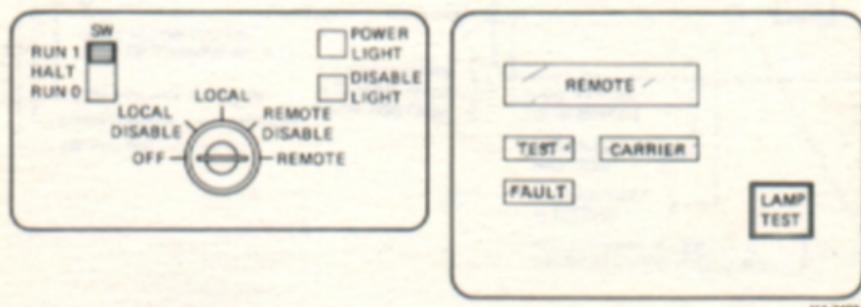


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PDP-11/70

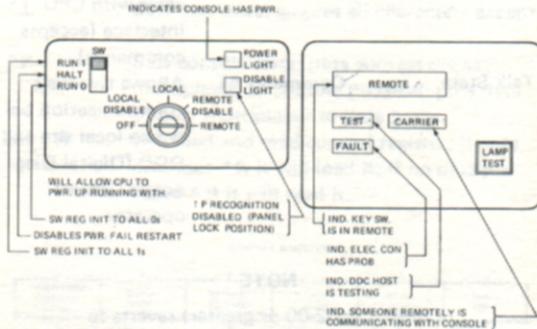
ELECTRONIC CONSOLE COMMANDS



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ELECTRONIC CONSOLE COMMANDS



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KEYSWITCH POSITION DESCRIPTION

- | | |
|-----------------------|---|
| OFF | Turns CPU and electronic console off. |
| LOCAL DISABLE | ▲P recognition disabled, disables all console functions. |
| LOCAL | ▲P recognition enabled, enables all console functions at local terminal. |
| REMOTE DISABLE | ▲P recognition disabled, disables all console functions, forces local copy. |
| REMOTE | ▲P recognition enabled, enables all console functions at remote terminal. |

THREE SEPARATE STATES

Program I/O State	Command Z	Allows communication with program
Console State	Command ^P	Console communicates with CPU interface (accepts commands)
Talk State	Command ^L	Allows two-way communication between local site and DDC (Digital Diagnostic Center) operator

NOTE

Console (V02-00 or greater) reverts to program I/O state when the following conditions occur:

- 20 seconds have elapsed without using console, and
- Program is running, and
- Character Ready bit is set, and
- Key switch in LOCAL.

LEGEND:

All **RED** symbols typed by human. All other symbols typed by CPU.

^P	Means typing the control key and the letter P at the same time to perform the command.
\$	Means typing \$ to perform the command.
n	Is used to indicate that a numeric variable is REQUIRED.
[n]	Is used to indicate that a numeric variable is OPTIONAL.
m	Is content of console switch register.
<NL>	Means that a <CR> and <LF> were generated by the CPU.

CONSOLE CONTROL COMMANDS

^E	Prints ASCII text that identifies CPU and console code revision; Example: 11/70 V01-00.
^L	Sets talk state; ignores all characters except ^P.
^P	Sets console state; puts address display multiplexer to console physical; puts data display multiplexer to data paths.
[n] ^R	Will load and read control register; if data precedes ^R it will load it; if no data precedes ^R it will read it.

CONTROL REGISTER

5	4	3	2	1	0
SUPPRESSES REMOTE TYPEDOUT	SPECIAL MODE	EXPAND PRINTOUT	TALK ECHO	LOCAL CONTROL	LOCAL COPY
• SUPPRESSES • SYNTAX ERRORS • RUNNING ERRORS	• ADDS AN "M" COMMAND AFTER EACH "N" COM	• ENABLES LOCAL COPY IN TALK MODE	• ENABLES LOCAL CONTROL IN REMOTE MODE	• OUTPUTS LOCAL COPY IN REMOTE MODE	• OUTPUTS LOCAL COPY IN REMOTE MODE

* THESE BITS CAN NOT BE SET FROM LOCAL TERMINAL

TK-1224

^U	Clears the data typed in the temporary data register.
\$	Sets a flag to indicate a register versus a memory location; Example: \$n/XXXXXX will examine contents of general register n.
'	Data separator before a start or go command; Example: 30,1776500G.
V	Verifies console logic; will print V000377 if no fault is detected.
Z	Sets serial line multiplexer to program I/O state.
<RO>	Rub out; deletes the rightmost octal character from the temporary register. DEL KEY causes "rubout" action to occur. Example: 1234\4\3\2\1\0\0 (For V01-00 consoles) 1234\4321\ (For V02-00 consoles)*

* On V02-00 the backslash only occurs on the first and last character being deleted from the buffer.

CPU CONTROL ODT-11 COMMANDS

n^D	Dumps successive memory locations continuously, until a character is typed, starting at address n.
[n] <LF>	Deposits any data typed and opens the next sequential location.
[n] <CR>	Deposits any data typed and closes the location to further modification.
"	Changes to hex data format from octal; data is displayed in hex while address display does not change.*
"	Changes to octal data format from hex.*
Example: ^P	
	CON = 0/123456" 00000000/"A72E' 00000000/123456
n/	Performs load address and examine; effectively opens word location n.
:	Reserved for future expansion.
[n] @	Deposits any data typed and uses contents of currently open location as address of location to open next.
B	Reserved for future expansion.
[m,] nG	Go command begins at address n with switch register set to m; places console in program I/O. Example: 30,17765000G
P	Proceed command places console in program I/O. It continues program from address in program counter.
n\	Performs load address and examine; effectively opens byte location n. Example: * ^P CON=0/XXXXXX 123456 <CR> CON=0\056 <LF> CON=1\247 <CR> CON=

* Command is available on consoles with an ID of V02-00 or greater.

CONSOLE MESSAGES

"? SYN ER"	Syntax error; command is given out of sequence or with missing character.
"? RUN ER"	Illegal when CPU running; certain commands are illegal with CPU running. Example: Start, load address, and initialize.
"? ER/TXXXXX"	Memory reference error; address/data parity error detected during a memory reference.
Fault Indicator	Console logic fault; console logic has detected an error within itself.
"+"	Serial line error; identifies framing or overrun errors with a "+".
"#"	CPU response time out; # is printed if CPU did not respond to a console command.
"*H XXXXXXXX/TXXXXX"	Programmed halt; console will print "halt notification" and HALT ADDR/ status.
"? CAR ER"	Carrier lost.

CPU CONTROL BASIC COMMANDS

- [n] A Prints address display in octal as received from one of eight inputs to address multiplexer.
 n = 0 Program Physical
 n = 1 Kernel Data
 n = 2 Kernel Inst.
 n = 3 Console Physical
 n = 4 Supervisor Data
 n = 5 Supervisor Inst.
 n = 6 User Data
 n = 7 User Inst.

NOTE

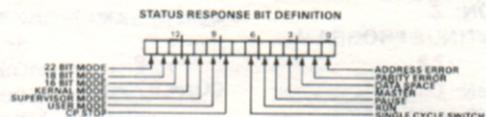
$\wedge P$ or "Power On" set position 3; if octal # precedes A, new position is set.

- C Continues program from address stored in program counter.
 [n] D Deposit; sequential deposits are possible (location must be open).
 E Examine; sequential examines are possible.
 H Halt; address counter and CPU status will be printed.
 I Initialize CPU.
 J Set single bus cycle.
 K Reset single bus cycle.
 nL Load address n.
 [n] M Prints data registers:
 n = 0 Bus Register
 n = 1 Data Paths (shifter)
 n = 2 Display Register
 n = 3 CPU μ ADRS

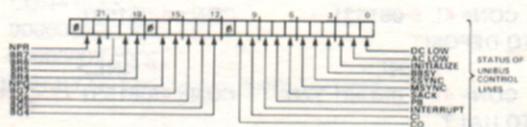
NOTE

Position 1 is set by $\wedge P$, E or "Power on." To change data path's position, type new position n first then type M.

- N Execute next instruction/bus cycle.
 R Read switch register.
 [m,] nS Start the CPU at the address n with switch register set to m.
 T Read CPU status.



- U Print the state of the Unibus in octal.



- nW Write n into switch register.

Unibus - 16 bit word
normal - non - valid ring requires an interrupt

EXAMPLES

BASIC COMMANDS WITH ODT

START PROGRAM

^P <NL>

CON= 200S <NL>

CON= Z

CONTINUE PROGRAM

^P

CON= C Z <NL>

^P <NL>

CON= 200G

READ ROM STATE

^P <NL>

CON= 3MXXXXXXXXX

^P

CON= P <NL>

DISPLAY ADRS IN CON PHY

^P <NL>

CON= AXXXXXXXXXX

^P <NL>

TO EXAMINE

^P <NL>

CON= 4L E 051531

^P <NL>

CON= 4/051531

TO DEPOSIT

^P <NL>

CON= 4L E 051531 77D

^P <NL>

CON= 4/051531 77 <CR>

TO HALT

^P <NL>

CON= H 01731240/T14410

TO CK FOR RUNNING CPU

^P

CON= T XX0XX CPU IS RUNNING

An example of how to single step a program using the electronic console is shown below.

^P

CON= 1000/XXXXXX 12737<LF>

00001002/XXXXXX 101<LF>

00001004/XXXXXX 177566<LF>

00001006/XXXXXX 0<CR>

CON= 1000L I N00001006 A

This program
will print the
letter A

means program moved

character to terminal print buffer not a human

BASIC COMMANDS WITH ODT

HEXADECIMAL DEPOSIT

ONLY POSSIBLE
UNDER ODT

^P

CON= 0/XXXXXX"

0000000/"XXXX 2AF1<LF>

0000002/"XXXX 2AF2<CR>

HEXADECIMAL DISPLAY

^P

CON= "0L E"XXXX <CR>

CON= 0/XXXXXX"

CON= E"XXXXX'<CR>

00000000/"XXXX<LF>

CON= EXXXXXX

00000002/"XXXX<CR>

HEXADECIMAL CONTINUOUS EXAMINES

^P

CON= " 0^D

00000000/"XXXX XXXX.....

OPEN BYTE LOCATION IN HEX

^P

CON= 0\XXX"

00000000\"XX <LF>

00000002\XX

OPEN BYTE LOCATION AND DEPOSIT

^P

CON= 0\XXX <LF>

00000001\XXX <LF>

00000002\XXX 24<LF>

00000003\XXX

OPEN BYTE LOCATION IN A REGISTER

^P

CON= \$0\XXX <LF>

17777700H\XXX <LF>

17777701L\XXX

TO BOOT THE SYSTEM

Bootstrap Example with initial switch value for an RP04 (M9301-YC)

-
- 70 , 17765000 G
1. Switch register value _____
 2. Data separator _____
 3. Set the starting address _____
 4. Start processor/enable program I/O _____

M9301-YC BOOTSTRAP (Type **^P H** before attempting to boot.)

10,17765000G	TM11
20,17765000G	TC11
30,17765000G	RK05
40,17765000G	RP03/RP05/RP06
50,17765000G	RK06/RP07
60,17765000G	TU16
70,17765000G	RP04
100,17765000G	RS04
110,17765000G	RX01

Bootstrap Example with an initial switch value for an RP06 (M9312)

Conditions	Using Basic Commands
1. • Diagnostic ROM in E20 • RP06 ROM in E35 socket (ROM 1) • Unit 0 (Drive 0)	56,17765744G
2. Same as in #1 except for RP06 ROM in E34 socket (ROM 3)	456,17765744G
3. Same as in #2 except for Unit 2 (Drive 2)	2456,17765744G

UNIT 2 _____
ROM 3 _____
RP06 _____
BOOT ADDRESS _____