Chapter 19

ETHERNET_SERVERS

.This chapter by Barry Lowry . . .

19.1 DECSERVERS

19.1.1 DECSERVER 100

The DECSERVER 100 allows connection of eight asynchronous RS232-C terminals or printers to an ethernet. Modem control is not supported. A DECSERVER 100 (part number DSRVA-AB) has eight terminal ports, one ethernet port, one mains input socket, one green led and one red button. The green led is an error indicator. The red button can be used to reset the DECSERVER database.

19.1.2 DECSERVER 200

A DECSERVER 200 also allows connection of eight asynchronous terminals to ethernet. There are two types of DECSERVER 200.

The DECSERVER 200/MC (part number DSRVB-AB) is the modem control version which has eight ports like the DECSERVER 100. Each port supports the following signals . . .

	XMIT	RCVE	RTS	CTS	DSR	GND	CD	SMI	DTR	RI	DSRS
pin	2	3	4	5	6	7	8	12	20	22	23

Each port is RS232-C compatible.

The DECSERVER 200/DL (part number DSRVB-BB) is the data lines only version which has a 36-pin connector instead of eight terminal ports. A decconnect cable called BC16C-10 plugs into this 36 pin connector. The other end of the cable plugs into a H3014 cable concentrator. The cable concentrator looks a bit like an harmonica and has eight modified modular jacks into which can be plugged DEC423 terminals or printers. These ports can also be used for RS232-C devices if an adapter is used.

Both types of DECSERVER 200 have an ethernet port, a mains input socket, a circuit breaker, four green leds and one red button. The green leds are status indicators. The red button is used to reset the DECSERVER database.

19.1.3 DECSERVER Common Features

For all three types of DECSERVER the maintenance philosophy is option swap. Other required hardware is: H4000 transceiver or DELNI or DESTA, BNE3X/BNE4X transceiver cable, and terminal cables. For all types of server, Lat software is down loaded from a host node when the server is turned on. Within each server is a permanent database containing characteristics of server and terminals. The permanent database is on an EEPROM which originally contains the factory defaults. The operational database is loaded from the permanent database when a terminal logs in. To reset the permanent database to factory defaults depress the red button at the back and simultaneously power the DECSERVER off/on.

Users can be in local or service mode. LOCAL means interact with the DECSERVER. SERVICE means interact with a service node. A service node is any system on the ethernet with a suitable lat protocol driver. Decnet does not need to be running on the service node. The vms lat driver is the ltdriver.

The first time a user tries to login to the DECSERVER a hash prompt appears on the terminal. The default login password is ACCESS but this may be changed by the system manager. If the user manages to get past this stage a LOCAL> prompt appears. See section "normal user commands" for what a user can do next.

Each user can have several sessions active simultaneously. A server manager can enter privileged mode to change server and terminal characteristics.

Table 19–1: Default DECSERVER passwords

Login Password	Privilege Password
ACCESS	SYSTEM

You can connect to a DECSERVER from a node using NCP:

`NCP> CONNECT NODE nodename`

or if server is not configured in the host database

`NCP> CONNECT VIA UNA-0 PHYSICAL ADDRESS aa-aa-aa-aa-aa-aa`

When you do this you get the hash prompt.
Type access to get to the LOCAL> prompt.
Type control D at any time to return to NCP.

19.1.4 DECSERVER 100 Power Up Sequence

- A power up causes a self test for 20 secs, then the green led comes on.

- Green led off after 20 seconds means power problem or DECSERVER fatal error.

- Green led blinking means non-fatal error

- A non-fatal error causes a status message to be printed on terminal 1.

- The terminal should be set to 9600 baud, 8 bits, no parity.

Table 19–2: Non fatal status messages.

Code	Meaning
nnn1	Server parameters have reverted to factory settings. Redefine them.
nn1n	Server is old rev. It will run slow and show server has * in hardware rev field.
n1nn	Ethernet connection problem.
1nnn	Heartbeat problem. Probably non-DEC transceiver. Disable heartbeat. Status will not change but it will work.

Terminal status is printed out as two digits for each port nn nn nn nn nn nn nn nn

Table 19–3: Terminal Stutus Codes

Code	Meaning
n1	Terminal parameters have reverted to factory settings. Redefine them.
1n	Terminal hard error. No fix for this

19.1.5 DECSERVER 200 Power Up Sequence

The DECSERVER 200 has four green leds, D1 to D4, arranged vertically with D1 at the top and D4 at the bottom.

Table 19–4: Decserver 200 LEDs

LED	Definition	State	Meaning
D1	POWER	ON	DC VOLTAGES OK
		OFF	DC VOLTAGES NOT OK
D2	DIAGNOSTIC	ON	SELF-TEST PASSED
		OFF	FATAL ERROR (OR TEST IN PROGRESS)
		BLINK	NON-FATAL ERROR
D3	SOFTWARE	ON	DOWN LINE LOAD OK
		OFF	DOWN LINE LOAD IN PROGRESS
		BLINK	MULTIPLE DOWN LOAD FAILURES
D4	NETWORK ACTIVITY	ON	SHOWS NETWORK ACTIVITY

So, when the DECSERVER 200 is turned on, we should get D1 on immediately, D2 on after 20 seconds, D3 on after the down line load is complete, and D4 flashing to indicate ethernet traffic.

• If D1 stays off, mains input is OK and the circuit breaker is in then change the server.

• If D2 stays off then change the server.

• If D2 blinks then put a terminal on to port 1 and try again. You should get an error message. If the error message is 920, 921, 922, 923, 930, 931 or 932 then try resetting the server to factory settings by powering on the server with the red button held in. If this doesn't fix it then change the server. If the error message is 941, 942, 950 then the problem is something to do with the ethernet connection. Try using the ethernet loopback connector 12-22196-01. If you get no messages on the console terminal then try all the other ports before resetting the server to factory settings. This is because the customer could have changed the console port before the problem occurred.

o   If D3 blinks then there is a down load problem. Using a terminal on port 1 should indicate
load failure timeouts and may indicate which host if any responded. See next section.

19.1.6 Down Line Loading

The DECSERVER will request a downline load immediately after it has passed its self test. A
host node on the ethernet will normally respond by down loading the DECSERVER software.
The host console will report the load request and the downline load. If the DECSERVER does
not get any response to a load request it will keep requesting down line loads at gradually
increasing intervals.

19.1.6.1 Down Load Problems

o   Make sure the following statement is in systartup.com

```
$ defino/system/exec/nolog mom$load sys$sysroot:[DECSERVER]
```

o   Make sure server software characteristic is PS0801ENG.SYS for DECSERVER 100 or
PR0801ENG.SYS for DECSERVER 200

o   Make sure host file PS0801ENG.SYS or PR0801ENG.SYS is in SYS$SYSROOT:[DECSERVER]

•   Verify host contains node entry for server:

1.   @dsvconfig.com in sys$sysroot:[DECSERVER]
select option 1 to display server info.
check ethernet address, node name, decnet address
if address is 08-00-2B-00-AB-CD then dump file is psdmpABCD.sys

2.   NCP> SHOW NODE name CHARACTERISTICS
check info from this with result from previous step.
make sure load file name is PS0801ENG.SYS or PR0801ENG.SYS
make sure server type is correct (eg. DECSERVER 200)

•   Make sure the host node is available on the network:

```
NCP> SHOW EXEC STATUS                    state should be on
NCP> SHOW ACTIVE LINES STATUS            state should be on
NCP> SHOW ACTIVE CIRCUIT STATUS          state should be on
NCP> SHOW ACTIVE CIRCUIT CHARACTERISTICS service should be enabled
```

19.1.7 TERMINAL PROBLEMS

o   If the terminal is set up to a dedicated service check that the dedicated service is available

e   Check the terminal setup, especially flow control

o   Check the port using the test command

•   PC file transfers require correct terminal setup

```
$ set terminal /passall /nohostsync /nottsync /nobroadcast/eightbit/nowrap
```

19.1.8 COMMANDS

The commands in this section are for the DECSERVER 100. The DECSERVER 200 commands are mostly the same. Unlike the DECSERVER 100, the DECSERVER 200 has a very good help file so I do not intend to include the differences in this article.

Table 19–5: Normal User Local Commands

BACKWARDS	resume previous session
BROADCAST N TEXT	sends text to terminal n (unless set nobroadcast)
CONNECT	connect to preferred service
CONNECT BARRY	connect to service Barry
CONNECT TERMINAL N print	connect terminal n to service print. Useful for printers. N must be type other.
DEFINE/SET	terminal characteristics (own terminal only, see later section)
DISCONNECT	current session.
DISCONNECT N SESSION Y	Terminal N must be type other (for non-priv user)
DISCONNECT N ALL	Terminal N must be type other (for non-priv user)
LOCK	Password required to reuse terminal. Sessions left connected.
LOGOUT	Disconnects all sessions, causes all SET characteristics to revert to DEFINED values
RESUME SESSION N	Get session number from SHOW SESSIONS
SET PRIVILEGED	Must know the password. Default is system
SHOW COUNTERS	Data link level counters. See Section 19.1.10
SHOW NODES ALL	Gives status info for all known nodes
SHOW NODE name	Gives more information for one node.
SHOW SERVER	Server characteristics in brackets are permanent.
SHOW SERVICES ALL	All available services
SHOW SERVICE name	List of nodes that supply the service. Includes a rating. Higher value indicates more capability to provide that service.
SHOW SESSIONS N	For terminal n
SHOW SESSIONS ALL	For all terminals
SHOW TERMINAL ALL	Terminal characteristics
SHOW TERMINAL N	
SHOW USERS	
TEST TERMINAL WIDTH W COUNT C	Chars sent to terminal n for c lines. w=screen width.
TEST TERMINAL WIDTH W	Test terminal till a break is typed.

Table 19–6: Privileged Commands

BROADCAST ALL text	TEXT is sent to all DECSERVER terminals.
DISCONNECT N	N = terminal number
LOGOUT N	N = terminal number
LOOP aa-aa-aa-aa-aa	Ethernet loopback to node aa-aa-aa-aa-aa can use a third "assistant node"

LOOP aa-aa-aa-aa-aa HELP $\left\{ \begin{array}{l} \text{TRANSMIT} \\ \text{RECEIVE} \\ \text{FULL} \end{array} \right\}$ ASSISTANT bb-bb-bb-bb-bb

MON COUNTERS	Continuous show counters display
SET NOPRIVILEGED	
SHOW SERVER	Same as nonpriv command. With status fields also shows dump and load addresses.

```
                    server status: 00 0000 00 00 00 00 00 00 00 00
                                    |      |  |  <----------+---------->    |
2-digit hardware status_____/    |  |                                   |
                                    |                       |
4-digit non-fatal hardware error code_/                     |
                                                            |
2-digit non-fatal code per terminal_____/
```

SHOW TERMINAL	same as non-priv with extra fields (e.g. xon/xoff)
TEST TERMINAL N WIDTH W COUNT C LOOPBACK	same as the nonpriv test command but uses loopback connector.
STOP TEST TERMINAL N	
ZERO COUNTERS	

INITIALISE	**Causes a shutdown with the following options.**
DELAY M	Time in minutes before shutdown. Default is 1 minute. Warning messages will appear at intervals.
DISABLE	Disable new connects. Re-enable later with ENABLE.
DIAGNOSE BRIEF	Internal self test only.
DIAGNOSE NORMAL	Default self test + ethernet interface
DIAGNOSE FULL	Normal + Extended memory
DIAGNOSE COUNT N	Run N passes of diagnostic
DIAGNOSE LOOP	Run self test for ever
ABORT	Abandon shutdown that is in progress

Table 19–7: SET and DEFINE commands

COMMAND †	meaning
LOGIN PASSWORD xxxxx	Max 6 chars. Required for users with login characteristic enabled. Default password is ACCESS.
PRIVILEGED PASSWORD xxxxx	Max 6 chars. Default is SYSTEM
SERVER CHARACTERISTICS	(see Table 19–8)
TERMINAL CHARACTERISTICS	(see Table 19–9)

†DEFINE commands change the permanent database
SET commands change the operational database.

Table 19–8: Set/Define Server Commands

CIRCUIT TIMER N	Seconds between messages sent to host. Default 80. Min 30. Max 200. Decrease this value to improve terminal response but increase service load.
CONSOLE N	Console terminal number. Default is terminal 1
DUMP $\left\{ \begin{array}{l} \text{ENABLED} \\ \text{DISABLED} \end{array} \right\}$	Enable/disable upline dump to host if fatal bugcheck occurs.
HEARTBEAT $\left\{ \begin{array}{l} \text{ENABLED} \\ \text{DISABLED} \end{array} \right\}$	Only disable if transceiver does not support collision detection.
KEEPALIVE TIMER N	Seconds between messages for idle circuits. $10 < n < 180$. Default 20
LOCATION TEXT	Text = "location of server" message
LOGIN $\left\{ \begin{array}{l} \text{LIMIT N} \\ \text{NOLIMIT} \end{array} \right\}$	Maximum number of login attempts per minute.
NAME text	Server name, default = DECSERVER 100
NUMBER N	Server number $0 < n < 32767$, default = 0
SOFTWARE text	Text = file name of software load image. Default is PS0801ENG.

Table 19–9: Set/Define Terminal Commands

SET TERMINAL N	n=terminal number
SET TERMINAL ALL	all terminals
AUTOBAUD { ENABLED / disabled }	Default enabled.
AUTOCONNECT { ENABLED / DISABLED }	Default is disabled. Allows a terminal to be automatically connected to dedicated or preferred service.
BACKWARD SWITCH { N / NONE }	n=switch character to select previous session. Default none.
BROADCAST { ENABLED / DISABLED }	Allow receipt of messages. Default enabled.
CHARACTER SIZE N †	7 or 8. default is 8
DEDICATED SERVICE { name / NONE }	name is dedicated service name. Default is NONE.
FLOW CONTROL †{ ENABLED / DISABLED }	xon/xoff. Default ENABLED.
INPUT FLOW CONTROL { ENABLED / DISABLED }	to the terminal
OUTPUT FLOW CONTROL { ENABLED / DISABLED }	from the terminal
FORWARD SWITCH †{ N / NONE }	N is character to resume next session. Default is ~
GROUP CODES x,y,z { ENABLED / DISABLED }	x y and z are group codes 0 to 127
GROUP CODES ALL { ENABLED / DISABLED }	
LOCAL SWITCH †{ N / NONE }	n=character to switch to local. Default = none (use break).
LOGIN { ENABLED / DISABLED }	If login enabled then password is needed. Default = disabled
LOSS NOTIFICATION †{ ENABLED / DISABLED }	causes server to transmit a bell if a character is lost due to overrun etc.
MESSAGE CODES †{ ENABLED / DISABLED }	Codes accompany status/error messages.
NAME "TEXT"	text is terminal name
PARITY †{ ODD / EVEN / NONE }	Default is none.
PREFERRED·SERVICE †{ BARRY / NONE }	Barry is service selected if none specified in a connect command.
SESSION { LIMIT N / NOLIMIT }	N = maximum number of simultaneous sessions. N < 5.
{ INPUT / OUTPUT } SPEED N †	line speed default is 9600
TYPE { ANSI / HARDCOPY / SOFTCOPY / OTHER }	{ VT100, VT220 etc. / LA120, LA36 etc. / VT52, foreign VDU's etc. / LA50 printer etc. }
USERNAME Barry	saves typing Barry every login
VERIFICATION { ENABLED / DISABLED }	allows info messages from server e.g.connect,switch etc. Default enabled.

†These commands may be issued by a nonpriv user for their own terminal only. All commands may be issued by a privileged user for any terminal.

19.1.9 Error Messages

000-099 & 500-599	normal user info messages
100-199 & 600-699	warning messages (
200-299	connection error messages
700-799	user error messages
900-999	error messages from the DECSERVER

19.1.9.1 Interesting Error Messages

```
601-TERMINAL PARAMETERS CORRUPTED.....try to redefine them
602-SERVER PARAMETERS CORRUPTED.......try to redefine them

719-NO MEMORY.................this should not happen unless
                             you have more than 100 nodes

901-INIT.....................normal load sequence
902-WAIT FOR LOAD..............          |
903-LOADING...................           |
904-LOAD COMPLETE..............          V

910-LOAD NOT TRIED............DECSERVER ethernet test failed

911-WARNING MESSAGE...........decode the status

912-LOAD TIMEOUT..............waiting for host to respond

913-FATAL BUGCHECK............replace the unit if it happens often
                             try an init diag (see priv commands)

914-UP LINE DUMP FAILED

916-WRONG LOAD IMAGE............host software problem
```

19.1.10 Counters (not the obvious ones)

FRAMES SENT DEFERRED	during initial attempt
FRAMES SENT, 1 COLLISION	OK on second attempt
FRAMES SENT, 2+ COLLISION	OK after three or more attempts
EXCESSIVE COLLISIONS	transmission aborted after 16 tries
CARRIER CHECK FAILURE	carrier lost during transmit
FRAME TOO LONG	byte count > 1518 (ethernet limit)
LATE COLLISION	collision after slot time
DATA UNDERRUN	server failed to transmit because it could not keep up with data rate
DATA OVERRUN	server could not keep up with incoming data rate
BLOCK CHECK ERROR	crc error
FRAMING ERROR	received frame incomplete
SYSTEM BUFFER UNAVAILABLE	in server for incoming frame
USER BUFFER UNAVAILABLE	in server for incoming frame after system buffer OK
ILLEGAL MESSAGES RECVD	lat messages with illegal format
ILLEGAL SLOT RECVD	lat messages with bad slot format
DUPLICATE NODE COUNT	a service node became available with different ethernet address

messages refer to LAT messages. Normal values should be in the following ranges...

frames sent/deferred	< 5% of frames sent
frames sent/collision	< 1% of frames sent
messages retransmitted	< 0.1% of messages transmitted
duplicates received	< 0.1% of messages received

19.1.11 SETTING UP A PRINTER PORT

Prior to VMS V4.6 there was a separate LATPLUS software product that supported LAT printers. From VMS V4.6 onwards all systems support LAT printers.

When you change a DECSERVER 100/200 which supports a printer then you might have to set up the port to get the printer working again. The first thing to do is look in SYSTARTUP.COM for something similar to the following:

```
$ LCP :== $LATCP
$ LCP create port LTA9993                        !(9993 is a variable)
$ LCP set port /node=CLAUS /port= ELF LTA9993    !(CLAUS and ELF are variable)
$ set terminal LTA9993: /perm /width=80 /page=66 /nobroad /lower
$!
$ set protection = (s:rwlp,o,g,w) /device LTA9993
$!
$ set device LTA9993: /spooled=(DSVQUE,sys$sysdevice:)  ! (DSVQUE is a variable)
$ init /queue /start /processor=latsym /retain=error /noenable_generic --
  /default=(noburst, noflag, notrailer) /record /on=LTA9993: DSVQUE
```

The second thing to do is to note the node and port names from above. In this example they are CLAUS and ELF.

Then, using server commands, set the server name to be the same.

```
LOCAL> SET SERVER NAME CLAUS
```

Then set up the port, port 5 in this example, using the following commands.

```
LOCAL> define port 5 access remote
LOCAL> define port 5 autobaud disabled
LOCAL> define port 5 autoconnect disabled
LOCAL> define port 5 autoprompt disabled
LOCAL> define port 5 backward switch none
LOCAL> define port 5 break disabled
LOCAL> define port 5 broadcast disabled
LOCAL> define port 5 forward switch none
LOCAL> define port 5 local switch none
LOCAL> define port 5 type hard
LOCAL> define port 5 verification disabled
LOCAL> define port 5 input speed 9600
LOCAL> define port 5 output speed 9600
LOCAL> define port 5 dedicated service none
LOCAL> define port 5 preferred service none
LOCAL> define port 5 name ELF     ! (ELF is the variable found in step 1)
LOCAL> logout port 5
```

If the port name and server name are in lower case then use lower case for the server commands. Same for upper case.

19.1.12 SETTING UP A NON-LAT HOST (Reverse Lat)

The DECSERVER 200 supports links to non-lat systems. This means that the non-lat system is attached to the DECSERVER 200 port, and then users can log into it from another DECSERVER 200 port or from any other terminal server on the ethernet. For example if an async. user port on an IBM system is connected to the DECSERVER 200 then users can log in to the IBM system via the DECSERVER 200. To do this means that the ports must be set up correctly. This means that when you change a DECSERVER 200 you should make sure that the new DECSERVER is set up in the same way.

The user will have set the DECSERVER 200 up as a service node. So, if possible, BEFORE you change the DECSERVER 200, you should get to the local prompt and type . . .

```
LOCAL> SHOW SERVICES LOCAL CHARACTERISTICS
```

This should show which ports are set up for non-lat systems.

```
LOCAL> SHOW SERVER
```

This should show the service groups of the users of the service. ·

```
LOCAL> SHOW PORT n
```

This should show the port characteristics for the ports concerned.

Then after changing the DECSERVER 200, you must set up the server and the ports using the following command types (and the help facility):

```
LOCAL> DEFINE SERVER ...        (Make sure you enable announcements)
LOCAL> DEFINE PORT ...
LOCAL> DEFINE SERVICE NAME ....IDENTIFICATION ... PORTS ....
```

If you have problems during this phase, remember that the broken DECSERVER 200 can always be reinstalled to check the previous parameter settings.

If the DECSERVER 200 is so broken that you cannot observe the characteristics before you change it then the customer will have to supply the service name information and also tell you which ports are involved. Note that all the ports used for non-lat host should be ACCESS REMOTE, MODEM ENABLED and AUTOBAUD DISABLED.

19.2 LAT-11

A LAT-11 is a PDP-11 system with appropriate software allowing it to act as a terminal server on an Ethernet local area network. The hardware required is . . .

1. PDP 11/24, 34A, 35, 40, 44, 60 or 70 processor.

2. 256 KByte of memory

3. RX02 or TU58

4. Console device

5. DEUNA and transceiver

6. Up to 8 DZ11's.

The PDP-11 system is usually set up so that when it is powered on it requests a down line load from a Decnet node on the ethernet. If the LAT-11 does not work then diagnostics should be run using the local load device eg. RX02. It is important to remember when working with a LAT-11 that it is (only) a PDP-11 so do not get confused.

The files requested by the LAT-11 are:

Secondary loader	SECUNA.SYS
Tertiary loader	TERUNA.SYS
Operating system	LAT11UNA.SYS

The Decnet node is set up to recognise the physical address of the Lat-11 and to respond to the load request with the above files. This means that if the DEUNA is changed, the address rom from the original DEUNA should be fitted in to the new DEUNA. The rom is in location E11 on M7792.

19.2.1 Configuration of WELWYN LAT-11B

I cannot describe how to set up all cpu types in this article so I will describe the LAT-11B system in the Welwyn office. The LAT-11A system is identical. The only other LAT-11 in our district (that I know of) is at British Aerospace and that is also an 11/34.

```
DD11-DK +----------------------------------------------------+
         |                                 |   M9302    | TERM
         +----------------------------------------------------+
  DEUNA  |                   M7792                      |
         +----------------------------------------------------+
  DEUNA  |                   M7793                      |
         +----------------------------------------------------+
         |                                              |
         +----------------------------------------------------+
  DZ11   |                   M7819                      |
         +----------------------------------------------------+
  DZ11   |                   M7819                      |
         +----------------------------------------------------+
  DZ11   |                   M7819                      |
         +----------------------------------------------------+
  DZ11   |                   M7819                      |
         +----------------------------------------------------+
         |                                 |   M9202    |
         +----------------------------------------------------+
                                              ^
                                              v
DD11-PK +----------------------------------------------------+
  DL11   |        M7856             |       M9202    |
         +----------------------------------------------------+
         |                                              |
         +----------------------------------------------------+
  MS11-L |                   M7891                      |
         +----------------------------------------------------+
         |                                              |
         +----------------------------------------------------+
  MS11-L |                   M7891                      |
         +----------------------------------------------------+
  RX11   |        M7846             |                    |
         +----------------------------------------------------+
  KY11   |        M7859             |       M9312    | BOOT
         +----------------------------------------------------+
  CPU    |                   M7265                      |
         +----------------------------------------------------+
  CPU    |                   M7266                      |
         +----------------------------------------------------+
```
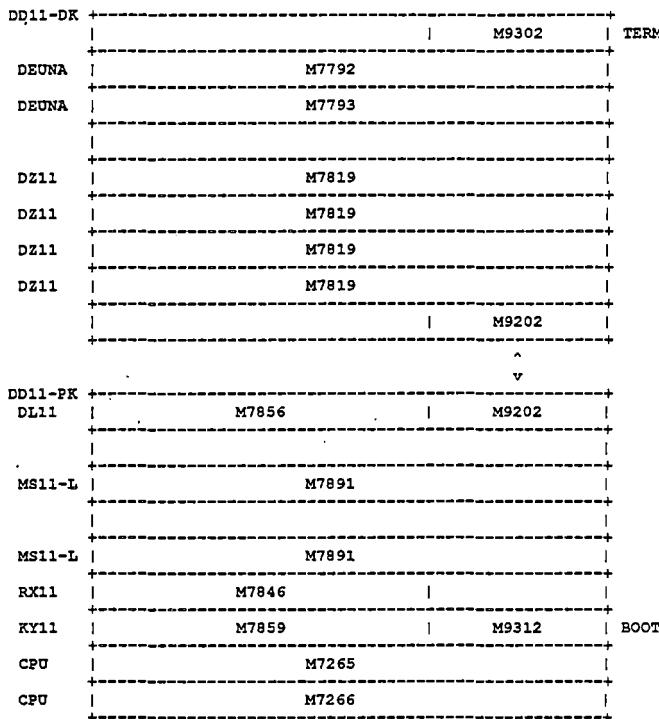
19.2.2 LAT Switch Settings

```
M7792      E62     1,2,4,6,7,10    Closed
                   3,5,8,9         Open
```

Vector 120, Remote Boot With Power Up Boot And System Load, Self Test Loop Disable.

```
M7792      E40     2,3,5,7,8       Closed
                   1,4,6,9,10      Open
```

CSR Address 774510

```
M7793   No Switches.
M7819
        CSR's   760100       Vectors   300
                760110                 310
                760120                 320
                760130                 330
```

If the load media is a TU58 then its controller is at vector 300 and all the DZ11's vectors move up by 10.

```
M7856

        SW1     2,4,7,8,10       Closed
                1,3,5,6,9        Open

        SW2     3,6              Closed
                1,2,4,5,7,8      Open

        SW3     3,5,6,8,10       Closed
                1,2,4,7,9        Open
                                          Baud rate 300 baud xmit/rcve
        SW4     10               Closed   8-bit,2 stop bits,No parity,
                1,2-->9          Open     Break disable, Rcve err disable

        SW5     4,7,10           Closed
                ·1,2,3,5,6,8,9   Open
```

The receive and transmit baud rates are set up by different switches. Here are some other settings that might be useful.

	T R A N S M I T			R E C E I V E		
	S4-10	S3-1	S3-4	S3-2	S3-3	S3-5
speed 300	on	off	off	off	on	on
1200	on	on	off	off	off	on
2400	off	off	off	on	on	on
9600	off	on	off	on	off	on

```
M7891 (slot 7)

        E47     1,2,3            Closed   CSR 772102
                4                Open

        E61     1-->4,6-->9      Closed   Starting address 64k
                5                Open

M7891 (slot 5)

        E47     All Closed                CSR 772100

        E61     All Closed                Starting address 0k

M7846

        Jumpers

        Address       A7,A8      In

        Vector·       V2,V4,V5,V7  In

M7859   No Switches

M9312

    ,   Console emulator rom in middle of board slot.
        Red wire to TP1
        Black wire to TP2
        Shield to TP3
        RX01 boot rom 753A9 in rom slot 1

        Switches
                1,7              Closed
                2,3,4,5,6,9,10   Open
```

19.2.3 TESTING

To test the LAT-11, use the front panel to boot the system, using the boot rom on the M9312. So for the Welwyn Lat-11 use the RX01.

When you want to test the LAT-11

1. Use the front panel. Press CONTROL and BOOT.

2. This causes an @ prompt (or perhaps $)

3. Put the XXDP+ floppy into to the RX01 and type DX to boot it.

4. Run the appropriate diagnostics.

19.3 Muxserver 100 and Decmux II

19.3.1 Description

A Muxserver 100 is connected to an ethernet using an H4000, DESTA, DECOM or DELNI. One or two DECmux II units are connected to the Muxserver 100 usually using modems. User terminals are then connected to the DECmux II's. The users can then act as if they were connected to a terminal server on the ethernet.

This means that the users on the ethernet can be in a different location. It also means that the Muxserver 100 and DECmux II can be miles apart.

The link between the Muxserver 100 and the DECmux II is a synchronous link known as the composite link. The terminal data is statistically multiplexed and transferred over the composite link. It is usual for the customer to have synchronous modems connected to a leased line at two locations but it is possible to have a direct link without modems.

Throughout the rest of this article I will refer to a Muxserver 100 as a Muxserver and the DECmux II as a DECmux.

19.3.2 Configuration

There are three possible configurations. (see fig 21.1)

Figure 19–1: Possible Muxserver/DECmux configurations
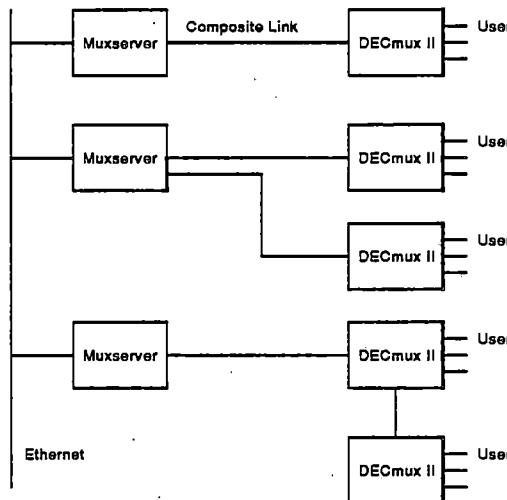
The first configuration shows one DECmux connected to a Muxserver using one composite link. This configuration allows up to eight users to be connected.

The second configuration shows two DECmux's connected to the Muxserver using two composite links. This configuration allows up to sixteen users to be connected. This is known as a star configuration.

The third configuration shows one DECmux connected directly to the Muxserver. The second DECmux is connected to the Muxserver via the first DECmux. This configuration also allows up to sixteen users. The link between the two DECmux's is also a composite link. This is known as a route-through configuration.

In each of the configurations the composite link may include a modem link via a leased line or it may be a direct connection.

19.3.3 Ports and Indicators

The Muxserver has an ethernet port, two composite link ports and one supervisor terminal port.

The DECmux has eight terminal ports, one supervisor terminal port and two composite link ports.

Both units have a green led to indicate power is OK. If the green led flashes and then stays off it indicates that the power-up self test failed.

A composite link port on a DECmux is made up of two connectors. One is a 25-pin RS232 connector and the other is a nine pin RS422 connector. The composite link port on a Muxserver only uses one connector which can be used for RS232 or RS422. Each composite port has a red led to indicate the presence of DSR (data set ready) from the modem, used for RS232 only.

Figure 19–2: Muxserver/Decmux Connectors and Leds

Muxserver 100 Connections

DECmux II Connections
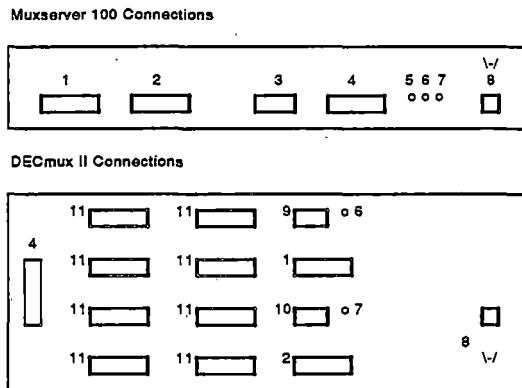

```
1 = Port A Composite Link (RS232 only on DECmux)
2 = Port B Composite Link (RS232 only on DECmux)
3 = Ethernet Connector
4 = Supervisor Port
5 = Green Led
6 = DSR Led Port A
7 = DSR Led Port B
8 = Mains Input and Voltage Selection
9 = RS422 Port A Composite Link
10 = RS422 Port B Composite Link
11 = User Port
```

19.3.4 Installation and Cables

19.3.4.1 Cables

The muxserver is connected to an ethernet transceiver using a normal transceiver cable as described in the ethernet head1.

A BC22D cable is used for all terminal ports (ie. user and supervisor) of both Muxserver and DECmux. It is an RS232 null-modem cable with two female connectors using pins 1,2,3,6,7 and 20. This means pins 2 and 3 are crossed and pins 6 and 20 are crossed. Modem control is not supported by the Muxserver.

A BC22F cable is used for the composite link cable between an RS232 modem and the Muxserver or DECmux. This is a straight through cable using all 25 conductors.

A BC17D cable is used to directly connect two RS232 composite link ports. This is a synchronous null modem cable.

The cables for RS422 are usually made by the customer using information supplied in the documentation delivered with the kit. The cables may be purchased from DEC however. There are three different types:

A 70-22418-XX cable is used to connect a DECmux port B to a Muxserver port A.

A 70-20983-XX cable is used to connect a Muxserver port B to a DECmux port A.

A 70-20976-XX cable is used to connect a DECmux port A to a DECmux port B.

An RS422 composite link cable ALWAYS uses port A at one end and port B at the other end.

The maximum length of RS232 cables is 50 feet. The maximum length of RS422 cables is 1 Kilometre (3,280 feet).

19.3.4.2 Setting Composite Port Characteristics. The SYSTEM and SAVE commands

The composite links are set to RS232, 9600 baud and modem control enabled as default. It is possible to select different speeds, RS422 and modem control disabled.

From the COM> prompt on a Muxserver or a SYS> prompt on a DECmux (see useful commands) type SYSTEM. This command causes the unit to prompt you for speed. The current value is displayed and then you can input a new value, type ? to get a list of options or press (CR) to keep the current value. You can then do the same for modem control and line type. Modem control can only be enabled for RS232 links. If "LONG LINE DRIVE" is selected this means RS422. No changes will be effective until after a SAVE command. Note that although the speed of an RS232 link is normally determined by the modem clock, the DECmux MUST have the correct speed specified.

If RS422 is selected on a Muxserver then internal switch settings have to be changed. The default setting is RS232. To change the switches power off, remove the top cover and reveal the printed circuit board. There are two switch packs E53 and E24. E24 is the one nearest the edge of the pcb and refers to port B. E53 refers to port A. For RS422 switches 1,2,3,4,5 and 6 should be on and the test off. For RS232 switches 7,8,9 and 10 should be on and the rest off.

19.3.4.3 Setting Terminal Port Characteristics

The port set up commands are the same as on the Decserver 100. (See head1 19). From the local prompt you can set your own port characteristics. In privileged mode you can set any port characteristics. To make a permanent change use a DEFINE command instead of SET command. The port configuration information is loaded into the DECmux from the Muxserver using the map. (see Useful Commands)

There is a PORT command available from the DECmux to set port characteristics. This command is useful only for testing purposes.

The default values for all terminal ports is 9600 baud, 8 bits and no parity.

19.3.5 Software

The Muxserver 100 is very similar to a Decserver 100 in functionality. This means that it supports printers but not non-lat host. It does not support modem control although the DECmux has the hardware capability to do so. It is down-line loaded from a VMS, Ultrix or RSX system and then uses LAT protocol to allow the terminal users to login to the computers.

The image that is down-line loaded is called MS1601ENG.SYS and for VMS is in the directory SYS$SYSROOT:[DECSERVER]. There is a command procedure called MSVCONFIG.COM which can be used for adding and removing Muxservers form the host node database. This is a menu driven command file, nearly identical to the DSVCONFIG.COM used for Decserver 100's.

If a printer is set up, remember that the port referred to by the system is a Muxserver port. The Muxserver port is then mapped to a DECmux port using the MAP command (see Useful Commands)

19.3.6 Useful Commands

If all else fails type HELP or MAPHELP.

19.3.6.1 The Muxserver COM> prompt

From the COM> prompt it is possible to examine Muxserver and DECmux status, examine and change the terminal map, change the privileged password and to test and/or restart the Muxserver.
To get to the COM> prompt from the LOCAL> prompt on the Muxserver supervisor port or a DECmux terminal port:

1. Type SET PRIV. The Muxserver will ask for a password. The default is SYSTEM. If this does not work because another port is already privileged then type SET PRIV OVER. The password may be changed.

2. Now type COMM. The Muxserver will reply with the COM> prompt.

19.3.6.2 The DECmux SYS> prompt

The SYS> prompt is used by the supervisor port on a DECmux. To get to this prompt:

1) Connect a terminal to the supervisor port and type (CR).

2) Enter the password. The default is SYSTEM.

19.3.6.3 The MAP and SAVE commands

From either the COM> prompt or the SYS> prompt it is possible to use the MAP command. The response is a map of the configuration in the following format:

```
Mux : B2-MASTER-UP      B1-up           Self            A1-down
Port: 0 1 2 3 4 5 6 7   0 1 2 3 4 5 6 7   0 1 2 3 4 5 6 7   0 1 2 3 4 5 6 7
Conn: A B C D E F G H   I J K L M N O P   A B C D E F G P   I J K L M N O H
```

So what does it all mean? The map indicates which port numbers on the Muxserver are associated with the real ports on the DECmux's. The map command allows you to change the letters in the row starting with "Conn:" in the map. If you enter a letter below a Muxserver port and then enter the same letter under a DECmux port then the ports become logically connected.

In the map the Muxserver is always shown as two consecutive blocks of eight ports. "Self" is always written above the block representing the unit where the MAP command was executed.

The map also shows which composite links are connected and what is connected. If another unit is called A1 for example then it means this unit is connected to port A and is one step away from the unit where the MAP command was executed.

So, in the above example, the MAP command was executed on a DECmux. Port B of the DECmux is connected to the Muxserver and the link is up. Port A is connected to another DECmux but the link is down. The first seven ports on the Muxserver are logically associated with the first seven ports of the first DECmux. Port 7 of the DECmux is associated with the last port of the Muxserver. Each pair of associated ports have the same letter underneath them in the display. The second DECmux's ports are associated with the remaining Muxserver ports.

The configuration map is maintained by the Muxserver. When the map is changed or a DECmux started; then the map is loaded from the Muxserver to the DECmux's. To change the map, execute the MAP command on the Muxserver.

```
Mux : B2-up        Self-Master-up  1 1 1 1 1 1 1 1  A1-down
Port: 0 1 2 3 4 5 6 7   2 3 4 5 6 7 8 9   0 1 2 3 4 5 6 7   0 1 2 3 4 5 6 7
Conn: A B C D E F G H   A B C D E F G H   I J K L M N O P   I J K L M N O P
```

This will give a display similar to the above. The Muxserver ports are numbered from 2 to 17. The cursor should be on the first letter underneath the left column in the display. Now you can type in a letter or number, move right using the spacebar , move left using the delete or exit using control-Z. The idea is to end up with pairs of ports logically connected.

After changing the map then the SAVE command is used to store the new values in the Muxserver permanent database. If this is not done then the map will revert to its former state after a reboot.

19.3.6.4 The CONNECT and DISCONNECT commands

From the COM> prompt or the SYS> prompt, the Connect command allows you to execute commands on another unit. For example, from a Muxserver a CONNECT A1 command will allow the user to execute commands as if he were at the SYS> prompt on the DECmux connected to port A. The possible commands are CONNECT A1,A2,A3,B1,B2 or B3. The letter depends on the port and the number depends on the number of hops from yourself. Look at the map first to find out the configuration. For the Muxserver, it is only possible to connect to the port labelled master. Use the DISCONNECT command to get back to the original prompt.

19.3.6.5 Commands to find setups and statistics

Local> SHOW/MONITOR COMMS for a display of composite link counters.
Local> SHOW/MONITOR COUNTERS for a display of muxserver counters.
Local> SHOW NODE (name/all) for a display of node counters.
Local> SHOW PORT (number) for a display of port setups and counters.
Local> SHOW/MONITOR QUEUE for a display of printer queue entries.
Local> SHOW SERVER for a display of Muxserver set-ups.
COM> MAP (see above)
COM> SHOW to display Muxserver composite link setups.
COM> STATUS to display Muxserver composite link counters.
SYS> MAP (see above)
SYS> SHOW to display DECmux port and composite link setups.
SYS> STATUS to display DECmux composite link counters

19.3.7 Useful Messages

Most of the messages that appear on a user terminal are self explanatory. The supervisor port of the Muxserver is used to display the messages concerning down-line loading and errors. The following ones are of interest:

Table 19–10:   Useful messages

Message	Meaning
Local-901-Initializing	This message is output every time the server is powered on or initialised. It gives the ethernet address and firmware versions.
Local-902-Waiting for image load	If this message repeats every thirty seconds it means that no host is responding to the downline load request.
Local-902-Waiting for image load Local-903-Loading from address Local-904- Image load Complete	This the normal message sequence for a successful downline load.
Local-910-Image load not attempted, network communication error	This message means that the Muxserver cannot do a loopback on the ethernet and has failed its self test. Use Control-P to clear it.
Local-911-Warning non-fatal error detected. Server code nnn1	The server code 0001 means that the server has reset itself to factory defaults.
Local-911-Warning non-fatal error detected. Server code nn1n	The code 0010 means the server memory is faulty but it may continue working.
Local-911-Warning non-fatal error detected. Server code n1nn	The code 0100 means the ethernet loopback test failed.
Local-911-Warning non-fatal error detected. Server code 1nnn	The code 1000 means that the transceiver does not give heartbeat.
Local-911-Warning non-fatal error detected. Server code nnnn . Terminal codes n n n nn	The terminal code 01 for the supervisor port or 1 for any other port indicates that the server has reset that port to factory settings for some reason. A terminal code of 10 for the supervisor port is not correctable, change the server.
Local-913-Fatal Bugcheck + Codes	This means an internal software error has occurred. There should be a dumpfile created on the load host called ASDMPnnnn.SYS where nnnn is the last 4 digits from the ethernet address. Check if other servers have same problem.
Local-916-Illegal Load Image	Incorrect image downline loaded. Check host software setups.

19.3.8 Troubleshooting

It is very probable that troubleshooting will have to be conducted either at the Muxserver location or the DECmux location. There are room based tests available to test both units. These should always be run before and after changing the unit.

19.3.8.1 Testing the Muxserver

Use a terminal on the supervisor port. From the COM> prompt type TEST.

A list of offline diagnostic options is displayed:
1. Restart
2. Composite port internal logic test.
3. Composite port external test.
4. Modem control test.

Option 2 is self explanatory.

Option 3 needs a loop back connector to be attached to each composite link port. The choice of loopback connectors is:
H325, Modem with internal loop, Remote modem with remote loop or a DECmux. The DECmux will act as a loopback connector automatically. If RS422 is selected then a loopback cable 70-22411-01 is required.

Option 4 tests that the modem control signals are working. Use an H325 connector on each port.

Option 1 is used to reboot the Muxserver after testing is complete.

19.3.8.2 Testing the DECmux II

From the SYS> prompt type TEST.
A list of offline diagnostic options is displayed:
1. Basic option test.
2. Asynchronous port external test.
3. Asynchronous port internal logic test.
4. Composite port external test.
5. Composite port internal logic test.
6. Broadcast test.
7. Echo test
8. Modem control test.

Option 1 is a continuous basic test. A display of "012345678*" appears for each test cycle. To stop the test type ^C.

Option 2 needs an H325 loopback connector on each of the async. ports to be tested. When the test is started then the user is prompted for the ports to be tested. Type in a port number and answer the questions about speed etc. If more ports are to be tested then type in another port number. If no more ports are to be tested then type {CR}. Type ^C to stop the test.

Option 3 is an async. port internal logic test. It tests all ports and takes 30 seconds. Type ^C to stop the test.

Option 4 is an external test of the composite link ports. This test will not work if test 1 has been run. The port characteristics used are the the ones previously defined using the SYSTEM command. For RS232 the loopback can be provided by an H325, a local modem, a remote modem or an automatic loopback provided by another DECmux or a Muxserver. For RS422 there are three loopback methods:
1) Test cable 70-20984-01 between ports A and B
2) Remote cable loopback. Use the cable 70-20984-01 at the remote end of the cable. If the remote end is a "B" port then the test cable needs to be connected to the port as well to pick up the clock signal.
3) Automatic loopback provided by another DECmux or Muxserver.

Option 5 is a test of the composite link internal logic. It always tests both ports.

Option 6 asks for the numbers of the ports to be tested with speeds etc. After entering all the port numbers use {CR} to start the test. The DECmux then broadcasts a test pattern to the terminal. Note that this test does not use flow control.

Option 7 also asks for the numbers of the ports to be tested etc. Type {CR} to start the test. Then use a terminal on the port selected and everything you type in will be echoed to the screen.

Option 8 tests the modem control signals on all eight async. ports and the RS232 composite link ports. You need ten H325 loopback connectors to run this test. Stop the test using ^C. Since the Muxserver does not support modem control this test is not currently very useful.

19.3.8.3 Testing a terminal

To test a terminal port without stopping normal operation. From the COM> prompt on the Muxserver use the command:
START TEST [PORT number] [WIDTH number] [COUNT number]
This outputs "count" lines of "width" characters to the terminal associated with the Muxserver "port". All three arguments are optional.
If the "count" argument is not used then a STOP TEST PORT n command is needed to stop the test.

19.3.8.4 Testing the ethernet

To test that the Muxserver is connected to the same ethernet as another system use the command:
Local> LOOP 08-00-2B-00-AB-CD
where 08-00-etc is the address of the other system.

19.3.8.5 The INIT and RESTART commands

The INIT command is used to shutdown the Muxserver and perform a rom based self test. The command format is the same as for the DECserver 100 (see head1 19). The RESTART command is the same as an INIT command with delay zero.

19.3.9 Factory Reset

To reset the Muxserver :
Locate the reset button on the back of the Muxserver and hold the button in during a power up.

To reset the DECmux:
The reset button is inside the DECmux next to the fan. To get to it, power off and take the top off. Hold the button down and power on. Power off again and replace the top.

19.3.10 Part Numbers

The maintenance philosophy for both the Muxserver and the DECmux is to option swap the failing option AFTER testing to confirm the failure. No option should be swapped without first resetting it to factory settings and running the tests.

Table 19–11: Part Numbers

Description	Part Number
Muxserver 100 (240v)	70-24216-01
Decmux II (240v)	70-20999-01
Test Connector	H325
RS422 test cable	70-22411-01
RS422 test cable	70-20984-01

19.3.11 Known Problems

1. There is sometimes a problem if a DECmux is powered off and on. The composite link does not always restart. The fix is a rom change in both the DECmux and the Muxserver. The fco numbers are EQ-01525-01 for the Muxserver and EQ-01524-01 for the DECmux. Both units become revision C.

2. There is a possible performance problem especially if lots of small packets are sent to the terminals. There is a newer version of the Muxserver software which may fix this problem. The old version is V2.1-11.

3. It is possible to hang the composite link if there is noise on the terminal lines. This is exaggerated if the terminal lines are set to dedicated service, autoconnect and autobaud.

19.4 DECSA

This section should be used in conjunction with the DECSA section of the Comms. Minireference Guide.

19.4.1 Part Numbers

Table 19–12: Part Numbers

Part Number	Description
DCSAX-LA	LOW SPEED SYNC CARD
DCSAX-LB	V35 SYNC LINE CARD
DCSAX-LC	DUAL ASYNC LINE CARD
M3110	PAM DMA CONTROL 1
M3111	PAM DMA CONTROL 2
M3112	CBT CONSOLE BOOT TERMINATOR
M7133-YA	11/24 CPU
M8743-AA	512K MEMORY
M8743-BA	1 MEG MEMORY (used in SNA Gateway only)
M7792	DEUNA LINK MODULE
M7793	DEUNA PORT MODULE
12-09403-02	FAN (100 cfm)
H7200	+5V REG
H7211	+15V REG
BC08R-0F	DEUNA CABLE
70-18763-00	AC INPUT ASSY
70-18765-00	FAN HARNESS ASSY
70-18766-00	POWER SUPPLY SIGNAL HARNESS
70-18767-00	+5V POWER HARNESS
70-18768-00	COMM POWER HARNESS
70-18769-00	AC POWER SUPPLY HARNESS
70-19097-00	BACKPLANE ASSY
70-18798-00	LINK TO BULKHEAD CABLE

19.4.1.1 Setting up an M7133-YA module

There is a new 11/24 module. Here is how to set it up for a DECSA:

Figure 19–3:   M7133-YA switchpack locations

Switch pack locations (looking at top of module with
fingers pointing down)

```
┌─────────────────────────────┐
│ E129  E121                  │
│                             │
│ E128                        │
│                             │
```
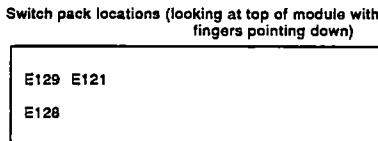
The switchpack settings are:

E129 : 2,5,8,9 on

E121 : 2,3,4,6,7,8 on

E128 : 5,8 on

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Figure 19—4: M7133-YA jumper locations

```
          W3  W2            W1
          |   |   |   |   |   |
          |   |   |   |   |   |        r = resistor
          r   j   j   r   r   j
          |   |   |   |   |   |        j = jumper
          |   |   |   |   |   |
          in  in          out
```
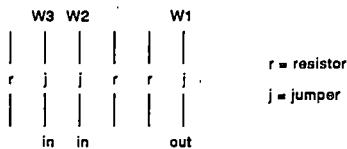
Above E50 there are a group of resistors and jumpers as shown.

W1 should be out.

W2 and W3 should be in.

19.4.2 Testing a DECSA

The DECSA has a set of diagnostics that can be downline loaded from a host. The file on the host is called CSVLDI.SYS or CSVDIAG.SYS.

The diagnostics can be run automatically:

o   Power on or start the DECSA with the TEST button in. This causes a downline load of CSVLDI.SYS which then runs in automatic mode. This means that all the diagnostics run and then the normal operating system software is downline loaded.

The diagnostics can be run individually from the PLU> prompt:

•   Power on or start the DECSA with the test button in and when the downline load has started, release the test button. (Look for L_5n in the led display).

•   Use NCP on a load host to display the node characteristics for the DECSA. One of the characteristics will be the Diagnostic Image which will be something like dev:[dir]csvldi.sys. Then use NCP to load the DECSA with the command :
    NCP> LOAD NODE DECSA FROM DEV:[DIR]CSVLDI.SYS

    If this does not work then it means that the decnet database is not set up correctly for the DECSA. If you can find the ethernet address of the DECSA and the name of the ethernet interface on the system then use a command like:
    NCP> LOAD VIA UNA-0 PHYSICAL ADDRESS 08002B001234 FROM DEV:[DIR]CSVLDI.SYS

A terminal should be connected to the port at the front of the CBT module. It should be set to 1200 baud. After the diagnostic image is loaded, a PLU> prompt should appear on the terminal.

Alternatively, it is possible to connect to a DECSA from a system using an NCP connect command. To do this type:
NCP> CONNECT NODE DECSA
The response should be [REMOTE CONSOLE RESERVED]. If you type <CR> then the PLU> prompt will appear. Use ^D to escape at any time.

19.4.2.1 Possible actions from the PLU> prompt

From the PLU> prompt it is possible type any of the following commands:

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Table 19–13: PLU> Commands

Command	Diagnostic
RUN CIDSAA	PAM REPAIR TEST #1
RUN CIDSBA	PAM REPAIR TEST #2
RUN CIDSCA	LINE CARD TEST 1
RUN CIDSDA	LINE CARD TEST 2
RUN CIDSEA	CBT DIAGNOSTIC
RUN SYSEXE	SYSTEM EXERCISER
AUTO	AUTOMATIC SCRIPT
HELP	LISTS VALID COMMANDS
BOOT	BOOT THE DECSA

The diagnostics are based on xxdp+ diagnostics. When a diagnostic is started a DR> prompt appears. A start command is then required to run the diagnostic. The start command has several switches to allow printout, halt on error etc. I do not intend to list all the commands or the switches in this article. Refer to the xxdp+ books.

I suggest that when the DR> prompt appears, it is a good idea to type:
DR> STA/PASS:1/FLAG:HOE:PNT
This command will allow test printouts to appear and will halt on error or after one pass. The diagnostics will ask if you want to change the hardware, to which the answer is no.

CIDSAA and CIDSBA diagnostics are designed to find faults on the M3110 and M3111 PAM cards only. The PAM cards are set up as address 171200, hardware vector 130, software vector 134 and 171000,140,144.

CIDSCA and CIDSDA diagnostics are designed to test all three types of line cards. They assume that all other diagnostics pass. CIDSCA needs a loopback connector to fitted as each line card is tested. The diagnostic will prompt the user to fit a loopback connector on each card in turn. The diagnostic will also note any empty slots. To test just one line use a command:
DR>STA/PASS:1/FLAG:HOE:PNT/UNIT:7
This command causes line 7 to be tested.

The RS232 line cards (25 pins) use a loopback connector 12-15336-02 which has the following pins connected: 2-3, 4-6, 5-20, 18-12, 15-17-24 and 8-22-23.
The V35 line card (37 pins) uses a loopback connector 12-15336-05 which has the following pins connected: 4-6, 5-8-17, 7-9-13, 11-12, 22-24, 23-26-35.

CIDSEA diagnostic is designed to test the M3112 CBT module. If it is necessary to change hardware to get it to run, answer yes to the change hardware prompt and then type 1 to the unit? prompt.

SYSEXE is a diagnostic designed to create as much activity as possible within the DECSA.

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19.4.3 DECSA Known Problems and Solutions

1. The fans that are fitted in manufacturing are not powerful enough and need to be changed in the UK. The original fans are usually labelled Nidec-Torin Alpha V, TA450S, Model A30390-10, 115v, .110/.104 A, 50/60 Hz, Impedance protected. The label is usually orange. The correct fan is DEC part number 12-09403-02 which is a 100 cfm fan. This is often, but not always, labelled Torin TA450 115v, 0.20/0.22 amps.

   If the fan type is wrong, then the DECSA will sometimes halt for no apparent reason, or suffer from other intermittent failures. The same problems can be caused by insufficient air flow through the box.

2. The DECSA will not downline load if there is no heartbeat from the ethernet transceiver. It hangs with L_40 in the leds just after loading the tertiary loader.

3. After the DECSA has downline loaded its operating system, it then needs to get the line card configuration information from the host. If you see the rotating led pattern on the front of the DECSA, but all the line card leds are still on, then the problem is probably a software set up on the load host.

19.5 Decserver 500/550

19.5.1 Decserver 500/550 General Description

The Decserver 500 is a terminal server based on a PDP11/53 q-bus system in a BA123 box. The system consists of a PDP11/53, an ethernet interface, and up to eight line cards. The line cards are either CXA16 or CXY08 which are standard q-bus comms. options. The CXA16 has sixteen DEC423 lines and the CXY08 has eight RS232 lines. This means that a Decserver 500 can have up to 128 ports.

A Decserver 500 has less memory than the Decserver 550. This means that a different cpu module is used. The Decserver 500 can handle up to 256 simultaneous terminal sessions, whereas the 550 can handle up to 512 sessions. The Decserver 500 has one power supply and the Decserver 550 has two.

The Decserver 500 uses a DEQNA ethernet interface and a Decserver 550 uses a DESQA ethernet interface. A DESQA allows the Decserver to be directly connected to thinwire ethernet.

Each Decserver 500/550 has its own software image on the load hosts, which contains the Decserver operating system plus the server/port set up information. This is different to the way the Decserver 100 and 200 work, which use a local prom to store configuration information and modify the down line loaded image. This means that, for a Decserver 500/550, if a permanent configuration change is required, then the image on each load host needs to be modified.

19.5.2 Decserver 500/550 Part Numbers

Table 19–14: Decserver 500/500 Part Numbers

Part Number	Description
M7554-PB	KDJ11-SB CPU Module for Decserver 500
M7554-SD	KDJ11-SD CPU Module for Decserver 550
M7504-PA	DEQNA Ethernet Interface for Decserver 500
M3127-PA	DESQA Ethernet Interface for Decserver 550
M3118-YA	CXA16 Line Card (16 DEC423 lines)
M3119-YA	CXY08 Line Card (8 RS-232 lines)
H7868-A/B	Power Supply 120v/240v
M9047	Q-bus Grant Card
M9060-YA	Load Module for Slot 10 (Decserver 550 only)
70-23769-01	AC Line Filter
70-01469-01	AC Switch Assembly
70-23712-02	Q-bus Backplane for Decserver 500
70-23712-01	Q-bus Backplane for Decserver 550
17-01360-01	Fan Power Cable
12-23609-04	DC Fans

All fru's should be changed with the power off. All fru's can be changed from the front of the box.

If the ethernet interface is changed, then you must either install the old address chip into the new interface or get the customer to change the host node decnet database using DSVCON-FIG.COM. Remember, there may be several host nodes, and they will all need changing.

The Decserver 550 backplane has jumpers removed to separate the DC output from the two power supplies. It is possible to use one of these backplanes in a Decserver 500, if the jumpers are reinstalled. (Copy the old backplane.)

DO NOT DO THIS EXCEPT IN AN EMERGENCY. REMOVE THE JUMPERS AGAIN ONCE THE CORRECT PART HAS BEEN RESOURCED.

19.5.3 Configuration of Decserver 500/550

Slot 1 is used for the CPU/Memory Module

Slot 2 is used for the ethernet interface.

Slots 3 to 12 are known as LC1 to LC10. Slots LC1 to LC8 are used for line cards which can be any combination of CXA16's and CXY08's in any order.

Slot 12, known as LC10, has a M9060-YA load module fitted in a Decserver 550 only.

The device address is selected using switchpack E36 on a CXY08 or E34 on a CXA16. The vector address is selected using switchpack E28 on a CXY08 or E27 on a CXA16. The following settings (1=closed) should be used:

Table 19–15:   Decserver 500/550 Line Card Device Address Switch Settings

Slot	Device Address	Switch Setting 1-10	Vector	Switch Setting 1-8	Ports
3	17760440	0000010010	310	10011001	1-16
4	17760460	0000010011	320	10011010	17-32
5	17760500	0000010100	330	10011011	33-48
6	17760520	0000010101	340	10011100	49-64
7	17760540	0000010110	350	10011101	65-80
8	17760560	0000010111	360	10011110	73-96
9	17760600	0000011000	370	10011111	97-112
10	17760620	0000011001	400	10100000	113-128

19.5.4 Servicing the Decserver 500

The main maintenance aids on a Decserver 500 are the rom-based self tests, the different boot modes, the status display and the console port. The boot mode select switch is a 16 position rotary switch on the front of the CPU/Memory module in slot 1. It is used to control the power up self tests and should normally be set to position 0 or 1.

The CPU/Memory module has a DEC423 comms. port marked A1 to be used for the local console device. The console should be set to 9600 baud, 8 bit, no parity. To use an RS232 terminal, use a BC16E-xx cable with an H8571 passive adapter.

19.5.4.1 Self Tests and Status Displays

When a working Decserver 500 is powered on, some rom based diagnostics test each module. If the tests pass then the Decserver will request a down line load over the ethernet. A host node, probably a VAX, will then load the software into the Decserver 500. The indicators will be:

o   one led on each power supply ON.

●   one red led on each line card ON.

o   DEQNA/DESQA leds all OFF.

o   An alternating 0/8 display on the CPU module.

Other status displays may occur. (see table for meanings)

Table 19-16: Decserver 500/550 Status and Error Displays

Display	Description
	/ indicates alternating display
1	Cpu test in progress
1/2	Line card and ethernet test in progress
1/C	Configuration Test in progress
1/3	External ethernet test in progress
1/4	Extended line card test in progress
1/5	System exerciser test in progress
1/6	Local console in control
1/7	Remote console in control ie. someone has used an NCP> Connect command
0	System Kernel Test failed, This means cpu module, bus or power problem
E/2	Line card or ethernet interface test failed. Look for a led on.
E/3	Extended ethernet test failed. This could be ethernet connection or the module.
E/4	Extended line card test failed.
E/5	System exerciser test failed.
E/C	Diagnostic program software error.
E/F	There is a hardware configuration error. Check for wrong address/vector switches.
B/1	The Decserver is requesting a load from one host.
B/2	The Decserver is requesting a load from any host set up to load.
B/3	A load host has agreed to load the server. The server is requesting the software.
B/4	The software is being downline loaded.
B/5	The server software is initialising and starting.
0/8	The server is running normally.
E/B	Downline load failed
F	Internal software problem.
D/1	Dump request issued to one host.
D/2	Dump request issued to all hosts set up to receive one.
D/3	Server memory dump in progress.
D/4	Server memory dump complete.
E/D	Server memory dump failed.

19.5.4.2 Boot Modes

The boot modes are selected using the rotary switch on the cpu module. Boot modes 0,1,2,3,7, and F are allowed.

BOOT MODE 0 is the normal boot mode. It ignores line card errors. Remote console connections are allowed.

BOOT MODE 1 is also a normal boot mode. If a line card error occurs then an error code will be displayed and the server will not downline load. Remote console commands are not allowed.

BOOT MODE 2 allows the use of the local console or remote console. See console commands section.

BOOT MODE 3 allows you to check the configuration. When the server rom based self tests complete it runs a configuration program. The results of the program are printed on the local console. The led on the line card in slot 3 then comes on. If you move the boot mode select switch from position 1 to A it will light the led on the associated line card and print out the address and vector for the card. So, for example, if you move it to position 4, the led on line card 2 will come on and its address and vector will be displayed on the console.

BOOT MODE 7 allows the running of an extended self test. Do not use this as the normal boot mode, otherwise the server will take too long to reboot.

BOOT MODE F is used for manufacturing testing and will not work in the field.

19.5.4.3 CONSOLE COMMANDS

The console commands are used to run module diagnostics in the Decserver 500/550. They can be issued from the local console or from a remote console. To connect to a Decserver from a VMS node: .
NCP> CONNECT VIA circuit-name PHYSICAL ADDRESS ethernet-address

The prompt is Console>.

19.5.4.3.1 HELP

Gives a description of all the commands.

19.5.4.3.2 SELECT and DESELECT

These commands are used to select the tests to be run.

Type SEL/TEST:xxx where xxx can be:

○   ASY to run asynchronous tests.

○   ETH to run ethernet tests.

○   SYS to run a system test.

○   ALL which is the default and runs all the tests.

The DESELECT command has the same format.

Advanced and ambitious users may also use the /SUBTEST:n switch here.

19.5.4.3.3 ADD, DROP and MODIFY

The ADD and DROP commands are used to select which modules should be tested. By default all modules are tested.

The MODIFY command is used to modify the test parameters for each module. By default all lines on each module are tested using internal loopback.

Type DROP/UNI:NET to no longer test the ethernet interface.

Type DROP/UNI:LC1-LC3,LC7 to no longer test line cards 1,2,3 and 7.

Type ADD/UNI:LC1 to enable testing line card 1.

Type ADD/UNI:ALL to enable testing all modules.

Type MOD/UNI:LC1 to change the way that line card 1 is tested.
The Decserver will ask which lines are to be tested:
Line to test (ALL)> 0-3 ! This means lines 0,1,2 and 3 are tested.
Looptype (INTERNAL)> EX ! This means external testing.

Type MOD/UNI:NET to modify way that the ethernet module is tested.

19.5.4.3.4 START and CONTINUE

This is the command that starts the tests. Use Control-C to interrupt the tests. Use CONTINUE to resume the tests after a Control-C or a halt on error.

The general format of a START command is:
START /FLA:xxx,xxx /PAS:passn /EOP:eopn /UNI:lcn /TES:testname

The general format for a Continue command is:
CONTINUE /FLA:xxx,xxx /PAS:passn /EOP:eopn

where XXX is:

•   BOE for bell on error

- HOE for halt on error

- IER for inhibit all error reporting

- ISR for inhibit statistics reporting

- LOT for loop on test

- PNT for printout test numbers as they execute

PASSN is the number of passes.

EOPN is the number of passes between an end of pass report

LCN could be NET, LC1, LC2-4 etc.

19.5.4.3.5 DISPLAY, FLAGS, ZFLAGS, PRINT and BOOT

The DISPLAY command causes a display of the server configuration and the current set up of the diagnostic ie flags, units under test etc.

The FLAGS command causes a display of the current diagnostic flag settings.

The ZFLAGS command resets all the diagnostic flags.

The PRINT command causes a statistical summary report display.

The BOOT command causes the server to request a down line load.

19.5.5 Host Node Software

Each Decserver 500/550 has its own unique software image on the load host. If the Decserver 500/550 has a Decnet node name of ABCDEF then the load image is called DS5ABCDEF.SYS. It is usually in a directory called SYS$SYSROOT:[DECSERVER]. There will also be a dump file called DS5ABCDEF.DMP. The same command file, DSVCONFIG.COM, that it is used with the Decserver 100 and 200's, is used to add a Decserver 500/550 to a host nodes Decnet database. This command file uses a template image called DS5TSV.SYS to create the new unique image for each Decserver. The downline load will not work if the ethernet address changes.

To change a server characteristic so that it becomes permanent (eg. port speed) the load image must be patched. To do this a program called SYS$COMMON:[DECSERVER]DS5CFG.EXE is run. When the program is started it asks for the name of the image which in the above example would be DS5ABCDEF.SYS. The prompt then becomes TSC> at which time DEFINE, LIST and PURGE commands can be used to change the server characteristics. This mode is exited by the use of the command EXIT or Control-Z.

There is a SAVE command on the Decserver 500/550 which can be issued from a Local> prompt. This command saves changes made to the port characteristics until the next down line load.

Options Affected:	DECSERVER 250
Submitted By:	Jim Burnley
Date:	26-MAR-1990
Filing Instructions:	The end of Chapter 19, ETHERNET_SERVERS

Decserver 250 Failure on power up.

The decserver 250 is a six line ethernet based server. It provides connections for Four RS232 async printers and two Parallel printers such as the LP29.

The Decserver 250 fails on power up with led 1 lit and led 2 off. This is normally seen when a printer attached to either of the parallel ports Via a BC27A cable is powered off during server booting. There are two work arounds for this problem. The first is to make sure that the printer is powered up when you boot the decserver. The second is to disconnect the BC27A cable before booting the server. The problem is currently being looked into by engineering. If you see any customers experiencing this problem then please let me know.

1

Options Affected: DECServer 500
Submitted By: Nigel Baker
Date: 24-AUG-1990
Filing Instructions: End of Chapter 19, Ethernet Servers

DECServer 500, Baud rate jumpers

The port speeds on the CPU module come pre-set at 9600, but may be changed via jumper connections.

```
Baud Rate JUMPER location on the M7554 CPU module
---------------------------------------------------

        +------------------+
        |        J1        |
        +------------------+
         o W10 o   o W4  o
       , o W7  o   o W6  o
         o W12 o   o W9  o

         Port A2    Port A1

Baud Rate Jumper configuration table
-------------------------------------

Console Port A1 ------- W4  W6  W9
Console Port A2 ------- W10 W7  W12

               Speed
                 300 Out Out Out
                 600 Out Out In
                1200 Out In  Out
                2400 Out In  In
                4800 In  Out Out
                9600 In  Out In
               19200 In  In  Out
               38400 In  In  In
```
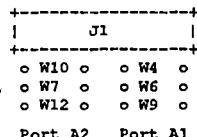
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