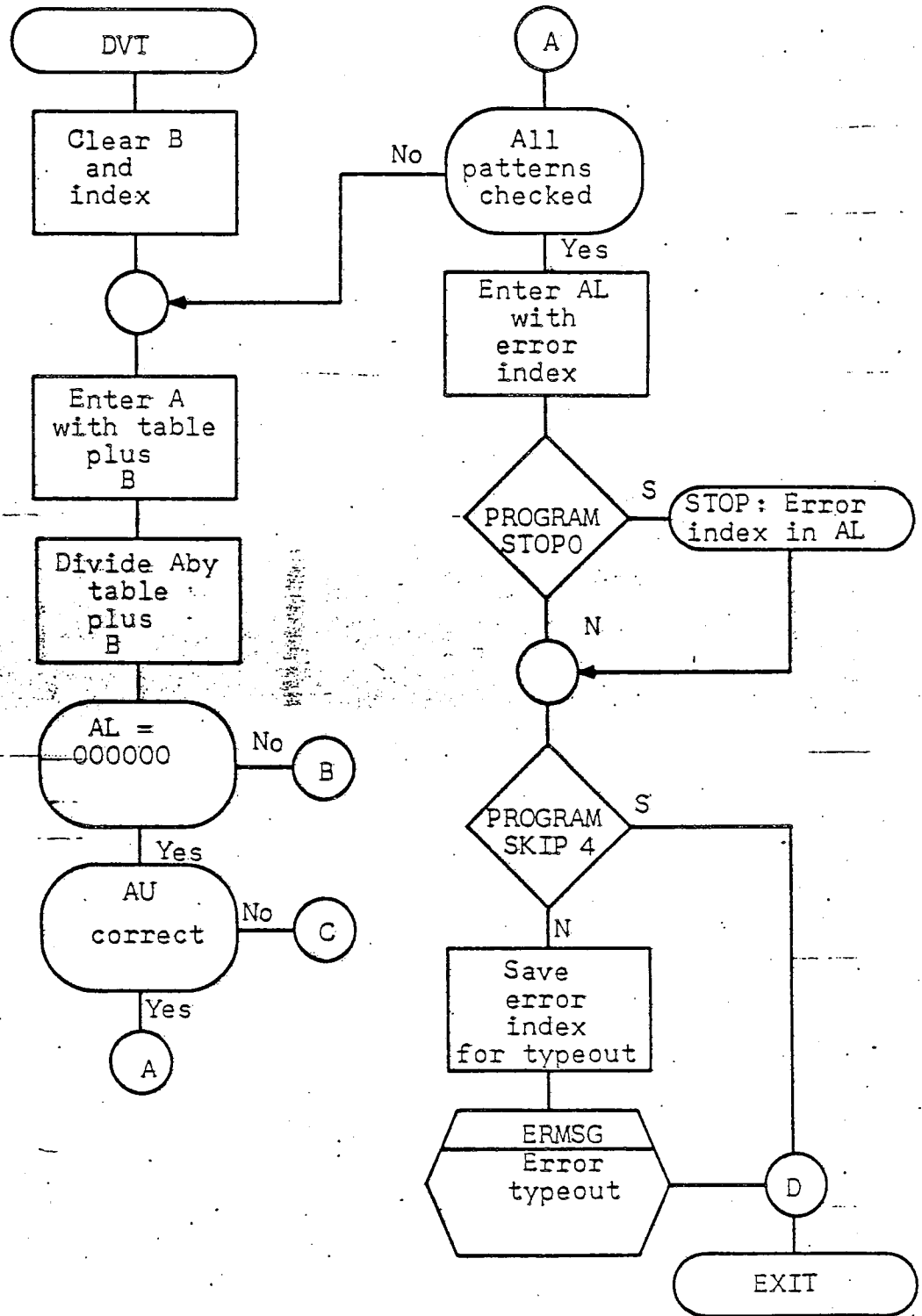
PROGRAM STOP 0 - Set for computer console error display
Upon stop

P = 12067

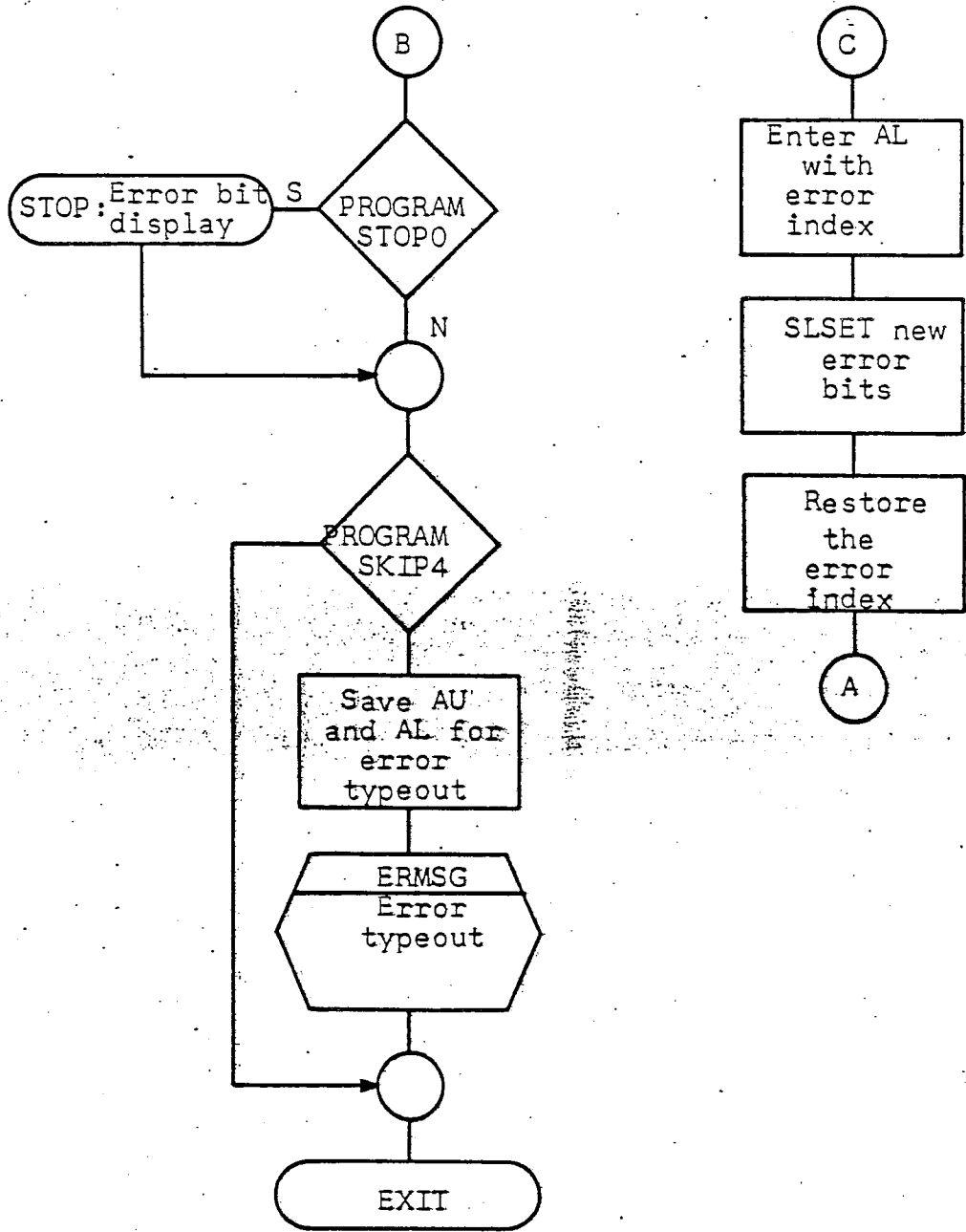
AL = incorrect pattern

P = 12112

AL = bits that failed in remainder AU after divide
was executed.



DVT - DIVIDE TEST



DVT - DIVIDE TEST

SHEET	623	REVISION	
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SPECIFICATION SYMBOL
SB-10163

TITLE: CONSTA - CONSTANTS

DECK IDENTIFIER: FACT

CS-1 LABEL: CONSTA KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8-December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 146

DESCRIPTION:

CONSTA contains the constants, patterns, and tables used in executing the ARITHMETIC TEST.