BLACK BOX Catalogue Ltd
The Source for Connectivity

MXU9910-R2

MICROMUX SP-3i
ULTIMA REVISION 2.1

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Introduction

The MicroMux SP-3i range consists of five standard products. In addition to these many special versions can be configured to meet special order requirements, thanks to the comprehensive and flexible design of the MicroMux SP-3i environment.

There are two standard hardware platforms that support the five standard products. The first standard hardware platform has a single network port and two DTE/DCE ports. This platform supports the single port and dual port SP-3i versions. The second hardware platform can be built with either one or two network ports, or two, four or six DTE/DCE ports. This platform supports the SP-3i SFP (four port), SHP (six port), and the SP-3i Ultima build standards. The network ports can be defined as T1 or E1 as a build option. The second hardware platform can also support a mix of one E1 network port and one T1 network port.

Special versions of the MicroMux SP-3i can include variations of hardware build standard, not included in the five standard versions, and special versions of software, to support alternative applications, such as CAS or CCS requirement and data broadcast, for example. Please contact your distributor for more information on special requirements.

Theory of operation

The MicroMux SP-3i range is a family of G.703 / E1 CEPT access multiplexors, ranging from a simple single port version up to the comprehensive SP-3i Ultima with add / drop capability and six synchronous serial data ports. Any one of the product variations can be built with a T1 interface in place of an E1 interface.

At the heart of every member of the MicroMux SP-3i family is a digital cross-connect switch. This switch operates at the system clock speed, a nominal 2Mbit/s clock frequency. The exact frequency of this clock is a function of the clock source. The architecture allows this clock to be synchronised to any of the interfaces populated in the particular MicroMux in question, or synchronised to an internal clock. The management system includes a clock arbitration mechanism and a clock pecking order definition. The internal architecture of the MicroMux family allows any of these clock sources to be used to synthesise the 2Mbit/s clock and the associated 8kHz framing pulse. If an external clock source should fail, due to a network line failure, for example, the MicroMux SP-3i will fall back to the next clock source defined in the clock pecking order, automatically, to a depth of up to nine clock sources. The T1 versions of the MicroMux SP-3i also run internally at 2Mbit/s.

Data received at a network port, be it an E1 or a T1, is recovered into a 2Mbit/s stream which is fed to an input of the cross-connect. The actual data stream appears as thirty two 8-bit channels in a 125 microsecond period, although the actual data can be channellised or clear channel data. Likewise, data received at a DTE/DCE port is converted into a 2Mbit/s data stream. If the data rate of the DTE/DCE port is less than 2Mbit/s, as it will be in most cases, the data is put into the appropriate number of nominal 8-bit channels to map to the data rate of the port. If the port is running at a multiple of 56k, rather than 64k, then only seven out of the available eight bits are used. These streams are also fed to an input of the cross-connect.

The cross-connect has eight input streams. Likewise, the cross-connect has eight output streams. There is an input and an output stream for each of the eight ports. The output streams are mapped back to the outputs of the network ports and data ports. The switching of the nominal channels between the input streams and the output streams, i.e. the process whereby data is multiplexed together for transmission, is controlled by the cross-connect.

The cross-connect enables any nominal input channel to be mapped to any nominated output channel on any one of the eight streams. The setting-up of the cross-connect could be a very complex task if the user had to do it all using many one line commands. However, the process is greatly simplified by the user interface of the MicroMux SP-3i management software. The setting up of a DTE/DCE port automatically configures the data rate on that port and the channel mapping of the cross-connect. The data rate is defined by the number of channels allocated to carry the data on the chosen network port. These channels are selected, and mapped to the chosen channels on the selected network port, using a simple screen based menu. The setting up of the cross-connect, the port logic to map the input and output data steams, and the clock generation and data buffering for the DTE/DCE port, are all functions handled automatically by the MicroMux SP-3i management software. The selected parameters are stored in non-volatile memory so that, should there be a power interruption, the configuration is restored automatically to that set-up by the user.

The MicroMux SP-3i is based on industry standards, thus the data carried by the network ports is in industry standard format, and can be de-multiplexed by a third party system. This is quite a common requirement in Carrier and Service Provider applications. However, in corporate private networking applications it is usual for the MicroMux SP-3i systems to be used in pairs. Where the MicroMux SP-3i systems are used in pairs it is imperative that both be set up in such a way that the data mapping of the groups of channels associated with each output port is consistent within both units. This will ensure consistent operation both end to end and port to port.

The MicroMux SP-3i range supports in-band remote management between two units. The data can be carried either in a dedicated time slot or within the spare bits in time slot zero. In either case the user can gain access to the management interface of the remote unit, just as if they were directly connected to it. This enables a pair of units to be managed from one site, and eliminates the need for remote site visits to change set-up parameters, or the need for trained personnel at the remote site. It also means that the set-up of both units can be changed within a matter of minutes. This can be very useful as a means of enabling transient applications, such as video conferencing, or changing the band width mix to cope with particular circumstances, such as monthly back-up procedures.

The MicroMux SP-3i range, with release V2.10, supports SNMP. The local SNMP interface is accessed via the async management port using the SLIP protocol. The SNMP interface can also be accessed from a remote unit, via the same remote management channel as used for remote terminal management.

The MicroMux SP-3i range has some special niche applications, particularly the single port version. The MicroMux SP-3i single port version can function as a clear channel unit, like the established MicroMux SP-1, and as a single port rate adapter, or Nx64k / Nx56k access device, like the established MicroMux SP-3 SRA. Ports on multiport systems can also be used clear channel mode. The difference is that the SP-3i has management. The remote management can also be used in both clear channel and rate adapting (channellised) mode.

When in clear channel mode all of the available 32 channels are used to carry user data from the DTE/DCE port transparently at 2Mbit/s. The configuration for this mode is set up using the unstructured setting option in the G703 port set up menus. The clear channel mode is enabled by setting the default mode to unstructured, again in the G703 port set up menus. If remote management is required then the MicroMux SP-3i with the attached management terminal (the local unit) turns on the channellisation and down speeds the DTE/DCE interface from 2Mbit/s to 1.984Mbit/s or 1.920Mbit/s. The remote MicroMux SP-3i senses that channellisation has been turned on and it too down speeds its DTE/DCE port per its configuration. This happens within a few milli-seconds. The attached equipment will see a very brief burst of errors due to miss-match of the data rates, but will recover within a few milli-seconds. With channellisation enabled the two MicroMux SP-3i units can communicate using the spare bits in time slot zero, or a dedicated time slot. The default is to use the spare bits in TS0, however, the configuration can be set to use any time slot. The local unit can take over the management port of the remote unit. When the management functions have been performed the local unit can revert to clear channel mode. The remote unit will sense that channellisation has been turned off and it too will revert to clear channel mode. Again, there will be a few milli-seconds where the attached equipments see errors, but they will recover within a few milli-seconds and revert to full 2Mbit/s operation.

Installation

Initial set-up parameters

Management port
Management port cables

Network ports
Network port cables
Network port jumper configuration

DTE/DCE ports
DTE/DCE port cables
DTE/DCE jumper configuration

Initial set-up parameters

The MicroMux SP-3i is set-up by default when shipped as follows:

Port A, and Port B when fitted: 75 ohm, structured (G.704).

Ports 1 to 6 as fitted: V.11 DCE, 64k bit/s, transmit TxClock and RxClock.

The system is set to use the internal clock.

On first unpacking the unit and the initial powering up the user should go through the following sequence to ensure that the non-volatile NV RAM is re-initialised.

Load the factory default settings.
Save the configuration to NV RAM. This will over-write the previous contents of NV RAM.
The unit should then be power cycled. This will load the current contents of NV RAM.

This procedure ensures that no spurious data from NV RAM is loaded into the configuration. The user can now set the channel mappings to suit the application, and save them to NV RAM.

The factory default channel mappings on a MicroMux SP-3i Ultima are set as follows:

```
                        Black Box SP-3I                              L6

                        View system configuration

IP=0.0.0.0, Clock Order I I I I I I I I I,
G703 port A HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=DTE 1
      00-09 >  SYNC  C01  C02  C03  C04  C05  C06  C07  C08    --
      10-19 >   --    --   --   --   --   --  C16   --   --    --
      20-29 >   --    --   --   --   --   P1   P2   P3   P4    P5
      30-31 >   P6    --
G703 port B HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=None
      00-09 >  SYNC  C01  C02  C03  C04  C05  C06  C07  C08    --
      10-19 >   --    --   --   --   --   --  C16   --   --    --
      20-29 >   --    --   --   --   --   --   --   --   --    --
      30-31 >   --    --
DTE port 1 G703 port A,TxcOut/RxcOut,V11,Txc,1x64k=64k
DTE port 2 G703 port A,TxcOut/RxcOut,V11,Txc,1x64k=64k
DTE port 3 G703 port A,TxcOut/RxcOut,V11,Txc,1x64k=64k
DTE port 4 G703 port A,TxcOut/RxcOut,V11,Txc,1x64k=64k
DTE port 5 G703 port A,TxcOut/RxcOut,V11,Txc,1x64k=64k
DTE port 6 G703 port A,TxcOut/RxcOut,V11,Txc,1x64k=64k

Please press 'Q' to quit >
```

Management Port and Management Port Cable

The management port is presented on an RJ45.

A simple three wire interface is required, set for 19200, 8 bit, no parity.

The terminal emulation mode required is VT100.

Pin 4 Gnd
Pin 5 Tx
Pin 6 Rx

One important operational difference of V2.10 systems is the behaviour of the async management interface port. On power up the SP-3i system listens on the async management port. If a `carriage return` character is observed on the interface then the system assumes that a conventional terminal interface is required and switches to that mode. If a `SLIP packet` is observed on the interface then the system assumes that a terminal server or a router with a SLIP port is attached, and that a SLIP interface is required, and so it switches to that mode. If a `carriage return` character is not observed on the interface within a ten-second period after power up then the system defaults to SLIP mode.

Async management mode is required for the initial set up, in order to set up the IP address and the community strings for SNMP. Therefore the initial installation will always need to be with async mode. It is recommended that the user have a terminal (or terminal emulation on a PC) connected and configured, ready to go, before powering up the SP-3i system. On power up the user should enter a carriage return within the ten-second time out period to activate the async management system.

Network Ports and Network Port Cables

The network ports are presented on DB15 female connectors. The selection between 75 ohm and 120 ohm operation is a combination of hardware and software selection. The termination resistance and grounding of shield options are configured by hardware jumpers (see next section). The selection of output waveform is a software function, set up via the management menu system (see user interface section). The network port cable specifications are in the appendix.

DTE/DCE ports and DTE/DCE port cables

The DTE/DCE ports are presented on DB25 female connectors. The selection between V.11 and V.35 operation is a combination of hardware and software selection. The termination resistance and selection of some receivers is configured by hardware jumpers (see next section). The selection of output drivers is a software function, set up via the management menu system (see user interface section). The DTE/DCE port cable specifications are in the appendix.

Management screen status line display

At the bottom of every management display there is a status line. Note that the status line is updated in real time in most menu screens. The left most box displays the system time, note that the clock should be set to the correct local time when the system is installed.

Network port jumper configuration

Jumper positions for 75 ohm termination

Port A	Port B	Position	Function
L18	L66		No function in 75 ohm mode.
L19	L67	Un-made	Tx Shield to signal ground.
L20	L68	Un-made	Rx Shield to ground.
L27		Un-made	Port A ground to Port B ground.
L1, L2	L63, L64	Made	Provides correct termination resistance for 75 ohm.

Jumper positions for 120 ohm termination

Port A	Port B	Position	Function
L18 made).	L66	Optional	Tx Shield to signal ground (recommended position is
L19	L67	Un-made	No function 120 ohm mode.
L20	L68	Un-made	No function 120 ohm mode.
L27		Un-made	Port A ground to Port B ground.
L1, L2	L63, L64	Un-made	Provides correct termination resistance for 120 ohm.

DTE/DCE jumper configuration

Jumper positions for X.21, EIA530 and RS449 operation

Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Position	Function
4 resistors	14	26	36	45	54	Un-made	Enable V.11 drivers / termination
5 resistors	15	27	37	46	55	Un-made	Enable V.11 drivers / termination
7 resistors	16	29	38	47	56	Un-made	Enable V.11 drivers / termination
8 resistors	17	30	39	48	57	Un-made	Enable V.11 drivers / termination
9 resistors	21	31	40	49	58	Un-made	Enable V.11 drivers / termination
10 resistors	22	32	41	50	59	Un-made	Enable V.11 drivers / termination
11 resistors	23	33	42	51	60	Un-made	Enable V.11 drivers / termination
12 resistors	24	34	43	52	61	Un-made	Enable V.11 drivers / termination
72 resistors	74	76	73	75	77	Un-made	Enable V.11 drivers / termination
78	80	82	84	86	88	Made	Enable V.11 receivers for DTE mode.
79	81	83	85	87	89	Made	Enable V.11 receivers for DTE mode.

Jumper positions for V.35 operation

Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Position	Function
4 resistors	14	26	36	45	54	Made	Enable V.35 drivers / termination
5 resistors	15	27	37	46	55	Made	Enable V.35 drivers / termination
7 resistors	16	29	38	47	56	Made	Enable V.35 drivers / termination
8 resistors	17	30	39	48	57	Made	Enable V.35 drivers / termination
9 resistors	21	31	40	49	58	Made	Enable V.35 drivers / termination
10 resistors	22	32	41	50	59	Made	Enable V.35 drivers / termination
11 resistors	23	33	42	51	60	Made	Enable V.35 drivers / termination
12 resistors	24	34	43	52	61	Made	Enable V.35 drivers / termination
72 resistors	74	76	73	75	77	Made	Enable V.35 drivers / termination
78	80	82	84	86	88	Un-made	Enable V.35 receivers for DTE mode.
79	81	83	85	87	89	Un-made	Enable V.35 receivers for DTE mode.

User interface

The user interface is accessed via an asynchronous data port. This port requires a three wire interface and supports Xon/Xoff flow control. The most common terminal attachment is a PC running a suitable terminal program. A conventional terminal can also be used.

LEDs - MicroMux SP-3i SDP

There are seven LEDs on the MicroMux SP-3i SDP, dual port hardware platform. From right to left their functions are as follows:

Power   On when power is connected to the MicroMux SP-3i.

Network   On when good HDB3 encoded signal is received on the network Port A.

Sync   On when good G.704 framing is received on the network Port A.

Clock Master   On when the internal clock is being used as the master clock for the system.

Clock Master   No function in current software release.

External   Flashes on when the system clock is being derived from either Port 1 or Port 2.

Remote   On when the system clock is being derived from Port A.

LEDs - MicroMux SP-3i Ultima (SFP, SHP de-populated).

There are eleven LEDs on the MicroMux SP-3i Ultima, dual network port, six data port hardware platform. From right to left their functions are as follows:

Power   On when power is connected to the MicroMux SP-3i.

Network 1   On when good HDB3 encoded signal is received on the network Port A.

Frame Sync 1   On when good G.704 framing is received on the network Port A.

Frame Sync 2   On when good G.704 framing is received on the network Port B.

Network 2   On when good HDB3 encoded signal is received on the network Port B.

Clock Master   On when the internal clock is being used as the master clock for the system.

External   Flashes on when the system clock is being derived from either Port 1 or Port 2.

Remote   On when the system clock is being derived from Port A
               Flashes when the system clock is being derived from Port B.

Loop back   There is a group of three LEDs for Loop back.
The right hand LED is for Port A Loop back.
The centre LED is for Port B Loop back.
The left hand LED is for DTE/DCE port Loop back (flashes in code).

The Logon Menu

On power up of the SP-3i the Logon Menu is displayed. If a password has been set then the screen will display a sign-on prompt. The Logon Menu has three options, Local, Remote, and Logoff. An option is selected by entering the appropriate number at the prompt. It is not necessary to enter a return or line feed character. There is a status line of the product display, but this has been omitted from the illustrations for clarity.

```
                    Black Box SP-3i

                      Logon Menu

                       1. Local

                       2. Remote

                       3. Logoff

Please select an item from the menu >
```

On selecting Local from the Logon Menu the SP-3i Main Menu is displayed. This menu is labelled L0 for easy reference. The 'L' indicates that this is the Main Menu of the local unit.

On selecting Remote from the Logon Menu SP-3i Main Menu for the remote unit is displayed. This menu is labelled R0 for easy reference. The 'R' indicates that this is the Main Menu of the remote unit. Other than the 'R' in the menu label the menu systems for the local and remote units are identical.

On selecting Logoff from the Logon Menu the user will be returned to the sign-on prompt.

The Status Line

At the bottom of every management display there is a status line. Note that the status line is updated in real time in most menu screens. The left most box displays the system time, note that the clock should be set to the correct local time when the system is installed.

An example status line display:

```
12:01:46|Changed |No clock|S.. BC..|C.. GC.1|         |        |RM=Ach17|*no
rem*
```

Block one is the time display.

Block two indicates if changes have been made to the set up and not implemented.

The third block indicates the current clock source.

Block four (and block five if the system is an Ultima):

First field
This shows the transmit mode of the E1 port.
S = Structured, C = Clear

Second field
This shows the status of transmit alarm bit on the E1 port.
A = the alarm bit is set, a dot (.) = the alarm bit is not set.

Third field
This shows the status of the transmit all ones signal on the E1 port.
1 = AIS is being transmitted, a dot (.) = normal data is being transmitted.

Fourth field - not used at this time.

Fifth field
This shows the receive status of the E1 port, specifically Loss of Input, LOI.
G = good i.e. a good signal is being received
B = bad i.e. either there is no receive signal or the receive signal can not be decoded.

Sixth field
This shows additional information about the received signal on the E1 port, specifically Loss of Sync, LOS.
S = Structured, C = Clear channel i.e. no sync data is being received.

Seventh field
This shows the receive status of the alarm bit on the E1 port.
A = the alarm bit is set, a dot (.) = the alarm bit is not set.

Eighth field
This shows the receive status of all ones on the E1 port.
1 = AIS is being received, a dot (.) = normal data is being received.

Block six and block seven are currently not used.

Block eight indicates the remote management time slot selection.

RM=off means that no time slot has been selected.
RM=Ach00 means that time slot zero on port A has been selected.
RM=Bch31 means that time slot 31 on port B has been selected.

Note that if TS0 is selected then the actual bit to be used must also be selected in the National Bits Usage menu, L14.

Block nine indicates the status of the remote management link.

`*no rem*`
means remote management is enabled but no connection is established.

`menu off`
means that the remote management is enabled, there is a logical link connection, and the terminal attached to the remote system is logged off.

`menu loc`
means that the remote management is enabled, there is a logical link connection, and the terminal attached to the remote system is logged in, and is in local management mode i.e. a remote user is actively managing what is to you the remote unit.

`menu rem`
means that the remote management is enabled, there is a logical link connection, and the terminal attached to the remote system is logged in, and remote management mode i.e. the remote user is actively managing what is to you the local unit.

The Main Menu

On selecting Local from the Logon Menu the SP-3i Main Menu is displayed. This menu is labelled L0 for easy reference. The 'L' indicates that this is the Main Menu of the local unit. The menu has seven options, Setup, System Maintenance, Save configuration, Restore configuration, Reset to factory defaults, View configuration, and Implement changes. An option is selected by entering the appropriate number at the prompt. It is not necessary to enter a return or line feed character.

```
                    Black Box SP-3i                           L0

                         Main Menu

                1. Setup

                2. System Maintenance

                3. Save configuration

                4. Restore configuration

                5. Reset to factory defaults

                6. View configuration

                7. Implement changes

Please select an item from the menu or 'Q' to quit this menu >
```

On entering 1, the user interface switches to the System Setup menu, L1. To return to the higher level menu simply enter the 'Q' character (upper or lower case).

On entering 2, the user interface switches to the System Maintenance menu, L2. To return to the higher level menu simply enter the 'Q' character (upper or lower case).

On entering 3, the user interface enters the Save configuration mode, still in menu, L0. The system manager is given the option to save the new configuration (Y/N) and to return to the Main Menu. If any parameter is changed by actions in the menus, the word 'Changed' will be displayed in the status line of the menu screens.

On entering 4, the user interface enters the Restore configuration mode, still in menu L0. The system manager is given the option to restore the configuration (Y/N) and to return to the Main Menu.

On entering 5, the user interface enters the Reset to factory defaults mode, still in menu L0. The system manager is given the option to restore the default configuration (Y/N) and to return to the Main Menu.

On entering 6, the user interface switches to the View system configuration menu, L6. This screen displays a summary of the current configuration including IP address, clock order, channel allocations and DTE/DCE port set up. To return to the higher level menu simply enter the 'Q' character (upper or lower case).

On entering 7, the user implements any changes made to the configuration in the lower menus. The status line indicates if changes have been made since the last 'save configuration' operation.

The Save Configuration option

If any parameter has been changed by actions in the menus, the word 'Changed' will be displayed in the status line.

```
            Black Box SP-3i                        L0

                  Main Menu

       1. Setup

       2. System Maintenance

       3. Save configuration

       4. Restore configuration

       5. Reset to factory defaults

       6. View configuration

       7. Implement changes

Save this configuration? Please confirm 'Y' or 'N' >
```

On selecting 3, the screen display will change to show the bottom line as above. The systems manager has the option to enter 'Y', to save the updated configuration parameters and return to the Main Menu, or 'N', to return to the Main Menu without saving the new configuration parameters. If the new configuration parameters are saved then the 'changed' message will disappear from the status line. If the new configuration parameters are not saved then the 'changed' message will remain in the status line display.

The Restore Configuration option

If, at any time, the system manager wishes to restore the configuration parameters to the set stored within the SP-3i then the Restore configuration option can be invoked.

```
               Black Box SP-3i                          L0

                    Main Menu

           1. Setup

           2. System Maintenance

           3. Save configuration

           4. Restore configuration

           5. Reset to factory defaults

           6. View configuration

           7. Implement changes

Restore previous configuration? Please confirm 'Y' or 'N' >
```

On selecting 4, the screen display will change to show the bottom line as above. The systems manager has the option to enter 'Y', to restore the previously saved configuration parameters and return to the Main Menu, or 'N', to return to the Main Menu without restoring the saved configuration parameters. If the stored configuration parameters are restored then the 'changed' message will disappear from the status line. If the stored configuration parameters are not restored then the 'changed' message will remain in the status line display.

The Reset to Factory Defaults

If, at any time, the system manager wishes to reset the SP-3i to the factory default configuration then the Reset to Factory Defaults option can be invoked.

```
                    Black Box SP-3i                         L0

                        Main Menu

                1. Setup

                2. System Maintenance

                3. Save configuration

                4. Restore configuration

                5. Reset to factory defaults

                6. View configuration

                7. Implement changes


Reset to factory defaults? Please confirm 'Y' or 'N' >
```

On selecting 5, the screen display will change to show the bottom line as above. The systems manager has the option to enter 'Y', to reset the SP-3i to the factory default configuration parameters and return to the Main Menu, or 'N', to return to the Main Menu without resetting the SP-3i to the factory default parameters. If the factory default configuration parameters are restored then the 'changed' message will disappear from the status line. If the factory default configuration parameters are not restored then the 'changed' message will remain in the status line display.

The View Configuration Menu

The view configuration menu is a read only / display menu that enables the systems manager to see the current configuration without having to go through the set-up and other derivative menus.

```
                    Black Box SP-3i                               L6

                   View system configuration

IP=0.0.0.0, Clock Order I I I I I I I I I,
G703 port A HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=None
      00-09 >  SYNC  --   --   --   --   --   --   --   --   --
      10-19 >   --   --   --   --   --   --   --   --   --   --
      20-29 >   --   --   --   --   --   --   --   --   --   --
      30-31 >   --   RM
G703 port B HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=None
      00-09 >  SYNC  --   --   --   --   --   --   --   --   --
      10-19 >   --   --   --   --   --   --   --   --   --   --
      20-29 >   --   --   --   --   --   --   --   --   --   --
      30-31 >   --   --
DTE port 1 G703 port A,TxcOut/RxcOut,V11,Txc,no channels 64k
DTE port 2 G703 port A,TxcOut/RxcOut,V11,Txc,no channels 64k
DTE port 3 G703 port A,TxcOut/RxcOut,V11,Txc,no channels 64k
DTE port 4 G703 port A,TxcOut/RxcOut,V11,Txc,no channels 64k
DTE port 5 G703 port A,TxcOut/RxcOut,V11,Txc,no channels 64k
DTE port 6 G703 port A,TxcOut/RxcOut,V11,Txc,no channels 64k


Please press 'Q' to quit >
```

The IP address of the system is displayed first, then the status of the clock source, followed by the channel allocations for G703 Port A, the channel allocations for G703 Port B, and then the status of the DTE/DCE ports. The only option in this menu is the quit option. To return to the higher level menu simply enter the 'Q' character (upper or lower case).

The G703 port status line displays the default status of the G703 port i.e. structured or unstructured. It also displays the set up for unstructured mode, as the final line item. If the default mode is unstructured and the line input is clear channel with no framing then the SP-3i will switch to unstructured mode on its output, and switch all 32 channels of input to the port defined as the unstructured default port. This is the managed SP-1 operating mode. This mode is only likely to be used on single or dual port SP-3i units. If remote management is required then the input will become framed, by virtue of the remote unit switching to framed mode to enable a remote management request. On sensing framed input the local unit will switch to structured operation, and remote management will be enabled. The speed of the data port will automatically be reduced from the full 2048kbit/s to a fractional rate, as a function of the structured set up parameters.

The default mode on the multiport units is likely to be structured, as this is necessary for the multiplexing. However, in the event of loss of sync on the G703 input they will automatically

switch to unstructured mode, and route the data according the unstructured set up. When sync is recovered on the input then operation will automatically revert to structured mode.

Note that the system menu structure is identical for all five of the standard SP-3i products. The actual content of the displays changes in conjunction with the number of ports fitted. A dual port SP-3i view configuration menu looks like this, with one G703 port and two DTE ports.

```
                    Black Box SP-3i                            L6

                  View system configuration

IP=0.0.0.0, Clock Order I I I I,
G703 port A HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=None
      00-09 >  SYNC  P2   P3   --   --   --   --   --   --   --
      10-19 >   --   --   --   --   --   --   --   --   --   --
      20-29 >   --   --   --   --   --   --   --   --   --   --
      30-31 >   --   --
DTE port 1 G703 port A,TxcOut/RxcOut,V11,Txc,no channels 64k
DTE port 2 G703 port A,TxcOut/RxcOut,V11,Txc,1x64k=64k

Please press 'Q' to quit >
```

The System Setup Menu

On selecting 1 from the Main Menu the System Setup Menu is displayed. This menu is labelled L1 for easy reference. This menu has three options, G703 Port Management, DTE/DCE Port Management, and Clock Pecking Order. These three menu items enable the system manager to set the main control parameters of the SP-3i simply and quickly. An option is selected by entering the appropriate number at the prompt. It is not necessary to enter a return or line feed character.

```
            Black Box SP-3i                          L1

                    System Setup

          1. G703 Port Management

          2. DTE/DCE Port Management

          3. Global settings


Please select an item from the menu or 'Q' to quit this menu >
```

On entering 1, the user interface switches to the G703 Port Management menu, L11. To return to the higher level menu simply enter the 'Q' character (upper or lower case).

On entering 2, the user interface switches to the DTE/DCE Port Management menu, L12. To return to the higher level menu simply enter the 'Q' character (upper or lower case).

On entering 3, the user interface switches to the Global System Setup, L13. To return to the higher level menu simply enter the 'Q' character (upper or lower case).

The G703 Port Management Menu

On selecting 1 from the System Setup Menu the G703 Port Management Menu is displayed. This menu is labelled L11 for easy reference. This menu has two options, Port A and Port B. An option is selected by entering the appropriate number at the prompt. It is not necessary to enter a return or line feed character.

```
                    Black Box SP-3i                      L11

                      G703 Port Management

                 1. Port A

                 2. Port B


Please select an item from the menu or 'Q' to quit this menu >
```

On entering 1, the user interface switches to the Edit G703 Settings Port A menu, L111. To return to the higher level menu simply enter the 'Q' character (upper or lower case).

On entering 2, the user interface switches to the Edit G703 Settings Port B menu, L112. To return to the higher level menu simply enter the 'Q' character (upper or lower case).

The Edit G703 Settings Port A Menu

On selecting 1 from the G703 Port Management menu the G703 Management - Port A menu is displayed. This menu is labelled L111 for easy reference. This menu has six options and a status line. An option is selected by entering the appropriate number at the prompt. It is not necessary to enter a return or line feed character.

```
            Black Box SP-3i                        L111

            Edit G703 Settings Port A

        1. Structured Settings

        2. Unstructured Settings

        3. Default Mode Structured

        4. Default Mode Unstructured

        5. Line Characteristics

        6. Remote Management Selection

HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=None

Please select an item from the menu or 'Q' to quit this menu >
```

On selecting 1, the user interface switches to the G703 Structured settings - Port A menu, L1111.
On selecting 2, the user interface switches to the G703 Unstructured settings - Port A menu, L1112.
On entering 3, the default operating mode of the G703 port is set to Structured.
On entering 4, the default operating mode of the G703 port is set to Unstructured.
On selecting 5, the user interface switches to the Line Characteristics settings - Port A menu, L1115.
On selecting 6, the user interface switches to the Active Remote Management Timeslot menu, L1116, see Remote Management section for details of this option.

```
            Black Box SP-3i                        L1115

         HDB3 Line Impedance - Port A

        1. 75 Ohm

        2. 120 Ohm

HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=None

Please select an item from the menu or 'Q' to quit this menu >
```

On entering 1, the line impedance is set to 75 ohms for port A. Please ensure that the hardware jumpers are set up for 75 ohm termination and the correct network cable (BNC) is used.

On entering 2, the line impedance is set to 120 ohms for port A. Please ensure that the hardware jumpers are set up for 120 ohm termination and the correct network cable (balanced pair) is used.

G703 Structured settings - Port A Menu

On selecting 1 from the Edit G703 Settings Port A menu, the user interface switches to the G703 Structured settings - Port A menu, L1111. This menu has three options, and a status line.

```
            Black Box SP-3i                      L1111

          G703 Structured settings - Port A

            1. Set channel map A/B

            2. CRC4 enable / disable

            3. Remove All channel mappings

HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=None

Please select an item from the menu or 'Q' to quit this menu >
```

On selecting 1, the user interface switches to the Edit Channel Allocations for G703 Port A menu, L11111. This menu is used to map channels from G703 Port A through to G703 Port B. This mapping is used for drop and insert applications, such as PBX integration with data lines, a particular strength of the SP-3i Ultima. See the Channel Mapping section for more information.

```
            Black Box SP-3i                      L11111

          Edit Channel Allocations for G703 Port A

           0    1    2    3    4    5    6    7    8    9

   00-09 >  <RM>  --   --   --   --   --   --   --   --   --

   10-19 >  --   --   --   --   --   --   --   --   --   --

   20-29 >  --   --   --   --   --   --   --   --   --   --

   30-31 >  --   --

Select <N>ext, <P>rev, <A>dd, <D>elete, <M>gmt, <C>AS, or <Q>uit >

Enter details for G703 Port A
```

In structured mode the SYNC channel in TS0 is mandatory. It is what defines the data stream as being structured. It provides the frame alignment and synchronisation data necessary for the systems to inter-operate in structured mode. The RM channel is the remote management channel. When one of the National bits in TS0 is allocated to remote management the SYNC display in TS0 is changed to <RM>. See the Remote Management section for more information.

Channel allocations are made using the add <A> command, and deleted using the <D> command. The next <N> command and the previous <P> command enable the cursor to be

skipped to the chosen channel. Both the <N> and the <P> command roll over from TS0 to TS31, and vice versa.

The management channel is selected using the <M> command. Only one management channel is permitted. The <C> option selects null CAS protocol in TS16. Selection of the <C> option is only valid for TS16. Invalid selections of <M> or <C> will result in an error beep from the terminal.

On entering 3, the user interface enters the Remove All channel mappings mode, still in menu L1111. The system manager is given the option to confirm (Y/N) and to return to the G703 Structured settings - Port A Menu. This option is very useful when re-configuring the system to a new application. It ensures that all past channel mappings are deleted; the user then has a known position to start from when allocating channels.

On selecting 2, the user interface switches to the CRC4 setting - Port A menu, L11112.

```
              Black Box SP-3i                      L11112

               G703 Line mode - Port A

          1. CRC Disable

          2. CRC Enable


HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=None

Please select an item from the menu or 'Q' to quit this menu >
```

On entering 1, CRC4 is disabled. On entering 2, CRC4 is enabled.

G703 Unstructured settings - Port A Menu

On entering 2, the user interface switches to the G703 Unstructured settings - Port A menu, L1112. This menu has two options, and a status line.

```
              Black Box SP-3i                        L1112

           G703 Unstructured settings - Port A

             1. Map Clear channel to DTE

             2. Map Clear channel to Port B


HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=None

Please select an item from the menu or 'Q' to quit this menu >
```

On entering 2, the data stream from Port A is mapped to Port B, and the display status line changes thus:

```
HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=Port B
```

On selecting 1, the user interface switches to the Select DTE Port menu, L11121. On entering a DTE port number 'N', where 'N' is from 1 to 6, the display switches back to the G703 Unstructured settings - Port A menu, L1112, and the display status line changes thus:

```
HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=DTE N
```

The G703 Management - Port B Menu

On selecting 2 from the G703 Port Management menu the Edit G703 Settings - Port B menu is displayed. This menu is labelled L112 for easy reference. This menu has six options and a status line. An option is selected by entering the appropriate number at the prompt. It is not necessary to enter a return or line feed character. The options for G703 Management - Port B are exactly the same as for G703 Management - Port A. Channel mappings between Port A and Port B can be made and changed from either the Port A or Port B menus.

Channel Mapping Port A to Port B

Channel mapping between Port A and Port B is used for drop and insert applications, such as PBX integration with data lines, a particular strength of the SP-3i Ultima. It can also be used to daisy chain SP-3i Ultima systems together, to provide a higher number of data ports per G.703 line. Up to thirty ports can be supported using five SP-3i Ultima systems.

A channel is mapped by selecting it, using the <N> and <P> commands to position the cursor over the channel required, and the entering <A>, to add the channel to the channel allocation map. If a channel is added in error it can be removed from the allocation using the <D> command. If all channels are to be cleared then it may be simpler to use the "clear channel mappings" command from the G703 Management - Port A menu. The following screen illustrates the display after 12 channels have been allocated to Port B. These channels are shown as Cnn, where 'nn' is the channel number. Channels are mapped from channel to channel only between G703 Port A and G703 Port B.

```
              Black Box SP-3i                      L11111

           Edit Channel Allocations for G703 Port A


           0     1     2     3     4     5     6     7     8     9

  00-09 >  SYNC  C01   C02   C03   C04   C05   C06   C07   C08   C09

  10-19 >  C10   C11   C12   --    --    --    --    --    --    --

  20-29 >  --    --    --    --    --    --    --    --    --    --

  30-31 >  --    RM


Enter details for G703 Port A

Select <N>ext, <P>rev, <A>dd, <D>elete, <M>gnt, <C>AS, or <Q>uit >
```

To return to the higher level menu simply enter the 'Q' character (upper or lower case).

The DTE/DCE Port Management Menu

On selecting 2 from the System Setup Menu the Select DTE Port Menu is displayed. This menu is labelled L12 for easy reference. This menu has six options, one for each DTE/DCE port, identified as Ports 1 to 6. If the SP-3i has only two or four ports then only options for those ports fitted will be displayed. The options for each DTE/DCE port are identical. An option is selected by entering the appropriate number at the prompt. It is not necessary to enter a return or line feed character.

```
            Black Box SP-3i                        L12

                Select DTE Port

        1. Port 1

        2. Port 2

        3. Port 3

        4. Port 4

        5. Port 5

        6. Port 6


Please select an item from the menu or 'Q' to quit this menu >
```

The options for each DTE/DCE port are identical, so only one of them is explained in detail. On entering the number appropriate for the port to be configured the user interface switches to the DTE/DCE Management - Port 'N', where 'N' is between 1 and 6. These menus are labelled L121 for Port 1, L122 for Port 2 etc. The menu contains options for setting up the hardware of the interface, setting the clock options, including DTE/DCE options, and setting the port speed / data rate through the channel mapping menu. Loopback, on a per port basis, is also enabled and disabled from this menu. The menu includes a status line to show the current port set up. The default set up is DCE, with TxC and RxC transmitted from the SP-3i port, V.11 levels, transmit clock, and a zero data rate, by virtue of there being no channels mapped at 64k.

To return to the higher level menu simply enter the 'Q' character (upper or lower case).

```
                    Black Box SP-3i                        L121

                 DTE/DCE Management - Port 1

                 1. Setup Hardware

                 2. Clock Settings

                 3. Channel Mapping

                 4. Enable Loopback Mode

                 5. Disable Loopback Mode

G703 Port A, TxcOut/RxcOut, V11, Txc, no channels 64k

Please select an item from the menu or 'Q' to quit this menu >
```

On entering 1, from the DTE/DCE Management - Port 'N' menu, the user interface switches to the DTE/DCE Hardware - Port 'N' menu, L12'N'1. This menu enables the interface drivers and the specific clock signal options to be selected for this port. Note that this option selects only the electrical parameters. The termination resistance of the receive side, when in DTE mode, is set by jumpers within the SP-3i enclosure. Note also that the correct DTE/DCE cable is required for each option (see Installation section).

To return to the higher level menu simply enter the 'Q' character (upper or lower case).

```
                    Black Box SP-3i                        L1211

                 DTE/DCE Hardware - Port 1

                 1. V11 Interface

                 2. V35 Interface

                 3. TxcOut/RxcOut

                 4. TxcOut/RxcIn

                 5. TxcIn/RxcOut

                 6. TxcIn/RxcIn

G703 Port A, TxcOut/RxcOut, V11, Txc, no channels 64k

Please select an item from the menu or 'Q' to quit this menu >
```

Entering 1 selects V11 drivers and receivers, entering 2 selects V35 drivers and receivers.
Entering 3 selects TxC out and RxC out (DCE).
Entering 4 selects TxC out and RxC in (DCE).
Entering 5 selects TxC in and RxC out (DTE)
Entering 6 selects TxC in and RxC in (DTE).

The status of the DTE/DCE Port 'N' parameters is reported in the status line.

To return to the higher level menu simply enter the 'Q' character (upper or lower case).

On entering 2, from the DTE/DCE Management - Port 'N' menu, the user interface switches to the DTE/DCE Clock settings - Port 'N' menu, L12'N'2. This menu enables the interface clocking options to be set in relation to the SP-3i systems clock. This setting of the interface clocking options may affect the clock pecking order settings (menu L13).

Note that in order to select an external clock source for the unit the clock source must be either the External Clock, Exc, which is always external, or Txc or Rxc, with the clock direction set up as an input in the previous menu. Selecting Txc or Rxc when there are outputs will result in a malfunction.

If an external clock source is to be used it should be set as the first clock source in the clock pecking order for the current release of control software. When the primary clock source is changed from one DTE/DCE port to another the unit should be power cycled.

```
           Black Box SP-3i                        L1212

           DTE/DCE Clock settings - Port 1

           1. Clock from Txc

           2. Clock from Rxc

           3. Clock from Exc

           4. Internal clock

G703 Port A, TxcOut/RxcOut, Vll, Internal Clk, no channels 64k

Please select an item from the menu or 'Q' to quit this menu >
```

The status of the DTE/DCE Clock Setting parameter is reported in the status line.

To return to the higher level menu simply enter the 'Q' character (upper or lower case).

On entering 3, from the DTE/DCE Management - Port 'N' menu, the user interface switches to the Channel Mapping DTE/DCE Port 'N' menu, L12'N'3. This menu is the key to setting up the port data rate and the mapping of the data to the required channels on either G703 Port A or G703 Port B. This menu has five options, map to G703 Port A, map to G703 Port B, set 56k or set 64k as the base speed for the DTE/DCE port, and Assign Channels. An option is selected by entering the appropriate number at the prompt. It is not necessary to enter a return or line feed character.

```
                          Black Box SP-3i                      L1213

              Channel Mapping DTE/DCE Port 1

              1. G703 Port A

              2. G703 Port B

              3. 56k

              4. 64k

              5. Assign channels

G703 Port A, TxcOut/RxcOut, V11, Internal Clk, no channels 64k

Please select an item from the menu or 'Q' to quit this menu >
```

Entering 1 selects G703 Port A as the port to which data to and from the DTE/DCE port will be mapped.

Entering 2 selects G703 Port B as the port to which data to and from the DTE/DCE port will be mapped.

Entering 3 selects 56k as the base speed for the port.

Entering 4 selects 64k as the base speed for the port.

Entering 5 selects the Edit Channel Allocations for G703 Port 'X' menu, where 'X' is the G703 Port displayed in the status line.

The status of the DTE/DCE parameters is reported in the status line. The channel assignment can be viewed from the Assign Channels menu or from the Display port/channels menu, which is under the G703 Port Management menu for the selected G703 port.

To return to the higher level menu simply enter the 'Q' character (upper or lower case).

On entering 5, the user interface switches to the Edit Channel Allocations for G703 Port 'X' menu, L. This menu enables the systems manager to define the channel assignments for the selected DTE/DCE port on a channel by channel basis, either as a contiguous set or as a non-contiguous set. The number of channels chosen defines the multiplier M for the port data rate. The port data rate will be Mx56k, if 56k has been selected in the Channel Mapping DTE/DCE Port 'N' menu, and Mx64k, if 64k has been selected in the Channel Mapping DTE/DCE Port 'N' menu. Prior to making any channel allocations the menu screen looks like this.

```
                    Black Box SP-3i                        L12135

              Edit Channel Allocations for G703 Port A

              0    1    2    3    4    5    6    7    8    9

   01-09 >   SYNC  --   --   --   --   --   --   --   --   --

   10-19 >   --    --   --   --   --   --   --   --   --   --

   20-29 >   --    --   --   --   --   --   --   --   --   --

   30-31 >    --   RM
```

Enter details for DTE Port 1

Select <N>ext, <P>rev, <A>dd, <D>elete, or <Q>uit >

A channel is added by selecting it, using the <N> and <P> commands to position the cursor over the channel required, and then entering <A>, to add the channel to the channel allocation map. If a channel is added in error it can be removed from the allocation using the <D> command. The following screen illustrates the display after 4 channels have been allocated for DTE/DCE port 1.

```
                    Black Box SP-3i                        L12135

              Edit Channel Allocations for G703 Port A

              0    1    2    3    4    5    6    7    8    9

   01-09 >   SYNC  P1   P1   P1   P1   --   --   --   --   --

   10-19 >   --    --   --   --   --   --   --   --   --   --

   20-29 >   --    --   --   --   --   --   --   --   --   --

   30-31 >    --   RM
```

Enter details for DTE Port 1

Select <N>ext, <P>rev, <A>dd, <D>elete, or <Q>uit >

Quitting to the previous screen, the status line now reads as shown.

```
                    Black Box SP-3i                      L1213

                    Channel Mapping DTE/DCE Port 2

                    1. G703 Port A

                    2. G703 Port B

                    3. 56k

                    4. 64k

                    5. Assign channels


G703 Port A, TxcOut/RxcOut, V11, Internal Clk, 4x64k=256k

Please select an item from the menu or 'Q' to quit this menu >
```

There are four channels allocated, at 64k, making the port speed 256k. Adding channels for other ports, and mapping some from G703 Port B to G703 Port A, could produce a channel allocations display, found under the menu entry View configuration, as follows.

```
                    Black Box SP-3i                      L6

                    View system configuration

IP=0.0.0.0, Clock Order I I I I I I I I,
G703 port A HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=None
     00-09 >  SYNC C01  C02  C03  C04  C05  C06  C07  C08   P1
     10-19 >   P1   P1   P1   P2   P2   P2  C16   P2   P3   P3
     20-29 >   P3   P3   P3   P3   P4   P4   P5   P5   P6   --
     30-31 >   --   RM
G703 port B HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=None
     00-09 >  SYNC C01  C02  C03  C04  C05  C06  C07  C08   --
     10-19 >   --   --   --   --   --   --  C16   --   --   --
     20-29 >   --   --   --   --   --   --   --   --   --   --
     30-31 >   --   --
DTE port 1 G703 port A,TxcOut/RxcOut,V11,Txc,4x64k=256k
DTE port 2 G703 port A,TxcOut/RxcOut,V11,Txc,4x64k=256k
DTE port 3 G703 port A,TxcOut/RxcOut,V11,Txc,6x64k=384k
DTE port 4 G703 port A,TxcOut/RxcOut,V11,Txc,2x64k=128k
DTE port 5 G703 port A,TxcOut/RxcOut,V11,Txc,2x64k=128k
DTE port 6 G703 port A,TxcIn/RxcIn,V35,Rxc,1x64k=64k

Please press 'Q' to quit >
```

This shows four channels assigned to DTE/DCE Port 1 (P1), four channels assigned to DTE/DCE Port 2 (P2), six channels assigned to DTE/DCE Port 3 (P3), two channels assigned to DTE/DCE Port 4 (P4), two channels assigned to DTE/DCE Port 5 (P5), and one channel assigned to DTE/DCE Port 6 (P6). Nine channels are assigned to G703 Port B, eight for calls and one for signalling (TS0). These are shown as C'nn', where 'nn' is the channel number.

The second network port, G703 Port B, can also be used for WAN connection, giving the SP-3i Ultima two WAN ports. Data can be mapped between the two G703 ports for pass through applications, and data from any of the DTE/DCE ports can be mapped to channels on either G703 port. Special versions of the SP-3i can be configured with one 2Mbit/s E1 port and one 1.544Mbit/s T1 port, with conversion from T1 to E1 if required.

The Clocking Pecking Order Menu

On selecting 1 from the Global System Setup Menu the Clocking Pecking Order Menu is displayed. This menu is labelled L131 for easy reference.

```
           Black Box SP-3i                        L131

         Clock Pecking Auto/Manual

      1.   Automatic Clock Arbitration

      2.   Manual Clock Selection

Please select an item from the menu or 'Q' to quit this menu >
```

On selecting 1 from the Clock Pecking Auto/Manual Menu a user information message is displayed. This message is as follows:

```
           Black Box SP-3i                      L1311

              Clock Automatic

Warning: This mechanism uses the DCD/Indicate signal on the DTE port
from an external DCE, as the measure of the validity of the external clock.

When DCD/Indicate goes down on a port, the clock from that port is no
longer
valid, and a change of clock source will occur. An unstable or floating
DCD/Indicate signal will cause the system clock to be unstable.

An unstable clock WILL result in data errors !!!

Please press 'C' to continue or 'Q' to quit
```

On selecting C the Automatic Clock Arbitration Menu is displayed. This menu is labelled L131 for easy reference.

```
           Black Box SP-3i                      L1311

         Clock Pecking Order Selection

         S.   Start new ordering

         I.   Internal clock

         A/B. From G703 Port A or B

         1-6. From DTE Port 1-6

         N.   Next

         P.   Prev

         F.   Finish
```

```
Clock Order A 1 2 3 I I I I I
                      ^
Please select an item from the menu or 'Q' to quit this menu >
```

This is an interactive menu. The 'S' character repositions the input cursor to the beginning of the Clock Order string. The pecking order reads left to right, i.e. first choice for clock master is the first source in the string, and so forth. Entering the appropriate letter or number either adds the referenced port to the Clock Order (status line) or causes an administrative action. The 'N' and 'P' characters move the cursor forward and backward along the string. The 'F' character fills the remaining options to the right of the cursor with 'I', for internal clock. Entering 'I' at any point has the same effect as entering 'F', i.e. it terminates the selection process. Internal clock, 'I', is the lowest order possible in the list. If the internal clock is not available then the system cannot function. Therefore it is illogical to have any other option lower in the pecking order than 'I', as if the internal clock fails then the system fails, and anything after 'I' would, therefore, never be selected.

On selecting 2 from the Clock Pecking Auto/Manual Menu a user information message is displayed. This message is as follows:

```
                    Black Box SP-3i                         L1312

                          Clock Manual

This mechanism ties the system clock to one particular clock source
with a fallback to a free-running clock.

It can be used in situations where external clocking is required
from a DTE/DCE port that does NOT have a stable DCD/Indicate signal.

Please press 'C' to continue or 'Q' to quit
```

On selecting C the Manual Clock Selection Menu is displayed. This menu is labelled L1312 for easy reference.

```
                    Black Box SP-3i                         L1312

                     Manual Clock Selection

             I.   Internal clock

             A/B. From G703 Port A or B

             1-6. From DTE Port 1-6

Please select an item from the menu or 'Q' to quit this menu >

Clock Order I
```

This menu enables the user to select the clock to be used as the system clock, with the fall back being to a free run internal clock, rather than to another external clock source, as is possible with the clock arbitration mechanism.

The System Maintenance Menu

On selecting 2 from the Main Menu the System Maintenance Menu is displayed. This menu is labelled L2 for easy reference. This menu has four options, Total System Reset, Set System Clock, Diagnostics, and G821 statistics. An option is selected by entering the appropriate number at the prompt. It is not necessary to enter a return or line feed character.

```
           Black Box SP-3i                        L2

               System Maintenance

        1. Total System Reset

        2. Set System Clock

        3. Diagnostics

        4. G821 Statistics


Please select an item from the menu or 'Q' to quit this menu >
```

On entering 1, the user interface will switch to the Total System Reset menu with the option to either re-set the system and return to the previous menu, or return to the previous menu without a re-set.

On entering 2, the user interface switches to the Set System Date / Time menu, L. This enables the system real time clock to be set-up. This clock is only used in conjunction with G.821 statistics.

```
           Black Box SP-3i                         L

             Set System Date/Time

        H. Increment Hours

        I. Increment Minutes

        S. Increment Seconds

        D. Increment Days

        M. Increment Months

        Y. Increment Years

        G. Change clock now
```

```
Increment, enter date/time (HH:MM:SS DD/MM/YY), or Q to exit >

12:20:33 29/01/96
```

On entering 3, the user interface switches to the Diagnostics menu, L23. This menu enables various loop backs to be applied to the G.703 and data ports. To return to the higher level menu simply enter the 'Q' character (upper or lower case).

```
                    Black Box SP-3i                      L23

                        Diagnostics

                1. G703 Loopbacks Port A

                2. G703 Loopbacks Port B

                3. DTE  Loopbacks


Please select an item from the menu or 'Q' to quit this menu >
```

On entering 4, the user interface switches to the G.821 Statistics menu, L24. This function is not implemented in the first release. It will be included in a later release. To return to the higher level menu simply enter the 'Q' character (upper or lower case).

The Diagnostics Menu

On entering 1, from the Diagnostics Menu the user interface switches to the G703 Loop Back Port A menu. If there are two G703 ports fitted then entering 2 will switch to the equivalent Port B menu. To return to the higher level menu simply enter the 'Q' character (upper or lower case).

```
              Black Box SP-3i                        L231

                 G703 Loopback Port A

            1. Payload  Loopback

            2. Complete Loopback

            3. No Loopbacks


Please select an item from the menu or 'Q' to quit this menu >
```

On entering 1, payload loop back is enabled. This loops back all time slots except TS0.

On entering 2, complete loop back is enabled. This loops back all time slots including TS0.

On entering 3, any loop backs made previously on this port are disabled.

On entering 3, from the Diagnostics Menu, the user interface switches to the DTE Port Loopback menu. This menu has two entries, enter 1 to enable a loop back, enter 2 to disable a loop back. To return to the higher level menu simply enter the 'Q' character (upper or lower case). On entering either 1 or 2 the Select DTE Port menu is display. Selecting the port number either enables or disables loop back on that port, as a function of the option selected at the enable/disable DTE Port Loopback menu. Menus in the Diagnostics set have a status line that displays the current loop backs that are enabled. The status of Port A and Port B is always displayed. DTE status for a particular port is only displayed when loop back is enabled on that particular port.

```
              Black Box SP-3i                        L233

                 DTE Port Loopback

            1. Enable  DTE Loopback

            2. Disable DTE Loopback


Please select an item from the menu or 'Q' to quit this menu >

A-payload loop Loop1 Loop2
```

Remote management.

The remote management option, which appears in the Logon Menu, enables the terminal attached to the local unit to effectively become a terminal attached to the remote unit. Entering remote management transfers a copy of the set-up database from the remote unit to a data buffer in the local unit. The database image of the remote unit is changed using the standard menu system. Entering the command to implement changes, as described above, transfers the changed database back to the remote unit and implements the changes on the remote unit. Note that if the changes made are required to take effect after any interruption of power to the remote unit then they must first be stored in the non-volatile memory of the remote unit using the save configuration command.

The SP-3i units are usually installed to operate in pairs. The systems manager should be aware that changes to the remote unit may affect the operation of services supported by the two units until the local unit parameters and the remote unit parameters are synchronised.

Remote management requires some setting up by the user. The default state of remote management is disabled. The communications channel for remote management can be either via the spare bits in time slot zero or via any time slot. In order to enable remote management the remote management channel must be selected first, using the structured settings menu. Two remote management channels can be selected on the SP-3i Ultima, one per G.703 port, but only one of them can be enabled at any one time. There is a line item in the Edit G703 Settings Port A menu L111, item 6, that switches the user to the Remote Management Selection menu, L1116. This menu controls the enabling and disabling of the remote management.

```
                  Black Box SP-3i                        L111

                Edit G703 Settings Port A

           1. Structured Settings

           2. Unstructured Settings

           3. Default Mode Structured

           4. Default Mode Unstructured

           5. Line Characteristics

           6. Remote Management Selection

Please select an item from the menu or 'Q' to quit this menu >
```

Entering option six will bring up the following menu.

```
                    Black Box SP-3i                      L1116

               Select Remote Management Timeslot - Port A

                    1. Management disabled

                    2. Port A management

                    3. Port B management


Please select an item from the menu or 'Q' to quit this menu >
```

From this menu entering one disables remote management. Entering two enables management on Port A, entering 3 enables management on Port B. Changing from Port A to Port B automatically disables management on Port A, and visa-versa.

The channel mapping display reflects the remote management option currently selected. For example here is the view system configuration screen of a dual port SP-3i with remote management selected in time slot zero. The status of the remote management option, i.e. enabled / disabled, and which port and channel is selected / in use, is shown in block eight of the status line.

```
                    Black Box SP-3i                      L6

                    View system configuration

IP=0.0.0.0, Clock Order I,
G703 port A HDB3 75 ohm, no CRC, Structured,no loop, Unstruct=DTE 1
      00-09 >  <RM>  P1   P2   --   --   --   --   --   --   --
      10-19 >  --    --   --   --   --   --   --   --   --   --
      20-29 >  --    --   --   --   --   --   --   --   --   --
      30-31 >  --    --
DTE port 1 G703 port A,TxcOut/RxcOut,V11,Txc,1x64k=64k
DTE port 2 G703 port A,TxcOut/RxcOut,V11,Txc,1x64k=64k

Please press 'Q' to quit >
```

The <RM> in place of the SYNC in the time slot zero field of the display indicates that remote management is implemented in time slot zero. An <RM> in any other time slot field would indicate that remote management is implemented in that time slot. If there is no <RM> in the any of the time slot fields, and no <RM> in the time slot zero field, then remote management has not been selected.

SNMP management.

In order to use the SNMP management the IP address and the community strings need to be configured and stored, using the async management interface, and the save configuration option.

The local SNMP interface is accessed via the async management port using the SLIP protocol. This can be accessed directly via an async port on a network management system. However, it is more likely that indirect access from a management station on an ethernet network will be required. This is achieved using a terminal server, or a terminal server style port on a router, to convert the async interface to an ethernet interface.

The IP address set for the SP-3i needs to be within the address range of the user's network, and reachable from the network management station, either directly or via a routed path.

The SP-3i systems support the standard MIB II system arc, and objects from within the transmission arc that are applicable to a product with a G.703 interface. The objects in the system arc are read-write, where applicable. Objects in the transmission arc are read-only. Some of the objects in the transmission arc that would normally be read-write, are derived from objects in the enterprise MIB. We have taken the view (as have many vendors) that all configuration parameters should be set from within the enterprise MIB, as this avoids potential confusion. Most of the objects in the transmission arc are performance statistics (G.821), and are read-only by definition.

In addition to the standard MIB arcs there is a Black Box Enterprise MIB. This MIB contains a local system arc, similar to the MIB II system arc, and a products arc. Within the products arc is the SP-3i arc. This contains objects that are specific to the SP-3i product range. These objects have a close correlation to objects stored in the SP-3i configuration database. The SP-3i system can be configured via SNMP, with the caveat that we recommend that users do not change the IP address via SNMP, for obvious reasons.

Configuration of an SP-3i via the SNMP interface does require a thorough understanding of the configuration parameters, and of the SNMP management package that is being used. The summary configuration menu provides the user with single screen view, that describes the entire configuration of the SP-3i. The SP-3i configuration parameters are stored as variables, also known as objects. We recommend that users familiarise themselves with the configuration options using the async terminal management interface before embarking on the SNMP method. Once the user has an understanding of the structure of the database, and the variables (objects) that it contains, the MIB object descriptions become much more meaningful. The user can then experiment with the SNMP settings prior to using these in a live network situation. Please email support@Black Box.com for a copy of the SP-3i enterprise MIB.
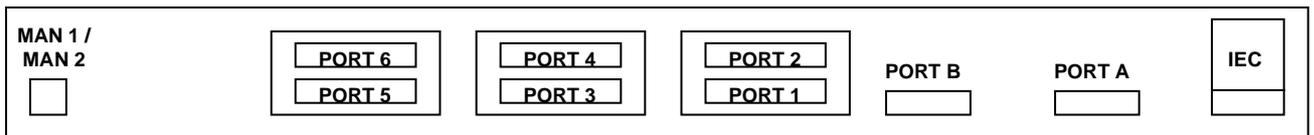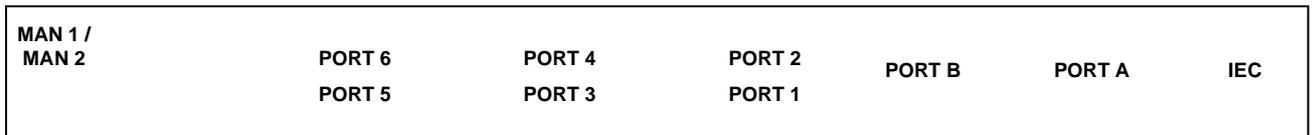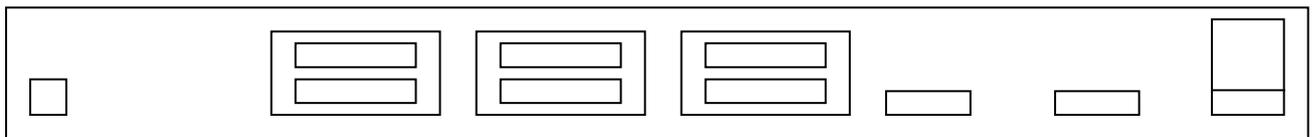
Appendices

Port identities

Example Clocking Options

Cable specifications

Port identities

The rear panel of the SP-3i can be viewed as having four areas. On the left side is the RJ45 connector for the management ports. Next there are up to three pairs of double height DB25 connectors. These are the DTE/DCE ports, labelled Port One to Port Six. Then there are either one or two DB15 connectors. These are the G.703 ports, labelled Port A and Port B. Finally there is the IEC connector for connecting mains power to the unit. On 48Volt D.C. versions the IEC connector is replaced with a screw terminal block.

MAN 1 / MAN 2		PORT 6		PORT 4		PORT 2		PORT B	PORT A	IEC
		PORT 5		PORT 3		PORT 1				

MAN 1 / MAN 2		PORT 6		PORT 4		PORT 2		PORT B	PORT A	IEC
		PORT 5		PORT 3		PORT 1				

Port identities for rear panel of SP-3i

Example Clocking Options

Cable specifications