

TELETYPE IOT'S

GENERAL INFORMATION

This section covers the information a user should need in order to use the Teletype IOT's.

The Teletype IOT's available to the user are:

TYI	= IOT 200	/input character
TYO	= IOT 300	/output character
TIS	= IOT 400	/input string
TOS	= IOT 500	/output string
TYIHNG	= IOT 100	/hang till interrupted
GTY	= IOT 600	/get Teletype
RTY	= IOT 700	/release Teletype
TTCKS	= IOT 1000	/check status
TTMODE	= IOT 1100	/8 bit or control mode
TTON	= IOT 10500	/turn on Teletype

Errors (found in ERCODE)

- 1 = not your Teletype
- 2 = interrupted by null
- 3 = TIS maximum exceeded
- 4 = attempt to TIS into lower core
(below 40) or into Exec

1) Teletype Words

Exec has 4 words of description about every Teletype (see Appendix III). These are stored starting at location 1000 of Core 14. The input-output buffers for each Teletype are located as follows in Core 14:

Teletypes	Area
0-7	100 - 177
10-27	400 - 577
30-64	1400-2077

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2) Lower Core Registers

The lower core registers for Teletypes are these:

Name	Location	Meaning
BILLTT	6	originating (billing) Teletype
TTNN	34	Teletype name number
TISMAX	75	highest location for Teletype input
TTNO	76	current Teletype, all IOT's reference this.

3) Trap Mode; Don't Hang Mode

Bits 16. and 17. of the IOT's have the following
meanings (only exceptions will be noted with the
individual descriptions):

Bit 16. on: Execute the IOT and don't hang.
If the program were to have
been hung, return -9 in the IO.
In all cases where it is not
specified otherwise, a Teletype
IOT is transparent to the AC
and IO.

Bit 16. off: Normal Mode (i.e., hung)

Bit 17. on: The IOT has 2 returns:
Return 1 is an error return.
The error code is placed in
ERCODE, and the user's PC is
placed in TRAPPC.
Return 2 means the IOT was
executed successfully.

Bit 17 off: When an error condition occurs the PC will be stored in TRAPPC and the user started up at TTTSU.

4) Warning Characters

Teletype Characters are 6 bits. This is not enough to represent the entire character set, so the following convention is used. Characters 0 - 76 are interpreted normally. When a 77 character is received by Exec it is not interpreted as a character but as a warning, and this fact stored in that Teletype's word 3. The following one-character is interpreted from a different table.

5) Miscellaneous

If a Teletype is interrupted while typing out, the rest of the characters left in Exec's buffer for it are lost. It is not possible to input a carriage return alone. Exec III generates and echoes an accompanying line feed.

Explanation of IOT's

These IOT's all have 2 returns unless otherwise noted.

TYI /input a character from the Teletype in TTNO
The character is received in bits 0 - 5 of the AC:
bits 6 - 17. of the AC are cleared.

TYO /output a character on the Teletype in TTNO
The character is output from bits 0 - 5 of the AC.

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LAW BUFFER

TIS /type in string

TIS accepts an 18-bit character pointer (in the LCH I sense), in the AC. The extend mode bits must be clear. The input string is stored 3 bytes to a word from left to right. Input is terminated by an internal code 74, i.e., by an EOM or RUBOUT. A character pointer (in the LCH sense) to the terminator is returned in the AC. A TIS is also terminated by a TISMAX error.

LAW TEXT

TOS /type out string

TOS accepts an 18-bit character pointer (in the LCH I sense) in the AC. TOS may address any core. The output string should be stored 3 bytes to a word from left to right. Output is terminated by an internal code 74, an EOM, which is not typed. (RUBOUT will also terminate a TOS, but the prefix 77 will be left waiting to combine with the next character sent.)

TYIHNG /hang until interrupted

TYIHNG causes the program to be hung until interrupted by a null on the Teletype in "TTNO". (This is used by DDT when it receives an EOT.) (Bits 16. and 17. both influence the action of this IOT in the usual way.)

GTY /get Teletype

GTY tries to assign the Teletype whose number is found in TTNO to the program. The IOT is treated as an NOP if the Teletype is already owned by the current user. If the Teletype is not available, the program is given the good return with -# in the IO, regardless of the state of bit 16. of the IOT.

This IOT advances the PC 1 or 2 registers (depending on bit 17.) so as to have a common format with the other IOT's. The error return is meaningless and never occurs.

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RTY /release Teletype

The Teletype whose number is in TTNO is released. If the Teletype does not belong to the program, this is an error.

TTCKS /check Teletype status

If an error condition exists, the error return is given with the error code word in AC as well as in ERCODE. Otherwise the good return is given, and the AC is unchanged.

TTMODE +20 /enter control mode

TTMODE +0 /leave control mode

Normally a program that is accepting input from the Teletype is run only when its input buffer in Exec is full or a RUBOUT or EOM has been received. A program in control mode is run at these times and when any of the characters listed in Appendix II are received. Ten added to this IOT will return word 6 of the Teletype pointers in the IO.

LAC (ALARM) /alarm character in top 8 bits

TTFMODE +60 /enter 8 bit mode

TTMODE +46 /leave 8 bit mode

Other 8-bit devices than Teletypes will be connected to the scanner. A program running in 8-bit mode may input any 8-bit values and have Exec ignore their meaning. 8-bit codes are stored in two bytes: the top 6 bits in the first byte ---- the low 2 bits left-adjusted in the second. When a program enters 8 bit mode it must specify

an alarm character (corresponding to EOM in regular mode) in the high order 8-bits of the AC. Ten added to this IOT will return word \emptyset of the Teletype pointers in the IO and the previous word 3 of the Teletype pointers in the AC.

TURN ON A TELETYPE

TTON	/get a Teletype and turn it on
R1	/not yours or does not turn on
R2	/O.K.

TTON gets the Teletype whose number is in TTNO and tries to turn it on (TTON executes IOT GTY). Return 1 means the Teletype belongs to someone else or the Teletype has been "gotten" but will not turn on; return 2 means it is O.K. When R1 is given because the Teletype is owned by someone else, \emptyset is put in the IO. This is a Core 16 IOT; bits 16. and 17. are ignored, and the error return does not change ERCODE or TRAPPC.

APPENDIX I
TELETYPE CODE CONVERSION

INTERNAL	ASCII	CHARACTER
ØØ	Ø4Ø	SPACE
Ø1	Ø41	Ø
Ø2	Ø42	Ø
Ø3	Ø43	Ø
Ø4	Ø44	Ø
Ø5	Ø45	Ø
Ø6	Ø46	Ø
Ø7	Ø47	Ø
1Ø	Ø5Ø	{
11	Ø51	}
12	Ø52	*
13	Ø53	+
14	Ø54	-
15	Ø55	:
16	Ø56	/
17	Ø57	
2Ø	Ø6Ø	Ø
21	Ø61	1
22	Ø62	2
23	Ø63	3
24	Ø64	4
25	Ø65	5
26	Ø66	6
27	Ø67	7
30	Ø7Ø	8
31	Ø71	9
32	Ø72	:
33	Ø73	,
34	Ø74	V
35	Ø75	=
36	Ø76	>
37	Ø77	?

INTERNAL	ASCII	CHARACTER
4Ø	1ØØ	@ or ✓
41	1Ø1	A
42	1Ø2	B
43	1Ø3	C
44	1Ø4	D
45	1Ø5	E
46	1Ø6	F
47	1Ø7	G
5Ø	11Ø	H
51	111	I
52	112	J
53	113	K
54	114	L
55	115	M
56	116	N
57	117	O
6Ø	12Ø	P
61	121	Q
62	122	R
63	123	S
64	124	T
65	125	U
66	126	V
67	127	W
7Ø	13Ø	X
71	131	Y
72	132	Z
73	133	
74	175, 176, Ø33	EOM
75	135] CARRIAGE RETURN-LINE FEED
76	Ø15-Ø12	WARNING
77		

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INTERNAL	ASCII	CHARACTER
7700	000	NULL OR BREAK OR "@"
7701	001	"A"
7702	002	"B"
7703	003	"C"
7704	004	EOT
7705	005	"E" OR WRU
7706	006	"F" OR RU
7707	007	"G" OR BELL
7710	010	"H"
7711	011	TAB
7712	012	LINE FEED
7713	013	"K" OR VT
7714	014	"L" OR FORM FEED
7715	015	CARRIAGE RETURN (OUTPUT ONLY)
7716	016	"N"
7717	017	"O"
7720	020	"P"
7721	021	"Q"
7722	022	"R" OR TAPE
7723	023	"S" OR RDR OFF
7724	024	"T"
7725	025	"U"
7726	026	"V"
7727	027	"W"
7730	030	"X"
7731	031	"Y"
7732	032	"Z"
7733	033	"["
7734	034	SHIFT "L"
7735	035	
7736	036	"↑"
7737	037	"←"
7740-7743	UNUSED	
7744	134	BACKSLASH
7745	UNUSED	
7746	136	↑
7747	137	←
7750-7773	UNUSED	
7774	177	RUB OUT
7775-7777	UNUSED	
"X"	MEANS	CONTROL-X

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APPENDIX II

CONTROL MODE ALARM CHARACTERS

space

:

#

\$

%

^

-

(

)

*

+

,

-

/

:

;

<

=

>

?

^

all warning characters i.e., 77XX codes

APPENDIX III

TT POINTERS

WORD 0:

4000000	BIT 0	NULL COUNT
2000000	BIT 1	"
1000000	BIT 2	"
400000	BIT 3	"
200000	BIT 4	"
100000	BIT 5	"
40000	BIT 6	NONE
20000	BIT 7	"
10000	BIT 8	"
4000	BIT 9	"
2000	BIT 10	IGNORE NEXT ECHO IF 1
1000	BIT 11	RING MODE (ALWAYS 1)
400	BIT 12	TYPE ACTIVE IF 1
200	BIT 13	8 BIT MODE IF 1
100	BIT 14	BEING INTERRUPTED IF 1
40	BIT 15	CONTROL MODE IF 1
20	BIT 16	FULL BUFFER ON INPUT IF 1
10	BIT 17	LINE OPEN IF 0
WORD 1:		PTR TO PUT CHARACTERS IN EXEC'S BUFFER
WORD 2:		PTR TO TAKE CHARACTERS OUT OF EXEC'S BUFFER
WORD 3:		
10000	BITS 0 - 7	8 BIT MODE ALARM CHARACTER
400	BIT 8	NONE
	BIT 9	SAVED 77 STATUS IN DISPATCHER
	BITS 10 - 17	STAT POINTER TO OWNER