MX550A
MX551A
MX552A

Statistical Multiplexers User's Guide

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The United States Government Federal Communications Commission has specified that the following notice be brought to the attention of users of this product:

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference with radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his own expense, will be required to take whatever measure may be required to correct the interference.

In order to ensure FCC compliance, only properly constructed, terminated, and shielded cabling should be used with this product.

NOTE:

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set forth in the radio interference regulations of the Canadian Department of Communications.

Table of Contents

About This Manual

Conventions Used in This Manual iii

Chapter One Introduction 1

General Description 1

Physical Specifications 2

Physical Description 3

Chapter Two Installation 4

Unpacking 4

Inspection 4

Location Determination 5

Chapter Three Connections 6

Wiring Systems 6

Composite Port 7

Composite RS-232 Signaling 8

Composite V.35 Signaling 9

Chapter Four Operation 10

Front Panel Operation 10

Flow Control Options 11

Set-up 12

Password Entry 12

New of Factory Configuration 14
Old or Previous Configuration 18

Chapter Five Assistance 19
Warranty Returns 19

About This Manual

This manual covers installation and operation of the Black Box MX550A, MX551A and MX552A Statistical Multiplexers, which are designed to combine two or more asynchronous data streams into a single communications link.

Conventions Used in This Manual

MX550A

Refers to a dual port unit with asynchronous port speeds ranging from 300bps to 19200bps. The composite communications link range from 9600bps to 64000bps.

MX551A

Refers to a four port unit with asynchronous port speeds ranging from 300bps to 19200bps. The composite communications link range from 9600bps to 64000bps.

MX552A

Refers to an eight port unit with asynchronous port speeds ranging from 300bps to 19200bps. The composite communications link range from 9600bps to 64000bps.

Chapter One Introduction

General Description

This manual provides the information needed to install, set-up, and operate the MX550A, MX551A and MX552A Statistical Multiplexer. The MX550A is a dual port unit; the MX551A is the four port unit; the MX552A is an eight port unit. All three units support asynchronous port speeds ranging from 300bps to 19200bps. The composite communications link range from 9600bps to 64000bps.

Electrical requirements are supplied by an external power transformer that accepts 117VAC and supplies 12VAC/2amp to the multiplexer. Thus, the electrical connection is free from any dangerous voltages on the PC board itself. UL and CSA approvals exist for the power transformer separately from the multiplexer.

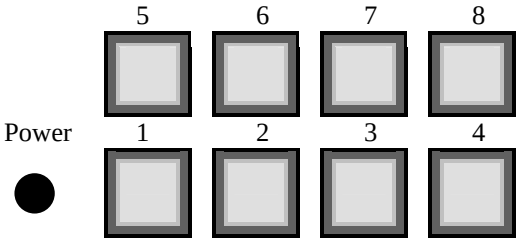
Physical Specifications

Terminal/CPU Ports:	Number:	MX550A has 2; MX551A has 4; MX552A has 8
	Type:	V.24/V.28 RS-232C
Port Speeds:	Asynchronous	300, 600, 1200, 2400, 4800, 9600, 19200 bps
Character Format:	Asynchronous:	5, 6, 7, 8 bit data 1, 1.5, 2 stop bits No, Odd, Even parity 8 wire or 3 wire
Composite Link:	Number: 1 Synchronous, full duplex operation Speed: Accepts from 9.6 to 64K bps Interface: V.35 or RS-232	
Power Requirements:	117VAC, 47-63Hz – external transformer providing 12VAC/2amp	
Operating Environment:	Temperature 0-40 degrees Celsius Humidity to 95% non-condensing	
Storage Environment:	Temperature 0-70 degrees Celsius Humidity to 95% non-condensing	
Altitude:	10K Ft. Operating 40K Ft. Non-operating	
Interface Protection:	Complies: FCC part 15A emissions requirements	
Safety:	UL listed CSA approved	
Dimensions:	MX550A,MX551A,MX552A 8.6” (W) x 8.4” (D) x 1.8” (H)	
Approximate Weight:	MX550A,MX551A,MX552A 2.6 pounds	

Physical Description

All three statistical multiplexers are stand alone units that are used in a desktop configuration. The front panel is labeled appropriately so that the controls and indicators may be read from a normal viewing position.

The front panel contains six LED indicators. The rear panel contains two (MX550A), four (MX551A), or eight (MX552A) RJ-50 port connectors, one DB-25 connector used for connection to the composite link, and a power connection receptacle. Port 1 is used as a control port. Port 1 is only active as a control port when the unit is off-line. In all other conditions, port 1 is totally transparent to all data transmission and may be used like any of the other ports. Port 1 is adjacent to the power connector. Ports are numbered as follows:



RJ50 to DB-25 cables are provided with each unit. Each port is a DCE interface and only requires straight through cables for all DTE equipment. See Chapter 3 for RJ50 pin assignments.

Chapter Two Installation

Unpacking

The unit is shipped in a corrugated cardboard box. Suitable packing material is used to insure that the unit, together with its power transformer, is secure during transport. Unpacking consists of opening the carton and removing the equipment. It is recommended that the packing material be retained should it ever be necessary to re-transport the equipment. After unpacking, all equipment should be inspected for damage or deficiencies. Any such damage or deficiency should be immediately reported in accordance with the distributor's established procedures.

Inspection

When the initial inspection has been completed, the equipment should be identified and verified against the accompanying shipped documents. Each item should be checked for the correct model and serial number as indicated on the shipping list; any discrepancies should be reported to Black Box customer service. The bottom and rear panel of the chassis bears a label on which the unit's model, serial number, and certification are printed.

If the carton containing the unit is obviously damaged by the shipping carrier, file a claim immediately and then contact Black Box customer service for additional instructions and quick check procedures for the damaged equipment. This procedure may allow warranty provisions to remain in effect.

Location Determination

It is recommended that a grounded 117VAC, 47-63 Hertz power receptacle be used. The power transformer provides a six foot two conductor cable with the appropriate power connector for the unit. Be sure that all DTE cables are long enough to reach to the rear of the unit. Position the unit within a convenient distance from the CSU/DSU or communications interface that enables the composite cable to be connected without stretching or binding. At this point, do not connect any cables until the unit has been configured through its control port—Port 1.

Chapter Three Connections

At the rear of the unit are two (MX550A), four (MX551A), or eight (MX552A) RJ50, RS-232 female connectors. These are for asynchronous user connections to the multiplexer. Each of the RJ50 connectors are configured as a DCE interface. Almost any equipment that can be connected to a modem or CSU/DSU may be directly connected to the RJ50 multiplexer port. Pins used on the RJ50 connector are:

Pin Number	Abbreviation	Description
1	N/A	Not Used
2	DSR	Data Set Ready
3	DCD	Data Carrier Detect
4	DTR	Data Terminal Ready
5	Ground	Ground
6	RXD	Receive Data
7	TXD	Transmit Data
8	CTS	Clear To Send
9	RTS	Request To Send
10	N/A	Not Used

Wiring Systems

Asynchronous three wire systems also operate properly on the unit. The pins used are 5, 6, and 7 (receive data, transmit data, and ground). It is necessary to select the appropriate flow control options when configuring the unit.

Composite Port

The unit provides the user a choice of one of two composite port signaling interfaces—V.35 or RS-232. Both appear on the single DB-25 connector. Located near the DB-25 connector is a slide switch that selects the V.35 or RS-232 signaling. When the slide switch is “out”, signaling is RS-232, when “in”, signaling is V.35. The format of the data appearing on the composite port is synchronous. Synchronous clocking must be provided by the DCE to the unit’s composite port for the multiplexer to operate. The composite port cable should be secured to the unit with appropriate screws that connect to the provided jack posts. The pin out configuration for the DB-25 connector is as follows:

Composite RS-232 Signaling

Pin Number	Abbreviation	Description
1	Chassis Ground	Chassis Ground
2	TXD	Transmit Data
3	RXD	Receive Data
4	RTS	Request To Send
5	CTS	Clear To Send
6	DSR	Data Set Ready
7	Signal Ground	Signal Ground
8	Not Used	--
9	Not Used	--
10	Not Used	--
11	Not Used	--
12	Not Used	--
13	Not Used	--
14	Not Used	--
15	TXC	Transmit Clock
16	Not Used	--
17	RXC	Receive Clock
18	Not Used	--
19	Not Used	--
20	DTR	Data Terminal Ready
21	Not Used	--
22	Not Used	--
23	Not Used	--
24	Not Used	--
25	Not Used	--

Composite V.35 Signaling

Pin Number	Abbreviation	Description
1	Chassis Ground	Chassis Ground
2	TXD+	Transmit Data Plus
3	RXD+	Receive Data Plus
4	RTS	Request To Send
5	CTS	Clear To Send
6	DSR	Data Set Ready
7	Signal Ground	Signal Ground
8	Not Used	--
9	RXC-	Receive Clock Minus
10	Not Used	--
11	Not Used	--
12	TXC-	Transmit Clock Minus
13	Not Used	--
14	TXD-	Transmit Data Minus
15	TXC+	Transmit Clock Plus
16	RXD-	Receive Data Minus
17	RXC+	Receive Clock Plus
18	Not Used	--
19	Not Used	--
20	DTR	Data Terminal Ready
21	Not Used	--
22	Not Used	--
23	Not Used	--
24	Not Used	--
25	Not Used	--

Chapter Four Operation

A normal operating mode is achieved once power has been supplied, the unit has been configured, and the composite link has been connected. Normal operation is present when the In Sync LED is solid green. The remaining LEDs should be various intensities of red.

Front Panel Operation

The front panel of the unit contains six LEDs that indicate the status of the multiplexer. The right five LEDs are directly connected to the composite link and reflect its status. The LEDs are labeled from left to right as follows:

In/Sync
When on steady green, indicates normal operating mode. White or not illuminated indicates that there is not power. Solid red indicates that the multiplexer is not communicating with the remote multiplexer. The In/Sync LED may go from red to green when initialization is taking place.

Car/Det
Solid red indicates that the multiplexer is receiving the Data Carrier Detect Signal from the composite link.

Req/Send
Solid red indicates that the multiplexer is providing a Request To Send signal to the composite link.

Clr/Send
Solid red indicates that the multiplexer has the Clear To Send signal from the composite link.

Send/Data

Solid red indicates that the multiplexer is sending data across the composite link.

Recv/Data

Solid red indicates that the multiplexer is receiving data on the composite link.

Flow Control Options

Hardware

The multiplexer optionally employs RTS/CTS hardware flow control. When a DTE is ready to transmit data, it presents a high RTS signal to the connected multiplexer port. It interprets the high RTS and responds with a high CTS signal. The DTE is then free to send data to the port. CTS may be lowered by the port to halt data flow from the DTE. If RTS is not present at the port from the DTE, transmission of data to the DTE will not occur.

Software

The multiplexer optionally employs Xoff/Xon software protocol for its software flow control. Xoff/Xon protocol is available if a port is configured to an eight-wire configuration, but is automatically chosen if a three-wire configuration is chosen at port set-up. The Xoff/Xon control characters have an immediate effect on the port when received, and are passed to the remote multiplexer through normal data channels to be presented to the remote DTE.

Set-up

The unit provides a menu screen set-up facility accessed through Port 1. In normal operation, Port 1 is transparent to all data. If the multiplexer is in operation, disconnect the COM interface. When the In Sync LED on the front panel is red, access to Port 1 set-up facility is possible. Access to Port 1 set-up facility is also possible at power up if the COM interface is disconnected.

The Port 1 set-up facility will only react to an ASCII terminal set to the following parameters:

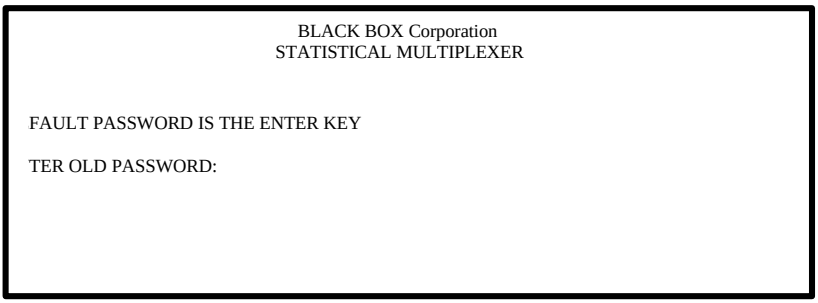
Speed: 9600 bps
Data Bits: 8
Parity: None
Stop Bits: 1

After the ASCII terminal is set to these specifications, and connected to Port 1 with an RS-232 cable, one of the following three key-sequence commands may be entered:

Five consecutive [Ctrl-P]s (**^P**) for new Password entry
Five consecutive [Ctrl-N]s (**^N**) for New or Factory Configuration
Five consecutive [Ctrl-O]s (**^O**) for Old or Previous Configuration

Password Entry

Following entry of five consecutive Ctrl-Ps, the Stat-Mux displays the following screen:



The Stat-mux is prompting for the old password that has been previously entered. If the Stat-Mux is new from the factory, the default password is the "Enter" key. When a correct password has been entered, the screen below is displayed. Please note the following:

1) The user has three attempts to enter a correct password. After the third unsuccessful attempt, the password entry system exits without providing access to the Stat-Mux.

2) If no password has ever been entered, the Stat-Mux will prompt for a new password upon entry to the configuration/setup routines.

3) The initial password entered by Black Box is always the "Enter" key.

```
BLACK BOX Corporation
STATISTICAL MULTIPLEXER

ENTER NEW PASSWORD:
```

The Stat-Mux is now prompting for a new password to be entered. The user should type a new password of up to eight alpha/numeric characters followed by the "Enter" key. The Stat-Mux then displays the following screen:

```
BLACK BOX Corporation
STATISTICAL MULTIPLEXER

ENTER NEW PASSWORD: ********

VALIDATE PASSWORD:
```

The Stat-Mux is prompting a second time for the same password originally entered. This validates that the correct password has been entered. In the event the same password is not entered, the following screen is presented to the user.

```
BLACK BOX Corporation
STATISTICAL MULTIPLEXER

ENTER NEW PASSWORD: ********

INVALID PASSWORD: Any Key to Continue

ENTER PASSWORD:
```

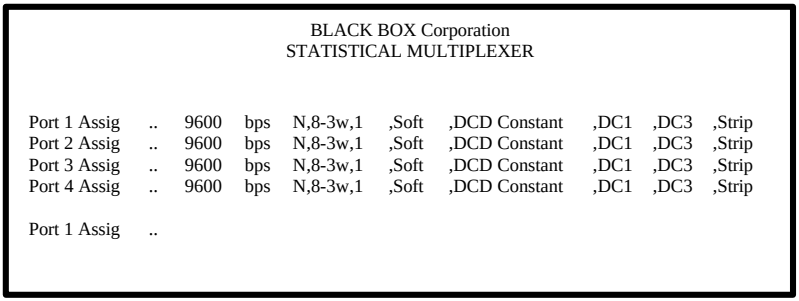
New or Factory Configuration

By pressing five consecutive [Ctrl N]s (^N), the following is presented to the ASCII terminal connected to Port 1:

```
BLACK BOX Corporation
STATISTICAL MULTIPLEXER

Local or Remote? (L/R)..
```

At this point, the unit is awaiting input from the user. The user may now enter either an "L" or an "R". Pressing **L** provides the set-up screen for the local, initiator multiplexer. Pressing **R** provides the set-up screen for the remote unit. Upon entry of either, the following is presented to the ASCII terminal.



The unit is prompting for Port 1 to be Assigned or Un-Assigned. The **SPACEBAR** key toggles between the two options. If Port 1 is to be in the new port configuration, press **ENTER**. If the user does not expect to use Port 1, press **SPACEBAR**, followed by **ENTER.** If only **ENTER** is depressed, the set up line will appear as follows:

```
Port 1  Assigned..9600 Bps_
```

The unit then prompts for an asynchronous speed. The initial default speed is 9600 bps. Press **SPACEBAR** to see the next speed option if 9600 bps is not the desired speed. Successive depressions of the space bar will provide the following speed options: 19.2 Kbps, 300, 600, 1200, 2400, 4800, and again 9600 bps. The list is circular. When the desired speed appears, press **ENTER** to select it. As an example, if 19.2 Kbps was chosen the set up line now appears as follows:

```
Port 1  Assigned..19.2Kbps  N_
```

The unit then prompts for the type of parity to be used. The options are: “N” (as appears on the example) for no parity, “E” for even parity, and “O” for odd parity. Once the parity is chosen, the entry will now appear as follows:

```
Port 1  Assigned..19.2Kbps  N,8-3w,_
```

The unit then prompts for the number of data bits and the type of wire system (8 or 3 wire). The entries will cycle through the following combinations:

8-3w, 5-8w, 5-3w, 6-8w, 6-3w, 7-8w, 7-3w, and 8-8w.

Once the data bit and wire combination is chosen, the entry will appear as follows if 8-8w was chosen:

```
Port 1  Assigned..19.2Kbps  N,8-8w, 1,  ,_
```

The unit then prompts for the number of stop bits. The options cycle through 1, 1.5, and 2. If **1** was chosen the entry now appears as follows:

```
Port 1  Assigned..19.2Kbps  N,8-8w, 1,  ,Hard_
```

The unit then prompts for the type of flow control. The options cycle between Hard and soft. (Note, if a three-wire parameter was chosen, this prompt will not appear). Press **ENTER** to choose either Hard or Software control.

```
Port 1  Assigned..19.2Kbps N,8-8w, 1 ,Hard ,DCD Constant_
```

The unit then prompts for whether DCD is to be held constant or follows the remote unit's DTR control lead (DCD tied DTR). Press **ENTER**, or **SPACEBAR ENTER** to select the desired option.

```
Port 1  Assigned..19.2Kbps N,8-8w, 1 ,Hard ,DCD Constant
```

If hardware flow control (RTS/CTS) has been selected, set up of this port is complete. If software flow control (XON/XOF) were selected, three additional parameters are prompted (DC1, DC3, Strip or Pass). The selection of these parameters are identical to the above using the **SPACEBAR** and **ENTER** keys.

DC1 is the default flow on character selected by the Stat-Mux. The user may choose from DC1, DC2, DC3, or DC4 as the flow on character to be used. DC3 is the default flow off character selected by the Stat-Mux. The user may choose from DC1, DC2, DC3, or DC4 as the flow off character to be used. A check is made to insure that the flow on and flow off characters are not the same. The Strip or Pass options are selected by the user. The Strip option deletes the flow on or

off character from the data stream and allows the Stat-Mux to buffer all characters. When the Stat-Mux detects that its port buffer is becoming full, it will automatically issue a flow off character. In the same way, if a port buffer is emptying out, a flow on character is automatically generated by the Stat-Mux. The Pass option does not delete any characters from the data stream. Instead, flow on and flow off characters are allowed to pass through the system to reach the corresponding opposite port.

After this, the next port is displayed and the above steps repeated.

Once the last port has been either Assigned and parameters set or Un-Assigned has been chosen, the Stat-Mux prompts the user as follows:

```
Save changes ? (Y/N)…
```

The Stat-Mux is asking whether or not to make the new set-up the configuration of the multiplexer or discard the new set-up and keep the unchanged configuration. Regardless of the choice, the next screen appears as follows:

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Statistical Multiplexer

```
Change the other table ? (Y/N)..
```

The unit then asks whether or not to change the other configuration table. At this point, pressing N exits the set-up facility. Pressing **Y** causes the following to appear:

BLACK BOX Corporation
Statistical Multiplexer

```
Local or Remote ? (L/R)..
```

If the set-up facility was used to set up the local configuration, the “R” option should be chosen and the above steps taken to set-up the remote multiplexer’s configuration. Thus, the remote can be configured from the initiator.

Old or Previous Configuration

To view or change the present configuration, press [Ctrl-O] five consecutive times. Make sure that the multiplexer is off-line and the composite link disconnected. This will bring up the same screens as discussed in **New or Factory Configuration**, except that the first screen, which displays the ports, will present the current configuration of the unit.

Chapter Five
Assistance

BLACK BOX Corporation markets data communications products through distribution, manufacturer's representatives, and catalog sales. For questions regarding the operation or installation of its products, you should first contact the Technical Support Department at Black Box Corporation to gain greater clarity on technical questions at (724)746-5500.

Black Box Technical Support may be reached 24 hours a day, 7 days a week.

Warranty Returns

Units that require a return for warranty repair or replacement, must first be reviewed by BLACK BOX Technical Support. If BLACK BOX Technical Support concludes that a unit should be returned for whatever reason, BLACK BOX Customer Sales & Service will issue a Return Material Authorization (RMA #).

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