

QUALITY SOFTWARE

DATE: October 1968
ID CODE: BYM
DRAWING: 392292
LABEL: M. THSPT
AUTHOR: JMMC
SOURCE: SYM II
OBJECT: Absolute

PURPOSE

The Teletype-High Speed Paper Tape Driver services I/O operations on the Console Teletype, the High Speed Paper Tape Reader and the High Speed Paper Tape Punch. The driver is fully re-enterable and can service simultaneous I/O on all three devices.

USAGE

Refer to the I/O Monitor documentation (DN 391476) for the description of the IOS calls and FIOT configuration used to operate the driver. This driver can perform the following functions:

1. Read a record - Teletype and High Speed Reader
2. Write a record - Teletype and High Speed Punch
3. Write a file mark - Teletype and High Speed Punch
4. Punch leader - Teletype and High Speed Punch

RECORD FORMATS

This driver reads and writes formatted or unformatted records. Two formats, alpha and binary, are used for formatted records. The binary format includes a record size, in bytes, at the beginning of the record.

The binary record format is shown in Figure 1, and the alpha format in Figure 2.

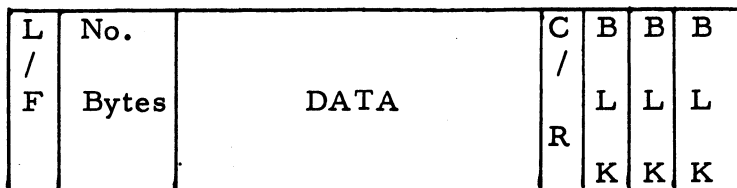


Figure 1

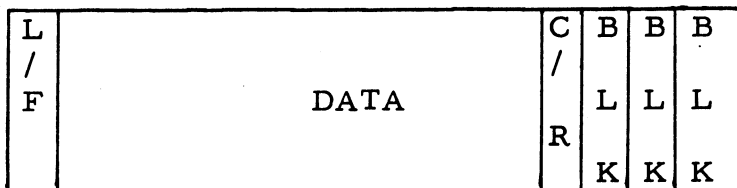


Figure 2

As shown in the diagrams, a line feed character (L/F, $8A_{16}$) will be the first character in each record. The binary record follows with two characters of byte count. This is the total number of data bytes contained in the binary record.

The alpha record does not have a byte count. The area shown as data in the diagrams is the information to be moved during the I/O operation. Each record closes with a carriage return character (C/R, $8D_{16}$). There are three blank characters (BLK, $A0_{16}$) after each record on tape. These will allow an operator to position the tape between records. The blanks are not necessary when input is from a keyboard.

When the requested operation is alpha mode input, the first C/R following the initial L/F terminates the record regardless of how many input words had been requested. This means there can be no C/R characters within an alpha input record. When the requested number of words have been input, the device will be disconnected even if there has been no C/R. The

number of bytes in a binary record is a similar delimiter. If a user requests 100 words input and the binary record contains 25, only 25 words would be input. If a record is larger than the number of characters requested to input, the remainder is skipped before the input is terminated.

For output operations bit 0 of FIOT word 2 determines whether the record will be output as a binary or alpha record. For input operations the driver determines whether the incoming record is alpha or binary and sets bit 0 of word 2 accordingly.

For alpha mode input two control characters are recognized. These are primarily to permit easy operator correction of mis-typed teletype input records; however, they function for paper tape records as well. The first character is RUBOUT (FF₁₆). Instead of storing this character the driver backs up the buffer pointer one character for each RUBOUT character, thereby permitting mis-typed characters to be retyped. For example, if the record

```
:QU, AKPH
```

were typed, when the operator intended to type

```
:QU, ALPH
```

he may correct it by continuing

```
(RUBOUT)(RUBOUT)(RUBOUT) LPH
```

Since the RUBOUT doesn't print the resulting record will appear on the printout as

```
:QU, AKPHLPH
```

however, it will be corrected internally. The second character is the horizontal arrow (←). This will delete the entire record, which should be then restarted including the initial line feed. Both of these characters must be input before the closing carriage return. Once the carriage return has been input, the record is processed and no correction is possible.

When reading formatted records, if an ASCII BELL (X'87') character is encountered between records, prior to the Line Feed character, the I/O operation is terminated and end-of-file status (bit 10 true) is returned in word 3 of the FIOT. The driver accepts a WEOF call and outputs this character to the device.

Unformatted records, some time referred to as special format contain no added formatting characters. The contents of the number of words specified are transferred to or from the external medium. Unformatted records are specified by setting bit 0 of FIOT word 6 true.

Notice that no positioning of paper tape input records occur for unformatted record; data transferring begins with the first frame of tape read and continues until the requested number of frames has been read.

INDIVIDUAL DEVICES

The following section details considerations applicable to each of the device operated by this driver.

Console Teletype

The standard Teletype Mode 33/35 (Automatic Send-Receive) can be used to type in or print out information at a rate of up to ten characters per second, or to read in or punch out perforated paper tape at a ten characters per second rate.

The teletype unit can perform the following functions through the driver:

1. Read a Record from Keyboard - Function Code B

The keyboard is enabled, the keyboard light lights, and characters read are printed.

2. Read a Record from Reader - Function Code 9

The reader light lights and characters read are not typed. However, the keyboard is enabled.

The teletype reader is not controllable by command from the computer. It must be turned on and off manually. If the teletype keyboard is selected for input, the reader may be turned on and allowed to drive the keyboard. Similarly, when the reader is selected, the keyboard may be used instead, but what is typed will not be printed.

3. Write a Record - Function Code E

A record is output to the receive section of the teletype and will print if the ASR35 teletype mode switch is in the PRINT position, punched if the switch is in the PUNCH position and printed and punched if the switch is in the PRINT and PUNCH position. For the ASR33

record is always printed and will be printed and punched if the punch is turned on. These modes must be selected manually.

4. Write a File Mark - Call WEOF

The ACSII Bell character is output followed by approximately 60 blank frames. If the punch is on, it will appear as leader. Bit 0 of FIOT word 6 must be false, (not special format)

5. Punch Leader - Function Code E

If the buffer address is given as X'7FFF', no data is output; instead 60 blank frames are output.

High Speed Paper Tape Reader

The 703 paper tape reader is an unidirectional photoelectric reader capable of reading 300 characters per second continuously; or up to 100 characters per second intermittently.

The reader has an adjustable tape guide which makes it capable of reading 8-channel, 7-channel, or 5-channel tapes.

Control of reader power is provided by an ON/OFF switch located on the reader front panel. The RUN/LOAD switch is an integral part of the tape guide mechanism.

The high speed reader can perform the following function through the driver.

1. Read a Record - Function codes 8 or 9

A formatted or unformatted record is read from the reader device.

High Speed Paper Tape Punch

The 703 paper tape punch is capable of punching up to 110 characters per second. Each character consists of eight data bits plus a sprocket hole. A hole in a data bit position represents a "one"; no hole represents a "zero".

The controller contains a one-character buffer register that accepts data from the 703 in the form of eight-bit binary numbers.

Data transfer to the controller is under control of the central processor. There are no punch controls or indicators located on the computer console. Only a manual tape feed push-button is located on the punch assembly front panel. When the TAPE FEED pushbutton is pressed, power is applied to the punch mechanism whenever a character is transferred from the computer. If the punch is off, there is a one second delay which allows the punch to come up to speed before data is transferred to the punch. If the punch is already on, there is no delay. Once started, the punch remains on until a command from the computer turns it off.

The punch can perform the following functions through the driver.

1. Write a Record - Function Code E

A formatted or unformatted record is output to the paper tape punch. This record will be identical to the same record punched on the teletype punch.

2. Write a File Mark - Call WEOF

The WEOF call will cause a file mark (X'87') character to be punched followed by approximately 60 blank frames. Bit 0 of FIOT word 6 must be false, (not special format)

3. Punch Leader - Function Code E

If the buffer address is X'7FFF', 60 blank frames are punched as leader.

After any punch operation, the punch motor remains on which will eliminate the one second delay when more than one record is to be output. When the user is entirely finished using the punch, he should turn off the motor by executing the instruction.

DOT PCHU, 3

when PCHU is the unit code for the punch, normally X'C'. This instruction may be given even when the device might not be the punch. If another user is using the punch, in a real-time system, the motor will be turned back on when the next character is transferred and the turn-off instruction is harmless.

TECHNICAL DISCUSSION

The following section is a discussion of the internal operation of the driver. It describes the way in which the FIOT is used within the driver. Refer to the I/O Monitor documentation (DN 391476) for a description of the FIOT from the user's point of view.

A chart of the FIOT as it is used by the driver follows:

FIOT	0	BB	IBA		
	1	M	ANW		
	2	JC		LUN	FC
	3	S			
	4	WA			
	5	DS			
	6	F	EAA		
	7	NB			

The fields shown have the following meanings:

IBA - If IBA = 7FFF, the driver will output 6" of blank paper tape.
If IBA \neq 7FFF, it is used as the initial buffer address.

The user program should either directly or through the OPEN calling sequence, set in the mode bit of FIOT(1) when an output operation is being performed by the teletype driver. However, when a read request is made, the mode bit is set to reflect the correct input record format. The driver checks the first input character to determine how to set the first input character to determine how to set the mode and then reads the record.

Any time the left most bit of the first character is on, the mode is set to alpha. Any time the bit is off, the mode is set to binary. This can be done because all alpha characters have the left bit on. The first character read in binary mode is the left byte of the number of bytes in the record and, if the left bit was on, the record would be greater than 32,767 bytes. The record is read using the correct format.

- JC - a 7-bit field used internally by the driver as a jump counter control.
- S - 16-bit field which is the machine language command for the particular I/O operation. If it is an input operation, the sign bit is set; e.g. $82E9_{16}$. If it is an output operation, the sign bit is not set; e.g. $03EE_{16}$.
- WA - a 16-bit field which is the byte address of the next character to be stored. This address starts out as the initial buffer byte address and is incremented as characters are stored into the buffer.
- DS - a 16-bit field which is the end buffer byte address. This is tested by the driver to insure the user's buffer doesn't overflow. DS is a byte address of the initial buffer address plus the number of words requested.
- F - a 1-bit field used to specify the special format for input/output. When F is a 1, there is no formatting done by the teletype driver. The number of words specified by the user are transferred either in or out and the teletype is disconnected. If F is 0, then M of FIOT(1) is used to determine the format.
- NB - a 16-bit field where the number of bytes in an input binary record are stored. The number is decremented as characters are stored into the user buffer. The input is terminated if NB goes to zero.

RAYTHEON

700 PROGRAMMING SYSTEMS

TELETYPE - HIGH SPEED PAPER TAPE I/O DRIVER

QUALITY SOFTWARE

APPENDIX A

ASSEMBLY LISTING

of

TELETYPE - HIGH SPEED PAPER TAPE I/O DRIVER

Drawing No.

392292

ID Code

BYM

SETUP AREA FOR TTY AND HSPT DRIVERS

TIRSA	D	TIRS	VH 44170
M,THSPT	3		VH 44180
	LDX	M,DF	VH 44190
	AND	XFO	VH 44200
	STM	* 3	VH 44210
	JSX	SFTF	VH 44220
	LDX	M,DF	VH 44230
	LDM	* 2	VH 44240
	TRUE	NPTR>0	VH 44250
	CLB	X'4B'	VH 44260
	SNE	X'49'	VH 44270
	LLB	X'49'	VH 44280
	ENDC		VH 44290
	LDX	M,OPENR	VH 44300
	AND	AF	VH 44310
	CLB	X'E'	VH 44320
	SXP	X'E'	VH 44330
	LLB	X'E'	VH 44340
	ORI	X300	VH 44350
	SEQ		VH 44360
	ORE	X81	VH 44370
	LDX	M,DF	VH 44380
	ORI	* 3	VH 44390
	STM	* 3	VH 44400
	LDM	M,OPENR	VH 44410
	LLB	X'8A'	VH 44420
	SAP		VH 44430
	LLB	X'87'	VH 44440
	SNE		VH 44450
	SXM		VH 44460
	JMP	NSPECF	VH 44470
	LDM	* 7	VH 44480
	SUB	* M1	VH 44490
	STM	* 7	VH 44500
	LDM	* 4	VH 44510
	ADD	* N1	VH 44520
	STM	* 4	VH 44530
	LDX	* 0	VH 44540
	SLL	D 1	VH 44550
	LDB	* U	VH 44560
NSPECF	EQV	* 3	VH 44570
	STB	M,DC	VH 44580
	JSX	INTENB	VH 44590
	D	TTYS	VH 44600
TMSK	EQV	* 3	VH 44610
	UNM		VH 44620
	LDX	M,DF	VH 44630
	LDM	* 3	VH 44640
	JSX	ST	VH 44650
	SAP		VH 44660
	JMP	TMSK	VH 44670
	DIN	TTYU,0	VH 44680
	LDX	TIRSA	VH 44690
	SAM		VH 44700
	STX	TTYF-1	VH 44710
	LDX	M,DF	VH 44720
	FALS	ISHAKE=YES	VH 44730
	STX	TTYF	VH 44740
			VH 44750

LOAD FIOT TO X REG

SET FIOT VALUES
LOAD FIOT ADDRESS

DID WE END UP WITH READ
KEYBOARD ON THE PHOTOREADER?
YES, THAT'S STUPID, FIX IT

FORCE WRITE MODE IF WEOF

WRITE

READ 8100
RELOAD FIOT ADDRESS

STORE DOT OR DIN DEVANDFC
GET RETURN
LOAD L/F

IS WEOF FLAG SET
IT'S END OF FILE
IS IT READ

TEST FOR SPECIAL FORMAT
READ NO OUTPUT CHAR NEEDED
GET BYTE COUNT
DECREMENT 1 FOR STARTING BYTE

PUT IT BACK
GET BUFFER BYTE ADDRESS
INCREMENT 1, FOR BYTE WE DOT NOW
PUT IT BACK
GET THE BUFFER ADDRESS
MAKE BYTE ADDRESS
GET FIRST BYTE (7FFF) = 0

SAVE FIRST CHAR
SEE IF INTERRUPT IS ENABLED

RECOVER DEVICE FOT ST
GET STATUS
BUSY ?
YES, LET'S WAIT
IS TTY BUSY

NO RESET
SET FIOT INTO R AREA

VH 44760
 VH 44770
 VH 44780
 VH 44790
 VH 44800
 VH 44810
 VH 44820
 VH 44830
 VH 44840
 VH 44850
 VH 44860
 VH 44870
 VH 44880
 VH 44890
 VH 44900
 VH 44910
 VH 44920
 VH 44930
 VH 44940
 VH 44950
 VH 44960
 VH 44970
 VH 44980
 VH 44990
 VH 45000
 VH 45010
 VH 45020
 VH 45030
 VH 45040
 VH 45050
 VH 45060
 VH 45070
 VH 45080
 VH 45090
 VH 45100
 VH 45110
 VH 45120
 VH 45130
 VH 45140
 VH 45150
 VH 45160
 VH 45170
 VH 45180
 VH 45190
 VH 45200
 VH 45210
 VH 45220
 VH 45230
 VH 45240
 VH 45250
 VH 45260
 VH 45270
 VH 45280
 VH 45290
 VH 45300
 VH 45310
 VH 45320
 VH 45330

NSPEC
 H,T T
 ATTS
 * SETF FILLS FIOCT WITH INIT BYTE ADD,END BYTE ADD, AND BYTE COUNT
 SETF

* COMPUTE THE CORRECT JUMP COUNT

M,TSCR
 * STUFF STARTING AND ENDING BYTE ADDRESS AND COUNT

NS1

STORE OPERATION SELECT
 EXCHANGE
 EXCHANGE
 STORE AWAY FIOCT ADDRESS
 LOAD FIRST CHAR
 SELECT THE DEVICE
 ALL DONE,EXIT
 RELOAD FO
 CLEAR JUMP COUNT
 CLEAN FC
 TEST FOR OUTPUT
 GET WEOF FLAG BIT 0
 IS IT WEOF
 YES FIX JUMP TODISCONNECT
 NOW SET JUMP COUNTER FOR READ
 TEST FOR SPECIAL FORMAT
 SKIP READ FORMAT CHARACTERS
 BUT IS IT WRITE
 NO,SET JUMP COUNT
 SKIP WRITE BYTE COUNT
 IF IT IS SPECIAL FORMAT
 IT IS
 IT ISN'T, GET MODE
 IS IT ALPHA, IF NOT X'IE' IS OK
 NO, SET PUNCH BYTE COUNT
 REPOSITION JUMP COUNT LEFT
 LOAD FIOCT ADD
 STORE JUMP COUNTER
 BYTE ADDRESS AND COUNT
 WAS IT ZERO BEFORE 1 WAS ADDED
 STORE INITIAL BYTE ADDRESS
 DUMMY WORD COUNT FOR LEADER
 AND USE IT IF LEADER CALL
 STORE END BYTE ADDRESS - DONE WITH SETUP
 SET BYTE COUNT FOR SPECIAL PHAT
 COMPUTE END BYTE ADDRESS
 STORE END BYTE ADDRESS-DONE WITH SETUP

```

DRRET EQU $
DRBOP EXIT M,DC+1
      LDH X1200
      ORI * 2
      STH * 2
      JMP DRRET
      INTERRUPT SERVICE AREA FOR TTY AND MPT DRIVERS

TIRS EQU $
      TRUE ISHARENO
      LDX M,TFA
      ENDC
      TRUE ISHAREYES
      SLH
      LDX N3
      DXS 1
      LDH * DINS
      STH S+1
      DATA 0
      SRL
      SAG
      JMP BL
      LDX * FLOTS
      STX M,TFA
      SOH
      ENDC
      LDH * 2
      SRL
      ADD M,TJMPA
      LDX * 3
      SLC D 1
      SLC D 15
      STH M,TDOT2
      SAK
      JMP * 0
      GRE X84
      STH M,TDIN
      MSK
      M,TDIN DATA 0
      JMP * 0
      * FOLLOWING IS THE JUMP TABLES
      M,TJMP JMP M,TLFI
      JMP M,1CHAR
      JMP M,TNHI
      JMP M,TDATA1
      JMP DNWB
      JMP M,TNHO
      JMP M,TNHO
      JMP M,TDATA0
      JMP M,TCRO
      JMP M,TBLK
      JMP M,TBLK
      JMP M,TBLK
      JMP M,TDISC
      JMP M,TDISC
      M,TJMPA DATA
      M,TLFI CLB X'8A1
      SNE
      JMP M,TIJR

```

JUMP TO DISC

INTERRUPT SERVICE AREA FOR TTY AND MPT DRIVERS

GET THE FLOT ADDRESS

LOAD COUNT OF DEVICES
COUNT DOWN NO. DEVICES
MOVE STATUS INSTRUCTION.

ACQUIRE STATUS

IR OR NO
NO LOOK FOR ANOTHER
LOAD FLOT ADDRESS

LOAD OPERATION
EXCHANGE
EXCHANGE
STORE IN CASE OF OUTPUT
READ OR WRITE
WRITE
READ

QUARANTER PHOTOREADER TIMING FOR DISCON.
DIN CHAR
GO SERVICE CHAR

INPUT JUMP TABLE

OUTPUT JUMP TABLES

JUMP TABLE ADDRESS
SEARCH FOR L/F CHAR

VH 45340
VH 45350
VH 45360
VH 45370
VH 45380
VH 45390
VH 45400
VH 45410
VH 45420
VH 45430
VH 45440
VH 45450
VH 45460
VH 45470
VH 45480
VH 45490
VH 45500
VH 45510
VH 45520
VH 45530
VH 45540
VH 45550
VH 45560
VH 45570
VH 45580
VH 45590
VH 45600
VH 45610
VH 45620
VH 45630
VH 45640
VH 45650
VH 45660
VH 45670
VH 45680
VH 45690
VH 45700
VH 45710
VH 45720
VH 45730
VH 45740
VH 45750
VH 45760
VH 45770
VH 45780
VH 45790
VH 45800
VH 45810
VH 45820
VH 45830
VH 45840
VH 45850
VH 45860
VH 45870
VH 45880
VH 45890
VH 45900
VH 45910

```

CLB X'87'  IS IT END OF FILE
SEQ      NO DID HE FIND IT
JMP M,TIRR NO TRY AGAIN LATER
LDW X'0  YES SET EOF BIT MA MA
JMP M,TDJSC1  GO DISCONNECT THE UNIT

* THIS ROUTINE EXCEPTS FIRST CHARACTER AFTER LINE FEED
M,1CHAR CLB 0 TEST FOR ALPHA CHAR
SLS
JMP M,TDJSC1  NO, SET WORD COUNT
STM M,TT SAVE IT
LDX M,DF GET FLOT ADDRESS
LDW * 2 GET JUMP COUNT
ADD X'400 SKIP 2
STM * 2 PUT BACK
LDW * 1 GET MODE WORD
AND X'FFF SET ALPHA MODE
STM * 1 PUT BACK
LDW M,TT GET THIS ALPHA CHARACTER
* THIS ROUTINE SERVICES RECEIVING OF DATA TO BE STORED IN USER BUFFER
M,TDATA1 LDX M,TFA LOAD MODE
LDX * 1 BIN OR ALPHA
IXS 0
JMP TLWA
CLB X'DF'  IS CHAR A DELETE RECORD
SNE
JMP DELR YES
CLB X'FF' TEST FOR RUB OUT
SNE
JMP DELC YES
CLB X'8D' IS CHAR A C/R
SNE
JMP M,TDJSC YES DISCONNECT UNIT
EQU $
LDX M,DF LOAD FLOT
LDX * 4
STB * 0 DO DIRTY DEED
* TEST FOR END OF BUFFER, COMMON SEQUENCE FOR TTY IN OR OUT
CHEKEOB IXS 1 INCREMENT BYTE ADDRESS
CXA DON'T KNOW IF IT WILL SKIP
CXA
LDX M,DF RECOVER FLOT ADDRESS
STM * 4 REPLACE WORKING ADDRESS
CHW * 5 COMPARE WITH END OF BUFFER
SEQ WAS IT?
JMP DNWB NO, JUST COUNT DOWN BYTE COUNT
LDW * 2 YES
ADD X'200 INCREMENT JUMP COUNT TO SKIP IF THERE
STM * 2 ARE BYTES REMAINING IN THE RECORD
LDX M,DF JUMP ENTRY TO SKIP RECORD REMAINDER
LDW * 7 GET BYTE COUNT
SUB N1 DECREMENT ONE BYTE
STM * 7 PUT IT BACK
CHW N0 IS IT ZERO?
SEQ 7
JMP M,TIRR NO, KEEP GOING
LDW * 2 YES, FINISH UP

```

```

45920
VH 45930
VH 45940
VH 45950
VH 45960
VH 45970
VH 45980
VH 45990
VH 46000
VH 46010
VH 46020
VH 46030
VH 46040
VH 46050
VH 46070
VH 46080
VH 46090
VH 46100
VH 46110
VH 46120
VH 46130
VH 46140
VH 46150
VH 46160
VH 46170
VH 46180
VH 46190
VH 46200
VH 46210
VH 46220
VH 46230
VH 46240
VH 46250
VH 46260
VH 46270
VH 46280
VH 46290
VH 46300
VH 46310
VH 46320
VH 46330
VH 46340
VH 46350
VH 46360
VH 46370
VH 46380
VH 46390
VH 46400
VH 46410
VH 46420
VH 46430
VH 46440
VH 46450
VH 46460
VH 46470
VH 46480
VH 46490

```

```

ADD X800
SXP
SYN * 2
LDH * 3
SAH
JMP M,TIRR
* THIS ROUTINE WILL DISCONNECT THE DEVICE BEING USED
*
M,TDISC CLR
M,TDISC1 LDX M,DF
SYN * 7
LDH * 3
AND X7F
ORI X300
SYN S+1
DOT 0,0
UNH
LDH * 7
SYN * 3
JMP M,DDR
* THIS ROUTINE STORES AWAY THE NO, BYTES IN THE BINARY RECORD
*
M,TNWI LDX M,TFA
SYN M,TT
LDH * 7
SLL 8
ORI M,TT
SYN * 7
LDH * 1
ORI SIGB
SYN * 1
LDX M,TFA
LDH * 2
ADD X200
SYN * 2
UNH
LDX INTPOINT
MSK
ENB TTYI
JMP REST+1
UNH
JSX SETF
M,TIRR
LDX M,TFA
LDH * 4
SUB * N1
SYN * 4
LDH * 7
ADD * N1
SYN * 7
JMP M,TIRR
TTY AND HSPT OUTPUT DRIVER AREA
A * OPERATION
M,TDATA0 SYN M,TDOT
LDX M,TFA
LDH * 0
CMH NH1
PREPARE TO INCREMENT JC FOR SPECIAL FORMAT
IS IT SPECIAL FORMAT?
YES, INCREMENT JUMP COUNT
GET INC OUT FLAG
IS IT OUTPUT?
YES, AWAY NEXT IR, JC HS INCREMENTED
NO, DISCONNECT NOW, ZERO STATUS
ENTRY FROM EOF
SAVE SIMULATED STATUS
GET UNIT
7FF0
BUILD DOT
EXECUTE DOT
SET TO CORRECT DOT
GET SIMULATED STATUS
STORE INTO STATUS WORD
EXIT
LOAD FIOT ADDRESS
LOAD NO. BYTES
HERE IN NEW CHAR
GET MODE WORD
AFFIRM BINARY MODE
AND REPLAGE IT
LOAD FIOT ADDRESS
YES INC JUMP COUNTER AND RETURN
AND GO TO IRR
ALLOW AN INTERRUPT HERE
I DONT HAVE ANYTHING ELSE TO DO.....
READY TO RE-ENABLE
ENABLE THE INTERRUPT
....AND IT SAVES A LITTLE TIME
RESET THE FIOT
AND RESTOR FROM IR
DELETE CHAR
LOAD WORKING ADDRESS
RSTORE
GET BYTE COUNT
RESET IT
RETURN
GET BUFFER ADDRESS
IS IT LEADER CALL

```

VH 46300
VH 46310
VH 46320
VH 46330
VH 46340
VH 46350
VH 46360
VH 46370
VH 46380
VH 46390
VH 46400
VH 46410
VH 46420
VH 46430
VH 46440
VH 46450
VH 46460
VH 46470
VH 46480
VH 46490
VH 46500
VH 46510
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VH 46600
VH 46610
VH 46620
VH 46630
VH 46640
VH 46650
VH 46660
VH 46670
VH 46680
VH 46690
VH 46700
VH 46710
VH 46720
VH 46730
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VH 46790
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VH 46880
VH 46890
VH 46900
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VH 46960
VH 46970
VH 46980
VH 46990
VH 47000
VH 47010
VH 47020
VH 47030
VH 47040
VH 47050
VH 47060
VH 47070

47080
 VM 47090
 VM 47100
 VM 47110
 VM 47120
 VM 47130
 VM 47140
 VM 47150
 VM 47160
 VM 47170
 VM 47180
 VM 47190
 VM 47200
 VM 47210
 VM 47220
 VM 47230
 VM 47240
 VM 47250
 VM 47260
 VM 47270

OUTPUT BLANKS
 LOAD WA
 SEE IF THATS WHAT I SHOULD DO
 LOAD NEW BYTE
 GO TEST FOR BUFFER'S END
 OUTPUT A ZERO
 LOAD C/R FOR OUTPUT
 LOAD PIOT ADDRESS
 SHIFT AROUND THE NO WORDS
 RESTORE NEW NO WORDS

CLR * 4
 LDX * 4
 SEQ * 0
 LDB * 0
 DATA 0
 JMP CHECKEB
 CLR
 M,TDOT
 M,TBLK
 M,TDOT2
 DATA 0
 JMP M,TIJR
 LLB X'8D'
 JMP M,TDOT2
 M,TCRO
 M,TNWO
 LDX * 7
 LDW * 7
 SRC * 8
 STW * 7
 JMP M,TDOT2
 TRUE ISHARE=YES
 DATA X'2C0',X'200',X'2E0'
 RES 3
 ENDC
 REEL 1 FILE 1 400 RECORDS

DINS
 PIOTS

