BLACK BOX®
NETWORK SERVICES

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2-WIRE/4-WIRE MODULAR CAMPUS DRIVERS
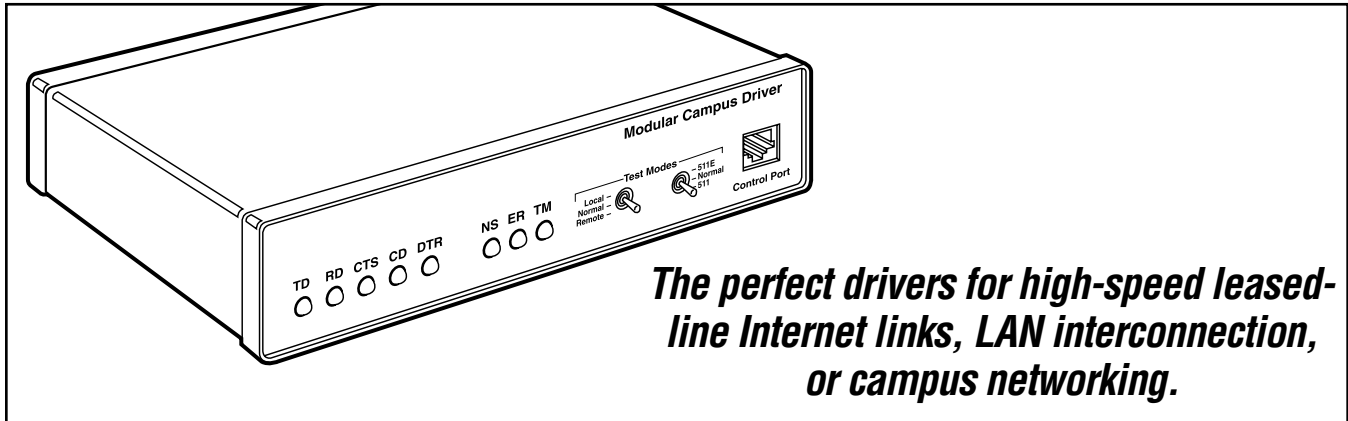
The perfect drivers for high-speed leased-line Internet links, LAN interconnection, or campus networking.

Key Features

▶ **Operate point-to-point over one or two UTPs.**

▶ **Distances up to 10.1 miles for 2-wire models and 11.1 miles for 4-wire models.**

▶ **Modular DCE-DTE interface cards for RS-232, RS-422/530, V.35, X.21, and G.703 connections.**

▶ **2-wire card version available for use in our MicroRACK.**

▶ **Use WAN Bridge Module with 4-wire driver to link LANs.**

▶ **Configurable via DIP switches and terminal connection.**

▶ **LEDs indicate DTE signals, network links, and test modes.**

With their support for high data rates, long distances, and multiple interfaces, the BLACK BOX® 2-Wire and 4-Wire Modular Campus Drivers provide a number of point-to-point communication solutions. Whether your task is connecting two LANs over private campus or leased lines, extending a 64-kbps G.703 link, performing G.703 extension and interface conversion, or transferring high-speed data, these drivers can do it all.

The Modular Campus Drivers give you communication over either a single twisted pair (with the 2-wire models) or two twisted pairs (with the 4-wire versions). Offering a variety of switch-selectable synchronous data rates (and asynchronous data rates for the 2-wire models), the drivers are great for connecting two bridges or routers, or for similar campus networking applications at distances up to 10.1 miles (for the 2-wire models) or 11.1 miles (for the 4-wire model).

One of the Modular Campus Driver's unique features is the quick-change, plug-in DCE-to-DTE Interface Card. Several different models are available to provide connection to a variety of popular terminal interfaces: G.703, V.35, X.21, RS-422/-530, and RS-232. Each card has a 50-pin card-edge connector on one side and a serial port interface on the other. Use the Modular Campus Driver's rear RJ-45 jack to connect the twisted-pair line.

The 2-Wire Modular Campus Drivers feature a V.52 bit-error-rate-test (BERT) pattern generator and incorporate local line loopback (LLB) and remote digital loopback (RDL) test modes.

The LLB test checks the operation of the local driver and is performed separately on each unit. Any data sent to the local driver in this test mode will be echoed (returned) back to the user device. For example, characters typed on the keyboard of a terminal will appear on the terminal screen.

The RDL test checks the performance of both the local and remote Modular Campus Drivers and the communication link between them. Any characters sent to the remote driver in this test mode will be returned back to the originating device. For example, characters typed on the keyboard of the local terminal will appear on the local terminal screen after having been passed to the remote driver and looped back.

For extended distances, the 2-Wire Modular Campus Drivers use automatic equalization, gain control, and echo cancellation. Data integrity is enhanced by transformer isolation and surge protection.

We also offer a BLACK BOX® MicroRACK version of the 2-Wire V.35 Modular Campus Driver (ME485C-35/B). Supporting one DTE interface connection and one 2-wire line connection, this economical card fits into and draws its power from the 2U-high MicroRACK chassis, which mounts cards in a midplane architecture. The module consists of a front card and a rear card. Both meet inside the rack chassis and plug into each other by way of 50-pin card-edge connectors.

For more information on the MicroRACK, request **Product Data Sheet 12915** or call Black Box Tech Support.

The 4-Wire Modular Campus Driver boasts built-in V.54 loopback tests (which can be activated from the front panel or the terminal interface), and a V.52 BERT pattern generator. Automatic equalization and gain control enhance data integrity. The line driver also features transformer isolation for protection against ground loops, as well as Silicon Avalanche Diodes to guard data and connected equipment against transient surges.

For the 4-Wire Modular Campus Driver, we also offer a WAN Bridge Module. This card, with its modular 10BASE-T connector, enables you to link two peer Ethernet LANs. Supporting transparent operation to higher-level protocols (such as TCP/IP and NetBIOS), the bridge module requires no configuration—it automatically discovers, loads, and deletes MAC addresses using its 512-MB onboard RAM.

For both 2- and 4-wire models, synchronous clocking options
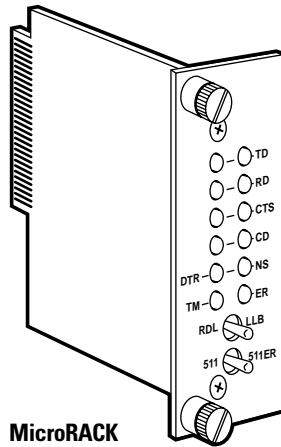
MicroRACK 2-Wire V.35 Modular Campus Driver (ME485C-35/B)

include internal, external, and receive recovered clock. And configuration is made easier by two sets of eight externally accessible DIP switches. An RJ-45 (RS-232) control port on the driver's front enables you to use a menu-driven commands to configure the unit and initiate diagnostic tests via a VT100™ terminal or similar RS-232 DTE with terminal emulation. Once properly configured and installed, the drivers operate transparently.

ME480A-R2 (4-Wire) Distance Table

Data Rate (kbps)	Wire Gauge (miles/kilometers)			
	19	22	24	26
160	8.1 (13)	5.9 (9.5)	4.1 (6.6)	3 (4.8)
144	8.5 (13.7)	6.1 (9.8)	4.4 (7.1)	3.1 (5)
128	9 (14.5)	6.2 (10)	4.6 (7.4)	3.2 (5.2)
112	9.2 (14.8)	6.3 (10.1)	4.8 (7.7)	3.2 (5.2)
80	9.2 (14.8)	6.4 (10.3)	5.2 (8.4)	3.2 (5.2)
72	10.8 (17.4)	6.6 (10.6)	5.5 (8.9)	3.4 (5.5)
64	11 (17.7)	6.8 (10.9)	5.5 (8.9)	3.4 (5.5)
56	11.1 (17.9)	6.8 (10.9)	5.5 (8.9)	3.4 (5.5)
48	10.8 (17.4)	6.6 (10.6)	5.4 (8.7)	3.3 (5.3)

ME485A and ME485C-35/B (2-Wire) Distance Table

Data Rate (kbps)	Wire Gauge (miles/kilometers)			
	19	22	24	26
128	10.1 (16.3)	6.4 (10.3)	4.5 (7.2)	3.4 (5.5)
64	10.1 (16.3)	6.4 (10.3)	4.5 (7.2)	3.4 (5.5)
56	10.1 (16.3)	6.4 (10.3)	4.5 (7.2)	3.4 (5.5)
32	10.1 (16.3)	6.4 (10.3)	4.5 (7.2)	3.4 (5.5)
0 to 38.4	10.1 (16.3)	6.4 (10.3)	4.5 (7.2)	3.4 (5.5)

Specifications

Approvals: CE, UL®, cUL

Clocking: Internal, external, receive

Data Rates: ME480A-R2: 48, 56, 64, 72, 80, 112, 128, 144, or 160 kbps (switch-selectable); ME485A, ME485AE, ME485A-D48, ME485C-35/B: 32, 56, 64, or 128 kbps synchronous (switch-selectable), or 0 to 38.4 kbps asynchronous

Distance: See **above right**

Carrier Control: Constantly On or Controlled By RTS

Diagnostics: ME480A-R2: V.52-compliant bit-error-rate pattern (511/511E pattern) generator and detector with error injection mode; V.54-compliant; local analog loopback, digital loopback, remote digital loopback;

ME485A, ME485AE, ME485A-D48, ME485C-35/B: Local analog loopback, remote digital loopback; V.52-compliant bit-error-rate pattern (511/511E pattern) generator and detector with error injection mode

Line Encoding: ME485A, ME485AE, ME485A-D48, ME485C-35/B: 2B1Q with Integrated Echo Cancellation

RTS/CTS Delay: No delay, short delay (4 to 9 ms), or long delay (33 to 71 ms)

Speed (Maximum): ME480A-R2: 160 kbps; ME485A, ME485AE, ME485A-D48, ME485C-35/B: Async: 38.4 kbps; Sync: 128 kbps;

Transmission Format: ME480A-R2: Sync; ME485A, ME485AE, ME485A-D48, ME485C-35/B: Async or sync

Transmission Line: Unconditioned twisted pair or Local Area Data Circuits (LADS), 19 to 26 AWG; DC continuity not required

Interface: ME485A, ME485AE, ME485A-D48, ME480A-R2: RS-232, RS-422/530, V.35, X.21, or G.703 depending on interface card; ME485C-35/B: V.35

Connectors: All standalone units: (1) RJ-45 control, (1) RJ-45 line; ME481C-232, ME481C-422: (1) DB25 F, (1) card-edge; ME481C-35, ME485C-35/B: (1) M/34 F, (1) card-edge; ME481C-X.21: (1) DB15 F, (1) card-edge; ME481C-G703, ME530A: (1) RJ-45, (1) card-edge

Temperature Tolerance: Operating: 32 to 113°F (0 to 45°C)

Humidity Tolerance: 5 to 95%, noncondensing

Power: ME485A: 115 VAC, 60 Hz; ME485AE: 230 VAC, 50 Hz; ME485A-D48: 48 VDC, 5 watts; ME480A-R2: 115/230 VAC, 50/60 Hz, switchable; ME485C-35/B: From the MicroRACK

Surge Protection: 600W power dissipation at 1 ms

Size: All standalone units: 7.3"H x 6.6"W x 1.6"D (18.5 x 16.8 x 4.1 cm); ME485C-35/B: Front card: 4.8"H x 3.1"W x 0.95"D (12.2 x 7.9 x 2.4 cm); Rear card: 3.3"H x 2.8"W x 0.95"D (8.4 x 7.1 x 2.4 cm)

Weight: All standalone units: 2 lb. (0.9 kg); ME485C-35/B: Front card: 0.22 lb. (0.1 kg); Rear card: 0.12 lb. (0.05 kg)

Why Buy From Black Box? Exceptional Value. Exceptional Tech Support. Period.

Recognize any of these situations?

- You wait more than 30 minutes to get through to a vendor's tech support.
- The so-called "tech" can't help you or gives you the wrong answer.
- You don't have a purchase order number and the tech refuses to help you.
- It's 9 p. m. and you need help, but your vendor's tech support line is closed.

According to a survey by Data Communications magazine, 90% of network managers surveyed say that getting the technical support they need is extremely important when choosing a vendor. But even though network managers pay anywhere from 10 to 20% of their overall purchase price for a basic service and support contract, the technical support and service they receive falls far short of their expectations—and certainly isn't worth what they paid.

At Black Box, we guarantee the best value and the best support. You can even consult our Technical Support Experts before you buy if you need help selecting just the right component for your application.

Don't waste time and money—call Black Box today.

Ordering Information

ITEM	CODE
4-Wire Modular Campus Driver	
115-/230-VAC	ME480A-R2
2-Wire Modular Campus Driver	
115-VAC	ME485A
230-VAC	ME485AE
48-VDC	ME485A-D48
2- or 4-Wire Campus Driver Interface Cards	
RS-232	ME481C-232
RS-422/530	ME481C-422
V.35	ME481C-35
X.21	ME481C-X21
G.703	ME481C-G703
WAN Bridge Module (for ME480A-R2 Only)	ME530A
MicroRACK 2-Wire Modular Campus Driver Card	
(M/34 to RJ-45)	ME485C-35/B
For the ME485C-35/B, you'll need…	
MicroRACK 2-Port	RM202
4-Port	RM204
8-Port	RM208
16-Port	RM216