

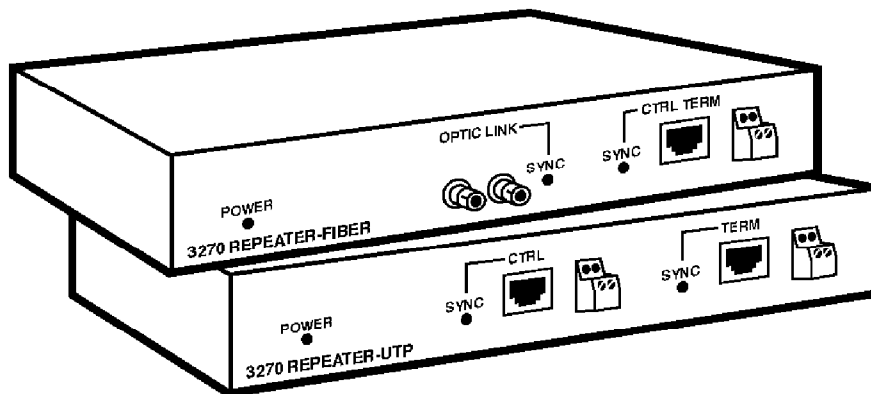


# BLACK BOX®

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The Source for Connectivity™

## 3270 Repeaters



*The 3270 Repeaters give even extremely remote terminals access to your controllers.*

*With the 3270 Repeaters, your controller will have a fantastic range. The UTP model lets you place terminals up to 3000 ft. (914 m) away; the Fiber Repeater, 2.1 miles (3.4 km) or more.*

### Key Features

- ▶ Connect coax terminals even at extreme distances from your controllers.
- ▶ One UTP Repeater reaches as far as 3000 ft. (914 m).
- ▶ One pair of Fiber Repeaters connects devices at a distance of up to 11,200 ft. (3413 m).
- ▶ Fiber link is immune to electromagnetic interference.
- ▶ Daisychain and reach as far as your controller's timeout can handle.

### Overview

Extend your 3270 system down the hall or across the campus. Our 3270 Repeaters allow terminals to be connected to your controllers at theoretically limitless distances, via inexpensive modular UTP cable. A single UTP Repeater delivers clean, sharp data signals across 3000 ft. (914 m) of separation. And you can daisychain UTP Repeaters; each one will boost your transmission another 2000 ft. (609 m).

But for truly long-distance runs, especially outdoor ones, nothing beats the 3270 Fiber Repeater. One Fiber Repeater will receive a controller's signal that has traveled up to 1500 ft. (457 m) on UTP cable, regenerate the signal, and send it as far as 8200 ft. (2499 m) to another Fiber Repeater over fiberoptic cable.

The second Repeater will regenerate the signal again and send it, via UTP, to a terminal up to 1500 ft. (457 m) farther on.

Altogether, one pair of Fiber Repeaters will transmit signals across 11,200 ft. (3413 m)—better than two miles. And these can also be daisychained, with individual UTP Repeaters or with other Fiber pairs. The only limit to how far you can go is your controller's timeout—how long it's willing to wait for a reply. See the "Technically Speaking" section for more

details on daisy chaining.

An added benefit of the fiberoptic link is its immunity to electromagnetic interference. Run fiberoptic cables between your Fiber 3270 Repeaters, through the harshest electrical environments, knowing that your sensitive controller/terminal communication won't be disturbed in the least.

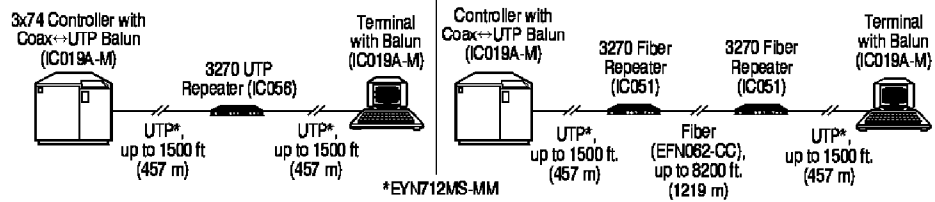
Rackmount plates and hinged wallmount brackets are available, so placing the Repeaters is as easy and convenient as possible.

### Typical Applications

*Using a UTP Repeater, run UTP cable between your 3270-system controller and a 3299 multiplexor in the accounting department in the next wing.*

*Connect controllers in your data center with terminals in the sales building down the road, via Fiber Repeaters and fiberoptic cable.*

Connect distant terminals to your controller with twisted pair alone, or add a fiber link for greater distances.



### Technically Speaking

To calculate how far you can chain 3270 Repeaters in your system, first find out your controller's timeout: your absolute controller to terminal communications time limit. On 3274 controller models the standard timeout is 98  $\mu$ s; on 3174 models it's normally 50  $\mu$ s, but with "Microcode B" it can be set to 100  $\mu$ s. (Ask your MIS manager.)

Then add up the total propagation delay you'll have at the distance(s) you want; cable and devices are the two sources of propagation delay in this type of application.

Both types of cable used with the Repeaters carry a signal at the same velocity: about 0.7 times the speed of light. At this speed, cable propagation delay is approx. 2.9 ns/ft. (9.6 ns/m).

Multiply this figure by your distance(s) to get specific time(s).

Your device propagation delay consists of a terminal's 5.5- $\mu$ s response time, plus 11  $\mu$ s of total propagation delay for a 3299 multiplexor (if you use one), plus 6.8  $\mu$ s of total propagation delay for each Repeater you'll need. (One UTP Repeater serves an initial 3000 ft. [914 m] of UTP cable; one Fiber pair serves an initial 11,200 ft. [3413 m] of UTP and fiber. Additional UTP Repeaters each serve up to 2000 ft. [609 m] of UTP cable; extra pairs of Fiber Repeaters serve up to 10,200 ft. [3108 m] of UTP and fiber.)

An example using two Fiber pairs at maximum distance, with a mux, has a total propagation delay of (21,400 ft. x 0.0029  $\mu$ s/ft.)

+ (5.5  $\mu$ s + 11  $\mu$ s + (4 x 6.8  $\mu$ s)) = 107  $\mu$ s, which is just out of range of a controller set for 100  $\mu$ s. To get in range with this setup (and leave a 10% margin for error), run cable to a max distance of 16000 ft. (4876 m): propagation delay, 90  $\mu$ s.

Some brands of 3299 muxes may have their own timeout requirement. If yours does, and you want to daisy-chain Repeaters, call our Tech

Support Engineers for help in determining your distance limitations.

Some brands of controllers and terminals may require DC continuity between the host and workstation. The 3270 Repeaters have DC isolation and might not work with this type of equipment. Check with your computer dealer for more information.

### Additional equipment you may need

- ◆ UTP Cable and (for IC051A) Duplex Fiberoptic Cable
- ◆ Rackmount Plate(s) and/or Wallmount Bracket(s)
- ◆ Coax to UTP Baluns
- ◆ Surge Protector
- ◆ Redundant Power Supply

### Specifications

#### 3270 Repeaters

**System Requirements** — IBM® 3270 Type A and compatible controllers; IBM® 3178, 3278, 3179, 3180-1, 3279, 3287, 3299, and compatible terminals supported by IBM® 3270

**Data Rate** — 2.358 Mbps

**Transmission** — Transparent to user

**Propagation Delay** — 3.4  $\mu$ s each way (6.8  $\mu$ s total)

**Maximum Distance** — Controller to Repeater: 1500 ft. (457 m); Repeater to Repeater: [IC051] 8200 ft. (2499 m); [IC056] 2000 ft.

(609 m); Controller to Workstation: 1500 ft. (457 m)

**Indicators** — (3) LEDs: (1) Power, (2) Line Sync

**Connectors** — IC051: (1) RJ-11 female, (1) pair of screw-type terminals, (2) ST® female; IC056: (2) RJ-11 modular jacks, (2) pairs of screw-type terminals

**Power** — 110 VAC (U.S.) or 220 VAC, 50-60 Hz

**Size** — 1.3"H x 8.5"W x 4"D (3.3 x 21.6 x 10.2 cm)

**Weight** — 2 lb. (0.9 kg)

## Ordering Information

This information will help you place your order quickly.

PRODUCT NAME	ORDER CODE
3270 Fiber Repeater.....	IC051
3270 UTP Repeater.....	IC056
<i>NOTE: Customers with 230-VAC standard power should add the suffix "E" to the order codes above when ordering or inquiring.</i>	
<b>CABLE AND BALUNS FOR YOUR APPLICATION</b>	
Duplex Fiber Optic Cable (ST Connectors) .....	EFN-062-CC
2-Pair PVC UTP Cable (Straight) .....	EYN712MS-MM
Coax to UTP Balun (Coax Male/RJ-11 Female) .....	IC019A-M
<b>OPTIONAL ACCESSORIES</b>	
19" (48 cm) Rackmount Plate .....	IC055
Hinged Wallmount Bracket .....	IC054
3299E Mux.....	MX202A