1.	IDENTIFICATION
1.2	Digital-7-10-0
1.3	Teletype Output Package
1.3	January 7, 1965



2. ABSTRACT

This package includes subroutines which allow the user to type characters on line represented by 1, 3, or a string of codes. Routines are included to facilitate formating by the user. The user must supply his own subroutine, OTY, to type out one Teletype character.

- 3. REQUIREMENTS
- 3.3 Equipment
 - Teleprinter
- 4. USAGE
- 4.1 Loading

The Teletype Output Package source tape should be assembled with the program which refers to it, or assembled using a symbol punch which contains the required subroutine calls (see Digital-7-3-S). In either case, the operation of the routines are independent of their position in memory. The user must supply a type-out routine, OTY, which is referred to by the package (see below).

4.2 Calling Sequence

The following calling sequences may be used to call the Teletype output sub-

routines.

Format Routines

TCR Type a carriage return and line feed.

TSP Type a space.

TYT Type a tab. Tab stops are located every TTAB spaces. This value is initially 10, but may be altered by the user. The subroutine counts the number of characters being printed on a line so that a TYT call will generate the proper number of spaces for a consistant format. TCR resets the character count to 0.

TIN Initialize the teleprinter. Type a carriage return, line feed, lower case, and set the character count to 0. TIN should be called before any other subroutines in the package.

Character Type-out Routines

TDIGIT Type the digit (code value from 0 to 9) in the right four bits of the AC.



Type the character represented by the code in the right six bits

of the AC.

Type the three characters represented by the codes in left, middle, TY3 and right six bits of the AC, respectively.

LAW A

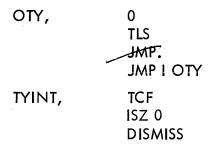
TY1

TSR Type the string of characters represented by the codes stored beainning in register A. A code having zeros in the leftmost five bits terminates the string.

All characters are typed by calling the subroutine OTY, which must be defined by the user. Two sequences are suggested, one for use with programs which use program interrupt for I/O service, and one for programs which do not.

> NOTE: When using a Type 28 Teletype, TLS will type characters represented by 5-bit codes; when using a Type 33 Teletype, TLS will type from 8-bit codes.

The following subroutine works very well with interrupt programs where buffering is not needed:



When using the associated program interrupt routine, an interrupt from the teleprinter should execute the command:

JMP TYINT

OTY

In addition, the symbol DISMIS should be defined as a JMP to the section of the interrupt routine which restores the AC and link and dismisses the program interrupt.

The following subroutine is suggested for noninterrupt programs:

0 TLS TSF JMP .-1 JMP I OTY



6. DESCRIPTION

6.1 Discussion

These routines assume that the codes which represent the characters to be typed consist of six bits. The leftmost five bits are the Baudot code for the character; the rightmost bit indicates the case of the character (1 for upper case, 0 for lower case). This format is generated by the PDP-7 Assember's character input operations in Teletype mode (see Digital-7-3-S). The case of the Type 28 Teletype is automatically checked (and adjusted if necessary) when each character is typed. A code whose leftmost five bits are 0 is not printed.

When using a PDP-7 with KSR33 teleprinter, the 5-bit Teletype codes are translated to 8- bit Type 33 codes (ASCII plus 200) before printing. Case shifts on the KSR33 are nonexistent. References to case in this document may be ignored when using the KSR33.

WARNING

When using a Type 28 Teletype the routine keeps track of keyboard case and assumes it knows the case at all times. However, if the user is also using the keyboard for input, he may change the case without the routines knowing it, possibly causing hash at the next type-out. For this reason and also for convenience, it is suggested that the user keep track of case by using the same indicators the package uses.

The contents of the register OCS indicates the case of the teleprinter, 33_8 for upper case and 37_8 for lower case. If this is changed whenever a case shift is typed upon input, no problems of this type will be encountered.

10. PROGRAM

10.4 Program Listing

PDP-7 BTA

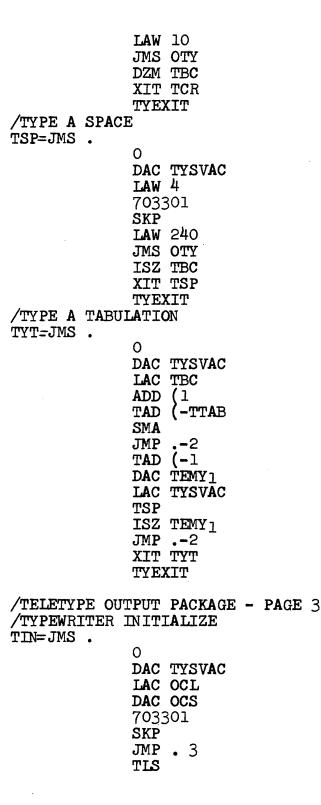
/TELETYPE OUTPUT PACKAGE 8-13-63 XIT=LAC-JMS TTAB=10 /TYPE 1 CHARACTER FROM AC BITS 12-17



Digital-7-10-0 Page 5

TY1=JMS . 0 DAC TY-SVAC RAR JMS TY1A XIT TY1 TYEXIT /TYPE 1 CHARACTER (5 BIT), LINK INDICATES CASE TY1A, 0 DAC T→EMY AND (37 SNA JMP TY2 703301 SKP JMP TY1B LAC OCL SZL LAC OCU SAD OCS JMP . 3 JMS OTY DAC OCS LAC TEMY JMS OTY ISZ T>BC TY2, LAC TEMY JMP I TY1A /TYPE 3 CHARACTERS FROM AC 0-5, 6-11,12-17 RESPECTIVELY TY3=JMS . 0 DAC TYSVAC JMS RL6 JMS TY1A JMS RL6 JMS TY1A JMS RL6 JMS TY1A XIT TY3 TYEXIT /TELETYPE OUTPACKAGE PAGE 2 TYPE A CARRIAGE RETURN, AND LINE FEED TCR=JMS . 0 DAC TYSVAC 703301 SKP JMP TCRA LAW 2 JMS OTY







Digital-7-10-0 Page 7

JMS OTY LAC TYSVAC TCR JMP I TIN-JMS TYPE THE DIGIT IN THE AC TDIGIT=JMS . 0 DAC TEMY1 AND (17 ADD (LAC NCT **DAC** . 1 XX TYl LAC TEMY] JMP TDIGIT-JMS TYPE A STRING OF CHARACTERS TSR=JMS . 0 DAC T>EMY1 LAC I TEMY1 TY3 AND (76 ISZ TEMY1 SZA JMP TSR+2-JMS LAC TEMY1 JMP I TSR-JMS /EXIT AFTER RESTORING AC AND LINK TYEXIT JMP . DAC TEMY RAL LAC TYSVAC JMP I TEMY /TELETYPE OUTPUT PACKAGE - PAGE 4 /ROTATE LEFT 6 RL6, 0 RTL RTL RTL JMP I RL6 /TABLE OF DIGITS 63 71 33 73 53 41 25 NCT, 3 31 7 /CASE STORAGE 33 OCU, 37 OCL, OCS, 0 /END OF TELETYPE OUTPUT PACKAGE



Digital-7-10-Ø Page 8

/PDP-4/7	ADDENDUM
TY1B,	ADD (LAC BTATAB-1
,	DAC 1
	XX
	SZL
	JMP TY1C
TY1D,	JMS OTY
•	JMP TY2-1
TY1C,	JMS RL6
-	RTL
	RTL
	JMP TY1D
TCRA,	IAW 215
-	JMS OTY
	IAW 212
	JMP TCR-JMS 10

BTATAB,

265324 /5 , T	
215215	/CARRIAGE RETURN
271317 240240	/9,0 /SPACE
243310	/x,H
25 4 316 256315	/,,N /.,M
212212	/LINE FEED
251314 264322	/),L /4,R
246307	/+,G
270311 260320	/8,I /0,P
272303	/:,C
273326 263305	/,,V /3,E
242332	/\$,Z
244304 277302	/ ə D /?,B
211323	/BELL.S
266331 241306	/6,Y
257330	/*,F //,X
255301	/-,A
262327 247 <u>3</u> 12	/2,₩ /→,J
377377	/FIGURES
267325 261321	/7,U /1,Q
250313	/(,K
377377	/LETTERS



START

.