

TMA,B-11

TMA,B-11 DR FCTN TMR
CZTMEE0

AH-9411E-MC

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SEP 1979

digital

MADE IN USA

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IDENTIFICATION

PRODUCT CODE: AC-9410E-MC
PRODUCT NAME: CZTMEE0 TMA,B-11 DR FCTN TMR
DATE : JANUARY 1979
MAINTAINER: DIAGNOSTIC ENGINEERING
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TABLE OF CONTENTS

PARAGRAPH	SUBJECT	PAGE
1.	ABSTRACT	3
2.	REQUIREMENTS	3
3.	LOADING PROCEDURE	3
4.	STARTING PROCEDURE	4
5.	OPERATING PROCEDURE	4
6.	ERRORS AND LIMITS	5
7.	RESTRICTIONS	7
8.	MISCELLANEOUS	7
9.	PROGRAM DESCRIPTION	8
10.	REGISTER BIT ASSIGNMENTS	17

1. ABSTRACT

THE DRIVE FUNCTION TIMER ASSISTS IN THE TESTING OF THE TM-11 OR TMA,B-11 CONTROL UNIT AND TU10 OR TU10W OR TU10N OR TE10N OR TE10W TAPE UNITS. OPERATIONS ARE EXECUTED, TIMED, AND THE TIMES ARE THEN PRINTED (IN MILLISECONDS). THERE IS NO LIMIT OR ERROR TESTING FACILITIES IN THE PROGRAM, THE DECISION ON THE VALIDITY OF TIMES MEASURED MUST BE MADE BY THE OPERATOR. ANY CONFIGURATION OF UP TO 8 TU10,N,W/TE10N,W TAPE UNITS (7 AND 9 CHANNEL) MAY BE SELECTED.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11;TM,A,B-11 TAPE CONTROL UNIT AND 1 TO 8 TAPE DRIVES. (TU10,N,W/TE10N,W AND ANY CONFIGURATION OF 7 OR 9 CHANNEL DRIVES)
*NOTE: TU10W/TE10W TAPE UNITS WILL GO IN COMBINATION W/TMA,B-11 CONTROL UNITS ONLY.

2.2 STORAGE

2.2.1 PROGRAM STORAGE

THE PROGRAM REQUIRES 4K OF MEMORY.

3. LOADING PROCEDURE

3.1 METHOD

- A. PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED
- B. PROGRAM IS LOADABLE AND CHAINABLE IN 8K OF MEMORY.
DEFAULT IS DRIVE 0 9TRK ONLY.

4. STARTING PROCEDURE

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

*****IF UNDER ACT SEE 4.4 *****

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

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

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.

4.4 OPERATION UNDER ACT MODE

THE DIAGNOSTIC WILL AUTO-SIZE ALL TU10,TE10 DRIVES WHICH ARE ON-LINE.
 7 CHANNEL OR 9 CHANNEL OR ANY MIXED COMBINATION IS ACCEPTABLE.
 NO LOCATION SETTINGS NECESSARY.

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

ZIMEED TMA,B-11 DR FCTN TMR
ZIMEE.P11 24-JAN-79 13:38

MAGY11 30A(1052) 05-MAR-79 14:10 F 1
PAGE 6

SEQ 0005

NONE

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. TE10W (M8926) TIMING INFO REFERENCE 6.3
- 3. TU10W (M9826) TIMING INFO REFERENCE 6.4
- 4. TU10N/TE10N (M8927) TIMING INFO REFERENCE 6.5

6.2 TIME LIMITS AND PRINTOUT FORMAT *****
 *** TUIO 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
GAP 2	13.4	NOTE
GAP 3	13.4	ABOVE
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.

6.3

TIME LIMITS AND PRINTOUT FORMAT *** TE10W (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	151.5 (15.0)	200.7 (15.0)
WRITE SHUTDOWN	6.5 (0.6)	6.8 (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
GAP 2	13.2	NOTE
GAP 3	13.2	ABOVE
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	35.0 (5.0)	87.0 (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.

6.4 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)	6.8 (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)	(.6)
GAP 1	13.2 SEE	19.1
GAP 2	13.2 NOTE	19.1
GAP 3	13.2 ABOVE	19.1
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 (0.8)	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.

6.5

TIME LIMITS AND PRINTOUT FORMAT *** TU10N/TE10N (M8927) ***

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	SEE
GAP 2	13.4	NOTE
GAP 3	13.4	ABOVE
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)
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	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.

7. RESTRICTIONS

7.1 STARTING RESTRICTIONS

AT LEAST ONE TU10/TE10 TAPE UNIT MUST BE 'ON-LINE' AND SELECTED BY SWITCHES PER 4.1. ALSO MAKE CERTAIN THAT EACH TM10 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. (CZTME)

8. MISCELLANEOUS

8.1 EXECUTION TIME

NOT APPLICABLE

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'.

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 TU10 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 RECCRDS.

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'.

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'.

9.8 GAP CONSISTENCY

FOR PROPER OPERATION, THE INTERRECORD GAPS ON TAPE MUST ALWAYS BE AT LEAST 1/2 OF AN INCH. THIS WILL ALLOW DATA WRITTEN USING ONE TAPE UNIT TO BE READ ON ANOTHER TAPE UNIT WHEN THE START/STOP CHARACTERISTICS OF EACH UNIT ARE DIFFERENT. THE MINIMUM GAP SIZE OF 1/2 INCH IS GENERATED WHEN A WRITE FOLLOWS A READ. ALL OTHER GAPS SHOULD BE LARGER DEPENDING ON HOW THEY WERE WRITTEN.

PROCEDURE TO MEASURE TIME:

- A. A TOTAL OF NINE RECORDS ARE WRITTEN ON TAPE (FROM BOT) UTILIZING DIFFERENT SEQUENCES TO GENERATE THE INTERRECORD GAPS.
- B. THE TAPE IS REWOUND TO BOT.
- C. INITIALIZE BYTE RECORD COUNTER AND CURRENT MEMORY ADDRESS REGISTER.
- D. ISSUE READ FUNCTION, 800 BPI, SET 'GO'.
- E. WAIT FOR 'CU READY' TO BECOME A 1, THEN REPEAT STEP C AND RESET 'GO' TO CONTINUE.
- F. MONITOR CURRENT MEMORY ADDRESS TO DETERMINE WHEN 2ND BYTE IS INPUT.
- G. THE TIME FROM WHEN 'GO' IS RESET UNTIL THE 2ND BYTE IS INPUT WILL REFLECT THE SIZE OF THE GAP.
- H. STEPS E, F ARE REPEATED UNTIL ALL 8 GAPS ARE MEASURED.

PROGRAM SEQUENCE FOR EACH GAP:

- | | |
|-------|--|
| GAP 1 | WRITE FOLLOWED BY A WRITE (START/STOP). |
| GAP 2 | WRITE FOLLOWED BY A WRITE (START/STOP). |
| GAP 3 | READ FOLLOWED BY A WRITE (START/STOP). |
| GAP 4 | WRITE- BACKSPACE FOLLOWED BY A WRITE (START/STOP). |
| GAP 5 | SAME AS GAP 4 EXCEPT WRITE- BACKSPACE REPEATED 2 TIMES. |
| GAP 6 | SAME AS GAP 4 EXCEPT WRITE- BACKSPACE REPEATED 3 TIMES. |
| GAP 7 | SAME AS GAP 4 EXCEPT WRITE- BACKSPACE REPEATED 4 TIMES. |
| GAP 8 | SAME AS GAP 4 EXCEPT WRITE- BACKSPACE REPEATED 5 TIMES. |

GAP LENGTHS SHOULD REFLECT THE FOLLOWING RELATIONSHIP:

8>7>6>5>4>3, 3=2-1 (1.5).

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'.

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 'LU 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'.

4.74 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'.

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'

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

CZTMEEO TMA,B-11 DR FCTN TMR
CZTMEE.P11 24-JAN-79 13:38

MACY11 30A(1052) 05-MAR-79 14:10 J 2 PAGE 23

SEQ 0022

807

.LIST SEQ,BIN

CZTMEE0 TMA,B-11 DR FCTN TMR
CZTMEE.P11 24-JAN-79 13:38

MAC 11 30A(1052) 05-MAR-79 14:10 ^{K 2} PAGE 24

SEQ 0023

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001000
005670

000000

.TITLE CZTMEE0 TMA,B-11 DR FCTN TMR
:COPYRIGHT: (C) 1974,1977, 1978 DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
:
:SET LOC 176 WITH DESIRED CONTROL SETTINGS
:LOAD ADDRESS 200, PRESS START
:
STACK=1000
BLENGTH=3000.
.ENABL ABS,AMA

:TRAP CATCHER FROM 0 TO 740
.=0


```
822  
823 : *****  
824 : MODIFIFD DEC 7 1977  
825 :  
826 : **  
827 : ACT11 AND XXDP HOOKS  
828 :  
829 :  
830 : $SVPC=. ;SAVE PROGRAM COUNTER  
831 :  
832 : . =40  
833 000040 000040 DRIVE: .BYTE 0 ;DRIVE # FOR XXDP LOAD MEDIUM  
834 : ;ASSEMBLE AS A 0  
835 :  
836 : . =41  
837 000041 000041 MEDIUM: .BYTE 0 ;XXDP LOAD MEDIUM  
838 : ;ASSEMBLE AS A 0  
839 :  
840 : . =42  
841 000042 000000 .WORD 0 ;ACT11 INDICATOR  
842 : ;ASSEMBLE AS A 0  
843 :  
844 : . =46  
845 000046 000046 .WORD $ENDAD ;SET TO $ENDAD IN .$EOP  
846 :  
847 : . =52  
848 000052 000000 .WORD 0 ;CHARACTERISTICS OF PROGRAM  
849 : ;SET TO 0  
850 :  
851 : .=$SVPC ;RESTORE PROGRAM COUNTER  
852 : *****  
853 :  
854 :
```

855
856
857
858
859
860
861
862
863 000740 000000
864 000742 000
865 000743 000
866 000744 000
867 000745 000
868
869
870

```
*****  
MODIFIED DEFC 7 1977  
  
++  
ACT11 AND XXDP MODE INDICATORS  
--  
  
AUTOM: .WORD 0 ;AUTOMATIC MODE INDICATOR  
ACT11M: .BYTE 0 ;ACT11 AUTO MODE INDICATOR  
XXDPM: .BYTE 0 ;XXDP AUTO MODE INDICATOR  
ADUMPM: .BYTE 0 ;ACT11 DUMP MODE INDICATOR  
XDUMPM: .BYTE 0 ;XXDP DUMP MODE INDICATOR  
  
*****
```

871
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000176 000176
000176 000200
000200 000200
000200 000137 001046
001000 001000
001002 172520
001004 172522
001006 172524
001010 172526
001012 172530
001014 172532
001016 177570
001016 177560
001020 177562
001022 177564
001024 177566
001026 000224
001030 177776
001032 000000
001034 000000
001036 000000
001040 000000
001042 000000
001044 000000

```
*****  
;NOTE:PROGRAM HAS BEEN MODIFIED TO RUN WITHOUT SWITCH REGISTER  
*****  
SWITCH: =176  
200 ;DRIVE SELECT MAP(DEFAULT=DRIVE 0;9 TRK)  
S, =200  
JMP START  
=1000  
MTS: 172520  
MTC: 172522  
BC: 172524  
CA: 172526  
MTD: 172530  
MTRD: 172532  
SWR: 177570  
TKS: 177560  
TKB: 177562  
TPS: 177564  
TPB: 177566  
MTV: 224  
CC: 177776  
R10: 0  
R11: 0  
R12: 0  
R13: 0  
T5DRV: 0  
T11T: 0
```

CZTMEEO IMA,B-11 DR FCTN TMR
CZTMEE.P11 24-JAN-79 13:38

MACY11 30A(1052) 05-MAR-79 14:10 PAGE 28

SEQ 0027

```

906 001046 012706 001000          START:  MOV    #STACK,%6      ;INITIALIZE STACK
907 001052 012777 000340 177750  MOV    #340,@CC      ;SET PRIORITY LEVEL 7
908 001060 004737 010602          JSR    PC,CKMODE     ;CHECK FOR MODE OF OPERATION ++ C.W
909 001064 105737 000742          TSTB   ACT11M        ;ACT11 MODE? ++ C.W
910 001070 001005          BNE    1$            ;BRANCH - IF YES ++ C.W
911 001072 012737 012013 C10766  MOV    #MSG28,MESSAGE
912 001100 004737 010462          JSR    %7, TOP       ;PRINT TITLE
913 001104 004737 007350          1$:    JSR    PC,SIZER    ;GO AUTO-SIZE
914 001110 122737 000004 000041  CMPB   #4,@#41      ;SEE IF LOAD MEDIUM
915 001116 001007          BNE    ST0           ;IF NOT: BR
916 001120 012737 012445 010766  MOV    #MSG31,MESSAGE
917 001126 004737 010462          JSR    %7, TOP       ;PRINT NO TEST
918 001132 000137 007160          JMP    T13           ;END TEST
919 001136 013737 000176 007344  ST0:   MOV    SWITCH,DRIVES ;SAVE DRIVES SELECTED
920 001144 001006          BNE    1$            ;
921 001146 012737 012361 010766  MOV    #MSG30,MESSAGE
922 001154 004737 010462          JSR    %7, TOP
923 001160 000000          HALT
924 001162 004737 007230          1$:    JSR    %7,RSFDRV   ;RESET DRIVES
925 001166 004737 007616          ST1:   JSR    %7,STRREW ;START REWIND
926 001172 004737 007274          JSR    %7,CHGDRV    ;DONE ALL DRIVES?
927 001176 000773          BR     ST1           ;NO
928 001200 004737 007656          ST2:   JSR    %7,WATREW ;WAIT FOR BOT
929 001204 004737 007274          JSR    %7,CHGDRV    ;DONE ALL DRIVES?
930 001210 000773          BR     ST2           ;NO
931
932          ;PRINT HEADER
933
934 001212 012737 011011 010766  MOV    #MSG2,MESSAGE
935 001220 004737 010462          JSR    %7, TOP
936 001224 012737 011035 010766  ST3:   MOV    #MSG2A,MESSAGE ;PRINT 'FUNCTION'
937 001232 004737 010462          JSR    %7, TOP
938 001236 013737 007346 010444  MOV    FDRIVE,DIGIT ;PRINT 'UNIT'
939 001244 000337 010444          SWAB   DIGIT
940 001250 042737 177770 010444  BIC    #177770,DIGIT
941 001256 052737 000060 010444  BIS    #60,DIGIT
942 001264 105777 177532          TSTB   @TPS
943 001270 100375          BPL    .-4
944 001272 013777 010444 177524  MOV    DIGIT,@TPB   ;PRINT DRIVE 'NUMBER'
945 001300 004737 007274          JSR    %7,CHGDRV    ;DONE ALL DRIVES?
946 001304 000747          BR     ST3           ;NO
947 001306 004737 007576          JSR    %7,ST1S      ;STORE ONES IN WRITE BUFFER

```

```
948 ;TIME WRITE FROM BOT DELAY, AND WRITE SHUTDOWN
949
950 001312 012700 007744 T1: MOV #TM1,%0 ;INITIALIZE TIME BUFFERS
951 001316 012701 007770 MOV #TM2,%1
952 001322 004737 007560 T1A: JSR %7,WRINT
953 001326 013777 007346 177446 MOV FDRIVE,@MTC ;SELECT DRIVE
954 001334 052777 040005 177440 BIS #40005,@MTC ;800 BPI, WRITE, GO
955 001342 005037 007742 CLR TIME
956 001346 022777 012504 177432 T1B: CMP #WBLF+2,@CA ;IS 2ND WORD OUTPUT?
957 001354 003403 BLE T1C ;YES
958 001356 004737 007720 JSR %7,TIMER ;NO, COUNT TIME
959 001362 000771 BR T1B
960 001364 013720 007742 T1C: MOV TIME,(0)+ ;SAVE 'WRITE FROM BOT DELAY' TIME
961 001370 005037 007742 CLR TIME
962 001374 005777 177404 TST @BC ;SEE IF WORD COUNT DONE
963 001400 001375 BNE .-4 ;IF NOT: BR
964 001402 032777 000010 177370 T1D: BIT #10,@MTC ;HAS SETTLEDOWN SET?
965 001410 001003 BNE T1E ;YES
966 001412 004737 007720 JSR %7,TIMER ;NO, COUNT TIME
967 001416 000771 BR T1D
968 001420 013721 007742 T1E: MOV TIME,(1)+ ;SAVE 'WRITE SHUTDOWN' TIME
969 001424 004737 007274 JSR %7,CHGDRV ;DONE ALL DRIVES
970 001430 000734 BR T1A ;NO
971 001432 012720 177777 MOV #-1,(0)+ ;TERMINATE TIMES
972 001436 012721 177777 MOV #-1,(1)+ ;TERMINATE TIMES
973 001442 012737 011051 010766 MOV #MSG3,MESSAGE
974 001450 012700 007744 MOV #TM1,%0
975 001454 004737 010204 JSR %7,TYPTIM ;PRINT 'WRITE FROM BOT DELAY' TIMES
976 001460 012737 011077 010766 MOV #MSG4,MESSAGE
977 001466 012700 007770 MOV #TM2,%0
978 001472 004737 010204 JSR %7,TYPTIM ;PRINT 'WRITE SHUTDOWN' TIMES
```

```

;TIME WRITE START AND SETTLEDOWN DELAY
979
980
981 001476 004737 007230 T2: JSR %7,RSFDRV ;RESET DRIVE SELECTION
982 001502 012700 007744 MOV #TM1,%0
983 001506 012701 007770 MOV #TM2,%1
984 001512 004737 007560 T2A: JSR %7,WRINT
985 001516 013777 007346 177256 MOV FDRIVE,@MTC ;SELECT DRIVE
986 001524 052777 040005 177250 BIS #40005,@MTC ;800 BPI, WRITE, GO
987 001532 005037 007742 CLR TIME
988 001536 022777 012504 177242 T2B: CMP #WBUF+2,@CA ;IS 2ND WORD OUTPUT
989 001544 003403 BLE T2C ;YES
990 001546 004737 007720 JSR %7,TIMER ;NO, COUNT TIME
991 001552 000771 BR T2B
992 001554 013720 007742 T2C: MOV TIME,(0)+ ;SAVE 'WRITE START' TIME
993 001560 005037 007742 CLR TIME
994 001564 005777 177214 TST @BC
995 001570 001375 BNE .-4
996 001572 032777 000010 177200 BIT #10,@MTS
997 001600 001774 BEQ .-6 ;WAIT FOR SETTLEDOWN TO SET
998 001602 006077 177172 T2D: ROR @MTS ;WAIT FOR TU READY
999 001606 103403 BCS T2E
1000 001610 004737 007720 JSR %7,TIMER
1001 001614 000772 BR T2D
1002 001616 013721 007742 T2E: MOV TIME,(1)+ ;SAVE 'SETTLEDOWN' TIME
1003 001622 004737 007274 JSR %7,CHGDRV
1004 001626 000731 BR T2A
1005 001630 012720 177777 MOV #-1,(0)+ ;TERMINATE TIMES
1006 001634 012721 177777 MOV #-1,(1)+ ;TERMINATE TIMES
1007 001640 012737 011125 010766 MOV #MSG5,MESSAGE
1008 001646 012700 007744 MOV #TM1,%0
1009 001652 004737 010204 JSR %7,TYPTIM ;PRINT 'WRITE START' TIMES
1010 001656 012737 011153 010766 MOV #MSG6,MESSAGE
1011 001664 012700 007770 MOV #TM2,%0
1012 001670 004737 010204 JSR %7,TYPTIM ;PRINT 'SETTLEDOWN' TIMES
  
```

```
1013 :TIME WRITE TO ERASE HEAD
1014 :LONG RECORD WAS PREVIOUSLY WRITTEN
1015 :WRITE A 3 BYTE RECORD AND POWER CLEAR
1016 :DISTANCE FROM NEW DATA TO OLD IS
1017 :ERASE HEAD DISTANCE
1018
1019 001674 004737 007616 T3: JSR %7,STRREW ;START REWIND
1020 001700 004737 007274 JSR %7,CHGDRV ;DONE ALL DRIVES?
1021 001704 000773 BR T3 ;NO
1022 001706 004737 007656 T3A: JSR %7,WATREW ;IS DRIVE AT BOT?
1023 001712 004737 007274 JSR %7,CHGDRV ;DONE ALL DRIVES
1024 001716 000773 BR T3A ;NO
1025 001720 012777 177775 177056 T3B: MOV #-3,@BC ;3 BYTE RECORD
1026 001726 012777 012502 177052 MOV #WBUF,@CA ;INITIALIZE CURRENT ADDRESS
1027 001734 013777 007346 177040 MOV FDRIVE,@MTC ;SELECT DRIVE
1028 001742 052777 040005 177032 BIS #40005,@MTC ;800BPI, WRITE, GO
1029 001750 005777 177030 TST @BC
1030 001754 001375 BNE -4
1031 001756 052777 010000 177016 BIS #10000,@MTC ;POWER CLEAR
1032 001764 004737 007616 JSR %7,STRREW ;START REWIND
1033 001770 004737 007274 JSR %7,CHGDRV ;DONE ALL DRIVES
1034 001774 000751 BR T3B ;NO
1035 001776 004737 007656 T3C: JSR %7,WATREW ;DRIVE AT BOT
1036 002002 004737 007274 JSR %7,CHGDRV ;DONE ALL DRIVES
1037 002006 000773 BR T3C ;NO
1038
1039 :NOW THAT ALL DRIVES ARE AT BOT AGAIN
1040 :READ OVER PARTIAL RECORD
1041
1042 002010 012700 007744 T3D: MOV #TM1,%0
1043 002014 012777 177775 176762 MOV #-3,@BC
1044 002022 012777 012502 176756 MOV #WBUF,@CA ;SELECT DRIVE
1045 002030 013777 007346 176744 MOV FDRIVE,@MTC ;800BPI, READ, GO
1046 002036 052777 040003 176736 BIS #40003,@MTC ;CLEAR TIME
1047 002044 005037 007742 CLR TIME
1048 002050 022777 177777 176726 CMP #-1,@BC
1049 002056 001374 BNE -6
1050 002060 005777 176720 T3E: TST @BC ;WAIT FOR NEXT WORD IN
1051 002064 001403 BEQ T3F ;HAVE IT
1052 002066 004737 007720 JSR %7,TIMER ;NO, COUNT TIME
1053 002072 000772 BR T3E
1054 002074 013720 007742 T3F: MOV TIME,(0)+ ;SAVE 'WRITE TO ERASE HEAD TIME'
1055 002100 006077 176674 ROR @MTC
1056 002104 103375 BCC -4 ;AWAIT TUR
1057 002106 004737 007274 JSR %7,CHGDRV ;DONE ALL DRIVES
1058 002112 000740 BR T3D ;NO
1059 002114 012720 177777 010766 MOV #-1,(0)+ ;TERMINATE TIMES
1060 002120 012737 011201 MOV #MSG7,MESSAGE
1061 002126 012700 007744 MOV #TM1,%0
1062 002132 004737 010204 T3G: JSR %7,TYPTIM ;PRINT 'WRITE TO ERASE HEAD TIMES'
1063 002136 004737 007616 JSR %7,STRREW ;START REWIND
1064 002142 004737 007274 JSR %7,CHGDRV ;DONE ALL DRIVES
1065 002146 000773 BR T3G ;NO
1066 002150 004737 007656 T3H: JSR %7,WATREW ;DRIVE AT BOT
1067 002154 004737 007274 JSR %7,CHGDRV ;DONE ALL DRIVES
1068 002160 000773 BR T3H ;NO
```

```

1069                                     :TIME WRITE NONSTOP GAP, BACKSPACE SHUTDOWN AND READ SHUTDOWN
1070                                     :WRITE ONE RECORD, FOLLOW WITH ONE RECORD NONSTOP
1071                                     :FOLLOWED BY ONE RECORD START-STOP
1072                                     :FOLLOWED BY WRITE-BACKSPACE-READ-WRITE
1073                                     :FOLLOWED BY WRITE-BACKSPACE-WRITE
1074
1075 002162 004737 007576 T4: JSR %7,ST1S ;INITIALIZE TIME BUFFERS
1076 002166 012700 007744 MOV #TM1,%0
1077 002172 012701 007770 MOV #TM2,%1
1078 002176 012702 010014 MOV #TM3,%2
1079 002202 005037 007742 T4AA: CLR TIME
1080 002206 004737 007560 JSR %7,WRINT ;TRACK AND DRIVE NUMBERS
1081 002212 013777 007346 176562 MOV FDRIVE,@MTC ;800 BPI, WRITE, GO
1082 002220 052777 040005 176554 BIS #40005,@MTC
1083 002226 000240 NOP
1084 002230 032777 000001 176542 BIT #1,@MTC ;AWAIT TUR
1085 002236 001774 BEQ .-6
1086
1087                                     :HAVE FIRST RECORD WRITTEN, GO NONSTOP
1088
1089 002240 004737 007560 JSR %7,WRINT ;GO
1090 002244 005277 176532 INC @MTC ;IS 2ND WORD OUTPUT?
1091 002250 022777 012504 176530 T4A: CMP #WBUF+2,@CA ;YES
1092 002256 003403 BLE T4B ;NO, COUNT TIME
1093 002260 004737 007720 JSR %7,TIMER
1094 002264 000771 BR T4A ;SAVE 'WRITE NONSTOP GAP' TIME
1095 002266 013720 007742 T4B: MOV TIME,(0)+
1096 002272 005037 007742 CLR TIME
1097 002276 105777 176500 TSTB @MTC ;WAIT FOR CU READY
1098 002302 100375 BPL .-4
1099 002304 006077 176470 ROR @MTC ;WAIT FOR TU READY
1100 002310 103375 BCC .-4
1101
1102                                     :WRITE-BACKSPACE-READ-WRITE
1103
1104 002312 004737 007560 JSR %7,WRINT ;DRIVE SELECT
1105 002316 013777 007346 176456 MOV FDRIVE,@MTC ;800 BPI, WRITE EOF, GO
1106 002324 052777 040007 176450 BIS #40007,@MTC
1107 002332 105777 176444 TSTB @MTC
1108 002336 100375 BPL .-4 ;WAIT FOR CU READY
1109 002340 006077 176434 ROR @MTC
1110 002344 103375 BCC .-4 ;AWAIT TUR
1111 002346 012777 177777 176430 MOV #-1,@BC ;BACKSPACE 1 RECORD
1112 002354 042777 000016 176420 BIC #16,@MTC
1113 002362 052777 000013 176412 BIS #13,@MTC ;SPACE REVERSE, GO
1114 002370 000240 NOP
1115 002372 032777 040000 176400 T4BA: BIT #40000,@MTC ;SEE IF EOF
1116 002400 001774 BEQ T4BA ;IF NOT: BR
1117 002402 000240 NOP
1118 002404 000240 NOP
1119 002406 032777 000010 176364 T4C: BIT #10,@MTC ;HAS SETTLEDOWN SET?
1120 002414 001003 BNE T4D ;YES
1121 002416 004737 007720 JSR %7,TIMER ;NO, COUNT TIME
1122 002422 000771 BR T4C
1123 002424 006077 176350 T4D: ROR @MTC ;WAIT FOR TU READY
1124 002430 103375 BCC .-4
  
```


1125	002432	013721	007742		MOV	TIME,(1)+	;SAVE 'BACKSPACE SHUTDOWN' TIME
1126	002436	004737	007560		JSR	%7,WRINT	
1127	002442	005037	007742		CLR	TIME	
1128	002446	013777	007346	176326	MOV	FDRIVE,@MTC	;SELECT DRIVE
1129	002454	052777	040003	176320	BIS	#40003,@MTC	;800 BPI, READ, CO
1130	002462	032777	040000	176310	T4DA: BIT	#40000,@MTC	
1131	002470	001774			BEQ	T4DA	;AWAIT EOF
1132	002472	032777	000010	176300	T4E: BIT	#10,@MTC	;HAS SETTLEDOWN SET?
1133	002500	001003			BNE	T4F	;YES
1134	002502	004737	007720		JSR	%7,TIMER	;NO, COUNT TIME
1135	002506	000771			BR	T4E	
1136	002510	006077	176264		T4F: ROR	@MTC	
1137	002514	103375			BCC	.-4	;WAIT FOR TU READY
1138	002516	013722	007742		MOV	TIME,(2)+	;SAVE 'READ SHUTDOWN' TIME
1139	002522	004737	007274		JSR	%7,CHGDRV	
1140	002526	000625			BR	T4AA	
1141	002530	012720	177777		MOV	#-1,(0)+	;TERMINATE TIMES
1142	002534	012721	177777		MOV	#-1,(1)+	;TERMINATE TIMES
1143	002540	012722	177777		MOV	#-1,(2)+	;TERMINATE TIMES
1144	002544	012737	011255	010766	MOV	#MSG9,MESSAGE	
1145	002552	012700	007770		MOV	#TM2,%0	
1146	002556	004737	010204		JSR	%7,TYPTIM	;PRINT 'BACKSPACE SHUTDOWN' TIMES
1147	002562	012737	011303	010766	MOV	#MSG10,MESSAGE	
1148	002570	012700	010014		MOV	#TM3,%0	
1149	002574	004737	010204		JSR	%7,TYPTIM	;PRINT 'READ SHUTDOWN' TIMES
1150	002600	004737	007576		JSR	%7,STIS	
1151	002604	004737	007616		T4FA: JSR	%7,STRREW	;START REWIND
1152	002610	004737	007274		JSR	%7,CHGDRV	;CHANGE DRIVE
1153	002614	000773			BR	T4FA	
1154	002616	004737	007656		T4FB: JSR	%7,WATREW	;AWAIT BOT
1155	002622	004737	007274		JSR	%7,CHGDRV	;CHANGE DRIVE
1156	002626	000773			BR	T4FB	
1157	002630	000240			NOP		
1158	002632	004737	007560		T4FC: JSR	%7,WRINT	;SET UP FOR WRITE
1159	002636	013777	007346	176136	MOV	FDRIVE,@MTC	;SET DRIVE NUMBER
1160	002644	052777	040005	176130	BIS	#40005,@MTC	;SET 800 BPI, WRITE, GO
1161	002652	105777	176124		TSTB	@MTC	
1162	002656	100375			BPL	.-4	;AWAIT CUR
1163	002660	006077	176114		ROR	@MTC	
1164	002664	103375			BCC	.-4	;AWAIT TUR
1165	002666	000240			NOP		
1166	002670	004737	007560		JSR	%7,WRINT	;SET UP FOR NEXT WRITE
1167	002674	005277	176102		INC	@MTC	;SET GO
1168	002700	105777	176076		TSTB	@MTC	
1169	002704	100375			BPL	.-4	;AWAIT CUR
1170	002706	006077	176066		ROR	@MTC	
1171	002712	103375			BCC	.-4	;AWAIT TUR
1172	002714	004737	007560		JSR	%7,WRINT	;SET UP FOR NEXT WRITE
1173	002720	005277	176056		INC	@MTC	;SET GO
1174	002724	105777	176052		TSTB	@MTC	
1175	002730	100375			BPL	.-4	;AWAIT CUR
1176	002732	006077	176042		ROR	@MTC	
1177	002736	103375			BCC	.-4	;AWAIT TUR
1178	002740	004737	007274		JSR	%7,CHGDRV	;CHANGE DRIVE
1179	002744	000732			BR	T4FC	
1180	002746	000240			NOP		

1181

```

1182
1183           ;WRITE RECORDS TO BE USED IN GAP TEST
1184
1185 002750 004737 007560          T4G: JSR    %7,WRINT
1186 002754 013777 007346 176020  MOV    FDRIVE,@MTC           ;SELECT DRIVE
1187 002762 052777 040005 176012  BIS    #40005,@MTC         ;800 BPI, WRITE, GO
1188 002770 105777 176006          TSTB   @MTC
1189 002774 100375          BPL    .-4                 ;WAIT FOR CU READY
1190 002776 006077 175776          ROR    @MTC
1191 003002 103375          BCC    .-4                 ;AWAIT TUR
1192 003004 004737 007560          JSR    %7,WRINT
1193 003010 005277 175766          INC    @MTC                 ;GO NONSTOP
1194 003014 105777 175762          TSTB   @MTC
1195 003020 100375          BPL    .-4                 ;WAIT FOR CU READY
1196 003022 006077 175752          ROR    @MTC
1197 003026 103375          BCC    .-4                 ;AWAIT TUR
1198 003030 012777 177777 175746  MOV    #-1,@3C
1199 003036 013777 007346 175736  MOV    FDRIVE,@MTC         ;SELECT DRIVE
1200 003044 052777 040013 175730  BIS    #40013,@MTC         ;800 BPI, BACKSPACE, GO
1201 003052 105777 175724          TSTB   @MTC
1202 003056 100375          BPL    .-4                 ;WAIT FOR CU READY
1203 003060 006077 175714          ROR    @MTC
1204 003064 103375          BCC    .-4                 ;AWAIT TUR
1205 003066 004737 007560          JSR    %7,WRINT
1206 003072 013777 007346 175702  MOV    FDRIVE,@MTC
1207 003100 052777 040005 175674  BIS    #40005,@MTC         ;800 BPI, WRITE, GO
1208 003106 105777 175670          TSTB   @MTC
1209 003112 100375          BPL    .-4
1210 003114 006077 175660          ROR    @MTC
1211 003120 103375          BCC    .-4                 ;AWAIT TUR
1212 003122 012737 177777 001034  MOV    #-1,R11             ;INDICATES BACK 3 COMPLETE
1213 003130 012737 177777 001036  MOV    #-1,R12             ;INDICATES BACK 4 COMPLETE
1214 003136 012737 177777 001040  MOV    #-1,R13             ;INDICATES BACK 5 COMPLETE
1215 003144 012737 177776 001032  MOV    #-2,R10             ;FIRST SEQUENCE BACK 2 TIMES

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```
1216 :NOW WRITE, BACKSPACE, WRITE, BACKSPACE, WRITE
1217 :GAP SHOULD GET LARGER
1218
1219 003152 004737 007560 MULWRT: JSR %7,WRINT :GO NONSTOP
1220 003156 005277 175620 INC @MTC
1221 003162 105777 175614 TSTB @MTC
1222 003166 100375 BPL -.4 :WAIT FOR DONE
1223 003170 006077 175604 ROR @MTC
1224 003174 103375 BCC -.4 :AWAIT TUR
1225 003176 012777 177777 175600 MULBAK: MOV #-1,@BC :BACKSPACE 1 RECORD
1226 003204 042777 000016 :75570 BIC #16,@MTC
1227 003212 052777 000013 175562 BIS #13,@MTC :SET BACKSPACE, GO
1228 003220 105777 175556 TSTB @MTC
1229 003224 100375 BPL -.4 :WAIT FOR BACKSPACE DONE
1230 003226 006077 175546 ROR @MTC
1231 003232 103375 BCC -.4 :AWAIT TUR
1232 003234 004737 007560 JSR %7,WRINT
1233 003240 042777 000016 175534 BIC #16,@MTC
1234 003246 052777 000005 175526 BIS #5,@MTC :SET WRITE, GO
1235 003254 105777 175522 TSTB @MTC
1236 003260 100375 BPL -.4 :WAIT FOR WRITE DONE
1237 003262 006077 175512 ROR @MTC
1238 003266 103375 BCC -.4 :AWAIT TUR
1239 003270 005237 001032 INC R10 :BACKSPACED ENOUGH TIMES?
1240 003274 001340 BNE MULBAK :NO BACKSPACE AND WRITE AGAIN
1241 003276 005237 001034 INC R11 :DONE 3 BACKSPACE SEQUENCES?
1242 003302 001004 BNE MUL1 :YES
1243 003304 012737 177775 001032 MOV #-3,R10
1244 003312 000717 BR MULWRT
1245 003314 005237 001036 MUL1: INC R12 :DONE 4 BACKSPACE SEQUENCES?
1246 003320 001004 BNE MUL2 :YES
1247 003322 012737 177774 001032 MOV #-4,R10
1248 003330 000710 BR MULWRT
1249 003332 005237 001040 MUL2: INC R13 :DONE 5 BACKSPACE SEQUENCES?
1250 003336 001004 BNE MUL3 :YES
1251 003340 012737 177773 001032 MOV #-5,R10
1252 003346 000701 BR MULWRT
1253 003350 006077 175424 MUL3: ROR @MTC
1254 003354 103375 BCC -.4 :WAIT FOR TU READY
1255 003356 004737 007616 JSR %7,STREW :START REWIND
1256 003362 004737 007274 JSR %7,CHDRV
1257 003366 000137 002750 JMP T4G
```

```
1258 ;NOW READ NONSTOP
1259 ;ACCUMULATE GAP TIMES ON READ
1260 ;TYPE ACCUMULATED TIMES AT END OF READ
1261 ;GAP1 SHOULD = GAP2, GAP3 <GAP1 AND GAP2
1262 ;GAP4 THRU GAP8 SHOULD GET INCREASINGLY LONGER
1263 003372 005037 001042 CLR T5DRV
1264
1265 003376 004737 007656 T5: JSR %7,WATREW
1266 003402 004737 007560 JSR %7,WRINT
1267 003406 012700 007744 MOV #TM1,%0
1268 003412 063700 001042 ADD T5DRV,%0
1269 003416 013777 007346 175356 MOV FDRIVE,@MTC ;SELECT DRIVE
1270 003424 052777 040003 175350 BIS #40003,@MTC ;800 BPI, READ, GO
1271 003432 012737 177770 001032 MOV #-8.,R10 ;COUNT 8 GAPS
1272 003440 105777 175336 T5A: TSTB @MTC
1273 003444 100375 BPL .-4 ;WAIT FOR CU READY
1274 003446 006077 175326 ROR @MTC
1275 003452 103375 BCC .-4 ;AWAIT TUR
1276 003454 004737 007560 JSR %7,WRINT
1277 003460 005037 007742 CLR TIME
1278 003464 005277 175312 INC @MTC ;GO NONSTOP
1279 003470 022777 012504 175310 T5B: CMP #WBUF+2,@CA ;IS 2ND WORD OUTPUT
1280 003476 003403 BLE T5C ;YES
1281 003500 004737 007720 JSR %7,TIMER ;NO, COUNT TIME
1282 003504 000771 BR T5B
1283 003506 013720 007742 T5C: MOV TIME,(0)+ ;SAVE GAP TIME
1284 003512 012710 177777 MOV #-1,(0) ;TERMINATE, JUST IN CASE AT END
1285 003516 062700 000022 ADD #22,%0 ;STEP GAP POINTER
1286 003522 005237 001032 INC R10 ;DONE ALL 8 GAPS?
1287 003526 001344 BNE T5A ;NO
1288 003530 006077 175244 ROR @MTC
1289 003534 103375 BCC .-4 ;WAIT FOR TU READY
1290 003536 004737 007616 JSR %7,STRREW ;START REWIND
1291 003542 062737 000002 001042 ADD #2,T5DRV ;+2 TO DRIVE TIME POINTER
1292 003550 004737 007274 JSR %7,CHGDRV
1293 003554 000710 BR T5
1294 003556 112737 000061 011410 MOVB #1,MSG11A+6
1295 003564 012737 011331 010766 MOV #MSG11,MESAGE
1296 003572 004737 010462 JSR %7,TOP
1297 003576 012737 011402 010766 MOV #MSG11A,MESAGE
1298 003604 012700 007744 MOV #TM1,%0
1299 003610 004737 010204 JSR %7,TYPTIM ;PRINT 'GAP 1'
1300 003614 105237 011410 INCB MSG11A+6
1301 003620 012737 011402 010766 MOV #MSG11A,MESAGE
1302 003626 012700 007770 MOV #TM2,%0
1303 003632 004737 010204 JSR %7,TYPTIM ;PRINT 'GAP 2'
1304 003636 105237 011410 INCB MSG11A+6
1305 003642 012737 011402 010766 MOV #MSG11A,MESAGE
1306 003650 012700 010014 MOV #TM3,%0
1307 003654 004737 010204 JSR %7,TYPTIM ;PRINT 'GAP 3'
1308 003660 105237 011410 INCB MSG11A+6
1309 003664 012737 011402 010766 MOV #MSG11A,MESAGE
1310 003672 012700 010040 MOV #TM4,%0
1311 003676 004737 010204 JSR %7,TYPTIM ;PRINT 'GAP 4'
1312 003702 105237 011410 INCB MSG11A+6
1313 003706 012737 011402 010766 MOV #MSG11A,MESAGE
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1314 003714 012700 010064      MOV      #TM5,%0
1315 003720 004737 010204      JSR      %7,TYPTIM      ;PRINT 'GAP 5'
1316 003724 105237 C11410      INCB    MSG11A+6
1317 003730 012737 011402 010766      MOV      #MSG11A,MESAGE
1318 003736 012700 010110      MOV      #TM6,%0
1319 003742 004737 010204      JSR      %7,TYPTIM      ;PRINT 'GAP 6'
1320 003746 105237 011410      INCB    MSG11A+6
1321 003752 012737 011402 010766      MOV      #MSG11A,MESAGE
1322 003760 012700 010134      MOV      #TM7,%0
1323 003764 004737 010204      JSR      %7,TYPTIM      ;PRINT 'GAP 7'
1324 003770 105237 011410      INCB    MSG11A+6
1325 003774 012737 011402 010766      MOV      #MSG11A,MESAGE
1326 004002 012700 010160      MOV      #TM8,%0
1327 004006 004737 010204      JSR      %7,TYPTIM      ;PRINT 'GAP 8'
1328 004012 004737 007576      JSR      %7,ST1S
1329
1330      ;TIME WRITE START NOT AT BOT
1331
1332 004016 012700 007744      T6:     MOV      #TM1,%0
1333 004022 012701 007770      MOV      #TM2,%1
1334 004026 004737 007560      T6A:    JSR      %7,WRINT
1335 004032 013777 007346 174742      MOV      FDRIVE,@MTC      ;SELECT DRIVE
1336 004040 105777 174736      TSTB    @MTC
1337 004044 100375      BPL     .-4
1338 004046 006077 174726      ROR     @MTC
1339 004052 103375      BCC     .-4      ;WAIT FOR TU READY
1340 004054 052777 040005 174720      BIS     #40005,@MTC      ;800 BPI, WRITE, GO
1341 004062 032777 000040 174710      BIT     #40,@MTC
1342 004070 001374      BNE     .-6      ;WAIT FOR BOT TO CLEAR
1343 004072 052777 010000 174702      BIS     #10000,@MTC      ;POWER CLEAR
1344 004100 013777 007346 174674      MOV      FDRIVE,@MTC
1345 004106 004737 007560      JSR      %7,WRINT
1346 004112 006077 174662      ROR     @MTC
1347 004116 103375      BCC     .-4      ;WAIT FOR TU READY
1348 004120 005037 001742      CLR     TIME
1349 004124 013777 007346 174650      MOV      FDRIVE,@MTC      ;SELECT DRIVE
1350 004132 012777 160000 174644      MOV      #160000,@BC      ;SET FOR VERY LONG RECORD
1351 004140 052777 040005 174634      BIS     #40005,@MTC      ;800 BPI, WRITE, GO
1352 004146 022777 012504 174632      T6B:    CMP      #WBUF+2,@CA      ;IS 2ND WORD OUTPUT?
1353 004154 003403      BLE     T6C      ;YES
1354 004156 004737 007720      JSR      %7,TIMER      ;NO, COUNT TIME
1355 004162 000771      BR      T6B
1356 004164 006077 174610      T6C:    ROR     @MTC
1357 004170 103375      BCC     .-4      ;WAIT FOR TU READY
1358 004172 013720 007742      MOV      TIME,(0)+      ;SAVE 'WRITE START' TIME
1359 004176 005037 007742      CLR     TIME
1360 004202 004737 007560      JSR      %7,WRINT
1361 004206 013777 007346 174566      MOV      FDRIVE,@MTC      ;SELECT DRIVE
1362 004214 052777 040015 174560      BIS     #40015,@MTC      ;800 BPI, WRITE XIRG, GO
1363 004222 022777 012504 174556      T6D:    CMP      #WBUF+2,@CA      ;IS 2ND WORD OUTPUT?
1364 004230 003403      BLE     T6E      ;YES
1365 004232 004737 007720      JSR      %7,TIMER      ;NO COUNT TIME
1366 004236 000771      BR      T6D
1367 004240 006077 174534      T6E:    ROR     @MTC
1368 004244 103375      BCC     .-4      ;WAIT FOR TU READY
1369 004246 013721 007742      MOV      TIME,(1)+      ;SAVE 'WRITE XIRG' TIME

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1370 004252 004737 007616 JSR %7,STRREW
1371 004256 004737 007274 JSR %7,CHGDRV
1372 004262 000661 BR T6A
1373 004264 012720 177777 MOV #-1,(0)+ ;TERMINATE TIMES
1374 004270 012721 177777 MOV #-1,(1)+ ;TERMINATE TIMES
1375 004274 012737 011125 010766 MOV #MSG5,MESAGE
1376 004302 012700 007744 MOV #TM1,%0
1377 004306 004737 010204 JSR %7,TYPTIM ;TYPE 'WRITE START' TIME
1378 004312 012737 011430 010766 MOV #MSG12,MESAGE
1379 004320 012700 007770 MOV #TM2,%0
1380 004324 004737 010204 JSR %7,TYPTIM ;TYPE 'WRITE XIRG' TIME
1381 004330 004737 007656 T6F: JSR %7,WATREW
1382 004334 004737 007274 JSR %7,CHGDRV
1383 004340 000773 BR T6F ;WAIT FOR ALL DRIVES AT BOT.
1384 ;NOW TIME 'READ FROM BOT DELAY
1385
1386
1387 004342 012700 007744 T7: MOV #TM1,%0
1388 004346 005037 007742 T7A: CLR TIME
1389 004352 004737 007560 JSR %7,WRINT
1390 004356 013777 007346 174416 MOV FDRIVE,@MTC ;SELECT DRIVE
1391 004364 052777 040003 174410 BIS #40003,@MTC ;800 BPI, READ GO
1392 004372 022777 012504 174406 T7B: CMP #WBUF+2,@CA ;IS 2ND WORD INPUT?
1393 004400 003403 BLE T7C ;YES
1394 004402 004737 007720 JSR %7,TIMER ;NO COUNT TIME
1395 004406 000771 BR T7B
1396 004410 013720 007742 T7C: MOV TIME,(0)+ ;SAVE 'READ FROM BOT' TIME
1397 004414 105777 174362 TSTB @MTC
1398 004420 100375 BPL -4 ;WAIT FOR CU READY.
1399 004422 006077 174352 ROR @MTS
1400 004426 103375 BCC -4 ;AWAIT TUR
1401 004430 004737 007274 JSR %7,CHGDRV ;DONE ALL DRIVES?
1402 004434 000744 BR T7A ;NO
1403 004436 006077 174336 ROR @MTS
1404 004442 103375 BCC -4
1405 004444 012720 177777 MOV #-1,(0)+ ;TERMINATE TIMES
1406 004450 012737 011456 010766 MOV #MSG13,MESAGE
1407 004456 012700 007744 MOV #TM1,%0
1408 004462 004737 010204 JSR %7,TYPTIM ;PRINT 'READ FROM BOT' TIME
1409 004466 004737 007576 JSR %7,STIS
1410
1411 004472 004737 007616 T8: JSR %7,STRREW ;REWIND
1412 004476 004737 007274 JSR %7,CHGDRV ;ANYMORE DRIVES?
1413 004502 000773 BR T8 ;YES
1414 004504 012720 177777 MOV #-1,(0)+ ;TERMINATE TIMES
1415 004510 004737 007656 T8A: JSR %7,WATREW
1416 004514 004737 007274 JSR %7,CHGDRV
1417 004520 000773 BR T8A
1418
1419 ;TIME 'WRITE EOF'
1420 ;WRITE A 3 BYTE RECORD FROM BOT FOLLOWED BY AN EOF.
1421
1422 004522 012700 007744 T9: MOV #TM1,%0
1423 004526 005037 007742 T9A: CLR TIME
1424 004532 012777 177775 174244 MOV #-3,@BC ;WRITE 3 BYTES
1425 004540 012777 012502 174240 MOV #WBUF,@CA
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1426	004546	013777	007346	174226	MOV	FDRIVE,@MTC	:SELECT DRIVE
1427	004554	052777	040005	174220	BIS	#40005,@MTC	:800 BPI, WRITE, GO
1428	004562	105777	174214		TSTB	@MTC	
1429	004566	100375			BPL	.-4	
1430	004570	006077	174204		ROR	@MTC	
1431	004574	103375			BCC	.-4	:WAIT FOR TU READY
1432	004576	042777	000016	174176	BIC	#16,@MTC	
1433	004604	052777	000007	174170	BIS	#7,@MTC	:WRITE EOF, GO
1434	004612	105777	174164		TSTB	@MTC	:IS CU READY SET?
1435	004616	100403			BMI	1\$	:YES
1436	004620	004737	007720		JSR	%7,TIMER	:NO, COUNT TIME
1437	004624	030772			BR	T9B	
1438	004626	006077	174146		ROR	@MTC	
1439	004632	103403			BCS	T9C	:IF TUR: BR
1440	004634	004737	007720		JSR	%7,TIMER	:ELSE CONTINUE TIMER
1441	004640	000772			BR	1\$	
1442	004642	013720	007742		MOV	TIME,(0)+	:SAVE 'WRITE EOF' TIME
1443	004646	004737	007616		JSR	%7,STRREW	:REWIND
1444	004652	004737	007274		JSR	%7,CHGDRV	:ANYMORE DRIVES?
1445	004656	000723			BR	T9A	:YES
1446	004660	012720	177777		MOV	#-1,(0)+	:TERMINATE TIMES
1447	004664	012737	011532	010766	MOV	#MSG15,MESSAGE	
1448	004672	012700	007744		MOV	#TM1,%0	
1449	004676	004737	010204		JSR	%7,TYPTIM	:PRINT 'WRITE EOF' TIMES
1450	004702	004737	007656		JSR	%7,WATREW	
1451	004706	004737	007274		JSR	%7,CHGDRV	
1452	004712	000773			BR	T9D	

:TIME 'EOR TO EOF SPACE TIME', 'SPACE SHUTDOWN' AND 'ONE INCH DATA TIME'.
:WRITE A 3 BYTE RECORD OVER ONE PREVIOUSLY WRITTEN
:BACKSPACE 1 RECORD AND THEN SPACE FORWARD 2 RECORDS
:TIME FROM THE END OF FIRST RECORD UNTIL EOF IS REACHED

1453
1454
1455
1456
1457
1458 004714 012700 007744
1459 004720 012701 007770
1460 004724 012702 010014
1461 004730 005037 007742
1462 004734 012777 177775 174042
1463 004742 012777 012502 174036
1464 004750 013777 007346 174024
1465 004756 052777 040005 174016
1466 004764 105777 174012
1467 004770 100375
1468 004772 006077 174002
1469 004776 103375
1470 005000 012777 177777 173776
1471 005006 042777 000016 173766
1472 005014 052777 000013 173760
1473 005022 105777 173754
1474 005026 100375
1475 005030 006077 173744
1476 005034 103375
1477 005036 012777 177776 173740
1478 005044 042777 000016 173730
1479 005052 052777 000011 173722
1480 005060 022777 177777 173716
1481 005066 001374
1482 005070 032777 040000 173702
1483 005076 001014
1484 005100 006077 173674
1485 005104 103403
1486 005106 004737 007720
1487 005112 000766
1488 005114 032777 040000 173656
1489 005122 001002
1490 005124 005037 007742
1491 005130 013720 007742
1492 005134 005037 007742
1493 005140 000240
1494 005142 000240
1495 005144 000240
1496 005146 032777 000010 173624
1497 005154 001003
1498 005156 004737 007720
1499 005162 000771
1500 005164 013721 007742
1501 005170 006077 173604
1502 005174 103375
1503 005176 012777 176340 173600
1504 005204 012777 012502 173574
1505 005212 005037 007742
1506 005216 013777 007346 173556
1507 005224 006077 173550
1508 005230 103375

T10: MOV #TM1,%0
MOV #TM2,%1
MOV #TM3,%2
T10A: CLR TIME ;3 BYTE RECORD
MOV #-3,@BC ;SELECT DRIVE
MOV #WBUF,@CA ;800 BPI, WRITE, GO
MOV FDRIVE,@MTC
BIS #40005,@MTC
TSTB @MTC ;WAIT FOR CU READY
BPL -4
ROR @MTC ;AWAIT TUR
BCC -4 ;BACKSPACE 1 RECORD
MOV #-1,@BC ;SELECT DRIVE
BIC #16,@MTC ;BACKSPACE, GO
BIS #13,@MTC
TSTB @MTC ;WAIT FOR CU READY
BPL -4
ROR @MTC ;AWAIT TUR
BCC -4 ;SPACE FORWARD 2 RECORDS
MOV #-2,@BC
BIC #16,@MTC
BIS #11,@MTC ;SPACE FORWARD, GO
T10B: CMP #-1,@BC
BNE T10B ;WAIT FOR 1ST RECORD TO BE SPACED OVER
T10C: BIT #40000,@MTC ;IS EOF SET?
BNE T10D ;YES
ROR @MTC
BCS T10CC ;AWAIT TUR
JSR %7,TIMER ;NO, COUNT TIME
BR T10C
T10CC: BIT #40000,@MTC ;HAVE TU READY
BNE T10D ;IS EOF SET?
CLR TIME ;NO, SET ERROR
T10D: MOV TIME,(0)+ ;SAVE 'EOR TO EOF SPACE TIME'
CLR TIME
NOP
NOP
NOP
T10E: BIT #10,@MTC ;IS SETTLEDOWN SET?
BNE T10F ;YES
JSR %7,TIMER ;NO, COUNT TIME
BR T10E
T10F: MOV TIME,(1)+ ;SAVE 'SPACE SHUTDOWN' TIME
ROR @MTC
BCC -4 ;AWAIT TUR
MOV #-800,@BC ;1 INCH OF DATA
MOV #WBUF,@CA
CLR TIME
MOV FDRIVE,@MTC ;SELECT DRIVE
ROR @MTC ;AWAIT TUR
BCC -4

```
1509 005232 052777 040005 173542 BIS #40005,@MTC ;800 BPI, WRITE, GO
1510 005240 022777 012504 173540 CMP #WBUF+2,@CA ;IS 2ND BYTE OUTPUT
1511 005246 003374 BGT -6 ;NO
1512 005250 005777 173530 T10G: TST @BC ;YES IS LAST BYTE OUT
1513 005254 001403 BEQ T10H ;YES
1514 005256 004737 007720 JSR %7,TIMER ;NO, COUNT TIME
1515 005262 000772 BR T10G
1516
1517 005264 013722 007742 T10H: MOV TIME,(2)+ ;SAVE 'ONE INCH DATA TIME'
1518 005270 004737 007616 JSR %7,STRREW ;REWIND
1519 005274 004737 007274 JSR %7,CHGDRV ;ANYMORE DRIVES?
1520 005300 000613 BR T10A ;YES
1521 005302 012720 177777 MOV #-1,(0)+ ;TERMINATE TIMES
1522 005306 012721 177777 MOV #-1,(1)+
1523 005312 012722 177777 MOV #-1,(2)+
1524 005316 012737 011560 010766 MOV #MSG16,MESSAGE
1525 005324 012700 007744 MOV #TM1,%0
1526 005330 004737 010204 JSR %7,TYPTIM ;PRINT 'EOR TO EOF SPACE TIME'
1527 ;PRINT STATUS
1528 005334 012737 011606 010766 MOV #MSG18,MESSAGE
1529 005342 012700 007770 MOV #TM2,%0
1530 005346 004737 010204 JSR %7,TYPTIM ;PRINT 'SPACE SHUTDOWN' TIME
1531 005352 012737 011665 010766 MOV #MSG20,MESSAGE
1532 005360 012700 010014 MOV #TM3,%0
1533 005364 004737 010204 JSR %7,TYPTIM ;PRINT 'ONE INCH DATA TIME'
1534
1535 ;TIME SOME OF PREVIOUS OPERATIONS AT 200 BPI AND 556 BPI
1536
1537 005370 012700 007744 T11: MOV #TM1,%0 ;INITIALIZE TIME BUFFERS
1538 005374 012701 007770 MOV #TM2,%1
1539 005400 012702 010014 MOV #TM3,%2
1540 005404 012703 010040 MOV #TM4,%3
1541 005410 012704 010064 MOV #TM5,%4
1542 005414 012705 010110 MOV #TM6,%5
1543 005420 005037 001044 CLR T11T
1544 005424 004737 007656 T11A: JSR %7,WATREW ;WAIT FOR REWIND
1545 005430 032737 020000 007346 BIT #20000,FDRIVE ;IS DRIVE 9 TRACK?
1546 005436 001402 BEQ T11AA ;NO: BR
1547 005440 000137 006050 JMP T11P ;ELSE GET NEXT DRIVE
1548 005444 012737 177777 001044 T11AA: MOV #-1,T11T ;INDICATE 7 TRACK
1549 005452 012777 176724 173324 MOV #-556,@BC ;566 BYTES - ONE INCH
1550 005460 012777 012502 173320 MOV #WBUF,@CA
1551 005466 005037 007742 CLR TIME
1552 005472 013777 007346 173302 MOV FDRIVE,@MTC ;SELECT DRIVE
1553 005500 052777 020005 173274 BIS #20005,@MTC ;556 BPI, WRITE, GO
1554
1555 ;TIME 'WRITE FROM BOT DELAY' AT 556 BPI
1556
1557 005506 022777 012504 173272 T11B: CMP #WBUF+2,@CA ;IS 2ND WORD OUT?
1558 005514 003403 BLE T11C ;YES
1559 005516 004737 007720 JSR %7,TIMER ;NO, COUNT TIME
1560 005522 000771 BR T11B
1561 005524 013720 007742 T11C: MOV TIME,(0)+ ;SAVE 'WRITE FROM BOT DELAY'
1562 005530 005037 007742 CLR TIME
1563
```

```
1564  
1565 ;TIME 'ONE INCH DATA' AT 556 BPI  
1566  
1567 005534 005777 173244 T11D: TST @BC ;IS BC=0  
1568 005540 001403 BEQ T11F ;YES  
1569 005542 004737 007720 JSR %7,TIMER ;NO, COUNT TIME  
1570 005546 000772 BR T11D  
1571 005550 013721 007742 T11E: MOV TIME,(1)+ ;SAVE '1 INCH DATA' TIME  
1572 005554 005037 007742 CLR TIME  
1573  
1574 ;TIME 'WRITE SHUTDOWN' AT 556 BPI  
1575  
1576 005560 000240 NOP  
1577 005562 000240 NOP  
1578 005564 000240 NOP  
1579 005566 032777 000010 173204 T11F: BIT #10,@MTS ;IS SETTLEDOWN SET?  
1580 005574 001003 BNE T11G ;YES  
1581 005576 004737 007720 JSR %7,TIMER ;NO, COUNT TIME  
1582 005602 000771 BR T11F  
1583 005604 013722 007742 T11G: MOV TIME,(2)+ ;SAVE 'WRITE SHUTDOWN'  
1584 005610 005037 007742 CLR TIME  
1585  
1586 ;TIME 'BACKSPACE SHUTDOWN' AT 556 BPI  
1587  
1588 005614 006077 173100 ROR @MTS  
1589 005620 103375 BCC -4 ;AWAIT TUR  
1590 005622 042777 000016 173152 BIC #16,@MTC  
1591 005630 052777 000007 173144 BIS #7,@MTC ;SET WRITE EOF+GO  
1592 005636 105777 173140 TSTB @MTC  
1593 005642 100375 BPL -4 ;AWAIT CUR  
1594 005644 006077 173130 ROR @MTS ;AWAIT TUR  
1595 005650 103375 BCC -4  
1596 005652 012777 177777 173124 MOV #-1,@BC  
1597 005660 042777 000016 173114 BIC #16,@MTC  
1598 005666 052777 000013 173106 BIS #13,@MTC ;BACKSPACE 1 RECORD, GO  
1599 005674 000240 NOP  
1600 005676 032777 040000 173074 T11GA: BIT #40000,@MTS  
1601 005704 001774 BEQ T11GA ;AWAIT EOF  
1602 005706 000240 NOP  
1603 005710 000240 NOP  
1604 005712 032777 000010 173060 T11H: BIT #10,@MTS ;IS SETTLEDOWN SET?  
1605 005720 001003 BNE T11J ;YES  
1606 005722 004737 007720 JSR %7,TIMER ;NO COUNT TIME  
1607 005726 000771 BR T11H  
1608 005730 013723 007742 T11J: MOV TIME,(3)+ ;SAVE 'BACKSPACE SHUTDOWN'  
1609 005734 005037 007742 CLR TIME  
1610  
1611 ;TIME 'LAST CHAR IN TO MTF' AT 556 BPI  
1612  
1613 005740 105777 173036 TSTB @MTC ;SEE IF CUR  
1614 005744 100375 BPL -4 ;IF NOT: BR  
1615 005746 006077 173026 ROR @MTS  
1616 005752 103375 BCC -4 ;WAIT FOR TU READY  
1617 005754 012777 176724 173022 MOV #-556,@BC ;556 BYTES  
1618 005762 012777 012502 173016 MOV #WBUF,@CA  
1619 005770 013777 007346 173004 MOV FDRIVE,@MTC ;SELECT DRIVE
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1620 005776 052777 020003 172776      BIS      #20003,@MTC      ;556 BPI, READ, GO
1621 006004 032777 040000 172766 T11JA:  BIT      #40000,@MTS
1622 006012 001774          BEQ      T11JA      ;AWAIT EOF
1623 006014 032777 000010 172756 T11K:  BIT      #10,@MTS    ;SEE IF SDWN
1624 006022 001003          BNE      T11L      ;YES
1625 006024 004737 007720      JSR      %7,TIMER  ;NO COUNT TIME
1626 006030 000771          BR       T11K
1627 006032 013724 007742      T11L:  MOV      TIME,(4)+
1628 006036 013725 007742      MOV      TIME,(5)+  ;SAVE 'READ SHUTDOWN'
1629 006042 005037 007742      CLR      TIME
1630 006046 000406          BR       T11R
1631 006050 005020      T11P:  CLR      (0)+  ;CLEAR TIMES FOR 9 TRACK DRIVES
1632 006052 005021      CLR      (1)+
1633 006054 005022      CLR      (2)+
1634 006056 005023      CLR      (3)+
1635 006060 005024      CLR      (4)+
1636 006062 005025      CLR      (5)+
1637 006064 004737 007616      T11R:  JSR      %7,STRREW
1638 006070 004737 007274      JSR      %7,CHGDRV
1639 006074 000401          BR       .+4
1640 006076 000402          BR       .+6
1641 006100 000137 005424      JMP      T11A
1642
1643 006104 012720 177777      MOV      #-1,(0)+  ;TERMINATE DRIVES
1644 006110 012721 177777      MOV      #-1,(1)+
1645 006114 012722 177777      MOV      #-1,(2)+
1646 006120 012723 177777      MOV      #-1,(3)+
1647 006124 012724 177777      MOV      #-1,(4)+
1648 006130 012725 177777      MOV      #-1,(5)+
1649 006134 005737 001044      TST      T11T
1650 006140 001452          BEQ      T12
1651 006142 012737 011634 010766      MOV      #MSG19,MESSAGE ;PRINT 'FUNCTIONS AT 556'
1652 006150 004737 010462          JSR      %7,TOP
1653 006154 012737 011051 010766      MOV      #MSG3,MESSAGE
1654 006162 012700 007744          MOV      #TM1,%0
1655 006166 004737 010204          JSR      %7,TYPTIM  ;PRINT 'WRITE FROM BOT DELAY'
1656 006172 012737 011665 010766      MOV      #MSG20,MESSAGE
1657 006200 012700 007770          MOV      #TM2,%0
1658 006204 004737 010204          JSR      %7,TYPTIM  ;PRINT 'ONE INCH DATA TIME'
1659 006210 012737 011077 010766      MOV      #MSG4,MESSAGE
1660 006216 012700 010014          MOV      #TM3,%0
1661 006222 004737 010204          JSR      %7,TYPTIM  ;PRINT 'WRITE SHUTDOWN'
1662 006226 012737 011255 010766      MOV      #MSG9,MESSAGE
1663 006234 012700 010040          MOV      #TM4,%0
1664 006240 004737 010204          JSR      %7,TYPTIM  ;PRINT 'BACKSPACE SHUTDOWN'
1665 006244 012737 011303 010766      MOV      #MSG10,MESSAGE
1666 006252 012700 010110          MOV      #TM6,%0
1667 006256 004737 010204          JSR      %7,TYPTIM  ;PRINT 'READ SHUTDOWN'
1668 006262 004737 007576          JSR      %7,ST1S
1669
1670      ;TIME OPERATIONS AT 200 BPI
1671
1672 006266 012700 007744      T12:  MOV      #TM1,%0  ;INITIALIZE TIME BUFFERS
1673 006272 012701 007770      MOV      #TM2,%1
1674 006276 012702 010014      MOV      #TM3,%2
1675 006302 012703 010040      MOV      #TM4,%3
  
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1676 006306 012704 010064      MOV      #TM5,%4
1677 006312 012705 010110      MOV      #TM6,%5
1678 006316 005037 001044      CLR      T11T
1679 006322 004737 007656      JSR      %7,WATREW      ;WAIT FOR REWIND
1680 006326 032737 020000 007346  T12A:  BIT      #20000,%DRIVE  ;IS DRIVE 9 TRACK?
1681 006334 001402          BEQ      .+6             ;NO
1682 006336 000137 006746      JMP      T12P           ;YES, GET NEXT DRIVE
1683 006342 012737 177777 001044      MOV      #-1,T11T
1684 006350 012777 177470 172426      MOV      #-200,%ABC     ;566 BYTES = ONE INCH
1685 006356 012777 012502 172422      MOV      #WBUF,%CA
1686 006364 005037 007742          CLR      TIME
1687 006370 01_77 007346 172404      MOV      FDRIVE,%MTC    ;SELECT DRIVE
1688 006376 052777 000005 172376      BIS      #00005,%MTC    ;200 BPI, WRITE, GO
1689
1690          ;TIME 'WRITE FROM BOT DELAY' AT 556 BPI
1691
1692 006404 022777 012504 172374  T12B:  CMP      #WBUF+2,%CA    ;IS 2ND WORD OUT?
1693 006412 001403          BEQ      T12C           ;YES
1694 006414 004737 007720          JSR      %7,TIMER       ;NO, COUNT TIME
1695 006420 000771          BR       T12B
1696 006422 013720 007742  T12C:  MOV      TIME,(0)+    ;SAVE 'WRITE FROM BOT DELAY'
1697 006426 005037 007742          CLR      TIME
1698
1699          ;TIME 'ONE INCH DATA' AT 200 BPI
1700
1701 006432 005777 172346  T12D:  TST      @BC          ;IS BC=0
1702 006436 001403          BEQ      T12E           ;YES
1703 006440 004737 007720          JSR      %7,TIMER       ;NO, COUNT TIME
1704 006444 000772          BR       T12D
1705 006446 013721 007742  T12E:  MOV      TIME,(1)+    ;SAVE '1 INCH DATA' TIME
1706 006452 005037 007742          CLR      TIME
1707
1708          ;TIME 'WRITE SHUTDOWN' AT 200 BPI
1709
1710 006456 005777 172322          TST      @BC          ;SEE IF WORD COUNT DONE
1711 006462 001375          BNE      .-4           ;IF NOT: BR
1712 006464 032777 000010 172306  T12F:  BIT      #10,%MTC      ;IS SETTLEDOWN SET?
1713 006472 001003          BNE      T12G           ;YES
1714 006474 004737 007720          JSR      %7,TIMER       ;NO, COUNT TIME
1715 006500 000771          BR       T12F
1716 006502 013722 007742  T12G:  MOV      TIME,(2)+    ;SAVE 'WRITE SHUTDOWN'
1717 006506 005037 007742          CLR      TIME
1718
1719          ;TIME 'BACKSPACE SHUTDOWN' AT 200 BPI
1720
1721 006512 006077 172262          ROR      @MTC
1722 006516 103375          BCC      .-4           ;AWAIT TUR
1723 006520 042777 000016 172254      BIC      #16,%MTC
1724 006526 052777 000007 172246      BIS      #7,%MTC
1725 006534 105777 172242          TSTB    @MTC
1726 006540 100375          BPL      .-4           ;AWAIT CUR
1727 006542 006077 172232          ROR      @MTC
1728 006546 103375          BCC      .-4           ;AWAIT TUR
1729 006550 012777 177777 172226      MOV      #-1,%ABC
1730 006556 042777 000016 172216      BIC      #16,%MTC
1731 006564 052777 000013 172210      BIS      #13,%MTC
  
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1732 006572 000240      NOP
1733 006574 000240      NOP
1734 006576 000240      NOP
1735 006600 032777 040000 172172 T12GA: BIT      #40000,@MTS
1736 006606 001774      BEQ      T12GA      ;AWAIT EOF
1737 006610 032777 000010 172162 T12H: BIT      #10,@MTS      ;IS SETTLEDOWN SET?
1738 006616 001003      BNE      T12J      ;YES
1739 006620 004737 007720      JSR      %7,TIMER   ;NO COUNT TIME
1740 006624 000771      BR       T12H
1741 006626 013723 007742      T12J: MOV      TIME,(3)+ ;SAVE 'BACKSPACE SHUTDOWN'
1742 006632 005037 007742      CLR      TIME
1743
1744      ;TIME 'LAST CHAR IN TO MTF' AT 200 BPI
1745
1746 006636 006077 172136      ROR      @MTS
1747 006642 103375      BCC      .-4      ;WAIT FOR TU READY
1748 006644 012777 177470 172132      MOV      #-200,@BC ;556 BYTES
1749 006652 012777 012502 172126      MOV      #WBUF,@CA
1750 006660 013777 007346 172114      MOV      FDRIVE,@MTC ;SELECT DRIVE
1751 006666 052777 000003 172106      BIS      #00003,@MTC ;556 BPI, READ, GO
1752 006674 032777 040000 172076 T12JA: BIT      #40000,@MTS
1753 006702 001774      BEQ      T12JA      ;AWAIT EOF
1754 006704 000240      T12K: NOP
1755 006706 000240      NOP
1756 006710 000240      NOP
1757 006712 013724 007742      T12L: MOV      TIME,(4)+ ;SAVE 'LAST CHAR IN TO MTF'
1758 006716 005037 007742      CLR      TIME
1759 006722 032777 000010 172050 T12M: BIT      #10,@MTS
1760 006730 001003      BNE      T12N
1761 006732 004737 007720      JSR      %7,TIMER
1762 006736 000771      BR       T12M
1763 006740 013725 007742      T12N: MOV      TIME,(5)+ ;SAVE 'READ SHUTDOWN'
1764 006744 000406      BR       T12R
1765
1766 006746 005020      T12P: CLR      (0)+
1767 006750 005021      CLR      (1)+
1768 006752 005022      CLR      (2)+
1769 006754 005023      CLR      (3)+
1770 006756 005024      CLR      (4)+
1771 006760 005025      CLR      (5)+
1772 006762 004737 007274      T12R: JSR      %7,CHGDRV
1773 006766 000401      BR       .+4
1774 006770 000402      BR       .+6
1775 006772 000137 006322      JMP      T12A
1776 006776 012720 177777      MOV      #-1,(0)+ ;TERMINATE DRIVES
1777 007002 012721 177777      MOV      #-1,(1)+
1778 007006 012722 177777      MOV      #-1,(2)+
1779 007012 012723 177777      MOV      #-1,(3)+
1780 007016 012724 177777      MOV      #-1,(4)+
1781 007022 012725 177777      MOV      #-1,(5)+
1782 007026 005737 001044      TST      T11T
1783 007032 001452      BEQ      T13      ;HAVE TESTED ANY 7 TRACKS?
1784 007034 012737 011713 010766      MOV      #MSG21,MESSAGE ;PRINT 'FUNCTIONS AT 200'
1785 007042 004737 010462      JSR      %7,TOP
1786 007046 012737 011051 010766      MOV      #MSG3,MESSAGE
1787 007054 012700 007744      MOV      #TM1,%0
  
```

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1788 007060 004737 010204          JSR    %7, TYPTIM      ;PRINT 'WRITE FROM BOT DELAY'
1789 007064 012737 011665 010766  MOV    #MSG20, MESSAGE
1790 007072 012700 007770          MOV    #TM2, %0
1791 007076 004737 010204          JSR    %7, TYPTIM      ;PRINT 'ONE INCH DATA TIME'
1792 007102 012737 011077 010766  MOV    #MSG4, MESSAGE
1793 007110 012700 010014          MOV    #TM3, %0
1794 007114 004737 010204          JSR    %7, TYPTIM      ;PRINT 'WRITE SHUTDOWN'
1795 007120 012737 011255 010766  MOV    #MSG9, MESSAGE
1796 007126 012700 010040          MOV    #TM4, %0
1797 007132 004737 010204          JSR    %7, TYPTIM      ;PRINT 'BACKSPACE SHUTDOWN'
1798 007136 012737 011303 010766  MOV    #MSG10, MESSAGE
1799 007144 012700 010110          MOV    #TM6, %0
1800 007150 004737 010204          JSR    %7, TYPTIM      ;PRINT 'READ SHUTDOWN'
1801 007154 004737 007576          JSR    %7, ST1S
1802 007160 012737 011744 010766  T13:  MOV    #MSG27, MESSAGE ;PRINT 'END OF TIMING'
1803 007166 004737 010462          JSR    %7, TOP
1804 007172 013700 000042          MOV    @#42, %0
1805 007176 001405          BEQ    HERE
1806 007200 000005          RESET
1807 007202 004710          SENDAD: JSR    %7, (%0)
1808 007204 000240          NOP
1809 007206 000240          NOP
1810 007210 000240          NOP
1811 007212 000240          HERE:  NOP
1812 007214 105737 000742          TS1B   ACT11M      ;ACT11 MODE? ++ C.W
1813 007220 001001          BNE    1$          ;BRANCH - IF YES ++ C.W
1814 007222 000000          HALT
1815 007224 000137 001136          1$:    JMP    STO
1816
1817          ;RESET DRIVE SELECTION TO LOWEST NUMBER
1818
1819 007230 005037 007340          RSFDRV: CLR    CDRIVE      ;START WITH DRIVE 0
1820 007234 012737 100000 007342  MOV    #100000, CDRVBT ;INITIALIZE FOR 0
1821 007242 033737 007342 007344  RSF1:  BIT    CDRVBT, DRIVES ;MASK WITH SELECTED DRIVES
1822 007250 001006          BNE    RSF2
1823 007252 005237 007340          INC    CDRIVE      ;+1 TO DRIVE NUMBER
1824 007256 000241          CLC
1825 007260 006037 007342          ROR    CDRVBT      ;MOVE MASK BIT TO NEXT DRIVE
1826 007264 000766          BR    RSF1
1827 007266 004737 007520          RSF2:  JSR    %7, GTNINE ;CHECK 9 TRACK
1828 007272 000207          RTS    %7
  
```

```
1829                                     :SELECT NEXT DRIVE IN SEQUENCE
1830                                     :SKIP FIRST EXIT ADDRESS IF LAST DRIVE SELECTED
1831
1832 007274 005237 007340   CHGDRV: INC      CDRIVE      ;+1 TO DRIVE
1833 007300 000241          CLC
1834 007302 006037 007342   ROR      CDRVBT      ;MOVE MASK BIT TO NEXT DRIVE
1835 007306 001005          BNE      CHG1
1836 007310 004737 007230   JSR      %7,RSFDRV   ;RESET TO LOWEST DRIVE
1837 007314 062716 000002   ADD      #2,(6)     ;+2 TO SKIP FIRST EXIT
1838 007320 000207          RTS      %7          ;EXIT
1839 007322 033737 007342 007344 CHG1: BIT      CDRVBT,DRIVES ;MASK WITH SELECTED DRIVES
1840 007330 001761          BEQ      CHGDRV      ;CHECK FOR NEXT DRIVE
1841 007332 004737 007520   JSR      %7,GTNINE   ;CHECK 9 TRACK
1842 007336 000207          RTS      %7
1843                                     CDRIVE: 0
1844                                     CDRVBT: 0
1845                                     DRIVES: 0
1846 007346 000000          FDRIVE: 0
1847
1848
1849
1850
1851                                     :*****
1852                                     :CODE INSERTED BETWEEN THE ASTERICKS WAS DONE BY MIKE PAGE
1853                                     :PRODUCT ENHANCEMENT GROUP (DIAGNOSTICS)
1854
1855                                     :ROUTINE TO SIZE FOR DRIVES UNDER ACT
1856
1857
1858
1859 007350 012737 100000 007512 SIZER: MOV      #100000,TEMP ;SET UP DRIVE INDICATOR
1860 007356 005037 000176          CLR      SWITCH     ;CLEAR DRIVE INDICATOR
1861 007362 005037 007510          CLR      SIZ        ;INIT TO DRIVE 0
1862 007366 005000          CLR      R0         ;CLEAR DELAY COUNTER
1863 007370 013737 007510 007514   MOV      SIZ,TMP     ;SAVE CURRENT DRIVE #
1864 007376 000337 007514          SWAB     TMP        ;POSITION DRIVE #
1865 007402 053777 007514 171372   BIS      TMP,@MTC    ;TRY TO SELECT DRIVE
1866 007410 005300          DEC      R0         ;WAIT FOR SELECT REMOTE IN MTS
1867 007412 001376          BNE      2$
1868 007414 000241          CLC
1869 007416 032777 000100 171354   BIT      #100,@MTS   ;CLEAR C-BIT
1870 007424 001420          BEQ      4$         ;IS DRIVE ON-LINE
1871 007426 032777 000020 171344   BIT      #20,@MTC    ;NO , THEN BRANCH
1872 007434 001011          BNE      3$         ;DRIVE 7 CHANNEL ?
1873 007436 013737 007512 007516   MOV      TEMP,TMP1   ;YES, BRANCH
1874                                     ;IF DRIVE IS 9 CHANNEL THEN
1875 007444 000337 007516          SWAB     TMP1        ;POSITION FOR CORRECT BIT
1876 007450 053737 007516 000176   BIS      TMP1,SWITCH ;SET DRIVE INDICATOR IN LOC.176
1877 007456 000403          BR      4$
1878 007460 053737 007512 000176   BIS      TEMP,SWITCH ;SET DRIVE INDICATOR
1879 007466 006037 007512          ROR      TEMP        ;SET FOR NEXT DRIVE
1880 007472 005237 007510          INC      SIZ
1881 007476 022737 000010 007510   CMP      #10,SIZ
1882 007504 001330          BNE      1$
1883 007506 000207          RTS      PC
1884
```



```
1885
1886 007510 000000
1887 007512 000000
1888 007514 000000
1889 007516 000000
1890
1891
1892
1893
1894
1895 007520 013737 007340 007346 GTNINE: MOV CDRIVE,FDRIVE ;POSITION UNIT SELECT BITS
1896 007526 000337 007346 SWAB FDRIVE ;CLEAR ALL OTHER BITS
1897 007532 042737 174377 007346 BIC #174377,FDRIVE ;TEST FOR 9 TRACK
1898 007540 032737 000010 007340 BIT #10,CDRIVE ;NO
1899 007546 001403 BEQ GNT1 ;YES SET 9 TRACK BIT
1900 007550 052737 020000 007346 BIS #20000,FDRIVE
1901 007556 000207 GNT1: RTS %7
1902
1903 ;INITIALIZE BYTE COUNT AND CURRENT ADDRESS FOR WRITE
1904
1905 007560 012777 172110 171216 WRINT: MOV #-BLENGTH,@BC
1906 007566 012777 012502 171212 MOV #WBUF,@CA
1907 007574 000207 RTS %7
1908
1909 ;STORE 1'S IN WRITE BUFFER
1910
1911 007576 012700 012502 ST1S: MOV #WBUF,%0
1912 007602 012720 177777 ST1SA: MOV #-1,(0)+
1913 007606 022700 020374 CMP #WBUF+BLENGTH+2,%0
1914 007612 001373 BNE ST1SA
1915 007614 000207 RTS %7
1916
1917 ;START REWIND OPERATIONS
1918
1919 007616 013777 007346 171156 STRREW: MOV FDRIVE,@MTC ;SELECT DRIVE
1920 007624 105777 171152 TSTB @MTC ;WAIT FOR CU READY
1921 007630 100375 BPL .-4
1922 007632 006077 171142 ROR @MTC ;WAIT FOR TAPE UNIT READY
1923 007636 103375 BCC .-4 ;GO REWIND
1924 007640 052777 000017 171134 BIS #17,@MTC
1925 007646 105777 171130 TSTB @MTC ;WAIT FOR CONTROL UNIT READY
1926 007652 100375 BPL .-4
1927 007654 000207 RTS %7
1928
1929 ;WAIT FOR REWIND TO FINISH
1930
1931 007656 013777 007346 171116 WATREW: MOV FDRIVE,@MTC
1932 007664 006077 171110 ROR @MTC
1933 007670 103375 BCC .-4
1934 007672 032777 000040 171100 BIT #40,@MTC ;IS BOT SET?
1935 007700 001006 BNE 1$ ;YES
1936 007702 012737 012311 010766 MOV #MSG29,MESAGE
1937 007710 004737 010462 JSR %7,^OP ;ERROR, NOT AT BOT AFTER REWIND
1938 007714 000000 HALT
1939 007716 000207 1$: RTS %7
1940
```

1941
1942
1943
1944 007720 005777 171066
1945 007724 100375
1946 007726 005777 171060
1947 007732 100775
1948 007734 005237 007742
1949 007740 000207
1950 007742 000000
1951 007744 000000
1952 007770 007770
1953 010014 000000
1954 010014 010014
1955 010040 000000
1956 010040 010040
1957 010064 000000
1958 010064 010064
1959 010110 000000
1960 010110 010110
1961 010134 000000
1962 010134 010134
1963 010160 000000
1964 010160 010160
1965 010204 000000
1966 010204 010204

:KEEP COUNT OF ELAPSED TIME
:EXIT EVERY 100 USEC

TIMER: TST @MTRD
BPL .-4
TST @MTRD
BMI .-4
INC TIME
RTS %7

;+1 TO 100 USEC COUNT

TIME: 0
TM1: 0
.=TM1+20.
TM2: 0
.=TM2+20.
TM3: 0
.=TM3+20.
TM4: 0
.-TM4+20.
TM5: 0
.=TM5+20.
TM6: 0
.=TM6+20.
TM7: 0
.=TM7+20.
TM8: 0
.=TM8+20.

```

;PRINT TITLE OF TEST EXECUTED AND THE DRIVE TIMES
1967
1968
1969 010204 004737 010462 TYPTIM: JSR %7, TOP ;PRINT TITLE
1970 010210 012037 010440 TYPT0: MOV (0)+, VALUE ;GET TIME
1971 010214 022737 177777 010440 CMP #-1, VALUE ;FINISHED TIME BUFFER
1972 010222 001001 BNE .+4
1973 010224 000207 RTS %7
1974 010226 012737 010452 010450 MOV #DECPNT+2, DECPNT ;INITIALIZE DECIMAL VALUE POINTER
1975 010234 012737 000040 010446 MOV #40, ZERO ;INITIALIZE SPACE
1976 010242 012737 177774 010442 MOV #-4, DIGCNT ;DIGIT COUNT
1977 010250 012737 177777 010444 TYPT1: MOV #-1, DIGIT ;INITIAL VALUE
1978 010256 005237 010444 TYPT2: INC DIGIT ;+1 TO VALUE
1979 010262 167737 000162 010440 SUB @DECPNT, VALUE ;SUBTRACT CONSTANT
1980 010270 100372 BPL TYPT2 ;NOT NEGATIVE YET
1981 010272 067737 000152 010440 ADD @DECPNT, VALUE ;RESTORE LAST POSITIVE VALUE
1982 010300 004737 010370 JSR %7, DECOU ;PRINT DECIMAL DIGIT
1983 010304 005237 010442 INC DIGCNT ;+1 TO DIGIT COUNT
1984 010310 001006 BNE TYP2A
1985 010312 012737 011045 010766 MOV #MSG2B, MESSAGE
1986 010320 004737 010462 JSR %7, TOP
1987 010324 000731 BR TYPT0
1988 010326 022737 177777 010442 TYP2A: CMP #-1, DIGCNT ;CHECK FOR DECIMAL PLACE
1989 010334 001011 BNE TYPT3 ;NO
1990 010336 105777 170460 TSTB @TPS
1991 010342 100375 BPL .-4
1992 010344 012777 000056 170452 MOV #'., @TPB ;PRINT DECIMAL POINT
1993 010352 012737 000060 010446 MOV #60, ZERO
1994 010360 062737 000002 010450 TYPT3: ADD #2, DECPNT ;+2 TO DECIMAL VALUE POINTER
1995 010366 000730 BR TYPT1 ;DO AGAIN
1996
1997 010370 005737 010444 DECOU: TST DIGIT ;IS DIGIT 0
1998 010374 001004 BNE DEC1 ;NO
1999 010376 013737 010446 010444 MOV ZERO, DIGIT ;SUPPRESS LEADING ZEROS
2000 010404 000406 BR DEC2
2001 010406 012737 000060 010446 DEC1: MOV #60, ZERO ;INITIALIZE ZERO AFTER SOME VALUE FOUND
2002 010414 052737 000060 010444 BIS #60, DIGIT ;CONVERT TO ANSCII
2003 010422 105777 170374 DEC2: TSTB @TPS
2004 010426 100375 BPL .-4
2005 010430 013777 010444 170366 MOV DIGIT, @TPB ;PRINT
2006 010436 000207 RTS %7
2007 010440 000000 VALUE: 0
2008 010442 000000 DIGCNT: 0
2009 010444 000000 DIGIT: 0
2010 010446 000040 ZERO: 40 ;CONTAINS ZERO OR SPACE
2011 010450 010452 DECPNT: .+2
2012 010452 001750 1000.
2013 010454 000144 100.
2014 010456 000012 10.
2015 010460 000001 1.

```



```
2043  
2044 : *****  
2045 :                               MODIFIED DEC 7 1977  
2046 :  
2047 : ++  
2048 :                               CHECK FOR DUMP MODE OR AUTOMATIC/ACT11-XXDP MODE  
2049 : --  
2050 :  
2051 010602 005037 000740 CKMODE: CLR AUTOM ;INIT AUTOMATIC MODE INDICATOR  
2052 010606 105037 000742 CLRB ACT11M ;INIT ACT11 AUTO MODE INDICATOR  
2053 010612 105037 000743 CLRB XXDPM ;INIT XXDP AUTO MODE INDICATOR  
2054 010616 105037 000744 CLRB ADUMPM ;INIT ACT11 DUMP MODE IJNDICATOR  
2055 010622 105037 000745 CLRB XDUMPM ;INIT XXDP DUMP MODE INDICATOR  
2056 010626 005737 000042 TST @#42 ;AUTO MODE?  
2057 010632 001425 BEQ 2$ ;BRANCH - IF NO  
2058 010634 005237 000740 INC AUTOM ;SET AUTO MODE INDICATOR  
2059 010640 032737 020000 000052 BIT #20000,@#52 ;MANUAL INTERVENTION?  
2060 010646 001402 BEQ 6$ ;BRANCH - IF NO  
2061 010650 000137 010730 JMP ABORT ;ABORT THE PROGRAM  
2062 010654 023737 000042 000046 6$: CMP @#42,@#46 ;ACT11 MODE?  
2063 010662 001403 BEQ 1$ ;BRANCH - IF YES  
2064 010664 105237 000743 INCB XXDPM ;INDICATE XXDP AUTO MODE  
2065 010670 000416 BR 5$ ;AND EXIT  
2066 010672 105237 000742 000176 1$: INCB ACT11M ;INDICATE ACT11 AUTO MODE  
2067 010676 012737 177777 MOV #177777,SWITCH ;SET SWITCH REGISTER  
2068 010704 000410 BR 5$ ;AND EXIT  
2069 010706 105737 000041 2$: TSTB @#41 ;MAN/MODE VIA ACT11/PAPER TAPE?  
2070 010712 001003 BNE 3$ ;BRANCH IF NOT  
2071 010714 105237 000744 INCB ADUMPM ;INDICATE MAN/MODE VIA ACT11/PAPER TAPE  
2072 010720 000402 BR 5$ ;AND EXIT  
2073 010722 105237 000745 3$: INCB XDUMPM ;INDICATE MANUAL MODE VIA XXDP  
2074 010726 000207 5$: RTS PC ;RETURN  
2075 : *****  
2076 :  
2077 :
```

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```
*****  
:                                     MODIFIED DEC 7 1977  
:                                     *****  
:                                     **  
:                                     DISCONTINUE TESTING FOR ILLEGAL CONDITIONS  
:                                     --  
:                                     :CLEAR THE WORLD  
ABORT: RFSET                                     :GET ABORT MESSAGE  
MOV      #MSG01,MESAGE                          :TYPE ABORT MESSAGE  
JSR      %7, TOP                                :XXDP AUTO MODE  
TSTB     XXDPM                                  :BRANCH - IF NOT  
BEQ      1$                                     :GET MONITOR EXIT ADDRESS  
MOV      @#42,R0                                :USE AS ABORT FLAG  
CLR      @#42                                   :EXIT TO XXDP MONITOR  
JSR      PC,(R0)                                :AND HANG  
1$:      BR      .  
:                                     *****
```

2098	010766	000000			MESSAGE: 0
2099					
2100	010770	050057	047522	051107	MSG01: .ASCII ;/PROGRAM ABORTED/;
2101	010776	046501	040440	047502	
2102	011004	052122	042105	057	
2103	011011	057	043100	047125	MSG2: .ASCII ;/@FUNCTION /;
2104	011016	052103	047511	020116	
2105	011024	020040	020040	020040	
2106	011032	020040	057		
2107	011035	057	052440	044516	MSG2A: .ASCII ;/ UNIT /;
2108	011042	020124	057		
2109	011045	057	020040	057	MSG2B: .ASCII ;/ /;
2110	011051	057	053500	044522	MSG3: .ASCII ;/@WRITE FROM BOT /;
2111	011056	042524	043040	047522	
2112	011064	020115	047502	020124	
2113	011072	020040	020040	057	
2114	011077	057	053500	044522	MSG4: .ASCII ;/@WRITE SHUTDOWN /;
2115	011104	042524	051440	052510	
2116	011112	042124	053517	020116	
2117	011120	020040	020040	057	
2118	011125	057	053500	044522	MSG5: .ASCII ;/@WRITE START /;
2119	011132	042524	051440	040524	
2120	011140	052122	020040	020040	
2121	011146	020040	020040	057	
2122	011153	057	051500	052105	MSG6: .ASCII ;/@SETTLE DOWN DELAY /;
2123	011160	046124	020105	047504	
2124	011166	047127	042040	046105	
2125	011174	054501	020040	057	
2126	011201	057	053500	044522	MSG7: .ASCII ;/@WRITE TO ERASE HEAD/;
2127	011206	042524	052040	020117	
2128	011214	051105	051501	020105	
2129	011222	042510	042101	057	
2130	011227	057	053500	044522	MSG8: .ASCII ;/@WRITE NONSTOP GAP /;
2131	011234	042524	047040	047117	
2132	011242	052123	050117	043440	
2133	011250	050101	020040	057	
2134	011255	057	041100	041501	MSG9: .ASCII ;/@BACKSPACE SHUTDOWN /;
2135	011262	051513	040520	042503	
2136	011270	051440	052510	042124	
2137	011276	053517	020116	057	
2138	011303	057	051100	040505	MSG10: .ASCII ;/@READ SHUTDOWN /;
2139	011310	020104	044123	052125	
2140	011316	047504	047127	020040	
2141	011324	020040	020040	057	
2142	011331	057	043500	050101	MSG11: .ASCII ;/@GAPS SHOULD = 8>7>6>5>4>3, 3=2=1 (1.5)/;
2143	011336	020123	044123	052517	
2144	011344	042114	036440	034040	
2145	011352	033476	033076	032476	
2146	011360	032076	031476	070054	
2147	011366	036463	036462	020061	
2148	011374	030450	032456	027451	
2149	011402	040057	040507	020120	MSG11A: .ASCII ;/@GAP 1 /;
2150	011410	020061	020040	020040	
2151	011416	020040	020040	020040	
2152	011424	020040	027440		
2153	011430	040057	051127	052111	MSG12: .ASCII ;/@WRITE XIRG /;

CZTMEE0 TMA,B-11 DR FCTN TMR
CZTMEE.P11 24-JAN-79 13:38

MACY11 30A(1052) 05-MAR-79 14:10 ^{D 5} PAGE 56

SEQ 0055

2154	011436	020105	044530	043522	
2155	011444	020040	020040	020040	
2156	011452	020040	027440		
2157	011456	040057	042522	042101	MSG13: .ASCII ;/@READ FROM BOT DELAY/;
2158	011464	043040	047522	020115	
2159	011472	047502	020124	042504	
2160	011500	040514	027531		
2161	011504	040057	040514	052123	MSG14: .ASCII ;/@LAST CHAR TO CU RDY/;
2162	011512	041440	040510	020122	
2163	011520	047524	041440	020125	
2164	011526	042122	027531		
2165	011532	040057	051127	052111	MSG15: .ASCII ;/@WRITE EOF /;
2166	011540	020105	047505	020106	
2167	011546	020040	020040	020040	
2168	011554	020040	027440		
2169	011560	040057	047505	020122	MSG16: .ASCII ;/@EOR TO EOF SP TIME /;
2170	011566	047524	042440	043117	
2171	011574	051440	020120	044524	
2172	011602	042515	027440		
2173	011604	040057	050123	041501	MSG18: .ASCII ;/@SPACE SHUTDOWN /;
2174	011614	020105	044123	052125	
2175	011622	047504	047127	020040	
2176	011630	020040	027440		
2177	011634	040057	025052	052506	MSG19: .ASCII ;/@**FUNCTIONS AT 556 BPI/;
2178	011642	041516	044524	047117	
2179	011650	020123	052101	032440	
2180	011656	033065	041040	044520	
2181	011664	057			
2182	011665	057	047500	042516	MSG20: .ASCII ;/@ONE INCH DATA TIME /;
2183	011672	044440	041516	020110	
2184	011700	040504	040524	052040	
2185	011706	046511	020105	057	
2186	011713	057	025100	043052	MSG21: .ASCII ;/@**FUNCTIONS AT 200 BPI/;
2187	011720	047125	052103	047511	
2188	011726	051516	040440	020124	
2189	011734	030062	020060	050102	
2190	011742	027511			
2191	011744	040057	025052	025052	MSG27: .ASCII ;/@*****END OF TIMING*****@/;
2192	011752	025052	025052	025052	
2193	011760	042452	042116	047440	
2194	011766	020106	044524	044515	
2195	011774	043516	025052	025052	
2196	012002	025052	025052	025052	
2197	012010	040052	057		
2198	012013	057	040100	055103	MSG28: .ASCII ;/@@CZTMEE0 TMA,B-11 DR FCTN TMR;
2199	012020	046524	042505	020060	
2200	012026	046524	026101	026502	
2201	012034	030461	042040	020122	
2202	012042	041506	047124	052040	
2203	012050	051115			
2204	012052	052100	030525	020060	.ASCII ;@TU10 TIMING INFO REFERENCE 6.2;
2205	012060	044524	044515	043516	
2206	012066	044440	043116	020117	
2207	012074	042522	042506	042522	
2208	012102	041516	020105	027066	
2209	012110	062			

CZTMEE0 TMA,B-11 DR FCTN TMR
CZTMEF.P11 24-JAN-79 13:38

MACY11 30A(1052) 05-MAR-79 14:10 E 5
PAGE 57

SEQ 0056

2210	012111	100	042524	030061
2211	012116	020127	046450	034470
2212	012124	033062	020051	044524
2213	012132	044515	043516	044440
2214	012140	043116	020117	042522
2215	012146	042506	042522	041516
2216	012154	020105	027066	063
2217	012161	100	052524	030061
2218	012166	020127	046450	034470
2219	012174	033062	020051	044524
2220	012202	044515	043516	044440
2221	012210	043116	020117	042522
2222	012216	042506	042522	041516
2223	012224	020105	027066	064
2224	012231	100	052524	030061
2225	012236	027516	042524	030061
2226	012244	020116	046450	034470
2227	012252	033462	020051	044524
2228	012260	044515	043516	044440
2229	012266	043116	020117	042522
2230	012274	042506	042522	041516
2231	012302	020105	027066	040065
2232	012310	057		
2233	012311	057	040100	051105
2234	012316	047522	026522	047516
2235	012324	020124	052101	041040
2236	012332	052117	040440	052106
2237	012340	051105	051040	053505
2238	012346	047111	026504	040510
2239	012354	052114	040100	057
2240	012361	057	040100	047514
2241	012366	027103	033461	020066
2242	012374	052515	052123	041040
2243	012402	020105	047514	042101
2244	012410	042105	050040	044522
2245	012416	051117	052040	020117
2246	012424	054105	041505	052125
2247	012432	047511	026516	040510
2248	012440	052114	040100	057
2249	012445	057	040100	040503
2250	012452	047116	052117	052040
2251	012460	051505	020124	047514
2252	012466	042101	046440	042105
2253	012474	052511	040115	027500
2254				
2255	012502	000000		
2256		000001		

.ASCII ;@TE10W (M8926) TIMING INFO REFERENCE 6.3;

.ASCII ;@TU10W (M8926) TIMING INFO REFERENCE 6.4;

.ASCII ;@TU10N/TE10N (M8927) TIMING INFO REFERENCE 6.5a/;

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

T11E	005550	1568	1571#					
T11F	005566	1579#	1582					
T11G	005604	1580	1583#					
T11GA	005676	1600#	1601					
T11H	005712	1604#	1607					
T11J	005730	1605	1608#					
T11JA	006004	1621#	1622					
T11K	006014	1623#	1626					
T11L	006032	1624	1627#					
T11P	006050	1547	1631#					
T11R	006064	1630	1637#					
T11T	001044	904#	1543*	1548*	1649	1678*	1683*	1782
T12	006266	1650	1672#					
T12A	006322	1679#	1775					
T12B	006404	1692#	1695					
T12C	006422	1693	1696#					
T12D	006432	1701#	1704					
T12E	006446	1702	1705#					
T12F	006464	1712#	1715					
T12G	006502	1713	1716#					
T12GA	006600	1735#	1736					
T12H	006610	1737#	1740					
T12J	006626	1738	1741#					
T12JA	006674	1752#	1753					
T12K	006704	1754#						
T12L	006712	1757#						
T12M	006722	1759#	1762					
T12N	006740	1760	1763#					
T12P	006746	1682	1766#					
T12R	006762	1764	1772#					
T13	007160	918	1783	1802#				
T2	001476	981#						
T2A	001512	984#	1004					
T2B	001536	988#	991					
T2C	001554	989	992#					
T2D	001602	998#	1001					
T2E	001616	999	1002#					
T3	001674	1019#	1021					
T3A	001706	1022#	1024					
T3B	001720	1025#	1034					
T3C	001776	1035#	1037					
T3D	002014	1043#	1058					
T3E	002060	1050#	1053					
T3F	002074	1051	1054#					
T3G	002136	1063#	1065					
T3H	002150	1066#	1068					
T4	002162	1075#						
T4A	002250	1091#	1094					
T4AA	002202	1079#	1140					
T4B	002266	1092	1095#					
T4BA	002372	1115#	1116					
T4C	002406	1119#	1122					
T4D	002424	1120	1123#					
T4DA	002462	1130#	1131					
T4E	002472	1132#	1135					
T4F	002510	1133	1136#					

COMMEN	1#
ENDCOM	1#
ESCAPE	1#
GETPRI	1#
GETSWR	1#
MULT	1#
NFWTST	1#
POP	1#
PUSH	1#
REPORT	1#
SETPRI	1#
SETUP	1#
SKIP	1#
SLASH	1#
STARS	1#
SWRSU	1#
TYPBIN	1#
TYPDEC	1#
TYPNAM	1#
TYPNUM	1#
TYPOCS	1#
TYP OCT	1#
TYPTXT	1#
\$\$ESCA	1#
\$\$NEWT	1#
\$\$SKIP	1#
.EQUAT	1#
.HEADE	1#
.KT11	1#
.SETUP	1#
.SWRHI	1#
.\$ACT1	1#
.\$APT B	1#
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.\$APTY	1#
.\$ASTA	1#
.\$CATC	1#
.\$CMTA	1#
.\$DB2D	1#
.\$DB2C	1#
.\$DIV	1#
.\$EOP	1#
.\$ERRO	1#
.\$ERRT	1#
.\$MULT	1#
.\$POWE	1#
.\$RAND	1#
.\$RDDE	1#
.\$RDOC	1#
.\$READ	1#
.\$R2AZ	1#
.\$SAVE	1#
.\$SB2D	1#
.\$SB2C	1#
.\$SCOP	1#
.\$SIZE	1#

CZTMEE0 TMA,B-11 DR FCTN TMR
CZTMEE.P11 24-JAN-79 13:38

MACY11 30A(1052) 05-MAR-79 14:10 PAGE 66
CROSS REFERENCE TABLE -- MACRO NAMES

L 5

SEQ 0063

.\$SUPR 1#
.\$STRAP 1#
.\$STYPB 1#
.\$STYPD 1#
.\$STYPE 1#
.\$STYPO 1#
.\$40CA 1#
.\$1170 1#

. ABS. 012504 000

ERRORS DETECTED: 0

DSKZ:CZTMEE,DSKZ:CZTMEE.SEQ/CRF/SOL CZTMEE.SML,CZTMEE.P11
RUN-TIME: 10 12 .6 SECONDS
RUN-TIME RATIO: 500/24 20.6
CORE USED: 39K (77 PAGES)