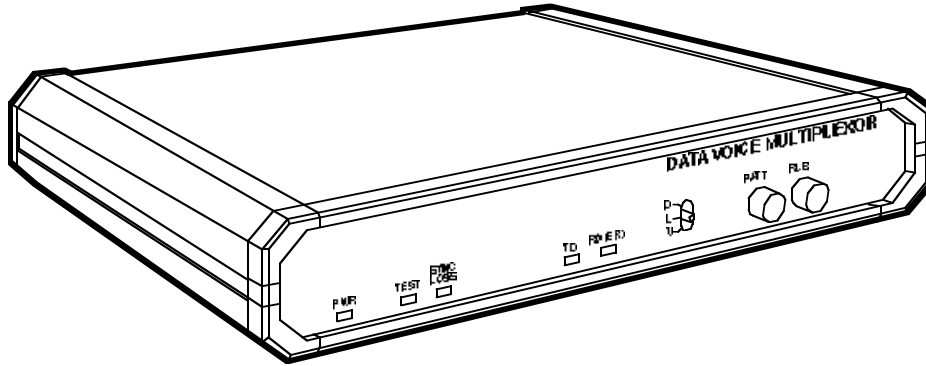




# BLACK BOX<sup>®</sup>

## NETWORK SERVICES

### Data Voice Multiplexors



*Don't pay for both dedicated data lines and PABX voice lines from your main office to your branch office. Run data, fax, and voice across a single line (even a dialup line) and save!*

#### Key Features

- ▶ Merge data, voice, and fax into one signal transmitted at up to 256 kbps.
- ▶ Send multiplexed traffic across a single dialup, leased, or high-speed line.
- ▶ MPMLQ compression for the best possible voice connections at 4.8, 6.4, 7.2, 9.6, or 12.8 kbps.
- ▶ Can be configured to give data channel extra bandwidth when voice channels are idle.
- ▶ Carries Group III fax traffic in-band (with the voice stream).
- ▶ Comes in RS-232 and V.35, FXO and FXS, and 115-VAC and 230-VAC versions, as well as versions with either one or two voice channels.

**S**o you have one line going to the WAN router. And another line to the fax machine. And another line to the PABX. Complicated, isn't it? Expensive, too.

But do you really need separate lines to carry your voice, fax, and data traffic? You might want to consider using our Data Voice Multiplexors (DVMs) instead. A pair of DVMs can put those three lines together for transmission across just one dialup, leased, or high-speed phone line.

The two DVMs can send and receive the multiplexed main-link signal at common data rates from 9.6 to 64 kbps (for the RS-232 models) or 256 kbps (for the V.35 models). This includes from 0.8 to 252.8 kbps for your data, from 4.8 to 12.8 kbps for each voice/fax channel, and from 0.8 to 3.2 kbps of overhead.

You can order DVMs with either one or two voice channels. When you run the voice channels at 6.4 kbps or higher, your users won't be

able to tell the difference between multiplexed calls and voice calls they make through other lines. The DVMs use adaptive echo cancellation to help achieve that level of perceived quality.

When nobody is making voice or fax calls, the DVMs can be set to allocate that extra bandwidth for your data, getting it from one site to the other that much faster. But they can be set to handle fixed-rate voice and data equipment too.

In standard PABX-to-extension applications, you would use a Foreign Exchange Office (FXO) model of the DVM at the PABX site and a Foreign Exchange Station (FXS) model of the DVM at the

extension site. But you can also use FXS models at either end to provide Private Line with Auto-Ring (PLAR) service.

The DVMs come in RS-232 and V.35 versions. Both versions have DB15 data and main-link connectors, but each version comes with adapter cables to patch these to the correct connector for the chosen interface (DB25 female and M/34 female respectively).

The DVMs are also available in 115-VAC and 230-VAC versions. In addition, they have a full suite of diagnostics for easy testing and troubleshooting, and you can download configurations from one unit to the next.

#### Typical Application

*Once you link your satellite offices in the suburbs to your downtown headquarters with fractional E1, ISDN, or leased or dialup modem lines, you can not only transfer data, you can hook up everybody's voice lines to your PABX as extensions.*

## Specifications

### General—High-Level:

**Multiplexor Type** —  
3-channel adaptive

**Multiplexing Method** —  
Bit-interleaved time-division  
multiplexing (TDM)

**Management and Supervision  
Overhead** —  
0.8 kbps for main-link data  
rates from 9.6 to 32 kbps;  
1.6 kbps for rates from 48 to  
128 kbps;  
3.2 kbps for rates higher than  
128 kbps

### Main Link:

**Data Rate** — 9.6 to 256 kbps,  
autodetected

**Protocol** — Synchronous

**Clock Source** — External

**Interface** —  
MX270, MX272, MX274, and  
MX276: EIA/TIA RS-232,  
ITU-T V.24 serial, DTE;  
MX271, MX273, MX275, and  
MX277: ITU-T V.35 serial,  
DTE

**Connector** —  
DB15 female, adapter cable  
included:  
RS-232 models:  
DB15 male to DB25  
female;  
V.35 models:  
DB15 male to M/34  
female

### Data Channel:

**Data Rate** —  
0.8 to 252.8 kbps, depending  
on mode and main-link data  
rates:  
ADAPTIVE mode:  
Main-link rate minus  
voice-channel rate  
minus overhead if at  
least one voice channel  
is active;  
Main-link rate minus  
overhead if both  
channels are idle;  
NON-ADAPTIVE 1 mode:  
Main-link rate minus  
assigned voice-channel  
rate minus overhead;  
NON-ADAPTIVE 2 mode:  
Assigned rate (sum of this  
and assigned voice-  
channel rate and overhead  
must not equal more than  
256 kbps)

**Protocol** — Synchronous

**Clock Source** — Receive and  
transmit clocks derived from

main-link clock

**Interface** —  
MX270, MX272, MX274, and  
MX276: EIA/TIA RS-232,  
ITU-T V.24 serial, DCE;  
MX271, MX273, MX275, and  
MX277: ITU-T V.35 serial,  
DCE

**Connector** —  
DB15 female, adapter cable  
included:  
RS-232 models:  
DB15 male to DB25  
female;  
V.35 models:  
DB15 male to M/34  
female

### Voice Channels—General:

**Number of Voice Channels** —  
MX270 through MX273  
models: Two;  
MX274 through MX277  
models: One

**Digitizing Technique and  
Voice-Transmission Rates**—  
ITU-T Rec. G.723 compliant  
MPMLQ low-bit-rate  
digitizing at 4.8, 6.4, 7.2, 9.6,  
or 12.8 kbps

**Fax Support and Fax Rates**—  
In-band, at 2.4, 4.8, 7.2, or  
9.6 kbps

**End-to-End Processing  
Delay** — 120 ms

**Acceptable Bit-Error Ratio for  
Channel** —  $1 \times 10^{-13}$  or better

**Interface** —  
MX270, MX271, MX274, and  
MX275 models:  
EIA/TIA-464 loop-start  
2-wire Foreign Exchange  
Office (FXO);  
MX272, MX273, MX276, and  
MX277 models:  
EIA/TIA-464 loop-start  
2-wire Foreign Exchange  
Station (FXS);  
See *Voice Channels—FXO  
Interface and Voice Channels—  
FXS Interface* for more  
details

**Connector** — RJ-45 (8-pin)  
female for each channel

### Voice Channels—Analog Characteristics (at 9.6 kbps):

**Nominal Transmit Level** —  
+2 to -13 dBm, independently  
adjustable for each channel in  
steps of  $1 \pm 0.15$  dB

**Nominal Receive Level** —  
Independently adjustable for  
each channel in steps of  
 $1 \pm 0.15$  dB:

FXO models: +2 to -13 dBm;  
FXS models: +1 to -13 dBm

**Frequency Response (Referred  
to 1020 Hz)** —  
Referenced to 1020 Hz:  
300 to 3000 Hz at  $\pm 0.5$  dB;  
250 to 3400 Hz at  $\pm 1.1$  dB

**Signal-to-Distortion Ratio** —  
At 9.6 kbps, using ITU-T  
Rec. G.712, G.713, method 2:  
From 0 to -30 dBm0:  
Better than 33 dB;  
From +3 to -45 dBm0:  
Better than 22 dB

**Idle Channel Noise** —  
Better than -70 dBm0

### Voice Channels—Adaptive Echo Canceler:

**Integral Module Echo-Path  
Length** — 8 ms

**Echo Return-Loss Enhancement  
(ERLE)** — Greater than 30 dB

**Convergence Speed** —  
Better than ITU-T Rec. G.165

**Dial-Pulse Distortion** —  
 $\pm 4$  ms maximum

### Voice Channels—Fax Characteristics:

**Standards** — Supports Group III  
fax machines that comply  
with ITU-T Rec. T.4 and T.30

**Fax Data Rates/Channel  
Bandwidth** —  
All with auto-fallback:  
2.4 kbps/4.8 kbps;  
4.8 kbps/6.4 or 7.2 kbps;  
7.2 kbps/9.6 kbps;  
9.6 kbps/12.8 kbps

### Voice Channels—FXO Interface:

**DC Impedance** —  
Off hook:  
150  $\Omega$  at 150-mA feed;  
330  $\Omega$  at 25-mA feed;  
On hook:  
More than 1 M $\Omega$

**AC Input Impedance** —  
Off hook: 600  $\Omega$ ;  
On hook: 20 k $\Omega$  at 20 Hz,  
70 Vrms

**Off-Hook Return Loss** —  
Off hook: Better than 22 dB

**On-Hook Ring-Detect Range** —  
Greater than 20 Vrms at  
17 to 25 Hz

**Transformer Isolation** —  
3000 Vrms

### Voice Channels—FXS Interface:

**Nominal Impedance** — 600  $\Omega$

**Return Loss (at 300 to**

**3400 Hz)** — Better than 20 dB

**Feed Current** — 25 mA at 300- $\Omega$   
loop resistance

**Ringer** — 40.5 to 49.5 Vrms,  
overload protected, 19.8 to  
24.2 Hz, 1 second ON,  
3 seconds OFF

### General—Low-Level:

**Configuration Transfer** —  
Downloading from "master"  
unit to "slave" unit across  
main link

**User Controls** —  
Front-mounted:  
(2) Pushbuttons for  
diagnostic testing;  
(1) 3-position slide switch  
for channel selection;  
Internal:  
(4) Jumper blocks for  
various configuration  
options

**Diagnostics** —  
Remote loopback, BERT on  
the data channel, and tone  
injection on the voice  
channels

**Indicators** —  
(5) Front-mounted LEDs:  
PWR, TEST, SYNC LOSS,  
TD, RD (ER)

**Power** —  
From utility-power (mains)  
outlet, through detachable  
6-ft. (1.8-m) power cord and  
rear-mounted IEC 320 male  
power inlet, to internal  
transformer:  
Models with "-A"-suffix  
product codes:  
103.5 to 126.5 VAC,  
47 to 63 Hz;  
Models with "-AE"-suffix  
product codes:  
207 to 253 VAC,  
47 to 63 Hz;  
Consumption:  
15 VA (15 watts maximum)

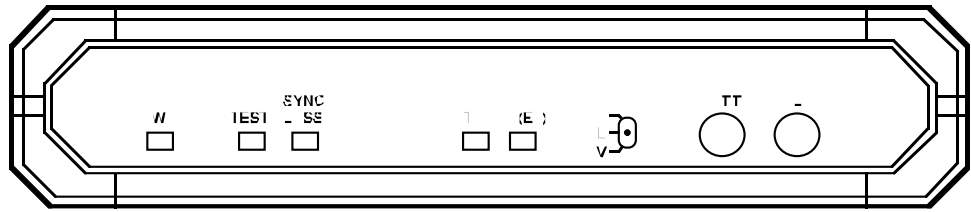
**Temperature  
Tolerance** — 0 to 45° C

**Humidity  
Tolerance** —  
Up to 90% noncondensing

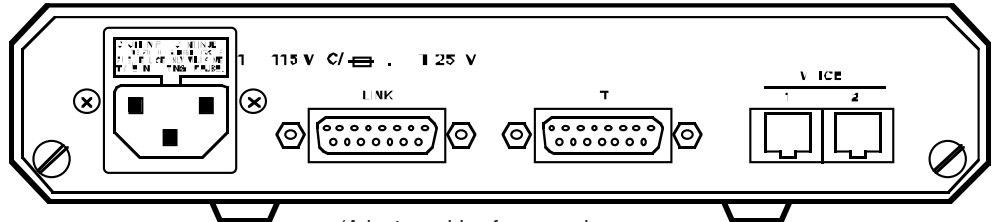
**Size** — 4.4 x 19.3 x 24 cm

**Weight** — 2.7 kg

Control and monitor  
the Data Voice  
Multiplexors through  
their front panels...

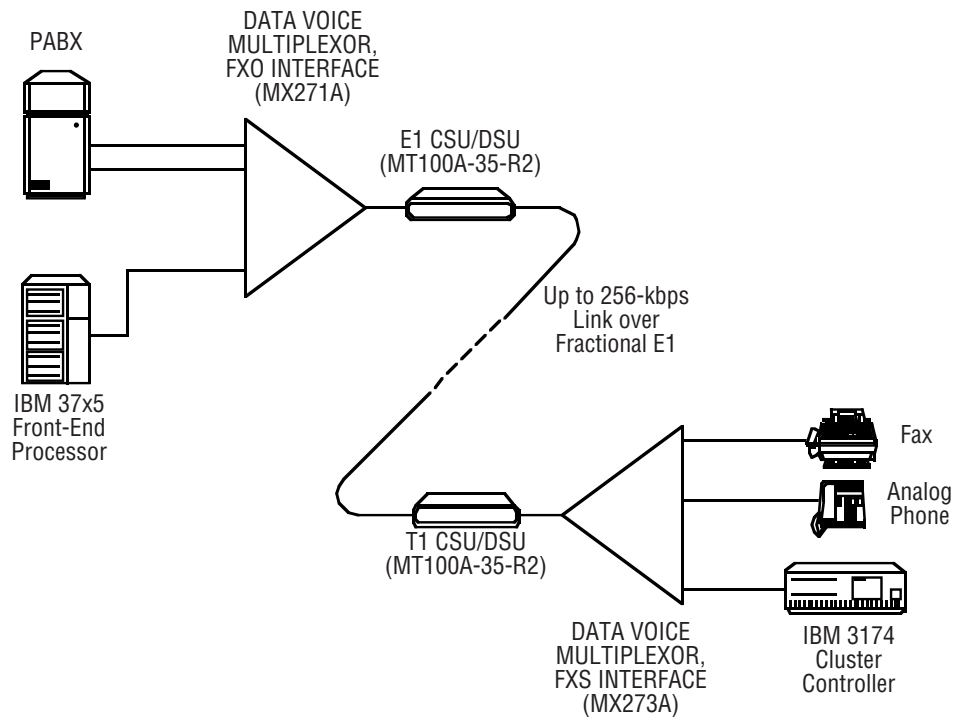


...and attach  
equipment to their  
rear panels (two-voice-  
channel model shown).



(Adapter cables for your chosen  
interface included)

The Multiplexors  
make it easy to  
"piggyback" voice  
data across an IBM  
SNA link.



**The complete package:**

- The Data Voice Multiplexor itself.
- Two adapter cables for the appropriate data interface.
- A 6-ft. (1.8-m) power cord.
- A user's manual.

**Additional equipment you might need:**

- Cables to connect your equipment to the Multiplexor.
- AC-power, data-line, and voice-line surge protectors.

## Ordering Information

<b>PRODUCT NAME</b> Data Voice Multiplexors:				<b>ORDER CODE</b>
<i>Voice/Fax Data Ports:</i>	<i>Location (Foreign Exchange Office [FXO] or Foreign Exchange Station [FXS]):</i>	<i>Interface:</i>	<i>AC Input Voltage:</i>	
Two	FXO	RS-232/V.24	230-VAC	MX270AE
		V.35	230-VAC	MX271AE
	FXS	RS-232/V.24	230-VAC	MX272AE
		V.35	230-VAC	MX273AE
One	FXO	RS-232/V.24	230-VAC	MX274AE
		V.35	230-VAC	MX275AE
	FXS	RS-232/V.24	230-VAC	MX276AE
		V.35	230-VAC	MX277AE
<b>OPTIONAL ACCESSORIES</b>				<b>ORDER CODE</b>
RS-232 Cable, DB25 Male to Male, 25-wire straight-through-pinned, 10 ft. (3 m).....				ECM25C-0010-MM
V.35 Cable, M/34 Male to Male, 10 ft. (3 m).....				EYN450-0010-MM
Flat Satin RJ-45 Male to Male Cable, 8-wire straight-through-pinned, 7 ft. (2.1 m).....				EL08MS-07
Flat Satin RJ-11 Male to Male Cable, 4-wire straight-through-pinned, 7 ft. (2.1 m).....				EL04MS-07