

NO. 2161816
SHEET 0
OF 31

DIAGNOSTIC TEST

FILE WRITE ADDRESSES ON DISK PACK - DT 0020

ACH. TYPE 1311 **BY** GIF **APPR.** CSF **DATE** 3-8-63

ENGINEERING CHANGE HISTORY

E/C NO.	DATE	SHEETS AFFECTED
404860	3-14-63	1-31

C NO.	404860						
DATE	3-14-63						

1311 DIAGNOSTIC TEST 0020Write Addresses on Disk Pack**A. SCOPE:**

This program writes indelible addresses on 1311 Disk Packs. The addresses are five digits in length and are written sequentially starting with the track specified by the address which is entered via the console typewriter. The test terminates when the last track of the specified disk storage module has been written. Addresses can be written on additional disk storage modules by repeating the test and entering a new five digit starting address.

This test can be used to write addresses on the CE Disk Pack. Addresses will be written on all cylinders except 00, 34, 35, 36, and 99.

The program provides the option of saving the data on each sector or generating data for each sector when writing the sector addresses.

B. SETUP:

1. While running the test, the program switches have the following functions:

Switch 1 ON	Bypasses error typeouts
OFF	Allows error typeouts
Switch 2 ON	Generates data for each sector
OFF	Saves data on disk pack
Switch 3 ON	Halts on error
OFF	Bypasses halt on error
Switch 4 ON	Loops test
OFF	Halts on test completion

-2-

B. SETUP (cont.):

2. During the keying in of data, if the user makes an error typing in data on the console typewriter, he can turn console Switch 3 on, press release and start, turn Switch 3 off, and re-enter the data.
3. File Switches:
 - Write Address Switch -- ON
 - Compare Disable Switch -- ON (OUT)
4. Normal Setting of Console Switches
 - Program Switches -- As Desired
 - Data Switches -- Program
5. The user should insure that the PACK ON and READY lights on the Disk Storage Drive are ON.
6. Loading Program
 - a. Clear core by inserting and executing 31 00003 00002
 - b. Paper Tape Input
 - (1) Load tape in reader.
 - (2) Insert and execute 36 00000 00300.
 - (3) After core has been loaded, depress START key.
 - (4) Follow typed out instructions.
 - c. Card Input
 - (1) Place cards in reader hopper.
 - (2) Place 1620 in manual mode.
 - (3) Depress load key.
 - (4) After core has been loaded, depress START key.
 - (5) Follow typed out instructions.

Note: When using this test with the CE Disk Pack, yes must be keyed in in answer to the question "Are you using CE Disk Pack." If no is keyed in, the head alignment data on cylinders 00, 34, 35, 36, and 99 will be destroyed.

C: DETAILED EXPLANATION:

This test is designed to write the indelible addresses on 1311 disk packs with the option of either saving the data that is on the sectors or writing known data on the sectors. The test has been written in routine form, and groups of routines perform certain logical functions. The routines that perform logical functions are:

- Control Routine
- Seek Cylinder Routine
- Write Addresses Routine
- Check Addresses Written Routine
- Test Complete Routine
- Error Routine

The Control Routine is comprised of a group of routines. The name of the test, operating instructions, and switch functions are typed out by these routines. Input data required for the proper operation of this test is entered during the execution of the Control Routine. A check that the entered address is not on cylinders 35 or 36 is made; the disk unit drive code digit is generated from the module number entered; and the address of the first sector of the track is calculated. If known data is to be written on the sectors, this data is generated in the Control Routine.

The following input must be entered during the execution of the Control Routine: (See Note At Bottom of Page 2)

1. Yes or no, entered from the console typewriter.
Normally the answer to this question is YES; because the test is being used with the CE Disk Pack. Typing in YES provides for a program check to prevent writing on cylinders 00, 34, 35, 36, and 99. If NO is entered, no program check is made of the cylinders being written on and the head alignment data will be destroyed if used

C. DETAILED EXPLANATION (cont.):

with the CE Disk Pack. A typeout occurs (DO NOT USE ON CE DISK PACK), if NO is entered to warn the user that all cylinders will be written on.

2. A one digit number, the module number of the Disk Storage drive on which the Disk Pack is located, is entered from the console typewriter.
3. A five digit sector address indicating the starting track on which addresses are to be written is entered from the console typewriter. To write all addresses, key in 00000. If YES was keyed in as the answer to whether or not the CE Disk Pack is being used, the sector address entered is checked that it is not on cylinders 35 or 36. If the entered address is on one of these cylinders, an error message will type out requesting that the address be entered again. A new address should be entered which is not on one of these cylinders.

The drive code digit must be calculated from the module number keyed in because of the format of the Disk Control Field. The calculation of the drive code gives the following results:

<u>Module No.</u>	<u>Drive Code</u>
0	1 -
1	3 -
2	5 -
3	7 -

This drive code is then set in the F_0 position of the Disk sub-instructions.

The starting address of the track containing the addresses entered is calculated. This is always an even digit in the tens position and zero in the units' position; i. e., XXXEO. If the tens' digit entered is even, it is the starting address, but if it is odd, the starting address is one less than the tens' digit entered.

C. DETAILED EXPLANATION (cont.):

The status of program switch 2 determines whether the data on the sectors will be rewritten (switch 2 off) when the addresses are written or whether generated data will replace (switch 2 on) the previous data on the sectors. The routine to generate a track (2100 characters) of data is entered if switch 2 is on. A typical sector of the data generated is:

0000000001111111112222222222...8888888889999999999

The twenty, five digit address are inserted in their respective positions before the data is written on the disk pack.

Prior to giving the access mechanism a seek command to position at the proper cylinder for writing, a check is made as to whether the CE Disk Pack is being used or not (entered information). If the CE Disk is being used, a check is made to verify that cylinders 00, 34, or 99 are not being accessed. If the cylinder is 00, the address is updated to cylinder 01 and the test continues; if the cylinder is 34, the address is updated to cylinder 37 before programming is continued; and if the cylinder is 99, the program enters the test completed routine. If the CE Disk Pack is not being used, this routine is bypassed.

The Seek Cylinder Routine positions the access mechanism and then checks to see if a Select Lock condition exists.

The Write Address Routine checks program switch 2 to determine if the data on the Disk Pack is to be saved or not. If it is, a Read Disk Track Numerically without wrong length record check (RTN) is executed. The new (generated) disk addresses are placed in their proper positions in the data just read in, and then a Write Disk Track without wrong length Record Check (WTN) is executed. A check for parity errors is made after the RTN and WTN instructions.

The Check Addresses Written Routine makes a double check to insure that the addresses were written on the Disk Pack. The first check is the execution of a check Disk Track Numerically without wrong length record

C. DETAILED EXPLANATION (cont.):

check (CTN). The second check is a program compare of each of the addresses read from the Disk Pack. A RTN instruction compares the Disk Addresses against the addresses in the data used in the WTN instruction, Write Address routine. If both of these checks give positive indications, the addresses have been written on the Disk Pack. Error messages are typed out if the results are negative.

The Check Addresses Written Routine also contains a routine to determine if a complete cylinder has been written. If it has, updating is performed and the Seek Cylinder Routine is entered. A check is also made to determine if the entire Disk Pack has been written. When it has, the Test Completed routine is entered.

The Test Completed Routine checks if any errors occurred while the program was being run, if the error typeouts were bypassed, and then types out the appropriate message.

The Error Routine is entered whenever a Parity Check is detected or a program compare indicates an incorrect result. It contains the necessary instructions to control whether or not an error message will be typed out, whether or not the program will halt on an error, or whether or not the program will loop on an error.

D. ERROR ANALYSIS:

CANT USE CYLINDERS 00, 34, 35, 36, 99 ON CE DISK PACK

ERO 00930, 00954

This error type out will occur if the user keys in a sector address that is on cylinders 35 and 36, and he has the CE Disk Pack on the storage drive. The program will request the sector address again.

ERROR OCCURRED BUT SWITCH 1 WAS ON, THUS NO ETO

ER80 02430

This error type out will occur in the test completed routine if the user has switch 1 ON and an error occurred during the

D. ERROR ANALYSIS (cont.):

running of the test. ETO = Error Type Out.

AAAAAAAAA BBBB (XX) CYL ZZ HDY

All other error type outs follow this standard format.

AAAAAAAAA is the Disk Storage Command on which the error occurred. All disk operations in this program are without Wrong Length Record Check.

BBBBB (XX) is the error that occurred and turned on ANY DATA check. (XX) is the indicator number.

CYL ZZ HDY gives the cylinder number ZZ (00-99) and the head Y90-9) addressed when the error occurred.

The AAAAAAAAA type outs that can occur are:

READ TRACK A1 ER2 01530

The program is reading from a track on the Disk into area A1 in memory.

WRITE TRACK ER3 01710

The program is writing from area A1 in memory onto a track on the Disk Pack.

READ BK TK CK ER4 01782

The program is doing a read back track compare of the data written onto the Disk Pack out of area A1 in memory.

READ TRACK A2 ER5 01842

The program is reading the track written back into area A2 in memory.

PROG COMPARE ER6 01986

The program is doing a compare of the sector addresses written from area A1 and read back into area A2.

SEEK ER8 01458

The program has performed a seek operation.

D. ERROR ANALYSIS (cont.):
BBBBBB (XX),

The BBBBBB type errors are:

ADS CK (36)	ER10	02574
WLR CK (37)	ER11	02694
OVFO CK (38)	ER12	02718
RD CK (06)	ER14	02754
WR CK (07)	ER15	02778
MBR-E (16)	ER16	02802
MBR-O (17)	ER17	02826
FILE NO IND (39)	ER13	02718

The program found Any File indicator on, but all the indicators which turn it on are off.

NOT/EQ ADS	ER18	02010
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The program during the compare of the sector address found one that was not equal. The program attempts to rewrite that track of addresses again.

SELECT LOCK	ER19	02574
CYL ZZ HD Y	ER20	02934

This is the rest of the error type out that tells the user which cylinder (CYL) the error occurred on, where ZZ will be from 00 to 99, and also which head (HD) or track was in error, where Y will be from 0 to 9.

E. SERVICE HINTS:

1. The test also contains a routine that will loop on a write instruction (write disk track numerically without record length check). This routine has to be entered via execution of a branch instruction in the insert area (49 03114). This routine changes a no operation instruction to a branch and branches to the main program for the data as to which module number and sector address is to be used.

E. SERVICE HINTS (cont.):

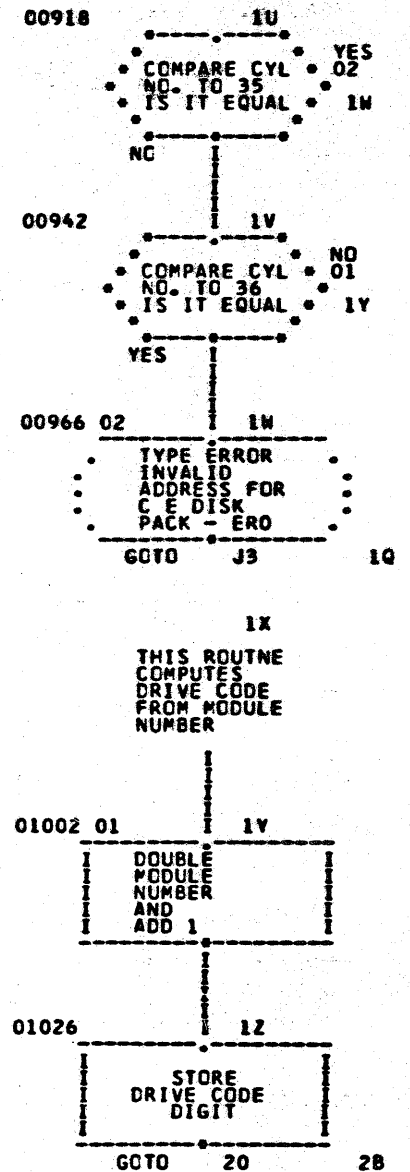
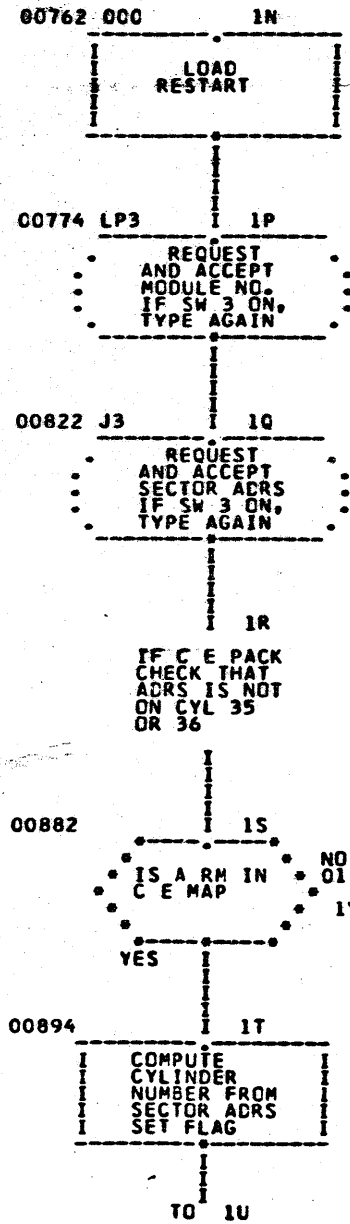
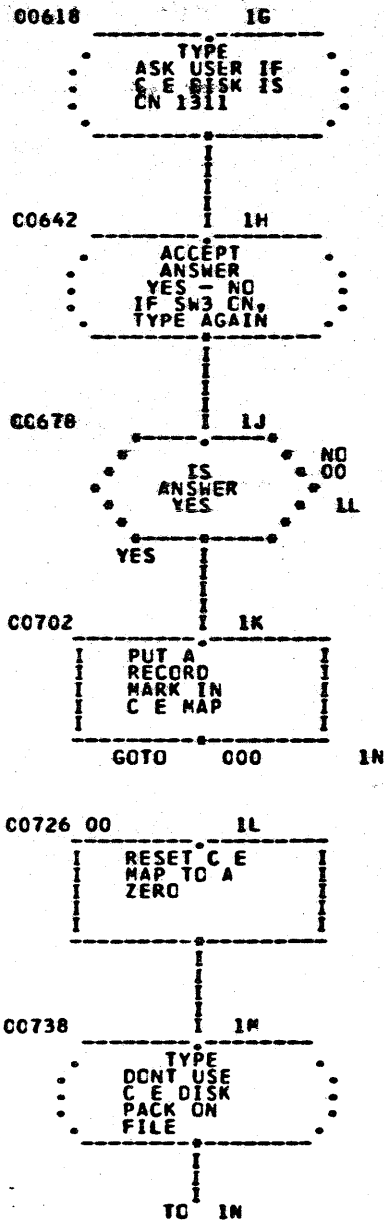
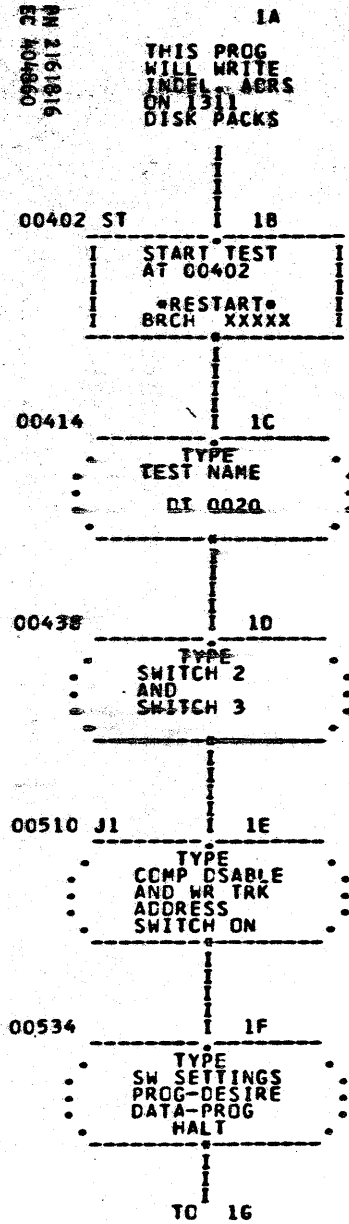
This is request from the user. The routine utilizes the write instruction in the main program. This write instruction is continually executed until the user turns console switch 4 off. The routine then changes a branch to a "NOP", and branches to the test complete routine in the main program.

2. This program was designed to fulfill the need to write addresses on the 1311 Disk Pack. However, it can also serve two other functions:

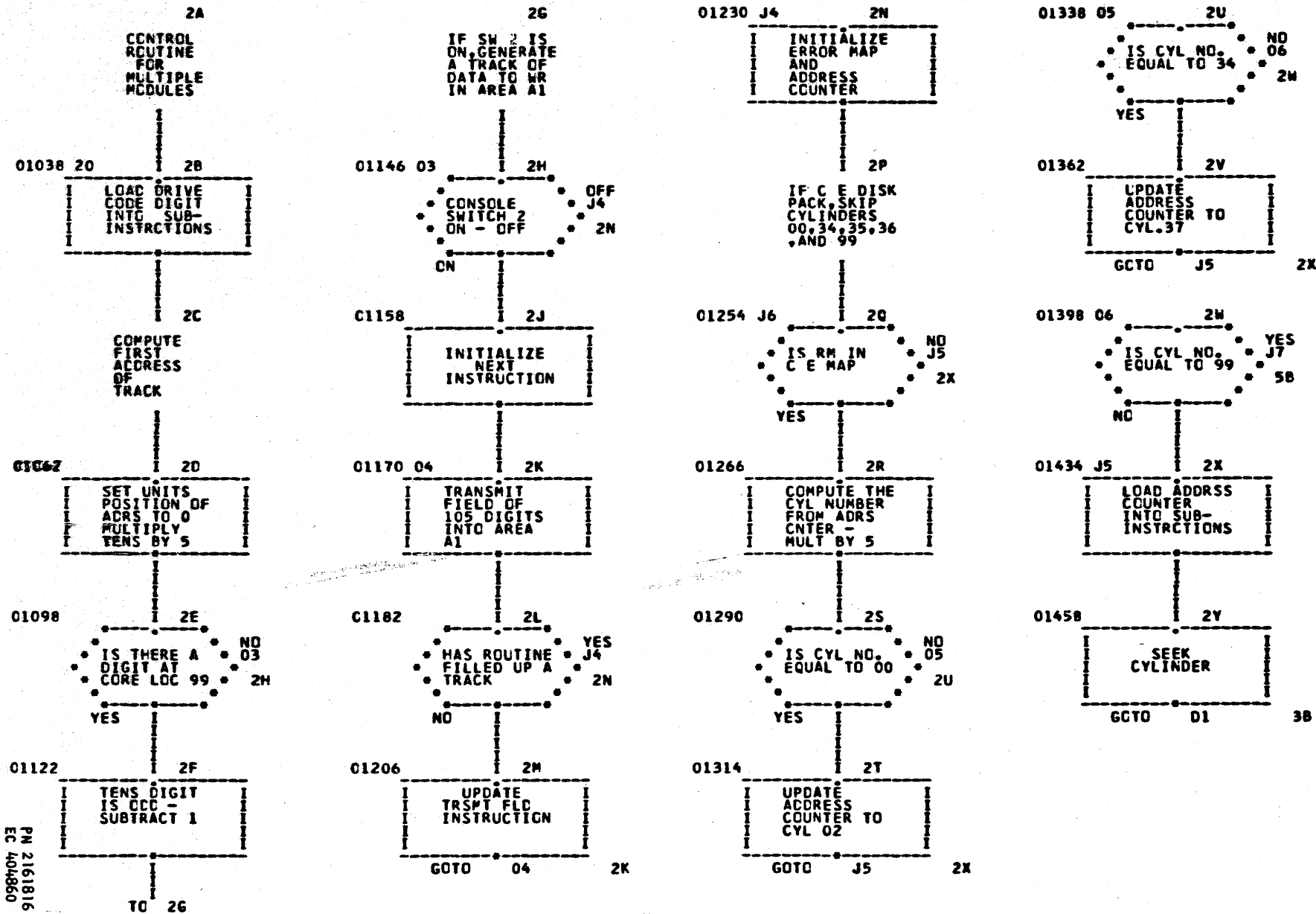
- a. It will detect bad spots on a Disk Pack if these interfere with the magnetic pattern on the disk. This is detected by parity errors during a Read Operation, should parity errors occur. The head and cylinder number associated with the error will be typed out with the error message. The user may then dump the data read onto the typewriter to determine, by examining the characters, which sector is bad. This is done by inserting and executing a 35
XXXXX 00100 where XXXXX is the core location of the data area in core. The XXXXX's can be determined by looking at the subinstruction of the Disk operation that error occurred on.
- b. This program will write addresses on the Disk Pack beginning with the starting track address of the track on which the sector address keyed in is on. As a Seek operation is executed for each cylinder and as the operation progresses through higher consecutive cylinders until the addresses are written on cylinder 99, the user can watch the access arms to determine if the Seek operation is successfully seeking the cylinders (i. e., access arm will progressively reach farther into the Disk Pack).

DT 0020 - 1311 INDELIBLE ADDRESSES PROGRAM

RM 2161816
EC 404860



DT 0020 - 1311 INDELIBLE ADDRESSES PROGRAM

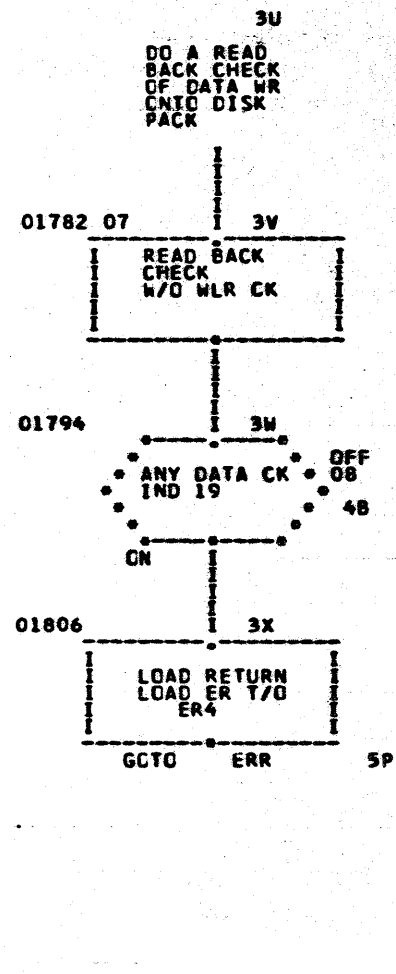
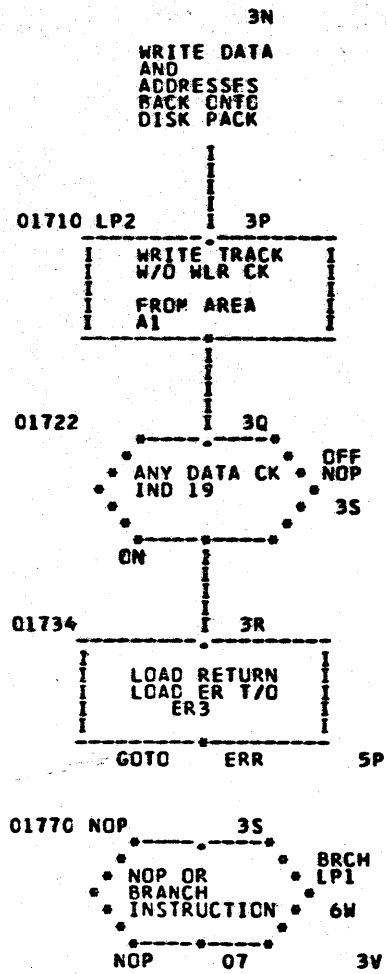
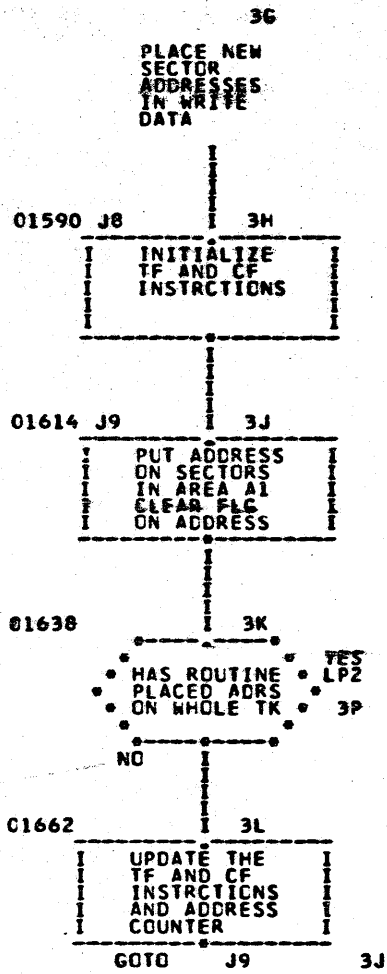
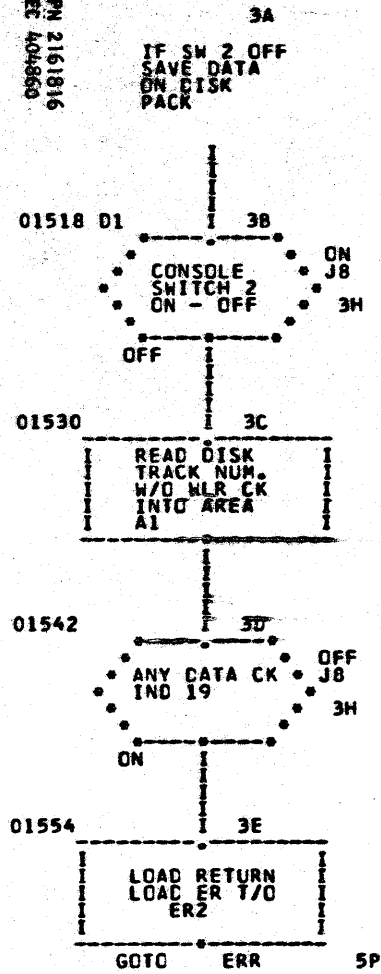


PN 2161816
EC 404860

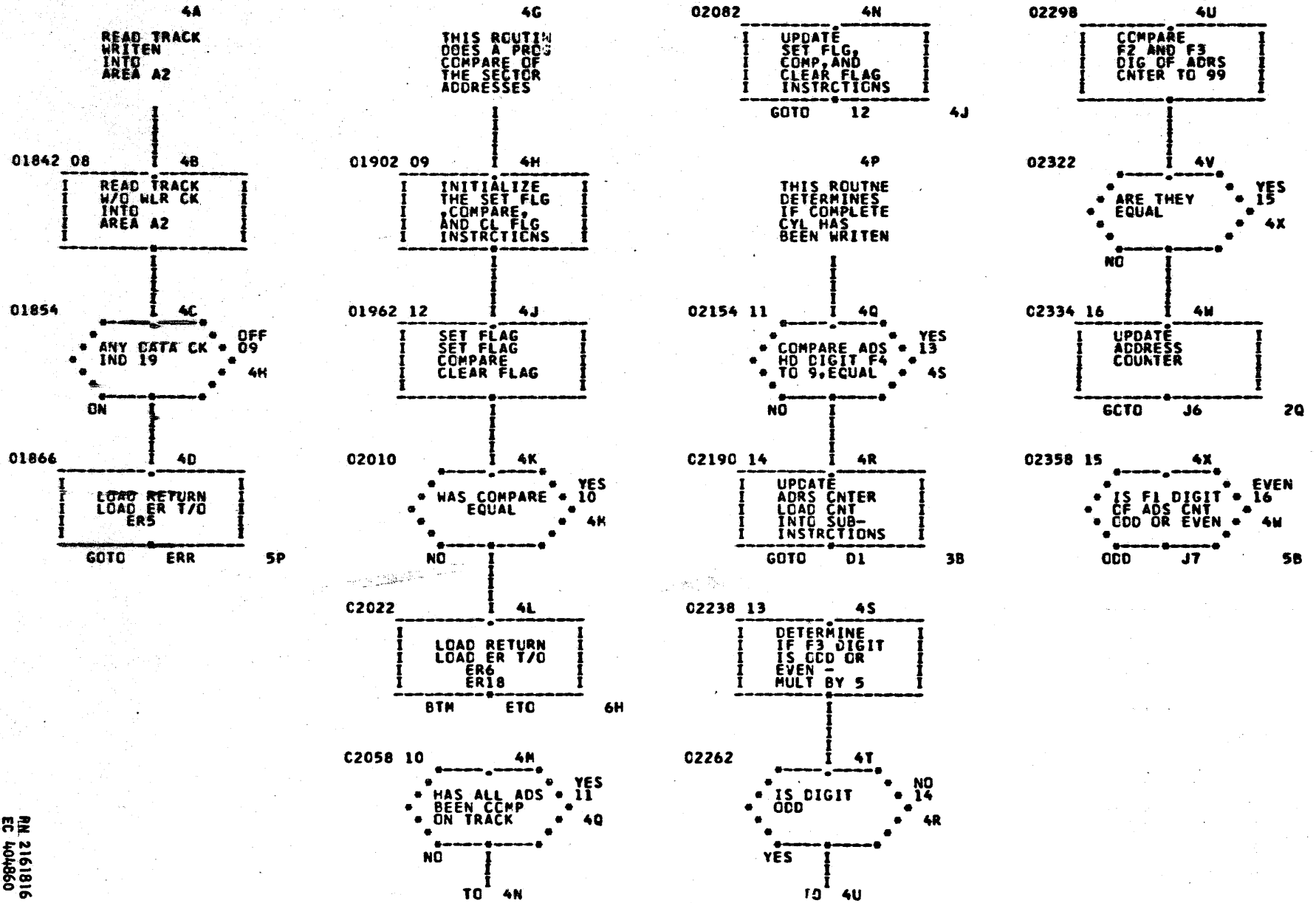
DT CO20 - 1311 INDELIBLE ADDRESSES PROGRAM

PN 2161816
EC 404860

DT 0020
Page 12



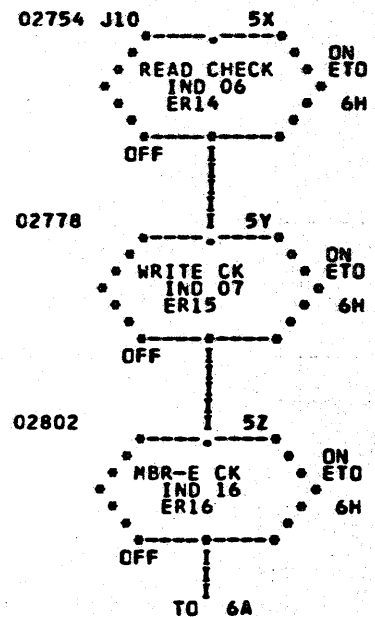
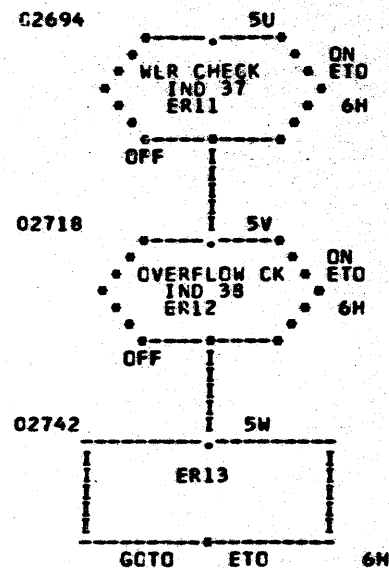
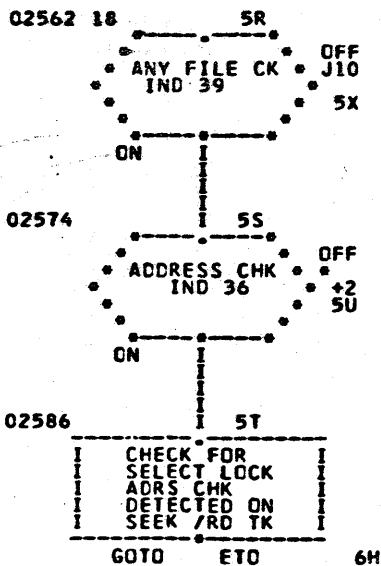
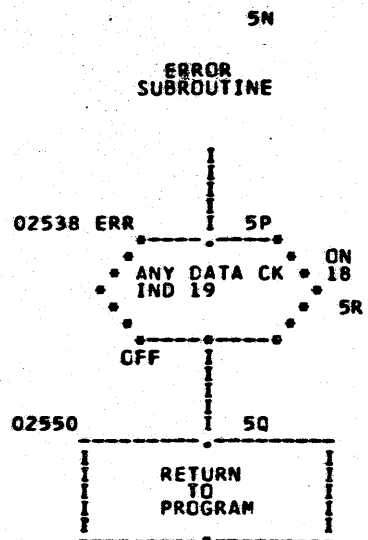
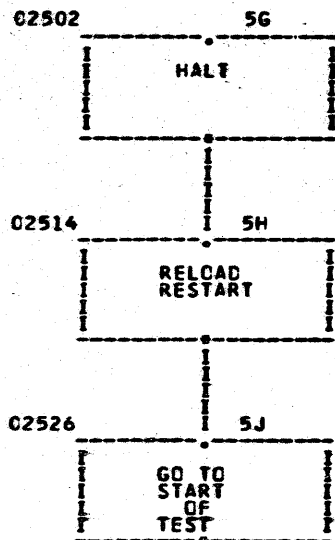
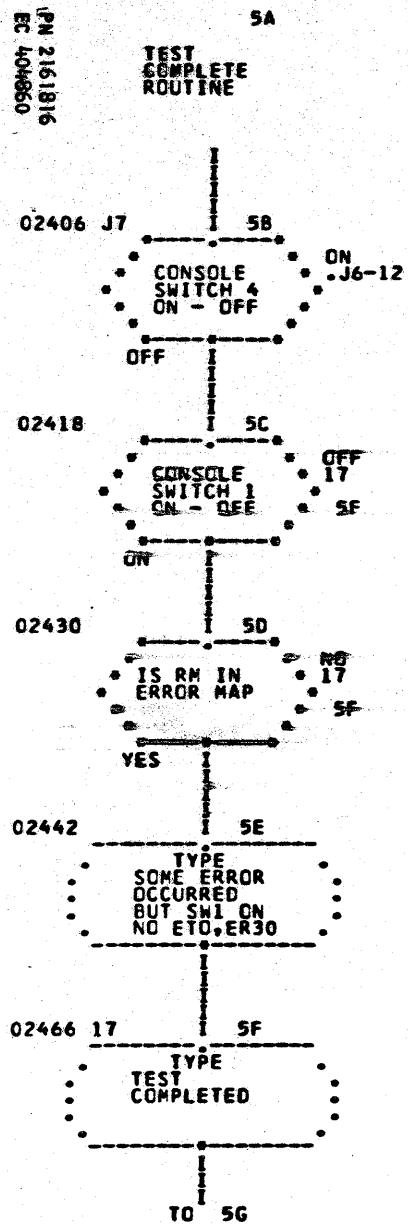
DT CO20 - 1311 INDELIBLE ADDRESSES PROGRAM



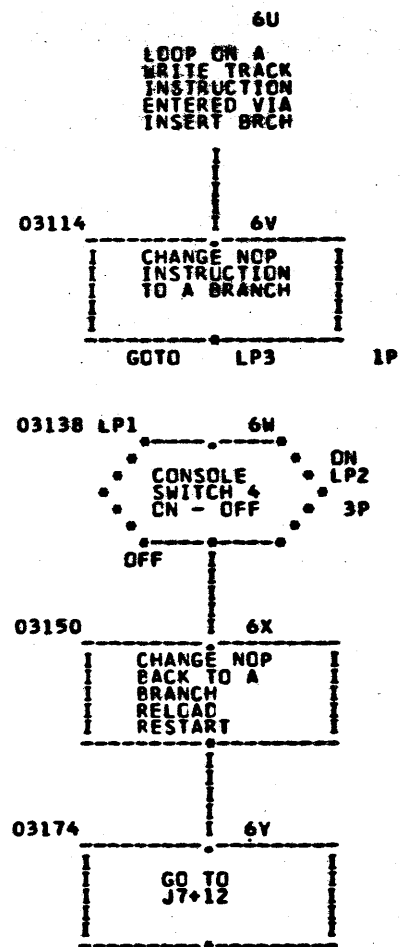
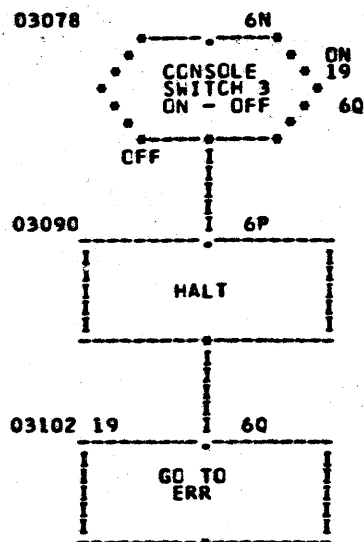
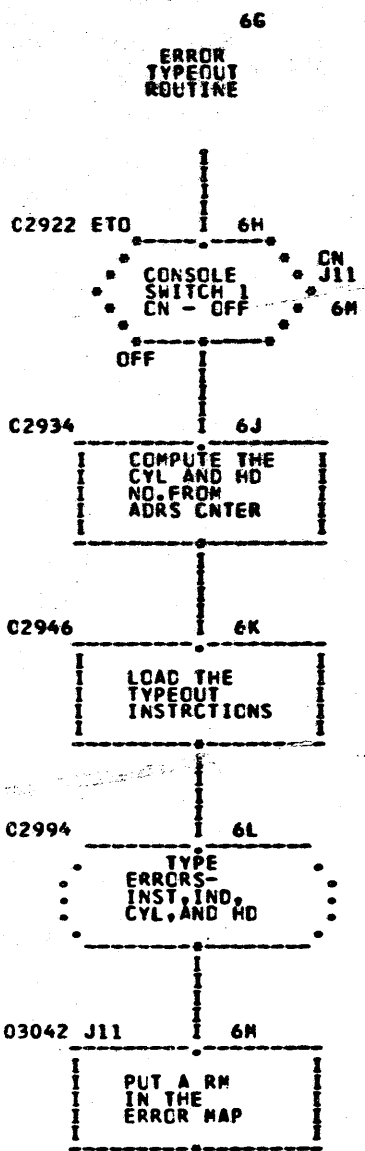
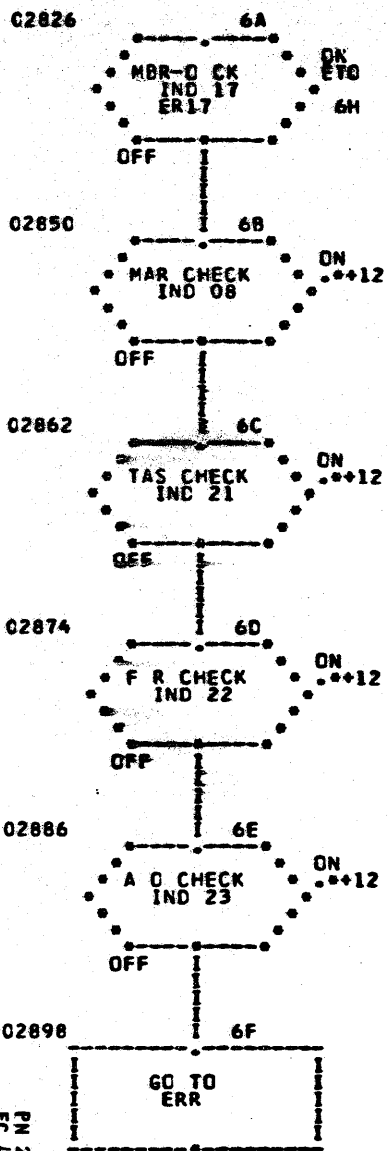
RM 2161816
EC 404860

DT 0020 - 1311 INDELIBLE ADDRESSES PROGRAM

PN 2161816
EC 404860



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PN 2161816
 EC 404860

SAMPLE OUTPUT FOR DT 0020

DT 0020 - INDELIBLE ADDRESSES PROGRAM
SW 2 ON GENERATE WRITE DATA
SW 2 OFF SAVES DATA
SW 3 ON FOR CORRECTING KEY IN
TURN ON THE COMPARE DISABLE (OUT) AND WRITE SECTOR ADDRESS SWITCHES
SWITCH SETTINGS
PROGRAM - AS DESIRED
DATA--PROG
ARE YOU USING CE DISK PACK,TYPE YES OR NO NO
DO NOT USE ON CE DISK PACK
KEY IN 1 DIGIT MODULE NUMBER 0
KEY IN 5 DIGIT SECTOR ADDRESS 00000
TEST COMPLETED

CORE LOC	INSTRUCTION	CARD NO.	LABEL, OPERATION OPERANDS AND REMARKS
		00010 **	
		00020 *	DT 0020 INDELIBLE ADRS PROG*
		00030 **	
		00040 *	THIS PROGRAM WILL WRITE*
		00050 *	INDELIBLE ADDRESSES ON THE*
		00060 *	1311 DISK STORAGE DRIVE*
		00070 *	DISK PACKS.*
		00080 **	
		00090 **	
		00100 *	CONTROL ROUTINE*
		00110 **	
00402		00120	DDRG 00402,,, DEFINE START*
00402	49 00414 00000	00130 ST	B **12,,, RESTART*
00414	34 00000 00102	00140	RCTY,,, RETURN CARRIAGE*
00426	39 03187 00100	00150	WATY T1,,, TYPE TEST NAME*
		00160 **	
		00170 *	TYPE UUT SWITCH SETTINGS*
		00180 **	
00438	34 00000 00102	00190	RCTY,,, RET CARR*
00450	39 03847 00100	00200	WATY T31,,, SW 2 SETTING*
00462	34 00000 00102	00210	RCTY,,, RET CARR*
00474	39 03903 00100	00220	WATY T32,,, SW 2 SETTING*
00486	34 00000 00102	00230	RCTY,,, RET CARR*
00498	39 03787 00100	00240	WATY T30,,, TYPE SW3 ON*
00510	34 00000 00102	00250 J1	RCTY,,, RETURN CARRIAGE*
00522	39 03317 00100	00260	WATY T3,,, TYPE SWITCH ON*
00534	34 00000 00102	00270	RCTY,,, RETURN CARRIAGE*
00546	39 03453 00100	00280	WATY T4,,, TYPE SW SETTING*
00558	34 00000 00102	00290	RCTY,,, RETURN CARRIAGE*
00570	39 03485 00100	00300	WATY T5,,, TYPE SENSE--OFF*
00582	34 00000 00102	00310	RCTY,,, RETURN CARRIAGE*
00594	39 03527 00100	00320	WATY T6,,, TYPE DATA--PROG*
00606	48 00000 00000	00330	H,,, HALT*
		00340 **	
		00350 *	ASK IF C E DISK PACK*
		00360 **	
00618	34 00000 00102	00370	RCTY,,, RETURN CARRIAGE*
00630	39 03671 00100	00380	WATY T9,,, ASKS IF CE PACK*

PN 2161816
EC 404860

00642 37 04599 00100 00390
 00654 46 00642 00300 00400
 00666 32 04598 00000 00410
 00678 14 04599 00008 00420
 00690 47 00726 01200 00430
 00702 25 04624 04622 00440
 00714 49 00762 00000 00450
 00726 15 04624 00000 00460
 00738 34 00000 00102 00470
 00750 39 03263 00100 00480
 00762 16 00408 -0774 00490

R/ATY C1,,, ACCEPT ANSWER#
 BC3 *-12,,, SW3 ON TYP AGAIN#
 SF C1-1,,, SET FLAG#
 CM C1,68,10, IS ANSWER YES#
 BNE **36,,, BRCH IF NOT#
 TD CEM, RM,, PUT RM IN MAP#
 B **48,,, SKIP T/O#
 TDM CEM,00000,, RESET MAP#
 RCTY,,, RETURN CARRIAGE#
 WATY T2,,, DONT USE CE PACK#
 TFM ST+6,**12,, LOAD RESTART#

00500 *#
 00510 *
 00520 *#

REQUEST AND ACCEPT MODULE NO.#

00774 34 00000 00102 00530 LP3
 00786 39 03549 00100 00540
 00798 38 04607 00100 00550
 00810 46 00798 00300 00560

RCTY,,, RETURN CARRIAGE#
 WATY T7,,, RQT MOD NO.#
 RNTY N,,, KEY IN NUMBER#
 BC3 *-12,,, SW3 ON TYP AGAIN#

00570 *#
 00580 *
 00590 *
 00600 *#

REQUEST AND ACCEPT#
 DESIRED SECTOR ADDRESS#

00822 34 00000 00102 00610 J3
 00834 39 03609 00100 00620
 00846 36 04614 00100 00630
 00858 46 00846 00300 00640
 00870 32 04614 00000 00650

RCTY,,, RETURN CARRIAGE#
 WATY T8,,, RQT ADDRESS#
 RNTY A-4,,, KEY IN ADDRESS#
 BC3 *-12,,, SW3 ON TYP AGAIN#
 SF A-4,,, SET FLG ON ADRS#

00660 *#
 00670 *
 00680 *
 00690 *#

IF C E PACK,CHECK THAT ADS#
 IS NOT ON CYLINDER 35 OR 36#

00882 45 01002 04624 00700
 00894 13 04616 000-5 00710
 00906 32 00097 00000 00720
 00918 14 00098 000L5 00730
 00930 46 00966 01200 00740
 00942 14 00098 000L6 00750
 00954 47 01002 01200 00760

BNR **120,CEM,, IS RM IN CE MAP#
 MM A-2,05,10, SET UP CYL NO.#
 SF 97,,, SET FLAG#
 CM 98,035,10, IS IT CYL 35#
 BE **36,,, BRCH IF SO#
 CM 98,036,10, IS IT CYL 36#
 BNE **48,,, BRCH IF NOT#

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00966 34 00000 00102 00770
00978 39 03943 00100 00780
00990 49 00822 00000 00790
00800 *#
00810 *
00820 *
00830 *#
01002 13 04607 000-2 00840
01014 11 00099 0-001 00850
01026 25 04611 00099 00860
00870 *#
00880 *
00890 *
00900 *#
01038 25 04638 04611 00910 J2
01050 25 04652 04611 00920
00930 *#
00940 *
00950 *
00960 *#
01062 15 04618 00000 00970
01074 25 01097 04617 00980
01086 13 04635 000-0 00990
01098 43 01122 00099 01000
01110 49 01134 00000 01010
01122 12 04617 0-C01 01020
01134 31 04772 00100 01030
01040 *#
01050 *
01060 *
01070 *
01080 *#
01146 47 01230 00200 01090
01158 16 01176 -5182 01100
01170 26 99999 04770 01110
01182 14 01176 -7177 01120
01194 46 01230 01200 01130
01206 11 01176 -0105 01140

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RCTY ,,, RETURN CARRIAGE#
WATY ERO,,, TYPE ERROR#
B J3,,, KEY IN AGAIN#

THIS ROUTINE COMPUTES DRIVE#
CODE DIGIT FROM MODULE NO.#

MM N,02,10, MULTIPLY#
AM 99,01,8, ADD 1#
TD M,99,, RELOAD MOD NO.#

SUB-INSTRUCTION CONTROL#
ROUTINE FOR MULTIPLE MODULES#

TD S1,M,, LOAD MOD NO.#
TD S2,M,, LOAD MOD NO.#

COMPUTE FIRST ADDRESS OF TRACK#
AND STORE MATH TABLES#

TDM A,0,, SET UNITS TO 0#
TD **23,A-1,, LOAD MULTIPLY#
MM C2,00,10, MULTIPLY E/O#
BD **24,99,, BRCH IF ODD#
B **24,,, SKIP NEXT INST#
SM A-1,01,8, SUBTRACT 1#
TR TAB,00100,, STORE MATH TABLES#

IF SW 2 IS ON,GENERATE A#
TRACK OF DATA TO WRITE ON#
DISK INTO AREA A1#

BNC2 J4,,, SW 2 OFF BYPASS#
TFM **18,A1+105,, LOAD NEXT INST#
TF 99999,C3-1,, PUT DATA IN A1#
CM *-6,A1+2100,, SEE IF DONE#
BE **36,,, BRCH IF DONE#
AM *-30,105,, UPDATE INST#

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PN 2161816
EC 404860

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01218 49 01170 00000 01150
                                01160 **
                                01170 *
                                01180 *
                                01190 **
01230 15 04626 00000 01200 J4
01242 26 04631 04618 01210
                                01220 **
                                01230 *
                                01240 *
                                01250 **
01254 45 01434 04624 01260 J6
01266 13 04629 000-5 01270
01278 32 00097 00000 01280
01290 14 00098 000-0 01290
01302 47 01338 01200 01300
01314 15 04629 00002 01310
01326 49 01434 00000 01320
01338 14 00098 000L4 01330
01350 47 01398 01200 01340
01362 15 04628 00007 01350
01374 15 04629 00004 01360
01386 49 01434 00000 01370
01398 14 00098 000R9 01380
01410 47 01434 01200 01390
01422 49 02406 00000 01400
01434 26 04643 04631 01410 J5
01446 26 04657 04631 01420
                                01430 **
                                01440 *
                                01450 **
01458 34 04638 00701 01460
01470 47 01518 01900 01470
01482 16 02556 -1458 01480
01494 16 03012 -4189 01490
01506 49 02538 00000 01500
                                01510 **
                                01520 *

```

```

B      *-48,,,      LOOP BACK#

      INITIALIZATION ROUTINE#
      FOR ADDRESS COUNTER AND MAPS#

TDM   ERM,00,,      RESET ERROR MAP#
TF    ADS,A,,      LOAD ADDRESS CNT#

      IF C E DISK PACK,SKIP#
      CYLINDERS 00,34,35,36,99#

BNR   J5,CEM,,      CK FOR RM#
MM    ADS-2,05,10,  COMPUTE CYL NO.#
SF    97,,,      SET FLAG#
CM    98,00,10,    IS NO. EQ TO 00#
BNE   **36,,,      BRCH IF NOT#
TDM   ADS-2,02,,    UPDATE CYLINDER#
B     J5,,,      COMPLT INIT#
CM    98,34,10,    IS NO. EQ TO 34#
BNE   **48,,,      BRCH IF NOT#
TDM   ADS-3,07,,    UPDATE CYL#
TDM   ADS-2,04,,    UPDATE CYL#
B     J5,,,      COMPLT INIT#
CM    98,99,10,,   IS NO. EQ TO 99#
BNE   J5,,,      BRCH IF NOT#
B     J7,,,      DONE#
TF    S1+5,ADS,,   LOAD SUB-INST 1#
TF    S2+5,ADS,,   LOAD SUB-INST 2#

      SEEK CYLINDER#

K     S1,701,,      SEEK DESIRED CYL#
BNI   **48,01900,, ANY DATA CHECK#
TFM   ERR+18,*-24,, LOAD RETURN#
TFM   E1+6,ER8,,   LOAD OPERATION#
B     ERR,,,      BRCH TO ER ROUT#

      IF SW 2 OFF SAVE DATA ON DISK#

```

01518 46 01590 00200 01530 *#
 01530 36 04638 00706 01540 D1
 01542 47 01590 01900 01550
 01554 16 02556 -1530 01560
 01566 16 03012 -4045 01570
 01578 49 02538 00000 01580
 01590

01600 *#
 01610 *
 01620 *
 01630 *
 01640 *#

01590 16 01620 -5082 01650 J8
 01602 16 01632 -5078 01660
 01614 26 99999 04631 01670 J9
 01626 33 99999 00000 01680
 01638 14 01620 -7077 01690
 01650 46 01710 01200 01700
 01662 11 01620 -0105 01710
 01674 11 01632 -0105 01720
 01686 11 04631 -0001 01730
 01698 42 01614 00000 01740

01750 *#
 01760 *
 01770 *
 01780 *#

01710 38 04638 00706 01790 LP2
 01722 47 01770 01900 01800
 01734 16 02556 -1710 01810
 01746 16 03012 -4075 01820
 01758 49 02538 00000 01830
 01770 41 03138 00000 01840 NOP
 01850 *#

01860 *
 01870 *
 01880 *#

01782 36 04638 00707 01890
 01794 47 01842 01900 01900

BC2 J8,,, SW 2 ON BYPASS#
 RN S1,0706,, RD TK W/O RLC#
 BNI **48,01900,, ANY DATA CHECK#
 TFM ERR+18,-24,, LOAD RETURN#
 TFM E1+6,ER2,, LOAD ERROR T/O#
 B ERR,,, BRCH TO ER ROUT#

PLACE NEW SECTOR ADDRESSES#
 IN WRITE DATA THAT WILL#
 BE WRITTEN ON DISK PACK#

TFM J9+6,A1+5,, INIT TRSMT FLD#
 TFM J9+18,A1+1,, INIT CL FLG INST#
 TF 99999,ADS,, PUT ADS IN A1#
 CF 99999,,, CLEAR FLAG#
 CM J9+3,A1+2000,, SEE IF DONE#
 BE **60,,, BRCH IF DONE#
 AM J9+6,105,, UPDATE TF#
 AM J9+18,105,, UPDATE CF#
 AM ADS,01,, UPDATE ADDRESS#
 B J9,,, LOOP BACK#

WRITE DATA AND ADDRESSES#
 BACK ONTO DISK PACK#

WN S1,0706,, WRITE TK W/O RLC#
 BNI **48,01900,, ANY DATA CHECK#
 TFM ERR+18,-24,, LOAD RETURN#
 TFM E1+6,ER3,, LOAD ERROR T/O#
 B ERR,,, BRCH TO ER ROUT#
 NOP LP1,,, NOP FOR LP ROUT#

DO A READ BACK CK OF DATA#
 WRITTEN ONTO DISK PACK#

RN S1,0707,, COMP DATA,ADDRS#
 BNI **48,01900,, ANY DATA CHECK#

PN 2161816
 EC 404860

PN 2161816
EC 404860

01806	16	02556	-1782	01910
01818	16	03012	-4101	01920
01830	49	02538	00000	01930
				01940 *#
				01950 *
				01960 *#
01842	36	04652	00706	01970
01854	47	01902	01900	01980
01866	16	02556	-1842	01990
01878	16	03012	-4131	02000
01890	49	02538	00000	02010
				02020 *#
				02030 *
				02040 *
				02050 *
				02060 *#
01902	16	01968	-5078	02070
01914	16	01980	-7180	02080
01926	16	01992	-5082	02090
01938	16	01997	-7184	02100
01950	16	02004	-5078	02110
01962	32	99999	00000	02120
01974	32	99999	00000	02130
01986	24	99999	99999	02140 D
01998	33	99999	00000	02150
02010	46	02058	01200	02160
02022	16	02556	-1710	02170
02034	16	03012	-4161	02180
02046	17	02922	-4429	02190
02058	14	01992	-7077	02200
02070	46	02154	01200	02210
02082	11	01968	-0105	02220
02094	11	01980	-0105	02230
02106	11	01992	-0105	02240
02118	11	01997	-0105	02250
02130	11	02004	-0105	02260
02142	49	01962	00000	02270
				02280 *#

TFM	ERR+18, *-24,,	LOAD RETURN#
TFM	E1+6, ER4,,	LOAD ERROR T/O#
B	ERR,,,	BRCH TO ER ROUT#

READ TRACK WRITTEN INTO AREA A2#

RN	S2,0706,,	RD TK W/D RLC#
BNI	*+48,01900,,	ANY DATA CHECK#
TFM	ERR+18, *-24,,	LOAD RETURN#
TFM	E1+6, ER5,,	LOAD ERROR T/O#
B	ERR,,,	BRCH TO ER ROUT#

INITIALIZATION FOR A PROGRAM#
COMPARE OF ADDRESSES PUT ON#
THE DISK PACK#

TFM	D-18, A1+1,,	INITIALIZE#
TFM	D-6, A2+1,,	INITIALIZE#
TFM	D+6, A1+5,,	INITIALIZE#
TFM	D+11, A2+5,,	INITIALIZE#
TFM	D+18, A1+1,,	INITIALIZE#
SF	99999,,,	SET FLAG#
SF	99999,,,	SET FLAG#
C	99999,99999,,	COMPARE ADDRESS#
CF	99999,,,	CLEAR FLAG#
BE	*+48,,,	BRCH OKAY#
TFM	ERR+18, LP2,,	LOAD RETURN#
TFM	E1+6, ER6,,	LOAD ER T/O#
BTM	ETO, ER18,,	BRCH, LOAD ER T/O#
CM	D+6, A1+2000,,	SEE IF DONE#
BE	*+84,,,	BRCH IF DONE#
AM	D-18, 105,,	UPDATE#
AM	D-6, 105,,	UPDATE#
AM	D+6, 105,,	UPDATE#
AM	D+11, 105,,	UPDATE#
AM	D+18, 105,,	UPDATE#
B	D-24,,,	LOOP BACK#

```

02290 *
02300 *
02310 *
02320 **
02154 25 02177 04630 02330
02166 14 04633 000-0 02340
02178 46 02238 01200 02350
02190 11 04631 -0001 02360
02202 26 04643 04631 02370
02214 26 04657 04631 02380
02226 49 01518 00000 02390
02238 25 02261 04629 02400
02250 13 04635 000-0 02410
02262 43 02286 00099 02420
02274 49 02190 00000 02430
02286 32 04628 00000 02440
02298 14 04629 000R9 02450
02310 33 04628 00000 02460
02322 46 02358 01200 02470
02334 11 04631 -0001 02480
02346 49 01254 00000 02490
02358 25 02381 04627 02500
02370 13 04635 000-0 02510
02382 43 02406 00099 02520
02394 49 02334 00000 02530

```

```

THIS ROUTINE DETERMINES IF#
A COMPLETE CYLINDER HAS#
BEEN WRITTEN#

```

```

TD  *+23,ADS-1,,  LOAD COMPARE#
CM  C4,00000,10,  COMPARE HD TO 9#
BE  *+60,,,  BRCH IF EQUAL#
AM  ADS,01,,  UPDATE ADS CNT#
TF  S1+5,ADS,,  LOAD SUB-INST 1#
TF  S2+5,ADS,,  LOAD SUB-INST 2#
B   D1,,,  LOOP BACK#
TD  *+23,ADS-2,,  LOAD MULTIPLY#
MM  C2,00000,10,  MULTIPLY#
BD  *+24,99,,  BRCH IF ODD#
B   *-84,,,  SET UP NEXT TK#
SF  ADS-3,,,  SET FLAG#
CM  ADS-2,099,10,  COMPARE TO 99#
CF  ADS-3,,,  CLEAR FLAG#
BE  *+36,,,  BRCH IF EQUAL#
AM  ADS,01,,  UPDATE ADS CNT#
B   J6,,,  LOOP BACK#
TD  *+23,ADS-4,,  LOAD MULTIPLY#
MM  C2,00000,10,  MULTIPLY#
BD  *+24,99,,  BRCH IF ODD#
B   *-60,,,  SET UP NEXT CYL#

```

```

02540 **
02550 *
02560 *
02406 46 01242 00400 02570 J7
02418 47 02466 00100 02580
02430 45 02466 04626 02590
02442 34 00000 00102 02600
02454 39 04511 00100 02610
02466 34 00000 00102 02620
02478 39 03757 00100 02630
02490 34 00000 00102 02640
02502 48 00000 00000 02650
02514 16 00408 -0414 02660

```

```

TEST COMPLETE ROUTINES#

```

```

BC4  J6-12,,,  SW 4 ON LOOP BK#
BNC1 *+48,,,  SW 1 OFF BYPASS#
BNR  *+36,ERM,,  CK FOR RM IN MAP#
RCTY ,,,  RETURN CARRIAGE#
WATY ER30,,,  TYPE ER OCCURRED#
RCTY ,,,  RETURN CARRIAGE#
WATY T10,,,  TEST COMPLETED#
RCTY ,,,  RETURN CARRIAGE#
H   ,,,  HALT#
TFM  ST+6,ST+12,,  RESTART#

```

PN 2161816
EC 404860


```

02526 49 00402 00000 02670
                                02680 *#
                                02690 *
                                02700 *#
02538 46 02562 01900 02710 ERR
02550 49 99999 00000 02720
02562 47 02754 03900 02730
02574 47 02694 03600 02740
02586 14 03012 -4189 02750
02598 46 02658 01200 02760
02610 14 03012 -4045 02770
02622 46 02658 01200 02780
02634 14 03012 -4131 02790
02646 47 02682 01200 02800
02658 16 03007 000ML 02810
02670 17 02922 -4455 02820
02682 17 02922 -4201 02830
02694 47 02718 03700 02840 BYSL
02706 17 02922 -4229 02850
02718 47 02742 03800 02860
02730 17 02922 -4257 02870
02742 17 02922 -4287 02880
02754 47 02778 00600 02890 J10
02766 17 02922 -4325 02900
02778 47 02802 00700 02910
02790 17 02922 -4351 02920
02802 47 02826 01600 02930
02814 17 02922 -4377 02940
02826 47 02850 01700 02950
02838 17 02922 -4403 02960
02850 46 02862 00800 02970
02862 46 02874 02100 02980
02874 46 02886 02200 02990
02886 46 02898 02300 03000
02898 49 02538 00000 03010
                                03020 *#
                                03030 *
                                03040 *#

```

```

B ST,,, RESTART TEST#
                                ERROR SUBROUTINE#
BI ++24,01900,, ANY DATA CHECK#
B 99999,,, RETURN TO PROG#
BNI J10,03900,, ANY FILE CHECK#
BNI BYSL,03600,, ADDRESS CHECK#
CM E1+6,ER8,, WAS OP A SEEK#
BE ++60,,, BRCH - YES#
CM E1+6,ER2,, WAS OP A RD TK#
BE ++36,,, BRCH - YES#
CM E1+6,ER5,, WAS OP A RD TK#
BNE ++36,,, BRCH - NO#
TFM E1+1,41,10, CHANG WATY TO NOP#
BTM ETO,ER19,, BRCH LOAD ER T/O#
BTM ETO,ER10,, BRCH LOAD ER T/O#
BNI ++24,03700,, RECORD LENGTH CK#
BTM ETO,ER11,, BRCH,LOAD ER T/O#
BNI ++24,03800,, OVERFLOW CHECK#
BTM ETO,ER12,, BRCH,LOAD ER T/O#
BTM ETO,ER13,, BRCH,LOAD ER T/O#
BNI ++24,00600,, READ CHECK#
BTM ETO,ER14,, BRCH,LOAD ER T/O#
BNI ++24,00700,, WRITE CHECK#
BTM ETO,ER15,, BRCH,LOAD ER T/O#
BNI ++24,01600,, MBR-E CHECK#
BTM ETO,ER16,, BRCH,LOAD ER T/O#
BNI ++24,01700,, MBR-O CHECK#
BTM ETO,ER17,, BRCH,LOAD ER T/O#
BI ++12,0800,, MAR CHECK#
BI ++12,02100,, TAS CHECK#
BI ++12,02200,, F R CHECK#
BI ++12,02300,, A O CHECK#
B ERR,,, LOOP BACK#

```

ERROR TYPE OUT ROUTINE#

02910 41 00000 00000 03050
 02922 46 03042 00100 03060 ETO
 02934 13 04631 000-5 03070
 02946 25 04493 00095 03080
 02958 25 04495 00096 03090
 02970 25 04507 00097 03100
 02982 26 03024 02921 03110
 02994 34 00000 00102 03120
 03006 39 99999 00100 03130 E1
 03018 39 99999 00100 03140
 03030 39 04483 00100 03150
 03042 25 04626 04622 03160 J11
 03054 31 00100 04772 03170
 03066 16 03007 000L9 03180
 03078 47 03102 00300 03190
 03090 48 00000 00000 03200
 03102 49 02538 00000 03210

NOP ,,, NO OPERATION‡
 BC1 J11,,, SW 1 ON BYPASS‡
 MM ADS,05,10, MULTIPLY‡
 TD ER20+10,95,, CYL. NUMBER‡
 TD ER20+12,96,, CYL. NUMBER‡
 TD ER20+24,97,, HD NUMBER‡
 TF E1+18,ETO-1,, LOAD ER T/O‡
 RCTY ,,, RETURN CARRIAGE‡
 WATY 99999,,, TYPE ERROR‡
 WATY 99999,,, TYPE ERROR‡
 WATY ER20,,, TYPE ERROR‡
 TD ERM,RM,, PUT RM IN MAP‡
 TR 00100,TAB,, REPLACE MATH TAB‡
 TFM E1+1,39,10, CHNG NOP TO WATY‡
 BNC3 *+24,,, SW 3 ON HALT‡
 H ,,, HALT‡
 B ERR,,, SEE IF MORE ERS‡

03220 *‡
 03230 *
 03240 *
 03250 *
 03260 *‡

LOOP ON A WRITE INSTRUCTION‡
 ENTERED VIA A BRANCH IN‡
 THE INSERTION AREA‡

03114 15 01771 00009 03270
 03126 49 00774 00000 03280
 03138 46 01710 00400 03290 LP1
 03150 15 01771 00001 03300
 03162 16 00408 -0414 03310
 03174 49 02418 00000 03320

TDM NOP+1,09,, CHANGE NOP TO B‡
 B LP3,,, BRCH TO MAINLINE‡
 BC4 LP2,,, LOOP BK TO WRITE‡
 TDM NOP+1,01,, CHANGE B TO NOP‡
 TFM ST+6,ST+12,, LOAD RESTART‡
 B J7+12,,, BRCH TO TST DNE‡

03330 *‡
 03340 *
 03350 *
 03360 *‡

DATA,TYPE OUTS,ERROR‡
 MESSAGES AND CONSTANTS‡

03187 00019 03370 T1
 03225 00019 03380
 03263 00027 03390 T2
 03317 00023 03400 T3
 03363 00024 03410
 03411 00021 03420

DAC 19,DT 0020 - INDELIBLE‡
 DAC 19, ADDRESSES PROGRAM‡
 DAC 27,DO NOT USE ON CE DISK PACK‡
 DAC 23,TURN ON THE COMPARE DIS‡
 DAC 24,ABLE (OUT) AND WRITE SEC‡
 DAC 21,TOR ADDRESS SWITCHES‡

PN 2161816
EC 404860

03453 00016
03485 00021
03527 00011
03549 00025
03599 00005
03609 00025
03659 00006
03671 00021
03713 00022
03757 00015
03787 00022
03831 00008
03847 00028
03903 00020

03943 00027
03997 00024
04045 00015
04075 00013
04101 00015
04131 00015
04161 00014
04189 00006
04201 00014
04229 00014
04257 00015
04287 00019
04325 00013
04351 00013
04377 00013
04403 00013
04429 00013
04455 00014
04483 00014
04511 00023
04557 00021

03430 T4
03440 T5
03450 T6
03460 T7
03470
03480 T8
03490
03500 T9
03510
03520 T10
03530 T30
03540
03550 T31
03560 T32
03570 *#
03580 *
03590 *#
03600 ERO
03610
03620 ER2
03630 ER3
03640 ER4
03650 ER5
03660 ER6
03670 ER8
03680 ER10
03690 ER11
03700 ER12
03710 ER13
03720 ER14
03730 ER15
03740 ER16
03750 ER17
03760 ER18
03770 ER19
03780 ER20
03790 ER30
03800

DAC 16, SWITCH SETTINGS*#
DAC 21, PROGRAM - AS DESIRED*#
DAC 11, DATA--PROG*#
DAC 25, KEY IN 1 DIGIT MODULE NUM*#
DAC 05, BER *#
DAC 25, KEY IN 5 DIGIT SECTOR ADD*#
DAC 06, RESS *#
DAC 21, ARE YOU USING CE DISK*#
DAC 22, PACK, TYPE YES OR NO *#
DAC 15, TEST COMPLETED*#
DAC 22, SW 3 ON FOR CORRECTING*#
DAC 08, KEY IN*#
DAC 28, SW 2 ON GENERATE WRITE DATA*#
DAC 20, SW 2 OFF SAVES DATA*#

ERROR MESSAGES#

DAC 27, CANT USE CYLINDERS 00, 34, 35*#
DAC 24, 36, 99 ON C E DISK PACK*#
DAC 15, READ TRACK A1 *#
DAC 13, WRITE TRACK *#
DAC 15, READ BK TK CK *#
DAC 15, READ TRACK A2 *#
DAC 14, PROG COMPARE *#
DAC 06, SEEK *#
DAC 14, ADS CK (36) *#
DAC 14, WLR CK (37) *#
DAC 15, DVFO CK (38) *#
DAC 19, FILE NO IND (39) *#
DAC 13, RD CK (06) *#
DAC 13, WR CK (07) *#
DAC 13, MBR-E (16) *#
DAC 13, MBR-O (17) *#
DAC 13, NOT/EQ ADS *#
DAC 14, SELECT LOCK *#
DAC 14, CYL 99 HD 9*#
DAC 23, ERROR OCCURRED BUT SW 1*#
DAC 21, WAS ON THUS NO ETO.*#

03810 **
 03820 *
 03830 *
 03840 **

DATA,CONSTANTS,WORKING*
 AREA AND SUB-INSTRUCTIONS*

04599	00003	03850	C1	DAC	03,999,,	ANSWER*
04605	00002	03860		DC	2,00,,	BUFFER*
04607	00002	03870	N	DC	2,00,,	MODULE*
04609	00002	03880		DC	2,00,,	BUFFER*
04611	00002	03890	M	DC	2,00,,	MODULE*
04613	00002	03900		DC	2,00,,	BUFFER*
04618	00005	03910	A	DC	5,00000,,	ADDRESS*
04620	00002	03920		DC	2,00,,	BUFFER*
04622	00002	03930	RM	DC	2,00,,	RECORD MARK*
04624	00002	03940	CEM	DC	2,00,,	C E MAP*
04626	00002	03950	ERM	DC	2,00,,	ERROR MAP*
04631	00005	03960	ADS	DC	5,00000,,	ADDRESS CNTR*
04633	00002	03970	C4	DC	2,09,,	CONSTANT 9*
04635	00002	03980	C2	DC	2,05,,	CONSTANT 5*
04637	00001	03990		DAC	1,0,,*	
04638	00009	04000	S1	DSC	9,000000020,,	SUB-INSTRUCTION*
04651	00005 -5078	04010		DSA	A1+1*	
04652	00009	04020	S2	DSC	9,000000020,,	SUB-INSTRUCTION*
04665	00005 -7180	04030		DSA	A2+1*	
04670	00005	04040		DC	5,00000,,	CONST*
04671	00020	04050		DSC	20,00000000001111111111,,	CONST*
04691	00020	04060		DSC	20,22222222223333333333,,	CONST*
04711	00020	04070		DSC	20,44444444445555555555,,	CONST*
04731	00020	04080		DSC	20,66666666667777777777,,	CONST*
04751	00020	04090		DSC	20,88888888889999999999,,	CONST*
04771	00001	04100	C3	DC	1,0,,	LABEL FOR CONST*
04772	00002	04110	TAB	DSC	2,0*	
04873	00100	04120		DSB	100,3,,	MATH TABLES*
05075	00001	04130		DAC	1,0*	
05077	00002	04140	A1	DC	2,00,,	RD/WR AREA A1*
05182	00105	04150		DSB	105,20,,	2100 POSITIONS*
07179	00002	04160	A2	DC	2,00,,	RD/WR AREA A2*
07284	00105	04170		DSB	105,20,,	2100 POSITIONS*
09280	00001	04180	A3	DC	1,0,,	LAST LABEL*

PM 2161816
EC 404860

00402

04190

END 00402*

1311 DIAGNOSTIC TEST 0020

360007200500360020100500440001200276260005900274250001100000260009000269000-0000
 26000950026431000000020026001140027425000000001149000120000000000000000000-0001
 490041400000340000000102390318700100340000000102390384700100#0-1-0402-0462 -0002
 340000000102390390300100340000000102390378700100340000000102#0-1-0462-0522 -0003
 390331700100340000000102390345300100340000000102390348500100#0-1-0522-0582 -0004
 340000000102390352700100480000000000340000000102390367100100#0-1-0582-0642 -0005
 370459900100460064200300320459800000140459900008470072601200#0-1-0642-0702 -0006
 250462404622490076200000150462400000340000000102390326300100#0-1-0702-0762 -0007
 1600408-0774340000000102390354900100360460700100460079800300#0-1-0762-0822 -0008
 340000000102390360900100360461400100460084600300320461400000#0-1-0822-0882 -0009
 4501002046241304616000-53200097000001400098000L5460096601200#0-1-0882-0942 -0010
 1400098000L6470100201200340000000102390394300100490082200000#0-1-0942-1002 -0011
 1304607000-211000990-001250461100099250463804611250465204611#0-1-1002-1062 -0012
 1504618000002501097046171304635000-0430112200099490113400000#0-1-1062-1122 -0013
 12046170-0013104772001004701230002001601176-5182269999904770#0-1-1122-1182 -0014
 1401176-71774601230012001101176-0105490117000000150462600000#0-1-1182-1242 -0015
 2604631046184501434046241304629000-53200097000001400098000-0#0-1-1242-1302 -0016
 4701338012001504629000024901434000001400098000L4470139801200#0-1-1302-1362 -0017
 1504628000071504629000044901434000001400098000R9470143401200#0-1-1362-1422 -0018
 490240600000260464304631260465704631340463800701470151801900#0-1-1422-1482 -0019
 1602556-14581603012-4189490253800000460159000200360463800706#0-1-1482-1542 -0020
 4701590019001602556-15301603012-40454902538000001601620-5082#0-1-1542-1602 -0021
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