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PROGRAM LIBRARY

DECUS NO.	8-496
TITLE	UTR7: A 7-TRACK MAGNETIC TAPE READING UTILITY
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SOURCE LANGUAGE	PAL-8

With overlay for TM8E Controller, by H. E. Cronin,
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UTR7: A 7-TRACK MAGNETIC TAPE READING UTILITY

INTRODUCTION

UTR7 IS A UTILITY PROGRAM DESIGNED TO READ AND PRINT SE-
LECTED RECORDS RECORDED ON 7-TRACK MAGNETIC TAPE, VIA THE TC-58.
PROGRAM INPUTS ARE: RECORD LENGTH, PARITY, RECORDING DENSITY, AND
DATA FORMAT. THE DATA FORMAT OUTPUT OPTIONS AVAILABLE IN THIS
PROGRAM ARE: 6-BIT ASCII (2 CHARACTERS TO A WORD), 8-BIT ASCII (1
CHARACTER TO A WORD), UNSIGNED OCTAL, UNSIGNED DECIMAL, UNSIGNED
HEXADECIMAL, SIGNED OCTAL, SIGNED DECIMAL, BINARY, AND IBM 7-
TRACK TAPE BCDIC. THE PROGRAM IS DESIGNED SO THAT NEW OPTIONS
MAY BE ADDED EASILY (DIRECTIONS ARE INCLUDED.)

REQUIREMENTS

UTR7 OCCUPIES LOCATIONS 0-2343(8). THE INPUT BUFFER
STARTS AT LOCATION 2344 AND REQUIRES A NUMBER OF LOCATIONS EQUI-
VALENT TO THE LENGTH OF ONE RECORD. THE MINIMUM EQUIPMENT RE-
QUIRED IS A MEMBER OF THE PDP-8 FAMILY, AN ASR-33 TELETYPEWRITER,
AND A TC-58 TAPE CONTROLLER.

USE

THE STARTING ADDRESS OF THE PROGRAM IS 200(8). IT IS NOT
ADVISABLE TO RESTART THE PROGRAM AS THE RESULTS WOULD BE UNPRE-

DICTABLE.   LOCATIONS 3, 4, AND 5 (ON PAGE ZERO) ARE NOT USED SO THAT ODT MAY BE USED IN ANY DEBUGGING.

DESCRIPTION

BEFORE USING THE PROGRAM, THE TAPE TO BE READ SHOULD BE MOUNTED ON A TAPE DRIVE WHOSE UNIT NUMBER IS SET TO 2.   THE DRIVE SHOULD BE TURNED ON-LINE AND THE TAPE MUST BE POSITIONED AT OR BEFORE THE BOT MARKER.

WHEN STARTED (SA=200), THE PROGRAM WILL REWIND THE TAPE TO THE BOT MARKER. WHEN THIS HAS BEEN DONE, IT WILL ASK:

BPI (2=200,5=556,8=800)?

THE USER RESPONDS BY TYPING THE APPROPRIATE DIGIT.   IN REPLY THE PROGRAM ASKS

RECORD SIZE(12-BIT WORDS):

TO WHICH THE USER RESPONDS BY TYPING (IN DECIMAL) THE SIZE OF THE RECORDS TO BE READ, FOLLOWED BY A CARRIAGE RETURN.   THE REQUEST IS THEN MADE

PARITY(1=ODD,0=EVEN)

AGAIN THE USER SHOULD TYPE THE APPROPRIATE DIGIT.   NOW   THE   RE-QUEST

DATA TYPE:

WILL BE MADE.   THE CODES CORRESPONDING TO THE AVAILABLE OPTIONS ARE:

CODE	OPTION
6	6-BIT ASCII (2 CHARACTERS TO A WORD)
A	8-BIT ASCII (1 CHARACTER TO A WORD)
O	UNSIGNED OCTAL
D	UNSIGNED DECIMAL
H	UNSIGNED HEXADECIMAL
S	SIGNED OCTAL
T	SIGNED DECIMAL
B	BINARY
E	7-TRACK TAPE BCDIC

THE USER SHOULD TYPE ONE OF THE OPTION CODES IN REPLY TO THE ABOVE REQUEST. THE PARAMETERS GIVEN UP TO THIS POINT WILL BE IN-VARIANT. TO USE DIFFERENT PARAMETERS THE PROGRAM MUST BE RE-LOADED AND RESTARTED.

THE PROGRAM PROCEEDS TO ASK

FILE NO.

TO WHICH THE USER REPLIES BY TYPING THE NUMBER OF THE FILE. FILES ARE TAKEN TO BE NUMBERED SEQUENTIALLY, STARTING WITH FILE 1, THE FIRST FILE ON THE TAPE. THIS NUMBER MUST BE FOLLOWED BY A CARRIAGE RETURN. WHEN THIS HAS BEEN DONE, THE PROGRAM WILL AD-VANCE OR REWIND THE TAPE TO THE BEGINNING OF THE DESIRED FILE (UNLESS THE TAPE IS ALREADY POSITIONED IN THAT FILE, IN WHICH CASE NO ACTION WILL BE TAKEN.) THEN THE PROGRAM ASKS

RECORD NO.

TO WHICH THE USER RESPONDS BY TYPING THE POSITION OF THE DESIRED RECORD IN THE FILE, FOLLOWED BY A CARRIAGE RETURN. AGAIN, REC-ORDS ARE NUMBERED SEQUENTIALLY WITHIN EACH FILE, STARTING WITH RECORD 1, THE FIRST RECORD. FINALLY, THE PROGRAM ASKS

NUMBER OF RECORDS TO BE PRINTED:

AGAIN THE USER TYPES THE DESIRED NUMBER, FOLLOWED BY A CARRIAGE RETURN.

FOR EACH RECORD PRINTED, A HEADER, INDICATING THE FILE AND RECORD NUMBERS, IS TYPED. IF, IN PRINTING THE RECORDS REQUESTED, A FILE BOUNDARY IS CROSSED, NO ERROR OCCURS. THE FILE NUMBER IN THE HEADER IS MERELY INCREMENTED BY ONE AND THE RECORD NUMBERING STARTS FROM 1 AGAIN.

THE PRINTOUT MAY BE INTERRUPTED BY TYPING CONTROL-C (AC-COMPLISHED BY DEPRESSING THE "CONTROL" AND "C" KEYS OF THE ASR-33 KEYBOARD SIMULTANEOUSLY). THIS, OR THE NORMAL COMPLETION OF PRINTING, CAUSES THE PROGRAM TO TYPE

MORE?(1=YES,0=NO)

IF THE USER IS FINISHED, HE TYPES 0, WHEREUPON CONTROL IS TRANS-FERRED TO LOCATION 7600(8) (THE USUAL LOCATION OF THE MONITOR). IF HE WANTS TO EXAMINE MORE RECORDS, HE TYPES 1, WHICH CAUSES THE DIALOGUE TO BE RESUMED AT THE POINT WHERE THE FILE AND RECORD NUMBERS ARE REQUESTED.

TAPE READING ERRORS

ALL ERRORS INCURRED IN THE PROCESS OF READING RECORDS ARE REPORTED ON THE PRINTOUT. THE ERROR MESSAGE SHOWS THE CONTENTS OF THE TC-58 STATUS AND CONTROL REGISTERS (IN OCTAL) AND STATES THE NATURE(S) OF THE APPARENT ERROR(S) ACCORDING TO THE FLAGS SET IN THE STATUS REGISTER (E.G. "EOF", "BAD TAPE"). IN ADDITION, WHEN A RECORD LENGTH ERROR IS ENCOUNTERED, THE MESSAGE TELLS THE USER WHETHER THE RECORD THAT THE PROGRAM TRIED TO READ WAS TOO LONG OR TOO SHORT, AND, IN THE LATTER CASE, THE LENGTH OF THE RECORD.

ADDING NEW OUTPUT OPTIONS

SOME USERS MAY FIND IT DESIRABLE TO ADD OUTPUT OPTIONS TO THIS UTILITY PROGRAM IN ORDER TO SATISFY THEIR PARTICULAR NEEDS. FOR EXAMPLE, THE OPTION TO INTERPRET RECORDS AS CONSISTING OF FLOATING POINT NUMBERS, COMPLEX NUMBERS, OR PACKED 8-BIT ASCII (3 CHARACTERS TO TWO WORDS) MAY BE USEFUL. THIS PROGRAM HAS BEEN WRITTEN IN SUCH A WAY AS TO FACILITATE SUCH ADDITIONS.

THE FIRST STEP IN ADDING A NEW OPTION IS TO ADD ITS ONE-CHARACTER CODE AND THE ADDRESS OF THE CORRESPONDING PRINTOUT ROUTINE TO THE APPROPRIATE TABLES, BOTH OF WHICH ARE FOUND ON PAGE ZERO. THE CHARACTER CODE TABLE BEGINS AT LOCATION 110. A NEW CHARACTER CODE IS APPENDED TO THIS TABLE BY PUTTING THE 2'S COMPLEMENT OF THE ASCII CODE FOR THE CHARACTER DESIGNATING THE NEW OPTION IN THE LOCATION IMMEDIATELY FOLLOWING THE END OF THIS TABLE. IN THE CASE OF THE EXISTING PROGRAM, THIS WOULD BE LOCATION 121. THE LOCATION NAMED OPS CONTAINS THE LENGTH OF THE

TABLE (= THE NUMBER OF OPTIONS.) THUS IT NOW CONTAINS 11(8). OPS MUST BE UPDATED TO REFLECT CHANGES IN TABLE LENGTH.

IMMEDIATELY FOLLOWING THE CHARACTER CODE TABLE IS THE PRINTOUT SUBROUTINE ADDRESS TABLE. THE ENTRIES IN THIS TABLE CORRESPOND POSITIONALLY TO THEIR ASSOCIATED OPTION CODES IN THE CHARACTER CODE TABLE. THUS THE ADDRESS OF THE PRINTOUT SUBROU-TINE FOR A NEW OPTION APPENDED TO THE CHARACTER CODE TABLE MUST BE APPENDED TO THIS TABLE (IMMEDIATELY ABOVE PSUB.)

THE PRINTOUT SUBROUTINE FOR THE NEW OPTION MAY BE PLACED ANY PLACE NOT ALREADY OCCUPIED BY CODE. THE USER SHOULD TAKE CARE THAT IT IS NOT PUT IN THE RECORD BUFFER, WHICH BEGINS AT THE LOCATION NAMED BUFFER. [THE LOCATION OF BUFFER MAY, OF COURSE, BE MOVED UP.]

A SIMPLE EXAMPLE OF A SUBROUTINE IS ASC (FOR 8-BIT ASCII). ON ENTRY IT PLACES THE 2'S COMPLEMENT OF THE RECORD LENGTH (WHICH CAN ALWAYS BE FOUND IN THE LOCATION NAMED WORDS) IN A COUNTER (THE VARIABLE ZAHL IS AVAILABLE ON PAGE ZERO FOR THIS PURPOSE) SO THAT IT WILL KNOW WHEN IT IS DONE. THE INSTRUCTION

TAD I 13

WILL ALWAYS DELIVER THE NEXT WORD IN THE INPUT BUFFER. USEFUL FUNCTIONS ARE:

TYPE: PRINTS THE CHARACTER REPRESENTED BY THE 8-BIT ASCII CODE IN THE AC.

CRLF: PRINTS A CARRIGAE RETURN AND LINE-FEED.

SPACE: PRINTS THE NUMBER OF SPACES INDICATED IN THE AC.

THUS

```
        CLA
        IAC
        SPACE
```

CAUSES ONE SPACE TO BE PRINTED.

INTCHK: CHECKS TO SEE WHETHER A CONTROL-C HAS BEEN
TYPED RECENTLY.   IF SO, PREMATURE TERMINATION OCCURS
AND THE USER IS ASKED WHETHER HE WOULD LIKE TO CONTINUE
TO PRINT OUT RECORDS.

GRR/PDP8

Examples (all examples operate on the same record)

  RU 7:UTR7

BPI (2=200,5=556,8=800)? 8
RECORD SIZE (12-BIT WORDS): 100
PARITY (1=ODD, 0=EVEN): 1
DATA TYPE: E

FILE NO. 1
RECORD NO. 1

NUMBER OF RECORDS TO BE PRINTED: 1

ERROR INCURRED IN OPERATING ON RECORD   1
STAT REG:4211   CMND REG:2422
PARITY ERROR
RECORD IS TOO SHORT; LENGTH =   40

MORE? (1=YES, 0=NO) 0

.RU 7:UTR7

BPI (2=200,5=556,8=800)? 8
RECORD SIZE (12-BIT WORDS): 40
PARITY (1=ODD, 0=EVEN): 0
DATA TYPE: B

FILE NO. 1
RECORD NO. 1

NUMBER OF RECORDS TO BE PRINTED: 1

FILE   1   RECORD   1

000001000010   100100111000   110110000011   000001000100   000100001010
000001000001   000001000001   010001000010   001010010001   000111001010
010000010000   010000010000   010000010000   000110000101   000100001001
010000010000   010000001000   000001001010   001001000001   010000010000
010000001000   000001000001   000011001000   010000010000   001010111011
001010001000   000110010000   001010111011   001010000111   000100010000
010000010000   010000010000   010000001001   000111000101   111011001000
010000010000   001001000111   000110111011   000110010000   010000010000

MORE? (1=YES, 0=NO) 0

```
.RU 7:UTR7

BPI (2=200,5=556,8=800)? 8
RECORD SIZE (12-BIT WORDS): 40
PARITY (1=ODD, 0=EVEN): 0
DATA TYPE: O


FILE NO. 1
RECORD NO. 1

NUMBER OF RECORDS TO BE PRINTED: 1



FILE    1         RECORD    1


0102    4470    6603    0104    0412    0101    0101    2102    1221    0712
2020    2020    2020    0605    0411    2020    2010    0112    1101    2020
2010    0101    0310    2020    1273    1210    0620    1273    1207    0420
2020    2020    2011    0705    7310    2020    1107    0673    0620    2020


MORE? (1=YES, 0=NO) 0




RU 7:UTR7

BPI (2=200,5=556,8=800)? 8
RECORD SIZE (12-BIT WORDS): 40
PARITY (1=ODD, 0=EVEN): 0
DATA TYPE: H


FILE NO. 1
RECORD NO. 1

NUMBER OF RECORDS TO BE PRINTED: 1



FILE    1         RECORD    1


042 938 D83 044 10A 041 041 442 291 1CA 410 410 410 185 109 410
408 04A 241 410 408 041 0C8 410 2BB 288 190 2BB 287 110 410 410
409 1C5 EC8 410 247 1BB 190 410


MORE? (1=YES, 0=NO) 0
```

```
.RU 7:UTR7

BPI (2=200,5=556,8=800)? 8
RECORD SIZE (12-BIT WORDS): 40
PARITY (1=ODD, 0=EVEN): 0
DATA TYPE: D


FILE NO. 1
RECORD NO. 1

NUMBER OF RECORDS TO BE PRINTED: 1


FILE    1    RECORD    1


   66  2360  3459    68   266    65    65  1090   657   458
 1040  1040  1040   389   265  1040  1032    74   577  1040
 1032    65   200  1040   699   648   400   699   647   272
 1040  1040  1033   453  3784  1040   583   443   400  1040


MORE? (1=YES, 0=NO) 0




.RU 7:UTR7

BPI (2=200,5=556,8=800)? 8
RECORD SIZE (12-BIT WORDS): 40
PARITY (1=ODD, 0=EVEN): 0
DATA TYPE: S


FILE NO. 1
RECORD NO. 1

NUMBER OF RECORDS TO BE PRINTED: 1


FILE    1    RECORD    1


+0102 -3310 -1175 +0104 +0412 +0101 +0101 +2102 +1221 +0712
+2020 +2020 +2020 +0605 +0411 +2020 +2010 +0112 +1101 +2020
+2010 +0101 +0310 +2020 +1273 +1210 +0620 +1273 +1207 +0420
+2020 +2020 +2011 +0705 -0470 +2020 +1107 +0673 +0620 +2020


MORE? (1=YES, 0=NO) 0
```

```
.RU 7:UTR7

BPI (2=200,5=556,8=800)? 8
RECORD SIZE (12-BIT WORDS): 40
PARITY (1=ODD, 0=EVEN): 0
DATA TYPE: T


FILE NO. 1
RECORD NO. 1

NUMBER OF RECORDS TO BE PRINTED: 1


FILE     1      RECORD     1


+   66 -1736 -  637 +   68 +  266 +   65 +   65 +1090 +  657 +  458
+1040 +1040 +1040 +  389 +  265 +1040 +1032 +   74 +  577 +1040
+1032 +   65 +  200 +1040 +  699 +  648 +  400 +  699 +  647 +  272
+1040 +1040 +1033 +  453 -  312 +1040 +  583 +  443 +  400 +1040


MORE? (1=YES, 0=NO) 0




RU 7:UTR7

BPI (2=200,5=556,8=800)? 8
RECORD SIZE (12-BIT WORDS): 40
PARITY (1=ODD, 0=EVEN): 0
DATA TYPE: 6


FILE NO. 1
RECORD NO. 1

NUMBER OF RECORDS TO BE PRINTED: 1


FILE     1      RECORD     1


AB$86CADDJAAAAQBJQGJPPPPPPPFEDIPPPHAJIAPPPHAACHPPJ;JHFPJ;JGDP
PPPPPIGE;HPPIGF;FPPP


MORE? (1=YES, 0=NO) 0
```

```
.RU 7:UTR7

BPI (2=200,5=556,8=800)? 8
RECORD SIZE (12-BIT WORDS): 40
PARITY (1=ODD, 0=EVEN): 0
DATA TYPE: E


FILE NO. 1
RECORD NO. 1

NUMBER OF RECORDS TO BE PRINTED: 1


FILE     1     RECORD     1


12MHF314401111/20/70          6549     81091     81138   0.086 0.074
      975.8   976.6


MORE? (1=YES, 0=NO) 0

.
```

ADDENDUM TO DECUS 8-496

MODIFICATION FOR UTR7: MAGNETIC TAPE READING UTILITY PROGRAM
FOR TM8E CONTROLLER

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ABSTRACT. An overlay has been written to be able to use the magnetic tape

reading utility program, UTR7: with the TM8E controller instead of the TC 58.

Due to differences in the hardware registers, some small changes were made

in the op codes, commands, masks and text printouts. For the most part, the

program works as originally designed.

INTRODUCTION: A magnetic tape utility program has been written (DECUS-8-496)

for use with the TC 58 controller, which is very powerful in its ability to

read tapes of unknown structure such as block length, density, parity, type

of coding, etc. as well as to print out as many data blocks as needed for

information or quality checks. The newer TM8E controller however, uses a

different instruction set which is not compatible with the older instruction

set, so a translation was made. Due to differences in the command and function

registers, changes were made in parts of the original program and incorporated

into an overlay. Access to the original program listing is assumed in the

following discussion.

OVERLAY: The coding for the overlay is shown in Figure 1. In locations 33 to 40,

the operation codes which are loaded into the function register are shown for

read, forward, backspace and rewind. Location 146 is added to store the bits for

unit number, parity, interrupt enables, extended memory address and density

information which is loaded into the command register. Locations 370-372 store

the above information in location 146. In locations 1001 and 1035, the TM8E

commands are used for the equivalent commands for the TC 58 controller. In

locations 1444-1462 the text to be printed out and the commands to read the status

registers and command registers are interchanged, due to the fact that the bits for

error flags and indicators are in the status register. In locations 2064-2105 is the subroutine for executing the tape drive command according to the contents of the accumulator when the subroutine is called. Besides changing to equivalent or near equivalent commands for the TM8E, the main difference is in the loading of the word count and current address registers. These require machine language codes for the TM8E, whereas memory locations 7752 and 7753 are used by the TC-58 for these registers. Other changes in the program are for changing the masking words that are used for the error checking routines. The errors checked remain nearly the same, except the last one is for "Read/Compare Error" instead of "Bad Tape". The text printed in locations 1606-1612 has been changed to read "R/C ERROR".

OPERATION: There are a few details which are different in the program operation. The tape selector is for unit 0, instead of Unit 2. If one wishes to change to a different unit number, the leading digit of location 146 can be changed to the number desired.

In operating on very lengthy tapes, it is sometimes necessary to go quite far into the tape, which fills the block counter with a very large number and can lead to erratic searches if the counter overflows. It is more convenient at times to find a block location by manual search and then restart at SA = 0203. This keeps the tape from rewinding and the counters consider this block number 1. Although a warning is given in the original write-up against restarting, this seems to work well.

The tape is in three parts: the self-starting binary loader plus UTR7 plus the overlay. The reason for the use of the self starting binary loader is that in order to change the input parameters, parity, density, etc. the program has to be reloaded. Since the binary loader is wiped out by the program,

it is much more convenient to reload via the self starting binary loader, using the RIM loader. There is one halt requiring that the operator press "continue". Those with disks can save and recall the program without the self-starting feature.

The program works otherwise as shown in the original DECUS Program Library Write-up. A sample run is shown as Figure 2.

FIGURE 1.

OVERLAY TO UTR 7: A 7-TRACK MAGNETIC TAPE READING UTILITY PROGRAM FOR TM8E

	* 33	
0033	2100	/READ
0034	6100	/FORWRD
0035	7100	/BACKSP
0036	0000	
0037	0000	
0040	1100	/REWIND
	* 146	
0146	0000	/CM
0147	0020	/MSK20
	* 370	
0370	1134	/TAD ZAHL
0371	3146	/DCA CM
0372	7200	/CLA
0373	7000	/NOP
0374	7000	/
0375	7000	/
0376	7000	/
0377	7000	/
0400	7000	/NOP
	*1001	
1001	6714	/READ MAIN STATUS REG.
	*1035	
1035	6715	/READ COMMAND REG.
	*1444	
1444	0315	/"CM
1445	1604	/N D
1446	4022	/ R
1447	0507	/ EG
1450	7200	/ : "
1451	6715	/ READ COMMAND REG.
1452	4470	/JMS I NTLOC
1453	4443	/PRINT
1454	4040	/4040
1455	2324	/"S T
1456	0124	/ A T
1457	4022	/ R
1460	0507	/ EG
1461	7200	/ : "
1462	6714	/READ MAIN STATUS REG.
	*1503	
1503	0101	/AND MSK10
	*1513	
1513	0100	/AND MSK40
	*1557	
1557	0147	/AND MSK20
	*1606	
1606	2257	/"R/

FIGURE 1. (Continued)

1607	0340	/ C
1610	0522	/ ER
1611	2217	/ RO
1612	2200	/ R "
	*2064	
2064	0000	/JMS ENTRY
2065	3032	/DCA OPCODE
2066	6724	/SKIP WHEN TAPE READY
2067	5266	/JMP .-1
2070	6725	/CLEAR FLAGS
2071	1146	/TAD CM
2072	6705	/LOAD COMMAND REG.
2073	7200	/CLA
2074	1026	/TAD WRD CNT
2075	6701	/LOAD WRD CNT REG.
2076	1057	/TAD BUFLOC
2077	6703	/LOAD CUR ADDR REG.
2100	6722	/SKIP IF CNTL NOT BUSY
2101	5300	/JMP .-1
2102	1032	/TAD OPCODE
2103	6706	/LOAD FUNCT REG.
2104	6724	/SKIP WHEN TAPE READY
2105	5304	/JMP .-1
	* 200	/START ADDR FOR
		/SELF-START

$

```
BPI (2=200,5=556,8=800)? 5
RECORD SIZE (12-BIT WORDS): 130
PARITY (1=ODD, 0=EVEN): 1
DATA TYPE: E


FILE NO. 1
RECORD NO. 1

NUMBER OF RECORDS TO BE PRINTED: 3


FILE    1    RECORD    1


 050 052-043-203 185 233 547 357 357 482 009 712 076 058-037
-176 177 234 552 357 357 482 010 712 048 055-041-190 187 232
 551 357 357 482 010 712 071 057-042-201 191 232 549 358 356
 482 010 712 056 056-044-213 1909-019-226 164 409 466 370 36
3 485 009 684 021-Y4


FILE    1    RECORD    2


0276210122232B22" 064-045-204 206 229 575 358 356 62 058-037
-176 177 234 552 357 357 482 010 712 048 055-041-190 187 232
 551 357 357 482 010 712 071 057-042-201 191 232 549 358 356
 482 010 712 056 056-044-213 1909-019-226 164 409 466 370 36
3 485 009 684 021-Y4


FILE    1    RECORD    3


0276210233373C33" 066-053-204 198 233 560 360 356 482 011 77
 000 068-050-214 198 225 553 364 360 483 011 712 050 066-056
-210 227 229 563 364 360 483 011 712 046 064-045-215 229 228
 555 364 360 483 011 712 063 064-042-210 212 229 548 365 361
 482 011 712 082 069


MORE? (1=YES, 0=NO) 0
```

FIGURE 2.