IDENTIFICATION

PRODUCT CODE: MAINDEC-08-DHTMC-A-D

PRODUCT NAME: TM8-E DRIVE FUNCTION TIMER

DATE CREATED: JULY 16, 1973

MAINTAINER: DIAGNOSTIC GROUP

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~~TMDRFF~~ TMTIM

NOTE

THERE ARE SIX DIAGNOSTIC PROGRAMS ASSOCIATED WITH THE TM8-E DECMAGTAPE CONTROL AND ITS TRANSPORT SYSTEM. ALTHOUGH PHYSICALLY SEPARATE, THESE PROGRAMS MUST BE TREATED AS A LARGE INTEGRATED TEST, AND TO ENSURE PROPER SYSTEM OPERATION, THESE TESTS MUST BE EXECUTED IN THE ORDER DELINEATED BELOW.

IF A GIVEN TEST SHOULD FAIL AND IT APPEARS THAT A FIX HAS BEEN FOUND, ALL PROGRAMS MUST ONCE AGAIN BE RUN. ONLY WHEN ALL TESTS HAVE RUN WITHOUT ANY UNACCEPTABLE ERRORS CAN THE TM8-E SYSTEM BE CONSIDERED UP.

TM8-E DIAGNOSTIC PROGRAMS' ORDER OF EXECUTION

1. TM8-E CONTROL TEST PART 1 (MAINDEC-08-DHTMA)
2. TM8-E CONTROL TEST PART 2 (MAINDEC-08-DHTMB)
3. TM8-E DRIVE FUNCTION TIMER (MAINDEC-08-DHTMC)
4. TM8-E DATA RELIABILITY 9 TRACK (MAINDEC-08-DHTMD)
5. TM8-E DATA RELIABILITY 7 TRACK (MAINDEC-08-DHTME)
6. TM8-E RANDOM EXERCISER (MAINDEC-08-DHTMF)

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1. ABSTRACT

THE TM8E DRIVE FUNCTION TIMER ASSISTS IN THE TESTING OF THE TM8E CONTROL UNIT AND TU10 TAPE UNIT. SELECTED 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 TAPE UNITS (7 AND 9 CHANNEL) MAY BE SELECTED.

2. REQUIREMENTS

2.1 HARDWARE

PDP-8/E, 8/M, 8/F
TELETYPE OR COMPATIBLE DEVICE (TTY)
TM8-E DECMAGTAPE CONTROL
TU10 MASTER/SLAVE TRANSPORT SYSTEM

2.2 MEMORY

THIS PROGRAM REQUIRES 4K OF MEMORY AND MAY RESIDE IN ANY MEMORY FIELD.

2.3 PRELIMINARY PROGRAMS

ALL PROCESSOR/MEMORY DIAGNOSTICS
TM8-E CONTROL TEST PART 1
TM8-E CONTROL TEST PART 2

3. PROGRAM LOADING PROCEDURE

LOAD THE PROGRAM INTO ANY DESIRED MEMORY FIELD USING THE STANDARD BINARY LOADER TECHNIQUE.

4. PROGRAM STARTING PROCEDURE

A. LOAD ADDRESS 0200

B. LOAD THE EXTENDED ADDRESS WITH THE PROGRAM FIELD.

C. CLEAR SWITCHES

D. DEPRESS CLEAR, THEN CONTINUE

E. THE PROGRAM WILL PRINT ITS TITLE AND MAINDEC NUMBER, THEN ASK FOR DRIVE SELECTION. PRIOR TO MAKING DRIVE SELECTION, GO TO THE STANDARD TEST PROCEDURE IN PARAGRAPH 5.

NOTE: THE PROGRAM MAY BE RESTARTED AT ANY TIME AT ADDRESS 0201. IN THIS CASE THE PROGRAM BYPASSES PRINTING ITS TITLE AND IMMEDIATELY ASKS FOR DRIVE SELECTION.

5. STANDARD TEST PROCEDURE

USE OF THE STANDARD TEST PROCEDURE ENSURES PROPER TM8-E/TU10 CHECKOUT. INFORMATION REGARDING THE TIME LIMIT SPECIFICATIONS FOR THE TAPE OPERATIONS TIMED BY THIS PROGRAM ARE GIVEN IN PARAGRAPH 7.1. NO ERROR DETECTION OR DECISIONS REGARDING PROPER FUNCTION TIMES ARE CARRIED OUT BY THE PROGRAM.

5.1 DRIVE SELECTION

TO SPECIFY THE DRIVE(S) TO BE TESTED, CARRY OUT THE FOLLOWING STEPS:

A. MOUNT A SPARE REEL OF INDUSTRY COMPATIBLE MAGNETIC TAPE ON ALL DRIVES TO BE SELECTED WITH THE WRITE ENABLE RING IN PLACE (WRITE ENABLED). LOAD THE TAPES AND POSITION AT BOT. ASSIGN DRIVE NUMBERS IN THE FOLLOWING SEQUENCE: 0;7;1;6;2;5;3;4; AND THEN SWITCH ON LINE.

B. START OR RESTART THE PROGRAM AS DESCRIBED IN PARAGRAPH 4.

C. RESPOND TO "SELECT DRIVES" BY SETTING SR BIT N = 1 FOR EACH DRIVE TO BE TESTED (DRIVE N). THEN DEPRESS CONTINUE.

D. RESPOND TO "SELECT 7 AND/OR 9 TRACK OPERATION" BY SETTING SR BIT N = 1 ONLY FOR THOSE SELECTED DRIVES WHICH ARE 9 TRACK UNITS. THEN DEPRESS CONTINUE.

5.2 TEST PROCEDURE

ACCOMPLISH THE FOLLOWING STEPS FOR ALL DRIVES IN THE SYSTEM UNDER TEST.

A. SELECT ALL DRIVES IN THE SYSTEM UNDER TEST AS DESCRIBED IN PARAGRAPH 5.1 ABOVE.

B. AS SOON AS TRACK SELECTION IS COMPLETE, THE PROGRAM WILL START TIMING THE VARIOUS TAPE OPRATIONS AND INDICATING ALL TIMES ON THE TTY.

C. REPEAT THE ENTIRE TIMING PROCEDURE 2 TIMES.

D. COMPARE THE RESULTS AS PRINTED ON THE TTY WITH THE LIMITS SPECIFIED IN PARAGRAPH 7.1. ADDITIONAL INFORMATION IS

GIVEN IN THE PROGRAM DESCRIPTION IN PARAGRAPH 10.

6. PROGRAM CONTROLS

THERE ARE NO SWITCH REGISTER OPTIONS ASSOCIATED WITH THIS PROGRAM.

7. ERRORS

THERE IS NO ERROR DETECTION INCLUDED IN THIS PROGRAM. ALL DECISIONS MUST BE MADE BY THE USER BY COMPARING THE FUNCTION TIMES PRINTED ON THE TTY WITH THOSE TIMES GIVEN IN THE TABLE BELOW.

7.1 TIME LIMITS SPECIFICATION

THE TABLE BELOW LISTS THE TIME LIMITS IN THE SAME FORMAT AS THEY ARE PRINTED ON THE TTY. TIMES LISTED UNDER UNIT 0 ARE 9 TRACK TIMES, AND THOSE UNDER UNIT 1 ARE 7 TRACK TIMES. ALL TIMES ARE IN MILLISECONDS.

FUNCTION	(9TRACK) UNIT0	+/-	(7TRACK) UNIT1	+/-
800 BPI				
WR FM BOT DELAY	185	15	185	15
WRITE SHUTDOWN	2,7	0,5	2,7	0,5
WRITE START	8,9	1,0	12,6	1,0
WR NONSTOP GAP	11,5	2,0	14,5	2,0
BKSP SHDWN*SDWN	15	5	19	5
READ SHUTDOWN	1,8	0,5	1,8	0,5
WRITE XIRG	95	10	95	10
LAST CHR TO CUR	0,26	0,1	0,26	0,1
RD FM BOT DELAY	185	15	185	15
SPCE SHDWN*SDWN	14	5	14	5
WRITE EOF	100	10	105	10
ER TO EF SP TME	100	10	105	10
WR TO ERASE HEAD	12	5	12	5
1 INCH DATA TIME	22	1	22	1
GAP1				
GAP2				
GAP3				
GAP4	GAPS: 8>7>6>5>4>1; 1=2<1,7; 2>3			
GAP5				
GAP6				
GAP7				
GAP8				

556 BPI	UNIT1	+/-	(7TRACK)
WR FM BOT DELAY	185	15	
WRITE SHUTDOWN	2,7	0,5	
LAST CHR TO CUR	0,35	0,1	
BKSP SHDWN*SDWN	19	5	
READ SHUTDOWN	1,8	0,5	
1 INCH DATA TIME	22	1	

200 BPI	UNIT1	+/- (7TRACK)
WR FM BOT DELAY	185	15
WRITE SHUTDOWN	2.7	0.5
LAST CHR TO CUR	1.05	0.2
BKSP SHDWN*SDWN	19	5
READ SHUTDOWN	1.8	0.5
1 INCH DATA TIME	22	1

8. RESTRICTIONS

NONE.

9. EXECUTION TIME

EXECUTION TIME VARIES DEPENDING ON THE NUMBER AND TYPES OF DRIVES BEING TESTED.

10. PROGRAM DESCRIPTION

10.1 WRITE FROM BOT DELAY

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

PROCEDURE TO MEASURE TIME:

A. REWIND TO BOT.

B. INITIALIZE WC & CA LOCATIONS.

C. LOAD COMMAND REGISTER WITH DRIVE SELECT, 800 BPI, ODD PARITY.

D. LOAD FUNCTION WITH WRITE & GO BITS.

E. NOMITOR CA REGISTER UNTIL IT INDICATES FIRST WORD HAS BEEN TAKEN.

F. THE TIME FROM "GO" UNTIL FIRST WORD IS OUTPUT IS "WRITE FROM BOT DELAY."

10.2 WRITE SHUTDOWN

THIS IS THE 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. REWIND TO BOT.

B. INITIALIZE WC & CA LOCATIONS TO WRITE ONE

200(10) WORD RECORD FROM BOT.

C. LOAD COMMAND REGISTER WITH DRIVE SELECT, 800 BPI, ODD PARITY.

D. LOAD FUNCTION WITH WRITE & GO BITS.

E. AFTER MTTF SETS INDICATING THE END OF RECORD, INITIATE A CONTINUOUS WRITE AND TIME TILL THE FIRST WORD IS TRANSFERRED FROM MEMORY TO THE TM8-E CONTROL (OCCURS APPROXIMATELY ON THE LEADING EDGE OF SDWN).

10,3 WRITE START

THE TIME NECESSARY FOR TAPE TO ACCELERATE TO FULL SPEED + GUARANTEE A 1/2" INTERRECORD GAP.

PROCEDURE TO MEASURE TIME:

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

A. INITIALIZE WC & CA REGISTER.

B. LOAD COMMAND WITH DRIVE SELECT, 800 BPI, ODD PARITY.

C. LOAD FUNCTION WITH WRITE & GO BITS.

D. MONITOR CA FOR ITS SECOND INCREMENT.

E. THE TIME FROM "GO" UNTIL 2ND INCREMENT OF CA IS APPROXIMATELY EQUAL TO "WRITE START".

10,4 WRITE NONSTOP GAP

WRITE NONSTOP GAP IS EQUIVALENT TO THE SUM OF "WRITE SHUTDOWN" & "WRITE START" AND IS THE TIME NECESSARY TO INSURE THAT THE INTERRECORD GAP WILL BE AT LEAST 1/2" WHEN WRITING NON-STOP.

PROCEDURE TO MEASURE TIME:

A. INITIALIZE WC & CA LOCATIONS

B. LOAD COMMAND WITH DRIVE SELECT, 800 BPI, ODD PARITY.

C. LOAD FUNCTION;WRITE, GO BITS.

D. WAIT FOR "JOB DONE."

E. ISSUE "CLF."

F. RE-INITIALIZE WC & CA LOCATIONS.

G. LOAD FUNCTION;WRITE, GO BITS.

H. TIME FROM 2ND "GO" UNTIL FIRST WORD OF 2ND WRITE IS OUTPUT IS "WRITE NONSTOP GAP."

10,5 BACKSPACE SHUTDOWN + SETTLE DOWN DELAY

THIS 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.

PROCEDURE TO MEASURE TIME:

RECORD IS USED WHICH WAS JUST WRITTEN IN PREVIOUS TEST "WRITE NONSTOP GAP".

A. LOAD COMMAND WITH DRIVE SELECT, 800 BPI, ODD PARITY.

B. SET WC TO BACKSPACE 1 RECORD.

C. ISSUE BACKSPACE, GO.

D. AFTER JOB DONE BECOMES A ONE INDICATING THE BEGINNING OF THE RECORD MONITOR TUR UNTIL IT BECOMES A "1", THE TIME FROM JOB DONE UNTIL TUR IS "BACKSPACE SHUTDOWN + SETTLEDOWN DELAY."

10,6 READ SHUTDOWN

THIS 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".

PROCEDURE TO MEASURE TIME:

A. RECORD USED IN "BACKSPACE SHUTDOWN" IS READ.

B. INITIALIZE WC & CA REGISTERS.

C. ISSUE READ FUNCTION, 800 BPI, GO.

D. AFTER MTTF SETS INDICATING THE END OF RECORD, INITIATE A CONTINUOUS WRITE AND TIME TILL THE FIRST WORD IS TRANSFERRED FROM MEMORY TO THE TM8-E CONTROL (OCCURS APPROXIMATELY ON THE LEADING EDGE OF SDWN).

10,7 WRITE XIRG

THIS IS THE TIME NECESSARY TO CAUSE THE GENERATION OF AN INTERRECORD GAP THAT IS AT

LEAST 3" LONG AS COMPARED WITH THE NORMAL 3/9" 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 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" TO THE INTERRECORD GAP UNTIL "GOOD" TAPE WAS REACHED.
PROCEDURE TO MEASURE TIME:

A. TAPE IS NOT BOT.

B. INITIALIZE WC & CA REGISTERS.

C. ISSUE WRITE WITH XIRG FUNCTION, 800 BPI, GO.

D. MONITOR CA TO DETERMINE WHEN FIRST WORD IS OUTPUT.

E. THE TIME FROM "GO" UNTIL FIRST WORD IS OUTPUT IS "WRITE WITH XIRG".

10.8 LAST CHARACTER TO CU READY

THIS IS THE AMOUNT OF TIME IT TAKES FOR THE CONTROL TO SENSE 3 MISSING WORDS ON TAPE (END OF RECORD) UNTIL "CU READY" BECOMES A "1."

PROCEDURE TO MEASURE TIME:

A. PROGRAM USES SAME RECORD THAT WAS WRITTEN DURING "WRITE XIRG."

B. LOAD COMMAND WITH DRIVE SELECT, 800 BPI, ODD PARITY.

C. INITIALIZE WC TO SPACE REVERSE 1 RECORD.

D. WAIT FOR JOB DONE.

E. REINITIALIZE WC & CA LOCATIONS.

F. LOAD COMMAND WITH DRIVE SELECT, 800 BPI, ODD PARITY.

G. ISSUE READ FUNCTION, GO.

H. WAIT UNTIL WC=0 AND THEN MONITOR "CU READY" UNTIL IT BECOMES A "1".

J. THE TIME FROM WC=0 UNTIL "CU READY" = 1 IS "LAST CHARACTER TO CU READY".

10.9 READ FROM BOT

THE FIRST RECORD WRITTEN ON TAPE IS SUPPOSED

TO BE AT LEAST 6" 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 FIRST WORD IS
OUTPUT.

PROCEDURE TO MEASURE TIME:

A. THE RECORD THAT WAS WRITTEN JUST OFF BOT
DURING "WRITE START" IS USED.

B. TAPE IS REWOUND TO BOT.

C. INITIALIZE WC & CA REGISTERS.

D. ISSUE READ FUNCTION, 800 BPI, GO.

E. MONITOR CA TO DETERMINE WHEN FIRST WORD
IS OUTPUT.

F. THE TIME FROM "GO" UNIL FIRST BREAK IS
"READ FROM BOT."

10,10 SPACE SHUTDOWN + SETTLEDOWN DELAY

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. SAME RECORD IS USED AS IN T3 WRITE START.

B. INITIALIZE WC TO SPACE FORWARD 1 RECORD.

C. ISSUE SPACE FORWARD FUNCTION, 800 BPI, GO.

D. MONITOR JOB DONE UNTIL IT IS =1.

E. TIME FROM JOB DONE =1 UNTIL TUR IS
"SPACE SHUTDOWN + SETTLEDOWN DELAY".

10,11 WRITE EOF

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

PROCEDURE TO MEASURE TIME:

A. TAPE UNIT IS REWOUND TO BOT.

B. INITIALIZE WC & CA REGISTERS.

C, ISSUE WRITE, 800 BPI, GO,

D, WAIT FOR JOB DONE,

E, ISSUE CLF,

F, ISSUE WRITE EOF FUNCTION, 800 BPI, GO,

G, WAIT FOR JOB DONE #1

H, THE TIME FROM "GO" UNTIL "JOB DONE" IS "WRITE EOF."

10,12 EOR TO EOF TIME

THIS 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 "JOB DONE" BECAME A ONE.

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 DION'T REALLY WRITE AN EOF MARK,

OTHERWISE "EOR 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",

B, TAPE IS REWOUND TO BOT,

C, REWRITE RECORD OVER PREVIOUSLY WRITTEN RECORD,

D, BACKSPACE OVER RECORD JUST WRITTEN,

E, SET WC REGISTER TO SPACE 2 RECORDS,

F, ISSUE SPACE FORWARD FUNCTION, SET GO,

G, WAIT FOR WC REGISTER TO INDICATE THAT FIRST RECORD HAS BEEN SPACED OVER THEN MONITOR "CU READY" UNTIL IT BECOMES A

"1", AFTER "CU READY" CHECK TO SEE IF "EOF" IS A 1 IN STATUS REGISTER. IF EOF IS NOT SET THEN ZERO TIME COUNTER.

H. TIME FROM WC=-1 UNTIL "CU READY" IS "EOR TO EOF SPACE TIME."

10,13 WRITE TO ERASE HEAD

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. WC REGISTER IS INITIALIZED FOR A 3 WORD RECORD
CA REGISTER IS INITIALIZED TO 3775.

D. LOAD COMMAND REGISTER WITH DRIVE SELECT, 800 BPI, ODD PARITY.

E. LOAD FUNCTION REGISTER WITH WRITE & GO BITS.

F. MONITOR CA UNTIL IT IS 3777 INDICATING 2 WORDS HAVE BEEN OUTPUT, THEN ISSUE CLT WHICH STOPS ALL DATA TRANSFERS & CAUSES THE DRIVE TO SHUTDOWN.

G. REWIND TO BOT.

H. INITIALIZE CA TO 3775

I. ISSUE READ FUNCTION, 800 BPI, SET GO.

J. MONITOR CA UNTIL IT IS 3777 THEN
GO TO TIMING ROUTINE AND TIME UNTIL CA=4000
THIS TIME WILL INDICATE THE DISTANCE BETWEEN THE LAST WORD OF THE NEW DATA AND THE FIRST WORD OF THE OLD DATA WHICH IS ALSO THE AMOUNT OF TAPE THAT WAS ERASED BY THE ERASE HEAD DURING THE WRITE OPERATION.

10,14 ONE INCH DATA TIME

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

PROCEDURE TO MEASURE TIME:

A. INITIALIZE WC & CA REGISTERS. CA(3776) WC(=2000)

B, ISSUE WRITE FUNCTION, 800, 556 OR 200 BPI, GO,

C, WAIT FOR CURRENT MEMORY ADDRESS REGISTER TO INDICATE FIRST WORD IS TAKEN AND THEN MONITOR WORD COUNT UNTIL EQUAL TO ZERO,

D, TIME FROM FIRST WORD OUTPUT UNTIL WORD COUNT=0 IS "ONE INCH DATA TIME."

10.15 GAP CONSISTENCY

FOR PROPER OPERTION 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 AN 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 WORD COUNT AND CURRENT ADDRESS REGISTERS,

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 NONSTOP.

F, NOMITOR CA REGISTER TO DETERMINE WHEN FIRST WORD IS INPUT,

G, THE TIME FROM WHEN "GO" IS RESET UNTIL THE FIRST WORD 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!

GAP1 WRITE FOLLOWED BY A WRITE (NONSTOP),

GAP2 WRITE FOLLOWED BY A WRITE (START/STOP),

GAP3 READ FOLLOWED BY A WRITE (START/STOP),

GAP4 WRITE-BACKSPACE FOLLOWED BY A WRITE (START/STOP),

GAP5 SAME AS GAP4 EXCEPT WRITE-BACKSPACE REPEATED 2 TIMES.

GAP6 SAME AS GAP4 EXCEPT WRITE-BACKSPACE REPEATED 3 TIMES.

GAP7 SAME AS GAP4 EXCEPT WRITE-BACKSPACE REPEATED 4 TIMES.

GAP8 SAME AS GAP4 EXCEPT WRITE-BACKSPACE REPEATED 5 TIMES.

GAP LENGTHS SHOULD REFLECT THE FOLLOWING RELATIONSHIP:
8>7>6>5>4>1, 1-2<1,7, 2>3

10,16 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.

10,17 FUNCTIONS AT 200 BPI.

SAME AS ABOVE.
REFERENCE 8.16, "FUNCTIONS AT 556 BPI".

11. LISTING (ATTACHED)

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                /TM8E DRIVE FUNCTION TIMER  MAINDEC-08-DHTMC-A-L
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                        //INSTRUCTION EQUALITIES//

        6701    LWCR=6701                       /LOAD WORD COUNT, CLR AC.
        6702    CWCR=6702                       /CLEAR WORD COUNT.
        6703    LCAR=6703                       /LOAD CURRENT ADDRESS, CLR AC.
        6704    CCAR=6704                       /CLEAR CURRENT ADDRESS.
        6705    LCMR=6705                       /LOAD COMMAND REGISTER, CLR AC.
        6706    LFGR=6706                       /LOAD FUNCTION REGISTER, CLR AC.
        6707    LDBR=6707                       /LOAD DATA BUFFER, CLR AC.
        6711    RWCR=6711                       /READ WORD COUNT.
        6712    CLT=6712                        /CLEAR TRANSPORT.
        6713    RCAR=6713                       /READ CURRENT ADDRESS.
        6714    RMSR=6714                       /READ MAIN STATUS.
        6715    RCMR=6715                       /READ COMMAND REGISTER.
        6716    RFSR=6716                       /READ FUNCTION + STATUS 1 REGISTERS.
        6717    RDBR=6717                       /READ DATA BUFFER.
        6721    SKEF=6721                       /SKIP IF ERROR FLAG IS SET.
        6722    SKCB=6722                       /SKIP IF CONTROL IS NOT BUSY.
        6723    SKJD=6723                       /SKIP ON JOB DONE.
        6724    SKTR=6724                       /SKIP ON TUR.
        6725    CLF=6725                        /CLR THE CONTROLLER + TRANSPORT MASTER IF TUR,
                                                /IF NOT, CLR MTTF, EF & STATUS REGISTERS.
        6726    CKDL=6726                       /CHECK FOR DATA LATE ERROR.
        6727    SBRM=6727                       /SET BREAK REQUEST FOR ONE DATA BREAK.
        4457    TIMER=JMS I     XTIME


        0010    *10
0010    0000    INDX10, 0
        0012    *12
0012    0000    INDX12, 0
        0020    *20
0020    0000    DRVTAB, 0000
0021    1000            1000
0022    2000            2000
0023    3000            3000
0024    4000            4000
0025    5000            5000
0026    6000            6000
0027    7000            7000

0030    0000    ALLTU,  0
0031    0000            0
0032    0000            0
0033    0000            0
0034    0000            0
0035    0000            0
0036    0000            0
0037    0000            0

0040    0000    TU7,    0
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0041    0000            0
0042    0000            0
0043    0000            0
0044    0000            0
0045    0000            0
0046    0000            0
0047    0000            0

0050    7777    ONCE,   7777
0051    5460    XCRLF,  CRLF
0052    0000    NUMPNT, 0
0053    0000    TBLALL, 0
0054    0000    TBLTU7, 0
0055    5325    XHEAD,  ALLMSG
0056    5345    XHEAD1, TU7MSG
0057    5011    XTIME,  TIME
0060    0000    CNTALL, 0
0061    0000    CNT7,   0
0062    0020    DRVPNT, DRVTAB
0063    5200    XRWND,  RWIND
0064    5216    XRWND7, RWIND7
0065    5000    XWCCA,  WCCA
0066    0402    ODD800, 0402
0067    7777    TITLE,  7777
0070    0000    DRVSEL, 0
0071    0000    OUT,    0
0072    5264    SELALL, ALTU79
0073    5304    SELTU7, ALLTU7
0074    5711    XMESS,  MESAGE
0075    5425    XPRINT, PRINT
0076    5501    XDEC,   DECPRT
0077    0000    VFS20,  0
0100    0000    VFSUPR, 0
0101    5416    XOTY,   OTY
0102    7774    KM4,    7774
0103    0000    HDIVND, 0
0104    0000    PRNCT,  0
0105    5132    NULL,   XNULL
0106    0000    TEMP1,  0
0107    0000    MIKECT, 0
0110    0000    MILICT, 0
0111    7634    NCPU,   -144
0112    0144    PCPU,   144
0113    4100    K4100,  4100
0114    7777    K7777,  7777
0115    7100    K7100,  7100
0116    2100    K2100,  2100
0117    4500    K4500,  4500
0120    6100    K6100,  6100
0121    5100    K5100,  5100
0122    1100    K1100,  1100
0123    7776    K7776,  7776
0124    0001    K0001,  0001
0125    0100    K0100,  0100
0126    4001    K4001,  4001
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0127  1000    K1000,  1000
0130  0212    K212,   0212
0131  0215    K215,   0215
0132  7777    KM1,    -1
0133  7776    KM2,    -2
0134  7775    KM3,    -3
0135  7770    KM10,   -10
0136  5616    XBAK,   BAKSPA
0137  5600    XRITE1, RITE1
0140  5633    XREAD,  READ
0141  5651    XREAD1, READ1
0142  0400    K0400,  0400
0143  0000    XBPI,   0
0144  2214    LINK16, T10
0145  5704    XEND,   FIN1
0146  5670    XREAD2, READ2
0147  0000    INCH,   0

0150  0260    NUMTBL, 260
0151  0261            261
0152  0262            262
0153  0263            263
0154  0264            264
0155  0265            265
0156  0266            266
0157  0267            267

0160  0000    ALLTBL, 0
0161  0000            0
0162  0000            0
0163  0000            0
0164  0000            0
0165  0000            0
0166  0000            0
0167  0000            0

0170  0000    TU7TBL, 0
0171  0000            0
0172  0000            0
0173  0000            0
0174  0000            0
0175  0000            0
0176  0000            0
0177  0000            0

      0200    *200
0200  7610    START,  SKP CLA
0201  5206    RESTAR, JMP     SELECT
0202  4474            JMS I   XMESS           /BEGINNING OF HEADER.
0203  6000            MSG1
0204  4474            JMS I   XMESS
0205  6017            MSG2
```



```
                        //ROUTINE FOR TRANSPORT SELECTION AND
                        //7 OR 9 TRACK OPERATION.
                        //
0206  4474    SELECT, JMS I   XMESS           /SET SWITCHES TO SELECT TRANSPORTS.
0207  6033            MSG3
0210  7402            HLT
0211  7604            LAS                     /GET SWITCHES FOR TRANSPORT SELECTION.
0212  3344            DCA     DRVSAV          /SAVE SWITCHES.
0213  4474            JMS I   XMESS           /SET SWITCHES FOR 7 OR 9 TRACK OPERATION.
0214  6044            MSG4
0215  7402            HLT
0216  7604            LAS                     /GET SWITCHES FOR 7 OR 9 TRACK SELECTION.
0217  3343            DCA     TRKSAV          /SAVE SWITCHES.
0220  3060            DCA     CNTALL          /INITIALIZE COUNTERS.
0221  3061            DCA     CNT7
0222  1377            TAD     (DRVTAB         /SETUP POINTER
0223  3062            DCA     DRVPNT          /FOR DRIVE TABLE.
0224  1376            TAD     (ALLTU          /SETUP POINTER FOR TABLE WHICH WILL HOLD
0225  3340            DCA     XALL            /ALL TU-10/S TO BE TESTED.
0226  1375            TAD     (TU7            /SETUP POINTER FOR TABLE WHICH WILL HOLD ONLY
0227  3341            DCA     XTU7            /7 TRACK TU-10/S TO BE TESTED.
0230  1374            TAD     (NUMTBL
0231  3052            DCA     NUMPNT
0232  1373            TAD     (ALLTBL
0233  3053            DCA     TBLALL
0234  1372            TAD     (TU7TBL
0235  3054            DCA     TBLTU7
0236  1345            TAD     K7770           /SETUP COUNTER TO EXIT THIS ROUTINE WHEN ALL
0237  3342            DCA     DRVCNT          /BITS OF SELECT WORDS HAVE BEEN CHECKED.
0240  1344    CHKWRD, TAD     DRVSAV          /PICKUP DRIVE SELECT WORD.
0241  7700            SMA CLA                 /MINUS AC INDICATES DRIVE IS SELECTED.
0242  5264            JMP     UPDATE          /THIS DRIVE NOT SELECTED UPDATE ALL POINTERS.
0243  1462            TAD I   DRVPNT          /SAVE DRIVE SELECTED IN TABLE CONTAINING
0244  3740            DCA I   XALL            /ALL DRIVES TO BE TESTED.
0245  1452            TAD I   NUMPNT
0246  3453            DCA I   TBLALL
0247  2060            ISZ     CNTALL          /COUNTER FOR SELECT ALL DRIVES TABLE.
0250  1343            TAD     TRKSAV          /PICKUP TRACK SELECT WORD.
0251  7710            SPA CLA                 /MINUS AC INDICATES 9 TRACK OPERATION.
0252  5262            JMP     UPDATE-2                /9 TRACK SELECTED, EXIT AND UPDATE POINTERS.
0253  1462            TAD I   DRVPNT          /7 TRACK SELECTED, SAVE IT IN 7 TRACK
0254  3741            DCA I   XTU7            /SELECT TABLE.
0255  1452            TAD I   NUMPNT
0256  3454            DCA I   TBLTU7
0257  2061            ISZ     CNT7            /KEEP COUNT OF ALL 7 TRACK DRIVES SELECTED.

0260  2054            ISZ     TBLTU7          /UPDATE ALL TABLE POINTERS.
0261  2341            ISZ     XTU7
0262  2053            ISZ     TBLALL
0263  2340            ISZ     XALL
0264  2342    UPDATE, ISZ     DRVCNT          /CHECKED ALL BITS OF SELECT WORDS?
0265  7410            SKP                     /NO, CONTINUE CHECKING
0266  5303            JMP     ENDCHK          /YES, BEGIN TESTING SELECTED DRIVES.
0267  2062            ISZ     DRVPNT
0270  2052            ISZ     NUMPNT
```

```
0271  7130            CLL
0272  1344            TAD     DRVSAV          /GET DRIVE SELECT WORD,
0273  7004            RAL                     /SETUP NEXT BIT TO BE CHECKED,
0274  3344            DCA     DRVSAV          /SAVE IT,
0275  7130            CLL
0276  1343            TAD     TRKSAV          /GET TRACK SELECT WORD,
0277  7004            RAL                     /SETUP NEXT BIT TO BE CHECKED,
0300  3343            DCA     TRKSAV          /SAVE IT,
0301  7130            CLL
0302  5240            JMP     CHKWRD          /DO IT ALL AGAIN,
0303  1061    ENDCHK, TAD     CNT7            /CHECK TO SEE IF ANY DRIVES
0304  7040            SZA CLA                 /HAVE BEEN SELECTED,
0305  5311            JMP     .+4
0306  1060            TAD     CNTALL
0307  7650            SNA CLA
0310  5206            JMP     SELECT          /NO DRIVES SELECTED, RETURN TO START,
0311  1371            TAD     (3767           /FILL WRITE BUFFER WITH ONES,
0312  3346            DCA     ONES
0313  1370            TAD     (-630
0314  3347            DCA     ONESCT
0315  7040            CMA
0316  3050            DCA     ONCE
0317  7040            CMA
0320  3746            DCA I   ONES
0321  2346            ISZ     ONES
0322  2347            ISZ     ONESCT
0323  5317            JMP     .-4
0324  1367            TAD     (6377
0325  3010            DCA     INDX10
0326  4474            JMS I   XMESS
0327  6067            MSG5
0330  4474            JMS I   XMESS
0331  6102            MSG7
0332  4455            JMS I   XMEAD
0333  4451            JMS I   XCRLF
0334  3565            DCA I   NULL            /ZERO TIME COUNTERS,
0335  3110            DCA     MILTCT
0336  5737            JMP I   LINK1           /BEGIN TESTING,
0337  0400    LINK1,  T1


0340  0030    XALL,   ALLTU
0341  0040    XTU7,   TU7
0342  0000    DRVCNT, 0
0343  0000    TRKSAV, 0
0344  0000    DRVSAV, 0
0345  7772    K7770,  7770
0346  0000    ONES,   0
0347  0000    ONESCT, 0

0367  6377
0370  7150
0371  3767
0372  0178
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0373  0160
0374  0196
0375  0048
0376  0032
0377  0020
      0400              PAGE

                        //TIME WRITE FROM BOT DELAY//
                        //
0400  7300    T1,     CLA CLL
0401  1377            TAD     (OUT1           /SETUP T1 EXIT LOCATION,
0402  3071            DCA     OUT
0403  4463            JMS I   XREWND          /REWIND ALL SELECTED DRIVES TO BOT,
0404  4465    RET1,   JMS I   XWCCA           /INITIALIZE WC, CA LOCATIONS,
0405  3776            3776                    /CA
0406  7472            -316                    /WC
0407  4472            JMS I   SELALL          /GET DRIVE SELECT WORD,
0410  1066            TAD     ODD888          /COMBINE DRIVE SELECT, 800 BPI, ODD PARITY
0411  6705            LCMR                    /LOAD COMMAND,
0412  1113            TAD     K4100
0413  6706            LFGR                    /LOAD FUNCTION( WRITE, GO BITS,
0414  4457            TIMER                   /TIME "BOT DELAY,"
0415  6713            RCAR                    /GOT TO BE USED BY TIMER,
0416  7710            SPA CLA                 /CONDITION TO REMAIN IN TIMING LOOP,
0417  6724            SKTR
0420  5217            JMP     .-1             /WAIT FOR FUR,
0421  6725            CLF
0422  5204            JMP     RET1            /DO AGAIN ON NEXT DRIVE,
0423  4474    OUT1,   JMS I   XMESS           /MESSAGE ROUTINE
0424  6112            MSG11
0425  1060            TAD     CNTALL
0426  3104            DCA     PRNCT
0427  4475            JMS I   XPRINT

                        //TIME WRITE SHUTDOWN//
                        //
0430  7300    T2,     CLA CLL
0431  1376            TAD     (OUT2           /SETUP T2 EXIT LOCATION,
0432  3071            DCA     OUT
0433  4463            JMS I   XREWND          /REWIND ALL SELECTED DRIVES TO BOT,
0434  4465    RET2,   JMS I   XWCCA           /INITIALIZE WC, CA LOCATIONS,
0435  3776            3776                    /CA
0436  7472            -316                    /WC
0437  4472            JMS I   SELALL          /GET DRIVE SELECT WORD,
0440  1066            TAD     ODD888          /COMBINE DRIVE SELECT, 800 BPI, ODD PARITY,
0441  6705            LCMR                    /LOAD COMMAND,
0442  1113            TAD     K4100
0443  6706            LFGR                    /LOAD FUNCTION( WRITE, GO BITS,
0444  6723            SKJD
0445  5244            JMP     .-1             /WAIT FOR JOB DONE,
0446  6725            CLF                     /CLEAR FLAGS
0447  4775            JMS I   (WRTCNT         /CONTINUOUS WRITE
0450  5234            JMP     RET2
0451  4474    OUT2,   JMS I   XMESS           /MESSAGE ROUTINE
```

```
0452  6123            MSGT2
0453  1060            TAD     CNTALL
0454  3104            DCA     PRNCT
0455  4475            JMS I   XPRINT
0456  5657            JMP I   LINK3
0457  0600    LINK3,  T3

0575  5400
0576  0451
0577  0423
      0600            PAGE

                      //TIME WRITE START//
                      //
0600  7300    T3,     CLA CLL
0601  1377            TAD     (OUT3           /SETUP T3 EXIT LOCATION.
0602  3071            DCA     OUT
0603  4465    RET3,   JMS I   XWCCA           /INITIALIZE WC + CA LOCATIONS.
0604  3776            3776                    /CA
0605  7470            -310                    /WC
0606  4472            JMS I   SELALL          /GET DRIVE SELECT WORD.
0607  1066            TAD     ODD800          /COMBINE DRIVE SELECT, 800 BPI, ODD PARITY.
0610  6705            LCMR                    /LOAD COMMAND.
0611  1113            TAD     K4100
0612  6706            LFGR                    /LOAD FUNCTION; WRITE, GO BITS.
0613  4457            TIMER                   /TIME "WRITE START."
0614  6713            RCAR                    /EXIT TIMER ON
0615  7710            SPA CLA                 /CA=4000.
0616  6724            SKTR
0617  5216            JMP     .-1             /WAIT FOR TUR.
0620  6725            CLF
0621  5203            JMP     RET3            /DO AGAIN ON NEXT DRIVE.

0622  4474    OUT3,   JMS I   XMESS           /MESSAGE ROUTINE
0623  6134            MSGT3
0624  1060            TAD     CNTALL
0625  3104            DCA     PRNCT
0626  4475            JMS I   XPRINT

                      //TIME WRITE NONSTOP GAP//
                      //
0627  7300    T4,     CLA CLL
0630  1376            TAD     (OUT4           /SETUP T4 EXIT LOCATION.
0631  3071            DCA     OUT
0632  4465    RET4,   JMS I   XWCCA           /INITIALIZE WC + CA LOCATIONS.
0633  3776            3776                    /CA
0634  7470            -310                    /WC
0635  4472            JMS I   SELALL          /GET DRIVE SELECT WORD.
0636  1066            TAD     ODD800          /COMBINE DRIVE SELECT, 800 BPI, ODD PARITY.
0637  6705            LCMR                    /LOAD COMMAND.
0640  1113            TAD     K4100
0641  6706            LFGR                    /LOAD FUNCTION; WRITE, GO BITS.
0642  6723            SKJD
0643  5242            JMP     .-1             /WAIT FOR JOB DONE.
0644  6725            CLF
```



```
0645  4465            JMS I   XWCCA           /RE-INITIALIZE WC & CA LOCATIONS.
0646  3776            3776                    /CA
0647  7470            -310                    /WC
0650  1375            TAD     (3              /PRESET TIME COUNTER WITH
0651  3505            DCA I   NULL            /DURATION OF THIS SETUP PROCEDURE.
0652  1113            TAD     K4100
0653  6706            LFGR                    /LOAD FUNCTION; WRITE, GO BITS.
0654  4457            TIMER                   /TIME "NONSTOP GAP."
0655  6713            RCAR                    /EXIT TIMER ON
0656  7710            SPA CLA                 /CA=4000.
0657  6723            SKJD
0660  5257            JMP     .-1             /WAIT FOR JOB DONE.
0661  6725            CLF
0662  5232            JMP     RET4
0663  4474    OUT4,   JMS I   XMESS           /MESSAGE ROUTINE.
0664  6145            MSGT4
0665  1060            TAD     CNTALL
0666  3104            DCA     PRNCT
0667  4475            JMS I   XPRINT

                      //TIME BACKSPACE SHUTDOWN + SETTLE DOWN DELAY//
                      //
0670  7300    T5,     CLA CLL
0671  1374            TAD     (OUT5           /SETUP T5 EXIT LOCATION.
0672  3071            DCA     OUT
0673  4472    RET5,   JMS I   SELALL          /GET DRIVE SELECT WORD.
0674  1066            TAD     ODD800          /COMBINE DRIVE SELECT, 800 BPI, ODD PARITY.
0675  6705            LCMR                    /LOAD COMMAND.
0676  1114            TAD     K7777
0677  6701            LWCR                    /LOAD WC = -1.
0700  1115            TAD     K7100
0701  6706            LFGR                    /LOAD FUNCTION; SPACE REVERSE, GO BITS.
0702  6723            SKJD
0703  5302            JMP     .-1             /WAIT FOR JOB DONE.
0704  4457            TIMER                   /TIME "BACKSPACE SHUTDOWN + SETTLE DOWN DELAY".
0705  6724            SKTR                    /EXIT TIMER ON TUR.
0706  7610            SKP CLA                 /USED BY TIMER.
0707  6725            CLF
0710  5273            JMP     RET5            /DO AGAIN ON NEXT DRIVE.
0711  4474    OUT5,   JMS I   XMESS           /MESSAGE ROUTINE.
0712  6156            MSGT5
0713  1060            TAD     CNTALL
0714  3104            DCA     PRNCT
0715  4475            JMS I   XPRINT

                      //TIME READ SHUTDOWN//
                      //
0716  7300    T6,     CLA CLL
0717  1373            TAD     (OUT6           /SETUP T6 EXIT LOCATION.
0720  3071            DCA     OUT
0721  4465    RET6,   JMS I   XWCCA           /INITIALIZE WC + CA LOCATIONS.
0722  3777            3777                    /CA
0723  7470            -310                    /WC
0724  4472            JMS I   SELALL          /GET DRIVE SELECT WORD.
```

```
0725  1066          TAD     ODD800          /COMBINE DRIVE SELECT, 800 BPI, ODD PARITY,
0726  6705          LCMR                    /LOAD COMMAND,
0727  1116          TAD     K2100
0730  6706          LFGR                    /LOAD FUNCTION; READ, GO BITS,
0731  6723          SKJD
0732  5331          JMP     .-1             /WAIT FOR JOB DONE,
0733  6725          CLF                     /CLEAR FLAGS
0734  4772          JMS I   (WRTCNT         /WRITE CONTINUOUS
0735  5321          JMP     RET6            /DO NEXT DRIVE
0736  4474  OUT6,   JMS I   XMESS          /MESSAGE ROUTINE,
0737  6167          MSGT6
0740  1060          TAD     CNTALL
0741  3104          DCA     PRNCT
0742  4475          JMS I   XPRINT
0743  5744          JMP I   LINK7
0744  1000  LINK7,  T7

0772  5400
0773  0736
0774  0711
0775  0003
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0777  0622
      1000          PAGE

                    //TIME WRITE XIRG//
                    //
1000  7300  T7,     CLA CLL
1001  1377          TAD     (OUT7           /SETUP T7 EXIT LOCATION,
1002  3071          DCA     OUT
1003  4465  RET7,   JMS I   XWCCA          /INITIALIZE WC + CA LOCATIONS,
1004  3776          3776                    /CA
1005  7470          -310                    /WC
1006  4472          JMS I   SELALL          /GET DRIVE SELECT WORD,
1007  1066          TAD     ODD800          /COMBINE DRIVE SELECT, 800 BPI, ODD PARITY,
1010  6705          LCMR                    /LOAD COMMAND,
1011  1117          TAD     K4900
1012  6706          LFGR                    /LOAD FUNCTION; WRITE XIRG, GO BITS,
1013  4457          TIMER                   /TIME "WRITE XIRG",
1014  6713          RCAR                    /EXIT TIMER ON
1015  7710          SPA CLA                 /CA=4000,
1016  6724          SKTR
1017  5216          JMP     .-1             /WAIT FOR TUR,
1020  6725          CLF
1021  5203          JMP     RET7            /DO AGAIN ON NEXT DRIVE,
1022  4474  OUT7,   JMS I   XMESS          /MESSAGE ROUTINE
1023  6200          MSGT7
1024  1060          TAD     CNTALL
1025  3104          DCA     PRNCT
1026  4475          JMS I   XPRINT

                    //TIME LAST CHARACTER TO CU READY//
                    //
1027  7300  T8,     CLA CLL
1030  1376          TAD     (OUT8           /SETUP T8 EXIT LOCATION,
```



```
1031  3071          DCA     OUT
1032  4472  RET8,   JMS I   SELALL          /GET DRIVE SELECT WORD,
1033  1066          TAD     ODD800          /COMBINE DRIVE SELECT, 800 BPI, ODD PARITY,
1034  3106          DCA     TEMP1           /SAVE THEM,
1035  1106          TAD     TEMP1
1036  6705          LCMR                    /LOAD COMMAND,
1037  1114          TAD     K7777
1040  6701          LWCR                    /LOAD WC = -1,
1041  1115          TAD     K7100
1042  6706          LFGR                    /LOAD FUNCTION; SPACE REVERSE, GO,
1043  6723          SKJD
1044  5243          JMP     .-1             /WAIT FOR JOB DONE,
1045  6725          CLF
1046  4465          JMS I   XWCCA           /INITIALIZE WC & CA LOCATIONS,
1047  3776          3776                    /CA
1050  7470          -310                    /WC
1051  1106          TAD     TEMP1           /GET DRIVE, 800 BPI, ODD PARITY,
1052  6705          LCMR                    /LOAD COMMAND,
1053  1116          TAD     K2100
1054  6706          LFGR                    /LOAD FUNCTION; READ, GO,
1055  6711          RWCR                    /READ WC,
1056  7640          SZA CLA                 /WC = 0?
1057  5255          JMP     .-2             /NO, WAIT FOR IT,
1060  4457          TIMER                   /YES, TIME "LAST CHARACTER TO CU READY,"
1061  6722          SKCB                    /EXIT TIMER ON CU READY,
1062  7610          SKP CLA
1063  6724          SKTR
1064  5263          JMP     .-1             /WAIT FOR TUR,
1065  6725          CLF
1066  5232          JMP     RET8            /DO AGAIN ON NEXT DRIVE,
1067  4474  OUT8,   JMS I   XMESS          /MESSAGE ROUTINE
1070  6211          MSGT8
1071  1060          TAD     CNTALL
1072  3104          DCA     PRNCT
1073  4475          JMS I   XPRINT

                    //TIME READ FROM BOT//
                    //
1074  7300  T9,     CLA CLL
1075  1375          TAD     (OUT9           /SETUP T9 EXIT LOCATION,
1076  3071          DCA     OUT
1077  4463          JMS I   XRWND           /REWIND ALL SELECTED DRIVES TO BOT,
1100  4465  RET9,   JMS I   XWCCA          /INITIALIZE WC & CA LOCATIONS,
1101  3777          3777                    /CA
1102  7470          -310                    /WC
1103  4472          JMS I   SELALL          /GET DRIVE SELECT WORD,
1104  1066          TAD     ODD800          /COMBINE DRIVE SELECT, 800 BPI, ODD PARITY,
1105  6705          LCMR                    /LOAD COMMAND,
1106  1116          TAD     K2100
1107  6706          LFGR                    /LOAD FUNCTION; READ, GO BITS,
1110  4457          TIMER                   /TIME "READ FROM BOT,"
1111  6713          RCAR                    /EXIT TIMER ON CA=4000,
1112  7710          SPA CLA
1113  6724          SKTR
1114  5313          JMP     .-1             /WAIT FOR TUR
```

```
1115  6725            CLF
1116  5300            JMP     RET9            /DO AGAIN ON NEXT DRIVE
1117  4474    OUT9,   JMS I   XMESS           /MESSAGE ROUTINE.
1120  6222            MSGT9
1121  1060            TAD     CNTALL
1122  3104            DCA     PRNCT
1123  4475            JMS I   XPRINT

                      //TIME SPACE SHUTDOWN + SETTLE DOWN DELAY//
                      //
1124  7300    T10,    CLA CLL
1125  1374            TAD     (OUT10          /SETUP T10 EXIT LOCATION.
1126  3071            DCA     OUT
1127  1114    RET10,  TAD     K7777
1130  6701            LWCR                    /LOAD WC = -1.
1131  4472            JMS I   SELALL          /GET DRIVE SELECT WORD.
1132  1066            TAD     ODD800          /COMBINE DRIVE SELECT,800 BPI, ODD PARITY.
1133  6705            LCMR                    /LOAD COMMAND
1134  1120            TAD     K6100
1135  6706            LFGR                    /LOAD FUNCTION; SPACE FORWARD, GO BITS.
1136  6723            SKJD
1137  5336            JMP     .-1             /WAIT FOR JOB DONE.
1140  4457            TIMER                   /TIME "SPACE SHUTDOWN & SETTLEDOWN DELAY."
1141  6724            SKTR                    /EXIT TIMER ON TUR.
1142  7610            SKP CLA
1143  6725            CLF
1144  5327            JMP     RET10           /DO AGAIN ON NEXT DRIVE.
1145  4474    OUT10,  JMS I   XMESS           /MESSAGE ROUTINE.
1146  6233            MSGT10
1147  1060            TAD     CNTALL
1150  3104            DCA     PRNCT
1151  4475            JMS I   XPRINT
1152  5753            JMP I   LINK11
1153  1200    LINK11, T11

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1175  1117
1176  1067
1177  1022
      1200            PAGE

                      //TIME WRITE EOF//
                      //
1200  7300    T11,    CLA CLL
1201  1377            TAD     (OUT11          /SETUP T6 EXIT LOCATION.
1202  3071            DCA     OUT
1203  4463            JMS I   XRWND           /REWIND ALL SELECTED DRIVES TO BOT.
1204  4465    RET11,  JMS I   XWCCA           /INITIALIZE WC + CA LOCATIONS.
1205  3776            3776                    /CA
1206  0000            0000                    /WC
1207  4472            JMS I   SELALL          /GET DRIVE SELECT WORD.
1210  1066            TAD     ODD800          /COMBINE DRIVE SELECT, 800 BPI, ODD PARITY.
1211  3106            DCA     TEMP1
1212  1106            TAD     TEMP1
1213  6705            LCMR                    /LOAD COMMAND.
```



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1214  1113            TAD     K4100
1215  6706            LFGR                    /LOAD FUNCTION; WRITE, GO BITS.
1216  6723            SKJD
1217  5216            JMP     .-1             /WAIT FOR JOB DONE.
1220  6725            CLF
1221  1121            TAD     K5100
1222  6706            LFGR                    /LOAD FUNCTION; WRITE EOF, GO BITS.
1223  4457            TIMER                   /TIME "WRITE EOF".
1224  6723            SKJD
1225  7610            SKP CLA
1226  6725            CLF
1227  5204            JMP     RET11           /DO AGAIN ON NEXT DRIVE.
1230  4474    OUT11,  JMS I   XMESS           /MESSAGE ROUTINE.
1231  6244            MSGT11
1232  1060            TAD     CNTALL
1233  3104            DCA     PRNCT
1234  4475            JMS I   XPRINT


                      //TIME EOR TO EOF SPACE TIME//
                      //
1235  7300    T12,    CLA CLL
1236  1376            TAD     (OUT12          /SETUP T7 EXIT LOCATION
1237  3071            DCA     OUT
1240  4463            JMS I   XRWND           /REWIND ALL SELECTED DRIVES TO BOT.
1241  4465    RET12,  JMS I   XWCCA           /INITIALIZE WC + CA LOCATIONS.
1242  3776            3776                    /CA
1243  0000            0000                    /WC
1244  4472            JMS I   SELALL          /GET DRIVE SELECT WORD.
1245  1066            TAD     ODD800          /COMBINE DRIVE SELECT, 800 BPI, ODD PARITY.
1246  3106            DCA     TEMP1           /SAVE IT.
1247  1106            TAD     TEMP1
1250  6705            LCMR                    /LOAD COMMAND.
1251  1113            TAD     K4100
1252  6706            LFGR                    /LOAD FUNCTION; WRITE, GO BITS.
1253  6723            SKJD
1254  5253            JMP     .-1             /WAIT FOR JOB DONE.
1255  6725            CLF
1256  1106            TAD     TEMP1
1257  6705            LCMR
1260  1122            TAD     K1100
1261  6706            LFGR                    /LOAD FUNCTION, REWIND, GO BITS.
1262  6723            SKJD
1263  5262            JMP     .-1
1264  6725            CLF
1265  1106            TAD     TEMP1
1266  6705            LCMR                    /LOAD COMMAND.
1267  1123            TAD     K7776           /-2
1270  6701            LWCR                    /LOAD WC.
1271  1120            TAD     K6100
1272  6706            LFGR                    /LOAD FUNCTION; SPACE FORWARD, GO BITS.
1273  6711            RWCR
1274  1124            TAD     K0001           /CHECK FOR WC=-1
1275  7640            SZA CLA                 /INDICATING FIRST RECORD HAS BEEN SPACED OVER.
```

```
1276  5273            JMP     .-3
1277  4457            TIMER                   /TIME "EOR TO EOF SPACE TIME",
1300  6723            SKJD                    /EXIT TIMER ON JOB DONE.
1301  7610            SKP CLA
1302  6714            RMSR                    /CHECK EOF BIT,
1303  0125            AND     K0100           /EOF = 1?
1304  7650            SNA CLA                 /YES, SAVE EOF TIME,
1305  5317            JMP     ERRT12          /NO, ZERO TIME COUNTER,
1306  6725            CLF
1307  5241            JMP     RET12           /DO AGAIN ON NEXT DRIVE.

1310  4474  OUT12,    JMS I   XMESS           /MESSAGE ROUTINE,
1311  6255            MSGT12
1312  1060            TAD     CNTALL
1313  3104            DCA     PRNCT
1314  4475            JMS I   XPRINT
1315  5716            JMP I   LINK13
1316  1400  LINK13,   T13
1317  1010  ERRT12,   TAD     10
1320  1375            TAD     (-2
1321  3010            DCA     10
1322  3410            DCA I   10
1323  3410            DCA I   10
1324  6725            CLF
1325  5241            JMP     RET12


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1376  1310
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      1400            PAGE

                      //TIME WRITE TO ERASE HEAD//
                      //
1400  7300  T13,       CLA CLL
1401  1377            TAD     (OUT13          /SETUP T8 EXIT LOCATION,
1402  3071            DCA     OUT
1403  4463            JMS I   XRWND           /REWIND ALL SELECTED DRIVES TO BOT,
1404  4465  RET13,     JMS I   XWCCA           /INITIALIZE WC & CA LOCATIONS,
1405  3775            3775                    /CA
1406  7775            -3                      /WC
1407  4472            JMS I   SELALL          /GET DRIVE SELECT WORD,
1410  1066            TAD     ODD800          /COMBINE DRIVE SELECT, 800 BPI, ODD PARITY,
1411  3106            DCA     TEMP1           /SAVE IT,
1412  1106            TAD     TEMP1
1413  6705            LCMR                    /LOAD COMMAND,
1414  1113            TAD     K4100
1415  6706            LFGR                    /LOAD FUNCTION; WRITE, GO BITS,
1416  6713            RCAR                    /CA = 3777 INDICATES 2ND WORD SENT,
1417  1126            TAD     K4001
1420  7640            SZA CLA                 /2ND WORD SENT?
1421  5216            JMP     .-3             /NO, DO AGAIN,
1422  6712            CLI                     /YES, ISSUE CLEAR ALL,
1423  1106            TAD     TEMP1
```



```
1424  6705            LCMR                    /LOAD COMMAND
1425  1122            TAD     K1100
1426  6706            LFGR                    /LOAD FUNCTION; REWIND, GO BITS,
1427  6714            RMSR
1430  0127            AND     K1000           /CHECK FOR BOT,
1431  7650            SNA CLA
1432  5227            JMP     .-3
1433  6725            CLF
1434  4465            JMS I   XWCCA           /INITIALIZE WC & CA LOCATIONS
1435  3776            3776                    /CA
1436  7775            -3                      /WC
1437  1106            TAD     TEMP1
1440  6705            LCMR                    /LOAD COMMAND,
1441  1116            TAD     K2100
1442  6706            LFGR                    /LOAD FUNCTION; READ, GO BITS,
1443  6713            RCAR                    /CA=3777 INDICATES 2ND WORD READ
1444  1126            TAD     K4001
1445  7640            SZA CLA                 /2ND WORD READ?
1446  5243            JMP     .-3             /NO, WAIT,
1447  4457            TIMER                   /YES, TIME "WRITE TO ERASE HEAD,"
1450  6713            RCAR                    /EXIT TIMER ON CA=4000,
1451  7710            SPA CLA
1452  6723            SKJD
1453  5252            JMP     .-1
1454  6725            CLF
1455  5204            JMP     RET13           /DO AGAIN ON NEXT DRIVE,
1456  4474  OUT13,     JMS I   XMESS           /MESSAGE ROUTINE,
1457  6266            MSGT13
1460  1060            TAD     CNTALL
1461  3104            DCA     PRNCT
1462  4475            JMS I   XPRINT

                      //ONE INCH DATA TIME//
                      //
1463  7300  T14,       CLA CLL
1464  1376            TAD     (OUT14          /SETUP T9 EXIT LOCATION,
1465  3071            DCA     OUT
1466  4463            JMS I   XRWND           /REWIND ALL SELECTED DRIVES TO BOT,
1467  4465  RET14,     JMS I   XWCCA           /INITIALIZE WC & CA LOCATIONS,
1470  3776            3776                    /CA
1471  7160            -620                    /WC
1472  4472            JMS I   SELALL          /GET DRIVE SELECT WORD,
1473  1066            TAD     ODD800          /COMBINE DRIVE SELECT, 800 BPI,ODD PARITY
1474  6705            LCMR                    /LOAD COMMAND,
1475  1113            TAD     K4100
1476  6706            LFGR                    /LOAD FUNCTION, WRITE, GO BITS,
1477  6713            RCAR                    /MINUS CA INDICATES FIRST WORD TAKEN,
1500  7700            SMA CLA
1501  5277            JMP     .-2
1502  4457            TIMER                   /TIME "800 BPI DATATIME",
1503  6711            RWCR                    /EXIT TIMER ON WC=0,
1504  7650            SNA CLA
1505  6724            SKTR
1506  5305            JMP     .-1             /WAIT FOR TUR,
```

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1507  6725            CLF
1510  5267            JMP     RET14           /DO AGAIN ON NEXT DRIVE.
1511  4474  OUT14,    JMS I   XMESS           /MESSAGE ROUTINE.
1512  6277            MSGT14
1513  1060            TAD     CNTALL
1514  3104            DCA     PRNCT
1515  4475            JMS I   XPRINT
1516  5717            JMP I   LINKGP
1517  1600  LINKGP,   GAPS


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1577  1456
      1600            PAGE

                      //CREATE GAPS TO BE TIMED IN GAP CONSISTENCY TEST//
                      //
1600  7300  GAPS,     CLA CLL
1601  1377            TAD     (OUTGAP         /SETUP GAP8 EXIT LOCATION.
1602  3071            DCA     OUT
1603  4463            JMS I   XRWND           /REWIND ALL SELECTED DRIVES TO BOT.
1604  1133  RETGAP,   TAD     KM2
1605  3306            DCA     GAP2CT          /GAP2 COUNT=-2.
1606  1133            TAD     KM2
1607  3307            DCA     GAP5CT          /GAP5 COUNT=-2.
1610  1134            TAD     KM3
1611  3310            DCA     GAP6CT          /GAP6 COUNT=-3.
1612  1102            TAD     KM4
1613  3311            DCA     GAP7CT          /GAP7 COUNT=-4.
1614  1313            TAD     KM8
1615  3312            DCA     GAP8CT          /GAP8 COUNT=-8.
1616  4465            JMS I   XWCCA           /INITIALIZE WC, CA LOCATIONS.
1617  3767            3767                    /CA
1620  7470            -310                    /WC
1621  4472            JMS I   SELALL          /GET DRIVE SELECT WORD.
1622  1066            TAD     ODD800          /COMBINE DRIVE SELECT, 800 BPI, ODD PARITY.
1623  3106            DCA     TEMP1           /SAVE IT.
1624  1106            TAD     TEMP1
1625  6705            LCMR                    /LOAD COMMAND.
1626  1113            TAD     K4100
1627  6706            LFGR                    /LOAD FUNCTION; WRITE, GO BITS.
1630  6723            SKJD
1631  5230            JMP     .-1             /WAIT FOR JOB DONE.
1632  6725  DOGAP2,   CLF                     /WRITE NONSTOP, GAP1 CREATED.
1633  4465            JMS I   XWCCA           /INITIALIZE WC, CA LOCATIONS.
1634  3767            3767                    /CA
1635  7470            -310                    /WC
1636  1106            TAD     TEMP1           /PICKUP DRIVE, BPI, ODD PARITY.
1637  6705            LCMR                    /LOAD COMMAND.
1640  1113            TAD     K4100
1641  6706            LFGR                    /LOAD FUNCTION; WRITE GO BITS.
1642  6723            SKJD                    /WAIT FOR JOB DONE.
1643  5242            JMP     .-1
1644  6724            SKTR                    /WAIT FOR TUR.
1645  5244            JMP     .-1
```



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1646  2306            ISZ     GAP2CT          /WRITE 3RD RECORD START-STOP
1647  5232            JMP     DOGAP2          /TO CREATE GAP2.
1650  6725            CLF
1651  4536            JMS I   XBAK            /SPACE REVERSE 1 RECORD.
1652  4540            JMS I   XREAD           /READ RECORD.
1653  4537            JMS I   XRITE1          /WRITE 4TH RECORD; 3RD GAP CREATED.
1654  4537            JMS I   XRITE1          /START GAP4, WRITE 1 RECORD.
1655  4536            JMS I   XBAK            /SPACE REVERSE OVER RECORD JUST WRITTEN.
1656  4537            JMS I   XRITE1          /WRITE 5TH RECORD; 4TH GAP CREATED.
1657  4537            JMS I   XRITE1          /START GAP5, WRITE 1 RECORD.

1660  4536  DOGAP5,   JMS I   XBAK            /SPACE REVERSE OVER RECORD JUST WRITTEN.
1661  4537            JMS I   XRITE1          /WRITE 1 RECORD
1662  2307            ISZ     GAP5CT          /DO XBAK + XRITE 1 MORE TIME
1663  5260            JMP     DOGAP5          /TO CREATE 5TH GAP.
1664  4537            JMS I   XRITE1          /START GAP6, WRITE 1 RECORD.
1665  4536  DOGAP6,   JMS I   XBAK            /SPACE REVERSE OVER RECORD JUST WRITTEN.
1666  4537            JMS I   XRITE1          /WRITE 1 RECORD.
1667  2310            ISZ     GAP6CT          /DO XBAK + XRITE 2 MORE TIMES
1670  5265            JMP     DOGAP6          /TO CREATE 6TH GAP.
1671  4537            JMS I   XRITE1          /START GAP7, WRITE 1 RECORD.
1672  4536  DOGAP7,   JMS I   XBAK            /SPACE REVERSE OVER RECORD JUST WRITTEN.
1673  4537            JMS I   XRITE1          /WRITE 1 RECORD.
1674  2311            ISZ     GAP7CT          /DO XBAK + XRITE 3 MORE TIMES
1675  5272            JMP     DOGAP7          /TO CREATE 7TH GAP.
1676  4537            JMS I   XRITE1          /START GAP8, WRITE 1 RECORD.
1677  4536  DOGAP8,   JMS I   XBAK            /SPACE REVERSE OVER RECORD JUST WRITTEN.
1700  4537            JMS I   XRITE1          /WRITE 1 RECORD
1701  2312            ISZ     GAP8CT          /DO XBAK + XRITE 4 MORE TIMES
1702  5277            JMP     DOGAP8          /TO CREATE 8TH GAP.
1703  5204            JMP     RETGAP          /DO AGAIN ON NEXT DRIVE.
1704  5705  OUTGAP,   JMP I   LINK15
1705  2000  LINK15,   T15

1706  0000  GAP2CT,   0
1707  0000  GAP5CT,   0
1710  0000  GAP6CT,   0
1711  0000  GAP7CT,   0
1712  0000  GAP8CT,   0
1713  7773  KM5,      -5

1777  1704
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                      //NOW READ NONSTOP THE GAPS JUST CREATED
                      //TYPE GAP TIME AS EACH GAP IS READ ON ALL DRIVES
                      //GAP1 > GAP2, GAP8 APPROXIMATELY 8 GAP3
                      //GAP4 THRU GAP8 SHOULD GET INCREASINGLY LONGER
                      //
2000  7300  T15,      CLA CLL
2001  1377            TAD     (OUT15A         /SETUP T15A EXIT LOCATION.
2002  3071            DCA     OUT
2003  1264            TAD     M7
2004  3263            DCA     GAPCNT
```

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2005  1376            TAD     (GAPTBL-1
2006  3012            DCA     INDX12
2007  4463            JMS I   XRWND
2010  4472    RET15A, JMS I   SELALL          /GET DRIVE SELECT WORD,
2011  1066            TAD     OD0800          /COMBINE DRIVE, BPI, ODD PARITY,
2012  3106            DCA     TEMP1           /SAVE THEM,
2013  4546            JMS I   XREAD2          /READ INITIAL BLOCK ON TAPE,
2014  4541            JMS I   XREAD1          /CONTINUE READING NONSTOP & TIME GAP,
2015  5210            JMP     RET15A          /DO AGAIN ON NEXT DRIVE,
2016  4250    OUT15A, JMS     GAPOUT          /OUTPUT 1ST GAP TIMES
2017  1375            TAD     (OUT15B         /SETUP T15B EXIT LOCATION,
2020  3071            DCA     OUT
2021  4472    RET15B, JMS I   SELALL          /GET DRIVE SELECT WORD,
2022  1066            TAD     OD0800          /COMBINE DRIVE, BPI, ODD PARITY,
2023  3106            DCA     TEMP1           /SAVE THEM,
2024  4536            JMS I   XBAK            /BACKSPACE 1 RECORD,
2025  4546            JMS I   XREAD2          /READ RECORD PRECEDING GAP TO BE TIMED,
2026  4541            JMS I   XREAD1          /CONTINUE READING NONSTOP & TIME GAP,
2027  5221            JMP     RET15B          /DO AGAIN ON NEXT DRIVE,
2030  4250    OUT15B, JMS     GAPOUT          /OUTPUT 2-8 GAP TIMES,
2031  2263            ISZ     GAPCNT          /ALL 8 GAPS TIMED?
2032  5221            JMP     RET15B          /NO, CONTINUE,
2033  1061            TAD     CNT7            /YES, NOW CHECK FOR ANY 7 TRK DRIVES,
2034  7650            SNA CLA
2035  5545            JMP I   XEND            /NO 7 TRK DRIVES, TESTING COMPLETE,
2036  5637            JMP I   LINK36          /CONTINUE TESTING
2037  2200    LINK36, SET556                  /OF 7 TRK DRIVES,

2040  0261    GAPTBL, 0261
2041  0262            0262
2042  0263            0263
2043  0264            0264
2044  0265            0265
2045  0266            0266
2046  0267            0267
2047  0270            0270

2050  0000    GAPOUT, 0                       /ROUTINE TO OUTPUT GAP TIMES,
2051  4474            JMS I   XMESS
2052  6310            MSGT15                  /GAP MESSAGE,
2053  1412            TAD I   INDX12
2054  4501            JMS I   XOTY
2055  4474            JMS I   XMESS
2056  6313            MSGSPC
2057  1060            TAD     CNTALL
2060  3104            DCA     PRNCT
2061  4475            JMS I   XPRINT
2062  5650            JMP I   GAPOUT
2063  0000    GAPCNT, 0
2064  7771    M7,     -7

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      2200            PAGE
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                      //ROUTINE TO RUN TESTS AT 556 BPI//
2200  7300    SET556, CLA CLL
2201  4474            JMS I   XMESS           /MESSAGE ROUTINE
2202  6321            MSG556
2203  4456            JMS I   XHEAD1          /MESSAGE ROUTINE
2204  4451            JMS I   XCRLF
2205  1142            TAD     K0400
2206  7001            IAC                     /AC=0401
2207  3143            DCA     XBPI            /BPI=556
2210  1213            TAD     M426            /SETUP 1 INCH DATA
2211  3147            DCA     INCH            /TIME FOR 556 BPI,
2212  5544            JMP I   LINK16

2213  7352    M426,   -426

                      //TIME WRITE FROM BOT DELAY AT EITHER 556 OR 200 BPI//
                      //
2214  7300    T16,    CLA CLL
2215  1377            TAD     (OUT16          /SETUP T16 EXIT LOCATION,
2216  3071            DCA     OUT
2217  4464            JMS I   XRWND7          /REWIND ALL 7 TRK DRIVES TO BOT,
2220  4465    RET16,  JMS I   XWCCA           /INITIALIZE WC, CA LOCATIONS,
2221  3776            3776                    /CA
2222  7470            -310                    /WC
2223  4473            JMS I   SELTU7          /GET DRIVE SELECT WORD,
2224  1143            TAD     XBPI            /COMBINE DRIVE, BPI, ODD PARITY,
2225  6705            LCMR                    /LOAD COMMAND,
2226  1113            TAD     K4100
2227  6706            LFGR                    /LOAD FUNCTION/ WRITE, GO BITS,
2230  4457            TIMER                   /TIME "BOT DELAY",
2231  6713            RCAR                    /IOT USED BY TIMER,
2232  7710            SPA CLA                 /CONDITION TO REMAIN IN TIMER,
2233  6724            SKTR
2234  5233            JMP     .-1             /WAIT FOR TUR,
2235  6725            CLF
2236  5220            JMP     RET16           /DO AGAIN ON NEXT DRIVE,
2237  4474    OUT16,  JMS I   XMESS           /MESSAGE ROUTINE,
2240  6112            MSGT1
2241  1061            TAD     CNT7            /SETUP COUNTER
2242  3104            DCA     PRNCT           /WITH NUMBER OF DRIVES BEING TESTED,
2243  4475            JMS I   XPRINT          /OUTPUT DECIMAL TIMES,

                      //TIME WRITE SHUTDOWN AT
                      //EITHER 556 OR 200 BPI
                      //
2244  7300    T17,    CLA CLL
2245  1376            TAD     (OUT17          /SETUP T17 EXIT LOCATION,
2246  3071            DCA     OUT
2247  4464            JMS I   XRWND7          /REWIND ALL 7 TRK DRIVES TO BOT,
2250  4465    RET17,  JMS I   XWCCA           /INITIALIZE WC, CA LOCATIONS,
2251  3776            3776                    /CA
2252  7470            -310                    /WC
2253  4473            JMS I   SELTU7          /GET DRIVE SELECT WORD,
```

```
9047  1111          TAQ     NC#U            /SUBTRACT MIKECT FROM ORIGINAL CONSTANT.
9050  7040          CMA
9051  1112          TAQ     PC#U            /NOW ADD ORIGINAL CONSTANT TO NUMBER OF
9052  3256          DCA     DIVDEN          /ITERATIONS IN MIKECT TO FORM DIVIDEND.
9053  1112          TAQ     PC#U            /NOW SETUP
9054  3257          DCA     DIVSR           /DIVISOR,
9055  4274          JMS     DIVIDE          /ENTER DIVIDE ROUTINE.

9056  0000    DIVDEN, 0                     /DIVIDEND.
9057  0000    DIVSR,  0                     /DIVISOR.
9060  7200    DIVRET, CLA                   /RETURN HERE FROM DIVIDE ROUTINE.
9061  1103          TAQ     HDIVND          /GET ANSWER.
9062  3273          DCA     SAVANS          /SAVE IT.
9063  1110          TAQ     MILICT          /GET VALUE IN MILLISECONDS.
9064  3410          DCA I   INDX10          /STORE AWAY.
9065  1273          TAQ     SAVANS          /GET VALUE IN MICRO SECONDS.
9066  3410          DCA I   INDX10          /STORE AWAY.
9067  3107          DCA     MIKECT
9070  3110          DCA     MILICT          /CLEAR TIME COUNTERS.
9071  3505          DCA I   NULL
9072  5611          JMP I   TIME            /RETURN TO TEST.

9073  0000    SAVANS, 0

                    /SINGLE PRECISION DIVIDE SUBROUTINE
                    /

9074  0000    DIVIDE, 0
9075  7100          CLL
9076  3103          DCA     HDIVND          /HIGH ORDER DIVIDEND.
9077  1674          TAQ I   DIVIDE          /FETCH LOW ORDER DIVIDEND.
9100  3326          DCA     LDIVND          /SAVE IT.
9101  2274          ISZ     DIVIDE          /UPDATE POINTER.
9102  1674          TAQ I   DIVIDE          /FETCH DIVISOR.
9103  3327          DCA     DIVSOR          /SAVE IT.
9104  2274          ISZ     DIVIDE
9105  1331          TAQ     KM13
9106  3330          DCA     DIVCNT
9107  5320          JMP     DV2
9110  1103    DV3,  TAQ     HDIVND          /DIVIDE LOOP
9111  7004          RAL
9112  3103          DCA     HDIVND          /DIVIDEND LEFT SHIFT.
9113  1103          TAQ     HDIVND
9114  1327          TAQ     DIVSOR          /COMPARE DIVISOR/DIVIDEND.
9115  7430          SZL
9116  3103          DCA     HDIVND          /REMAINDER AFTER SUBTRACT.
9117  7200          CLA
9120  1326    DV2,  TAQ     LDIVND          /QUOTIENT BITS.
9121  7004          RAL                     /ENTER HERE.
9122  3326          DCA     LDIVND
9123  2330          ISZ     DIVCNT          /DONE 12?
9124  5310          JMP     DV3             /NO, CONTINUE.
9125  5674          JMP I   DIVIDE          /YES, EXIT.

9126  0000    LDIVND, 0
```



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9127  0000    DIVSOR, 0
9130  0000    DIVCNT, 0
9131  7765    KM13,   -13
9132  0000    XNULL,  0

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      5200          PAGE

                    /ROUTINE TO REWIND ALL SELECTED TRANSPORTS TO BOT/
9200  0000    RWIND,  0
9201  6722          SKOB
9202  5201          JMP     .-1             /WAIT FOR DUR.
9203  6725          CLF
9204  1377          TAQ     (ALLTU          /SETUP DRIVE SELECTION
9205  3070          DCA     DRVSEL          /POINTER FOR ALL DRIVES.
9206  1060          TAQ     CNTALL          /SETUP COUNT
9207  7041          CIA                     /TO INDICATE WHEN ALL
9210  3261          DCA     REWCNT          /DRIVES HAVE BEEN REWOUND.
9211  1257          TAQ     EXALL
9212  3256          DCA     GETBAK
9213  1066          TAQ     OD0800          /PICKUP PARITY AND BPI.
9214  3263          DCA     TEMP3           /SAVE THEM.
9215  5233          JMP     RWINDA          /GO AND REWIND SELECTED DRIVES.
9216  0000    RWIND7, 0
9217  6722          SKOB
9220  5217          JMP     .-1             /WAIT FOR DUR.
9221  6725          CLF
9222  1376          TAQ     (TU7            /SETUP DRIVE SELECTION
9223  3070          DCA     DRVSEL          /POINTER FOR 7 TRACK DRIVES ONLY.
9224  1061          TAQ     CNT7            /SETUP COUNT TO INDICATE
9225  7041          CIA                     /WHEN ALL 9 TRACK DRIVES
9226  3261          DCA     REWCNT          /HAVE BEEN REWOUND.
9227  1260          TAQ     EXTU7
9230  3256          DCA     GETBAK
9231  1143          TAQ     XB8I            /PICKUP PARITY AND BPI.
9232  3263          DCA     TEMP3           /SAVE THEM.
9233  1470    RWINDA, TAD I   DRVSEL         /GET DRIVE SELECTED.
9234  1263          TAQ     TEMP3           /COMBINE WITH PARITY AND BPI.
9235  6705          LCMR                    /LOAD COMMAND.
9236  6724          SKTR
9237  5236          JMP     .-1             /WAIT FOR TUR.
9240  6714          RMSR                    /READ STATUS.
9241  0262          AND     MK1000          /CHECK FOR BOT.
9242  7640          SZA CLA                 /DRIVE NOT AT BOT, REWIND.
9243  5252          JMP     .+7             /DRIVE AT BOT, DO NOT REWIND.
9244  1375          TAQ     (1100
9245  6706          LFGR                    /LOAD FUNCTION; REWIND, GO BITS.
9246  6723          SKJD
9247  5246          JMP     .-1             /WAIT FOR JOB DONE.
9250  6724          SKTR
9251  5250          JMP     .-1             /WAIT FOR TUR.
9252  6725          CLF
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9253  2070            ISZ     DRVSEL
9254  2261            ISZ     REWCNT          /ALL DRIVES DONE?
9255  5233            JMP     RWINDA          /NO, CONTINUE.
9256  7402    GETBAK, HLT                     /MODIFIED TO JMP I.

9257  5600    EXALL,  JMP I   RWIND
9260  5616    EXTU7,  JMP I   RWIND7
9261  0000    REWCNT, 0
9262  1000    MK1000, 1000
9263  0000    TEMP3,  0

                      /ROUTINE USED TO SELECT BOTH 7 AND 9 TRACK DRIVES/
                      /TO BE TESTED AT 800 BPI/
                      /
9264  0000    ALTU79, 0
9265  2050            ISZ     ONCE            /DO INITIAL SETUP ONE TIME ONLY.
9266  5274            JMP     .+6
9267  1377            TAD     (ALLTU          /INITIALIZE SELECT TABLE.
9270  3070            DCA     DRVSEL
9271  1060            TAD     CNTALL
9272  7040            CMA
9273  3324            DCA     SELCNT
9274  1470            TAD I   DRVSEL          /GET DRIVE TO BE TESTED.
9275  2070            ISZ     DRVSEL          /UPDATE POINTER.
9276  2324            ISZ     SELCNT          /HAVE ALL DRIVES BEEN TESTED?
9277  5664            JMP I   ALTU79          /NO, CONTINUE.
9300  7200            CLA                     /YES, EXIT CURRENT TEST.
9301  1114            TAD     K7777           /SETUP INITIALIZATION
9302  3050            DCA     ONCE            /LOCATION.
9303  5471            JMP I   OUT             /EXIT.

                      /ROUTINE USED TO SELECT 7 TRACK DRIVES TO BE/
                      /TESTED AT 556 AND 200 BPI/
                      /
9304  0000    ALLTU7, 0
9305  2050            ISZ     ONCE            /DO INITIAL SETUP ONE TIME ONLY.
9306  5314            JMP     .+6
9307  1376            TAD     (TU7            /INITIALIZE
9310  3070            DCA     DRVSEL
9311  1061            TAD     CNT7
9312  7040            CMA
9313  3324            DCA     SELCNT
9314  1470            TAD I   DRVSEL          /GET DRIVE TO BE TESTED.
9315  2070            ISZ     DRVSEL          /UPDATE POINTER.
9316  2324            ISZ     SELCNT          /HAVE ALL DRIVES BEEN TESTED?
9317  5704            JMP I   ALLTU7          /NO, CONTINUE.
9320  7200            CLA                     /YES, EXIT CURRENT TEST.
9321  1114            TAD     K7777           /SETUP INITIALIZATION
9322  3050            DCA     ONCE            /LOCATION.
9323  5471            JMP I   OUT             /EXIT.

9324  0000    SELCNT, 0
```



```
                      /ROUTINE USED TO OUTPUT TO TTY BOTH 7 AND 9 TRACK/
                      /DRIVES TESTED AT 800 BPI/
                      /
9325  0000    ALLMSG, 0
9326  1374            TAD     (ALLTBL         /INITIALIZE SELECTION TABLE.
9327  3070            DCA     DRVSEL
9330  1060            TAD     CNTALL          /SETUP COUNTER=TOTAL NUMBER OF DRIVES
9331  7041            CIA                     /SELECTED.
9332  3324            DCA     SELCNT
9333  4474    ALLRET, JMS I   XMESS           /MESSAGE SUBROUTINE.
9334  6076            MSG6                    /"UNIT".
9335  1470            TAD I   DRVSEL          /GET UNIT NUMBER.
9336  4501            JMS I   XOTY            /OUTPUT TO TTY.
9337  1365            TAD     SPACE
9340  4501            JMS I   XOTY
9341  2070            ISZ     DRVSEL          /UPDATE POINTER.
9342  2324            ISZ     SELCNT          /ARE ALL UNITS OUTPUT?
9343  5333            JMP     ALLRET          /NO, GET NEXT UNIT.
9344  5725            JMP I   ALLMSG          /YES, EXIT.

                      /ROUTINE USED TO OUTPUT TO TTY ALL 7 TRACK DRIVES/
                      /TESTED AT 556 AND 200 BPI/
                      /
9345  0000    TU7MSG, 0
9346  1373            TAD     (TU7TBL         /INITIALIZE SELECTION TABLE.

9347  3070            DCA     DRVSEL
9350  1061            TAD     CNT7            /SETUP COUNTER=NUMBER OF 7 TRACK
9351  7041            CIA                     /DRIVES SELECTED.
9352  3324            DCA     SELCNT
9353  4474    TU7RET, JMS I   XMESS           /MESSAGE SUBROUTINE.
9354  6076            MSG6                    /"UNIT".
9355  1470            TAD I   DRVSEL          /GET UNIT NUMBER.
9356  4501            JMS I   XOTY            /OUTPUT TO TTY.
9357  1365            TAD     SPACE
9360  4501            JMS I   XOTY
9361  2070            ISZ     DRVSEL          /UPDATE POINTER.
9362  2324            ISZ     SELCNT          /ARE ALL UNITS OUTPUT?
9363  5353            JMP     TU7RET          /NO, GET NEXT UNIT.
9364  5745            JMP I   TU7MSG          /YES, EXIT.

9365  0240    SPACE,  0240

9373  0170
9374  0160
9375  1100
9376  0040
9377  0030
      5400            PAGE


                //ROUTINE TO WRITE CONTINUOUS AND TIME TILL LEADING EDGE OF SDWN.//
                //THIS ROUTINE USED FOR TIMING WRITE AND READ SHUTDOWN.//
9400  0000    WRTCNT, 0
```

```
9401  1377            TAD     (3              /ADJUST FOR SETUP TIME
9402  3505            DCA I   NULL
9403  1113            TAD     K4100           /CONTINUOUS WRITE
9404  6706            LFGR
9405  4457            TIMER                   /TIME TILL FIRST WORD XFERRED OUT OF
9406  6711            RWGR                    /MEMORY TO TM8E (APPROX LEADING EDGE
9407  7640            SZA CLA                 /OF SQWV.
9410  6723            SKJD                    /WAIT JOB DONE
9411  5210            JMP     .-1
9412  6724            SKTR                    /WAIT TUR
9413  5212            JMP     .-1
9414  6725            CLF                     /CLEAR ALL
9415  5600            JMP I   WRTCNT          /EXIT

                      /SINGLE CHARACTER OUTPUT ROUTINE
                      /ENTERED WITH CHARACTER IN AC
                      /
9416  0000    OTY,    0
9417  6046            TLS
9420  6041            TSF
9421  5220            JMP     .-1
9422  6042            TCF
9423  7200            CLA
9424  5616            JMP I   OTY

9425  0000    PRINT,  0                       /ROUTINE TO OUTPUT ACCUMULATED
9426  7300            CLA CLL                 /TIMES FOR ALL DRIVES.
9427  1376            TAD     (6377
9430  3010            DCA     INDX10
9431  1104            TAD     PRNCT           /SETUP PRINT COUNTER.
9432  7041            CIA
9433  3104            DCA     PRNCT
9434  3077    LOPRIN, DCA     VFS20
9435  3100            DCA     VFSUPR
9436  1410            TAD I   INDX10
9437  4476            JMS I   XDEC
9440  1277            TAD     K256            /DECIMAL POINT.
9441  4501            JMS I   XOTY
9442  1300            TAD     K7775
9443  3077            DCA     VFS20
9444  7040            CMA
9445  3100            DCA     VFSUPR
9446  1410            TAD I   INDX10
9447  4476            JMS I   XDEC
9450  1276            TAD     K240            /SPACE.
9451  4501            JMS I   XOTY
9452  2104            ISZ     PRNCT
9453  5234            JMP     LOPRIN
9454  4260            JMS     CRLF
9455  1376            TAD     (6377
9456  3010            DCA     INDX10
9457  5625            JMP I   PRINT
```



```
9460  0000    CRLF,   0
9461  1131            TAD     K215            /CARRIAGE RETURN.
9462  6046            TLS
9463  6041            TSF
9464  5263            JMP     .-1
9465  6042            TCF
9466  7200            CLA
9467  1130            TAD     K212            /LINE FEED.
9470  6046            TLS
9471  6041            TSF
9472  5271            JMP     .-1
9473  6042            TCF
9474  7200            CLA
9475  5660            JMP I   CRLF

9476  0240    K240,   0240
9477  0256    K256,   0256
9500  7775    K7775,  7775

                      /UNSIGNED DECIMAL PRINT
                      /CALL WITH NUMBER TO BE TYPED IN AC
                      /RETURN TO LOCATION FOLLOWING THE JMS.

9501  0000    DECPRT, 0
9502  3363            DCA     VALUE           /SAVE INPUT.
9503  3364            DCA     DIGIT           /CLEAR.
9504  3366            DCA     VTEMP2
9505  1102            TAD     KM4
9506  3365            DCA     VTEMP1          /SET COUNTER TO 4.
9507  1356            TAD     ADDRSA
9510  3315            DCA     ARROW           /SET TABLE POINTER.
9511  7410            SKP
9512  3363            DCA     VALUE           /SAVE
9513  7100            CLL
9514  1363            TAD     VALUE
9515  1357    ARROW,  TAD     TENPWR          /SUBTRACT POWER OF TEN.
9516  7430            SZL
9517  2364            ISZ     DIGIT           /DEVELOP BCD DIGIT.
9520  7430            SZL
9521  5312            JMP     ARROW-3         /LOOP
9522  7200            CLA                     /HAVE BCD DIGIT.
9523  1077            TAD     VFS20
9524  7650            SNA CLA                 /SUPPRESS LEADING DIGITS?
9525  5330            JMP     .+3             /NO
9526  2077            ISZ     VFS20           /YES, COUNT AND DO NOT PRINT.
9527  5347            JMP     LOOPD+2
9530  1364            TAD     DIGIT           /GET DIGIT
9531  7450            SNA                     /IS THIS A ZERO?
9532  5335            JMP     .+3             /YES
9533  2366            ISZ     VTEMP2          /NO
9534  5345            JMP     LOOPD
9535  1366            TAD     VTEMP2
9536  7640            SZA CLA                 /HAS A DIGIT BEEN TYPED?
9537  5345            JMP     LOOPD           /YES.
9540  1100            TAD     VFSUPR          /NO.
```

```
9541  7640            SZA CLA                 /SHOULD THIS ONE BE SUPPRESSED?
9542  5345            JMP     LOOPD           /NO.
9543  1276            TAD     K240            /YES, TYPE SPACE
9544  5346            JMP     LOOPD+1
9545  1367    LOOPD,  TAD     K260            /MAKE IT ASCII
9546  4501            JMS I   XOTY            /TYPE DIGIT.
9547  3364            DCA     DIGIT           /CLEAR
9550  2315            ISZ     ARROW           /UPDATE POINTER.
9551  2365            ISZ     VTEMP1          /DONE ALL FOUR?
9552  5314            JMP     ARROW-1         /NO, CONTINUE.
9553  3100            DCA     VFSUPR
9554  3077            DCA     VFS20
9555  5701            JMP I   DECPRT          /YES, EXIT.

9556  1357    ADDR2A, TAD     TENPWR
9557  6030    TENPWR, -1750                   /ONE THOUSAND
9560  7634            -0144                   /ONE HUNDRED
9561  7766            -0012                   /TEN
9562  7777            -0001                   /ONE

9563  0000    VALUE,  0
9564  0000    DIGIT,  0
9565  0000    VTEMP1, 0
9566  0000    VTEMP2, 0
9567  0260    K260,   260

9576  6377
9577  0003
      5600            PAGE

                      //ROUTINE TO WRITE ONE 200(10) WORD RECORD//
                      //
9600  0000    RITE1,  0
9601  4465            JMS I   XWCCA           /INITIALIZE WC, CA LOCATIONS.
9602  3777            3777                    /CA
9603  7470            -310                    /WC
9604  1106            TAD     TEMP1           /PICKUP DRIVE, BPI, ODD PARITY,
9605  6705            LCMR                    /LOAD COMMAND.
9606  1113            TAD     K4100
9607  6706            LFGR                    /LOAD FUNCTION; WRITE, GO BITS,
9610  6723            SKJD
9611  5210            JMP     .-1             /WAIT FOR JOB DONE.
9612  6724            SKTR
9613  5212            JMP     .-1             /WAIT FOR TUR.
9614  6725            CLF
9615  5600            JMP I   RITE1           /RETURN.

                      //BACKSPACE ONE RECORD//
                      //
9616  0000    BAKSPA, 0
9617  1132            TAD     KM1
9620  6701            LWCR                    /WC=-1
9621  1106            TAD     TEMP1           /GET DRIVE, BPI, ODD PARITY,
9622  6705            LCMR                    /LOAD COMMAND.
9623  1115            TAD     K7100
```



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9624  6706            LFGR                    /LOAD FUNCTION; SPACE REVERSE, GO.
9625  6723            SKJD
9626  5225            JMP     .-1             /WAIT FOR JOB DONE.
9627  6724            SKTR
9630  5227            JMP     .-1             /WAIT FOR JOB DONE.
9631  6725            CLF
9632  5616            JMP I   BAKSPA          /RETURN.

                      //ROUTINE TO READ 1 RECORD START-STOP//
                      //
9633  0000    READ,   0
9634  4465            JMS I   XWCCA           /INITIALIZE WC, CA LOCATIONS.
9635  3777            3777                    /CA
9636  7470            -310                    /WC
9637  1106            TAD     TEMP1           /PICKUP DRIVE, BPI, ODD PARITY,
9640  6705            LCMR                    /LOAD COMMAND.
9641  1116            TAD     K2100
9642  6706            LFGR                    /LOAD FUNCTION; READ, GO BITS,
9643  6723            SKJD
9644  5243            JMP     .-1             /WAIT FOR JOB DONE.
9645  6724            SKTR
9646  5245            JMP     .-1             /WAIT FOR TUR.
9647  6725            CLF
9650  5633            JMP I   READ            /RETURN.

                      //ROUTINE TO READ 1 RECORD AND TIME THE INTERRECORD
                      //GAP FOLLOWING IT
                      //
9651  0000    READ1,  0
9652  4465            JMS I   XWCCA           /INITIALIZE WC, CA LOCATIONS.
9653  3777            3777                    /CA
9654  7470            -310                    /WC
9655  1106            TAD     TEMP1           /PICKUP DRIVE, BPI, ODD PARITY,
9656  6705            LCMR                    /LOAD COMMAND.
9657  1116            TAD     K2100
9660  6706            LFGR                    /LOAD FUNCTION; READ, GO BITS,
9661  4457            TIMER                   /TIME GAP,
9662  6713            RCAR                    /EXIT TIMER ON CA=4000.
9663  7710            SPA CLA
9664  6724            SKTR                    /RETURN HERE.
9665  5264            JMP     .-1             /WAIT FOR TUR.
9666  6725            CLF
9667  5651            JMP I   READ1           /RETURN.

                      //ROUTINE TO READ 1 RECORD NONSTOP?//
                      //
9670  0000    READ2,  0
9671  4465            JMS I   XWCCA           /INITIALIZE WC,CA LOCATIONS.
9672  3777            3777                    /CA
9673  7470            -310                    /WC
9674  1106            TAD     TEMP1           /PICKUP DRIVE, BPI, ODD PARITY,
9675  6705            LCMR                    /LOAD COMMAND.
9676  1116            TAD     K2100
9677  6706            LFGR                    /LOAD FUNCTION; READ, GO BITS,
9700  6723            SKJD
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```
9701  5300            JMP     .-1             /WAIT FOR JOB DONE.
9702  6725            CLF
9703  5670            JMP I   READ2           /RETURN.

                      //ENDING ROUTINE//
9704  7300    FINI,   CLA CLL
9705  4474            JMS I   XMESS
9706  6343            MSGEND
9707  5710            JMP I   .+1
9710  0206            SELECT

                      /MESSAGE TYPE-OUT ROUTINE
                      /
9711  0000    MESAGE, 0
9712  7240            CLA CMA
9713  1711            TAD I   MESAGE
9714  3011            DCA     11
9715  2311            ISZ     MESAGE
9716  1411            TAD I   11
9717  3330            DCA     MSRGHT
9720  1330            TAD     MSRGHT
9721  7012            RTR
9722  7012            RTR
9723  7012            RTR
9724  4331            JMS     TYPECH
9725  1330            TAD     MSRGHT
9726  4331            JMS     TYPECH
9727  5316            JMP     MESAGE+5
9730  0000    MSRGHT, 0
9731  0000    TYPECH, 0
9732  0363            AND     MASK77
9733  7450            SNA
9734  5711            JMP I   MESAGE
9735  1364            TAD     M40
9736  7510            SPA
9737  5342            JMP     .+3
9740  1365            TAD     C240
9741  5355            JMP     MTP
9742  7001            IAC
9743  7440            SZA
9744  5347            JMP     .+3
9745  1366            TAD     C215
9746  5355            JMP     MTP
9747  7001            IAC
9750  7440            SZA
9751  5354            JMP     .+3
9752  1367            TAD     C212
9753  5355            JMP     MTP
9754  1370            TAD     C336
9755  6046    MTP,    TLS
9756  6041            TSF
9757  5356            JMP     .-1
9760  6042            TCF
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9761  7200            CLA
9762  5731            JMP I   TYPECH
9763  0077    MASK77, 77
9764  7740    M40,    -40
9765  0240    C240,   240
9766  0215    C215,   215
9767  0212    C212,   212
9770  0336    C336,   336

      6000              PAGE

0000  3736    MSG1,   TEXT    "*+TM8E DRIVE FUNCTION TIMER*+"
0001  2415
0002  7005
0003  4004
0004  2211
0005  2605
0006  4006
0007  2516
0010  0324
0011  1117
0012  1040
0013  2411
0014  1505
0015  2237
0016  3600

0017  3736    MSG2,   TEXT    "*+MAINDEC-08-DHTMC-A*+"
0020  1501
0021  1116
0022  0405
0023  0355
0024  6070
0025  5504
0026  1024
0027  1503
0030  5501
0031  3736
0032  0000

0033  3736    MSG3,   TEXT    "*+SELECT DRIVES*+"
0034  2305
0035  1405
0036  0324
0037  4004
0040  2211
0041  2605
0042  2337
0043  3600

0044  3736    MSG4,   TEXT    "*+SELECT 7 AND/OR 9 TRACK OPERATION*+"
0045  2305
0046  1405
0047  0324
```

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0050  4067
0051  4001
0052  1604
0053  5717
0054  2240
0055  7140
0056  2422
0057  0103
0060  1340
0061  1720
0062  0522
0063  0124
0064  1117
0065  1637
0066  3600

0067  3736    MSG5,   TEXT    "**FUNCTION**"
0070  0625
0071  1603
0072  2411
0073  1716
0074  3736
0075  0000

0076  4040    MSG6,   TEXT    "  UNIT"
0077  2516
0100  1124
0101  0000

0102  7060    MSG7,   TEXT    "800 BPI        "
0103  6040
0104  0220
0105  1140
0106  4040
0107  4040
0110  4040
0111  4000

0112  2722    MSGT1,  TEXT    "WR FM BOT DELAY "
0113  4006
0114  1540
0115  0217
0116  2440
0117  0405
0120  1401
0121  3140
0122  0000

0123  2722    MSGT2,  TEXT    "WRITE SHUTDOWN  "
0124  1124
0125  0540
0126  2310
0127  2524
0130  0417
0131  2716
```



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0132  4040
0133  0000

0134  2722    MSGT3,  TEXT    "WRITE START     "
0135  1124
0136  0540
0137  2324
0140  0122
0141  2440
0142  4040
0143  4040
0144  0000

0145  2722    MSGT4,  TEXT    "WR NONSTOP GAP  "
0146  4016
0147  1716
0150  2324
0151  1720
0152  4007
0153  0120
0154  4040
0155  0000

0156  0213    MSGT5,  TEXT    "BKSP SHOWN-SDWN "
0157  2328
0160  4023
0161  1004
0162  2716
0163  5323
0164  0427
0165  1640
0166  0000

0167  2205    MSGT6,  TEXT    "READ SHUTDOWN   "
0170  0104
0171  4023
0172  1025
0173  2404
0174  1727
0175  1640
0176  4040
0177  0000

0200  2722    MSGT7,  TEXT    "WRITE XIRG      "
0201  1124
0202  0540
0203  3011
0204  2207
0205  4040
0206  4040
0207  4040
0210  0000

0211  1401    MSGT8,  TEXT    "LAST CHR TO CUR "
0212  2324
```

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0213  4003
0214  1022
0215  4024
0216  1740
0217  0325
0220  2240
0221  0000

0222  2204    MSGT9,  TEXT    "RD FM BOT DELAY "
0223  4006
0224  1540
0225  0217
0226  2440
0227  0405
0230  1401
0231  3140
0232  0000

0233  2320    MSGT10, TEXT    "SPCE SHOWN+SDWN "
0234  0305
0235  4023
0236  1004
0237  2716
0240  5323
0241  0427
0242  1640
0243  0000

0244  2722    MSGT11, TEXT    "WRITE EOF       "
0245  1124
0246  0540
0247  0517
0250  0640
0251  4040
0252  4040
0253  4040
0254  0000

0255  0522    MSGT12, TEXT    "ER TO EF SP TME "
0256  4024
0257  1740
0260  0506
0261  4023
0262  2040
0263  2415
0264  0540
0265  0000

0266  2722    MSGT13, TEXT    "WR TO ERASE HED "
0267  4024
0270  1740
0271  0522
0272  0123
0273  0540
0274  1005
```



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0275  0440
0276  0000

0277  6140    MSGT14, TEXT    "1 INCH DATA TME "
0300  1116
0301  0310
0302  4004
0303  0124
0304  0140
0305  2415
0306  0540
0307  0000
0310  0701    MSGT15, TEXT    "GAP "
0311  2040
0312  0000
0313  4040    MSGSPC, TEXT    "                "
0314  4040
0315  4040
0316  4040
0317  4040
0320  4000
0321  3736    MSG556, TEXT    "<<556 BPI       "
0322  6565
0323  6640
0324  0220
0325  1140
0326  4040
0327  4040
0330  4040
0331  4000
0332  3736    MSG200, TEXT    "<<200 BPI       "
0333  6260
0334  6040
0335  0220
0336  1140
0337  4040
0340  4040
0341  4040
0342  4000
0343  3736    MSGEND, TEXT    "<<END OF TIMING<<"
0344  0516
0345  0440
0346  1706
0347  4024
0350  1115
0351  1116
0352  0737
0353  3600
```

```
0000  000000000  101000000  111111111  111111111  111111111  111111111  111111111  111111111
0100  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111

0200  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
0300  111111111  111111111  111111111  111111111  111111111  000000000  000000001  111111111

0400  111111111  111111111  111111111  111111111  111111111  111111111  000000000  000000000
0500  000000000  000000000  000000000  000000000  000000000  000000000  000000000  000001111

0600  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
0700  111111111  111111111  111111111  111111111  111110000  000000000  000000000  000111111

1000  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
1100  111111111  111111111  111111111  111111111  111111111  111100000  000000000  000001111

1200  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
1300  111111111  111111111  111111100  000000000  000000000  000000000  000000000  000001111

1400  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
1500  111111111  111111111  000000000  000000000  000000000  000000000  000000000  000000111

1600  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
1700  111111111  111100000  000000000  000000000  000000000  000000000  000000000  000000001

2000  111111111  111111111  111111111  111111111  111111111  111111111  111111000  000000000
2100  000000000  000000000  000000000  000000000  000000000  000000000  000000000  000001111

2200  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
2300  111111111  111111111  111111111  111111111  111111111  111111111  111111110  000111111

2400  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
2500  111111000  000000000  000000000  000000000  000000000  000000000  000000000  000001111

2600
2700


3000
3100

3200
3300

3400
3500

3600
3700
```



```
4000
4100

4200
4300

4400
4500

4600
4700


5000  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
5100  111111111  111111111  111111111  111100000  000000000  000000000  000000000  000001111

5200  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
5300  111111111  111111111  111111111  111111111  111111111  111111111  111111100  000111111

5400  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
5500  111111111  111111111  111111111  111111111  111111111  111111111  111111111  000000111

5600  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
5700  111111111  111111111  111111111  111111111  111111111  111111111  111111111  100000000


6000  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
6100  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111

6200  111111111  111111111  111111111  111111111  111111111  111111111  111111111  111111111
6300  111111111  111111111  111111111  111111111  111111111  111110000  000000000  000000000

6400
6500

6600
6700


7000
7100

7200
7300

7400
7500

7600
7700
```

```
ADDR#A  5556        GAP5CT  1707        LINK20  2366        ONESCT  0347
ALLMSG  5325        GAP6CT  1710        LINK3   0457        OTY     5416
ALLRET  5333        GAP7CT  1711        LINK5#  2037        OUT     0071
ALLTBL  0160        GAP8CT  1712        LINK7   0744        OUT1    0423
ALLTU   0030        GAPCNT  2063        LINKGP  1527        OUT10   1145
ALLTU7  5304        GAPOUT  2050        LOOPD   5545        OUT11   1230
ALTU79  5264        GAPS    1600        LOPRIN  5434        OUT12   1310
ARROW   5515        GAPTBL  2040        LWCR    6701        OUT13   1456
BARSPA  5616        GETBAK  5256        M100    2504        OUT14   1511
C212    5767        HDIVND  0103        M40     5764        OUT15A  2016
C215    5766        INCH    0147        M426    2213        OUT15B  2030
C250    5765        INDX10  0010        M7      2044        OUT16   2237
C336    5770        INDX12  0012        MASK77  5743        OUT17   2265
CCAR    6704        IOTT    5024        MESAGE  57I1        OUT18   2332
CHKWRD  0240        K0001   0124        MIKECT  0107        OUT19   2360
CKUL    6726        K0100   0125        MILICT  01I0        OUT2    0451
CLF     6725        K0400   0142        MK1000  5242        OUT20   2420
CLT     6712        K1000   0127        MSG1    6000        OUT21   2455
CNT7    0061        K1100   0122        MSG2    60I7        OUT3    0522
CNTALL  0060        K2100   0116        MSG200  6352        OUT4    0663
CRLF    5460        K212    0130        MSG3    6033        OUT5    0711
CWCR    6702        K215    0131        MSG4    6044        OUT6    0736
DATATI  2435        K240    5476        MSG5    6067        OUT7    1022
DEUPRT  5501        K256    5477        MSG550  63I1        OUT8    1067
DIGIT   5564        K260    5567        MSG6    6076        OUT9    1117
DIVCNT  5130        K4001   0126        MSG7    6102        OUTGAP  1704
DIVDEN  5056        K4100   0113        MSGENQ  6343        PCPU    0112
DIVIDE  5074        K4200   0117        MSGSPC  63I3        PRINT   5425
DIVRET  5060        K5100   0121        MSGT1   61I2        PRNCT   0104
DIVSOR  5127        K6100   0120        MSGT10  6233        RCAR    6713
DIVSR   5057        K7100   0115        MSGT11  6244        RCMR    6715
DQ400   2503        K7770   0345        MSGT12  6255        RDBR    6717
DQGAP2  1632        K7775   5500        MSGT13  6266        READ    5633
DQGAP5  1660        K7776   0123        MSGT14  6277        READ1   5651
DQGAP6  1665        K7777   0114        MSGT15  63I0        READ2   5670
DQGAP7  1672        KM1     0132        MSGT2   6133        RESTAR  0201
DQGAP8  1677        KM10    0135        MSGT3   6154        RET1    0404
DRVCNT  0342        KM13    5131        MSGT4   6145        RET10   1127
DRVPNT  0062        KM2     0133        MSGT5   6156        RET11   1204
DRVSAV  0344        KM3     0134        MSGT6   6167        RET12   1241
DRVSEL  0070        KM4     0102        MSGT7   6200        RET13   1404
DRVTAB  0020        KM5     1713        MSGT8   62I1        RET14   1467
DVX     5120        LCAR    6703        MSGT9   6222        RET15A  2010
DVY     5110        LCMR    6705        MSRGHT  5730        RET15B  2021
ENDCHK  0303        LDBR    6707        MTP     5795        RET16   2220
ENDTST  2500        LDIVND  5126        NCPU    01I1        RET17   2250
ERMT12  1317        LFGR    6706        NULL    0105        RET18   2275
EXALL   5257        LINK1   0337        NUMPNT  0092        RET19   2342
EXITME  5040        LINK11  1103        NUMTBL  0150        RET2    0434
EXTU7   5260        LINK13  1316        ODDBBB  0066        RET20   2403
FINI    5704        LINK15  1705        ONCE    0090        RET21   2433
GAP2CT  1706        LINK16  0144        ONES    0346        RET3    0603
```



```
RET4    0632        TBLTU7  0084
RET5    0673        TEMP1   0106
RET6    0721        TEMP3   5263
RET7    1003        TENPWR  5597
RET8    1032        TIME    5011
RET9    1100        TIMER   4487
RETGAP  1604        TITLE   0067
REWCNT  5261        TRKSAV  0343
RFGR    6716        TU7     0040
RITE1   5600        TU7MSG  5345
RMBR    6714        TU7RET  5353
RWCR    6711        TU7TBL  0170
RWIND   5200        TYPECH  5731
RWIND7  5216        UPDATE  0264
RWINDA  5233        VALUE   5563
SAVANS  5073        VFS20   0077
SBMM    6727        VFSUPR  0100
SELALL  0072        VTEMP1  5565
SELCNT  5324        VTEMP2  5566
SELECT  0206        WCCA    5080
SELTU7  0073        WRTCNT  5400
SET200  2462        XALL    0340
SET556  2200        XBAK    0136
SKCB    6722        XBPI    0143
SKEF    6721        XCRLF   0081
SKIP    5025        XDEC    0076
SKJD    6723        XEND    0145
SKIR    6724        XHEAD   0095
SPACE   5365        XHEAD1  0096
START   0200        XMESS   0074
T1      0400        XNULL   5132
T10     1124        XOTY    0101
T11     1200        XPRINT  0075
T12     1235        XREAD   0140
T13     1400        XREAD1  0141
T14     1463        XREAD2  0146
T15     2000        XRITE1  0137
T16     2214        XRWND   0063
T17     2244        XRWND7  0064
T18     2272        XTIME   0087
T19     2337        XTU7    0341
T2      0430        XWCCA   0065
T20     2400
T21     2425
T3      0600
T4      0627
T5      0670
T6      0716
T7      1000
T8      1027
T9      1074
TBLALL  0053
```

```
ERRORS DETECTED: 0
LINKS GENERATED: 0
RUN-TIME:  10 SECONDS
3K CORE USED
```