

TMA-11

DRIVE FUNCTION TIMER
MD-11-DZTME-C

EP-DZTME-C-DL-A
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4. STARTING PROCEDURE

4.1 BEFORE STARTING PROGRAM SET LOC. 176 WITH DESIRED CONTROL SETTINGS. (DEFAULT=200:DRIVE 0;9 TRK)

BITS 15-0 ARE USED TO INDICATE THE TAPE UNIT CONFIGURATION.

15=1	HAVE UNIT 0	SELECTED,	7 TRACK
14=1	"	"	"
13=1	"	"	"
12=1	"	"	"
11=1	"	"	"
10=1	"	"	"
9=1	"	"	"
8=1	"	"	"
7=1	HAVE UNIT 0	SELECTED,	9 TRACK
6=1	"	"	"
5=1	"	"	"
4=1	"	"	"
3=1	"	"	"
2=1	"	"	"
1=1	"	"	"
0=1	"	"	"

4.2 STARTING ADDRESS

200

4.3 PROGRAM AND/OR OPERATOR ACTION

LOAD PROGRAM INTO MEMORY.
 SET DESIRED TAPE UNITS ON-LINE.
 LOAD LOC. 176 WITH CONTROL SETTINGS (SEE 4.1)
 LOAD STARTING ADDRESS.
 PRESS START.
 THE PROGRAM WILL BEGIN TIMING FUNCTIONS.
 ON COMPLETION OF ALL TESTS "END OF TIMING" WILL BE PRINTED AND
 THE PROCESSOR WILL HALT.
 TO REPEAT TEST: IF SAME CONTROL SETTINGS ARE DESIRED SIMPLY PRESS CONTINUE.
 IF DIFFERENT SETTINGS ARE NECESSARY RELOAD LOC.176 AND LOAD ADDRESS 200-START.

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

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6. ERRORS

THE PROGRAM HAS NO INTERNAL ERROR DETECTION FACILITIES AND, THEREFORE, NO ACTUAL ERROR TYPEOUTS. THE VALIDITY OF THE TIMES MEASURED MUST BE DETERMINED BY THE OPERATOR.

6.1 TIME RELATIONSHIPS

- A. "READ SHUTDOWN" MUST BE < "WRITE SHUTDOWN".
- B. GAPS MUST = 8>7>6>5>4>3, 3=2=1 (1.5).
- C. "WRITE EOF" SHOULD BE SLIGHTLY > "WRITE XIRG".

*NOTE:

- 1. TU10 TIMING INFO REFERENCE 6.2
- 2. TU10W (M8926) TIMING INFO REFERENCE 6.3
- 3. TU10N (M8927) TIMING INFO REFERENCE 6.4

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6.2

TIME LIMITS AND PRINTOUT FORMAT

*** TU10 ONLY ***

TIMES INDICATED UNDER "UNIT A" ARE STANDARD FOR A 9 CHANNEL UNIT AND "UNIT B" FOR A 7 CHANNEL UNIT. TIMES ARE IN MILLISECONDS. TOLERANCES INDICATED WITHIN "()" ARE PLUS OR MINUS.

FUNCTION	UNIT A	(9 CHANNEL)	UNIT B	(7 CHANNEL)
WRITE FROM BOT DELAY	180.0	(15.0)	SAME	
WRITE SHUTDOWN	7.1	(1.0)	10.4	(1.0)
WRITE START	8.9	(0.4)	12.6	(0.5)
SETTLE DOWN DELAY	12.0	(4.0)	SAME	
WRITE TO ERASE HEAD	11.0	(4.0)	SAME	
BACKSPACE SHUTDOWN	2.2	(0.3)	6.5	(0.5)
READ SHUTDOWN	2.2	(0.3)	SAME	
GAPS SHOULD = 8>7>6>5>4>3, 3=2=1 (1.5).				
GAP 1	13.4	SEE	20.1	
GAP 2	13.4	NOTE	20.1	
GAP 3	13.4	ABOVE	20.1	
GAP 4	16.8		26.7	
GAP 5	20.2		33.3	
GAP 6	23.4		39.9	
GAP 7	26.5		46.5	
GAP 8	30.2		53.1	
WRITE START	8.9	(0.4)	12.6	(0.5)
WRITE XIRG	95.0	(10.0)	SAME	
READ FROM BOT DELAY	90.0	(10.0)	SAME	
WRITE EOF	114.0	(10.0)	118.0	(10.0)
EOR TO EOF SP TIME	100.0	(10.0)	SAME	
SPACE SHUTDOWN	2.2	(0.3)	SAME	
ONE INCH DATA TIME	22.3	(1.0)	SAME	
*FUNCTIONS AT 556 BPI				
WRITE FROM BOT	.0		185.0	(15.0)
ONE INCH DATA TIME	.0		22.0	(0.8)
WRITE SHUTDOWN	.0		10.4	(1.0)
BACKSPACE SHUTDOWN	.0		6.7	(0.5)
READ SHUTDOWN	.0		2.3	(0.3)
*FUNCTIONS AT 200 BPI				
WRITE FROM BOT	.0		185.0	(15.0)
ONE INCH DATA TIME	.0		22.0	(1.0)
WRITE SHUTDOWN	.0		10.4	(1.0)
BACKSPACE SHUTDOWN	.0		7.5	(0.5)
READ SHUTDOWN	.0		3.1	(0.3)
END OF TIMING				

* NOTE: THESE TIMES ONLY PRINTED WHEN ONE OR MORE 7 CHANNEL TAPE UNITS ARE SELECTED.

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6.3 TIME LIMITS AND PRINTOUT FORMAT *****
*** TU10W (M8926) ONLY ***

TIMES INDICATED UNDER "UNIT A" ARE STANDARD FOR A 9 CHANNEL UNIT AND "UNIT B" FOR A 7 CHANNEL UNIT. TIMES ARE IN MILLISECONDS. TOLERANCES INDICATED WITHIN "()" ARE PLUS OR MINUS.

FUNCTION	UNIT A (9 CHANNEL)	UNIT B (7 CHANNEL)
WRITE FROM BOT DELAY	184.6 (15.0)	200.7 (15.0)
WRITE SHUTDOWN	6.5 (0.6)	5.8 (0.6)
WRITE START	8.9 (0.8)	15.1 (1.3)
SETTLE DOWN DELAY	12.0 (4.0)	SAME
WRITE TO ERASE HEAD	11.0 (5.0)	SAME
BACKSPACE SHUTDOWN	2.2 (0.2)	6.6 (0.6)
READ SHUTDOWN	2.2 (0.2)	SAME
GAPS SHOULD = 8>7>6>5>4>3, 3=2=1	(1.5)	(1.6)
GAP 1	13.2	SEE NOTE ABOVE
GAP 2	13.2	
GAP 3	13.2	
GAP 4	16.8	
GAP 5	20.2	
GAP 6	23.4	
GAP 7	26.5	
GAP 8	30.2	
WRITE START	8.9 (0.8)	15.1 (1.3)
WRITE XIRG	95.0 (9.0)	98.6 (9.0)
READ FROM BOT DELAY	150.6 (13.0)	90.0 (9.0)
WRITE EOF	114.0 (15.0)	117.2 (15.0)
EOR TO EOF SP TIME	100.9 (9.0)	104.4 (9.0)
SPACE SHUTDOWN	2.2 (0.2)	SAME
ONE INCH DATA TIME	22.3 (1.0)	SAME
*FUNCTIONS AT 556 BPI		
WRITE FROM BOT	.0	200.7 (15.0)
ONE INCH DATA TIME	.0	22.3 (1.0)
WRITE SHUTDOWN	.0	7.2 (0.7)
BACKSPACE SHUTDOWN	.0	6.9 (0.6)
READ SHUTDOWN	.0	2.3 (0.2)
*FUNCTIONS AT 200 BPI		
WRITE FROM BOT	.0	200.7 (15.0)
ONE INCH DATA TIME	.0	22.3 (1.0)
WRITE SHUTDOWN	.0	9.4 (1.0)
BACKSPACE SHUTDOWN	.0	7.9 (0.7)
READ SHUTDOWN	.0	3.3 (0.3)
END OF TIMING		

* NOTE: THESE TIMES ONLY PRINTED WHEN ONE OR MORE 7 CHANNEL TAPE UNITS ARE SELECTED.

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6.4 TIME LIMITS AND PRINTOUT FORMAT *****
*** TU10N (M8927) ONLY ***

TIMES INDICATED UNDER "UNIT A" ARE STANDARD FOR A 9 CHANNEL UNIT AND "UNIT B" FOR A 7 CHANNEL UNIT. TIMES ARE IN MILLISECONDS. TOLERANCES INDICATED WITHIN "()" ARE PLUS OR MINUS.

FUNCTION	UNIT A (9 CHANNEL)	UNIT B (7 CHANNEL)
WRITE FROM BOT DELAY	180.0 (15.0)	SAME
WRITE SHUTDOWN	7.1 (1.0)	7.1 (1.0)
WRITE START	8.9 (0.4)	15.3 (0.5)
SETTLE DOWN DELAY	12.0 (4.0)	SAME
WRITE TO ERASE HEAD	11.0 (4.0)	SAME
BACKSPACE SHUTDOWN	2.2 (0.3)	6.5 (0.5)
READ SHUTDOWN	2.2 (0.3)	SAME
GAPS SHOULD = 8>7>6>5>4>3, 3=2=1 (1.5).		
GAP 1	13.4	20.1
GAP 2	13.4	20.1
GAP 3	13.4	20.1
GAP 4	16.8	26.7
GAP 5	20.2	33.3
GAP 6	23.4	39.9
GAP 7	26.5	46.5
GAP 8	30.2	53.1
WRITE START	8.9 (0.4)	15.3 (0.5)
WRITE XIRG	95.0 (10.0)	SAME
READ FROM BOT DELAY	90.0 (10.0)	SAME
WRITE EOF	114.0 (10.0)	118.0 (10.0)
EOF TO EOF SP TIME	100.0 (10.0)	SAME
SPACE SHUTDOWN	2.2 (0.3)	SAME
ONE INCH DATA TIME	22.3 (1.0)	SAME
*FUNCTIONS AT 556 BPI		
WRITE FROM BOT	.0	185.0 (15.0)
ONE INCH DATA TIME	.0	22.0 (0.8)
WRITE SHUTDOWN	.0	7.1 (1.0)
BACKSPACE SHUTDOWN	.0	6.7 (0.5)
READ SHUTDOWN	.0	2.3 (0.3)
*FUNCTIONS AT 200 BPI		
WRITE FROM BOT	.0	185.0 (15.0)
ONE INCH DATA TIME	.0	22.0 (1.0)
WRITE SHUTDOWN	.0	7.1 (1.0)
BACKSPACE SHUTDOWN	.0	7.5 (0.5)
READ SHUTDOWN	.0	3.1 (0.3)
END OF TIMING		

* NOTE: THESE TIMES ONLY PRINTED WHEN ONE OR MORE 7 CHANNEL TAPE UNITS ARE SELECTED.

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7. RESTRICTIONS

7.1 STARTING RESTRICTIONS

AT LEAST ONE TUID TAPE UNIT MUST BE "ON-LINE" AND SELECTED BY SWITCHES PER 4.1. ALSO MAKE CERTAIN THAT EACH TUID THAT IS "ON-LINE" HAS A UNIQUE UNIT NUMBER SELECTED.

7.2 OPERATING RESTRICTIONS

THE INSTRUCTION TEST MUST RUN WITHOUT ERRORS BEFORE ATTEMPTING TO OPERATE THIS PROGRAM. (DZTMA)

8. MISCELLANEOUS

8.1 EXECUTION TIME

NOT APPLICABLE

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9.0 PROGRAM DESCRIPTION

9.1 WRITE FROM BOT DELAY

WRITE FROM BOT DELAY IS THE TIME NECESSARY TO MOVE THE BEGINNING OF TAPE (BOT) MARKER APPROXIMATELY 6 INCHES PAST THE WRITE HEAD. THE FIRST RECORD ON TAPE MUST BE WRITTEN AT LEAST 3 INCHES AWAY FROM THE BOT MARKER.

PROCEDURE TO MEASURE TIME:

- A. IF TU10 IS NOT AT BOT IT IS REWOUND TO BOT.
- B. INITIALIZE BYTE RECORD COUNTER AND CURRENT MEMORY ADDRESS REGISTER.
- C. ISSUE WRITE FUNCTION, 800 BPI, SET "GO".
- D. MONITOR CURRENT MEMORY ADDRESS REGISTER TO DETERMINE WHEN 2ND BYTE IS OUTPUT.
- E. THE TIME FROM "GO" UNTIL 2ND BYTE IS OUTPUT IS APPROXIMATELY EQUAL TO "WRITE FROM BOT DELAY".

9.2 WRITE SHUTDOWN

WRITE SHUTDOWN IS THE AMOUNT OF TIME NECESSARY TO CONTINUE MOVING TAPE AFTER A RECORD IS WRITTEN SO THAT THE PROPER INTERRECORD GAP WILL EXIST BETWEEN RECORDS.

PROCEDURE TO MEASURE TIME:

- A. THE PROGRAM USES THE SAME RECORD THAT WAS WRITTEN TO TIME "WRITE FROM BOT DELAY".
- B. AFTER THE LAST BYTE (BC=0), INDICATING THE END OF THE RECORD, MONITOR "SETTLEDOWN" UNTIL IT BECOMES A 1.
- C. THE TIME FROM "BC=0" UNTIL "SETTLEDOWN" IS "WRITE SHUTDOWN".

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9.3 WRITE START

WRITE START IS THE TIME NECESSARY FOR TAPE TO ACCELERATE TO FULL SPEED AND GUARANTEE A 1/2 INCH INTERRECORD GAP.

PROCEDURE TO MEASURE TIME:

SAME AS "WRITE FROM BOT" EXCEPT NOW WE ARE NOT AT BOT.

- A. INITIALIZE BYTE RECORD COUNTER AND CURRENT MEMORY ADDRESS REGISTER.
- B. ISSUE WRITE FUNCTION, 800 BPI, SET "GO".
- C. MONITOR CURRENT MEMORY ADDRESS REGISTER TO DETERMINE WHEN 2ND BYTE IS OUTPUT.
- D. THE TIME FROM "GO" UNTIL 2ND BYTE IS OUTPUT IS APPROXIMATELY EQUAL TO "WRITE START".

9.4 SETTLEDOWN DELAY

TAPE DOES NOT ACTUALLY COME TO A COMPLETE STOP UNTIL SOME PERIOD OF TIME AFTER SHUTDOWN HAS ENDED. ALSO, AFTER TAPE HAS FULLY STOPPED, AN ADDITIONAL PERIOD OF TIME IS NECESSARY FOR THE TAPE AND HARDWARE TO "SETTLEDOWN" AND BECOME STABLE. THE "SETTLEDOWN DELAY" IS THE PERIOD OF TIME NECESSARY FOR THE TAPE AND MECHANICAL CHARACTERISTICS OF THE TUID TO BECOME STABLE, SO THAT THE UNIT CANNOT BE OPERATED, START/STOP, AT A FREQUENCY WHERE IT IS MECHANICALLY RESONANT.

PROCEDURE TO MEASURE TIME:

- A. THE PROGRAM USES THE SAME RECORD THAT WAS WRITTEN TO TIME "WRITE START".
- B. AFTER "SETTLEDOWN" BECOMES A 1, INDICATING THE START OF SETTLEDOWN, MONITOR "TU READY" UNTIL IT BECOMES A 1.
- C. THE TIME FROM "SETTLEDOWN" UNTIL "TU READY" IS "SETTLEDOWN".

9.5 WRITE TO ERASE HEAD

THE PURPOSE OF THE ERASE HEAD IS TO INSURE THAT THE TAPE IS IN THE SAME FLUX STATE AS THE WRITE HEADS. THIS IS NECESSARY FOR SEVERAL REASONS.

1. START/STOP CHARACTERISTICS VARY AMONG TAPE UNITS AND IT WOULD BE POSSIBLE TO LEAVE OLD DATA IN THE INTERRECORD GAPS WHEN USING A TAPE ON MORE THAN ONE UNIT.
2. A TAPE PREVIOUSLY USED AT ONE RECORDING DENSITY COULD NOT BE USED LATER AT ANOTHER DENSITY.
3. TRACK ALIGNMENT AND HEAD WIDTH VARY FROM TAPE UNIT TO TAPE UNIT AND IT WOULD BE POSSIBLE FOR DATA TO BE LEFT ON THE TRACK EDGES FROM OLD RECORDS.

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THE "WRITE TO ERASE HEAD" TEST INSURES THAT THE TAPE IN FRONT OF THE WRITE HEAD IS ERASED DURING A WRITE OPERATION.

PROCEDURE TO MEASURE TIME:

- A. A LONG RECORD HAS BEEN WRITTEN FROM BOT. SAME RECORD THAT WAS USED TO TIME "WRITE FROM BOT DELAY".
- B. TAPE IS REWOUND TO BOT.
- C. BYTE RECORD COUNTER IS INITIALIZED FOR A 3 BYTE RECORD AND CURRENT MEMORY ADDRESS REGISTER IS INITIALIZED.
- D. ISSUE WRITE FUNCTION, 800 BPI, SET "GO".
- E. MONITOR BYTE RECORD COUNTER UNTIL IT = 0 INDICATING THAT 2 BYTES ARE WRITTEN IMMEDIATELY ISSUE A POWER CLEAR WHICH STOPS ALL DATA TRANSFERS AND CAUSES THE DRIVE TO SHUTDOWN.
- F. TAPE IS REWOUND TO BOT
- G. INITIALIZE BYTE RECORD COUNTER (3 BYTES) AND CURRENT MEMORY ADDRESS REGISTER.
- H. ISSUE READ FUNCTION, 800 BPI, SET GO
- I. MONITOR BYTE RECORD COUNTER UNTIL IT = -1 AND THEN TIME UNIT IT = 0. THIS TIME WILL INDICATE THE DISTANCE BETWEEN THE 2ND BYTE AND THE 3RD BYTE WHICH IS ALSO THE AMOUNT OF TAPE THAT WAS ERASED BY THE ERASE HEAD DURING THE WRITE OPERATION OR "WRITE TO ERASE HEAD".

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9.6 BACKSPACE SHUTDOWN

"BACKSPACE SHUTDOWN" IS THE LENGTH OF TIME NECESSARY TO GUARANTEE THAT IF A WRITE OPERATION FOLLOWS A BACKSPACE THE TAPE WILL BE POSITIONED SUCH THAT ALL PREVIOUS DATA IS IN FRONT OF THE WRITE AND ERASE HEADS AND WILL BE ERASED. "BACKSPACE SHUTDOWN" MUST BE LESS THAN "WRITE START" SO THAT INTERRECORD GAPS WILL INCREASE IF A BACKSPACE/REWRITE OPERATION IS INITIATED.

PROCEDURE TO MEASURE TIME:

- A. INITIALIZE BYTE RECORD COUNTER AND CURRENT MEMORY ADDRESS REGISTER.
- B. ISSUE WRITE EOF FUNCTION, 800 BPI, SET "GO"
- C. AFTER EOF RECORD IS WRITTEN WAIT FOR "TU READY".
- D. SET BYTE RECORD COUNTER TO BACKSPACE 1 RECORD.
- E. ISSUE BACKSPACE FUNCTION, SET "GO".
- F. AFTER "EOF" BECOMES A 1, INDICATING THE RECOGNITION OF THE "EOF" RECORD, MONITOR "SETTLEDOWN" UNTIL IT BECOMES A 1.
- G. THE TIME FROM "EOF" UNTIL "SETTLEDOWN" IS "BACKSPACE SHUTDOWN".

9.7 READ SHUTDOWN

READ SHUTDOWN IS THE AMOUNT OF TIME NECESSARY TO CONTINUE MOVING TAPE AFTER A RECORD IS READ SO THAT THERE IS ENOUGH GAP FOR TAPE TO BE FULLY ACCELERATED IF A READ IS FOLLOWED BY A BACKSPACE. "READ SHUTDOWN" MUST ALSO BE LESS THAN "WRITE SHUTDOWN" TO GUARANTEE THAT THE WRITE AND ERASE HEADS WILL BE POSITIONED SUCH THAT ALL PREVIOUS DATA IS IN FRONT OF THE HEADS AND WILL BE ERASED IF A WRITE FOLLOWS A READ. IN ADDITION, WHEN A WRITE FOLLOWS A READ THE INTERRECORD GAP MUST STILL BE AT LEAST 1/2 OF AN INCH.

PROCEDURE TO MEASURE TIME:

- A. RECORD PREVIOUSLY USED IN "BACKSPACE SHUTDOWN" IS READ.
- B. INITIALIZE BYTE RECORD COUNTER AND CURRENT MEMORY ADDRESS REGISTER
- C. ISSUE READ FUNCTION, 800 BPI, SET "GO".
- D. AFTER "EOF" BECOMES A 1, INDICATING THE END OF THE RECORD, MONITOR "SETTLEDOWN" UNTIL IT BECOMES A 1.
- E. THE TIME FROM "EOF" UNTIL "SETTLEDOWN" IS "READ SHUTDOWN"

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9.9 WRITE START

THIS IS A REPEAT OF THE "WRITE START" TEST PREVIOUSLY COMPLETED (REFERENCE 9.3). IT'S PURPOSE IS TO DETERMINE IF TAPE WILL DRIFT BACKWARDS TO BOT IF A "POWER CLEAR" IS ISSUED AS SOON AS BOT DISAPPEARS WHEN MOVING FORWARD FROM BOT. TIME SHOULD EQUAL "WRITE START" AS MEASURED IN 9.3.

9.10 WRITE XIRG

WRITE WITH AN EXTENDED INTERRECORD GAP IS A FUNCTION THAT CAUSES THE GENERATION OF AN INTERRECORD GAP THAT IS AT LEAST 3 INCH LONG AS COMPARED WITH THE NORMAL 3/5 INCH GAP. THE PURPOSE IS TO ELIMINATE WRITE ERRORS THAT MAY BE CAUSED BY A DEFECTIVE AREA ON TAPE. NORMALLY ONE REWRITE WITH XIRG WOULD BE SUFFICIENT TO MOVE PAST THE BAD SPOT, HOWEVER IF IT ISN'T, THE PROCEDURE WOULD BE TO REPEAT THE "BACKSPACE-REWRITE WITH XIRG" SEQUENCE UNTIL A RECORD IS WRITTEN WITHOUT ERRORS. EACH SUCCESSIVE REWRITE WOULD ADD 3 INCHES TO THE INTERRECORD GAP UNTIL "GOOD" TAPE WAS REACHED.

PROCEDURE TO MEASURE TIME:

- A. TAPE IS NOT AT BOT
- B. INITIALIZE BYTE RECORD COUNTER AND CURRENT MEMORY ADDRESS REGISTER.
- C. ISSUE WRITE WITH XIRG FUNCTION, 800 BPI, SET "GO".
- D. MONITOR CURRENT MEMORY ADDRESS REGISTER TO DETERMINE WHEN 2ND BYTE IS OUTPUT.
- E. THE TIME FROM "GO" UNIT 2ND BYTE IS OUTPUT IS "WRITE WITH XIRG".

9.11 READ FROM BOT

THE FIRST RECORD WRITTEN ON TAPE IS SUPPOSED TO BE AT LEAST 6 INCHES FROM THE BOT MARKER. IN THE EVENT THAT THIS CONDITION WASN'T MET IT IS STILL DESIREABLE TO READ THE RECORD. READ FROM BOT IS THE TIME FROM WHEN A READ FUNCTION IS ISSUED UNTIL THE 2ND BYTE IS INPUT.

PROCEDURE TO MEASURE TIME:

- A. THE RECORD THAT WAS WRITTEN JUST OFF BOT DURING "WRITE START" (REFERENCE 9.10) IS USED.
- B. TAPE IS REWOUND TO BOT
- C. INITIALIZE BYTE RECORD COUNTER AND CURRENT MEMORY ADDRESS REGISTER.
- D. ISSUE READ FUNCTION, 800 BPI, SET "GO".
- E. MONITOR CURRENT MEMORY ADDRESS REGISTER TO DETERMINE WHEN 2ND BYTE IS INPUT.
- F. THE TIME FROM "GO" UNTIL 2ND BYTE IS INPUT IS "READ FROM BOT".

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9.12 WRITE EOF.

TO WRITE AN END OF FILE MARK IT IS NECESSARY FOR TAPE TO MOVE 3 INCHES BEFORE WRITING. IN THAT RESPECT IT IS SIMILAR TO WRITING A RECORD WITH EXTENDED INTERRECORD GAP. HOWEVER, AN EOF MARK CORRESPONDS TO A 1 BYTE RECORD. THE TIME SHOULD BE SLIGHTLY LARGER THAN "WRITE XIRG".

PROCEDURE TO MEASURE TIME:

- A. TAPE UNIT IS REWOUND TO BOT.
- B. INITIALIZE BYTE RECORD COUNTER AND CURRENT MEMORY ADDRESS REGISTER.
- C. ISSUE WRITE FUNCTION, 800 BPI, SET "GO".
- D. WAIT FOR "CU READY" AND THEN "TU READY" TO BECOME A 1.
- E. ISSUE WRITE EOF FUNCTION, 800 BPI, SET "GO".
- F. WAIT FOR "TU READY" TO BECOME A 1.
- G. THE TIME FROM "GO" UNTIL "TU READY" IS "WRITE EOF".

9.13 EOR TO EOF SPACE TIME

EOB TO EOF SPACE TIME IS THE TIME NEEDED TO MOVE TAPE FROM THE END OF A RECORD TO AN END OF FILE MARK WRITTEN AFTER IT. THE PROCEDURE USED TURNS OUT TO BE A TEST OF THE WRITE AND ERASE HEAD POLARITIES. IF THE TIME PRINTED IS EQUAL TO ZERO IT IS AN INDICATION THAT THE EOF WAS NOT FOUND WHEN "TU READY" BECAME A 1.

THIS COULD INDICATE ONE OR MORE OF THE FOLLOWING PROBLEMS:

1. ERASE HEAD POLARITY REVERSED.
2. ERASE HEAD CURRENT NOT SUFFICIENT TO FULLY SATURATE TAPE.
3. ONE OR MORE OF WRITE HEAD TRACKS POLARITY REVERSED.
4. ONE OR MORE SENSITIVE READ AMPLIFIERS.
5. WRITE EOF FUNCTION DIDN'T REALLY WRITE AN EOF MARK. OTHERWISE "EOB TO EOF SPACE TIME" SHOULD BE SLIGHTLY LARGER THAN "WRITE EOF".

PROCEDURE TO MEASURE TIME:

- A. A RECORD AND EOF WAS PREVIOUSLY WRITTEN FROM BOT FOR "WRITE EOF" (REFERENCE 9.14).
- B. TAPE IS REWOUND TO BOT.
- C. REWRITE RECORD OVER PREVIOUSLY WRITTEN RECORD.
- D. BACKSPACE OVER RECORD JUST WRITTEN.
- E. SET BYTE RECORD COUNTER TO SPACE 2 RECORDS.
- F. ISSUE SPACE FORWARD FUNCTION, SET "GO".
- G. WAIT FOR BYTE RECORD COUNTER TO INDICATE THAT 1ST RECORD HAS BEEN SPACED OVER THEN MONITOR "TU READY" UNTIL IT BECOMES A 1. AFTER "TU READY" CHECK TO SEE IF "EOF" IS A 1 IN STATUS REGISTER. IF "EOF" NOT SET THEN ZERO TIME COUNTER.
- H. TIME FROM BYTE RECORD COUNTER --1 UNTIL "TU READY" IS "EOB TO EOF SPACE TIME".

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9.14 SPACE SHUTDOWN

SPACE SHUTDOWN IS THE AMOUNT OF TIME NECESSARY TO CONTINUE MOVING TAPE AFTER A RECORD IS SPACED OVER IN THE FORWARD DIRECTION FOR THE SAME REASONS AS "READ SHUTDOWN"

PROCEDURE TO MEASURE TIME:

- A. SPACE FORWARD FUNCTION USED TO TIME "EOR TO EOF SPACE TIME" IS USED.
- B. AFTER "EOF" BECOMES A 1, INDICATING THE END OF THE RECORD (EOF), MONITOR "SETTLEDOWN" UNTIL IT BECOMES A 1.
- C. THE TIME FROM "EOF" UNTIL "SETTLEDOWN" IS "SPACE SHUTDOWN".

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9.15 ONE INCH DATA TIME

ONE INCH OF DATA, 800 BYTES (ALSO 556 AND 200 IF 7 CHANNEL UNIT), IS WRITTEN AND TIMED TO DETERMINE IF TAPE IS MOVING AT PROPER SPEED.

PROCEDURE TO MEASURE TIME:

- A. INITIALIZE BYTE RECORD COUNTER AND CURRENT MEMORY ADDRESS.
- B. ISSUE WRITE FUNCTION, 800 BPI (OR 556, OR 200), SET "GO".
- C. WAIT FOR CURRENT MEMORY ADDRESS REGISTER TO INDICATE 2ND BYTE IS OUTPUT AND THEN MONITOR BYTE RECORD COUNTER UNTIL EQUAL TO ZERO.
- D. TIME FROM 2ND BYTE OUTPUT UNTIL BYTE RECORD COUNTER = 0 IS "ONE INCH DATA TIME"

9.16 FUNCTIONS AT 556 BPI

ALL OF THE PREVIOUS TESTS USED THE DENSITY OF 800 BPI. IF A 7 CHANNEL DRIVE IS SELECTED IT IS USEFUL TO RUN SEVERAL OF THE TESTS AGAIN USING DENSITY OF 556 BPI. REFERENCE THE PROPER PARAGRAPHS FOR A DESCRIPTION OF EACH TEST.

9.17 FUNCTIONS AT 200 BPI

SAME AS ABOVE. REFERENCE 9.17, "FUNCTIONS AT 556 BPI"

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10. STATUS AND COMMAND REGISTER BIT ASSIGNMENTS

COMMAND REGISTER

15 ERROR

14 DEN 8 00 = 200 BPI 7 TRACK 10 = 800 BPI 7 TRACK
13 DEN 5 01 = 556 BPI 7 TRACK 11 = 800 BPI 9 TRACK
12 POWER CLEAR

11 PARITY 0 = ODD 1 = EVEN
10 UNIT SEL. BIT 2
9 UNIT SEL. BIT 1

8 UNIT SEL. BIT 0
7 CONTROL UNIT READY
6 INTERRUPT ENABLE

5 ADDRESS BIT 17
4 ADDRESS BIT 16
3 FUNCTION BIT 2 000 = OFF LINE 100 = SPACE FORWARD
001 = READ 101 = SPACE REVERSE
2 FUNCTION BIT 1 010 = WRITE 110 = WRITE XIRG
1 FUNCTION BIT 0 011 = WRITE EOF 111 = REWIND
0 GO

STATUS REGISTER

15 ILLEGAL COMMAND (ILC)

14 END OF FILE (EOF)
13 CYCLICAL REDUNDANCY ERROR (CRE)
12 PARITY ERROR (PAE)

11 BUS GRANT LATE (BGL)
10 END OF TAPE (EOT)
9 RECORD LENGTH ERROR (RLE)

8 BAD TAPE ERROR (BTE)
7 NON EXISTENT MEMORY (NXM)
6 SELECT REMOTE (SELR)

5 BEGINNING OF TAPE (BOT)
4 7 CHANNEL (7CH)
3 SETTLE DOWN (SDWN)

2 WRITE LOCK (WRL)
1 REWIND STATUS (RWS)
0 TAPE UNIT READY (TUR)
.ENDR

H02

MAINDEC-11-DZTME-C-D
DZTMEC.SRC

TM,A,B-11/TU10,W,N DRIVE FUNCTION TIMER MACY11 27(732) 04-NOV-76 12:02 PAGE 21

```
747 .TITLE MAINDEC-11-DZTME-C-D TM,A,B-11/TU10,W,N DRIVE FUNCTION TIMER
748 ;COPYRIGHT: (C) 1976,1974 DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
749 ;
750 ;
751 ;SET LOC 176 WITH DESIRED CONTROL SETTINGS
752 ;LOAD ADDRESS 200, PRESS START
753 ;
754 001000 STACK=1000
755 005670 BLENTH=3000.
756 .ENABL ABS,AMA
757 .MCALL .SACT11
758 ;
759 ;TRAP CATCHER FROM 0 TO 1000
760 000000 .=0
761 ;
762 ;
763 000042
764 .SBTTL .=42 ACT11 HOOKS
765 ;
766 ;*****
767 ;HOOKS REQUIRED BY ACT11
768 000042 $SVPC=. ;SAVE PC
769 000046 .=46
770 000046 SENDAD ;;1)SET LOC.46 TO ADDRESS OF SENDAD IN .SEOP
771 000052 .=52
772 000052 .WORD 0 ;;2)SET LOC.52 TO ZERO
773 000042 .=$SVPC ;; RESTORE PC
774 ;
775 ;*****
776 ;NOTE:PROGRAM HAS BEEN MODIFIED TO RUN WITHOUT SWITCH REGISTER
777 ;*****
778 ;
779 ;
780 ;
781 ;
782 ;
783 000176 SWITCH: .=176
784 000176 000200 ;DRIVE SELECT MAP(DEFAULT=DRIVE 0;9 TRK)
785 ;
786 000200 .=200
787 000200 000137 001046 JMP START
788 001000 .=1000
789 001000 172520 MTS: 172520
790 001002 172522 MTC: 172522
791 001004 172524 BC: 172524
792 001006 172526 CA: 172526
793 001010 172530 MTD: 172530
794 001012 172532 MTRD: 172532
795 001014 177570 SWR: 177570
796 001016 177560 TKS: 177560
797 001020 177562 TKB: 177562
798 001022 177564 TPS: 177564
799 001024 177566 TPB: 177566
800 001026 000224 MTV: 224
801 001030 177776 CC: 177776
802 001032 000000 RIO: 0
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803 001034 000000
804 001036 000000
805 001040 000000
806 001042 000000
807 001044 000000
808

R11: 0
R12: 0
R13: 0
TSDRV: 0
TIIT: 0

```

809 001046 012706 001000          START:  MOV    #STACK,%6      ;INITIALIZE STACK
810 001052 012777 000340 177750    MOV    #340,%CC      ;SET PRIORITY LEVEL 7
811 001050 012737 011412 010406    MOV    #MSG28,MESAGE
812 001066 004737 010266          JSR    %7, TOP      ;PRINT TITLE
813 001072 122737 000004 000041    CMPB   #4,%#41      ;SEE IF LOAD MEDIUM
814 001100 001007          BNE    ST0          ;IF NOT: BR
815 001102 012737 012013 010406    MOV    #MSG31,MESAGE
816 001110 004737 010266          JSR    %7, TOP      ;PRINT NO TEST
817 001114 000137 007142          JMP    T13          ;END TEST
818 001120 013737 000176 007320    ST0:   MOV    SWITCH,DRIVES ;SAVE DRIVES SELECTED
819 001126 001006          BNE    1$
820 001130 012737 011727 010406    MOV    #MSG30,MESAGE
821 001136 004737 010266          JSR    %7, TOP
822 001142 000000          HALT
823 001144 004737 007204          1$:   JSR    %7,RSFDRV   ;RESET DRIVES
824 001150 004737 007422          ST1:  JSR    %7,STRREW ;START REWIND
825 001154 004737 007250          JSR    %7,CHGDRV   ;DONE ALL DRIVES?
826 001160 000773          BR     ST1         ;NO
827 001162 004737 007462          ST2:  JSR    %7,WATREW ;WAIT FOR BOT
828 001166 004737 007250          JSR    %7,CHGDRV   ;DONE ALL DRIVES?
829 001172 000773          BR     ST2         ;NO
830
831          ;PRINT HEADER
832
833 001174 012737 010410 010406          MOV    #MSG2,MESAGE
834 001202 004737 010266          JSR    %7, TOP
835 001206 012737 010434 010406    ST3:  MOV    #MSG2A,MESAGE ;PRINT "FUNCTION"
836 001214 004737 010266          JSR    %7, TOP
837 001220 013737 007322 010250    MOV    FDRIVE,DIGIT ;PRINT "UNIT"
838 001226 000337 010250          SWAB   DIGIT
839 001232 042737 177770 010250    BIC    #177770,DIGIT
840 001240 052737 000060 010250    BIS    #60,DIGIT
841 001246 105777 177550          TSTB   %TP5
842 001252 100375          BPL    -4
843 001254 013777 010250 177542    MOV    DIGIT,%TPB   ;PRINT DRIVE "NUMBER"
844 001262 004737 007250          JSR    %7,CHGDRV   ;DONE ALL DRIVES?
845 001266 000747          BR     ST3         ;NO
846 001270 004737 007402          JSR    %7,ST1S     ;STORE ONES IN WRITE BUFFER
    
```

K02

MAINDEC-11-DZTME-C-D TM,A,B-11/TU10,W,N DRIVE FUNCTION TIMER MACY11 27(732) 04-NOV-76 12:02 PAGE 24
 DZTMEC.SRC ACT11 HOOKS

```

847                                     ;TIME WRITE FROM BOT DELAY, AND WRITE SHUTDOWN
848
849 001274 012700 007550      T1:   MOV      #TM1,%0      ;INITIALIZE TIME BUFFERS
850 001300 012701 007574      MOV      #TM2,%1
851 001304 004737 007364      T1A:  JSR      %7,WRINT
852 001310 013777 007322 177464  MOV      FDRIVE,%MTC  ;SELECT DRIVE
853 001316 052777 040005 177456  BIS      #40005,%MTC  ;800 BPI, WRITE, GO
854 001324 005037 007546      CLR
855 001330 022777 012052 177450  T1B:  CMP      #WBUF+2,%CA  ;IS 2ND WORD OUTPUT?
856 001336 003403      BLE      T1C          ;YES
857 001340 004737 007524      JSR      %7,TIMER    ;NO, COUNT TIME
858 001344 000771      BR      T1B
859 001346 013720 007546      T1C:  MOV      TIME,(0)+  ;SAVE "WRITE FROM BOT DELAY" TIME
860 001352 005037 007546      CLR      TIME
861 001356 005777 177422      TST      @BC
862 001362 001375      BNE      .-4
863 001364 032777 000010 177406  T1D:  BIT      #10,%MTS    ;SEE IF WORD COUNT DONE
864 001372 001003      BNE      T1E          ;IF NOT: BR
865 001374 004737 007524      JSR      %7,TIMER    ;HAS SETTLEDOWN SET?
866 001400 000771      BR      T1D          ;YES
867 001402 013721 007546      T1E:  MOV      TIME,(1)+  ;NO, COUNT TIME
868 001406 004737 007250      JSR      %7,CHGDRV   ;SAVE "WRITE SHUTDOWN" TIME
869 001412 000734      BR      T1A          ;DONE ALL DRIVES
870 001414 012720 177777      MOV      #-1,(0)+    ;NO
871 001420 012721 177777      MOV      #-1,(1)+    ;TERMINATE TIMES
872 001424 012737 010450 010406  MOV      #MSG3,MESAGE ;TERMINATE TIMES
873 001432 012700 007550      MOV      #TM1,%0
874 001436 004737 010010      JSR      %7,TYPTIM   ;PRINT "WRITE FROM BOT DELAY" TIMES
875 001442 012737 010476 010406  MOV      #MSG4,MESAGE
876 001450 012700 007574      MOV      #TM2,%0
877 001454 004737 010010      JSR      %7,TYPTIM   ;PRINT "WRITE SHUTDOWN" TIMES

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878                                     ;TIME WRITE START AND SETTLEDOWN DELAY
879
880 001460 004737 007204          T2:   JSR   %7,RSFDRV      ;RESET DRIVE SELECTION
881 001464 012700 007550          MOV   #TM1,%0
882 001470 012701 007574          MOV   #TM2,%1
883 001474 004737 007364          T2A: JSR   %7,WRINT
884 001500 013777 007322 177274  MOV   FDRIVE,%MTC      ;SELECT DRIVE
885 001506 052777 040005 177266  BIS   #40005,%MTC      ;800 BPI, WRITE, GO
886 001514 005037 007546          CLR   TIME
887 001520 022777 012052 177260  T2B:  CMP   #WBUF+2,%CA   ;IS 2ND WORD OUTPUT
888 001526 003403                BLE   T2C              ;YES
889 001530 004737 007524          JSR   %7,TIMER        ;NO, COUNT TIME
890 001534 000771                BR    T2B
891 001536 013720 007546          T2C:  MOV   TIME,(0)+    ;SAVE "WRITE START" TIME
892 001542 005037 007546          CLR   TIME
893 001546 005777 177232          TST   @BC
894 001552 001375                BNE   .-4
895 001554 032777 000010 177216  BIT   #10,%MTC
896 001562 001774                BEQ   .-6              ;WAIT FOR SETTLEDOWN TO SET
897 001564 006077 177210          T2D:  ROR   %MTC
898 001570 103403                BCS   T2E              ;WAIT FOR TU READY
899 001572 004737 007524          JSR   %7,TIMER
900 001576 000772                BR    T2D
901 001600 013721 007546          T2E:  MOV   TIME,(1)+    ;SAVE "SETTLEDOWN" TIME
902 001604 004737 007250          JSR   %7,CHGDRV
903 001610 000731                BR    T2A
904 001612 012720 177777          MOV   #-1,(0)+        ;TERMINATE TIMES
905 001616 012721 177777          MOV   #-1,(1)+        ;TERMINATE TIMES
906 001622 012737 010524 010406  MOV   #MSG5,MESAGE
907 001630 012700 007550          MOV   #TM1,%0
908 001634 004737 010010          JSR   %7,TYPTIM       ;PRINT "WRITE START" TIMES
909 001640 012737 010552 010406  MOV   #MSG6,MESAGE
910 001646 012700 007574          MOV   #TM2,%0
911 001652 004737 010010          JSR   %7,TYPTIM       ;PRINT "SETTLEDOWN" TIMES

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M02

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912          :TIME WRITE TO ERASE HEAD
913          :LONG RECORD WAS PREVIOUSLY WRITTEN
914          :WRITE A 3 BYTE RECORD AND POWER CLEAR
915          :DISTANCE FROM NEW DATA TO OLD IS
916          :ERASE HEAD DISTANCE
917
918 001656 004737 007422 T3: JSR %7,STRREW ;START REWIND
919 001662 004737 007250 JSR %7,CHGDRV ;DONE ALL DRIVES?
920 001666 000773 BR T3 ;NO
921 001670 004737 007462 T3A: JSR %7,WATREW ;IS DRIVE AT BOT?
922 001674 004737 007250 JSR %7,CHGDRV ;DONE ALL DRIVES
923 001700 000773 BR T3A ;NO
924 001702 012777 177775 177074 T3B: MOV #-3,@BC ;3 BYTE RECORD
925 001710 012777 012050 177070 MOV #WBUF,@CA ;INITIALIZE CURRENT ADDRESS
926 001716 013777 007322 177056 MOV FDRIVE,@MTC ;SELECT DRIVE
927 001724 052777 040005 177050 BIS #40005,@MTC ;800BPI, WRITE, GO
928 001732 005777 177046 TST @BC
929 001736 001375 BNE .-4
930 001740 052777 010000 177034 BIS #10000,@MTC ;POWER CLEAR
931 001746 004737 007422 JSR %7,STRREW ;START REWIND
932 001752 004737 007250 JSR %7,CHGDRV ;DONE ALL DRIVES
933 001756 000751 BR T3B ;NO
934 001760 004737 007462 T3C: JSR %7,WATREW ;DRIVE AT BOT
935 001764 004737 007250 JSR %7,CHGDRV ;DONE ALL DRIVES
936 001770 000773 BR T3C ;NO
937
938          :NOW THAT ALL DRIVES ARE AT BOT AGAIN
939          :READ OVER PARTIAL RECORD
940
941 001772 012700 007550 T3D: MOV #TM1,%D
942 001776 012777 177775 177000 MOV #-3,@BC
943 002004 012777 012050 176774 MOV #WBUF,@CA
944 002012 013777 007322 176762 MOV FDRIVE,@MTC ;SELECT DRIVE
945 002020 052777 040003 176754 BIS #40003,@MTC ;800BPI, READ, GO
946 002026 005037 007546 CLR TIME ;CLEAR TIME
947 002032 022777 177777 176744 CMP #-1,@BC
948 002040 001374 BNE .-6
949 002042 005777 176736 T3E: TST @BC ;WAIT FOR NEXT WORD IN
950 002046 001403 BEQ T3F ;HAVE IT
951 002050 004737 007524 JSR %7,TIMER ;NO, COUNT TIME
952 002054 000772 BR T3E
953 002056 013720 007546 T3F: MOV TIME,(D)+ ;SAVE "WRITE TO ERASE HEAD TIME"
954 002062 006077 176712 ROR @MTC
955 002066 103375 BCC .-4 ;AWAIT TUR
956 002070 004737 007250 JSR %7,CHGDRV ;DONE ALL DRIVES
957 002074 000740 BR T3D ;NO
958 002076 012720 177777 MOV #-1,(D)+ ;TERMINATE TIMES
959 002102 012737 010600 010406 MOV #MSG7,MESSAGE
960 002110 012700 007550 MOV #TM1,%D
961 002114 004737 010010 JSR %7,TYPTIM ;PRINT "WRITE TO ERASE HEAD TIMES"
962 002120 004737 007422 T3G: JSR %7,STRREW ;START REWIND
963 002124 004737 007250 JSR %7,CHGDRV ;DONE ALL DRIVES
964 002130 000773 BR T3G ;NO
965 002132 004737 007462 T3H: JSR %7,WATREW ;DRIVE AT BOT
966 002136 004737 007250 JSR %7,CHGDRV ;DONE ALL DRIVES
967 002142 000773 BR T3H ;NO
    
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968                                     ; TIME WRITE NONSTOP GAP, BACKSPACE SHUTDOWN AND READ SHUTDOWN
969                                     ; WRITE ONE RECORD, FOLLOW WITH ONE RECORD NONSTOP
970                                     ; FOLLOWED BY ONE RECORD START-STOP
971                                     ; FOLLOWED BY WRITE-BACKSPACE-READ-WRITE
972                                     ; FOLLOWED BY WRITE-BACKSPACE-WRITE
973
974 002144 004737 007402 T4: JSR %7,ST1S
975 002150 012700 007550 MOV #TM1,%0 ; INITIALIZE TIME BUFFERS
976 002154 012701 007574 MOV #TM2,%1
977 002160 012702 007620 MOV #TM3,%2
978 002164 005037 007546 T4AA: CLR TIME
979 002170 004737 007364 JSR %7,WRINT
980 002174 013777 007322 176600 MOV FDRIVE,%MTC ; TRACK AND DRIVE NUMBERS
981 002202 052777 040005 176572 BIS #40005,%MTC ; 800 BPI, WRITE, GO
982 002210 000240 NOP
983 002212 032777 000001 176560 BIT #1,%MTC
984 002220 001774 BEQ .-6 ; AWAIT TUR
985
986                                     ; HAVE FIRST RECORD WRITTEN, GO NONSTOP
987
988 002222 004737 007364 JSR %7,WRINT
989 002226 005277 176550 INC %MTC ; GO
990 002232 022777 012052 176546 T4A: CMP #WBUF+2,%CA ; IS 2ND WORD OUTPUT?
991 002240 003403 BLE T4B ; YES
992 002242 004737 007524 JSR %7,TIMER ; NO, COUNT TIME
993 002246 000771 BR T4A
994 002250 013720 007546 T4B: MOV TIME,(0)+ ; SAVE "WRITE NONSTOP GAP" TIME
995 002254 005037 007546 CLR TIME
996 002260 105777 176516 TSTB %MTC
997 002264 100375 BPL .-4 ; WAIT FOR CU READY
998 002266 006077 176506 ROR %MTC
999 002272 103375 BCC .-4 ; WAIT FOR TU READY
1000
1001                                     ; WRITE-BACKSPACE-READ-WRITE
1002
1003 002274 004737 007364 JSR %7,WRINT
1004 002300 013777 007322 176474 MOV FDRIVE,%MTC ; DRIVE SELECT
1005 002306 052777 040007 176466 BIS #40007,%MTC ; 800 BPI, WRITE EOF, GO
1006 002314 105777 176462 TSTB %MTC
1007 002320 100375 BPL .-4 ; WAIT FOR CU READY
1008 002322 006077 176452 ROR %MTC
1009 002326 103375 BCC .-4 ; AWAIT TUR
1010 002330 012777 177777 176446 MOV #-1,%BC ; BACKSPACE 1 RECORD
1011 002336 042777 000016 176436 BIC #16,%MTC
1012 002344 052777 000013 176430 FIS #13,%MTC ; SPACE REVERSE, GO
1013 002352 000240 NOP
1014 002354 032777 040000 176416 T4BA: BIT #40000,%MTC ; SEE IF EOF
1015 002362 001774 BEQ T4BA ; IF NOT: BR
1016 002364 000240 NOP
1017 002366 000240 NOP
1018 002370 032777 000010 176402 T4C: BIT #10,%MTC ; HAS SETTLEDOWN SET?
1019 002376 001003 BNE T4D ; YES
1020 002400 004737 007524 JSR %7,TIMER ; NO, COUNT TIME
1021 002404 000771 BR T4C
1022 002406 006077 176366 T4D: ROR %MTC
1023 002412 103375 BCC .-4 ; WAIT FOR TU READY
    
```

1024	002414	013721	007546		MOV	TIME,(1)+	;SAVE "BACKSPACE SHUTDOWN" TIME
1025	002420	004737	007364		JSR	%7,WRINT	
1026	002424	005037	007546		CLR	TIME	
1027	002430	013777	007322	176344	MOV	FDRIVE,%MTC	;SELECT DRIVE
1028	002436	052777	040003	176336	BIS	#40003,%MTC	;800 BPI, READ, GO
1029	002444	032777	040000	176326	BIT	#40000,%MTC	
1030	002452	001774			SEQ	T4DA	;AWAIT EOF
1031	002454	032777	000010	176316	BIT	#10,%MTC	;HAS SETTLEDOWN SET?
1032	002462	001003			BNE	T4F	;YES
1033	002464	004737	007524		JSR	%7,TIMER	;NO, COUNT, TIME
1034	002470	000771			BR	T4E	
1035	002472	006077	176302		ROR	%MTC	
1036	002476	103375			BCC	-4	;WAIT FOR TU READY
1037	002500	013722	007546		MOV	TIME,(2)+	;SAVE "READ SHUTDOWN" TIME
1038	002504	004737	007250		JSR	%7,CHGDRV	
1039	002510	000625			BR	T4AA	
1040	002512	012720	177777		MOV	#-1,(0)+	;TERMINATE TIMES
1041	002516	012721	177777		MOV	#-1,(1)+	;TERMINATE TIMES
1042	002522	012722	177777		MOV	#-1,(2)+	;TERMINATE TIMES
1043	002526	012737	010654	010406	MOV	#MSG9,MESSAGE	
1044	002534	012700	007574		MOV	#TM2,%0	
1045	002540	004737	010010		JSR	%7,TYPTIM	;PRINT "BACKSPACE SHUTDOWN" TIMES
1046	002544	012737	010702	010406	MOV	#MSG10,MESSAGE	
1047	002552	012700	007620		MOV	#TM3,%0	
1048	002556	004737	010010		JSR	%7,TYPTIM	;PRINT "READ SHUTDOWN" TIMES
1049	002562	004737	007402		JSR	%7,ST1S	
1050	002566	004737	007422		JSR	%7,STRREW	;START REWIND
1051	002572	004737	007250		JSR	%7,CHGDRV	;CHANGE DRIVE
1052	002576	000773			BR	T4FA	
1053	002600	004737	007462		JSR	%7,WATREW	;AWAIT BOT
1054	002604	004737	007250		JSR	%7,CHGDRV	;CHANGE DRIVE
1055	002610	000773			BR	T4FB	
1056	002612	000240			NOP		
1057	002614	004737	007364		JSR	%7,WRINT	;SET UP FOR WRITE
1058	002620	013777	007322	176154	MOV	FDRIVE,%MTC	;SET DRIVE NUMBER
1059	002626	052777	040005	176146	BIS	#40005,%MTC	;SET 800 BPI, WRITE, GO
1060	002634	105777	176142		TSTB	%MTC	
1061	002640	100375			BPL	-4	;AWAIT CUR
1062	002642	006077	176132		ROR	%MTC	
1063	002646	103375			BCC	-4	;AWAIT TUR
1064	002650	000240			NOP		
1065	002652	004737	007364		JSR	%7,WRINT	;SET UP FOR NEXT WRITE
1066	002656	005277	176120		INC	%MTC	;SET GO
1067	002662	105777	176114		TSTB	%MTC	
1068	002666	100375			BPL	-4	;AWAIT CUR
1069	002670	006077	176104		ROR	%MTC	
1070	002674	103375			BCC	-4	;AWAIT TUR
1071	002676	004737	007364		JSR	%7,WRINT	;SET UP FOR NEXT WRITE
1072	002702	005277	176074		INC	%MTC	;SET GO
1073	002706	105777	176070		TSTB	%MTC	
1074	002712	100375			BPL	-4	;AWAIT CUR
1075	002714	006077	176060		ROR	%MTC	
1076	002720	103375			BCC	-4	;AWAIT TUR
1077	002722	004737	007250		JSR	%7,CHGDRV	;CHANGE DRIVE
1078	002726	000732			BR	T4FC	
1079	002730	000240			NOP		

C03

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1090

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1081
1082
1083
1084 002732 004737 007364
1085 002736 013777 007322 176036
1086 002744 052777 040005 176030
1087 002752 105777 176024
1088 002756 100375
1089 002760 006077 176014
1090 002764 103375
1091 002766 004737 007364
1092 002772 005277 176004
1093 002776 105777 176000
1094 003002 100375
1095 003004 006077 175770
1096 003010 103375
1097 003012 012777 177777 175764
1098 003020 013777 007322 175754
1099 003026 052777 040013 175746
1100 003034 105777 175742
1101 003040 100375
1102 003042 006077 175732
1103 003046 103375
1104 003050 004737 007364
1105 003054 013777 007322 175720
1106 003062 052777 040005 175712
1107 003070 105777 175706
1108 003074 100375
1109 003076 006077 175676
1110 003102 103375
1111 003104 012737 177777 001034
1112 003112 012737 177777 001036
1113 003120 012737 177777 001040
1114 003126 012737 177776 001032

;WRITE RECORDS TO BE USED IN GAP TEST
T4G: JSR %7,WRINT
      MOV FDRIVE,%MTC ;SELECT DRIVE
      BIS #40005,%MTC ;800 BPI, WRITE, GO
      TSTB %MTC
      BPL -4 ;WAIT FOR CU READY
      ROR %MTC
      BCC -4 ;AWAIT TUR
      JSR %7,WRINT
      INC %MTC ;GO NONSTOP
      TSTB %MTC
      BPL -4 ;WAIT FOR CU READY
      ROR %MTC
      BCC -4 ;AWAIT TUR
      MOV #-1,%ABC
      MOV FDRIVE,%MTC ;SELECT DRIVE
      BIS #40013,%MTC ;800 BPI, BACKSPACE, GO
      TSTB %MTC
      BPL -4 ;WAIT FOR CU READY
      ROR %MTC
      BCC -4 ;AWAIT TUR
      JSR %7,WRINT
      MOV FDRIVE,%MTC
      BIS #40005,%MTC ;800 BPI, WRITE, GO
      TSTB %MTC
      BPL -4
      ROR %MTC
      BCC -4 ;AWAIT TUR
      MOV #-1,R11 ;INDICATES BACK 3 COMPLETE
      MOV #-1,R12 ;INDICATES BACK 4 COMPLETE
      MOV #-1,R13 ;INDICATES BACK 5 COMPLETE
      MOV #-2,R10 ;FIRST SEQUENCE BACK 2 TIMES
    
```

E03

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1115                                     :NOW WRITE, BACKSPACE, WRITE, BACKSPACE, WRITE
1116                                     :GAP SHOULD GET LARGER
1117
1118 003134 004737 007364      MULWRT: JSR      %7,WRINT
1119 003140 005277 175636      INC      @MTC           ;GO NONSTOP
1120 003144 105777 175632      TSTB    @MTC
1121 003150 100375              BPL     .-4           ;WAIT FOR DONE
1122 003152 006077 175622      ROR     @MTC
1123 003156 103375              BCC     .-4           ;AWAIT TUR
1124 003160 012777 177777 175616 MULBAK: MOV     #-1,@BC  ;BACKSPACE 1 RECORD
1125 003166 042777 000016 175606 BIC     #16,@MTC
1126 003174 052777 000013 175600 BIS     #13,@MTC      ;SET BACKSPACE, GO
1127 003202 105777 175574      TSTB    @MTC
1128 003206 100375              BPL     .-4           ;WAIT FOR BACKSPACE DONE
1129 003210 006077 175564      ROR     @MTC
1130 003214 103375              BCC     .-4           ;AWAIT TUR
1131 003216 004737 007364      JSR     %7,WRINT
1132 003222 042777 000016 175552 BIC     #16,@MTC
1133 003230 052777 000005 175544 BIS     #5,@MTC      ;SET WRITE, GO
1134 003236 105777 175540      TSTB    @MTC
1135 003242 100375              BPL     .-4           ;WAIT FOR WRITE DONE
1136 003244 006077 175530      ROR     @MTC
1137 003250 103375              BCC     .-4           ;AWAIT TUR
1138 003252 005237 001032      INC     R10          ;BACKSPACED ENOUGH TIMES?
1139 003256 001340              BNE     MULBAK      ;NO BACKSPACE AND WRITE AGAIN
1140 003260 005237 001034      INC     R11          ;DONE 3 BACKSPACE SEQUENCES?
1141 003264 001004              BNE     MUL1        ;YES
1142 003266 012737 177775 001032 MOV     #-3,R10
1143 003274 000717              BR      MULWRT
1144 003276 005237 001036      MUL1:  INC     R12          ;DONE 4 BACKSPACE SEQUENCES?
1145 003302 001004              BNE     MUL2        ;YES
1146 003304 012737 177774 001032 MOV     #-4,R10
1147 003312 000710              BR      MULWRT
1148 003314 005237 001040      MUL2:  INC     R13          ;DONE 5 BACKSPACE SEQUENCES?
1149 003320 001004              BNE     MUL3        ;YES
1150 003322 012737 177773 001032 MOV     #-5,R10
1151 003330 000701              BR      MULWRT
1152 003332 006077 175442      MUL3:  ROR     @MTC
1153 003336 103375              BCC     .-4           ;WAIT FOR TU READY
1154 003340 004737 007422      JSR     %7,STRREW    ;START REWIND
1155 003344 004737 007250      JSR     %7,CHGDRV
1156 003350 000137 002732      JMP     T4G
  
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F03

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1157                                     ;NOW READ NONSTOP
1158                                     ;ACCUMULATE GAP TIMES ON READ
1159                                     ;TYPE ACCUMULATED TIMES AT END OF READ
1160                                     ;GAP1 SHOULD = GAP2, GAP3 < GAP1 AND GAP2
1161                                     ;GAP4 THRU GAP8 SHOULD GET INCREASINGLY LONGER
1162 003354 005037 001042                CLR      T5DRV
1163
1164 003360 004737 007462                T5:     JSR      %7, WATREW
1165 003364 004737 007364                JSR      %7, WRINT
1166 003370 012700 007550                MOV      #TM1, %0
1167 003374 063700 001042                ADD      T5DRV, %0
1168 003400 013777 007322 175374        MOV      FDRIVE, %MTC                ;SELECT DRIVE
1169 003406 052777 040003 175366        BIS      #40003, %MTC                ;800 BPI, READ, GO
1170 003414 012737 177770 001032        MOV      #-8, R10                    ;COUNT 8 GAPS
1171 003422 105777 175354                T5A:    TSTB     %MTC
1172 003426 100375                      BPL      .-4                          ;WAIT FOR CU READY
1173 003430 006077 175344                ROR      %MTC
1174 003434 103375                      BCC      .-4                          ;AWAIT TUR
1175 003436 004737 007364                JSR      %7, WRINT
1176 003442 005037 007546                CLR      TIME
1177 003446 005277 175330                INC      %MTC                          ;GO NONSTOP
1178 003452 022777 012052 175326        T5B:    CMP      #WBUF+2, %CA            ;IS 2ND WORD OUTPUT
1179 003460 003403                      BLE      T5C                          ;YES
1180 003462 004737 007524                JSR      %7, TIMER                    ;NO, COUNT TIME
1181 003466 000771                      BR       T5B
1182 003470 013720 007546                T5C:    MOV      TIME, (0)+                ;SAVE GAP TIME
1183 003474 012710 177777                MOV      #-1, (0)                    ;TERMINATE, JUST IN CASE AT END
1184 003500 062700 000022                ADD      #22, %0                      ;STEP GAP POINTER
1185 003504 005237 001032                INC      R10                          ;DONE ALL 8 GAPS?
1186 003510 001344                      BNE      T5A                          ;NO
1187 003512 006077 175262                ROR      %MTC
1188 003516 103375                      BCC      .-4                          ;WAIT FOR TU READY
1189 003520 004737 007422                JSR      %7, STREW                     ;START REWIND
1190 003524 062737 000002 001042        ADD      #2, T5DRV                    ;+2 TO DRIVE TIME POINTER
1191 003532 004737 007250                JSR      %7, CHGDRV
1192 003536 000710                      BR       T5
1193 003540 112737 000061 011007        MOVB     #'1, MSG11A+6
1194 003546 012737 010730 010406        MOV      #MSG11, MESSAGE
1195 003554 004737 010266                JSR      %7, TOP
1196 003560 012737 011001 010406        MOV      #MSG11A, MESSAGE
1197 003566 012700 007550                MOV      #TM1, %0
1198 003572 004737 010010                JSR      %7, TYPTIM                    ;PRINT "GAP 1"
1199 003576 105237 011007                INCB     MSG11A+6
1200 003602 012737 011001 010406        MOV      #MSG11A, MESSAGE
1201 003610 012700 007574                MOV      #TM2, %0
1202 003614 004737 010010                JSR      %7, TYPTIM                    ;PRINT "GAP 2"
1203 003620 105237 011007                INCB     MSG11A+6
1204 003624 012737 011001 010406        MOV      #MSG11A, MESSAGE
1205 003632 012700 007620                MOV      #TM3, %0
1206 003636 004737 010010                JSR      %7, TYPTIM                    ;PRINT "GAP 3"
1207 003642 105237 011007                INCB     MSG11A+6
1208 003646 012737 011001 010406        MOV      #MSG11A, MESSAGE
1209 003654 012700 007644                MOV      #TM4, %0
1210 003660 004737 010010                JSR      %7, TYPTIM                    ;PRINT "GAP 4"
1211 003664 105237 011007                INCB     MSG11A+6
1212 003670 012737 011001 010406        MOV      #MSG11A, MESSAGE
  
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1269 004234 004737 007422      JSR      %7, STREW
1270 004240 004737 007250      JSR      %7, CHGDRV
1271 004244 000661                BR       T6A
1272 004246 012720 177777      MOV      #-1, (0)+      ; TERMINATE TIMES
1273 004252 012721 177777      MOV      #-1, (1)+      ; TERMINATE TIMES
1274 004256 012737 010524 010406  MOV      #MSG5, MESSAGE
1275 004264 012700 007550      MOV      #TM1, %0
1276 004270 004737 010010      JSR      %7, TYPTIM      ; TYPE "WRITE START" TIME
1277 004274 012737 011027 010406  MOV      #MSG12, MESSAGE
1278 004302 012700 007574      MOV      #TM2, %0
1279 004306 004737 010010      JSR      %7, TYPTIM      ; TYPE "WRITE XIRG" TIME
1280 004312 004737 007462      JSR      %7, WATREW
1281 004316 004737 007250      JSR      %7, CHGDRV
1282 004322 000773                BR       T6F              ; WAIT FOR ALL DRIVES AT BOT.
1283
1284                                ; NOW TIME "READ FROM BOT DELAY
1285
1286 004324 012700 007550      T7:     MOV      #TM1, %0
1287 004330 005037 007546      T7A:    CLR      TIME
1288 004334 004737 007364      JSR      %7, WRINT
1289 004340 013777 007322 174434  MOV      FDRIVE, @MTC      ; SELECT DRIVE
1290 004346 052777 040003 174426  BIS      #40003, @MTC      ; 800 BPI, READ GO
1291 004354 022777 012052 174424  T7B:    CMP      #WBUF+2, @CA  ; IS 2ND WORD INPUT?
1292 004362 003403                BLE      T7C              ; YES
1293 004364 004737 007524      JSR      %7, TIMER        ; NO COUNT TIME
1294 004370 000771                BR       T7B
1295 004372 013720 007546      T7C:    MOV      TIME, (0)+      ; SAVE "READ FROM BOT" TIME
1296 004376 105777 174400      TSTB    @MTC
1297 004402 100375                BPL      -4              ; WAIT FOR CU READY.
1298 004404 006077 174370      ROR      @MTC
1299 004410 103375                BCC      -4              ; AWAIT TUR
1300 004412 004737 007250      JSR      %7, CHGDRV        ; DONE ALL DRIVES?
1301 004416 000744                BR       T7A              ; NO
1302 004420 006077 174354      ROR      @MTC
1303 004424 103375                BCC      -4
1304 004426 012720 177777      MOV      #-1, (0)+      ; TERMINATE TIMES
1305 004432 012737 011055 010406  MOV      #MSG13, MESSAGE
1306 004440 012700 007550      MOV      #TM1, %0
1307 004444 004737 010010      JSR      %7, TYPTIM        ; PRINT "READ FROM BOT" TIME
1308 004450 004737 007402      JSR      %7, ST1S
1309
1310 004454 004737 007422      T8:     JSR      %7, STREW      ; REWIND
1311 004460 004737 007250      JSR      %7, CHGDRV        ; ANYMORE DRIVES?
1312 004464 000773                BR       T8              ; YES
1313 004466 012720 177777      MOV      #-1, (0)+      ; TERMINATE TIMES
1314 004472 004737 007462      T8A:    JSR      %7, WATREW
1315 004476 004737 007250      JSR      %7, CHGDRV
1316 004502 000773                BR       T8A
1317
1318                                ; TIME "WRITE EOF"
1319                                ; WRITE A 3 BYTE RECORD FROM BOT FOLLOWED BY AN EOF.
1320
1321 004504 012700 007550      T9:     MOV      #TM1, %0
1322 004510 005037 007546      T9A:    CLR      TIME
1323 004514 012777 177775 174262  MOV      #-3, @BC
1324 004522 012777 012050 174256  MOV      #WBUF, @CA      ; WRITE 3 BYTES
  
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1325	004530	013777	007322	174244		MOV	FDRIVE, @MTC	;SELECT DRIVE
1326	004536	052777	040005	174236		BIS	#40005, @MTC	;800 BPI, WRITE, GO
1327	004544	105777	174232			TSTB	@MTC	
1328	004550	100375				BPL	-4	
1329	004552	006077	174222			ROR	@MTS	
1330	004556	103375				BCC	-4	;WAIT FOR TU READY
1331	004560	042777	000016	174214		BIC	#16, @MTC	
1332	004566	052777	000007	174206		BIS	#7, @MTC	;WRITE EOF, GO
1333	004574	105777	174202		T9B:	TSTB	@MTC	;IS CU READY SET?
1334	004600	100403				BMI	1\$;YES
1335	004602	004737	007524			JSR	%7, TIMER	;NO, COUNT TIME
1336	004606	000772				BR	T9B	
1337	004610	006077	174164		1\$:	ROR	@MTS	
1338	004614	103403				BCS	T9C	;IF TUR: BR
1339	004616	004737	007524			JSR	%7, TIMER	;ELSE CONTINUE TIMER
1340	004622	000772				BR	1\$	
1341	004624	013720	007546		T9C:	MOV	TIME, (0)+	;SAVE "WRITE EOF" TIME
1342	004630	004737	007422			JSR	%7, STRREW	;REWIND
1343	004634	004737	007250			JSR	%7, CHGDRV	;ANYMORE DRIVES?
1344	004640	000723				BR	T9A	;YES
1345	004642	012720	177777			MOV	#-1, (0)+	;TERMINATE TIMES
1346	004646	012737	011131	010406		MOV	#MSG15, MESSAGE	
1347	004654	012700	007550			MOV	#TM1, %0	
1348	004660	004737	010010			JSR	%7, TYPTIM	;PRINT "WRITE EOF" TIMES
1349	004664	004737	007462		T9D:	JSR	%7, WATREW	
1350	004670	004737	007250			JSR	%7, CHGDRV	
1351	004674	000773				BR	T9D	

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1352                                     ; TIME "EOR TO EOF SPACE TIME", "SPACE SHUTDOWN" AND "ONE INCH DATA TIME".
1353                                     ; WRITE A 3 BYTE RECORD OVER ONE PREVIOUSLY WRITTEN
1354                                     ; BACKSPACE 1 RECORD AND THEN SPACE FORWARD 2 RECORDS
1355                                     ; TIME FROM THE END OF FIRST RECORD UNTIL EOF IS REACHED
1356
1357 004676 012700 007550 T10:  MOV      #TM1,%0
1358 004702 012701 007574      MOV      #TM2,%1
1359 004706 012702 007620      MOV      #TM3,%2
1360 004712 005037 007546 T10A: CLR      TIME
1361 004716 012777 177775 174060      MOV      #-3,%BC      ; 3 BYTE RECORD
1362 004724 012777 012050 174054      MOV      #WBUF,%CA
1363 004732 013777 007322 174042      MOV      FDRIVE,%MTC  ; SELECT DRIVE
1364 004740 052777 040005 174034      BIS      #40005,%MTC  ; 800 BPI, WRITE, GO
1365 004746 105777 174030      TSTB    %MTC
1366 004752 100375      BPL     -4      ; WAIT FOR CU READY
1367 004754 006077 174020      ROR     %MTC
1368 004760 103375      BCC     -4      ; AWAIT TUR
1369 004762 012777 177777 174014      MOV      #-1,%BC      ; BACKSPACE 1 RECORD
1370 004770 042777 000016 174004      BIC     #16,%MTC      ; SELECT DRIVE
1371 004776 052777 000013 173776      BIS     #13,%MTC      ; BACKSPACE, GO
1372 005004 105777 173772      TSTB    %MTC
1373 005010 100375      BPL     -4      ; WAIT FOR CU READY
1374 005012 006077 173762      ROR     %MTC
1375 005016 103375      BCC     -4      ; AWAIT TUR
1376 005020 012777 177776 173756      MOV      #-2,%BC      ; SPACE FORWARD 2 RECORDS
1377 005026 042777 000016 173746      BIC     #16,%MTC
1378 005034 052777 000011 173740      BIS     #11,%MTC
1379 005042 022777 177777 173734 T10B:  CMP     #-1,%BC
1380 005050 001374      BNE     T10B      ; WAIT FOR 1ST RECORD TO BE SPACED OVER
1381 005052 032777 040000 173720 T10C:  BIT     #40000,%MTC  ; IS EOF SET?
1382 005060 001014      BNE     T10D      ; YES
1383 005062 006077 173712      ROR     %MTC
1384 005066 103403      BCS     T10CC
1385 005070 004737 007524      JSR     %7,TIMER  ; AWAIT TUR
1386 005074 000766      BR     T10C      ; NO, COUNT TIME
1387 005076 032777 040000 173674 T10CC: BIT     #40000,%MTC  ; HAVE TU READY
1388 005104 001002      BNE     T10D      ; IS EOF SET?
1389 005106 005037 007546      CLR     TIME      ; NO, SET ERROR
1390 005112 013720 007546 T10D:  MOV     TIME,(0)+ ; SAVE "EOR TO EOF SPACE TIME"
1391 005116 005037 007546      CLR     TIME
1392 005122 000240      NOP
1393 005124 000240      NOP
1394 005126 000240      NOP
1395 005130 032777 000010 173642 T10E:  BIT     #10,%MTC    ; IS SETTLEDOWN SET?
1396 005136 001003      BNE     T10F      ; YES
1397 005140 004737 007524      JSR     %7,TIMER  ; NO, COUNT TIME
1398 005144 000771      BR     T10E
1399 005146 013721 007546 T10F:  MOV     TIME,(1)+ ; SAVE "SPACE SHUTDOWN" TIME
1400 005152 006077 173622      ROR     %MTC
1401 005156 103375      BCC     -4      ; AWAIT TUR
1402 005160 012777 176340 173616      MOV     #-900,%BC   ; 1 INCH OF DATA
1403 005166 012777 012050 173612      MOV     #WBUF,%CA
1404 005174 005037 007546      CLR     TIME
1405 005200 013777 007322 173574      MOV     FDRIVE,%MTC ; SELECT DRIVE
1406 005206 006077 173566      ROR     %MTC
1407 005212 103375      BCC     -4      ; AWAIT TUR
    
```

K03

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1408 005214 052777 040005 173560    BIS    #40005,DMTC    ;800 BPI, WRITE, GO
1409 005222 022777 012052 173556    CMP    #WBUF+2,ACA    ;IS 2ND BYTE OUTPUT
1410 005230 003374                    BGT    .-6            ;NO
1411 005232 005777 173546            T10G: TST    @BC            ;YES IS LAST BYTE OUT
1412 005236 001403                    BEQ    T10H            ;YES
1413 005240 004737 007524            JSR    %7,TIMER    ;NO, COUNT TIME
1414 005244 000772                    BR     T10G
1415
1416 005246 013722 007546            T10H: MOV    TIME,(2)+    ;SAVE "ONE INCH DATA TIME"
1417 005252 004737 007422            JSR    %7,STRREW    ;REWIND
1418 005256 004737 007250            JSR    %7,CHGDRV    ;ANYMORE DRIVES?
1419 005262 000613                    BR     T10A            ;YES
1420 005264 012720 177777            MOV    #-1,(0)+    ;TERMINATE TIMES
1421 005270 012721 177777            MOV    #-1,(1)+
1422 005274 012722 177777            MOV    #-1,(2)+
1423 005300 012737 011157 010406    MOV    #MSG16,MESAGE
1424 005306 012700 007550            MOV    #TM1,%0
1425 005312 004737 010010            JSR    %7,TYPTIM    ;PRINT "EOR TO EOF SPACE TIME"
1426
1427 005316 012737 011205 010406    ;PRINT STATUS
1428 005324 012700 007574            MOV    #MSG18,MESAGE
1429 005330 004737 010010            MOV    #TM2,%0
1430 005334 012737 011264 010406    JSR    %7,TYPTIM    ;PRINT "SPACE SHUTDOWN" TIME
1431 005342 012700 007620            MOV    #MSG20,MESAGE
1432 005346 004737 010010            MOV    #TM3,%0
1433                                    JSR    %7,TYPTIM    ;PRINT "ONE INCH DATA TIME"
1434                                    ;TIME SOME OF PREVIOUS OPERATIONS AT 200 BPI AND 556 BPI
1435
1436 005352 012700 007550            T11:  MOV    #TM1,%0            ;INITIALIZE TIME BUFFERS
1437 005356 012701 007574            MOV    #TM2,%1
1438 005362 012702 007620            MOV    #TM3,%2
1439 005366 012703 007644            MOV    #TM4,%3
1440 005372 012704 007670            MOV    #TM5,%4
1441 005376 012705 007714            MOV    #TM6,%5
1442 005402 005037 001044            CLR    T11T
1443 005406 004737 007462            T11A: JSR    %7,WATREW    ;WAIT FOR REWIND
1444 005412 032737 020000 007322    BIT    #20000,FDRIVE ;IS DRIVE 9 TRACK?
1445 005420 001402                    BEQ    T11AA        ;NO: BR
1446 005422 000137 006032            JMP    T11P        ;ELSE GET NEXT DRIVE
1447 005426 012737 177777 001044    T11AA: MOV    #-1,T11T    ;INDICATE 7 TRACK
1448 005434 012777 176724 173342    MOV    #-556,@BC    ;566 BYTES = ONE INCH
1449 005442 012777 012050 173336    MOV    #WBUF,ACA
1450 005450 005037 007546            CLR    TIME
1451 005454 013777 007322 173320    MOV    FDRIVE,DMTC ;SELECT DRIVE
1452 005462 052777 020005 173312    BIS    #20005,DMTC ;556 BPI, WRITE, GO
1453
1454                                    ;TIME "WRITE FROM BOT DELAY" AT 556 BPI
1455
1456 005470 022777 012052 173310    T11B: CMP    #WBUF+2,ACA    ;IS 2ND WORD OUT?
1457 005476 003403                    BLE    T11C        ;YES
1458 005500 004737 007524            JSR    %7,TIMER    ;NO, COUNT TIME
1459 005504 000771                    BR     T11B
1460 005506 013720 007546            T11C: MOV    TIME,(0)+    ;SAVE "WRITE FROM BOT DELAY"
1461 005512 005037 007546            CLR    TIME
1462

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1463
1464 ;TIME "ONE INCH DATA" AT 556 BPI
1465
1466 005516 005777 173262 T11D: TST @BC ;IS BC=0
1467 005522 001403 BEQ T11E ;YES
1468 005524 004737 007524 JSR %7,TIMER ;NO, COUNT TIME
1469 005530 000772 BR T11D
1470 005532 013721 007546 T11E: MOV TIME,(1)+ ;SAVE "1 INCH DATA" TIME
1471 005536 005037 007546 CLR TIME
1472
1473 ;TIME "WRITE SHUTDOWN" AT 556 BPI
1474
1475 005542 000240 NOP
1476 005544 000240 NOP
1477 005546 000240 NOP
1478 005550 032777 000010 173222 T11F: BIT #10,@MTC ;IS SETTLEDOWN SET?
1479 005556 001003 BNE T11G ;YES
1480 005560 004737 007524 JSR %7,TIMER ;NO, COUNT TIME
1481 005564 000771 BR T11F
1482 005566 013722 007546 T11G: MOV TIME,(2)+ ;SAVE "WRITE SHUTDOWN"
1483 005572 005037 007546 CLR TIME
1484
1485 ;TIME "BACKSPACE SHUTDOWN" AT 556 BPI
1486
1487 005576 006077 173176 ROR @MTC
1488 005602 103375 BCC .-4 ;AWAIT TUR
1489 005604 042777 000016 173170 BIC #16,@MTC
1490 005612 052777 000007 173162 BIS #7,@MTC ;SET WRITE EOF+GO
1491 005620 105777 173156 TSTB @MTC
1492 005624 100375 BPL .-4 ;AWAIT CUR
1493 005626 006077 173146 ROR @MTC
1494 005632 103375 BCC .-4 ;AWAIT TUR
1495 005634 012777 177777 173142 MOV #-1,@BC
1496 005642 042777 000016 173132 BIC #16,@MTC
1497 005650 052777 000013 173124 BIS #13,@MTC ;BACKSPACE 1 RECORD, GO
1498 005656 000240 NOP
1499 005660 032777 040000 173112 T11GA: BIT #40000,@MTC
1500 005666 001774 BEQ T11GA ;AWAIT EOF
1501 005670 000240 NOP
1502 005672 000240 NOP
1503 005674 032777 000010 173076 T11H: BIT #10,@MTC ;IS SETTLEDOWN SET?
1504 005702 001003 BNE T11J ;YES
1505 005704 004737 007524 JSR %7,TIMER ;NO COUNT TIME
1506 005710 000771 BR T11H
1507 005712 013723 007546 T11J: MOV TIME,(3)+ ;SAVE "BACKSPACE SHUTDOWN"
1508 005716 005037 007546 CLR TIME
1509
1510 ;TIME "LAST CHAR IN TO MTF" AT 556 BPI
1511
1512 005722 105777 173054 TSTB @MTC ;SEE IF CUR
1513 005726 100375 BPL .-4 ;IF NOT: BR
1514 005730 006077 173044 ROR @MTC
1515 005734 103375 BCC .-4 ;WAIT FOR TU READY
1516 005736 012777 176724 173040 MOV #-556,@BC ;556 BYTES
1517 005744 012777 012050 173034 MOV #WBUF,@CA
1518 005752 013777 007322 173022 MOV FDRIVE,@MTC ;SELECT DRIVE
    
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1519 005760 052777 020003 173014 BIS #20003,DMTC ;556 BPI, READ, GO
1520 005766 032777 040000 173004 T11JA: BIT #40000,DMTS
1521 005774 001774 BEQ T11JA ;AWAIT EOF
1522 005776 032777 000010 172774 T11K: BIT #10,DMTS ;SEE IF SDWN
1523 006004 001003 BNE T11L ;YES
1524 006006 004737 007524 JSR %7,TIMER ;NO COUNT TIME
1525 006012 000771 BR T11K
1526 006014 013724 007546 T11L: MOV TIME,(4)+
1527 006020 013725 007546 MOV TIME,(5)+ ;SAVE "READ SHUTDOWN"
1528 006024 005037 007546 CLR TIME
1529 006030 000406 BR T11R
1530 006032 005020 T11P: CLR (0)+ ;CLEAR TIMES FOR 9 TRACK DRIVES
1531 006034 005021 CLR (1)+
1532 006036 005022 CLR (2)+
1533 006040 005023 CLR (3)+
1534 006042 005024 CLR (4)+
1535 006044 005025 CLR (5)+
1536 006046 004737 007422 T11R: JSR %7,STRREW
1537 006052 004737 007250 JSR %7,CHGDRV
1538 006056 000401 BR .+4
1539 006060 000402 BR .+6
1540 006062 000137 005406 JMP T11A
1541
1542 006066 012720 177777 MOV #-1,(0)+ ;TERMINATE DRIVES
1543 006072 012721 177777 MOV #-1,(1)+
1544 006076 012722 177777 MOV #-1,(2)+
1545 006102 012723 177777 MOV #-1,(3)+
1546 006106 012724 177777 MOV #-1,(4)+
1547 006112 012725 177777 MOV #-1,(5)+
1548 006116 005737 001044 TST T11T
1549 006122 001452 BEQ T12 ;HAVE TESTED ANY 7 TRACKS
1550 006124 012737 011233 010406 MOV #MSG19,MESAGE ;NO
1551 006132 004737 010266 010406 JSR %7, TOP ;PRINT "FUNCTIONS AT 556"
1552 006136 012737 010450 010406 MOV #MSG3,MESAGE
1553 006144 012700 007550 MOV #TM1,%0
1554 006150 004737 010010 JSR %7,TYPTIM ;PRINT "WRITE FROM BOT DELAY"
1555 006154 012737 011264 010406 MOV #MSG20,MESAGE
1556 006162 012700 007574 MOV #TM2,%0
1557 006166 004737 010010 JSR %7,TYPTIM ;PRINT "ONE INCH DATA TIME"
1558 006172 012737 010476 010406 MOV #MSG4,MESAGE
1559 006200 012700 007620 MOV #TM3,%0
1560 006204 004737 010010 JSR %7,TYPTIM ;PRINT "WRITE SHUTDOWN"
1561 006210 012737 010654 010406 MOV #MSG9,MESAGE
1562 006216 012700 007644 MOV #TM4,%0
1563 006222 004737 010010 JSR %7,TYPTIM ;PRINT "BACKSPACE SHUTDOWN"
1564 006226 012737 010702 010406 MOV #MSG10,MESAGE
1565 006234 012700 007714 MOV #TM6,%0
1566 006240 004737 010010 JSR %7,TYPTIM ;PRINT "READ SHUTDOWN"
1567 006244 004737 007402 JSR %7,ST1S
1568
1569 ;TIME OPERATIONS AT 200 BPI
1570
1571 006250 012700 007550 T12: MOV #TM1,%0 ;INITIALIZE TIME BUFFERS
1572 006254 012701 007574 MOV #TM2,%1
1573 006260 012702 007620 MOV #TM3,%2
1574 006264 012703 007644 MOV #TM4,%3

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1575 006270 012704 007670      MOV      #TMS,%4
1576 006274 012705 007714      MOV      #TM6,%5
1577 006300 005037 001044      CLR      T11T
1578 006304 004737 007462      T12A:   JSR      %7,WATREW      ;WAIT FOR REWIND
1579 006310 032737 020000 007322      BIT      #20000,FDRIVE      ;IS DRIVE 9 TRACK?
1580 006316 001402          BEQ          ;NO
1581 006320 000137 006730      JMP      T12P      ;YES, GET NEXT DRIVE
1582 006324 012737 177777 001044      MOV      #-1,T11T
1583 006332 012777 177470 172444      MOV      #-200,%BC      ;566 BYTES = ONE INCH
1584 006340 012777 012050 172440      MOV      #WBUF,%CA
1585 006346 005037 007546      CLR      TIME
1586 006352 013777 007322 172422      MOV      FDRIVE,%MTC      ;SELECT DRIVE
1587 006360 052777 000005 172414      BIS      #00005,%MTC      ;200 BPI, WRITE, GO
1588
1589      ;TIME "WRITE FROM BOT DELAY" AT 556 BPI
1590
1591 006366 022777 012052 172412      T12B:   CMP      #WBUF+2,%CA      ;IS 2ND WORD OUT?
1592 006374 001403          BEQ      T12C      ;YES
1593 006376 004737 007524      JSR      %7,TIMER      ;NO, COUNT TIME
1594 006402 000771          BR      T12B
1595 006404 013720 007546      T12C:   MOV      TIME,(0)+      ;SAVE "WRITE FROM BOT DELAY"
1596 006410 005037 007546      CLR      TIME
1597
1598      ;TIME "ONE INCH DATA" AT 200 BPI
1599
1600 006414 005777 172364      T12D:   TST      %BC      ;IS BC=0
1601 006420 001403          BEQ      T12E      ;YES
1602 006422 004737 007524      JSR      %7,TIMER      ;NO, COUNT TIME
1603 006426 000772          BR      T12D
1604 006430 013721 007546      T12E:   MOV      TIME,(1)+      ;SAVE "1 INCH DATA" TIME
1605 006434 005037 007546      CLR      TIME
1606
1607      ;TIME "WRITE SHUTDOWN" AT 200 BPI
1608
1609 006440 005777 172340      TST      %BC      ;SEE IF WORD COUNT DONE
1610 006444 001375          BNE      .-4      ;IF NOT: BR
1611 006446 032777 000010 172324      T12F:   BIT      #10,%MTC      ;IS SETTLEDOWN SET?
1612 006454 001003          BNE      T12G      ;YES
1613 006456 004737 007524      JSR      %7,TIMER      ;NO, COUNT TIME
1614 006462 000771          BR      T12F
1615 006464 013722 007546      T12G:   MOV      TIME,(2)+      ;SAVE "WRITE SHUTDOWN"
1616 006470 005037 007546      CLR      TIME
1617
1618      ;TIME "BACKSPACE SHUTDOWN" AT 200 BPI
1619
1620 006474 006077 172300      ROR      %MTC
1621 006500 103375          BCC      .-4      ;AWAIT TUR
1622 006502 042777 000016 172272      BIC      #16,%MTC
1623 006510 052777 000007 172264      BIS      #7,%MTC      ;SET WRITE EOF+GO
1624 006516 105777 172260      TSTB     %MTC
1625 006522 100375          BPL      .-4      ;AWAIT CUR
1626 006524 006077 172250      ROR      %MTC
1627 006530 103375          BCC      .-4      ;AWAIT TUR
1628 006532 012777 177777 172244      MOV      #-1,%BC
1629 006540 042777 000016 172234      BIC      #16,%MTC
1630 006546 052777 000013 172226      BIS      #13,%MTC      ;BACKSPACE 1 RECORD, GO
    
```



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1631 006554 000240      NOP
1632 006556 000240      NOP
1633 006560 000240      NOP
1634 006562 032777 040000 172210 T12GA: BIT      #40000,2MTS
1635 006570 001774      BEQ      T12GA      ;AWAIT EOF
1636 006572 032777 000010 172200 T12H:  BIT      #10,2MTS      ;IS SETTLEDOWN SET?
1637 006600 001003      SNE      T12J      ;NO COUNT TIME
1638 006602 004737 007524      JSR      %7 TIMER
1639 006606 000771      BR       T12H
1640 006610 013723 007546      T12J:  MOV      TIME,(3)+ ;SAVE "BACKSPACE SHUTDOWN"
1641 006614 005037 007546      CLR      TIME
1642
1643
1644 ;TIME "LAST CHAR IN TO MTF" AT 200 BPI
1645 006620 006077 172154      ROR      2MTS
1646 006624 103375      BCC      .-4      ;WAIT FOR TU READY
1647 006626 012777 177470 172150  MOV      #-200,2BC ;556 BYTES
1648 006634 012777 012050 172144  MOV      #WBUF,2CA
1649 006642 013777 007322 172132  MOV      FDRIVE,2MTC ;SELECT DRIVE
1650 006650 052777 000003 172124  BIS      #00003,2MTC ;556 BPI, READ, GO
1651 006656 032777 040000 172114 T12JA:  BIT      #40000,2MTS
1652 006664 001774      BEQ      T12JA      ;AWAIT EOF
1653 006666 000240      NOP      T12K:
1654 006670 000240      NOP
1655 006672 000240      NOP
1656 006674 013724 007546      T12L:  MOV      TIME,(4)+ ;SAVE "LAST CHAR IN TO MTF"
1657 006700 005037 007546      CLR      TIME
1658 006704 032777 000010 172066 T12M:  BIT      #10,2MTS
1659 006712 001003      BNE      T12N
1660 006714 004737 007524      JSR      %7 TIMER
1661 006720 000771      BR       T12M
1662 006722 013725 007546      T12N:  MOV      TIME,(5)+ ;SAVE "READ SHUTDOWN"
1663 006726 000406      BR       T12R
1664
1665 006730 005020      T12P:  CLR      (0)+
1666 006732 005021      CLR      (1)+
1667 006734 005022      CLR      (2)+
1668 006736 005023      CLR      (3)+
1669 006740 005024      CLR      (4)+
1670 006742 005025      CLR      (5)+
1671 006744 004737 007250 T12R:  JSR      %7,CHGDRV
1672 006750 000401      BR       .+4
1673 006752 000402      BR       .+6
1674 006754 000137 006304      JMP      T12A
1675 006760 012720 177777      MOV      #-1,(0)+ ;TERMINATE DRIVES
1676 006764 012721 177777      MOV      #-1,(1)+
1677 006770 012722 177777      MOV      #-1,(2)+
1678 006774 012723 177777      MOV      #-1,(3)+
1679 007000 012724 177777      MOV      #-1,(4)+
1680 007004 012725 177777      MOV      #-1,(5)+
1681 007010 005737 001044      TST      T11T
1682 007014 001452      BEQ      T13      ;HAVE TESTED ANY 7 TRACKS?
1683 007016 012737 011312 010406  MOV      #MSG21, MESSAGE ;PRINT "FUNCTIONS AT 200"
1684 007024 004737 010266      JSR      %7 TOP
1685 007030 012737 010450 010406  MOV      #MSG3, MESSAGE
1686 007036 012700 007550      MOV      #TM1,%0
    
```

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1687 007042 004737 010010 JSR %7, TYPTIM ;PRINT "WRITE FROM BOT DELAY"
1688 007046 012737 011264 010406 MOV #MSG20, MESSAGE
1689 007054 012700 007574 MOV #TM2, %0
1690 007060 004737 010010 JSR %7, TYPTIM ;PRINT "ONE INCH DATA TIME"
1691 007064 012737 010476 010406 MOV #MSG4, MESSAGE
1692 007072 012700 007620 MOV #TM3, %0
1693 007076 004737 010010 JSR %7, TYPTIM ;PRINT "WRITE SHUTDOWN"
1694 007102 012737 010654 010406 MOV #MSG9, MESSAGE
1695 007110 012700 007644 MOV #TM4, %0
1696 007114 004737 010010 JSR %7, TYPTIM ;PRINT "BACKSPACE SHUTDOWN"
1697 007120 012737 010702 010406 MOV #MSG10, MESSAGE
1698 007126 012700 007714 MOV #TM6, %0
1699 007132 004737 010010 JSR %7, TYPTIM ;PRINT "READ SHUTDOWN"
1700 007136 004737 007402 JSR %7, ST1S
1701 007142 012737 011343 010406 T13: MOV #MSG27, MESSAGE
1702 007150 004737 010266 JSR %7, TOP ;PRINT "END OF TIMING"
1703 007154 013700 000042 MOV #42, %0
1704 007160 001405 BEQ HERE
1705 007162 000005 RESET
1706 007164 004710 SENDAD: JSR %7, (%0)
1707 007166 000240 NOP
1708 007170 000240 NOP
1709 007172 000240 NOP
1710 007174 000240 HERE: NOP
1711 007176 000000 HALT
1712 007200 000137 001120 JMP STO
1713
1714 ;RESET DRIVE SELECTION TO LOWEST NUMBER
1715
1716 007204 005037 007314 RSFDRV: CLR CDRIVE ;START WITH DRIVE 0
1717 007210 012737 100000 007316 MOV #100000, CDRVBT ;INITIALIZE FOR 0
1718 007216 033737 007316 007320 RSF1: BIT CDRVBT, DRIVES ;MASK WITH SELECTED DRIVES
1719 007224 001006 BNE RSF2
1720 007226 005237 007314 INC CDRIVE ;+1 TO DRIVE NUMBER
1721 007232 000241 CLC
1722 007234 006037 007316 ROR CDRVBT ;MOVE MASK BIT TO NEXT DRIVE
1723 007240 000766 BR RSF1
1724 007242 004737 007324 RSF2: JSR %7, GTNINE ;CHECK 9 TRACK
1725 007246 000207 RTS %7
    
```

```

1726          ;SELECT NEXT DRIVE IN SEQUENCE
1727          ;SKIP FIRST EXIT ADDRESS IF LAST DRIVE SELECTED
1728
1729 007250 005237 007314      CHGDRV: INC      CDRIVE          ;+1 TO DRIVE
1730 007254 000241              CLC
1731 007256 006037 007316      ROR      CDRVBT          ;MOVE MASK BIT TO NEXT DRIVE
1732 007262 001005              SNE      CHG1
1733 007264 004737 007204      JSR      %7,RSFDRV      ;RESET TO LOWEST DRIVE
1734 007270 062716 000002      ADD      #2,(6)        ;+2 TO SKIP FIRST EXIT
1735 007274 000207              RTS      %7            ;EXIT
1736 007276 033737 007316 007320 CHG1: BIT      CDRVBT,DRIVES ;MASK WITH SELECTED DRIVES
1737 007304 001761              BEQ      CHGDRV        ;CHECK FOR NEXT DRIVE
1738 007306 004737 007324      JSR      %7,GTNINE     ;CHECK 9 TRACK
1739 007312 000207              RTS      %7
1740 007314 000000      CDRIVE: 0
1741 007316 000000      CDRVBT: 0
1742 007320 000000      DRIVES: 0
1743 007322 000000      FDRIVE: 0
1744
1745          ;CHECK FOR NINE TRACK DRIVES
1746
1747 007324 013737 007314 007322 GTNINE: MOV      CDRIVE,FDRIVE
1748 007332 000337 007322      SWAB     FDRIVE        ;POSITION UNIT SELECT BITS
1749 007336 042737 174377 007322      BIC      #174377,FDRIVE ;CLEAR ALL OTHER BITS
1750 007344 032737 000010 007314      BIT      #10,CDRIVE    ;TEST FOR 9 TRACK
1751 007352 001403              BEQ      GNT1          ;NO
1752 007354 052737 020000 007322      BIS      #20000,FDRIVE ;YES SET 9 TRACK BIT
1753 007362 000207      GNT1:   RTS      %7
1754
1755          ;INITIALIZE BYTE COUNT AND CURRENT ADDRESS FOR WRITE
1756
1757 007364 012777 172110 171412 WRINT: MOV      #-BLENGTH,ABC
1758 007372 012777 012050 171406      MOV      #WBUF,ACA
1759 007400 000207              RTS      %7
1760
1761          ;STORE 1'S IN WRITE BUFFER
1762
1763 007402 012700 012050      ST1S:   MOV      #WBUF,%0
1764 007406 012720 177777      ST1SA:  MOV      #-1,(0)+
1765 007412 022700 017742      CMP      #WBUF+BLENGTH+2,%0
1766 007416 001373              BNE      ST1SA
1767 007420 000207              RTS      %7
1768
1769          ;START REWIND OPERATIONS
1770
1771 007422 013777 007322 171352 STAREW: MOV      FDRIVE,AMTC ;SELECT DRIVE
1772 007430 105777 171346      TSTB    AMTC
1773 007434 100375              BPL     -4            ;WAIT FOR CU READY
1774 007436 006077 171336      ROR     AMTS
1775 007442 103375              BCC     -4            ;WAIT FOR TAPE UNIT READY
1776 007444 052777 000017 171330      BIS     #17,AMTC     ;GO REWIND
1777 007452 105777 171324      TSTB    AMTC
1778 007456 100375              BPL     -4            ;WAIT FOR CONTROL UNIT READY
1779 007460 000207              RTS      %7
1780
1781          ;WAIT FOR REWIND TO FINISH
    
```

E04

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1782
1783 007462 013777 007322 171312 WATREW: MOV     FDRIVE, @MTC
1784 007470 006077 171304          ROR     @MTC
1785 007474 103375          BCC     .-4
1786 007476 032777 000040 171274          BIT     @40, @MTC      ; IS BOT SET?
1787 007504 001006          BNE     1$             ; YES
1788 007506 012737 011657 010406          MOV     #MSG29, MESSAGE
1789 007514 004737 010266          JSR     %7, TOP
1790 007520 000000          HALT
1791 007522 000207          RTS     %7             ; ERROR, NOT AT BOT AFTER REWIND
1792
1793          ; KEEP COUNT OF ELAPSED TIME
1794          ; EXIT EVERY 100 USEC
1795
1796 007524 005777 171262          TIMER: TST     @MTRD
1797 007530 100375          BPL     .-4
1798 007532 005777 171254          TST     @MTRD
1799 007536 100775          BMI     .-4
1800 007540 005237 007546          INC     TIME           ; +1 TO 100 USEC COUNT
1801 007544 000207          RTS     %7
1802 007546 000000          TIME:  0
1803 007550 000000          TM1:   0
1804          . = TM1 + 20.
1805 007574 000000          TM2:   0
1806          . = TM2 + 20.
1807 007620 000000          TM3:   0
1808          . = TM3 + 20.
1809 007644 000000          TM4:   0
1810          . = TM4 + 20.
1811 007670 000000          TM5:   0
1812          . = TM5 + 20.
1813 007714 000000          TM6:   0
1814          . = TM6 + 20.
1815 007740 000000          TM7:   0
1816          . = TM7 + 20.
1817 007764 000000          TM8:   0
1818          . = TM8 + 20.
1818 010010
  
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1819                                     ;PRINT TITLE OF TEST EXECUTED AND THE DRIVE TIMES
1820
1821 010010 004737 010266 TYPTIM: JSR %7, TOP ;PRINT TITLE
1822 010014 012037 010244 TYPT0: MOV (0)+, VALUE ;GET TIME
1823 010020 022737 177777 010244 CMP #-1, VALUE ;FINISHED TIME BUFFER
1824 010026 001001 BNE .+4
1825 010030 000207 RTS %7
1826 010032 012737 010256 010254 MOV #DECPNT+2, DECPNT ;INITIALIZE DECIMAL VALUE POINTER
1827 010040 012737 000040 010252 MOV #40, ZERO ;INITIALIZE SPACE
1828 010046 012737 177774 010246 MOV #-4, DIGCNT ;DIGIT COUNT
1829 010054 012737 177777 010250 TYPT1: MOV #-1, DIGIT ;INITIAL VALUE
1830 010062 005237 010250 TYPT2: INC DIGIT ;+1 TO VALUE
1831 010066 167737 000162 010244 SUB @DECPNT, VALUE ;SUBTRACT CONSTANT
1832 010074 100372 BPL TYPT2 ;NOT NEGATIVE YET
1833 010076 067737 000152 010244 ADD @DECPNT, VALUE ;RESTORE LAST POSITIVE VALUE
1834 010104 004737 010174 JSR %7, DECOU ;PRINT DECIMAL DIGIT
1835 010110 005237 010246 INC DIGCNT ;+1 TO DIGIT COUNT
1836 010114 001006 BNE TYP2A
1837 010116 012737 010444 010406 MOV #MSG2B, MESSAGE
1838 010124 004737 010266 JSR %7, TOP
1839 010130 000731 BR TYPT0
1840 010132 022737 177777 010246 TYP2A: CMP #-1, DIGCNT ;CHECK FOR DECIMAL PLACE
1841 010140 001011 BNE TYPT3 ;NO
1842 010142 105777 170654 TSTB @TPS
1843 010146 100375 BPL .-4
1844 010150 012777 000056 170646 MOV #'., @TPB ;PRINT DECIMAL POINT
1845 010156 012737 000060 010252 MOV #60, ZERO
1846 010164 052737 000002 010254 TYPT3: ADD #2, DECPNT ;+2 TO DECIMAL VALUE POINTER
1847 010172 000730 BR TYPT1 ;DO AGAIN
1848
1849 010174 005737 010250 DECOU: TST DIGIT ;IS DIGIT 0
1850 010200 001004 BNE DECI ;NO
1851 010202 013737 010252 010250 MOV ZERO, DIGIT ;SUPPRESS LEADING ZEROS
1852 010210 000406 BR DECI
1853 010212 012737 000060 010252 DECI: MOV #60, ZERO ;INITIALIZE ZERO AFTER SOME VALUE FOUND
1854 010220 052737 000060 010250 DECI: BIS #60, DIGIT ;CONVERT TO ANSCII
1855 010226 105777 170570 DECI: TSTB @TPS
1856 010232 100375 BPL .-4
1857 010234 013777 010250 170562 MOV DIGIT, @TPB ;PRINT
1858 010242 000207 RTS %7
1859 010244 000000 VALUE: 0
1860 010246 000000 DIGCNT: 0
1861 010250 000000 DIGIT: 0
1862 010252 000040 ZERO: 40 ;CONTAINS ZERO OR SPACE
1863 010254 010256 DECPNT: .+2
1864 010256 001750 1000.
1865 010260 000144 100.
1866 010262 000012 10.
1867 010264 000001 1.
    
```

```

1868                                     ;TELETYPE OUTPUT PACKAGE
1869
1870 010266 142777 000177 170526 TOP:  BICB  #177,@TPS      ;CLEAR FLAGS
1871 010274 117737 000106 010404      MOVB  @MESSAGE,EOMK ;SAVE MESSAGE DELIMETER
1872 010302 005237 010406                INC  MESSAGE        ;+2 TO POINTER
1873 010306 127737 000074 010404 TOP1: CMPB  @MESSAGE,EOMK ;IS CHARACTER THE 2ND DELIMETER
1874 010314 001001                SNE  .+4            ;NO
1875 010316 000207                RTS  %7            ;YES ENT
1876 010320 127727 000062 000100      CMPB  @MESSAGE,#'@  ;IS CHARACTER AN @ INDICATING A CARRIAGE RETURN
1877 010326 001411                BEQ  TOP3          ;YES
1878 010330 105777 170466                TSTB @TPS
1879 010334 100375                BPL  .-4
1880 010336 117777 000044 170460      MOVB  @MESSAGE,@TPB ;PRINT CHARACTER
1881 010344 005237 010406 TOP2:  INC  MESSAGE  ;+2 TO POINTER
1882 010350 000756                BR   TOP1         ;LOOP
1883
1884                                     ;CARRIAGE RETURN, LINE FEED
1885
1886 010352 105777 170444 TOP3:  TSTB  @TPS
1887 010356 100375                BPL  .-4
1888 010360 112777 000215 170436      MOVB  #215,@TPB
1889 010366 105777 170430                TSTB @TPS
1890 010372 100375                BPL  .-4
1891 010374 112777 000212 170422      MOVB  #212,@TPB
1892 010402 000760                BR   TOP2
1893 010404 000000      EOMK:  0
    
```

H04

1894	010406	000000			MESSAGE: 0
1895	010410	040057	052506	041516	MSG2: .ASCII ;/FUNCTION /;
1896	010416	044524	047117	020040	
1897	010424	020040	020040	020040	
1898	010432	027440			
1899	010434	020057	047125	052111	MSG2A: .ASCII ;/ UNIT /;
1900	010442	027440			
1901	010444	020057	027440		MSG2B: .ASCII ;/ /;
1902	010450	040057	051127	052111	MSG3: .ASCII ;/WRITE FROM BOT /;
1903	010456	020105	051106	046517	
1904	010464	041040	052117	020040	
1905	010472	020040	027440		
1906	010476	040057	051127	052111	MSG4: .ASCII ;/WRITE SHUTDOWN /;
1907	010504	020105	044123	052125	
1908	010512	047504	047127	020040	
1909	010520	020040	027440		
1910	010524	040057	051127	052111	MSG5: .ASCII ;/WRITE START /;
1911	010532	020105	052123	051101	
1912	010540	020124	020040	020040	
1913	010546	020040	027440		
1914	010552	040057	042523	052124	MSG6: .ASCII ;/SETTLE DOWN DELAY /;
1915	010560	042514	042040	053517	
1916	010566	020116	042504	040514	
1917	010574	020131	027440		
1918	010600	040057	051127	052111	MSG7: .ASCII ;/WRITE TO ERASE HEAD/;
1919	010606	020105	047524	042440	
1920	010614	040522	042523	044040	
1921	010622	040505	027504		
1922	010626	040057	051127	052111	MSG8: .ASCII ;/WRITE NONSTOP GAP /;
1923	010634	020105	047516	051516	
1924	010642	047524	020120	040507	
1925	010650	020120	027440		
1926	010654	040057	040502	045503	MSG9: .ASCII ;/BACKSPACE SHUTDOWN /;
1927	010662	050123	041501	020105	
1928	010670	044123	052125	047504	
1929	010676	047127	027440		
1930	010702	040057	042522	042101	MSG10: .ASCII ;/READ SHUTDOWN /;
1931	010710	051440	052510	042124	
1932	010716	053517	020116	020040	
1933	010724	020040	027440		
1934	010730	040057	040507	051520	MSG11: .ASCII ;/GAPS SHOULD = 8>7>6>5>4>3, 3=2=1 (1.5)/;
1935	010736	051440	047510	046125	
1936	010744	020104	020075	037070	
1937	010752	037067	037066	037065	
1938	010760	037064	026063	031440	
1939	010766	031075	030475	024040	
1940	010774	027061	024465	057	
1941	011001	057	043500	050101	MSG11A: .ASCII ;/GAP 1 /;
1942	011006	030440	020040	020040	
1943	011014	020040	020040	020040	
1944	011022	020040	020040	057	
1945	011027	057	053500	044522	MSG12: .ASCII ;/WRITE XIRG /;
1946	011034	042524	054040	051111	
1947	011042	020107	020040	020040	
1948	011050	020040	020040	057	
1949	011055	057	051100	040505	MSG13: .ASCII ;/READ FROM BOT DELAY/;

1950	011062	020104	051106	046517	
1951	011070	041040	052117	042040	
1952	011076	046105	054501	057	
1953	011103	057	046100	051501	MSG14: .ASCII ;/LAST CHAR TO CU RDY/;
1954	011110	020124	044103	051101	
1955	011116	052040	020117	052503	
1956	011124	051040	054504	057	
1957	011131	057	053500	044522	MSG15: .ASCII ;/WRITE EOF /;
1958	011136	042524	042440	043117	
1959	011144	020040	020040	020040	
1960	011152	020040	020040	057	
1961	011157	057	042500	051117	MSG16: .ASCII ;/EOR TO EOF SP TIME /;
1962	011164	052040	020117	047505	
1963	011172	020106	050123	052040	
1964	011200	046511	020105	057	
1965	011205	057	051500	040520	MSG18: .ASCII ;/SPACE SHUTDOWN /;
1966	011212	042503	051440	052510	
1967	011220	042124	053517	020116	
1968	011226	020040	020040	057	
1969	011233	057	025100	043052	MSG19: .ASCII ;/FUNCTIONS AT 556 BPI/;
1970	011240	047125	052103	047511	
1971	011246	051516	040440	020124	
1972	011254	032465	020066	050102	
1973	011262	027511			
1974	011264	040057	047117	020105	MSG20: .ASCII ;/ONE INCH DATA TIME /;
1975	011272	047111	044103	042040	
1976	011300	052101	020101	044524	
1977	011306	042515	027440		
1978	011312	040057	025052	052506	MSG21: .ASCII ;/FUNCTIONS AT 200 BPI/;
1979	011320	041516	044524	047117	
1980	011326	020123	052101	031040	
1981	011334	030060	041040	044520	
1982	011342	057			
1983	011343	057	025100	025052	MSG27: .ASCII ;/*****END OF TIMING*****/;
1984	011350	025052	025052	025052	
1985	011356	025052	047105	020104	
1986	011364	043117	052040	046511	
1987	011372	047111	025107	025052	
1988	011400	025052	025052	025052	
1989	011406	025052	027500		
1990	011412	040057	052100	026115	MSG28: .ASCII ;/TM,A,B-11:TU10,W,N DRIVE FUNCTION TIMER (DZTME-C);
1991	011420	026101	026502	030461	
1992	011426	052072	030525	026060	
1993	011434	026127	020116	051104	
1994	011442	053111	020105	052506	
1995	011450	041516	044524	047117	
1996	011456	052040	046511	051105	
1997	011464	024040	055104	046524	
1998	011472	026505	024503		
1999	011476	052100	030525	020060	.ASCII ;TU10 TIMING INFO REFERENCE 6.2;
2000	011504	044524	044515	043516	
2001	011512	044440	043116	020117	
2002	011520	042522	042506	042522	
2003	011526	041516	020105	027066	
2004	011534	062			
2005	011535	100	052524	030061	.ASCII ;TU10W (M8926) TIMING INFO REFERENCE 6.3;

2006	011542	020127	046450	034470
2007	011550	033062	020051	044524
2008	011556	044515	043516	044440
2009	011564	043116	020117	042522
2010	011572	042506	042522	041516
2011	011600	020105	027066	063
2012	011605	100	052524	030061
2013	011612	020116	046450	034470
2014	011620	033462	020051	044524
2015	011626	044515	043516	044440
2016	011634	043116	020117	042522
2017	011642	042506	042522	041516
2018	011650	020105	027066	040064
2019	011656	057		
2020	011657	057	040100	051105
2021	011664	047522	026522	047516
2022	011672	020124	052101	041040
2023	011700	052117	040440	052106
2024	011706	051105	051040	053505
2025	011714	047111	026504	040510
2026	011722	052114	040100	057
2027	011727	057	040100	047514
2028	011734	027103	033461	020066
2029	011742	052515	052123	041040
2030	011750	020105	047514	042101
2031	011756	042105	050040	044522
2032	011764	051117	052040	020117
2033	011772	054105	041505	052125
2034	012000	047511	026516	040510
2035	012006	052114	040100	057
2036	012013	057	040100	040503
2037	012020	047116	052117	052040
2038	012026	051505	020124	047514
2039	012034	042101	046440	042105
2040	012042	052511	040115	027500
2041				
2042	012050	000000		
2043		000001		

.ASCII ;@TU10N (M8927) TIMING INFO REFERENCE 6.4@/;

MSG29: .ASCII ;/@@ERROR-NOT AT BOT AFTER REWIND-HALT@@/;

MSG30: .ASCII ;/@@LOC.176 MUST BE LOADED PRIOR TO EXECUTION-HALT@@/;

MSG31: .ASCII ;/@@CANNOT TEST LOAD MEDIUM@@/;

WBUF: .EVEN
0
.END

T12B	006366	1591#	1594		
T12C	006404	1592	1595#		
T12D	006414	1600#	1603		
T12E	006430	1601	1604#		
T12F	006446	1611#	1614		
T12G	006464	1612	1615#		
T12GA	006562	1634#	1635		
T12H	006572	1636#	1639		
T12J	006610	1637	1640#		
T12JA	006656	1651#	1652		
T12K	006666	1653#			
T12L	006674	1656#			
T12M	006704	1658#	1661		
T12N	006722	1659	1662#		
T12P	006730	1581	1665#		
T12R	006744	1663	1671#		
T13	007142	817	1682	1701#	
T2	001460	880#			
T2A	001474	883#	903		
T2B	001520	887#	890		
T2C	001536	888	891#		
T2D	001564	897#	900		
T2E	001600	898	901#		
T3	001656	918#	920		
T3A	001670	921#	923		
T3B	001702	924#	933		
T3C	001760	934#	936		
T3D	001776	942#	957		
T3E	002042	949#	952		
T3F	002056	950	953#		
T3G	002120	962#	964		
T3H	002132	965#	967		
T4	002144	974#			
T4A	002232	990#	993		
T4AA	002164	978#	1039		
T4B	002250	991	994#		
T4BA	002354	1014#	1015		
T4C	002370	1018#	1021		
T4D	002406	1019	1022#		
T4DA	002444	1029#	1030		
T4E	002454	1031#	1034		
T4F	002472	1032	1035#		
T4FA	002566	1050#	1052		
T4FB	002600	1053#	1055		
T4FC	002614	1057#	1078		
T4G	002732	1084#	1156		
T5	003360	1164#	1192		
T5A	003422	1171#	1186		
T5B	003452	1178#	1181		
T5C	003470	1179	1182#		
T5DRV	001042	806#	1162*	1167	1190*
T6	004000	1231#			
T6A	004010	1233#	1271		
T6B	004130	1251#	1254		
T6C	004146	1252	1255#		
T6D	004204	1262#	1265		

T1	0004	1126	1266#											
T10	0004	1127	1267#											
T11	0004	1128	1268#											
T12	0004	1129	1269#											
T13	0004	1130	1270#											
T14	0004	1131	1271#											
T15	0004	1132	1272#											
T16	0004	1133	1273#											
T17	0004	1134	1274#											
T18	0004	1135	1275#											
T19	0004	1136	1276#											
T20	0004	1137	1277#											
T21	0004	1138	1278#											
T22	0004	1139	1279#											
T23	0004	1140	1280#											
T24	0004	1141	1281#											
T25	0004	1142	1282#											
T26	0004	1143	1283#											
T27	0004	1144	1284#											
T28	0004	1145	1285#											
T29	0004	1146	1286#											
T30	0004	1147	1287#											
VALUE	010252	1823*	1823*	1831*	1833*	1859#								
WATREN	007462	827*	921	934	965	1052	1164	1280	1314	1349	1443	1578	1783#	
WBUF	012050	855	887	925	943	990	1178	1251	1262	1291	1324	1362	1403	1409
WRINT	007364	1449	1456	1517	1584	1591	1648	1758	1763	1765	2042#			
ZERO	010252	851	883	979	988	1003	1025	1057	1065	1071	1084	1091	1104	1118
SENDAD	007164	1131	1165	1175	1233	1244	1259	1288	1757#					
SSVPC	000042	1827*	1845*	1851	1853*	1862#								
	012052	770	1706#											
		768#	773											
		760#	761	763#	768	769#	771#	773#	783#	786#	788#	842	862	894
		896	929	948	955	984	997	999	1007	1009	1023	1036	1061	1063
		1068	1070	1074	1076	1088	1090	1094	1096	1101	1103	1108	1110	1121
		1123	1128	1130	1135	1137	1153	1172	1174	1188	1236	1238	1241	1245
		1256	1267	1297	1299	1303	1328	1330	1366	1368	1373	1375	1401	1407
		1410	1488	1492	1494	1513	1515	1538	1539	1580	1610	1621	1625	1627
		1646	1672	1673	1773	1775	1778	1785	1797	1799	1804#	1806#	1808#	1810#
		1812#	1814#	1816#	1818#	1824	1843	1856	1863	1874	1879	1887	1890	

COMMEN 18
 ENDCOM 18
 ESCAPE 18
 GETPRI 18
 GETSWR 18
 MULT 18
 NEWTST 18
 POP 18
 PUSH 18
 REPORT 18
 SETPRI 18
 SETUP 18
 SKIP 18
 SLASH 18
 STARS 18
 SWRSU 18
 TYPBIN 18
 TYPDEC 18
 TYPNAM 18
 TYPNUM 18
 TYPOCS 18
 TYPOCT 18
 TYPTXT 18
 SSESCA 18
 SSNEWT 18
 SSSKIP 18
 .EQUAT 18
 .HEADE 18
 .KT11 18
 .SETUP 18
 .SWRHI 18
 .SACT1 18
 .SAPT8 18
 .SAPTH 18
 .SAPTY 18
 .SASTA 18
 .SCATC 18
 .SCMTA 18
 .SDB2D 18
 .SDB2O 18
 .SDIV 18
 .SEOP 18
 .SERRO 18
 .SERRT 18
 .SMULT 18
 .SPOWE 18
 .SRAND 18
 .SRDDE 18
 .SRDCC 18
 .SREAD 18
 .SR2AZ 18
 .SSAVE 18
 .SSB2D 18
 .SSB2O 18
 .SSCOP 18
 .SSIZE 18

766

757# 764

.SSUPR	18
.STRAP	18
.STYPB	18
.STYPD	18
.STYPE	18
.STYPO	18
.SHOCA	18
.1170	18

E05

ADD	1167	1184	1190	1734	1833	1846									
BCC	955	999	1009	1023	1036	1063	1070	1076	1090	1096	1103	1110	1123	1130	1137
	1153	1174	1188	1238	1246	1256	1267	1299	1303	1330	1368	1375	1401	1407	1488
	1494	1515	1621	1627	1646	1775	1785								
BOS	898	1338	1384												
BEG	896	950	984	1015	1030	1412	1445	1467	1500	1521	1549	1590	1592	1601	1635
	1652	1682	1704	1737	1751	1877									
BGT	1410														
BIC	839	1011	1125	1132	1331	1370	1377	1489	1496	1622	1629	1749			
BICB	1870														
BIS	840	853	885	927	930	945	981	1005	1012	1028	1059	1086	1099	1106	1126
	1133	1169	1239	1242	1250	1261	1290	1326	1332	1364	1371	1378	1408	1452	1490
	1497	1519	1587	1623	1630	1650	1752	1776	1854						
BIT	863	895	983	1014	1018	1029	1031	1240	1381	1397	1395	1444	1478	1499	1503
	1520	1522	1579	1611	1634	1636	1651	1658	1718	1736	1750	1786			
BLE	856	888	991	1179	1252	1263	1292	1457							
BMI	1334	1799													
BNE	814	819	862	864	894	929	948	1019	1032	1139	1141	1145	1149	1186	1241
	1380	1382	1388	1396	1479	1504	1523	1610	1612	1637	1659	1719	1732	1766	1787
	1824	1836	1841	1850	1874										
BPL	842	997	1007	1061	1066	1074	1088	1094	1101	1108	1121	1128	1135	1172	1236
	1297	1328	1366	1373	1492	1513	1625	1773	1778	1797	1832	1843	1856	1879	1887
	1890														
BR	826	829	845	858	866	869	890	900	903	920	923	933	936	952	957
	964	967	993	1021	1034	1039	1052	1055	1078	1143	1147	1151	1181	1192	1254
	1265	1271	1282	1294	1301	1312	1316	1336	1340	1344	1351	1386	1398	1414	1419
	1459	1469	1481	1506	1525	1529	1538	1539	1594	1603	1614	1639	1661	1663	1672
	1673	1723	1839	1847	1852	1882	1892								
CLC	1721	1730													
CLR	854	860	886	892	946	978	995	1026	1162	1176	1247	1258	1287	1322	1360
	1389	1391	1404	1442	1450	1461	1471	1483	1508	1528	1530	1531	1532	1533	1534
	1535	1577	1585	1596	1605	1616	1641	1657	1665	1666	1667	1668	1669	1670	1716
CMP	855	887	947	990	1178	1251	1262	1291	1379	1409	1456	1591	1765	1823	1840
CMPB	813	1873	1876												
HALT	761	822	1711	1790											
INC	989	1066	1072	1092	1119	1138	1140	1144	1148	1177	1185	1720	1729	1800	1830
	1835	1872	1881												
INCB	1199	1203	1207	1211	1215	1219	1223								
JMP	787	817	1156	1446	1540	1581	1674	1712							
JSR	812	816	821	823	824	825	827	828	834	836	844	846	851	857	865
	868	874	877	880	883	889	899	902	908	911	918	919	921	922	931
	932	934	935	951	956	961	962	963	965	966	974	979	988	992	1003
	1020	1025	1033	1038	1045	1048	1049	1050	1051	1053	1054	1057	1065	1071	1077
	1084	1091	1104	1118	1131	1154	1155	1164	1165	1175	1180	1189	1191	1195	1198
	1202	1206	1210	1214	1218	1222	1226	1227	1233	1244	1253	1259	1264	1269	1270
	1276	1279	1280	1281	1288	1293	1300	1307	1308	1310	1311	1314	1315	1335	1339
	1342	1343	1348	1349	1350	1385	1397	1413	1417	1418	1425	1429	1432	1443	1458
	1468	1480	1505	1524	1536	1537	1551	1554	1557	1560	1563	1566	1567	1578	1593
	1602	1613	1638	1660	1671	1684	1687	1690	1693	1696	1699	1700	1702	1706	1724
	1733	1738	1789	1821	1834	1838									
MOV	809	810	811	815	818	820	833	835	837	843	849	850	852	859	867
	870	871	872	873	875	876	881	882	884	891	901	904	905	906	907
	909	910	924	925	926	941	942	943	944	953	958	959	960	975	976
	977	980	994	1004	1010	1024	1027	1037	1040	1041	1042	1043	1044	1046	1047
	1058	1085	1097	1098	1105	1111	1112	1113	1114	1124	1142	1146	1150	1166	1168
	1170	1182	1183	1194	1196	1197	1200	1201	1204	1205	1208	1209	1212	1213	1216

F05

	1217	1220	1221	1224	1225	1231	1232	1234	1243	1248	1249	1257	1260	1268	1272
	1273	1274	1275	1277	1278	1286	1289	1295	1304	1305	1306	1313	1321	1323	1324
	1325	1341	1345	1346	1347	1357	1358	1359	1361	1362	1363	1369	1376	1390	1399
	1402	1403	1405	1416	1420	1421	1422	1423	1424	1427	1428	1430	1431	1436	1437
	1438	1439	1440	1441	1447	1448	1449	1451	1460	1470	1482	1495	1507	1516	1517
	1518	1526	1527	1542	1543	1544	1545	1546	1547	1550	1552	1553	1555	1556	1558
	1559	1561	1562	1564	1565	1571	1572	1573	1574	1575	1576	1582	1583	1584	1586
	1595	1604	1615	1628	1640	1647	1648	1649	1656	1662	1675	1676	1677	1678	1679
	1680	1683	1685	1686	1688	1689	1691	1692	1694	1695	1697	1698	1701	1703	1717
	1747	1757	1758	1763	1764	1771	1783	1788	1822	1826	1827	1828	1829	1837	1844
	1845	1851	1853	1857											
MOV8	1193	1871	1880	1888	1891										
NOP	982	1013	1016	1017	1056	1064	1079	1392	1393	1394	1475	1476	1477	1498	1501
RESET	1502	1631	1632	1633	1653	1654	1655	1707	1708	1709	1710				
ROR	1705														
	897	954	998	1008	1022	1035	1062	1069	1075	1089	1095	1102	1109	1122	1129
	1136	1152	1173	1187	1237	1245	1255	1266	1298	1302	1329	1337	1367	1374	1383
	1400	1406	1487	1493	1514	1620	1626	1645	1722	1731	1774	1784			
RTS	1725	1735	1739	1753	1759	1767	1779	1791	1801	1825	1858	1875			
SUB	1831														
SWAB	838	1748													
TST	861	893	928	949	1411	1466	1548	1600	1609	1681	1796	1798	1849		
TSTB	841	996	1006	1060	1067	1073	1087	1093	1100	1107	1120	1127	1134	1171	1235
	1296	1327	1333	1365	1372	1491	1512	1624	1772	1777	1842	1855	1878	1886	1889
.ASCII	1895	1899	1901	1902	1906	1910	1914	1918	1922	1926	1930	1934	1941	1945	1949
	1953	1957	1961	1965	1969	1974	1978	1983	1990	1999	2005	2012	2020	2027	2036
.ENABL	1	756													
.END	2043														
.ENDC	767	771	773												
.EVEN	2041														
.IF	766	769	771												
.IFF	767	771	773												
.LIST	1	2	761												
.MACRO	1														
.MCALL	757														
.NLIST	1	747	761												
.REPT	2	761													
.SBTTL	764														
.TITLE	747														
.WORD	772														

ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATED: 0

* ,DZTMEC.SEQ/SOL/CRF/PAGNUM/NL:TOC=DZTMEC.SML,DZTMEC.SRC
 RUN-TIME: 25 32 2 SECONDS
 RUN-TIME RATIO: 190/61=3.0
 CORE USED: 39K (77 PAGES)

G05

Spooler runtime 8 Seconds, 36 KCS, 195 disk reads, 3 disk writes, 57 pages

0011111111111111111111111110
00000011111111111122222222223333333333344444444445555555555666666666677777777778888888888999999999900000000001111111111222222222233312
000111111111111111111111111111110
00000000111111111122222222223333333333344444444445555555555666666666677777777778888888888999999999900000000001111111111222222222233312