IDENTIFICATION

PRODUCT CODE:	MAINDEC-12-D3GA-D
PRODUCT NAME:	PDP-12 TAPE CONTROL TEST (PART 2 OF 2)
DATE CREATED:	MAY 1, 1970
MAINTAINER:	DIAGNOSTICS GROUP
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1. ABSTRACT

The tape control diagnostics Part 2 is designed to test all Controller Logic not tested by Part 1. Specifically this includes, Inter-Processor Signals, Tape Control States and Instruction, Tape States, Tape Trap and the Transfer of Data between the Computer and the Tape Controller via the Data break facilities. It should be noted that Part 1 of this diagnostic should have been successfully run prior to running Part 2, because Part 2 assumes that the logic associated with Part 1 is functioning normally.

2. REQUIREMENTS

2.1 Equipment

1) A Standard Basic PDP-12
2) A TC-12, PDP-12 Linc Tape Controller
3) At least 1 Linc-Tape Transport
4) An ASR-33 Teletype or Equivalent

2.2 Storage

This program is designed to run in Memory Field Ø only and it occupies virtually all of Field Ø not occupied by the Binary and Rim Loaders.

2.3 Preliminary Programs

All PDP-8 and 12 mode basic instruction diagnostics and exercisers must have been successfully run prior to running the program.

3. LOADING PROCEDURE

3.1 Method

This program must be loaded with the binary loader. If you are unfamiliar with the proper binary loading procedures refer to Appendix A of this document, otherwise procede with the following:

A) Set the teletype reader switch to FREE.

B) Open the teletype reader and insert the program tape so that the arrows on the tape are visible to and pointing toward the operator.

C) Close the reader and set the reader switch to START.

D) Set the teletype front panel switch to START.

E) Set the left switches to 7777.

F) Set the right switches to 4ØØØ.

G) Set the mode switch to 8 mode.

H) Depress I/O preset.

I) Depress start LS.

J) When the program tape has been read in the ACCUMULATOR must be ØØØØ, if it is not, a read-in error has occurred and one might try reloading the binary loader.
See Appendix A.

K) Remove the program tape from the reader.

4. STARTING PROCEDURES

This preliminary set up procedure is critical and any omission will result in an error.

A) Set one and only one of the Linc-tape transport number thumbwheels to Ø - on some transports the Ø position is actually represented by 8.

B) Set all other transports, if available, to all different numbers i.e. no two transports have the same unit number.

C) No TRANSPORT may se to unit 1 as this number is used to generate a non-select signal.

D) Set the WRITE ENABLE switch on every transport to the disabled condition.

E) Set all transport switches to OFF.

F) Remove any Linc-tapes currently on the transport.

G) Set the left switches to Ø2ØØ.

H) Set the right switches to ØØØØ.

NOTE: Setting the right switches to configurations other than ØØØØ will cause the computer to scope loop, halt on error, and perform other options. These options are discussed later.

TAPE MARK SWITCH DOWN!

I) Set the MODE switch to 8 mode.

J) Depress I/O preset.

K) Depress START LS.

The program is running.

4.1 Control Switch Settings

A set of 6 optional mode switches consisting of right switches 0-6 has been included for the convenience of the test engineer, they are:

SR00 = 1 suppress error halts

SR01 = 1 suppress type outs ring bell on error

SR02 = 1 scope loop on a failing test

SR03 = 1 scope loop on a non-failing test

SR04 = 1 unit does not have extended tape fields (unused in part 2)

SR05 = 1 suppress the bell

SR06 = 1 suppress the pass counter.

The switches have an order of precedence associated with them. For example, if the option switches were set so as to cause a typeout and an error halt, it is obvious that the typeout must precede the halt. Right switch 00 if set to a one will prevent the computer from halting when an error is detected. Depending on the condition of the other switches, we may:

1) go on to the next test after typing out a message

2) stay in the same test.

Right switch 01, if set to a one, will prevent the computer from typing anything out and instead causes a bell to ring at every detected error. The purpose of this is merely to inform the operator that an error has occurred and nothing more.

Right switch 02, if set to a one, will prevent the computer from exiting the current failing test.

Using switches 00, 01, 02 several use full combinations of error analysis present themselves:

SR0	SR1	SR2	Explanation
0	0	0	Type error data and halt
0	1	0	Ring bell and halt
1	0	0	Continuous typing of data with no halt
1	1	0	Ring bell at every failure
1	0	1	Continuous typing of data in current test

In general, an error halt is useful for scoping status of the machine immediately following an error.

Right switch 03, if set to a one, will cause the program to remain in the current test, so long as no failures occur.

Right switch 04, if set to a one, will cause the program not to test the extended tape field register. (4K System)

Right switch 05, if set to a one, will inhibit the bell from ringing. Under normal operation the program will ring the bell about once every 1 and 1/2 minutes.

5. MESSAGE FORMAT

1) The message format is designed to yeild the maximum possible information with the minimum amount of typing. To that end the following format has been selected as the best of both worlds; i.e., amount of information vs. the amount of typing.

Example:

LTR AC RWB (VIA TB) Failed

AC RWB

ØØØ1 ØØØØ

ØØØ2 ØØØØ

LTR 2) The first item typed, in this case LTR, refers to the logic page on which the logic which is being tested is drawn. In this case the message tells us that the logic under test is located in the (LTR) Linc Tape Register logic.

It should be understood that the trouble is associated with the Linc tape register logic but not necessarily on the page referenced. For example, on this test the data transfered may not have gotten from the computer to the tape control or it may not have been read back properly. Both of these problems would cause a typeout such as this, indicating a bad register, when in fact, the trouble was in getting data to or from a register.

AC RWB 3) The second items typed AC RWB indicate that the two registers involved, the AC, referring to the computer AC, and the RWB, referring to the tape control read write buffer, are involved in the test.

(VIA TB) 4) The third item, enclosed in brackets, is a modifier. In this example, the program is capable of loading the RWB in one of three (3) ways, from the tape transport, from the AC serially via a maintenance gate, and from the AC via the TB. Obviously three different trouble shooting techniques are required depending on which of the three data paths are bad. The modifier is this case points out which one of three data paths failed.

FAILLD 5) The word "failed" is typed to be sure the operator understands that this message indicates trouble and is not interpreted as a status report.

AC RWB 6) The two registers whose data are shown are named on the second line of the typeout to ensure that the operator is aware that the data type out is AC and RWB and not the TB. Usually the registers involved do not have their names typed out unless there is a possibility of confusion.

ØØØ1 ØØØØ 7) The numerical data type outs also in a special format.

When more than one number is typed the first number is always the source number. In this typeout the ØØØ1 is the number in the AC after the contents of the RWB were read back into the AC. An engineer must always refer to this document and locate the exact type in order to properly interpret any message or data typeout.

6. MONITORS

This program contains two monitors, and error monitor and a non-error monitor. The error monitor handles scope looping on errors, message typeouts, and determines what data shall be used in a failing test. The non-error monitor is an extremely simple subroutine whose only function is to allow a test to loop continuously even when no error exists. The following example will be used to illustrate a typical coding sequence, involving the comparing of a true number with the actual results of an operation.

```
1)  TESTX,  TAD      REGB      /Fetch Received data
2)          CIA                /Negate
3)          TAD      REGA      /Subtract from sent number
4)          SNA      CLA       /Were they equal
5)          JMS      I NERROR  /AC was zero, they were equal
6)          JMS      I ERROR   /Sent Data Received data unequal
7)          GOOF               /Message TAG
8)          HLT                /Error HALT
9)          SKP CIA            /EXIT
10)         TESTX              /Scope Loop Pointer
```

The numbers shown in the left margin are for reference purposes only and are not part of the coding.
The first three lines performed in order (1) fetch the resultant of the test from "REGB". This could have been any memory register or any hardware register which can be read under computer control. The test data is converted to twos' complement form (2) and subtracted from the correct results (3) The test of the data (i.e. were they equal) takes place on line (4) and based on this test we go either to the non-error (NERROR) subroutine or if the ACCUMULATOR is not zero the error (ERROR) monitor. It should be obvious that any decision making instruction can be used to ascertain which monitor we hand control too.

Lines (5), (6), are the actual monitor calling instructions. Line (7) (GOOF) is the address of the first memory location of the error message which will be typed out in case of a failure. Line (8) is an error halt. If an error should occur and the switches are set so as to allow an error halt this address will be the one at which it will halt.

Line (9) is an exit. If an error halt occurs, pressing continue will cause the computer to execute the skip and exit to the next test.

Line (1Ø) contains the address at which this test is begun again. For example, after completing one pass thru this test routine the monitors will execute an effective Jump Indirect the contents of line (1Ø) and redo this test routine.

6.1 Non Error Monitor

The non error monitor has two functions. The first is to increment "REGA". "REGA" is a comman tally register used to count 4Ø96 passes thru a test and to notify the non-error monitor via an "ISZ" loop when the required number of passes have been perfomed and thereby causing an exit. The second function is to examine RSW Ø3 and if set, inhibit exiting to the next test.

In some tests, particularly those associated with time delays, or mechanical delays it becomes prohibitive to make 4Ø96 passes thru a test. To circumvent this it is possible to preset "REGA" to "7777" so as to only make a single pass thru a test, or any number of passes from 1 through 4Ø96.

6.2 Error Monitor

The error monitor is the major monitor responsible for all modes of communicating errors to the operator. The usage of switch inputs has been completely discussed under part 4.1 control switch settings and will not be discussed here. Several salient features of the error monitor are as follows. The first "scope loop on failing test" (SRØ2=1), is designed to cause the monitor to inhibit incrementation of "REGA", and to inhibit the advance of the random number generator. An example of its use might be in testing any of the 12 bit registers. Assume that bit Ø0 can never be set to a one because of some as yet unknown hardware error. This malfunction will become known the first time the number 4ØØØ is loaded into it because the read back will show ØØØØ - normally the next number to tried will be 4ØØ1, 4ØØ2 etc. with each being typed out and each causing

different data to be transferred. To facilitate scope testing of this problem, we must eliminate type outs and prevent the data from changing. This is easily accomplished as explained under switch settings.

An error message is always formatted such that all of the non numeric characters are typed out first followed by the numerics. The contents of some memory register, other than those selected by the programmer, may be of interest to the field engineer. For example, in a random data transfer test it is impossible to determine the number of successful data transfers, because only the errors are typed out. Lets presume that the engineer wishes to type out the pass counter i.e. "REGA" memory address ØØØ4. It is necessary to modify the message type out string as follows:

BEFORE		AFTER	
GOOF, ØØØ1	ØØØ1	GOOF, ØØØ1	ØØØ1
Ø2Ø3	Ø2Ø3	Ø2Ø3	Ø2Ø3
EXITA	7777	EXITA	7777
REGB	ØØØ5	REGB	ØØØ5
REGC	ØØØ6	REGC	ØØØ6
EXIT	ØØØØ	REGA	ØØØ4
		EXIT	ØØØØ

The following shows the before and after type out.

ABC 7351 735Ø ABC 6773 6253 ØØ37

The type out on the right shows the contents of the pass counter and will indicate if all random numbers failed or if only some of them failed. It is absolutely necessary to restore the

toggled in modifications to the message type out in order to prevent erroneous type outs in other messages.

7. MAINTENANCE INSTRUCTION SET

MNEMONIC	CODE	MODE	OPERATION
LMR	6151	PDP-8	Load maintenance register

AC	
Ø	TO MAINT INST REG
1	TO MAINT INST REG
2	TO MAINT INST REG
3	TO MAINT INST REG
4	CLEAR TAPE DONE FLOP
5	SKIP ON TAPE DONE
6	GENERATE A SIMULATED TT0, TT1, TT2, PULSES
7	GENERATE A SIMULATED TT3, TT4, PULSES
8	SIMULATE MARK INPUT
9	SIMULATE DATA 1 INPUT
10	SIMULATE DATA 2 INPUT
11	SIMULATE DATA 3 INPUT

Bits Ø,1,2,3

The contents of ACCUMULATOR bits Ø, 1, 2, 3, are loaded as a command into the maintenance instruction register. The command will be executed if and only if the XFR IOT (6154) is generated; the function of these commands are discussed later.

Bit 4

Executing the LMR command with AC bit 4 set will unconditionally clear the tape done flag.

Bit 5

Executing the LMR command with AC bit 5 set will cause the computer to skip the next instruction in sequence if the tape done flip-flop were set.

```
Example:        CLA CLL         /Clear AC, L
                TAD KØ1ØØ       /Set Bit 5
                LMR             /IOT 6151
                HLT             /Tape done was zero
                HLT             /Tape done was one
```

It should be noted that these commands are not designed to be microprogrammed; for example, setting both Bit 4 and 5 and executing LMR in an attempt to SKIP and clear on the tape done flag is unwise.

Bit 6

Executing the LMR command with AC bit 6 set will generate in order the timing pulses TTØ, TT1, TT2 regardless of the state of the tape control logic.

Bit 7

Executing the instruction LMR with bit 7 set will generate in order TT3 and TT4. It should be noted that to generate an entire timing stream consisting of pulses TTØ, TT1, TT2, TT3, and TT4, it is necessary to generate TTØ, TT1, and TT2 first followed by a second command to generate TT3 and TT4.

Bit 8

Is used to simulate an input to the mark window, see bits 9, 1Ø, 11 below.

Bits 9, 1Ø, 11

Executing the instruction LMR with data in AC bits 9, 1Ø, 11 will simulate reading data of the data heads into the Read-write buffer. This feature is useful in testing the tape control without a transport.

TRC 6152 PDP-8 Tape Register Clock

AC	
Ø	Generate tape preset
1	Shift RWB once left with no end around carry
2	Transfer TB to RWB
3	Add TB and TAC place the results in TAC
4	Ø Tape word flip flop
5	Set Forward
6	Set unit 1
7	Set Backward
8	Set write sync flip flop
9	Set 8 mode tape motion
1Ø	Select 8 tape mode
11	AC11 LTP8 Write if AC1Ø is set

The tape register control command TRC (6152) in conjunction with selected bits in the AC can perform a number of direct non-conditional operations. Several of the commands are useful primarily for logic testing the rest although they are tested, are used in normal machine operation.

Bit Ø:

Executing the command tape register control TMR (6152) in conjunction with AC bit Ø set to a one generates the internal signal tape preset. Tape preset, in general, sets all control flops to a null state, which may be either a one or a zero.

Bit 1:

TMR in conjunction with AC bit 1 will cause the Read-write buffer (RWB) to be shifted once to the left, observing it from the computer accumulator, or once up on the logic drawings. Data shifted out of RWB is lost and a logic Ø is shifted into the low order bit.

Bit 2:

TMR in conjunction with AC Bit 2 will cause the contents of the TB to be copied into the RWB. The previous contents of the RWB are lost, the TB remains unchanged. It should be noted that the only path by which the RWB may be loaded in parallel is via the TB register.

Bit 3:

AC bit 3 causes the contents of the TB register to be added to the contents of the TAC register, with the resultant being retained in the TAC.

Example:

BEFORE	AFTER
TB = 7321	TB =7321
TAC = Ø412	TAC = 773

Bit 4:

Clear the tape word flip flop. This bit generates an unconditional clear.

Bit 5:

Set forward. The direction flip flop is set to a one unconditionally. This command is useful for diagnostics.

Bit 6:

Set unit 1. When executed this command will select tape transport unit 1. It should be noted that this command can only select unit 1, if the extended transport select register (part of extended operations register bits 10, 11) are set to a zero. If the extended transport select register is not zero, the appropriate odd numbered unit is selected.

Bit 7:

Set Backward. The direction flip flop is set to zero unconditionally. This command is useful for diagnostics.

Bit 8:

Set write sync. This command unconditionally sets the write sync flip flop.

Bit 9:

Set 8 tape motion is used with the TC12-F option. This options allows the reading and writing of tapes written in PDP-8 Linc tape format.

Bit 10:

Set 8 write selects 8 tape mode.

Bit 11:

Set LTP8 write, AC bit 11 is provided as a data input to the 8 tape write flip-flop. If AC bit 10 is set, the bit is clocked into the flop.

XFR 6154 PDP-8 Transfer

Maintenance register

ØØ	AC to TB
Ø1	AC to TBN
1Ø	AC to TAC
11	AC to TMA
2Ø	TMA setup to AC
21	TBN to AC
3Ø	TB to AC
31	RWB to AC
4Ø	Mark window to AC
41	States to AC
5Ø	Units and motion to AC
51	Tape instruction register to AC
6Ø	Misc status 1 to AC
61	Misc status 2 to AC
7Ø	TMA to AC
71	Unused, returns all zeros to AC

In general all data transfers into the AC using maintenance commands are 1's transfers, that is, they do not clear the AC prior to inserting data. All data transfers from the AC into tape control register are jam transfers. Any data which was in a tape control register is lost.

ØØ AC to TB

The current contents of the AC are transferred into the TB (Tape Buffer). The AC data is unaffected the previous contents of the TB are lost.

Ø1 AC to TBN

The current contents of the AC are transferred into the TBN (Tape Block Number). The AC is unaffected, the previous contents of the TBN are lost.

10 AC to TAC

The current contents of the AC are transferred into the TAC (Tape Accumulator). The AC is unaffected, the previous contents of the TAC are lost.

11 AC to TMA

The contents of the AC are transferred into the TMA (Tape Memory Address). The AC is unaffected the previous contents of the TMA are lost.

2Ø TMA setup to AC

The contents of the TMA setup register is "ORED" into the AC. The contents of the TMA setup register is unaffected.

21 TBN to AC

The contents of the TBN register is "ORED" into the AC. The contents of the TBN are unaffected.

3Ø TB to AC

The contents of the TB register is "ORED" into the AC. The contents of the TB is unaffected.

31 RWB to AC

The contents of the RWB (Read write buffer) is "ORED" into the AC. The contents of the RWB are unaffected.

4Ø Mark Window to AC

The contents of the tape mark window and its associated mark decoding gates are "ORED" into the AC. The contents of the Mark window register is unaffected. The data format is as follows:

AC	
ØØ	Window shade
Ø1	Window ØØ
Ø2	Window Ø1
Ø3	Window Ø2
Ø4	Window Ø3
Ø5	End Zone mark
Ø6	Check mark
Ø7	Guard mark
Ø8	Data mark
Ø9	Final mark
1Ø	Block mark
11	Intermediate zone mark

41 States to AC

The contents of several flops and the levels of several gates are "ORED" into the AC. Reading the data does not affect its state. The data format is shown below:

AC

ØØ TAC = 7777

Ø1 IDLE Mode = 1

Ø2 Search mode = 1

Ø3 Block Mode = 1

Ø4 Check word mode = 1

Ø5 Turn around mode = 1

Ø6 Write flop = 1

Ø7 Write cycle flop = 1

Ø8 Acip delay not timed out

Ø9 Tape timing OK

1Ø Timing OK gate set

11 Tape fail delay

5Ø Units + MTN to AC

The data concerning transport selection, motion, direction, unit select, and write enable is "ORED" into the AC.

AC

ØØ UNIT Ø Selected

Ø1 UNIT 1 Selected

Ø2 UNIT 2 Selected

Ø3 UNIT 3 Selected

Ø4 UNIT 4 Selected

Ø5 UNIT 5 Selected

Ø6	UNIT 6 Selected
Ø7	UNIT 7 Selected
Ø8	MOTION FLOP (1)
Ø9	DIRECTION FLOP (1)
1Ø	UNIT SELECT
11	WRITE ENABLE

Bit 1Ø Unit Select

This bit indicates that one and only one unit is selected at a time.

51 TINST to AC

The contents of the tape instructions register decoder, the I bit and the group register are transferred to the AC. The contents of these datum are unaffected; however, the previous contents of the AC are lost.

AC	
ØØ	RDC
Ø1	RCG
Ø2	RDE
Ø3	MTB
Ø4	WRC
Ø5	WRE
Ø6	WRI
Ø7	CHK
Ø8	I BIT
Ø9	GPØ (1)
1Ø	GP 1 (1)
11	GP 2 (1)

6Ø Misc Status 1 to AC

This command transfers the status of several important levels to the AC. The format is shown below:

AC

ØØ	PHASE GATE
Ø1	PROGRESS FLOP (1)
Ø2	LC ØØ (1) Line Counter
Ø3	LC Ø1 (1) Line Counter
Ø4	MARK CHANNEL WRITE
Ø5	DATA CHANNEL 1
Ø6	DATA CHANNEL 2
Ø7	DATA CHANNEL 3
Ø8	GP CNT = GP FLOP
Ø9	GP CNT Ø (1)
1Ø	GP CNT 1 (1)
11	GP CNT 2 (1)

61 Misc Status 2 to AC

Bit Ø of the AC is set to a one if the LTP8 tape select flip-flop is set.

7Ø TMA to AC

The contents of the TMA register is transferred to the AC. The contents of the TMA are unchanged,the original contents of the AC is lost.

71 Unused

General Information

This program will test the PDP-12 tape control logic on a gate by gate basis. This was made possible by including a 16 instruction maintenance register in the basic desing. The linc tape maintenance register (LTMR) facilitates examination of all major registers and the majority of status bits, control levels etc., associated with the tape control. It is usually possible to isolate the fault to no more than one or two modules by analizing the diagnostic type out and referring to the appropriate logic diagram.

This program is written in several major and minor sections designed to point to a failure on an appropriate page in the logic drawings. The four major sections in order are:

1) Test out, in so far as possible, the maintenance logic. This includes the maintenance mode flop, maintenance instruction register, tape preset and the tape buffer to computer accumulator (TB to AC) data read back portion. This group of tests are a necessary preliminary diagnosis in order to be reasonably certain that the following tests fail because of logic failures and <u>not</u> because of failures in the maintenance instruction register

2) Test out the 12 bit registers TAC, TB, TMA, TMA setup, RWB and TBN. Two tests are performed on each register; the first test is a binary up count sequence; the second a random number sequence. The binary sequence ascertains that all flops can be both set to a one and set to a zero. In addition it also proves mutual independence of the data paths i.e. the flops can move independently of one another and the input and output data paths

are not shorted in any way. The random number test causes each bit of the registers to toggle at a relatively high speed, in contrast to the binary sequence wherein only the low order bits toggle at high speed. A second useful effect or the random number sequence is that it leaves the tested register in a random state, a technique sometimes useful for discovering grossly illogical wiring errors.

3) Test all minor registers; i.e., registers with less than 12 bits. These include unit select registers, mark window, extended [illegible]tions register, etc. In this series of tests an attempt is made to diagnose all flops and all sequenceable flops such as the major state generator. In most cases random number tests are not performed due to the fact that an unknown state in any control flop might have an adverse affect on the succeeding tests.

4) Test all gates using as many as possible input combinations. For example, AND gates are first tested with all inputs true to determine if the gate will function. Next each individual input is set false in turn to see if each input is expressed in the output. OR gates are tested by allowing at least one input and maybe more to become true and monitoring the output for a true condition. This is followed by setting all inputs to false monitoring the output for false, followed by setting each input in turn to true and checking the output.

A significant number of gates in the tape control can not be directly tested tape state logic TC12-Ø-LTS, for example. These untestable gates are evaluated indirectly by logical deduction; i.e., all testable inputs to these gates are tested as inputs to other gates. An example:
Block mark (BM) is a functional input to the LTS logic. As previously stated it is extremely difficult to prove that a correct (BM) appears at the LTS logic, however, it is each to prove that a correct (BM) signal itself is functional, that other gates using the (BM) signal function, and that the (BM) signal is not shorted, either to logical low or logical high. The technique used to circumvent the apparent difficulty in testing multilevel logic is as follows:

a) Attempt to set all inputs to a group of logic to a state which will cause a true output at some software observable point.

b) Attempt to disqualify the output by causing one input at a time to change to a state which will cause the output to become flase.

c) In many cases a gate will be qualified or disqualified, as the case may be for a specific period of time regardless of what the diagnostic program does. An example of this is any gate whose inputs are a function of tape delays.

The following four (4) error messages are associated with tests of the: TAPE DONE FLOP

LIP TAPE DONE FAILED TO SET

The LIP TAPE DONE M216 C31 flip-flop failed to set. The tape done flop is set by toggling the progress flop from a 1 to a Ø. This test is accomplished by setting progress via MTP Setup, clearing progress via MTB, BM, ACIP-NOT and TP2, and testing the TAPE DONE flop via the TAPE SKIP Maintenance Instruction.

LIP MTP SETUP FAILED TO CLEAR TAPE DONE

The signal, MTP SETUP, failed to clear the Tape done flop. The tape done flip-flop was set as discussed above, and cleared via direct clear input, by MTP SETUP. The results are checked via the TAPE SKIP Maintenance Instruction.

LIP TAPE PRESET FAILED TO CLEAR TAPE DONE

The signal,TAPE PRESET, failed to clear the tape done flop. The tape done flip-flop was set as discussed above, and cleared via direct clear input, by TAPE PRESET. The results are checked via the TAPE SKIP Maintenance Instruction.

LIP CLEAR TAPE DONE FAILED

The signal, CLEAR TAPE DONE, failed to clear the tape done flop. The tape done flip-flop was set as discussed above, and cleared via direct clear input, by CLEAR TAPE DONE. The results are check via the TAPE SKIP Maintenance Instruction.

The following three (3) messages are associated with the Linc mode command STD, STD i and Tape interrupt.

LIP STD FAILED TAPE DONE = 1

The Linc mode command STD (Ø416) failed to SKIP or STD i (Ø436) skipped in error when the TAPE DONE flop was on a 1.

LIP STD FAILED TAPE DONE = Ø

The Linc mode command STD (Ø436) failed to skip when the TAPE DONE flop was on a Ø.

LIP TAPE INTERRUPT FAILED INT ENB = 1

The tape processor failed to cause a tape interrupt. The TAPE DONE flop and the INTERRUPT ENABLE flop in the extended operations register were both set to a 1.

The following eight (8) messages are associated with tests of the PROGRESS and IN-PROGRESS flops. Specifically whether MTP SETUP sets the flops and that the clock input gating will zero the flops.

LIP MTP SETUP FAILED TO SET IN-PROGRESS

A non-paused tape instruction was executed to set the IN-PROGRESS M216, D19 flop. The resulting state of the flop is checked by reading it back into the AC, bit Ø1 via a Misc status 1 to AC Maintenance Instruction.

LIP TAPE PRESET FAILED TO Ø IN-PROGRESS

The IN-PROGRESS flop was set via a non-paused tape instruction then cleared via a TPAE PRESET. The resulting state of the flop is check by reading it back into the AC, bit Ø1 via a Misc status 1 to AC Maintenance Instruction.

LIP LCS (MTB * BM * SEARCH) FAILED TO Ø IN-PROGRESS

The IN-PROGRESS flop was set via a non-paused MTB tape instruction. The Mark window was loaded to BM (16) and a simulated TP1 pulse was generated to set search mode. The transition from IDLE mode to SEARCH mode.

LIP M115 C25 PIN S2 FAILED TO Ø IN-PROGRESS

The IN-PROGRESS flop was set by a MTP SETUP and an attempt was made to clear it via END INST signal which is generated by gate M115, C25, PINS N2, P2, R2 and S2.

LIP END INST FAILED TO Ø PROGRESS

The progress flop was set by a MTP SETUP and an attempt was made to clear it via END inst signal generated as discussed in the previous type out.

LIP CHK OK FAILED TO Ø PROGRESS

The progress flop was set by a MTP SETUP and an attempt was made to clear it via CHK OK generated by M119 C22 PIN P2. The resulting state of the progress flop is detected by examining the TAPE DONE flop to see if the transition of progress to a zero did in fact set TAPE DONE.

LIP M113, C16, H1 WRITE CYCLE (Ø) FAILED TO Ø IN PROGRESS

This test as in the previous test ascertains if the signal LIP CHK OK can in fact Ø the in progress flip-flop. In this case the input to gate M113 C16 PIN J1 is disabled i.e. LIN TINR 9 (1) and LCS write cycle (Ø) PIN H1 is true.

LIP STW FAILED TAPE WORD = 1

The tape word flip-flop is tested by the Linc command STW (457) and STW I (477). The tape done flop is kept in the one state during this test.

LIP STW FAILED TAPE WORD = Ø

The tape word flip-flop is tested by the LINC command STW (457) and STW I (477). The tape done flop is kept in the zero state during this test.

LIP TAPE WORD TOGGLES FAILED

The Tape Word flop failed to toggle as the result of the action of line counters LCØ1, LCØØ on the clock and data inputs.

LIP DATA BREAK FAILED

Ø176 ØØØØ ØØØØ

The DATA BREAK facility has failed. The first number typed is the address in memory which was referenced by the tape control this is always address Ø176. It was necessary to use a fixed address rather than all addresses because almost any error in data break will wipe out the controlling program. The second number typed is the data which was transferred from the tape control to the computer. The last number is the actual number received.

LCX MARK FLOP

ØØØØ ØØØØ

An attempt was made to set the mark flip-flop. The first number typed indicates the data sent to the extended operations register this number is either ØØØØ or Ø2ØØ. The second number typed indicates the status of the mark flop as read back from the extended operations register this number also is either ØØØØ or Ø2ØØ. This error may also indicate that the operator failed to set the mark key.

LCX MARK FLOP TAPE PRESET FAILED

ØØØØ

The mark flip-flop was set. An attempt was made to clear it via a tape preset pulse.

LIN TAC=7777, DIR = REV FAILED

The program attempted to set the tape control major state generator to the Blcok state. In order to go from Idle to search to block, it is necessary for the TAC register to equal 7777 and the direction to be forward. In this case we have purposely set the direction flop to a reverse condition so that the major state generator should be inhibited from going from search to block.

LIN TAC = ØØØØ DIR = FWD FAILED

Same as the previous test except that we are testing to see if TAC not equal to 7777 will inhibit going to the Block state.

LIT MARK CLOCK FAILED TO GENERATE TP3

An attempt was made to see if the mark clock can generate computer timing. The LCØ1 Line counter is on a zero, the mark window is set ot a Block mark, and sufficient time is allowed for the mark clock to generate TP3, TP4 to set LCØ1. This test will fail if the mark key is not set.

LCS IDLE SEARCH FAILED

An attempt was made to change the major state generator transfer from idle to search.

LCS SEARCH BLOCK FAILED

The major state generator is initially set to Idle. A routine is executed to set the generator first to search then to block. The primary test is from search to block, because the Idle to search has already been tested.

LCS SEARCH TURN AROUND FAILED

An attempt was made to go from the Idle to the search, to the turn around major state.

LCS TURN AROUND IDLE FAILED

The major state generator was set to the turn around state as in the previous test. An attempt to go from turn around to IDLE was made. The gate M115 A32 PIN H2 was used to generate the timing to cause the transition to the IDLE state.

LCS BLOCK CHK WRD FAILED

The major state generator was set to block mode in a manner similar to the search Block Test previously discussed and attempt was made to go from Block to CHK WRD Mode.

LCS CHK WRD IDLE FAILED

The major state generator was set to CHK WRD mode and attempt was made to Idle mode via gate M16Ø, B29, PIN V2.

LCS SEARCH IDLE (MTB+I) FAILED

The major state generator was set to search mode with the (I) bit set. This test tries to set idle mode using LIN I (1) and LCS MTP END at gate M16Ø, B29 PINS V1, U2 and V2.

LRL; LRE; EN TAC, EN TB, OR LOAD TAC

This type out indicates an error in the function TB+TAC to TAC. The adders and this function have previously been tested using the maintenance logic in tape control test PART 1. We can therefore presume that the trouble only occurs when the controller performs under its own control. The four (4) names typed out indicate the suspected logic. The three (3) numbers typed out indicate in order the contents of the TB, TAC and TAC after the addition has been performed.

LTS PHASE GATE FAILED

Each of the two gates which generate the PHASE signal are tested individually first with both inputs false then with each input set true in turn. The two inputs consist of CHK WRD and LCØ2.

LWN MARK WRITE GATE FAILED

The mark write test is similar in principle to the phase gate test above.

LTR DATA CHANNEL RWB Ø, 4, 8 FAILED

421Ø Ø16Ø

The Data channel output from the RWB was tested and failed. Bits Ø, 4, 8 of the RWB are alternately set to all ones then all zeros. The first number typed out shows bits Ø, 4, 8, set to ones. The second number shows them as they are read back via the data channel on bits 5, 6, 7.

LTT MARK CLOCK FAILED TO GENERATE TPØ

The timing logic is tested to ascertain if the mark clock can generate TPØ, TP1, TP2. The results are detected by determining if TP2 will set the GP=GPC flip-flop.

LTS LINE COUNTER FAILED TO COUNT

ØØØØ

The 3 Line counter flops were set to all ones an attempt was made to ripple a carry thru it i.e. set is to all zeros. The number printed in bits Ø2, Ø3 indicate the value of LCØØ, and LCØ1.

LMU TURN AROUND BM FAILED TO Ø MOTION

The motion flip-flop was set via a Linc tape instruction. The major state generator was set to turn around the window to block mark and time pulses Ø, 1, 2 were used to try to clear the motion flop.

LMU TAPE PRESET FAILED TO Ø MOTION

The motion flip-flop was set as discussed above. An attempt was made to clear it by generating a tape preset.

LMU CLR PROGRESS FAILED TO Ø MOTION

The tape flop was set an attempt was made to clear it using CLR progress. CLR is made up of MTB, I (Ø) and BM

LRR TP3 FAILED TO SHIFT RWB

ØØØØ ØØØØ

The RWB was set to the value of the first number typed. A TP3 pulse was used to shift RWB. The second number is the resulting value of the RWB. It should be noted that the shift logic i.e. the logic which handles the data which is being shifted has previously been tested. So a failure will be indicated by no shifting rather than bad data.

LRL EN WRITE LD RWB FAILED TO SHIFT RWB

ØØØØ ØØØØ

A test of the RWB shift logic has failed. The two numbers indicate the before and after contents of the RWB.

LRL TB+TAC=TAC FAILED

ØØØØ ØØØØ ØØØØ ØØØØ

The add function of the Tape processor is tested. The numbers typed are in order TAC, TB RESULTANT and the resultant as computed by the central processor.

LRL LOAD TAC FAILED TP3, SEARCH

ØØØØ

The TAC register was set to 7777. The major state generator was set to search. TP3 was used to try to clear TAC ie. generate. LOAD TAC with no data on the BUSS. The number typed out indicates taht data which was left in the TAC after the transfer.

LCS WRITE CYCLE FLOP TEST FAILED

The write cycle flop was both set and cleared with the result read back and tested after each change.

LTS TIMING OK GATE FAILED

The timing OK gate failed to indicate that all machine timing was OK after the program had set all inputs to the timing OK gate to true.

TMA failed to increment during tape break

was is

A tape break was executed; at the completion of the break cycle, the TMA was not equal to the previous address plus one.

TC12-Part 2 Pass--(PASS)

The octal number indicates the number of completed passes executed since the last "Start 2Ø".

```
                /PDP-12 TAPE CONTROL TEST PART II, MAINDEC 12-D3GA-L
                /COPYRIGHT 1970, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
                /
                /AUTHOR: JAMES KELLY
                /
                /THIS PROGRAM, OPERATING IN BOTH 8 AND LINC MODE,
                /IS DESIGNED TO COMPLETE CHECKOUT OF THE PDP-12
                /TAPE CONTROL LOGIC.  TAPE CONTROL TEST PART I
                /MUST RUN SUCCESSFULLY PRIOR TO EXECUTION OF PART II
                /THIS PORTION.
                /
                /SPECIAL INSTRUCTIONS:
                / 1.  REMOVE LINCTAPES FROM ALL DRIVES
                / 2.  SET TRANSPORT THUMBWHEELS TO "OFF LINE"
                / 3.  SET TRANSPORT SELECT SWITCHES TO "OFF"
                / 4.  DEPRESS AND HOLD THE MARK KEY
                / 5.  I/O PRESET TO 8 MODE
                / 6.  DEPRESS START 20.
                /
                /THE TEST IS CONTROLLED BY A MONITOR RESIDENT
                /IN PAGE 24.  OPTIONAL SETTINGS ARE AVAILABLE
                /FOR MODIFICATION OF ERROR CONTROL.
                /
                /SWITCH SETTINGS:  (NORMALLY 0000)
                /
                /RSW00=1, INHIBIT ERROR HALT.
                /RSW01=1, INHIBIT ERROR TYPEOUT.
                /RSW02=1, SCOPE LOOP ON ERROR.
                /RSW03=1, SCOPE LOOP ON NONERROR.
                /RSW05=1, INHIBIT BELL.
                /RSW06=1, INHIBIT PASS COUNTER TYPEOUT.
                /
                /AT THE COMPLETION OF A PASS, THE CONTENTS
                /OF THE PASS COUNTER WILL BE TYPED OUT.
                /
                /
```

```
                0001    *1
0001    5402            JMP I   RETURN
0002    0000    RETURN, 0000
0003    4000    K4000,  4000
0004    3400    K3400,  3400
0005    0250    K0250,  0250
0006    7400    K7400,  7400
0007    0017    K0017,  0017

                /COMMAND IDENTIFICATION
                /
                6141    LINC=6141
                0000    EXIT=0000
                7777    EXITA=7777
                0002    PDP=0002
                6151    LMR=6151
                6152    TRC=6152
                6154    XFR=6154
                0416    STD=0416
                0017    COM=0017
                0001    AXO=0001
                0457    STW=0457
                0003    TAC=0003

                0011    CLR=0011
                0021    XOA=0021
                0004    ESF=0004
```

```
                        *10
0010  0000  PINT,   0000
                        *20
0020  7300            CLA CLL           /START 20
0021  3065            DCA     PASS
0022  5423            JMP I   .+1
0023  0177            0177                      /THIS LOCATION MAY POINT TO ANY TEST
0024  0000  LSTERR,  0000                      /THE OPERATOR DESIRES
0025  0000  TPEPRE,  0000
0026  7330            CLA CLL CML RAR
0027  6152            TRC                TAPE PRESET
0030  7200            CLA
0031  5425            JMP I   TPEPRE
0032  3134  MAINT1,  MAINTS
0033  0016  K0016,   0016
0034  3144  LOADR,   LOADS
0035  0040  K0040,   0040
0036  5000  NERROR,  NERROS
0037  5021  ERROR,   ERRORS
0040  0002  K0002,   0002
0041  0160  K0160,   0160
0042  4210  K4210,   4210
0043  5000  K5000,   5000
0044  3040  K3040,   3040
0045  5216  RAN,     RANDOM
0046  0000  REGE,    0000
0047  7000  K7000,   7000
0050  7030  K7030,   7030
0051  7777  K7777,   7777
0052  3334  M4444,   -4444
0053  4140  K4140,   4140
0054  7770  K7770,   7770
0055  0100  K0100,   0100
0056  0200  K0200,   0200
0057  0150  K0150,   0150
0060  0450  PNTA,    LOCA
0061  3027  PNTB,    WRCFLB
0062  1302  PNTC,    LOCC
0063  3133  PNTJ,    LOCJ
0064  5054  OUTPAS,  ASCII
0065  0000  PASS,    0000
0066  2000  K2000,   2000
0067  6040  K6040,   6040
0070  6000  K6000,   6000
0071  1000  K1000,   1000
0072  0400  K0400,   0400
0073  0077  K0077,   0077
0074  7740  M40,     -40
```

```
                                
0075  0240    K240,   240
0076  7774    K7774,  7774
0077  1026    K1026,  1026
0100  0215    K0215,  0215
0101  0212    K0212,  0212
0102  0177    K0177,  0177
0103  5200    BELLA,  BELL
0104  0207    K0207,  0207
0105  5210    TYPE,   TYPOUT
0106  0000    SPACE,  0000
0107  0050    K0050,  0050
0110  0020    K0020,  0020
0111  7773    K7773,  7773
0112  0010    K0010,  0010
0113  0000    TEMPB,  0000
0114  0000    REGD,   0000
0115  0000    REGA,   0000
0116  0000    REGB,   0000
0117  0000    REGC,   0000
0120  0000    REGF,   0000
0121  0376    LIA004, LIB004
0122  4440    K4440,  4440
0123  3700    K3700,  3700
0124  7400    M0400,  -0400
0125  7000    M1000,  -1000
                
0126  0000    DELAY,  0000
0127  1162            TAD     K7737           /GET TALLY
0130  3025            DCA     TPEPRE          /SET TALLY
0131  3024            DCA     LSTERR          /0 LAST ERROR
0132  2024            ISZ     LSTERR          /WAIT
0133  5132            JMP     .-1
0134  2025            ISZ     TPEPRE          /WAIT
0135  5133            JMP     .-2
0136  5526            JMP I   DELAY           /WAIT FOR ACIP TO TIME OUT
0137  0177    K177,   177
```

```
                    0140    *140
0140    7777                7777
0141    0002                PDP                     /P MODE
0142    5543                JMP I   .+1             /EXIT
0143    3105                LOCTRP
0144    0050    C0050,      0050
0145    1400    K1400,      1400
0146    0013    K0013,      0013
0147    3000    K3000,      3000
0150    7700    M0100,      -0100
0151    6000    M2000,      -2000
0152    7600    M0200,      -0200
0153    0011    K0011,      0011
0154    3440    K3440,      3440
0155    6020    K6020,      6020
0156    0007    K0007,      0007
0157    7040    K7040,      7040
0160    0012    K0012,      0012
0161    3020    K3020,      3020
0162    7737    K7737,      7737
0163    0003    K0003,      0003
0164    3420    K3420,      3420
0165    3427    K3427,      3427
0166    0001    RNA,        0001
0167    0000    RNB,        0000
0170    0176    C0176,      0176
0171    7356    K7356,      7356
0172    2224    LWA104,     LWB104
```

```
           0176     *176

     0176  7777     LOC176, 7777                        /TEST ADDRESS FOR DATA BREAKS
     0177  4434             JMS I   LOADR               /SET REVERSE
     0200  4503             JMS I   BELLA               /RING BELL
     0201  4126             JMS     DELAY               /WAIT FOR ACIP
                    /
                    /TC12-0-LIP INTERPROCESSOR SIGNALS
                    /SKIP ON TAPE DONE TEST M115 C29 PIN U1 PULSES TO LOW
                    /THE NEXT 17 TESTS DIAGNOSE THE TAPE DONE LOGIC
                    /

     0202  4025     LIP000, JMS     TPEPRE              /0>PROGRESS, 0>TAPE DONE
     0203  1071             TAD     K1000               /GET AC > TAC
     0204  6151             LMR                         /LOAD MAINT REG
     0205  7330             CLA CLL CML RAR             /SET AC00
     0206  6154             XFR                         /SET TAC00
     0207  4432             JMS I   MAINT1              /SET MAINT MODE
     0210  6141             LINC                        /L MODE
     0211  0713             0713                        /MTB
     0212  7000             7000                        /NO PAUSE FAILED TO SET.
     0213  0002             PDP                         /P MODE SET PROGRESS
     0214  1033             TAD     K0016               /GET BM
     0215  4434             JMS I   LOADR               /SET MARK WINDOW TO BLOCK MARK
     0216  1035             TAD     K0040               /GENERATE TP2
     0217  6151             LMR                         /TP2
     0220  7104             RAL CLL                     /SET AC BIT 05
     0221  6151             LMR                         /TRY TO SKIP
     0222  7610             SKP CLA                     /INVERT SENSE OF SKIP
     0223  4436             JMS I   NERROR              /IT SKIPPED GOOD
     0224  4437             JMS I   ERROR               /NO GOOD
     0225  6006             LIM000                      /MESSAGE TAG
     0226  7402             HLT                         /ERROR HALT
     0227  7610             SKP CLA                     /EXIT
     0230  0202             LIP000                      /SCOPE LOOP
```

```
                        /
                        /DOES MTP SETUP CLEAR TAPE DONE M113,B16,L1,M1,N1
                        /
0231  4025    LIP001, JMS     TPEPRE          /0>PROGRESS, 0>TAPE DONE
0232  1071            TAD     K1000           /GET AC > TAC
0233  6151            LMR                     /LOAD MAINT REG
0234  7330            CLA CML CLL RAR         /SET AC00 (1)
0235  6154            XFR                     /SET TAC00
0236  4432            JMS I   MAINT1          /SET MAINT MODE
0237  6141            LINC                    /L MODE
0240  0713            0713                    /MTB
0241  7000            7000                    /WASTED MEMORY
0242  0002            PDP                     /P MODE
0243  1033            TAD     K0016           /GET BM
0244  4434            JMS I   LOADR           /SET MARK WINDOW TO BLOCK
0245  1035            TAD     K0040           /GENERATE TP2
0246  6151            LMR                     /LOAD MAINTENANCE REGISTER
0247  7300            CLA CLL                 /CLEAR AC,L
0250  6141            LINC                    /L MODE
0251  0703            0703                    /DOES MTP SETUP 0 TAPE DONE
0252  7000            7000                    /TAPE AREA
0253  0002            PDP                     /P MODE
0254  1035            TAD     K0100           /SET AC05
0255  6151            LMR                     /SKIP ON ERROR
0256  4436            JMS I   NERROR          /TEST OKAY
0257  4437            JMS I   ERROR           /TEST FAILED
0260  5233            LIM001                  /MESSAGE TAG
0261  7402            HLT                     /ERROR HALT
0262  7610            SKP CLA                 /EXIT
0263  0231            LIP001                  /SCOPE LOOP
```

```
                        /
                        /DOES TAPE PRESET CLEAR TAPE DONE M113,B16,M1,N1
                        /
0264  4025  LIP002, JMS     TPEPRE          /0>PROGRESS, 0>TAPE DONE
0265  1071        TAD     K1000           /GET AC > TAC
0266  6151        LMR                     /LOAD MAINT REG
0267  7330        CLA CML CLL RAR         /SET AC00 (1)
0270  6154        XFR                     /SET TAC00
0271  4432        JMS I   MAINT1          /SET MAINT MODE
0272  6141        LINC                    /L MODE
0273  0713        0713                    /MTB
0274  7000        7000                    /WASTED MEMORY
0275  0002        PDP                     /P MODE
0276  1033        TAD     K0016           /GET BM
0277  4434        JMS I   LOADR           /SET MARK WINDOW TO BLOCK
0300  1035        TAD     K0040           /GENERATE TP2
0301  6151        LMR                     /LOAD MAINTENANCE REGISTER
0302  4025        JMS     TPEPRE          /DOES TAPE PRESET 0 TAPE DONE
0303  1055        TAD     K0100           /SET AC05
0304  6151        LMR                     /SKIP ON TAPE DONE
0305  4436        JMS I   NERROR          /TEST OKAY
0306  4437        JMS I   ERROR           /TEST FAILED
0307  5261        LIM002                  /MESSAGE TAG
0310  7402        HLT                     /ERROR HALT
0311  7610        SKP CLA                 /EXIT
0312  0264        LIP002                  /SCOPE LOOP
```

```
                        /
                        /DOES LMR=AC05 CLEAR TAPE DONE
                        /
0313  4025   LIP003, JMS      TPEPRE          /0>PROGRESS, 0>TAPE DONE
0314  1071           TAD      K1000           /GET AC > TAC
0315  6151           LMR                      /LOAD MAINT REG
0316  7330           CLA CML CLL RAR          /SET AC00 (1)
0317  6154           XFR                      /SET TAC00
0320  4432           JMS I    MAINT1          /SET MAINT MODE
0321  6141           LINC                     /L MODE
0322  0713           0713                     /MTB
0323  7000           7000                     /WASTED MEMORY
0324  0002           PDP                      /P MODE
0325  1033           TAD      K0016           /SET BM
0326  4434           JMS I    LOADR           /SET MARK WINDOW TO BLOCK MARK
0327  1035           TAD      K0040           /SET TP2
0330  6151           LMR                      /GENERATE TP2
0331  7300           CLA CLL                  /CLEAR AC,L
0332  1056           TAD      K0200           /0>TAPE DONE
0333  6151           LMR                      /ZERO TAPE DONE
0334  7110           RAR CLL                  /SET AC05
0335  6151           LMR                      /SKID ON TAPE DONE
0336  4436           JMS I    NERROR          /TEST OKAY
0337  4437           JMS I    ERROR           /TEST FAILED
0340  5307           LIM003                   /MESSAGE TAG
0341  7402           HLT                      /ERROR HALT
0342  7510           SKP CLA                  /EXIT
0343  0313           LIP003                   /SCOPE LOOP
```

```
                        /DOES STD AND STD+20 WORK TAPE DONE = 1 PROGRESS = 1
                        /
0344  4025    LIP004,   JMS      TPEPRE          /GENERATE TAPE PRESET
0345  1071              TAD      K1000           /GET AC > TAC
0346  6151              LMR                      /LOAD MAINT REG
0347  7330              CLA CLL CML RAR          /SET AC00
0350  6154              XFR                      /SET TAC00(0)
0351  4432              JMS I    MAINT1          /SET NO PAUSE
0352  6141              LINC                     /L MODE
0353  0713              0713                     /MTB
0354  7000              7000                     /WASTED MEMORY
0355  0002              PDP                      /P MODE
0356  6151              LMR                      /GENERATE TP2
0357  7300              CLA CLL                  /CLEAR AC,L
0360  6141              LINC                     /GO TO LINC MODE
0361  0416              STD                      /SKIP ON TAPE MODE
0362  0017              COM                      /SET AC TO CLEAR LATER
0363  0017              COM                      /SET OR CLEAR
0364  0002              PDP                      /GO TO 8 MODE
0365  7640              SZA CLA                  /TEST IF=7777 IT SKIPPED
0366  5521              JMP I    LIA004          /STD FAILED
0367  6141              LINC                     /GO TO LINC MODE
0370  0436              STD 20                   /STD+20
0371  0017              COM                      /SET AC TO CLEAR LATER
0372  0017              COM                      /SET OR CLEAR
0373  0002              PDP                      /GO TO 8 MODE
0374  7640              SZA CLA                  /TEST FOR ALL 0000
0375  4436              JMS I    NERROR          /ALL 0000 NO ERROR
0376  4437    LIB004,   JMS I    ERROR           /TROUBLE
0377  5326              LIM004                   /MESSAGE ID
0400  7402              HLT                      /ERROR HALT
0401  7610              SKP CLA                  /EXIT
0402  0344              LIP004                   /SCOPE MODE
```

```
                        /
                        /DOES STD AND STD*20 FUNCTION TAPE DONE = 0 PROGRESS = 0
                        /
0403  4025    LIP005, JMS     TPEPRE          /0>TAPE DONE
0404  6141            LINC                    /GO TO LINC MODE
0405  0416            STD                     /STD SHOULD NOT SKIP
0406  0017            COM                     /IT DIDN'T SO SET THE AC
0407  0017            COM                     /CLEAR AC IF IT DIDN'T SKIP
0410  0002            PDP                     /GO TO 8 MODE
0411  7650            SNA CLA                 /TEST FOR ALL ZEROS
0412  5222            JMP     LIB005          /STD FAILED
0413  6141            LINC                    /GO TO LINC MODE
0414  0436            STD 2                   /STD SHOULD SKIP
0415  0017            COM                     /SET AC TO 7777
0416  0017            COM                     /CLEAR IF NO SKIP
0417  0002            PDP                     /GO TO 8 MODE
0420  7650            SNA CLA                 /TEST FOR ALL ZEROS
0421  4436            JMS I   NERROR          /NO ERROR
0422  4437    LIB005, JMS I   ERROR           /ERROR
0423  5345            LIM005                  /MESSAGE ID
0424  7402            HLT                     /ERROR HALT
0425  7610            SKP CLA                 /SCOPE LOOP
0426  0403            LIP005                  /ERROR HALT

                        /
                        /DOES LIP TAPE INTERRUPT FUNCTION M113,C16,L2,M2,N2
                        /
0427  1060    LIP006, TAD     PNTA            /GET INTERRUPT RETURN
0430  3002            DCA     RETURN          /SET UP INTERRUPT RETURN
0431  1057            TAD     K0150           /SET MAINT, TAPE INT, NO PAUSE
0432  3107            DCA     K0050           /RESET MAINT
0433  4432            JMS I   MAINT1          /SET MAINT
0434  6141            LINC                    /L MODE
0435  0713            0713                    /MTB
0436  7000            7000                    /WASTE SPACE
0437  0002            PDP                     /P MODE
0440  1033            TAD     K0016           /GET BM
0441  4434            JMS I   LOADR           /SET MARK WINDOW TO BLOCK MARK
0442  1035            TAD     K0040           /GET TP2
0443  6151            LMR                     /GENERATE TP2
0444  6001            ION                     /TURN ON INTERRUPT
0445  7000            NOP                     /WASTE TIME
0446  6002            IOF                     /TURN OFF INTERRUPT
0447  7610            SKP CLA                 /SKIP TO ERROR IF NO INT
0450  4436    LOCA,   JMS I   NERROR          /TEST OKAY
0451  4437            JMS I   ERROR           /TEST FAILED
0452  5364            LIM006                  /MESSAGE TAG
0453  7402            HLT                     /ERROR HALT
0454  7610            SKP CLA                 /EXIT
0455  0427            LIP006                  /SCOPE LOOP
0456  1144            TAD     C0050           /GET 0050
0457  3107            DCA     K0050           /RESET
```

```
                                /
                                /DOES MTP SETUP SET THE IN PROGRESS FLOP M216,D19
                                /
0460  4025   LIP007, JMS      TPEPRE          /0 PROGRESS
0461  4432           JMS I    MAINT1          /SET NO PAUSE
0462  6141           LINC                     /L MODE
0463  0710           0710                     /TAPE COMMAND
0464  7000           7000                     /WASTE
0465  0002           PDP                      /P MODE
0466  1070           TAD      K6000           /GET MISC STATUS 1 TO AC
0467  6151           LMR                      /LOAD MAINTENANCE REGISTER
0470  7300           CLA CLL                  /CLEAR AC,L
0471  6154           XFR                      /READ STATUS
0472  0066           AND      K2000           /SAVE IN PROGRESS BIT
0473  7640           SZA CLA                  /WAS IT SET
0474  4436           JMS I    NERROR          /TEST OKAY
0475  4437           JMS I    ERROR           /TEST FAILED
0476  5410           LIM007                   /ERROR MESSAGE
0477  7402           HLT                      /ERROR HALT
0500  7610           SKP CLA                  /EXIT
0501  0460           LIP007                   /SCOPE LOOP
                                /
                                /DOES TAPE PRESET ZERO IN PROGRESS FLOP M216,C19
                                /
0502  4432   LIP008, JMS I    MAINT1          /SET NO PAUSE
0503  6141           LINC                     /L MODE
0504  0710           0710                     /TAPE COMMAND
0505  7000           7000                     /WASTE
0506  0002           PDP                      /P MODE
0507  4025           JMS      TPEPRE          /TRY TO CLEAR IN PROGRESS
0510  1070           TAD      K6000           /GET MISC STATUS 1 TO AC
0511  6151           LMR                      /LOAD MAINT REGISTER
0512  7300           CLA CLL                  /CLEAR AC,L
0513  6154           XFR                      /READ STATUS
0514  0066           AND      K2000           /SAVE IN PROGRESS BIT
0515  7650           SNA CLA                  /DID IT CLEAR
0516  4436           JMS I    NERROR          /TEST OKAY
0517  4437           JMS I    ERROR           /TEST FAILED
0520  5435           LIM008                   /MESSAGE TAG
0521  7402           HLT                      /ERROR HALT
0522  7610           SKP CLA                  /EXIT
0523  0502           LIP008                   /SCOPE LOOP
```

```
                                /
                                /DOES LCS(MTB*BM*SEARCH) ZERO IN PROGRESS M115 C25 PIN L2,M2
                                /
0524  4025    LIP009, JMS     TPEPRE          /ZERO EVERY THING
0525  4432            JMS I   MAINT1          /SET NO PAUSE
0526  6141            LINC                    /L MODE
0527  0713            0713                    /TAPE COMMAND (MTB)
0530  7000            7000                    /WASTE
0531  0002            PDP                     /P MODE
0532  1033            TAD     K0016           /SET AC TO BLOCK MARK
0533  4434            JMS I   LOADR           /SET MARK WINDOW TO BM
0534  1067            TAD     K6040           /SET MISC STATUS 1 TO AC AND TP1
0535  6151            LMR                     /1>SEARCH, 0> IN PROGRESS
0536  7300            CLA CLL                 /CLEAR AC,L
0537  6154            XFR                     /READ STATUS
0540  0066            AND     K2000           /SAVE IN PROGRESS BIT
0541  7650            SNA CLA                 /TEST
0542  4436            JMS I   NERROR          /TEST OKAY
0543  4437            JMS I   ERROR           /TEST FAILED
0544  5464            LIM009                  /MESSAGE TAG
0545  7402            HLT                     /ERROR HALT
0546  7610            SKP CLA                 /EXIT
0547  0524            LIP009                  /SCOPE LOOP
                                /
                                /DOES M115 C25 PINS N2,P2,R2,S2 CLEAR IN PROGRESS
                                /
0550  4025    LIP010, JMS     TPEPRE          /ZERO EVERYTHING
0551  4432            JMS I   MAINT1          /SET NO PAUSE
0552  6141            LINC                    /L MODE
0553  0712            0712                    /SET TINR 10 (1)
0554  7000            7000                    /WASTE
0555  0002            PDP                     /P MODE
0556  1033            TAD     K0016           /GET BLOCK MARK
0557  4434            JMS I   LOADR           /SET MARK WINDOW TO BM
0560  1055            TAD     K0100           /GET SET FWD BIT
0561  6152            TRC                     /SET DIRT TO FORWARD
0562  7300            CLA CLL                 /CLEAR AC,L
0563  1071            TAD     K1000           /GET AC>TAC
0564  6151            LMR                     /LOAD MAINT REG
0565  7240            CLA CMA                 /SET AC=7777
0566  6154            XFR                     /SET TAC
0567  7300            CLA CLL                 /CLEAR AC,L
0570  1035            TAD     K0040           /GET TP0,1,2
0571  6151            LMR                     /1>BLOCK
0572  7110            RAR CLL                 /SET AC = 0020
0573  6151            LMR                     /SET LC01 SO WE CAN DECODE CM
0574  7300            CLA CLL                 /CLEAR AC,L
0575  4434            JMS I   LOADR           /CLOSE WINDOW
0576  1035            TAD     K0040           /SET TP0,1,2
0577  6151            LMR                     /GEN TP0,1,2
```

```
0600  7201          CLA IAC              /SET CM
0601  4434          JMS I   LOADR        /SET MARK WINDOW TO CM
0602  1035          TAD     K0040        /GET TP0,1,2
0603  6151          LMR                  /1>CHKWRD
0604  1070          TAD     K6000        /ADD MISC STATUS 1 TO AC
0605  6151          LMR                  /GENERATE TP0,1,2 0>IN PROGRESS
0606  7300          CLA CLL              /CLEAR AC,L
0607  6154          XFR                  /READ DATA
0610  0066          AND     K2000        /SAVE IN PROGRESS BIT
0611  7650          SNA CLA              /TEST
0612  4436          JMS I   NERROR       /TEST OKAY
0613  4437          JMS I   ERROR        /TEST FAILED
0614  5516          LIM010               /MESSAGE TAG
0615  7402          HLT                  /ERROR HALT
0616  7610          SKP CLA              /EXIT
0617  0550          LIP010               /SCOPE LOOP
```

```
                        /
                        /DOES LIP PROGRESS FLOP GET ZEROED BY TAPE PRESET
                        /IF THIS TEST FAILS THE COMPUTER WILL HANG UP WITH
                        /NO TYPE OUT DUE TO TAPE PAUSE
                        /
0620  4432    LIP011, JMS I   MAINT1          /SET NO PAUSE
0621  6141            LINC                    /L MODE
0622  0700            0700                    /TAPE INSTRUCTION 1 SET PROGRESS
0623  7000            7000                    /WASTE
0624  0002            PDP                     /P MODE
0625  4025            JMS     TPEPRE          /0>PAUSE, 0>PROGRESS
0626  2115            ISZ     REGA            /DONE YET
0627  5220            JMP     LIP011          /REDO
```

```
                        /
                        /DOES M115 C25 PINS N2,P2,R2,S2 ZERO PROGRESS FLOP
                        /
0630  4025    LIP012, JMS      TPEPRE          /0>TAPE DONE
0631  4432            JMS I    MAINT1          /SET NO PAUSE
0632  6141            LINC                     /L MODE
0633  0712            0712                     /SET TINR 10(1)
0634  7000            7000                     /WASTE
0635  0002            PDP                      /P MODE
0636  1033            TAD      K0016           /GET BLOCK MARK
0637  4434            JMS I    LOADR           /SET MARK WINDOW TO BM
0640  1055            TAD      K0100           /GET SET FWD BIT
0641  6152            TRC                      /SET DIR FWD
0642  7300            CLA CLL                  /CLEAR AC,L
0643  1071            TAD      K1000           /GET AC>TAC
0644  6151            LMR                      /LOAD MAINT REQ
0645  7240            CLA CMA                  /SET AC=7777
0646  6154            XFR                      /SET TAC
0647  7300            CLA CLL                  /CLEAR AC,L
0650  1035            TAD      K0040           /GET TP0,1,2
0651  6151            LMR                      /1>BLOCK
0652  7110            RAR CLL                  /SET AC = 0020
0653  6151            LMR                      /SET LC01
0654  7300            CLA CLL                  /CLEAR AC,L
0655  4434            JMS I    LOADR           /CLOSE WINDOW
0656  1035            TAD      K0040           /SET TP0,1,2
0657  6151            LMR                      /GEN TP0,1,2
0660  7201            CLA IAC                  /SET CM
0661  4434            JMS I    LOADR           /SET MARK WINDOW TO BM
0662  1035            TAD      K0040           /GET TP0,1,2
0663  6151            LMR                      /1>CHDWRK
0664  6151            LMR                      /0>PROGRESS
0665  7300            CLA CLL                  /CLEAR AC,L
0666  1055            TAD      K0100           /SET AC05
0667  6151            LMR                      /SKIP ON TAPE DONE (1)
0670  7610            SKP CLA                  /REVERSE
0671  4436            JMS I    NERROR          /TEST OKAY
0672  4437            JMS I    ERROR           /TEST FAILED
0673  6025            LIM012                   /MESSAGE TAG
0674  7402            HLT                      /ERROR HALT
0675  7610            SKP CLA                  /EXIT
0676  0630            LIP012                   /SCOPE LOOP
```

```
                        /TAPE 2
                        /
                        /DOES M119,C22,F1,H1,J1,K1,K2,L2,M2,N2,P2, CLEAR THE IN PROGRESS FLOP
                        /
0677  4025    LIP013, JMS      TPEPRE          /0 EVERYTHING
0700  4432            JMS I    MAINT1          /SET NO PAUSE
0701  6141            LINC                     /L MODE
0702  0712            0712                     /TAPE SET WRITE CYCLE
0703  7000            7000                     /WASTE
0704  0002            PDP                      /P MODE LIN TINR 09 (0)
0705  1035            TAD      K0040           /SET FOR TP2
0706  6151            LMR                      /GP EQ GPC (1)
0707  7300            CLA CLL                  /CLEAR AC,L
0710  1071            TAD      K1000           /GET AC>TAC
0711  6151            LMR                      /LOAD MAINT REGISTER
0712  7240            CLA CMA                  /SET AC
0713  6154            XFR                      /SET TAC
0714  7300            CLA CLL                  /CLEAR AC, L
0715  1033            TAD      K0016           /GET BM
0716  4434            JMS I    LOADR           /LOAD WINDOW
0717  1055            TAD      K0100           /SET FWD
0720  6152            TRC                      /SET FORWARD
0721  7300            CLA CLL                  /CLEAR AC,L
0722  1035            TAD      K0040           /SET TP0,1,2
0723  6151            LMR                      /SET BLOCK STATE
0724  7110            RAR CLL                  /SET AC = 0020
0725  6151            LMR                      /SET LC01
0726  7300            CLA CLL                  /CLEAR AC,2
0727  4434            JMS I    LOADR           /SET WINDOW SHUT
0730  1035            TAD      K0040           /SET TP0,1,2
0731  6151            LMR                      /GEN TP0,1,2
0732  7301            CLL CLA IAC              /SET AC
0733  4434            JMS I    LOADR           /SET CM
0734  1035            TAD      K0040           /SET TP0,1,2
0735  6151            LMR                      /1> CHK WRD
0736  7300            CLA CLL                  /CLEAR AC,L
0737  1071            TAD      K1000           /GET AC>TAC
0740  6151            LMR                      /LOAD MAINT REG
0741  7240            CLA CMA                  /SET AC
0742  6154            XFR                      /SET TAC
0743  7300            CLA CLL                  /CLEAR AC,L
0744  1110            TAD      K0020           /GET TP3
0745  6151            LMR                      /0 IN PROGRESS
0746  7300            CLA CLL                  /CLEAR AC,L
0747  1070            TAD      K6000           /GET MISC STATUS 1 TO AC
0750  6151            LMR                      /LOAD MAINT REG
0751  7300            CLA CLL                  /CLEAR AC,L
0752  6154            XFR                      /READ DATA
0753  0066            AND      K2000           /SAVE IN PROGRESS
0754  7650            SNA CLA                  /TEST
0755  4436            JMS I    NERROR          /TEST OKAY
0756  4437            JMS I    ERROR           /TEST FAILED
0757  5544            LIM013                   /MESSAGE TAG
0760  7402            HLT                      /ERROR HALT
```

```
613     0761  7610          SKP CLA                 /EXIT
614     0762  0677          LIP013                  /SCOPE LOOP
```

```
                        /
                        /DOES M119,C22 PIN P2 CLEAR PROGRESS FLOP
                        /
0763  4025    LIP015, JMS      TPEPRE          /0>EVERYTHING
0764  4432            JMS I    MAINT1          /SET NO PAUSE
0765  6141            LINC                     /L MODE
0766  0712            0712                     /TAPE
0767  7000            7000                     /WASTED MEMORY SPACE
0770  0002            PDP                      /P MODE LIN TINR 09 (0)
0771  1071            TAD      K0000           /GET AC>TAC
0772  6151            LMR                      /LOAD MAINT REG
0773  7240            CLA CMA                  /SET AC=7777
0774  6154            XFR                      /SET TAC=7777
0775  7300            CLA CLL                  /CLEAR AC,L
0776  1033            TAD      K0016           /GET SM
0777  4434            JMS I    LOADR           /LOAD WINDOW
1000  1055            TAD      K0100           /SET FWD
1001  6152            TRC                      /SET FORWARD
1002  7300            CLA CLL                  /CLEAR AC,L
1003  1035            TAD      K0040           /SET TP0,T,2
1004  6151            LMR                      /SET BLOCK STATE
1005  7104            CLL RAL                  /SET TP3
1006  6151            LMR                      /GENERATE TP3
1007  7300            CLA CLL                  /CLEAR AC,L
1010  4434            JMS I    LOADR           /CLEAR MARK WINDOW
1011  1035            TAD      K0040           /SET FOR TP0, 1, 2
1012  6151            LMR                      /GENERATE TP0, 1, 2
1013  7301            CLL CLA IAC              /SET AC=1
1014  4434            JMS I    LOADR           /SET CM
1015  1035            TAD      K0040           /SET TP0,1,2
1016  6151            LMR                      /1>CHR WRD
1017  7300            CLA CLL                  /CLEAR AC,2
1020  1071            TAD      K1000           /GET TAC>AC
1021  6151            LMR                      /LOAD MAINT REG
1022  7240            CLA CMA                  /SET AC=7777
1023  6154            XFR                      /SET TAC
1024  7300            CLA CLL                  /CLEAR AC,L
1025  1110            TAD      K0020           /GET TP0
1026  6151            LMR                      /0>PROGRESS
1027  7300            CLA CLL                  /CLEAR AC,L
1030  1055            TAD      K0100           /SET AC05
1031  6151            LMR                      /SKIP ON TAPE DONE
1032  7610            SKP CLA
1033  4436            JMS I    NERROR          /TEST OKAY
1034  4437            JMS I    ERROR           /TEST FAILED
1035  5567            LIM015                   /MESSAGE TAG
1036  7402            HLT                      /ERROR HALT
1037  7610            SKP CLA                  /EXIT
1040  0763            LIP015                   /SCOPE LOOP
```

```
                        /
                        /DOES M113 C16,PINS H1,J1,K1 WRITE CYCLE (0) CLEAR IN PROGRESS
                        /
1041  4025    LIP017, JMS     TPEPRE          /0>EVERYTHING
1042  4432            JMS I   MAINT1          /SET NO PAUSE
1043  6141            LINC                    /L MODE
1044  0716            0716                    /SET TINR 09 (1)
1045  7000            7000                    /WASTED MEMORY
1046  0002            PDP                     /SET WRITE CYCLE
1047  1033            TAD     K0016           /GET BM
1050  4434            JMS I   LOADR           /SET WINDOW TO BM
1051  1071            TAD     K1000           /GET AC>TAC
1052  6151            LMR                     /LOAD MAINT REG
1053  7240            CLA CMA                 /SET AC=7777
1054  6154            XFR                     /SET TAC=7777
1055  7300            CLA CLL                 /CLEAR AC,L
1056  1056            TAD     K0200           /GET DIRECTION BIT
1057  6152            TRC                     /SET DIRECTION FORWARD
1060  7300            CLA CLL                 /CLEAR AC,L
1061  1035            TAD     K0040           /SET UP FOR TP0,TP1,TP2
1062  6151            LMR                     /1>SEARCH, 1>BLOCK
1063  7344            CLA CMA CLL RAL         /SET AC=7776=CM
1064  4434            JMS I   LOADR           /SET MARK WINDOW TO BLOCK MARK
1065  1035            TAD     K0040           /SET UP FOR TP2
1066  6151            LMR                     /1>CHK WRD
1067  6151            LMR                     /0>WRITE CYCLE
1070  7201            CLA IAC                 /SET RWD BM
1071  4434            JMS I   LOADR           /SET MARK WINDOW
1072  1035            TAD     K0040           /SET UP FOR TP0,1,2
1073  7344            CLA CLL CMA RAL         /SET AC=7776=CM
1074  4434            JMS I   LOADR           /SET MARK WINDOW TO CM
1075  1035            TAD     K0040           /SET FOR TP0,TP1,TP2
1076  6151            LMR                     /SET 1>CHK-WRD
1077  7110            CLL RAR                 /SET AC=0020
1100  6151            LMR                     /GEN TP3,TP4
1101  7300            CLA CLL                 /CLEAR AC,L
1102  1070            TAD     K6000           /GET MISC STATUS I TO AC
1103  6151            LMR                     /LOAD MAINT REG
1104  7300            CLA CLL                 /CLEAR AC,L
1105  6154            XFR                     /READ DATA
1106  0066            AND K2000               /SAVE IN PROGRESS FLOP
1107  7640            SZA CLA                 /TEST
1110  4436            JMS I   NERROR          /TEST OKAY
1111  4437            JMS I   ERROR           /TEST FAILED
1112  5611            LIM017                  /MESSAGE TAG
1113  7402            HLT                     /ERROR HALT
1114  7610            SKP CLA                 /EXIT
1115  1041            LIP017                  /SCOPE LOOP
```

```
                        /
                        /DOES CLEAR TAPE WORD AND STW WORK
                        /
1116  4025    LIP018, JMS     TPEPRE          /GENERATE TAPE PRESET
1117  6141            LINC                    /GO TO LINC MODE
1120  0457            STW                     /SKIP ON TAPE WORD
1121  0017            COM                     /SET AC TO CLEAR LATER
1122  0017            COM                     /SET OR CLEAR
1123  0002            PDP                     /GO TO 8 MODE
1124  7650            SNA CLA                 /TEST IF=7777 IT SKIPPED
1125  7040            CMA                     /ERROR AC=0000
1126  6141            LINC                    /GO TO LINC MODE
1127  0477            STW 20                  /STW *20
1130  0017            COM                     /SET AC TO CLEAR LATER
1131  0017            COM                     /SET OR CLEAR
1132  0002            PDP                     /GO TO 8 MODE
1133  7650            SNA CLA                 /TEST FOR ALL 0000
1134  4436            JMS I   NERROR          /ALL 0000 NO ERROR
1135  4437            JMS I   ERROR           /TROUBLE
1136  5647            LIM018                  /MESSAGE ID
1137  7402            HLT                     /ERROR HALT
1140  7610            SKP CLA                 /EXIT
1141  1116            LIP018                  /SCOPE MODE
```

```
                                /
                                /DOES TAPE WORD FUNCTION
                                /
1142  1056  LIP019, TAD     K0200           /SET AC04(1)
1143  6152           TRC                    /GENERATE CLEAR TAPE WORD
1144  4432           JMS I   MAINT1         /SET NO PAUSE
1145  6141           LINC                   /TO LMODE
1146  0710           0710
1147  7000           7000                   /RDC U
1150  0457           STW                    /STW SHOULD NOT SKIP
1151  0017           COM                    /IT DIDN'T SO SET THE AC
1152  0017           COM                    /CLEAR AC IF IT DIDN'T SKIP
1153  0002           PDP                    /GO TO 8 MODE
1154  7640           SZA CLA                /TEST FOR ALL ZEROS
1155  7040           CMA                    /ERROR AC=7777
1156  6141           LINC                   /GO TO LINC MODE
1157  0477           STW 20                 /STW SHOULD SKIP
1160  0017           COM                    /SET AC TO 7777
1161  0017           COM                    /CLEAR IF NO SKIP
1162  0002           PDP                    /GO TO 8 MODE
1163  7640           SZA CLA                /TEST FOR ALL ZEROS
1164  4436           JMS I   NERROR         /NO ERROR
1165  4437           JMS I   ERROR          /ERROR
1166  5666           LIM019                 /MESSAGE TAG
1167  7402           HLT                    /ERROR HALT
1170  7610           SKP CLA                /SCOPE LOOP
1171  1142           LIP019                 /ERROR HALT
```

```
                        /
                        /DOES LC00 AND LC01 CONTROL TAPE WORD
                        /
1172  4025  LIP022, JMS     TPEPRE          /SET TAPE WORD
1173  1033        TAD     K0016           /GET BLOCK MARK
1174  4434        JMS I   LOADR           /SET MARK WINDOW TO BM
1175  1110        TAD     K0020           /GET TP3,TP4 TO SET LINE COUNTERS
1176  6151        LMR                     /SET BOTH LINE COUNTERS
1177  7104        CLL RAL                 /SET UP FOR TP0
1200  6151        LMR                     /GENERATE TP0,TP1,TP2
1201  7110        CLL RAR                 /SET UP FOR TP3
1202  6151        LMR                     /THIS CLEARS TAPE WORD
1203  7300        CLA CLL                 /CLEAR AC,L
1204  6141        LINC                    /L MODE
1205  0457        STW                     /SKIP ON TAPE WORD
1206  0017        COM                     /SET IT
1207  0017        COM                     /CLEAR IT
1210  0002        PDP                     /P MODE
1211  7650        SNA CLA                 /TEST RESULTS
1212  4436        JMS I   NERROR          /TEST OKAY
1213  4437        JMS I   ERROR           /TEST FAILED
1214  5705        LIM022                  /MESSAGE TAG
1215  7402        HLT                     /ERROR HALT
1216  7610        SKP CLA                 /EXIT
1217  1172        LIP022                  /SCOPE LOOP
```

```
                        /
                        /DOES TAPE BREAK FUNCTION WITH (DM)
                        /
1220  4025    LIP024, JMS     TPEPRE          /0 EVERYTHING
1221  4432            JMS I   MAINT1          /SET NO PAUSE
1222  1145            TAD     K1400           /GET AC TO TMA
1223  6151            LMR                     /LOAD MAINT REG
1224  7300            CLA CLL                 /CLEAR AC,L
1225  1170            TAD     C0176           /FETCH THE TEST ADDRESS
1226  3116            DCA     REGB            /STORE FOR TYPING
1227  1116            TAD     REGB            /FETCH IT
1230  6154            XFR                     /SET TEST ADDRESS IN TMA
1231  6141            LINC                    /L MODE
1232  0710            0710                    /SET TINR 09 (0)
1233  7000            7000                    /WASTE MEMORY
1234  0002            PDP                     /P MODE
1235  7300            CLA CLL                 /CLEAR AC,L
1236  1115            TAD     REGA            /FETCH DATA TO BE XFERED
1237  3117            DCA     REGC            /STORE IT
1240  1071            TAD     K1000           /GET AC TO TAC
1241  6151            LMR                     /LOAD MAINT REG
1242  7240            CLA CMA                 /SET AC=7777
1243  6154            XFR                     /SET TAC
1244  7300            CLA CLL                 /CLEAR AC,L
1245  1033            TAD     K0016           /GET BM
1246  4434            JMS I   LOADR           /SET BLOCK MARK
1247  1055            TAD     K0100           /GET FWD
1250  6152            TRC                     /SET FWD
1251  7300            CLA CLL                 /CLEAR AC,L
1252  1035            TAD     K0040           /GET TP0,1,2
1253  6151            LMR                     /GEN TP0,1,2 SET BLOCK MODE
1254  7300            CLA CLL                 /CLEAR
1255  1117            TAD     REGC            /GET DATA
1256  1040            TAD     K0002           /ADD TWO FOR CORRECTION
1257  6154            XFR                     /AC>TB
1260  7300            CLA CLL                 /CLEAR
```

```
1261  1153            TAD     K0011       /GET DM
1262  4434            JMS I   LOADR       /LOAD WINDOW
1263  1035            TAD     K0040       /GET TP0,1,2
1264  6151            LMR                 /GO TO TAPE BREAK
1265  7300            CLA CLL             /CLEAR AC,L
1266  1176            TAD     LOC176      /GET CELL 0176
1267  3114            DCA     REGD        /STORE FOR TYPING
1270  1114            TAD     REGD        /FETCH IT
1271  7041            CIA                 /NEGATE
1272  1117            TAD     REGC        /SUBTRACT DATA SOURCE
1273  7650            SNA CLA             /TEST
1274  5462            JMP I   PNTC        /TEST OKAY, NOW CHECK THAT TMA INCREMENTED (.+6)
1275  4437            JMS I   ERROR       /TEST FAILED
1276  5725            LIM023              /MESSAGE TAG
1277  7402            HLT                 /ERROR HALT
1300  7610            SKP CLA             /EXIT
1301  1220            LIP024              /SCOPE LOOP
1302  1047    LOCC,   TAD     K7000       /GET COMMAND "TMA TO AC"
1303  6151            LMR                 /LOAD IT
1304  7300            CLA CLL
1305  6154            XFR                 /GET TMA
1306  3117            DCA     REGC        /SAVE FOR TYPING
1307  1137            TAD     K177        /GET WHAT IT SHOULD BE
1310  7041            CIA                 /NEGATE
1311  1117            TAD     REGC        /SUBTRACT WHAT IT IS
1312  7650            SNA CLA             /EQUAL?
1313  4436            JMS I   NERROR      /YES
1314  4437            JMS I   ERROR       /NO
1315  6752            TMATB               /MESSAGE TAG
1316  7402            HLT                 /ERROR HALT
1317  7610            SKP CLA             /EXIT
1320  1220            LIP024              /SCOPE LOOP; ISZ LOOP
```

```
                                /
                                /TC12-0-LCX TAPE EXTENDED OPERATIONS (MARK FLOP)
                                /
1321  4025  LCX000, JMS     TPEPRE          /0 EVERYTHING
1322  1115          TAD     REGA            /GET A TEST NUMBER
1323  0056          AND     K0200           /SAVE MARK BIT
1324  3116          DCA     REGB            /STORE TEST BIT
1325  1116          TAD     REGB            /FETCH BIT
1326  6141          LINC                    /L MODE
1327  0001          AXO                     /LOAD MARK BIT
1330  0011          CLR                     /CLEAR AC,L
1331  0021          XOA                     /READ EXTENDED OPS REGISTER
1332  0002          PDP                     /P MODE
1333  0056          AND     K0200
1334  3117          DCA     REGC            /STORE FOR TESTING
1335  1117          TAD     REGC            /FETCH RETURNED DATA
1336  7041          CIA                     /NEGATE
1337  1116          TAD     REGB            /SUBTRACT DATA SOURCE
1340  7650          SNA CLA                 /TEST RESULTS
1341  4436          JMS I   NERROR          /TEST OKAY
1342  4437          JMS I   ERROR           /TEST FAILED
1343  5746          LCM000                  /MESSAGE TAG
1344  7402          HLT                     /ERROR HALT
1345  7610          SKP     CLA             /EXIT
1346  1321          LCX000                  /SCOPE LOOP
                                /
                                /DOES TAPE PRESET ZERO THE MARK FLOP
                                /
1347  1056  LCX001, TAD     K0200           /GET AC05
1350  6141          LINC                    /L MODE
1351  0001          AXO                     /SET MARK FLOP
1352  0002          PDP                     /P MODE
1353  4025          JMS     TPEPRE          /GENERATE TAPE PRESET
1354  6141          LINC                    /L MODE
1355  0021          XOA                     /READ EXTENDED OPS REGISTER
1356  0002          PDP                     /P MODE
1357  0056          AND     K0200           /SAVE MARK BIT
1360  7650          SNA CLA                 /TEST
1361  4436          JMS I   NERROR          /TEST OKAY
1362  4437          JMS I   ERROR           /TEST FAILED
1363  5762          LCM001                  /MESSAGE TAG
1364  7402          HLT                     /ERROR HALT
1365  7610          SKP CLA                 /EXIT
1366  1347          LCX001                  /SCOPE LOOP
```

```
                        /
                        /TC12-0-LIN M113,B26, PINS P1,R1,S1(TAC=7777+FWD)
                        /
                        /
                        /DOES THE GATE RESPOND TO FALSE INPUTS (TAC=7777 AND DIRECTION=REVERSE
                        /
1367  4025      LIN001, JMS      TPEPRE          /CLEAR THE WORLD
1370  4432              JMS I    MAINT1          /SET NO PAUSE
1371  6141              LINC                     /L MODE
1372  0700              0700                     /SET MTB, NOT
1373  7000              7000                     /WASTE
1374  0002              PDP                      /P MODE
1375  1033              TAD      K0016           /GET BLOCK MARK
1376  4434              JMS I    LOADR           /SET WINDOW TO BLOCK MARK
1377  1071              TAD      K1000           /GET AC TO TAC
1400  6151              LMR                      /LOAD MAINT REG
1401  7240              CLA CMA                  /SET AC=7777
1402  6154              XFR                      /SET TAC=0000 7777,NOT
1403  0122              AND      K4440           /STATES TO AC AND GENERATE TP0,T 1,TP2
1404  6151              LMR                      /LOAD MAINT REG TRY TO SET BLOCK
1405  7300              CLA CLL                  /CLEAR AC,L
1406  6154              XFR                      /READ MAJOR STATES
1407  0123              AND      K3700           /SAVE MAJOR STATES
1410  3116              DCA      REGB            /STORE DATA
1411  1116              TAD      REGB            /FETCH DATA
1412  1125              TAD      M1000           /SUBTRACT SEARCH MODE
1413  7650              SNA CLA                  /TEST
1414  4436              JMS I    NERROR          /TEST OKAY
1415  4437              JMS I    ERROR           /TEST FAILED
1416  6047              LINMX1                   /MESSAGE TAG
1417  7402              HLT                      /ERROR HALT
1420  7610              SKP CLA                  /EXIT
1421  1367              LIN001                   /SCOPE LOOP
                        /
                        /DOES THE GATE RESPOND TO (TAC=0000 AND DIRECTION=FORWARD)
                        /
1422  4025      LIN002, JMS      TPEPRE          /CLEAR THE WORLD
1423  4432              JMS I    MAINT1          /SET NO PAUSE
1424  6141              LINC                     /L MODE
1425  0700              0700                     /SET MTB-NOT
1426  7000              7000                     /WASTE
1427  0002              PDP                      /P MODE
1430  1033              TAD      K0016           /GET BM
1431  4434              JMS I    LOADR           /SET MARK WINDOW TO BM
1432  1071              TAD      K1000           /GET AC>TAC
1433  6151              LMR                      /LOAD MAINT REGISTER
1434  7300              CLA CLL                  /CLEAR AC,L
```

```
952
953  1435  6154          XFR                     /SET TAC = 7777
954  1436  1055          TAD     K0100           /GET FWD BIT
955  1437  6152          TRC                     /SET FORWARD
956  1440  7300          CLA CLL                 /CLEAR AC,L
957  1441  1122          TAD     K4440           /TRY TO SET BLOCK MODE
958  1442  6151          LMR                     /GENERATE TIMING
959  1443  7300          CLA CLL                 /CLEAR AC,L
960  1444  6154          XFR                     /READ DATA
961  1445  0123          AND     K3700           /SAVE SIGNIFICANT DATA
962  1446  3116          DCA     REGB            /STORE DATA
963  1447  1116          TAD     REGB            /FETCH DATA
964  1450  1125          TAD     M1000           /SUBTRACT SEARCH MODE
965  1451  7650          SNA CLA                 /TEST
966  1452  4436          JMS I   NERROR          /TEST OKAY
967  1453  4437          JMS I   ERROR           /TEST BAD
968  1454  6066          LINMX2                  /MESSAGE TAG
969  1455  7402          HLT                     /ERROR HALT
970  1456  7610          SKP CLA                 /EXIT
971  1457  1422          LIN002                  /SCOPE LOOP
```

```
                                /
                                /DOES M121 B25 V2,R2,S2 GENERATE TP3,TP4,
                                /
1460  4025    LTT004, JMS     TPEPRE          /0>EVERYTHING
1461  1033            TAD     K0016           /SET BM
1462  4434            JMS I   LOADR           /SET MARK WINDOW TO BLOCK MARK
1463  1005            TAD     K0250           /SET MARK, NO PAUSE, MAINT
1464  6141            LINC                    /L MODE
1465  0001            AXO                     /SET AOX
1466  0002            PDP                     /P MODE
1467  1110            TAD     K0020           /SET TP3,TP4
1470  6151            LMR                     /LOAD MAINT REG 1SET LC01,LC00
1471  7104            RAL CLL                 /SET TP0,TP1,TP2
1472  7300            CLA CLL                 /CLEAR AC,L
1473  1070            TAD     K6000           /GET MISC 1 TO AC
1474  6151            LMR                     /LOAD MAINT MODE
1475  7300            CLA CLL                 /CLEAR AC,L
1476  6154            XFR                     /READ STATUS
1477  0072            AND     K0400           /SAVE LC01
1500  7650            SNA CLA
1501  5305            JMP     .+4
1502  2120            ISZ     REGF            /WAIT
1503  5275            JMP     .-6
1504  7610            SKP CLA
1505  4436            JMS I   NERROR          /TEST OKAY
1506  4437            JMS I   ERROR           /TEST FAILED
1507  6105            LTM004                  /MESSAGE TAG
1510  7402            HLT                     /ERROR HALT
1511  7610            SKP CLA                 /EXIT
1512  1460            LTT004                  /SCOPE LOOP
```

```
1003
1004                    /TAPE 3
1005                    /TC12-0-LCS TAPE CONT STATES + INST
1006                    /
1007                    /CAN WE GO IDLE TO SEARCH
1008                    /
1009    1513  4025    LCS000, JMS     TPEPRE          /0 MAJOR STATE GENERATOR
1010    1514  4432            JMS I   MAINT1          /SET NO PAUSE
1011    1515  6141            LINC                    /L MODE
1012    1516  0700            0700                    /TAPE COMMAND USED TO SET -
1013    1517  7000            7000                    /IN PROGRESS
1014    1520  0002            PDP                     /P MODE
1015    1521  1122            TAD     K4440           /GENERATE TP1 AND SET STATES TO AC
1016    1522  6151            LMR                     /THIS SHOULD SET SEARCH
1017    1523  7300            CLA CLL                 /CLEAR AC,L
1018    1524  6154            XFR                     /TRANSFER STATES TO AC
1019    1525  0123            AND     K3700           /SAVE STATES
1020    1526  3116            DCA     REGB            /STORE FOR TYPING
1021    1527  1116            TAD     REGB            /FETCH IT
1022    1530  1125            TAD     M1000           /SUBTRACT SEARCH MODE
1023    1531  7650            SNA CLA                 /WERE WE IN IDLE MODE
1024    1532  4436            JMS I   NERROR         /TEST OKAY
1025    1533  4437            JMS I   ERROR          /TEST FAILED
1026    1534  6131            LCMX00                  /MESSAGE TAG
1027    1535  7402            HLT                     /ERROR HALT
1028    1536  7610            SKP CLA                 /EXIT
1029    1537  1513            LCS000                  /SCOPE LOOP
```

```
1030
1031                    /
1032                    /DOES SEARCH TO BLOCK WORK
1033                    /
1034    1540  4025      LCS001, JMS     TPEPRE          /Ø MAJOR STATE GENERATOR
1035    1541  4432              JMS I   MAINT1          /SET NO PAUSE
1036    1542  6141              LINC                    /L MODE
1037    1543  0700              0700                    /MTB.NOT
1038    1544  7000              7000
1039    1545  0002              PDP                     /P MODE
1040    1546  1033              TAD     K0016
1041    1547  4434              JMS I   LOADR
1042    1550  1055              TAD     K0100           /GET FORWARD BIT
1043    1551  6152              TRC                     /SET FWD
1044    1552  7300              CLA CLL                 /CLEAR AC,L
1045    1553  1071              TAD     K1000           /GET AC TO TAC
1046    1554  6151              LMR                     /SET MAINT IR TO AC TO TAC
1047    1555  7240              CLA CMA                 /SET AC=7777
1048    1556  6154              XFR                     /SET TAC=7777
1049    1557  7300              CLA CLL                 /CLEAR AC,L
1050    1560  1122              TAD     K4440           /SET STATES TO AC GENERATE TP1,TP2
1051    1561  6151              LMR                     /LOAD MAINT AND GENERATE TP1,TP2
1052    1562  7300              CLA CLL                 /CLEAR AC,L
1053    1563  6154              XFR                     /READ STATUS
1054    1564  3116              DCA     REGB            /STORE FOR TYPING
1055    1565  1116              TAD     REGB            /FETCH IT
1056    1566  0123              AND     K3700           /SAVE MAJOR STATES
1057    1567  1124              TAD     M0400           /SUBTRACT BLOCK MODE
1058    1570  7650              SNA CLA                 /TEST
1059    1571  4436              JMS I   NERROR          /TEST OKAY
1060    1572  4437              JMS I   ERROR           /TEST FAILED
1061    1573  6147              LCMX01                  /MESSAGE TAG
1062    1574  7402              HLT                     /ERROR HALT
1063    1575  7610              SKP CLA                 /EXIT
1064    1576  1540              LCS001                  /SCOPE LOOP
```

```
1065
1066                    /
1067                    /DOES SEARCH TO TURN AROUND FUNCTION
1068                    /
1069    1577  4025      LCS002, JMS     TPEPRE          /Ø MAJOR STATE GENERATOR
1070    1600  4432              JMS I   MAINT1          /SET NO PAUSE
1071    1601  6141              LINC                    /L MODE
1072    1602  0703              0703                    /MTB
1073    1603  7000              7000
1074    1604  0002              PDP                     /P MODE
1075    1605  1033              TAD     K0016           /GET BM
1076    1606  4434              JMS I   LOADR           /LOAD WINDOW
1077    1607  1071              TAD     K1000           /GET AC TO TAC
1078    1610  6155              LMR XFR                 /SET TAC=7777,NOT
1079    1611  7300              CLA CLL                 /CLEAR AC,L
1080    1612  1122              TAD     K4440           /SET STATES TO AC GENERATE TP1,TP2
1081    1613  6151              LMR                     /SET COMMAND AND GENERATE TIMING
1082    1614  7300              CLA CLL                 /CLEAR AC,L
1083    1615  6154              XFR                     /TRANSFER
1084    1616  0123              AND     K3700           /SAVE MAJOR STATES
1085    1617  3116              DCA     REGB            /STORE FOR TYPING
1086    1620  1116              TAD     REGB            /FETCH FOR TYPING
1087    1621  1150              TAD     M0100           /SUBTRACT TURN AROUND
1088    1622  7650              SNA CLA                 /TEST
1089    1623  4436              JMS I   NERROR          /TEST OKAY
1090    1624  4437              JMS I   ERROR           /TEST
1091    1625  6165              LCM002                  /MESSAGE TAG
1092    1626  7402              HLT                     /ERROR HALT
1093    1627  7610              SKP CLA                 /EXIT
1094    1630  1577              LCS002                  /SCOPE LOOP
```

```
1095
1096                    /
1097                    /DOES TURN AROUND TO IDLE WORK
1098                    /
1099    1631  4025    LCS003, JMS     TPEPRE          /0 MAJOR STATE GENERATOR
1100    1632  4432            JMS I   MAINT1          /SET NO PAUSE
1101    1633  6141            LINC                    /L MODE
1102    1634  0703            0703                    /SET MTB
1103    1635  7000            7000                    /SETS IN PROGRESS
1104    1636  0002            PDP                     /P MODE
1105    1637  1033            TAD     K0016           /GET BM
1106    1640  4434            JMS I   LOADR           /SET WINDOW TO BLOCK MARK
1107    1641  1122            TAD     K4440           /IDLE TO SEARCH TO TURN AROUND
1108    1642  6151            LMR                     /GENERATE TP1,TP2 TO SET TURN AROUND
1109    1643  6151            LMR                     /TRY TO GO TO IDLE
1110    1644  7300            CLA CLL                 /CLEAR AC, LINK
1111    1645  6154            XFR                     /READ STATUS
1112    1646  0123            AND     K3700           /SAVE MAJOR STATES
1113    1647  3116            DCA     REGB            /STORE FOR TYPING
1114    1650  1116            TAD     REGB            /FETCH
1115    1651  1151            TAD     M2000           /SUBTRACT IDLE MODE
1116    1652  7650            SNA CLA                 /TEST
1117    1653  4436            JMS I   NERROR          /TEST OKAY
1118    1654  4437            JMS I   ERROR           /TEST FAILED
1119    1655  6206            LCM003                  /MESSAGE TAG
1120    1656  7402            HLT                     /ERROR HALT
1121    1657  7613            SKP CLA                 /EXIT
1122    1660  1631            LCS003                  /SCOPE LOOP
```

```
1123
1124                    /
1125                    /DOES BLOCK TO CHK WRD WORK
1126                    /
1127    1661  4025      LCS004, JMS     TPEPRE          /0 MAJOR STATE GENERATOR
1128    1662  4432              JMS I   MAINT1          /SET NO PAUSE
1129    1663  6141              LINC                    /L MODE
1130    1664  0700              0700                    /MTB,NOT
1131    1665  7000              7000                    /SET IN PROGRESS
1132    1666  0002              PDP                     /P MODE
1133    1667  1033              TAD     K0016           /GET BM
1134    1670  4434              JMS I   LOADR           /SET BLOCK MARK
1135    1671  1055              TAD     K0100           /SET FWD BIT
1136    1672  6152              TRC                     /SET FORWARD
1137    1673  7300              CLA CLL                 /CLEAR AC,L
1138    1674  1071              TAD     K1000           /GET AC TO TAC COMMAND
1139    1675  6151              LMR                     /LOAD MAINT REG
1140    1676  7240              CLA CMA                 /SET AC=7777
1141    1677  6154              XFR                     /SET TAC=7777
1142    1700  7300              CLA CLL                 /CLEAR AC,L
1143    1701  1122              TAD     K4440           /GENERATE TP2,TP1,TP0
1144    1702  6151              LMR                     /AND SET STATES TO AC SETS BLOCK WORD
1145    1703  7300              CLA CLL                 /CLEAR AC,L
1146    1704  4434              JMS I   LOADR           /SET WIND,
1147    1705  1035              TAD     K0040           /GET TP0
1148    1706  6151              LMR
1149    1707  7201              CLA IAC                 /SET CM
1150    1710  4434              JMS I   LOADR           /SET WINDOW TO CHECK MARK
1151    1711  1122              TAD     K4440           /SET UP FOR TP2
1152    1712  6151              LMR                     /LOAD MAINT REG
1153    1713  7300              CLA CLL                 /CLEAR AC,L
1154    1714  6154              XFR                     /READ STATUS
1155    1715  0123              AND     K3700           /SAVE MAJOR STATES
1156    1716  3116              DCA     REGB            /STORE FOR TYPING
1157    1717  1116              TAD     REGB            /FETCH IT
1158    1720  1152              TAD     M0200           /SUBTRACT CHECK WORD
1159    1721  7650              SNA CLA                 /TEST
1160    1722  4436              JMS I   NERROR          /TEST OKAY
1161    1723  4437              JMS I   ERROR           /TEST FAILED
1162    1724  6226              LCM004                  /MESSAGE TAG
1163    1725  7402              HLT                     /ERROR HALT
1164    1726  7610              SKP CLA                 /EXIT
1165    1727  1661              LCS004                  /SCOPE LOOP
```

```
1166
1167                    /
1168                    /DOES CHK WRD TO IDLE WORK
1169                    /
1170    1730  4025      LCS005, JMS     TPEPRE          /0 MAJOR STATE GENERATOR
1171    1731  4432              JMS I   MAINT1          /SET NO PAUSE
1172    1732  6141              LINC                    /L MODE
1173    1733  0700              0700                    /MTB,NOT
1174    1734  7000              7000                    /SET IN PROGRESS
1175    1735  0002              PDP                     /P MODE
1176    1736  1033              TAD     K0016           /SET BN
1177    1737  4434              JMS I   LOADR           /SET MARK WINDOW TO BLOCK MARK
1178    1740  1055              TAD     K0100           /SET FWD BIT
1179    1741  6152              TRC                     /SET FORWARD
1180    1742  7300              CLA CLL                 /CLEAR AC,L
1181    1743  1071              TAD     K1000           /GET AC TO TAC COMMAND
1182    1744  6151              LMR                     /LOAD MAINT REG
1183    1745  7240              CLA CMA                 /SET AC=7777
1184    1746  6154              XFR                     /SET TAC
1185    1747  7300              CLA CLL                 /CLEAR AC,L
1186    1750  1122              TAD     K4440           /GEN TP1,TP2
1187    1751  6151              LMR                     /SET BLOCK MODE
1188    1752  7300              CLA CLL                 /CLEAR AC,L
1189    1753  4434              JMS I   LOADR           /SET WIND,
1190    1754  1035              TAD     K0040           /GET TP0
1191    1755  6151              LMR
1192    1756  7301              CLA CLL IAC             /GET CM
1193    1757  4434              JMS I   LOADR           /SET CHECK WORD
1194    1760  1122              TAD     K4440           /GET TP2 TO SET CHK-WRD
1195    1761  6151              LMR                     /SET CHECK WORD
1196    1762  6151              LMR                     /DOES CM*CHK WRD AND PROGRESS (1) SET IDLE
1197    1763  7300              CLA CLL                 /CLEAR AC,L
1198    1764  6154              XFR                     /READ STATUS
1199    1765  0123              AND     K3700
1200    1766  3116              DCA     REGB            /STORE FOR TYPING
1201    1767  1116              TAD     REGB            /FETCH FOR TESTING
1202    1770  1151              TAD     M2000           /SUBTRACT IDLE MODE
1203    1771  7650              SNA CLA                 /TEST
1204    1772  4436              JMS I   NERROR          /TEST OKAY
1205    1773  4437              JMS I   ERROR           /TEST FAILED
1206    1774  6245              LCM005                  /MESSAGE TAG
1207    1775  7402              HLT                     /ERROR HALT
1208    1776  7610              SKP CLA                 /EXIT
1209    1777  1730              LCS005                  /SCOPE LOOP
```

```
1210
1211                    /
1212                    /DOES MTB*I SET IDLE FROM SEARCH
1213                    /
1214    2000  4025    LCS006, JMS     TPEPRE          /0 EVERYTHING
1215    2001  4432            JMS I   MAINT1          /SET NO PAUSE
1216    2002  6141            LINC                    /L MODE
1217    2003  0723            0723                    /MTB I
1218    2004  7000            7000                    /SET IN PROGRESS
1219    2005  0002            PDP                     /P MODE
1220    2006  1033            TAD     K0016           /GET BM
1221    2007  4434            JMS I   LOADR           /SET BLOCK MARK
1222    2010  1122            TAD     K4440           /GENERATE TP1, TP2
1223    2011  6151            LMR                     /GO TO SEARCH MODE THEN BACK TO IDLE
1224    2012  7300            CLA CLL                 /CLEAR AC, L
1225    2013  6154            XFR                     /READ STATUS
1226    2014  0123            AND     K3700           /SAVE STATES
1227    2015  3116            DCA     REGB            /STORE IT FOR TYPING
1228    2016  1116            TAD     REGB            /FETCH IT
1229    2017  1151            TAD     M2000           /SUBTRACT IDLE MODE
1230    2020  7650            SNA CLA                 /TEST
1231    2021  4436            JMS I   NERROR          /TEST OKAY
1232    2022  4437            JMS I   ERROR           /TEST FAILED
1233    2023  6261            LCM006                  /MESSAGE TAG
1234    2024  7402            HLT                     /ERROR HALT
1235    2025  7610            SKP CLA                 /EXIT
1236    2026  2000            LCS006                  /SCOPE LOOP
```

```
                        /
                        /DOES (DM) FUNCTION USE (TB + TAC TO  TAC)
                        /
2027  4025    LWNORM, JMS      TPEPRE          /0 > EVERYTHING
2030  4432            JMS I    MAINT1          /SET MAINT
2031  6141            LINC                     /L MODE
2032  0707            0707
2033  0000            0000
2034  0002            PDP                      /P MODE
2035  1115            TAD      REGA            /FETCH TEST NUMBER
2036  6154            XFR                      /SET TB TO TEST NUMBER
2037  7300            CLA CL                   /CLEAR AC,L
2040  1071            TAD      K1000           /GET AC TO TAC
2041  6151            LMR                      /LOAD MAINT REG
2042  7240            CLA CMA                  /SET AC=7777
2043  6154            XFR                      /SET TAC REGISTER
2044  0033            AND      K0016           /SET AC = TO BLOCK MARK
2045  4434            JMS I    LOADR           /SET REVERSE AND LOAD WINDOW
2046  1055            TAD      K0100           /GET FWD BIT
2047  6152            TRC                      /SET DIRECTION FORWARD
2050  7300            CLA CLL                  /CLEAR AC,L
2051  1035            TAD      K0040           /SET UP FOR TP0,1,2
2052  6151            LMR                      /GO TO BLOCK MODE
2053  7300            CLA CLL                  /CLEAR AC, L
2054  1153            TAD      K0011           /GET DM
2055  4434            JMS I    LOADR           /LOAD
2056  1035            TAD      K0040           /GET TP0
2057  6151            LMR
2060  4025            JMS      TPEPRE          /0 PROGRAMS
2061  6141            LINC                     /L MODE
2062  0003            TAC                      /READ TAC
2063  0002            PDP                      /P MODE
2064  1163            TAD      K0003           /ADD THREE (SEE WRITE UP)
2065  3116            DCA      REGB            /STORE FOR TYPING
2066  1116            TAD      REGB            /FETCH
2067  7041            CIA                      /NEGATE
2070  1115            TAD      REGA            /SUBTRACT DATA SOURCE
2071  7650            SNA CLA                  /TEST
2072  4436            JMS I    NERROR          /TEST OKAY
2073  4437            JMS I    ERROR           /TEST FAILED
2074  6303            LWM101                   /MESSAGE TAG
2075  7402            HLT                      /ERROR HALT
2076  7610            SKP CLA                  /EXIT
2077  2027            LWNORM                   /SCOPE LOOP
```

```
1282
1283                    /
1284                    /DOES MARK WRITE FUNCTION FIRST TEST IS FOR PHASE ON TC12-0-LTS
1285                    /
1286    2100  4025  LWN102, JMS      TPEPRE          /0 EVERYTHING 0 CHKWRD
1287    2101  4432         JMS I    MAINT1
1288    2102  1067         TAD      K6040           /SET UP FOR TP0
1289    2103  6151         LMR                      /SET LC02 (1)
1290    2104  7300         CLA CLL                  /CLEAR AC,L
1291    2105  6154         XFR                      /READ STATUS
1292    2106  7700         SMA CLA                  /IS IT SET
1293    2107  5357         JMP      LWB102          /NO ERROR
1294    2110  1155         TAD      K6020           /SET UP TP ZERO LC02
1295    2111  6151         LMR                      /0>LC02
1296    2112  7300         CLA CLL                  /CLEAR AC,L
1297    2113  6154         XFR                      /READ STATUS
1298    2114  7710         SPA CLA                  /IS PHASE NOT SET
1299    2115  5357         JMP      LWB102          /FAILED
1300    2116  6141         LINC
1301    2117  0700         0700
1302    2120  0000         0000
1303    2121  0002         PDP
1304    2122  1033         TAD      K0016           /GET BM
1305    2123  4434         JMS I    LOADR           /SET BLOCK MARK
1306    2124  1071         TAD      K1000           /GET AC>TAC
1307    2125  6151         LMR                      /LOAD MAINT REG
1308    2126  7240         CLA CMA                  /SET AC=7777
1309    2127  6154         XFR                      /SET TAC 7777
1310    2130  0055         AND      K0100           /SAVE FWD BIT
1311    2131  6152         TRC                      /SET FORWARD
1312    2132  7300         CLA CLL                  /CLEAR AC,L
1313    2133  1035         TAD      K0040           /SET UP FOR TP0
1314    2134  6151         LMR                      /1 BLOCK MODE
1315    2135  7300         CLA CLL                  /CLEAR AC, L
1316    2136  4434         JMS I    LOADR           /CLEAR WINDOW
1317    2137  1035         TAD      K0040           /GEN TP0, 1, 2
1318    2140  6151         LMR                      /SET LC01
1319    2141  7201         CLA IAC                  /SET CM
1320    2142  4434         JMS I    LOADR           /SET WINDOW TO CHECK MARK
1321    2143  1067         TAD      K6040           /SET TO GO TO CHKWRD
1322    2144  6151         LMR                      /GO TO CHKWRD 1 LC02
1323    2145  7300         CLA CLL                  /CLEAR AC,L
1324    2146  6154         XFR                      /READ STATUS
1325    2147  7710         SPA CLA                  /DID PHASE COME UP IN ERROR
1326    2150  5357         JMP      LWB102          /ERROR
1327    2151  1155         TAD      K6020           /SET FOR TP3
1328    2152  6151         LMR                      /0 LC02
1329    2153  7300         CLA CLL                  /CLEAR AC,L
1330    2154  6154         XFR                      /READ STATUS
1331    2155  7710         SPA CLA                  /IS IT SET
1332    2156  4436         JMS I    NERROR          /TEST OKAY
1333    2157  4437  LWB102, JMS I    ERROR           /TEST FAILED
1334    2160  6333         LWM102                   /MESSAGE TAG
1335    2161  7402         HLT                      /ERROR HALT
1336    2162  7610         SKP CLA                  /EXIT
```

```
1337    2163  2100            LWN102                  /SCOPE LOOP
```

```
1338
1339                    /
1340                    /TEST MARK WRITE
1341                    /
1342    2164  4025    LWN104, JMS      TPEPRE          /Ø > EVERYTHING Ø TO IDLE MODE
1343    2165  1033            TAD      KØØ16           /SET WIND ØØ (1)
1344    2166  4434            JMS I    LOADR           /SET WINDOW BIT ØØ
1345    2167  1067            TAD      K6040           /GET STATUS TO AC
1346    2170  6151            LMR                      /LOAD MAINT REG
1347    2171  7300            CLA CLL                  /CLEAR AC,L
1348    2172  6154            XFR                      /READ MARK WRITE
1349    2173  0056            AND      KØ200           /SAVE MARK WRITE
1350    2174  7640            SZA CLA                  /DID IT SET
1351    2175  5572            JMP I    LWA104          /NOPE ERROR
1352    2176  1155            TAD      K6020           /GEN TP3
1353    2177  6151            LMR                      /LOAD MAINT REG
1354    2200  7300            CLA CLL                  /CLEAR AC,L
1355    2201  6154            XFR                      /READ STATUS
1356    2202  0056            AND      KØ200           /SAVE MARK WRITE
1357    2203  7650            SNA CLA                  /DID IT STAY ZERO
1358    2204  5572            JMP I    LWA104          /NOPE ERROR
1359    2205  4434            JMS I    LOADR           /Ø WIND
1360    2206  1067            TAD      K6040           /TRY TO GET OUTPUT FROM WINDØØ-PHASE
1361    2207  6151            LMR                      /LOAD MAINT REG
1362    2210  7300            CLA CLL                  /CLEAR AC,L
1363    2211  6154            XFR                      /READ STATUS
1364    2212  0056            AND      KØ200           /SAVE MARK WRITE
1365    2213  7650            SNA CLA                  /TEST IT
1366    2214  5572            JMP I    LWA104          /ERROR
1367    2215  1155            TAD      K6020           /RESET LCØ2 (1)
1368    2216  6151            LMR                      /LOAD MAINT REG
1369    2217  7300            CLA CLL                  /CLEAR AC,L
1370    2220  6154            XFR                      /READ STATUS
1371    2221  0056            AND      KØ200           /SAVE MARK WRITE
1372    2222  7650            SNA CLA                  /TEST
1373    2223  4436            JMS I    NERROR          /TEST OKAY
1374    2224  4437    LWB104, JMS I    ERROR           /TEST BAD
1375    2225  6347            LWM104                   /MESSAGE TAG
1376    2226  7402            HLT                      /ERROR HALT
1377    2227  7610            SKP CLA                  /EXIT
1378    2230  2164            LWN104                   /SCOPE LOOP
```

```
1379                    /
1380                    /LTS TC12-0-LTS
1381                    /
1382                    /
1383                    /DOES DATA CHANNEL RWB 0,4,8 WORK
1384                    /
1385    2231  4025    LTR000, JMS     TPEPRE          /0 EVERYTHING
1386    2232  1042            TAD     K4210           /GET RWB 0,4,8
1387    2233  3116            DCA     REGB            /STORE FOR TYPING
1388    2234  6151            LMR                     /SET MAINT REG TO AC > TB
1389    2235  1116            TAD     REGB            /FETCH TEST DATA
1390    2236  6154            XFR                     /SET TB
1391    2237  7300            CLA CLL                 /CLEAR AC,L
1392    2240  1071            TAD     K1000           /GET TB > RWB
1393    2241  6152            TRC                     /SET RWB
1394    2242  7300            CLA CLL                 /CLEAR AC,L
1395    2243  1070            TAD     K6000           /GET MISC STATUS 1 TO AC
1396    2244  6151            LMR                     /SET DATA CHANNEL TO AC
1397    2245  7300            CLA CLL                 /CLEAR AC,L
1398    2246  6154            XFR                     /READ
1399    2247  0041            AND     K0160           /SAVE IT
1400    2250  3117            DCA     REGC            /STORE IT
1401    2251  1117            TAD     REGC            /FETCH IT
1402    2252  7640            SZA CLA                 /TEST
1403    2253  5274            JMP     LTB000          /BLUNDER
1404    2254  3116            DCA     REGB            /TRY TESTING WITH ZERO DATA
1405    2255  6155            LMR XFR                 /SET MAINT REG TO AC > TB
1406    2256  1071            TAD     K1000           /GET TB > RWB
1407    2257  6152            TRC                     /SET RWB
1408    2260  7300            CLA CLL                 /CLEAR AC,L
1409    2261  1070            TAD     K6000           /GET MISC STATUS 1 TO AC
1410    2262  6151            LMR                     /SET DATA CHANNEL TO AC
1411    2263  7300            CLA CLL                 /CLEAR AC,L
1412    2264  6154            XFR                     /READ DATA
1413    2265  0041            AND     K0160           /SAVE DATA CHANNEL BITS
1414    2266  3117            DCA     REGC            /STORE FOR TYPING
1415    2267  1117            TAD     REGC            /FETCH
1416    2270  7041            CIA                     /NEGATE
1417    2271  1041            TAD     K0160           /SUBTRACT DATA
1418    2272  7650            SNA CLA                 /TEST RESULTS
1419    2273  4436            JMS I   NERROR          /TEST OKAY
1420    2274  4437    LTB000, JMS I   ERROR           /TEST FAILED
1421    2275  6366            LMM000                  /MESSAGE TAG
1422    2276  7402            HLT                     /ERROR HALT
1423    2277  7610            SKP CLA                 /EXIT
1424    2300  2231            LTR000                  /SCOPE LOOP
```

```
1425
1426                    /
1427                    /DOES THE MARK CLOCK GENERATE TIMING
1428                    /
1429    2301  4025    LXA000, JMS     TPEPRE          /0 TC01, TC00 AND MARK FLOP 0, GP EQ
1430    2302  1056            TAD     K0200           /GET MARK BIT
1431    2303  6141            LINC                    /L MODE
1432    2304  0001            AXO                     /SET MARK FLOP
1433    2305  0011            CLR                     /CLEAR AC
1434    2306  0001            AXO                     /CLEAR MARK FLOP
1435    2307  0002            PDP                     /P MODE
1436    2310  1070            TAD     K6000           /GET MISC 1 TO AC
1437    2311  6151            LMR                     /LOAD MAINT REG
1438    2312  7300            CLA CLL                 /CLEAR AC,L
1439    2313  6154            XFR                     /READ DATA
1440    2314  0112            AND     K0010           /SAVE EQUAL BIT
1441    2315  7640            SZA CLA                 /TEST IT
1442    2316  4436            JMS I   NERROR          /TEST OKAY
1443    2317  4437            JMS I   ERROR           /TEST FAILED
1444    2320  6414            LTM000                  /MESSAGE TAG
1445    2321  7402            HLT                     /ERROR HALT
1446    2322  7610            SKP CLA                 /EXIT
1447    2323  2301            LXA000                  /SCOPE LOOP
```

```
1448                    /
1449                    /DOES LC00,01,02 COUNT NORMALLY
1450                    /
1451    2324  4025      LTS101, JMS     TPEPRE          /0 > EVERYTHING
1452    2325  1033              TAD     K0016           /SET BLOCK MARK
1453    2326  4434              JMS I   LOADR           /SET MARK WINDOW TO REVERSE
1454    2327  1110              TAD     K0020           /SET UP FOR TP4
1455    2330  6151              LMR                     /SET LC01,00 TO ONES
1456    2331  7104              CLL RAL                 /SET AC FOR TP0
1457    2332  6151              LMR                     /SET LC02 (1)
1458    2333  7110              CLL RAR                 /SET AC FOR TP1
1459    2334  6151              LMR                     /LOAD MAINT REG
1460    2335  7300              CLA CLL                 /CLEAR AC,L
1461    2336  1070              TAD     K6000           /SET UP FOR MISC 1
1462    2337  6151              LMR                     /LOAD MAINT REG
1463    2340  7300              CLA CLL                 /CLEAR AC,L
1464    2341  6154              XFR                     /READ DATA
1465    2342  0145              AND     K1400           /SAVE LINE COUNTER
1466    2343  3116              DCA     REGB            /STORE FOR TYPING
1467    2344  1116              TAD     REGB            /FETCH IT
1468    2345  7650              SNA CLA                 /TEST
1469    2346  4436              JMS I   NERROR          /TEST OKAY
1470    2347  4437              JMS I   ERROR           /TEST FAILED
1471    2350  6440              LTM101                  /MESSAGE TAG
1472    2351  7402              HLT                     /ERROR HALT
1473    2352  7610              SKP CLA                 /EXIT
1474    2353  2324              LTS101                  /SCOPE LOOP
```

```
1475
1476                    /TAPE 4
1477                    /
1478                    /
1479                    /
1480                    /TC12 - Ø - LMU MOTION FLOP TESTS
1481                    /
1482    2354    4025    MOTST1, JMS     TPEPRE          /Ø EVERYTHING
1483    2355    4432            JMS I   MAINT1          /SET NO PAUSE AND MAINT FLOP
1484    2356    6141            LINC                    /L MODE
1485    2357    0703            0703                    /MOVE TOWARD BLOCK
1486    2360    7000            7000                    /
1487    2361    0002            PDP                     /P MODE
1488    2362    1033            TAD     K0016           /GET BLOCK MARK
1489    2363    4434            JMS I   LOADR           /SET MARK WINDOW TO BLOCK MARK
1490    2364    1035            TAD     K0040           /SET BIT FOR TPØ,TP1,TP2
1491    2365    6151            LMR                     /LOAD MAINT REGISTER SET TURN AROUND
1492    2366    1043            TAD     K5000           /ADD UNITS + MTN TO AC
1493    2367    6151            LMR                     /TRY TO ZERO MOTION
1494    2370    7300            CLA CLL                 /CLEAR AC,LINK
1495    2371    6154            XFR                     /READ DATA
1496    2372    0112            AND     K0010           /SAVE MOTION FLOP
1497    2373    7650            SNA CLA                 /TEST
1498    2374    4436            JMS I   NERROR          /TEST OKAY
1499    2375    4437            JMS I   ERROR           /TEST FAILED
1500    2376    6464            MOTT1M                  /MESSAGE TAG
1501    2377    7402            HLT                     /ERROR HALT
1502    2400    7610            SKP CLA                 /EXIT
1503    2401    2354            MOTST1                  /SCOPE LOOP
1504                    /
1505                    /DOES TAPE PRESET Ø > THE MOTION FLOP
1506                    /
1507    2402    4025    MOTST2, JMS     TPEPRE          /Ø > EVERYTHING
1508    2403    4432            JMS I   MAINT1          /SET MAINT AND NO PAUSE
1509    2404    6141            LINC                    /L MODE
1510    2405    0700            0700                    /SET MOTION FLOP
1511    2406    7000            7000                    /
1512    2407    0002            PDP                     /P MODE
1513    2410    4025            JMS     TPEPRE          /ATTEMPT TO ZERO MOTION FLOP
1514    2411    1043            TAD     K5000           /GET MTN TO AC
1515    2412    6151            LMR                     /LOAD MAINT REGISTER
1516    2413    7300            CLA CLL                 /CLEAR AC,L
1517    2414    6154            XFR                     /READ DATA
1518    2415    0112            AND     K0010           /SAVE MOTION FLOP
1519    2416    7650            SNA CLA                 /TEST
1520    2417    4436            JMS I   NERROR          /TEST OKAY
1521    2420    4437            JMS I   ERROR           /TEST FAILED
1522    2421    6507            MOTT2M                  /MESSAGE TAG
1523    2422    7402            HLT                     /ERROR HALT
1524    2423    7610            SKP CLA                 /EXIT
1525    2424    2402            MOTST2                  /SCOPE LOOP
```

```
1526
1527                    /
1528                    /DOES CLR PROGRESS Ø THE MOTION FLOP
1529                    /
1530    2425  4025  MQTST3, JMS     TPEPRE          /Ø > EVERYTHING
1531    2426  7240          CLA CMA                 /SET AC=7777
1532    2427  3115          DCA     REGA            /SET MONITOR TO 1 CYCLE
1533    2430  3116          DCA     REGB            /Ø TIMING
1534    2431  1071          TAD     K1000           /GET AC>TAC
1535    2432  6151          LMR                     /LOAD MAINT REG
1536    2433  7330          CLA CML CLL RAR         /SET ACØØ
1537    2434  6154          XFR                     /SET TAC=4000
1538    2435  4432          JMS I   MAINT1          /SET NO PAUSE MAINT
1539    2436  6141          LINC                    /L MODE
1540    2437  0703          0703                    /MTB
1541    2440  0000          0000                    /
1542    2441  0002          PDP                     /P MODE
1543    2442  1033          TAD     KØØ16           /GET BM
1544    2443  4434          JMS I   LOADR           /LOAD MARK WINDOW
1545    2444  1035          TAD     KØØ40           /GEN TP0,TP1,TP2
1546    2445  6151          LMR                     /LOAD MAINT REG
1547    2446  7300          CLA CLL                 /CLEAR AC,L
1548    2447  1043          TAD     K5000           /GET MTN TO AC
1549    2450  6151          LMR                     /LOAD MAINT REG
1550    2451  7300          CLA CLL                 /CLEAR AC,L
1551    2452  6154          XFR                     /READ DATA
1552    2453  0112          AND     KØØ10           /SAVE MOTION BIT
1553    2454  7650          SNA CLA                 /TEST
1554    2455  5261          JMP     .+4             /OKAY
1555    2456  2116          ISZ     REGB            /DONE YET
1556    2457  5244          JMP     .-13            /WAIT
1557    2460  7610          SKP CLA                 /ERROR
1558    2461  4436          JMS I   NERROR          /TEST OKAY
1559    2462  4437          JMS I   ERROR           /TEST FAILED
1560    2463  6532          MOTT3M                  /MESSAGE TAG
1561    2464  7402          HLT
1562    2465  7610          SKP CLA
1563    2466  2425          MOTST3
```

```
1564
1565                    /
1566                    /DOES M113 B24 PINS D2,E2,F2 SHIFT RWB
1567                    /
1568    2467  4025      REG004, JMS     TPEPRE          /0>EVERYTHING
1569    2470  4432              JMS I   MAINT1          /SET MAINT MODE
1570    2471  7240              CLA CMA                 /FETCH A TEST NUMBER
1571    2472  6154              XFR                     /SET TB TO (7777)
1572    2473  7300              CLA CLL                 /CLEAR AC, L
1573    2474  1071              TAD     K1000           /SET BIT 2, TB TO RWB
1574    2475  6152              TRC                     /SET RWB=TB=7777,
1575    2476  7300              CLA CLL                 /CLEAR AC, L
1576    2477  1165              TAD     K3427           /SET FOR TP3 AND READ RWB
1577    2500  6151              LMR                     /SHIFT RWB
1578    2501  7300              CLA CLL                 /CLEAR AC, L
1579    2502  6154              XFR                     /READ RWB
1580    2503  3116              DCA     REGB            /STORE
1581    2504  7240              CLA CMA                 /FETCH TEST DATA
1582    2505  0171              AND     K7356           /SHIFTED?  OR MASKED?
1583    2506  3117              DCA     REGC            /STORE FOR TYPING
1584    2507  1117              TAD     REGC            /FETCH
1585    2510  7041              CIA                     /NEGATE
1586    2511  1116              TAD     REGB            /SUBTRACT
1587    2512  7650              SNA CLA                 /TEST
1588    2513  4436              JMS I   NERROR
1589    2514  4437              JMS I   ERROR
1590    2515  6556              REGM04
1591    2516  7402              HLT
1592    2517  7610              SKP CLA
1593    2520  2467              REG004
1594
```

```
                                /
                                /DOES WRITE SHIFT RWB FUNCTION
                                /
2521  4025  REG006, JMS     TPEPRE          /0> EVERYTHING
2522  4432         JMS I    MAINT1          /SET MAINT AND NO PAUSE
2523  7300         CLA CLL                  /CLEAR AC,L
2524  1115         TAD      REGA            /FETCH DATA SOURCE
2525  7104         CLL RAL                  /SHIFT IT
2526  3116         DCA      REGB+           /STORE SIMULATION
2527  6141         LINC                     /L MODE
2530  0700         0700                     /SET IN PROGRESS
2531  0000         0000
2532  0002         PDP                      /P MODE
2533  1112         TAD      K0010           /GET WRITE SYNC BIT
2534  6152         TRC                      /SET WRITE SYNC
2535  7300         CLA CLL
2536  1033         TAD      K0016           /GET BM
2537  4434         JMS I    LOADR           /SET WINDOW TO BLOCK MARK
2540  1071         TAD      K1000           /SET AC> TAC
2541  6151         LMR                      /LOAD MAINT IR
2542  7240         CLA CMA                  /SET AC=7777
2543  6154         XFR                      /SET TAC
2544  0055         AND      K0100           /GET FWD BIT
2545  6152         TRC                      /SET FWD BIT
2546  7300         CLA CLL                  /CLEAR AC, L
2547  1035         TAD      K0040           /SET UP FOR TP0,1,2
2550  6151         LMR                      /1 TO BLOCK MODE
2551  7300         CLA CLL                  /CLEAR AC, L
2552  1112         TAD      K0010           /SET AC08
2553  6152         TRC                      /SET WRITE SYNC
2554  7300         CLA CLL                  /CLEAR AC,L
2555  1110         TAD      K0020           /SET UP FOR TP3
2556  6151         LMR                      /SET WRITE
2557  7300         CLA CLL                  /CLEAR AC, L
2560  1115         TAD      REGA            /GET DATA
2561  6154         XFR                      /SET TB
2562  7300         CLA CLL                  /CLEAR AC, L
2563  1071         TAD      K1000           /GET TB TO RWB
2564  6152         TRC                      /SHIFT RWB
2565  7300         CLA CLL                  /CLEAR AC, L
2566  1154         TAD      K3440           /PERFORM SHIFT RWB
2567  6151         LMR                      /SET RWB TO AC
2570  7300         CLA CLL                  /CLEAR AC, L
2571  6154         XFR                      /READ RWB
2572  3117         DCA      REGC            /STORE DATA
2573  1115         TAD      REGA            /FETCH DATA
2574  7041         CIA                      /NEGATE
2575  1117         TAD      REGC            /SUBTRACT DATA,
2576  7650         SNA CLA                  /TEST
2577  4436         JMS I    NERROR          /TEST OKAY
2600  4437         JMS I    ERROR           /TEST FAILED
2601  4601         REGM06                   /MESSAGE
2602  7402         HLT                      /ERROR HALT
2603  761          SKP CLA                  /EXIT
```

1650 2604 2521 REG006 /SCOPE LOOP

```
1651                    /DOES M115 B27 GENERATE LOAD TAC TAC+TB TO TAC
1652    2605  4025      REG009, JMS     TPEPRE          /0>EVERYTHING
1653    2606  4432              JMS I   MAINT1          /SET MAINT AND NO PAUSE
1654    2607  6141              LINC                    /L MODE,
1655    2610  0707              0707                    /SET IN PROGRESS
1656    2611  0000              0000                    /
1657    2612  0002              PDP                     /P MODE
1658    2613  1033              TAD     K0016           /GET BM
1659    2614  4434              JMS I   LOADR           /SET WINDOW TO BLOCK MARK
1660    2615  1071              TAD     K1000           /GET AC>TAC
1661    2616  6151              LMR                     /LOAD MAINT IR
1662    2617  7240              CLA CMA                 /SET AC=7777
1663    2620  6154              XFR                     /SET TAC=7777
1664    2621  0055              AND     K0100           /SET FWD BIT
1665    2622  6152              TRC                     /SET DIRECTION TO FORWARD
1666    2623  7300              CLA CLL                 /CLEAR AC,L
1667    2624  1035              TAD     K0040           /SET TP0,TP1,TP2
1668    2625  6151              LMR                     /LOAD MAINT REG 1>BLOCK
1669    2626  4445              JMS I   RAN             /GENERATE A RANDOM NUMBER
1670    2627  3116              DCA     REGB            /STORE IT
1671    2630  1071              TAD     K1000           /GET AC>TAC
1672    2631  6151              LMR                     /SET MAINT REG TO AC>TAC
1673    2632  7300              CLA CLL                 /CLEAR AC,L
1674    2633  1116              TAD     REGB            /FETCH RANDOM DATA
1675    2634  6154              XFR                     /SET UP TAC REGISTER
1676    2635  7300              CLA CLL                 /CLEAR AC,L
1677    2636  6151              LMR                     /SET UP AC>TB
1678    2637  4445              JMS I   RAN             /FETCH A NUMBER
1679    2640  7040              CMA                     /INVERT IT
1680    2641  6154              XFR                     /SET TB
1681    2642  3117              DCA     REGC            /STORE IT
1682    2643  1116              TAD     REGB            /ADD B
1683    2644  1117              TAD     REGC            /ADD C SIMULATE THE ADDITION
1684    2645  3114              DCA     REGD            /STORE SIMULATED ADDITION
1685    2646  1153              TAD     K0011           /GET DM
1686    2647  4434              JMS I   LOADR           /SET MARK WINDOW TO DATA MARK
1687    2650  1035              TAD     K0040           /GENERATE TP0
1688    2651  6151              LMR                     /TB+TAC TO TAC
1689    2652  4025              JMS     TPEPRE          /0 PROGRESS
1690    2653  6141              LINC                    /L MODE
1691    2654  0003              TAC                     /READ TAC
1692    2655  0002              PDP                     /P MODE
1693    2656  1040              TAD     K0002           /ADD TWO FOR CORRECTION.
1694    2657  3046              DCA     REGE            /STORE IT
1695    2660  1046              TAD     REGE            /FETCH IT
1696    2661  7041              CIA                     /NEGATE
1697    2662  1114              TAD     REGD            /SUBTRACT DATA SOURCE
1698    2663  7650              SNA CLA                 /TEST
1699    2664  4436              JMS I   NERROR          /TEST OKAY
1700    2665  4437              JMS I   ERROR           /TEST FAILED
1701    2666  6630              REGM09                  /MESSAGE TAG
1702    2667  7402              HLT                     /ERROR HALT
1703    2670  7610              SKP CLA                 /EXIT
1704    2671  2605              REG009                  /SCOPE LOOP
```

```
1705
1706                    /
1707                    /DOES M121, B25 PINS F1, H1, L1 GENERATE LOAD TAC
1708                    /
1709    2672  4025      REG012, JMS     TPEPRE          /0>EVERYTHING
1710    2673  4432              JMS I   MAINT1          /SET MAINT AND NO PAUSE
1711    2674  6141              LINC                    /L MODE
1712    2675  0700              0700                    /SET IN PROGRESS
1713    2676  0000              0000
1714    2677  0002              PDP                     /P MODE
1715    2700  4434              JMS I   LOADR           /WIPE OUT WINDOW
1716    2701  1035              TAD     K0040           /GEN TP0,TP1,TP2
1717    2702  6151              LMR                     /LOAD MAINT REG 1>SEARCH
1718    2703  7300              CLA CLL                 /CLEAR AC,L
1719    2704  1071              TAD     K1000           /SET AC>TAC
1720    2705  6151              LMR                     /LOAD MAINT REG
1721    2706  7240              CLA CMA                 /SET AC=7777
1722    2707  6154              XFR                     /SET TAC=7777
1723    2710  0110              AND     K0020           /SET UP FOR TP3, TP4
1724    2711  6151              LMR                     /CLEAR TAC
1725    2712  7300              CLA CLL                 /CLEAR AC,L
1726    2713  6141              LINC                    /L MODE
1727    2714  0003              TAC                     /READ TAC
1728    2715  0002              PDP                     /P MODE
1729    2716  3116              DCA     REGB            /STORE FOR TYPING
1730    2717  1116              TAD     REGB            /FETCH IT
1731    2720  7650              SNA CLA                 /TEST
1732    2721  4436              JMS I   NERROR          /TEST OKAY
1733    2722  4437              JMS I   ERROR           /TEST FAILED
1734    2723  6652              REGM12                  /MESSAGE TAG
1735    2724  7402              HLT                     /ERROR HALT
1736    2725  7610              SKP CLA                 /EXIT
1737    2726  2672              REG012                  /SCOPE LOOP
1738                    /
1739                    /TEST WRITE CYCLE FLOP
1740                    /
1741    2727  4025      WRCFLP, JMS     TPEPRE          /0> EVERYTHING
1742    2730  4432              JMS I   MAINT1          /SET MAINT AND NO PAUSE
1743    2731  6141              LINC                    /L MODE
1744    2732  0700              0700                    /SET WRITE CYCLE
1745    2733  7000              7000                    /WASTED MEMORY
1746    2734  0002              PDP                     /P MODE
1747    2735  1122              TAD     K4440           /GET ENABLE STATES TO AC SET GP EQ GPC
1748    2736  6151              LMR                     /LOAD MAINT REGISTER
1749    2737  7300              CLA CLL                 /CLEAR AC,L
1750    2740  6154              XFR                     /READ STATUS
1751    2741  0110              AND     K0020           /SAVE WRITE CYCLE FLOP
1752    2742  7650              SNA CLA                 /WAS IT SET
1753    2743  5461              JMP I   PNTB            /TROUBLE (GO TO WRCFLB)
1754    2744  1071              TAD     K1000           /GET AC> TAC
1755    2745  6151              LMR                     /LOAD MAINT REG
1756    2746  7240              CLA CMA                 /SET AC=7777
1757    2747  6154              XFR                     /SET TAC=7777
1758    2750  0033              AND     K0016           /SET BM
1759    2751  4434              JMS I   LOADR           /SET WINDOW TO BLOCK MARK
```

```
17602   2752  1055            TAD     K0100           /SET FWD BIT
```

```
1761  2753  6152          TRC                     /SET FORWARD FLOP
1762  2754  7300          CLA CLL                 /CLEAR AC,L
1763  2755  1035          TAD     K0040           /GENERATE TP0, TP1, TP2 1> SEARCH
1764  2756  6151          LMR                     /1> BLOCK MODE
1765  2757  7300          CLA CLL                 /CLEAR AC,L
1766  2760  4434          JMS I   LOADR           /0> WINDOW
1767  2761  1035          TAD     K0040           /GENERATE TP0
1768  2762  6151          LMR                     /TP0, TP1, TP2
1769  2763  7301          CLA CLL IAC             /SET CM
1770  2764  4434          JMS I   LOADR           /SET MARK WINDOW TO CM
1771  2765  1122          TAD     K4440           /GENERATE TP0, 1, 2
1772  2766  6151          LMR                     /SET CHK WRD
1773  2767  6151          LMR                     /0> WRITE CYCLE
1774  2770  7300          CLA CLL                 /CLEAR AC,L
1775  2771  6154          XFR                     /READ STATUS
1776  2772  0110          AND     K0020           /SAVE WRITE CYCLE
1777  2773  7640          SZA CLA                 /WAS IT ZEROED
1778  2774  5461          JMP I   PNTB            /TROUBLE (GO TO WRCFLB)
1779  2775  1033          TAD     K0016           /WILL WRITE CYCLE STAY ZEROED
1780  2776  4434          JMS I   LOADR           /SET WINDOW TO BM
1781  2777  1055          TAD     K0100           /SET FORWARD BIT
1782  3000  6152          TRC                     /SET FORWARD FLOP
1783  3001  7300          CLA CLL                 /CLEAR AC,L
1784  3002  1035          TAD     K0040           /GENERATE TP0, 1, 2 1> SEARCH
1785  3003  6151          LMR                     /LOAD MAINT REG
1786  3004  7300          CLA CLL                 /CLEAR AC,L
1787  3005  1071          TAD     K1000           /GET AC> TAC
1788  3006  6151          LMR                     /LOAD MAINT REG
1789  3007  7240          CLA CMA                 /SET AC=7777
1790  3010  6154          XFR                     /SET TAC
1791  3011  7300          CLA CLL                 /CLEAR AC,L
1792  3012  4434          JMS I   LOADR           /0> WINDOW
1793  3013  1035          TAD     K0040           /GENERATE TP0
1794  3014  6151          LMR                     /TP0, 1, 2
1795  3015  7301          CLA CLL IAC             /SET CM
1796  3016  4434          JMS I   LOADR           /SET MARK WINDOW TO CM
1797  3017  1122          TAD     K4440           /GENERATE TP0, 1, 2
1798  3020  6151          LMR                     /SET CHK WRD
1799  3021  6151          LMR                     /KEEP WRITE CYCLE 0
1800  3022  7300          CLA CLL                 /CLEAR AC,L
1801  3023  6154          XFR                     /READ STATUS
1802  3024  0110          AND     K0020           /SAVE WRITE CYCLE
1803  3025  7650          SNA CLA                 /DID IT SET IN ERROR
1804  3026  4436          JMS I   NERROR          /NO TROUBLE
1805  3027  4437  WRCFLB, JMS I   ERROR           /TROUBLE
1806  3030  6712          WRCM                    /MESSAGE
1807  3031  7402          HLT                     /ERROR HALT
1808  3032  7610          SKP CLA                 /EXIT
1809  3033  2727          WRCFLP                  /SCOPE LOOP
```

```
1810                    /
1811                    /TEST TIMING OKAY GATE
1812                    /
1813    3034  1033      TTOK1,  TAD     K0016           /GET BM
1814    3035  4434              JMS I   LOADR           /SET WINDOW
1815    3036  4025              JMS     TPEPRE          /0> MAINT, 0> MARK
1816    3037  1112              TAD     K0010           /SET NO PAUSE MODE
1817    3040  6141              LINC                    /L MODE
1818    3041  0001              AXO                     /SET NO PAUSE
1819    3042  0700              0700                    /SET MOTION
1820    3043  7000              7000
1821    3044  0002              PDP                     /P MODE
1822    3045  7240              CLA CMA                 /SET AC=7777
1823    3046  3115              DCA     REGA            /SET MONITOR TO DO ONE CYCLE,
1824    3047  3116              DCA     REGB            /0> TIMING REGISTER
1825    3050  1054              TAD     K7770
1826    3051  3117              DCA     REGC
1827    3052  1053              TAD     K4140           /GEN TIMING FOR TTOK
1828    3053  6151              LMR                     /LOAD MAINT REG
1829    3054  7300              CLA CLL                 /CLEAR AC,L
1830    3055  6154              XFR                     /READ
1831    3056  0040              AND     K0002           /SAVE TTOK
1832    3057  7640              SZA CLA                 /TEST
1833    3060  5266              JMP     .+6             /TEST OKAY
1834    3061  2116              ISZ     REGB            /WAIT
1835    3062  5252              JMP     .-10            /WAIT
1836    3063  2117              ISZ     REGC            /WAIT SOME MORE
1837    3064  5262              JMP     .-2             /WAIT
1838    3065  7610              SKP CLA                 /INVENT SKIP
1839    3066  4436              JMS I   NERROR          /TEST OKAY
1840    3067  4437              JMS I   ERROR           /TEST FAILED
1841    3070  6734              TTOKM                   /MESSAGE TAG
1842    3071  7402              HLT                     /ERROR HALT
1843    3072  7610              SKP CLA                 /EXIT
1844    3073  3034              TTOK1                   /SCOPE LOOP
1845                    /
1846                    /TAPE TRAP TEST
1847                    /
1848    3074  7300      TPTRAP, CLA CLL                 /0> AC,L
1849    3075  3140              DCA     140             /0 TRAP LOCATION
1850    3076  1145              TAD     K1400           /SET INST AND TAPE TRAP
1851    3077  6141              LINC                    /L MODE
1852    3100  0004              ESF                     /SET SPECIAL FUNCTION
1853    3101  0700              0700                    /TRY AND TRAP THIS
1854    3102  7000              7000
1855    3103  0002              PDP                     /P MODE
1856    3104  5314              JMP     TPTRBD          /NO TRAP, BLUNDER,
1857    3105  7300      LOCTRP, CLA CLL                 /RETURN HERE FROM TRAP,
1858    3106  6141              LINC                    /L MODE
1859    3107  0004              ESF                     /0 SPEC FUN
1860    3110  0002              PDP                     /P MODE
1861    3111  1140              TAD     140             /FETCH PROGRAM COUNTER,
1862    3112  7640              SZA CLA                 /WAS IT SET
1863    3113  4436              JMS I   NERROR          /TEST OKAY
1864    3114  4437      TPTRBD, JMS I   ERROR           /TEST FAILED
```

```
1865  3115  7012            TRAPM                   /MESSAGE TAG
1866  3116  7402            HLT                     /ERROR HALT
1867  3117  7610            SKP CLA                 /EXIT
1868  3120  3074            TPTRAP                  /SCOPE LOOP
1869                  /
1870                  /GRAND FINAL END
1871                  /
1872  3121  4025            JMS     TPEPRE          /0 EVERYTHING
1873  3122  2065            ISZ     PASS
1874  3123  7000            NOP
1875  3124  7604            LAS
1876  3125  0035            AND     K0040
1877  3126  7640            SZA CLA
1878  3127  5177            JMP     177             /START OVER
1879  3130  1063            TAD     PNTJ
1880  3131  3437            DCA I   ERROR
1881  3132  5464            JMP I   OUTPAS
1882  3133  6676    LOCJ,   PASSM
```

```
1883
1884    3134  0000  MAINTS, 0000                    /RETURN ADDRESS STORAGE
1885    3135  7200          CLA                     /CLEAR AC, L
1886    3136  1107          TAD     K0050           /SET MAINT, NO PAUSE
1887    3137  6141          LINC                    /L MODE
1888    3140  0001          AXO                     /LOAD EXTENDED ORS
1889    3141  0002          PDP                     /P MODE
1890    3142  7200          CLA                     /CLEAR AC, L
1891    3143  5734          JMP I   MAINTS          /EXIT
1892
1893    3144  0000  LOADS,  0000                    /RETURN ADDRESS STORAGE
1894    3145  7110          RAR CLL                 /WORD TO BE LOADED IS MOVED RIGHT ONE BIT
1895    3146  3113          DCA     TEMPB           /STORE IT
1896    3147  1110          TAD     K0020           /GET REV BIT
1897    3150  6152          TRC                     /SET REVERSE
1898    3151  7200          CLA                     /CLEAR AC, L
1899    3152  4432          JMS I   MAINT1          /SET MAINTENANCE BIT
1900    3153  1111          TAD     K7773           /SET AC=7773
1901    3154  3334          DCA     MAINTS          /SET TALLY TO MINUS 5
1902    3155  1113  DOMORE, TAD     TEMPB           /GET STORED DATA
1903    3156  0112          AND     K0010           /SAVE CURRENT DATA BIT
1904    3157  3025          DCA     TPEPRE          /STORE IT
1905    3160  1025          TAD     TPEPRE          /FETCH IT
1906    3161  7040          CMA                     /INVERT IT
1907    3162  0110          AND     K0020           /AND IN COMMAND BIT
1908    3163  1025          TAD     TPEPRE          /ADD IN LOADING BIT
1909    3164  6151          LMR                     /SEND IT
1910    3165  7200          CLA                     /CLEAR AC
1911    3166  1113          TAD     TEMPB           /MOVE NEXT MOST SIGNIFICANT
1912    3167  7004          RAL                     /DATA BIT INTO LINK
1913    3170  3113          DCA     TEMPB           /STORE IT BACK
1914    3171  2334          ISZ     MAINTS          /DONE YET
1915    3172  5355          JMP     DOMORE          /NOT DONE YET
1916    3173  5744          JMP I   LOADS           /EXIT
```

```
1917
1918          5000     *5000
1919                   /
1920                   /NON ERROR MONITOR DETERMINES IF OPERATOR WANTS TO LOOP ON NON FAILING TEST
1921     5000  0000     NERROS, 0                       /RETURN ADDRESS
1922     5001  4432             JMS I   MAINT1          /SET MAINTENANCE FLAG
1923     5002  7307             CLA CLL IAC RTL         /SET AC = 4
1924     5003  1200             TAD     NERROS          /GET RETURN ADDRESS
1925     5004  3200             DCA     NERROS          /UPDATE RETURN ADDRESS
1926     5005  1600             TAD I   NERROS          /GET SCOPE LOOP ADDRESS
1927     5006  3221             DCA     ERRORS          /STORE IT
1928     5007  2115             ISZ     REGA            /UPDATE DATA
1929     5010  5621             JMP I   ERRORS          /EXIT
1930     5011  7604             LAS                     /READ SWITCHES
1931     5012  0072             AND     K0400           /SAVE SR3
1932     5013  7640             SZA CLA                 /TEST AND CLEAR
1933     5014  5621             JMP I   ERRORS          /LOOPING
1934     5015  7040             CMA                     /SET AC=-1
1935     5016  1200             TAD     NERROS          /ADD NERRORS
1936     5017  3200             DCA     NERROS          /STORE IN NERRORS
1937     5020  5600             JMP I   NERROS          /JUMP INDIRECT LOOP
1938                   /
1939                   /ERROR PROCESSOR, SCOPE LOOP, HALT, PRINT
1940     5021  0000     ERRORS, 0                       /RETURN ADDRESS STORAGE
1941     5022  7604             LAS                     /READ SWITCHES
1942     5023  7004             RAL                     /MOVE SR1 INTO AC00
1943     5024  7700             SMA CLA                 /IS IT SET
1944     5025  5254             JMP     ASCII           /NO TYPE A MESSAGE
1945     5026  4503             JMS I   BELLA           /RING THE BELL
1946     5027  1221     ASCRXT, TAD     ERRORS          /GET CURRENT ERROR ADDRESS
1947     5030  7041             CIA                     /INVERT IT
1948     5031  3024             DCA     LSTERR          /STORE IN LAST ERROR
1949     5032  2221             ISZ     ERRORS          /YES INDEX ESCAPE
1950     5033  7604             LAS                     /READ SWITCHES
1951     5034  7700             SMA CLA                 /IS SR0 SET
1952     5035  5621             JMP I   ERRORS          /NO JUMP TO ERROR HALT
1953     5036  2221             ISZ     ERRORS          /YES INDEX ESCAPE TO JUMP OUT
1954     5037  2221             ISZ     ERRORS          /INDEX ERRORS TO SCOPE MODE
1955     5040  1621             TAD I   ERRORS          /GET SXOPE ADDRESS
1956     5041  3200             DCA     NERROS          /STORE IN TYPE
1957     5042  7604             LAS                     /READ SWITCHES
1958     5043  7006             RTL                     /MOVE SR02 TO AC0
1959     5044  7710             SPA CLA                 /IS SCOPE MODE SELECTED
1960     5045  5600             JMP I   NERROS          /YES CONTINUE IN SCOPE LOOP
1961     5046  2115             ISZ     REGA            /UPDATE DATA
1962     5047  5600             JMP I   NERROS          /TEST WITH NEW DATA
1963     5050  7040             CMA                     /NO SET AC=7777
1964     5051  1221             TAD     ERRORS          /SUBTRACT ONE FROM ERRORS
1965     5052  3221             DCA     ERRORS          /STORE SELECTED ADDRESS
1966     5053  5621             JMP I   ERRORS          /EXIT TO NEXT TEST
```

```
1967
1968  5054  7240  ASCII,  CLA CMA                 /SET C(AC)=-1
1969  5055  1621          TAD I   ERRORS          /GET MESSAGE ADDRESS STORAGE
1970  5056  3010          DCA     PINT            /STORE IT IN AUTO INDEX REGISTER
1971  5057  1221          TAD     ERRORS          /GET RETURN ADDRESS
1972  5060  1024          TAD     LSTERR          /SUBTRACT LAST ERROR ADDRESS
1973  5061  7650          SNA CLA                 /TEST
1974  5062  5366          JMP     DATYP           /SAME GO TYPE DATA
1975  5063  1410          TAD I   PINT            /GET FIRST CHARACTER
1976  5064  3200          DCA     NERROS          /SAVE IT
1977  5065  1200          TAD     NERROS          /GET IT
1978  5066  7450          SNA                     /TEST IT
1979  5067  5227          JMP     ASCRXT          /NUMBER=EXIT
1980  5070  7040          CMA                     /INVERT IT
1981  5071  7450          SNA                     /NUMBER=EXITA
1982  5072  5320          JMP     DATUM           /TYPE OUT DATA ROUTINE
1983  5073  7040          CMA                     /CHANGE IT BACK
1984  5074  7112          RTR CLL                 /SWAP AC TO THE RIGHT
1985  5075  7012          RTR                     /MOVE
1986  5076  7012          RTR                     /MOVE
1987  5077  4303          JMS     TYPECH          /TYPE IT
1988  5100  1200          TAD     NERROS          /GET IT AGAIN
1989  5101  4303          JMS     TYPECH          /TYPE IT
1990  5102  5263          JMP     ASCII+7         /MUST BE MORE WORDS THAT NEED TYPING
1991  5103  0000  TYPECH, 0
1992  5104  0073          AND     K0077           /SAVE SIGNIFICANT PART
1993  5105  3106          DCA     SPACE           /STORE WORD
1994  5106  1106          TAD     SPACE           /FETCH IT
1995  5107  7650          SNA CLA                 /TEST FOR 00 CRLF CODE
1996  5110  4357          JMS     CRLF            /YES IT WAS
1997  5111  1106          TAD     SPACE           /NO TYPE IT
1998  5112  1074          TAD     M40             /SUBTRACT 40
1999  5113  7510          SPA                     /TEST POLARITY
2000  5114  1055          TAD     K0100           /ADD 340
2001  5115  1075          TAD     K240            /ADD 240
2002  5116  4505          JMS I   TYPE            /TYPE
2003  5117  5703          JMP I   TYPECH          /EXIT
2004
2005  5120  1410  DATUM,  TAD I   PINT            /GET ADDRESS OF REGISTER
2006  5121  3200          DCA     NERROS          /STORE IN TEMP
2007  5122  1200          TAD     NERROS          /GET TEMP
2008  5123  7650          SNA CLA                 /TEST FOR EXIT
2009  5124  5227          JMP     ASCRXT          /EQUALS 0000 EXIT
2010  5125  1200          TAD     NERROS
2011  5126  1052          TAD     M4444
2012  5127  7650          SNA CLA                 /$$?
2013  5130  5177          JMP     177
2014  5131  1600          TAD I   NERROS          /GET DATA
2015  5132  4336          JMS     OCTYP           /TYPE IT
2016  5133  1075          TAD     K240            /SPACE
2017  5134  4505          JMS I   TYPE            /TYPE IT
2018  5135  5320          JMP     DATUM           /TYPE NUMERIC DATA
2019  5136  0000  OCTYP,  0                       /RETURN ADDRESS STORAGE
2020  5137  3303          DCA     TYPECH          /STORE DATA TO BE PRINTED
2021  5140  1076          TAD     K7774           /SET UP TALLY
```

```
2022    5141  3106          DCA     SPACE           /SET IT
```

```
2023
2024                        /TAPE 9
2025                        /
2026    5142  1077  HERE,   TAD     K1026           /GET FLAG NUMBER
2027    5143  3357  REDO,   DCA     CRLF            /STORE
2028    5144  1303          TAD     TYPECH
2029    5145  7004          RAL
2030    5146  3303          DCA     TYPECH
2031    5147  1357          TAD     CRLF
2032    5150  7004          RAL
2033    5151  7420          SNL
2034    5152  5343          JMP     REDO
2035    5153  4505          JMS I   TYPE
2036    5154  2106          ISZ     SPACE
2037    5155  5342          JMP     HERE
2038    5156  5736          JMP I   OCTYP            /EXIT
2039    5157  0000  CRLF,   0                       /RETURN ADDRESS STORAGE
2040    5160  1100          TAD     K0215           /GET CR
2041    5161  4505          JMS I   TYPE            /TYPE IT
2042    5162  1101          TAD     K0212           /GET LF
2043    5163  4505          JMS I   TYPE            /TYPE IT
2044    5164  1102          TAD     K0177           /SET TO RUBOUT
2045    5165  5757          JMP I   CRLF            /EXIT
2046    5166  1410  DATYP,  TAD I   PINT            /GET A TERM OFF OF TYPE LIST
2047    5167  7450          SNA                     /END OF LIST?
2048    5170  5227          JMP     ASCRXT          /YES EXIT
2049    5171  7040          CMA                     /INVERT
2050    5172  7640          SZA CLA                 /BEGINNING OF DATA
2051    5173  5366          JMP     DATYP           /NO
2052    5174  4357          JMS     CRLF            /YES OK RETURN THE TTY CARRIAGE AND LINE FEED
2053    5175  7300          CLA CLL                 /CLEAR AC AND LINK
2054    5176  5320          JMP     DATUM           /GO TYPE THE DATA
```

```
2055
2056            5200    *5200
2057    5200    0000    BELL,   0000
2058    5201    7604            LAS                     /READ SWITCHES
2059    5202    0055            AND     K0100           /SAVE SR05
2060    5203    7640            SZA CLA                 /IS BELL SUPPRESS SET
2061    5204    5600            JMP I   BELL            /YES EXIT
2062    5205    1104            TAD     K0207           /GET BELL
2063    5206    4505            JMS I   TYPE            /TYPE IT
2064    5207    5600            JMP I   BELL            /EXIT
2065    5210    0000    TYPOUT, 0000
2066    5211    6046            6046
2067    5212    6041            6041
2068    5213    5212            JMP     .-1
2069    5214    7200            CLA
2070    5215    5610            JMP I   TYPOUT
2071
2072    5216    0000    RANDOM, 0000
2073    5217    1166            TAD     RNA
2074    5220    1167            TAD     RNB
2075    5221    3166            DCA     RNA
2076    5222    7004            RAL
2077    5223    1166            TAD     RNA
2078    5224    1167            TAD     RNB
2079    5225    3167            DCA     RNB
2080    5226    7004            RAL
2081    5227    1166            TAD     RNA
2082    5230    3166            DCA     RNA
2083    5231    1167            TAD     RNB
2084    5232    5616            JMP I   RANDOM
2085    5233    0014    LIM001, 0014                    /LIP MTP SETUP FAILED TO CLEAR TAPE ZONE
2086    5234    1120            1120
2087    5235    4015            4015
2088    5236    2420            2420
2089    5237    4023            4023
2090    5240    0524            0524
2091    5241    2520            2520
2092    5242    4006            4006
2093    5243    0111            0111
2094    5244    1405            1405
2095    5245    0440            0440
2096    5246    2417            2417
2097    5247    4003            4003
2098    5250    1405            1405
2099    5251    0122            0122
2100    5252    4024            4024
2101    5253    0120            0120
2102    5254    0540            0540
2103    5255    0417            0417
2104    5256    1605            1605
2105    5257    4000            4000
2106    5260    0000            EXIT
```

```
2107
2108    5261  0014    LIM002, 0014                    /LIP TAPE PRESET FAILED TO CLEAR TAPE DONE
2109    5262  1120            1120
2110    5263  4024            4024
2111    5264  0120            0120
2112    5265  0540            0540
2113    5266  2022            2022
2114    5267  0523            0523
2115    5270  0524            0524
2116    5271  4006            4006
2117    5272  0111            0111
2118    5273  1405            1405
2119    5274  0440            0440
2120    5275  2417            2417
2121    5276  0314            0314
2122    5277  0501            0501
2123    5300  2240            2240
2124    5301  2401            2401
2125    5302  2005            2005
2126    5303  4004            4004
2127    5304  1716            1716
2128    5305  0500            0500
2129    5306  0000            EXIT
2130    5307  0014    LIM003, 0014                    /LIP CLEAR TAPE DONE FAILED
2131    5310  1120            1120
2132    5311  4003            4003
2133    5312  1405            1405
2134    5313  0122            0122
2135    5314  4024            4024
2136    5315  0120            0120
2137    5316  0540            0540
2138    5317  0417            0417
2139    5320  1605            1605
2140    5321  4006            4006
2141    5322  0111            0111
2142    5323  1405            1405
2143    5324  0400            0400
2144    5325  0000            EXIT
```

```
2145
2146    5326  0014    LIM004, 0014                    /LIP STD FAILED TAPE DONE=1
2147    5327  1120            1120
2148    5330  4023            4023
2149    5331  2404            2404
2150    5332  4006            4006
2151    5333  0111            0111
2152    5334  1405            1405
2153    5335  0440            0440
2154    5336  2401            2401
2155    5337  2005            2005
2156    5340  4004            4004
2157    5341  1716            1716
2158    5342  0575            0575
2159    5343  6100            6100
2160    5344  0000            EXIT
2161    5345  0014    LIM005, 0014                    /LIP STD FAILED TAPE DONE=0
2162    5346  1120            1120
2163    5347  4023            4023
2164    5350  2404            2404
2165    5351  4006            4006
2166    5352  0111            0111
2167    5353  1405            1405
2168    5354  0440            0440
2169    5355  2401            2401
2170    5356  2005            2005
2171    5357  4004            4004
2172    5360  1716            1716
2173    5361  0575            0575
2174    5362  6000            6000
2175    5363  0000            EXIT
```

```
2176
2177    5364  0014    LIM006, 0014                    /LIP TAPE INTERRUPT FAILED INT ENB=1
2178    5365  1120            1120
2179    5366  4024            4024
2180    5367  0120            0120
2181    5370  0540            0540
2182    5371  1116            1116
2183    5372  2405            2405
2184    5373  2222            2222
2185    5374  2520            2520
2186    5375  2440            2440
2187    5376  0601            0601
2188    5377  1114            1114
2189    5400  0504            0504
2190    5401  4011            4011
2191    5402  1624            1624
2192    5403  4005            4005
2193    5404  1602            1602
2194    5405  7561            7561
2195    5406  4000            4000
2196    5407  0000            EXIT
2197    5410  0014    LIM007, 0014                    /LIP MTP SETUP FAILED TO SET IN-PROGRESS
2198    5411  1120            1120
2199    5412  4015            4015
2200    5413  2420            2420
2201    5414  4023            4023
2202    5415  0524            0524
2203    5416  2520            2520
2204    5417  4006            4006
2205    5420  0111            0111
2206    5421  1405            1405
2207    5422  0424            0424
2208    5423  1740            1740
2209    5424  2305            2305
2210    5425  2440            2440
2211    5426  1116            1116
2212    5427  5520            5520
2213    5430  2217            2217
2214    5431  0722            0722
2215    5432  0523            0523
2216    5433  2300            2300
2217    5434  0000            EXIT
```

```
2218
2219    5435  0014    LIM008, 0014                    /LIP TAPE PRESET FAILED TO ZERO IN PROGRESS
2220    5436  1120            1120
2221    5437  4024            4024
2222    5440  0120            0120
2223    5441  0540            0540
2224    5442  2022            2022
2225    5443  0523            0523
2226    5444  0524            0524
2227    5445  4006            4006
2228    5446  0111            0111
2229    5447  1405            1405
2230    5450  0440            0440
2231    5451  2417            2417
2232    5452  4032            4032
2233    5453  0522            0522
2234    5454  1740            1740
2235    5455  1116            1116
2236    5456  4020            4020
2237    5457  2217            2217
2238    5460  0722            0722
2239    5461  0523            0523
2240    5462  2300            2300
2241    5463  0000            EXIT
2242    5464  0014    LIM009, 0014                    /LIP (LCS(MTB*BM*SEARCH) FAILED TO ZERO IN PROGRESS
2243    5465  1120            1120
2244    5466  4050            4050
2245    5467  1403            1403
2246    5470  2350            2350
2247    5471  1524            1524
2248    5472  0252            0252
2249    5473  0215            0215
2250    5474  5223            5223
2251    5475  0501            0501
2252    5476  2203            2203
2253    5477  1051            1051
2254    5500  4006            4006
2255    5501  0111            0111
2256    5502  1405            1405
2257    5503  0440            0440
2258    5504  2417            2417
2259    5505  4060            4060
2260    5506  4011            4011
2261    5507  1640            1640
2262    5510  2022            2022
2263    5511  1707            1707
2264    5512  2205            2205
2265    5513  2323            2323
2266    5514  4000            4000
2267    5515  0000            EXIT
```

```
2268
2269    5516  0014    LIM010, 0014                    /LIP M115 C25 PIN S2 FAILED TO 0 IN PROGRESS
2270    5517  1120            1120
2271    5520  4015            4015
2272    5521  6161            6161
2273    5522  6540            6540
2274    5523  0362            0362
2275    5524  6540            6540
2276    5525  2011            2011
2277    5526  1640            1640
2278    5527  2362            2362
2279    5530  4006            4006
2280    5531  0111            0111
2281    5532  1405            1405
2282    5533  0440            0440
2283    5534  2417            2417
2284    5535  4060            4060
2285    5536  2022            2022
2286    5537  1707            1707
2287    5540  2205            2205
2288    5541  2323            2323
2289    5542  4000            4000
2290    5543  0000            EXIT
```

```
2291
2292    5544  0014    LIM013, 0014                    /LIP CHK OK FAILED TO 0 IN PROGRESS
2293    5545  1120            1120
2294    5546  4003            4003
2295    5547  1013            1013
2296    5550  4017            4017
2297    5551  1340            1340
2298    5552  0601            0601
2299    5553  1114            1114
2300    5554  0504            0504
2301    5555  4024            4024
2302    5556  1740            1740
2303    5557  6040            6040
2304    5560  1116            1116
2305    5561  4020            4020
2306    5562  2217            2217
2307    5563  0722            0722
2308    5564  0523            0523
2309    5565  2300            2300
2310    5566  0000            EXIT
2311    5567  0014    LIM015, 0014                    /LIP CHK OK FAILED TO 0 PROGRESS
2312    5570  1120            1120
2313    5571  4003            4003
2314    5572  1013            1013
2315    5573  4017            4017
2316    5574  1340            1340
2317    5575  0601            0601
2318    5576  1114            1114
2319    5577  0504            0504
2320    5600  4024            4024
2321    5601  1740            1740
2322    5602  6040            6040
2323    5603  2022            2022
2324    5604  1707            1707
2325    5605  2205            2205
2326    5606  2323            2323
2327    5607  4000            4000
2328    5610  0000            EXIT
```

```
2329
2330    5611  0014    LIM017, 0014                    /LIP M113,C16,H1 WRITE CYCLE (0) FAILED TO 0 IN PROGRESS
2331    5612  1120            1120
2332    5613  4015            4015
2333    5614  6161            6161
2334    5615  6340            6340
2335    5616  0361            0361
2336    5617  6640            6640
2337    5620  1061            1061
2338    5621  4027            4027
2339    5622  2211            2211
2340    5623  2405            2405
2341    5624  4003            4003
2342    5625  3103            3103
2343    5626  1405            1405
2344    5627  4050            4050
2345    5630  6051            6051
2346    5631  4006            4006
2347    5632  0111            0111
2348    5633  1405            1405
2349    5634  0440            0440
2350    5635  2417            2417
2351    5636  4060            4060
2352    5637  4011            4011
2353    5640  1640            1640
2354    5641  2022            2022
2355    5642  1707            1707
2356    5643  2205            2205
2357    5644  2323            2323
2358    5645  4000            4000
2359    5646  0000            EXIT
2360    5647  0014    LIM018, 0014                    /LIP STW FAILED TAPE WORD =1
2361    5650  1120            1120
2362    5651  4023            4023
2363    5652  2427            2427
2364    5653  4006            4006
2365    5654  0111            0111
2366    5655  1405            1405
2367    5656  0440            0440
2368    5657  2401            2401
2369    5660  2005            2005
2370    5661  4027            4027
2371    5662  1722            1722
2372    5663  0475            0475
2373    5664  6100            6100
2374    5665  0000            EXIT
2375    5666  0014    LIM019, 0014                    /LIP STW FAILED TAPE WORD =2
2376    5667  1120            1120
2377    5670  4023            4023
2378    5671  2427            2427
2379    5672  4006            4006
2380    5673  0111            0111
2381    5674  1405            1405
2382    5675  0440            0440
2383    5676  2401            2401
```

```
5677  2ØØ5          2ØØ5
57ØØ  4Ø27          4Ø27
57Ø1  1722          1722
57Ø2  Ø475          Ø475
57Ø3  6ØØØ          6ØØØ
57Ø4  ØØØØ          EXIT
```

```
2390
2391    5705  0014    LIM022, 0014                    /LIP TAPE WORD TOGGLES FAILED
2392    5706  1120            1120
2393    5707  4024            4024
2394    5710  0120            0120
2395    5711  0540            0540
2396    5712  2717            2717
2397    5713  2204            2204
2398    5714  4024            4024
2399    5715  1707            1707
2400    5716  0714            0714
2401    5717  0523            0523
2402    5720  4006            4006
2403    5721  0111            0111
2404    5722  1405            1405
2405    5723  0400            0400
2406    5724  0000            EXIT
2407
2408    5725  0014    LIM023, 0014                    /LIP DATA BREAK FAILED
2409    5726  1120            1120                    /0000 0000 0000
2410    5727  4004            4004
2411    5730  0124            0124
2412    5731  0140            0140
2413    5732  0222            0222
2414    5733  0501            0501
2415    5734  1340            1340
2416    5735  0601            0601
2417    5736  1114            1114
2418    5737  0504            0504
2419    5740  4000            4000
2420    5741  7777            EXITA
2421    5742  0116            REGB
2422    5743  0117            REGC
2423    5744  0114            REGD
2424    5745  0000            EXIT
2425
2426    5746  0014    LCM000, 0014                    /LCX MARK FLOP
2427    5747  0330            0330                    /0000 0000
2428    5750  4015            4015
2429    5751  0122            0122
2430    5752  1340            1340
2431    5753  0614            0614
2432    5754  1720            1720
2433    5755  4000            4000
2434    5756  7777            EXITA
2435    5757  0116            REGB
2436    5760  0117            REGC
2437    5761  0000            EXIT
2438    5762  0014    LCM001, 0014                    /LCX MARK FLOP TAPE PRESET FAILED
2439    5763  0330            0330                    /0000
2440    5764  4015            4015
2441    5765  0122            0122
2442    5766  1340            1340
2443    5767  0614            0614
2444    5770  1720            1720
```

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2445    5771  4024              4024
2446    5772  0120              0120
2447    5773  0540              0540
2448    5774  2022              2022
2449    5775  0523              0523
2450    5776  0524              0524
2451    5777  4006              4006
2452    6000  0111              0111
2453    6001  1405              1405
2454    6002  0400              0400
2455    6003  7777              EXITA
2456    6004  0116              REGB
2457    6005  0000              EXIT
2458    6006  0014    LIM000,   0014                /LIP TAPE DONE FAILED TO SET
2459    6007  1120              1120
2460    6010  4024              4024
2461    6011  0120              0120
2462    6012  0540              0540
2463    6013  0417              0417
2464    6014  1605              1605
2465    6015  4006              4006
2466    6016  0111              0111
2467    6017  1405              1405
2468    6020  0440              0440
2469    6021  2417              2417
2470    6022  4023              4023
2471    6023  0524              0524
2472    6024  0000              EXIT
```

```
2473
2474    6025  0014    LIM012, 0014                    /LIP END INST FAILED TO 0 PROGRESS
2475    6026  1120            1120
2476    6027  4005            4005
2477    6030  1604            1604
2478    6031  4011            4011
2479    6032  1623            1623
2480    6033  2440            2440
2481    6034  0601            0601
2482    6035  1114            1114
2483    6036  0504            0504
2484    6037  4024            4024
2485    6040  1740            1740
2486    6041  6040            6040
2487    6042  2022            2022
2488    6043  1707            1707
2489    6044  2205            2205
2490    6045  2323            2323
2491    6046  0000            EXIT
2492    6047  0014    LINMX1, 0014                    /LIN TAC=7777 DIR=REV FAILED
2493    6050  1116            1116
2494    6051  4024            4024
2495    6052  0103            0103
2496    6053  7567            7567
2497    6054  6767            6767
2498    6055  6740            6740
2499    6056  0411            0411
2500    6057  2275            2275
2501    6060  2205            2205
2502    6061  2640            2640
2503    6062  0601            0601
2504    6063  1114            1114
2505    6064  0504            0504
2506    6065  0000            EXIT
2507    6066  0014    LINMX2, 0014                    /LIN TAC=0000 DIR=FWD FAILED
2508    6067  1116            1116
2509    6070  4024            4024
2510    6071  0103            0103
2511    6072  7560            7560
2512    6073  6060            6060
2513    6074  6040            6040
2514    6075  0411            0411
2515    6076  2275            2275
2516    6077  0627            0627
2517    6100  0440            0440
2518    6101  0601            0601
2519    6102  1114            1114
2520    6103  0504            0504
2521    6104  0000            EXIT
2522    6105  0014    LTM004, 0014                    /LIT MARK CLOCK FAILED TO GENERATE TRS
2523    6106  2424            2424
2524    6107  4015            4015
2525    6110  0122            0122
2526    6111  1340            1340
2527    6112  0314            0314
```

```
2528    6113  1703            1703
2529    6114  1340            1340
2530    6115  0601            0601
2531    6116  1114            1114
2532    6117  0504            0504
2533    6120  4024            4024
2534    6121  1740            1740
2535    6122  0705            0705
2536    6123  1605            1605
2537    6124  2201            2201
2538    6125  2405            2405
2539    6126  4024            4024
2540    6127  2063            2063
2541    6130  0000            EXIT
```

```
2542
2543    6131  0014    LCMX00, 0014                    /LCS IDLE > SEARCH FAILED
2544    6132  0323            0323
2545    6133  4011            4011
2546    6134  0414            0414
2547    6135  0540            0540
2548    6136  7640            7640
2549    6137  2305            2305
2550    6140  0122            0122
2551    6141  0310            0310
2552    6142  4006            4006
2553    6143  0111            0111
2554    6144  1405            1405
2555    6145  0440            0440
2556    6146  0000            EXIT
2557    6147  0014    LCMX01, 0014                    /LCS SEARCH > BLOCK FAILED
2558    6150  0323            0323
2559    6151  4023            4023
2560    6152  0501            0501
2561    6153  2203            2203
2562    6154  1040            1040
2563    6155  7640            7640
2564    6156  0214            0214
2565    6157  1703            1703
2566    6160  1340            1340
2567    6161  0601            0601
2568    6162  1114            1114
2569    6163  0504            0504
2570    6164  0000            EXIT
2571    6165  0014    LCM002, 0014                    /LCS SEARCH > TURN AROUND FAILED
2572    6166  0323            0323
2573    6167  4023            4023
2574    6170  0501            0501
2575    6171  2203            2203
2576    6172  1040            1040
2577    6173  7640            7640
2578    6174  2425            2425
2579    6175  2216            2216
2580    6176  4001            4001
2581    6177  2217            2217
2582    6200  2516            2516
2583    6201  0440            0440
2584    6202  0601            0601
2585    6203  1114            1114
2586    6204  0504            0504
2587    6205  0000            EXIT
```

```
2588
2589    6206  0014    LCM003, 0014                    /LCS TURN AROUND > IDLE FAILED
2590    6207  0323            0323
2591    6210  4024            4024
2592    6211  2522            2522
2593    6212  1640            1640
2594    6213  0122            0122
2595    6214  1725            1725
2596    6215  1604            1604
2597    6216  4076            4076
2598    6217  4011            4011
2599    6220  0414            0414
2600    6221  0540            0540
2601    6222  0601            0601
2602    6223  1114            1114
2603    6224  0504            0504
2604    6225  0000            EXIT
2605    6226  0014    LCM004, 0014                    /LCS BLOCK > CHK WRD FAILED
2606    6227  0323            0323
2607    6230  4002            4002
2608    6231  1417            1417
2609    6232  0313            0313
2610    6233  4076            4076
2611    6234  4003            4003
2612    6235  1013            1013
2613    6236  4027            4027
2614    6237  2204            2204
2615    6240  4006            4006
2616    6241  0111            0111
2617    6242  1405            1405
2618    6243  0440            0440
2619    6244  0000            EXIT
2620    6245  0014    LCM005, 0014                    /LCS CHK WRD > IDLE FAILED
2621    6246  0323            0323
2622    6247  4003            4003
2623    6250  1013            1013
2624    6251  4076            4076
2625    6252  4011            4011
2626    6253  0414            0414
2627    6254  0540            0540
2628    6255  0601            0601
2629    6256  1114            1114
2630    6257  0504            0504
2631    6260  0000            EXIT
```

```
2632
2633  6261  0014    LCM006, 0014                /LCS SEARCH > IDLE (MTB+I) FAILED
2634  6262  0323            0323
2635  6263  4023            4023
2636  6264  0501            0501
2637  6265  2203            2203
2638  6266  1040            1040
2639  6267  7640            7640
2640  6270  1104            1104
2641  6271  1405            1405
2642  6272  4050            4050
2643  6273  1524            1524
2644  6274  0253            0253
2645  6275  1151            1151
2646  6276  4006            4006
2647  6277  0111            0111
2648  6300  1405            1405
2649  6301  0400            0400
2650  6302  0000            EXIT
2651  6303  0014    LWM101, 0014                /LRL; LRE; EN TAC, EN TB, OR LOAD TAC
2652  6304  2214            2214                /0000 0000 0000
2653  6305  7340            7340
2654  6306  1422            1422
2655  6307  0573            0573
2656  6310  4005            4005
2657  6311  1640            1640
2658  6312  2401            2401
2659  6313  0354            0354
2660  6314  4005            4005
2661  6315  1640            1640
2662  6316  2402            2402
2663  6317  5440            5440
2664  6320  1722            1722
2665  6321  4014            4014
2666  6322  1701            1701
2667  6323  0440            0440
2668  6324  2401            2401
2669  6325  0300            0300
2670  6326  7777            EXITA
2671  6327  0051            K7777
2672  6330  0115            REGA
2673  6331  0116            REGB
2674  6332  0000            EXIT
```

```
2675
2676   6383  0014   LWM102, 0014                    /LTS PHASE GATE FAILED
2677   6384  2423           2423
2678   6385  4020           4020
2679   6386  1001           1001
2680   6387  2305           2305
2681   6340  4007           4007
2682   6341  0124           0124
2683   6342  0540           0540
2684   6343  0601           0601
2685   6344  1114           1114
2686   6345  0504           0504
2687   6346  0000           EXIT
2688   6347  0014   LWM104, 0014                    /LWN MARK WRITE GATE FAILED
2689   6350  2716           2716
2690   6351  4015           4015
2691   6352  0122           0122
2692   6353  1340           1340
2693   6354  2722           2722
2694   6355  1124           1124
2695   6356  0540           0540
2696   6357  0701           0701
2697   6360  2405           2405
2698   6361  4006           4006
2699   6362  0111           0111
2700   6363  1405           1405
2701   6364  0400           0400
2702   6365  0000           EXIT
2703   6366  0014   LMM000, 0014                    /LTR DATA CHANNEL RWB 0, 4, 8 FAILED
2704   6367  2422           2422                    /4210 0160
2705   6370  4004           4004
2706   6371  0124           0124
2707   6372  0140           0140
2708   6373  0310           0310
2709   6374  0116           0116
2710   6375  1605           1605
2711   6376  1440           1440
2712   6377  2227           2227
2713   6400  0240           0240
2714   6401  6054           6054
2715   6402  6454           6454
2716   6403  7040           7040
2717   6404  0601           0601
2718   6405  1114           1114
2719   6406  0504           0504
2720   6407  4000           4000
2721   6410  7777           EXITA
2722   6411  0116           REGB
2723   6412  0117           REGC
2724   6413  0000           EXIT
2725   6414  0014   LTM000, 0014                    /LTT MARK CLOCK FAILED TO GENERATE THE
2726   6415  2424           2424
2727   6416  4015           4015
2728   [redacted]  0122           0122
2729   [redacted]  1340           1340
```

```
2730    6421    0314            0314
2731    6422    1703            1703
2732    6423    1340            1340
2733    6424    0601            0601
2734    6425    1114            1114
2735    6426    0504            0504
2736    6427    4024            4024
2737    6430    1740            1740
2738    6431    0705            0705
2739    6432    1605            1605
2740    6433    2201            2201
2741    6434    2405            2405
2742    6435    4024            4024
2743    6436    2060            2060
2744    6437    0000            EXIT
```

```
2745
2746
2747    6440  0014    LTM101, 0014                    /LTS LINE COUNTER FAILED TO COUNT
2748    6441  2423            2423                    /0002
2749    6442  4014            4014
2750    6443  1116            1116
2751    6444  0540            0540
2752    6445  0317            0317
2753    6446  2516            2516
2754    6447  2405            2405
2755    6450  2240            2240
2756    6451  0601            0601
2757    6452  1114            1114
2758    6453  0504            0504
2759    6454  4024            4024
2760    6455  1740            1740
2761    6456  0317            0317
2762    6457  2516            2516
2763    6460  2400            2400
2764    6461  7777            EXITA
2765    6462  0116            REGB
2766    6463  0000            EXIT
2767    6464  0014    MOTT1M, 0014                    /LMU TURN ARND, BM FAILED TO 2 MOTION
2768    6465  1525            1525
2769    6466  4024            4024
2770    6467  2522            2522
2771    6470  1640            1640
2772    6471  0122            0122
2773    6472  1604            1604
2774    6473  5440            5440
2775    6474  0215            0215
2776    6475  4006            4006
2777    6476  0111            0111
2778    6477  1405            1405
2779    6500  0440            0440
2780    6501  2417            2417
2781    6502  4060            4060
2782    6503  1517            1517
2783    6504  2411            2411
2784    6505  1716            1716
2785    6506  0000            EXIT
```

```
2786    6507  0014    MOTT2M, 0014                    /LMU TAPE PRESET FAILED TO Ø MOTION
2787    6510  1525            1525
2788    6511  4024            4024
2789    6512  0120            0120
2790    6513  0540            0540
2791    6514  2022            2022
2792    6515  0523            0523
2793    6516  0524            0524
2794    6517  4006            4006
2795    6520  0111            0111
2796    6521  1405            1405
2797    6522  0440            0440
2798    6523  2417            2417
2799    6524  4060            4060
2800    6525  4015            4015
2801    6526  1724            1724
2802    6527  1117            1117
2803    6530  1640            1640
2804    6531  0000            EXIT
2805    6532  0014    MOTT3M, 0014                    /LMU CLR PROGRESS FAILED TO Ø MOTION
2806    6533  1525            1525
2807    6534  4003            4003
2808    6535  1422            1422
2809    6536  4020            4020
2810    6537  2217            2217
2811    6540  0722            0722
2812    6541  0523            0523
2813    6542  2340            2340
2814    6543  0601            0601
2815    6544  1114            1114
2816    6545  0504            0504
2817    6546  4024            4024
2818    6547  1740            1740
2819    6550  4060            4060
2820    6551  4015            4015
2821    6552  1724            1724
2822    6553  1117            1117
2823    6554  1640            1640
2824    6555  0000            EXIT
2825    6556  0014    REGM04, 0014                    /LRL TP3 FAILED TO SHIFT RWB
2826    6557  2214            2214                    /0000 0000
2827    6560  4024            4024
2828    6561  2063            2063
2829    6562  4006            4006
2830    6563  0111            0111
2831    6564  1405            1405
2832    6565  0440            0440
2833    6566  2417            2417
2834    6567  4023            4023
2835    6570  1011            1011
2836    6571  0624            0624
2837    6572  4022            4022
2838    6573  2702            2702
2839    6574  4000            4000
2840    6575  7777            EXITA
```

```
2841    6576  0116          REGB
2842    6577  0117          REGC
2843    6600  0000          EXIT
```

```
2844
2845  6601  0014  REGM06, 0014                  /LRL EN WRITE LD RWB FAILED TO SHIFT RWB.
2846  6602  2214         2214                  /0000 0000
2847  6603  4005         4005
2848  6604  1640         1640
2849  6605  2722         2722
2850  6606  1124         1124
2851  6607  0540         0540
2852  6610  1404         1404
2853  6611  4022         4022
2854  6612  2702         2702
2855  6613  4006         4006
2856  6614  0111         0111
2857  6615  1405         1405
2858  6616  0440         0440
2859  6617  2417         2417
2860  6620  4023         4023
2861  6621  1011         1011
2862  6622  0624         0624
2863  6623  4000         4000
2864  6624  7777         EXITA
2865  6625  0116         REGB
2866  6626  0117         REGC
2867  6627  0000         EXIT
2868  6630  0014  REGM09, 0014                  /LRL TB+TAC=TAC FAILED
2869  6631  2214         2214                  /0000 0000 0000 0000
2870  6632  4024         4024
2871  6633  0253         0253
2872  6634  2401         2401
2873  6635  0375         0375
2874  6636  2401         2401
2875  6637  0340         0340
2876  6640  0601         0601
2877  6641  1114         1114
2878  6642  0504         0504
2879  6643  4000         4000
2880  6644  7777         EXITA
2881  6645  0116         REGB
2882  6646  0117         REGC
2883  6647  0114         REGD
2884  6650  0046         REGE
2885  6651  0000         EXIT
2886  6652  0014  REGM12, 0014                  /LRL LOAD TAC FAILED TP3, SEARCH
2887  6653  2214         2214                  /0000
2888  6654  4014         4014
2889  6655  1701         1701
2890  6656  0440         0440
2891  6657  2401         2401
2892  6660  0340         0340
2893  6661  0601         0601
2894  6662  1114         1114
2895  6663  0504         0504
2896  6664  4024         4024
2897  6665  2063         2063
2898  6666  5440         5440
```

```
2899    6667  2305            2305
2900    6670  0122            0122
2901    6671  0310            0310
2902    6672  4000            4000
2903    6673  7777            EXITA
2904    6674  0116            REGB
2905    6675  0000            EXIT
2906    6676  0024    PASSM,  0024            /TC12-PART 2 PASS--(PASS)
2907    6677  0361            0361
2908    6700  6255            6255
2909    6701  2001            2001
2910    6702  2224            2224
2911    6703  4062            4062
2912    6704  4020            4020
2913    6705  0123            0123
2914    6706  2300            2300
2915    6707  7777            EXITA
2916    6710  0065            PASS
2917    6711  4444            4444            /RETURN TO LOC 177
2918
2919    6712  0014    WRCM,   0014            /LCS WRITE CYCLE FLOP TEST FAILED
2920    6713  0323            0323
2921    6714  4027            4027
2922    6715  2211            2211
2923    6716  2405            2405
2924    6717  4003            4003
2925    6720  3103            3103
2926    6721  1405            1405
2927    6722  4006            4006
2928    6723  1417            1417
2929    6724  2040            2040
2930    6725  2405            2405
2931    6726  2324            2324
2932    6727  4006            4006
2933    6730  0111            0111
2934    6731  1405            1405
2935    6732  0400            0400
2936    6733  0000            EXIT
2937    6734  0014    TTOKM,  0014            /LTS TIMING OK GATE FAILED
2938    6735  2423            2423
2939    6736  4024            4024
2940    6737  1115            1115
2941    6740  1116            1116
2942    6741  0740            0740
2943    6742  1713            1713
2944    6743  4007            4007
2945    6744  0124            0124
2946    6745  0540            0540
2947    6746  0601            0601
2948    6747  1114            1114
2949    6750  0504            0504
2950    6751  0000            EXIT
2951    6752  0014    TMATB,  0014            /LRE TMA FAILED TO INCREMENT DURING TAPE BREAK,
2952    6753  2205            2205
2953    6754  4024            4024
```

```
6755  1501              1501                 /WAS   IS
6756  4006              4006
6757  0111              0111
6760  1405              1405
6761  0424              0424
6762  1740              1740
6763  1116              1116
6764  0322              0322
6765  0515              0515
6766  0516              0516
6767  2440              2440
6770  0425              0425
6771  2211              2211
6772  1607              1607
6773  4024              4024
6774  0120              0120
6775  0502              0502
6776  2205              2205
6777  0113              0113
7000  5600              5600
7001  2701              2701
7002  2340              2340
7003  4040              4040
7004  1123              1123
7005  4000              4000
7006  7777              EXITA
7007  0170              C0176
7010  0117              REGC
7011  0000              EXIT
7012  0024      TRAPM,  0024                 /TAPE TRAP FAILED
7013  2201              2201                 /0000
7014  2040              2040
7015  2422              2422
7016  0120              0120
7017  4006              4006
7020  0111              0111
7021  1405              1405
7022  0400              0400
7023  7777              EXITA
7024  0140              0140
7025  0000              EXIT
                $
```

```
0000  01111111  10000000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11100011

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111


1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111


2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111


3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110000

3200
3300

3400
3500

3600
3700
```

```
4000
4100

4200
4300

4400
4500

4600
4700

5000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110

5200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

6000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

6200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

6400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

6600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

7000  11111111  11111111  11111100  00000000  00000000  00000000  00000000  00000000
7100  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

7200
7300

7400
7500

7600
7700
```

```
ASCII   5054    K3400   0004    LIM005  5435    LT1004  1560
ASCRXT  5027    K3420   0164    LIM009  5464    LW.104  0172
AXO     [illegible]  K3427   0165    LIM010  5516    LWB102  2157
BELL    5200    K3440   0154    LIM012  6025    LWB104  2224
BELLA   0103    K3700   0123    LIM013  5544    LWM101  6303
C0050   0144    K4000   0003    LIM015  5567    LWM102  6333
C0176   0170    K4140   0053    LIM017  5611    LWM104  6347
CLR     0011    K4210   0042    LIM018  5647    LWN102  2100
COM     0017    K4440   0122    LIM019  5666    LWN104  2164
CRLF    5157    K5000   0043    LIM022  5705    LWNORM  2027
DATUM   5120    K6000   0070    LIM023  5725    LXA000  2001
DATYP   5166    K6020   0155    LIN001  1367    M0100   0150
DELAY   0126    K6040   0067    LIN002  1422    M0220   0152
DONORE  3155    K7000   0047    LINC    6141    M0400   0124
ERROR   0037    K7030   0050    LINMX1  6047    M1000   0125
ERRORS  5021    K7040   0157    LINMX2  6066    M2000   0151
ESF     0004    K7356   0171    LIP000  0202    M40     0074
EXIT    0000    K7400   0006    LIP001  0231    M4444   0052
EXITA   7777    K7737   0162    LIP002  0264    MAINT1  0032
HERE    5142    K7770   0054    LIP003  0313    MAINTS  3134
K0002   0040    K7773   0111    LIP004  0344    MOTST1  2354
K0003   0163    K7774   0076    LIP005  0403    MOTST2  2402
K0007   0156    K7777   0051    LIP006  0427    MOTST3  2425
K0010   0112    LCM000  5746    LIP007  0460    MOTT1M  6464
K0011   0153    LCM001  5762    LIP008  0502    MOTT2M  6507
K0012   0160    LCM002  6165    LIP009  0524    MOTT3M  6532
K0013   0146    LCM003  6206    LIP010  0550    NERROR  0036
K0016   0033    LCM004  6226    LIP011  0620    NERRORS 5000
K0017   0007    LCM005  6245    LIP012  0630    OCTYP   5136
K0020   0110    LCM006  6261    LIP013  0677    OUTPAS  0064
K0040   0035    LCMX00  6131    LIP015  0763    PASS    0065
K0050   0107    LCMX01  6147    LIP017  1041    PASSM   6676
K0077   0073    LCS000  1513    LIP018  1116    PDP     0002
K0100   0055    LCS001  1540    LIP019  1142    PINT    0010
K0150   0057    LCS002  1577    LIP022  1172    PNTA    0060
K0160   0041    LCS003  1631    LIP024  1220    PNTB    0061
K0177   0102    LCS004  1661    LMM000  6366    PNTC    0062
K0200   0056    LCS005  1730    LMR     6151    PNTJ    0063
K0207   0104    LCS006  2000    LOADR   0034    RAN     0045
K0212   0101    LCX000  1321    LOADS   3144    RANDOM  5216
K0215   0100    LCX001  1347    LOC170  0176    REDC    5143
K0250   0005    LIA004  0121    LOCA    0450    REG004  2467
K0400   0072    LIB004  0376    LOCC    1302    REG006  2521
K1000   0071    LIB005  0422    LOCJ    3133    REG009  2605
K1026   0077    LIM000  6006    LOCTRP  3105    REG012  2672
K1400   0145    LIM001  5233    LSTERR  0024    REGA    0115
K177    0137    LIM002  5261    LTB000  2274    REGB    0116
K2000   0066    LIM003  5307    LTM000  6414    REGC    0117
K240    0075    LIM004  5326    LTM004  6105    REGD    0114
K3000   0147    LIM005  5345    LTM101  6440    REGE    0046
K3020   0161    LIM006  5364    LTR000  2231    REGF    0120
K3040   0044    LIM007  5410    LTS101  2324    REGM04  6556
```

```
        REGM06   6001
        RE[illegible]   6630
        RE[illegible]2   6652
        RETURN   0002
        RNA      0166
        RNB      0167
        SPACE    0106
        STD      0416
        STW      0457
        TAC      0003
        TEMPB    0113
        THATB    6752
        TPEPRE   0025
        TPTRAP   3074
        TPTNGD   3114
        TRAPM    7012
        TRC      6152
        TTOK1    3034
        TTOKM    6734
        TYPE     0105
        TYPECH   5103
        TYPOUT   5210
        WREFLB   3027
        WRTFLP   2727
        WRDM     6712
        XFR      6154
        XOA      0021
```

ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 29 SECONDS

3K CORE USED

K4215	119#	2040												
K3230	44#	979												
K4480	112#	991	1931											
K1888	111#	194	221	252	279	307	471	530	572	595	624	647	675	809
	919	949	1045	1077	1138	1181	1250	1306	1392	1406	1534	1573	[illegible]	[illegible]
	1660	1671	1719	1754	1787									
K1826	118#	2026												
K1480	158#	795	1465	1850										
K177	151#	849												
K2888	108#	484	425	449	493	607	704							
K288	116#	2001	2016											
K3090	160#													
K3825	170#													
K3848	90#													
K3480	43#													
K3420	173#													
K3427	174#	1576												
K3440	165#	1636												
K3788	138#	927	964	1019	1056	1084	1112	1155	1199	1226				
K4888	42#													
K4148	97#	1827												
K4218	88#	1386												
K4440	137#	923	957	1015	1050	1080	1107	1143	1151	1186	1194	1222	1747	1771
	1797													
K5888	89#	1492	1514	1548										
K6888	110#	409	421	489	603	700	987	1395	1409	1436	1461			
K6820	166#	1294	1327	1392	1367									
K6848	109#	445	1288	1321	1345	1360								
K7888	93#	844												
K7938	94#													
K7948	168#													
K7956	178#	1582												
K7988	45#													
K7737	143	171#												
K7770	98#	1825												
K7773	128#	1980												
K7774	117#	2021												
K7777	95#	2671												
LCH888	881	2426#												
LCH881	900	2438#												
LCH882	1091	2571#												
LCH883	1119	2589#												
LCH884	1162	2605#												
LCH885	1206	2620#												
LCH886	1233	2633#												
LCHX88	1026	2543#												
LCHX81	1061	2557#												
LCS880	1009#	1029												
LCS881	1034#	1064												
LCS882	1069#	1094												
LCS883	1099#	1122												
LCS884	1127#	1165												
LCS885	1170#	1209												

```
LC0006    1214#   1236
LCX000    863#    884
LCX001    888#    903
LIA004    136#    324
LIB004    136     332#
LIB005    348     356#
LIM000    212     2458#
LIM001    243     2085#
LIM002    270     2100#
LIM003    299     2130#
LIM004    333     2146#
LIM005    357     2161#
LIM006    384     2177#
LIM007    408     2197#
LIM008    429     2219#
LIM009    453     2242#
LIM010    497     2269#
LIM012    554     2474#
LIM013    611     2292#
LIM015    660     2311#
LIM017    708     2330#
LIM018    731     2360#
LIM019    759     2375#
LIM022    786     2391#
LIM023    840     2408#
LIN001    911#    937
LIN002    941#    971
LINC       50#    199     226     235     257     284     312     318     325     342     349     370     396     416
          439     462     500     521     565     620     669     716     723     742     751     778     802     860
          889     893     913     943     980     1011    1036    1071    1101    1129    1172    1216    1243    1267
         1300    1431    1484    1509    1539    1605    1654    1690    1711    1726    1743    1817    1851    1858
         1887
LINMX1    934     2498#
LINMX2    968     2507#
LIP000    193#    215
LIP001    220#    246
LIP002    251#    273
LIP003    278#    302
LIP004    306#    336
LIP005    341#    360
LIP006    365#    387
LIP007    394#    411
LIP008    415#    432
LIP009    437#    456
LIP010    460#    500
LIP011    507#    514
LIP012    519#    557
LIP013    563#    614
LIP015    618#    663
LIP017    667#    711
LIP018    715#    734
LIP019    739#    762
LIP022    768#    789
```

```
LIP024    793#    843     858
LMM000    421     2703#
LMR        54#    195     206     208     222     233     [illegible] 253   [illegible] 267   280     291     294     [illegible]
          308     316     377     401     422     446     472     477     479     483     488     490     531     536
          538     542     546     547     550     570     573     583     585     589     593     596     601     604
          625     635     637     641     645     648     653     656     676     684     688     689     696     698
          701     772     774     776     796     810     820     830     845     920     924     950     958     984
          988     1016    1046    1051    1078    1081    1108    1109    1139    1144    1148    1152    1182    1187
          1191    1195    1196    1223    1251    1260    1265    1289    1295    1307    1314    1318    1322    1328
          1346    1353    1361    1368    1388    1396    1405    1410    1437    1455    1457    1459    1462    1491
          1493    1515    1535    1546    1549    1577    1615    1622    1628    1637    1661    1668    1672    1677
          1688    1717    1720    1724    1748    1755    1764    1768    1772    1773    1785    1788    1794    1798
          1799    1828    1909
LOADR      82#    184     204     231     262     289     379     444     467     481     486     526     540     544
          578     587     591     630     639     643     674     686     691     694     770     815     828     918
          948     978     1041    1076    1106    1134    1146    1150    1177    1189    1193    1221    1255    1263
          1305    1316    1320    1344    1359    1453    1489    1544    1613    1659    1686    1715    1759    1766
          1770    1780    1792    1796    1814
LOADS      82     1893#   1916
LOC176    183#    832
LOCA      102     382#
LOCC      104     844#
LOCJ      105     1882#
LOCTRP    156     1857#
LSTERR     74#    145     146     1948    1972
LT0000    1403    1420#
LTM000    1444    2729#
LTM004    999     2522#
LTM101    1471    2747#
LTR000    1385#   1424
LTS101    1451#   1474
LTT004    976#    1008
LWA104    179#    1351    1358    1366
LWB102    1293    1299    1325    1333#
LWB104    179     1374#
LWM101    1278    2651#
LWM102    1334    2676#
LWM104    1375    2688#
LWN102    1286#   1337
LWN104    1342#   1378
LWNORM    1241#   1281
LXA000    1429#   1447
M0100     161#    1087
M0200     163#    1158
M0400     139#    1057
M1000     140#    930     964     1022
M2000     162#    1115    1202    1229
M40       114#    1998
M4444      96#    2011
MAINT1     80#    198     225     256     283     311     369     395     415     438     461     507     520     564
          619     668     741     794     912     942     1010    1035    1070    1100    1128    1171    1215    1242
          1287    1483    1508    1538    1569    1600    1653    1710    1742    1899    1922
MAINTS     80     1884#   1891    1901    1914
```