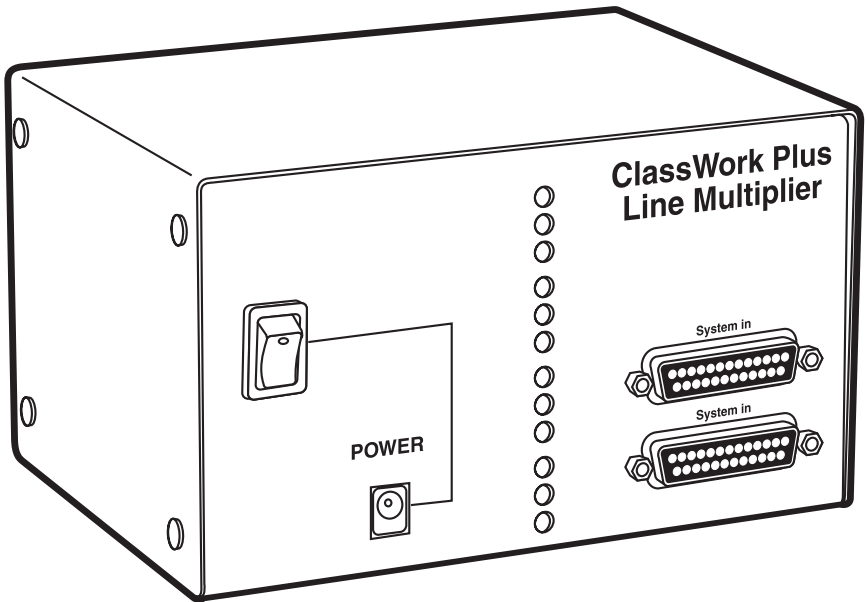




## ClassWork Plus Line Multiplier



**CUSTOMER  
SUPPORT  
INFORMATION**

Order toll-free in the U.S.: Call 877-877-BBOX (outside U.S. call 724-746-5500)  
FREE technical support 24 hours a day, 7 days a week: Call 724-746-5500 or fax 724-746-0746  
Mailing address: Black Box Corporation, 1000 Park Drive, Lawrence, PA 15055-1018  
Web site: [www.blackbox.com](http://www.blackbox.com) • E-mail: [info@blackbox.com](mailto:info@blackbox.com)

**FEDERAL COMMUNICATIONS COMMISSION  
AND  
INDUSTRY CANADA  
RADIO FREQUENCY INTERFERENCE STATEMENTS**

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is 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 measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

*This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.*

*Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.*

**NORMAS OFICIALES MEXICANAS (NOM)  
ELECTRICAL SAFETY STATEMENT****INSTRUCCIONES DE SEGURIDAD**

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
  - A: El cable de poder o el contacto ha sido dañado; u
  - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
  - C: El aparato ha sido expuesto a la lluvia; o
  - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
  - E: El aparato ha sido tirado o su cubierta ha sido dañada.

### TRADEMARKS USED IN THIS MANUAL

*Any trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.*

# Contents

Chapter	Page
1. Specifications . . . . .	6
2. Introduction . . . . .	7
2.1 Designing a ClassWork Plus Classroom Using the Line Multiplier . .	7
2.2 What the Package Includes . . . . .	8
3. Installation . . . . .	9
3.1 Before Installing the Line Multiplier . . . . .	9
3.2 Connecting the System . . . . .	9
3.3 Connecting the Line Multiplier . . . . .	11
3.4 Connecting Branch 1 . . . . .	12
3.5 Connecting Branch 2 . . . . .	12
3.6 Connecting Branch 3 . . . . .	13
3.7 Connecting Branch 4 . . . . .	13
3.8 Connecting the Terminators . . . . .	14
3.9 Connecting the Power Supply . . . . .	14
3.10 Setting the DIP Switches . . . . .	15
4. Operation . . . . .	19

# 1. Specifications

## **Input**

**Signal:** *Input:* R, G, B video signals, 200 MHz, 1.6 Vpp

**Sync:** *Input:* H, V, TTL

**Sync Range:** *Horizontal:* Up to 100 kHz; *Vertical:* Up to 100

## **Output**

**Video Gain:** *Output:* R, G, B video signals 200 MHz, 1.6 Vpp

**Sync:** TTL

## **General**

**Bandwidth:** 200 MHz

**Internal Jumpers:** Cancel keyboard; Mouse driver

**Connectors:** *Input:* (2) DB25 female; *Output:* (4) DB25 female

**Power:** AC817A: Input: 115 VAC; Output: 9 VAC; AC817AE: Input: 230 VAC

**Size:** 6.1" x 3.5" x 4.5" (15.5 x 8.9 x 11.4 cm)

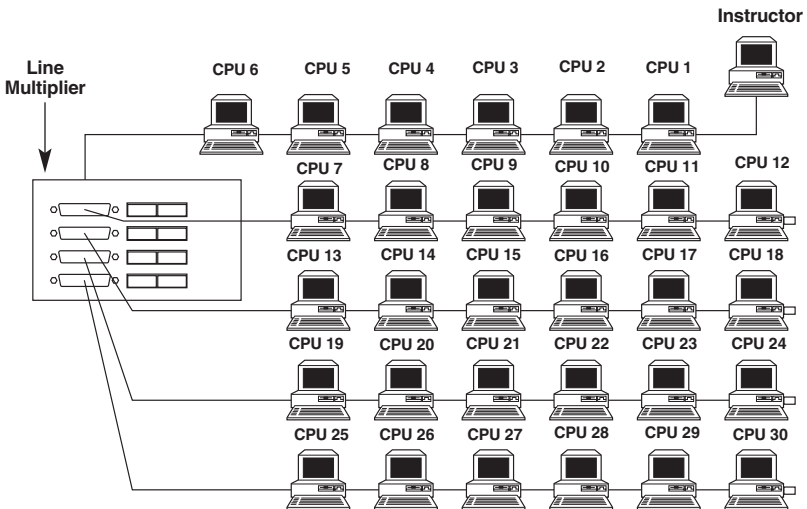
**Weight:** 1.2 lb. (0.5 kg)

## 2. Introduction

The standard ClassWork Plus classroom consists of one long bus used to transmit and receive signals. The Line Multiplier allows you to create up to five smaller buses (or branches) within one classroom. These smaller buses provide stronger signals to all CPUs in the classroom.

### 2.1 Designing a ClassWork Plus Classroom Using the Line Multiplier

The following example will explain how to set up a ClassWork Plus classroom of 30 students using one Line Multiplier (see Figure 2-1).



**Figure 2-1. Typical ClassWork Plus classroom with 30 students connected to one Line Multiplier.**

In this example, six Student Interface Units (SIUs) are connected directly to the Teacher Interface Unit (TIU). Student Number 6 is then connected to the System In port of the Line Multiplier. Six more SIUs are connected to each Branch port of the Line Multiplier (Branch 1, Branch 2, Branch 3, and Branch 4). A Terminator (see **Section 3.8** for more information) is then connected to the System Out port of the Line Multiplier, and to the last SIU in each of the branches.



## 2.2 What the Package Includes

Your package should include the following items.

- ClassWork Plus Line Multiplier
- (1) 6.6-ft. (2-m) System cable
- (1) Power supply (110-VAC for AC817A, 220-VAC for AC817AE)
- (4) DB25 terminators
- This users' manual

If anything is missing or damaged, please call Black Box at 724-746-5500.

# 3. Installation

## 3.1 Before Installing the Line Multiplier

Turn OFF all CPUs before installing the Line Multiplier.

## 3.2 Connecting the System

Figures 3-1 and 3-2 show the front and rear panels of the ClassWork Plus Line Multiplier. Figure 3-3 shows a diagram of the ClassWork Plus system. Refer to these diagrams when connecting the various cables.

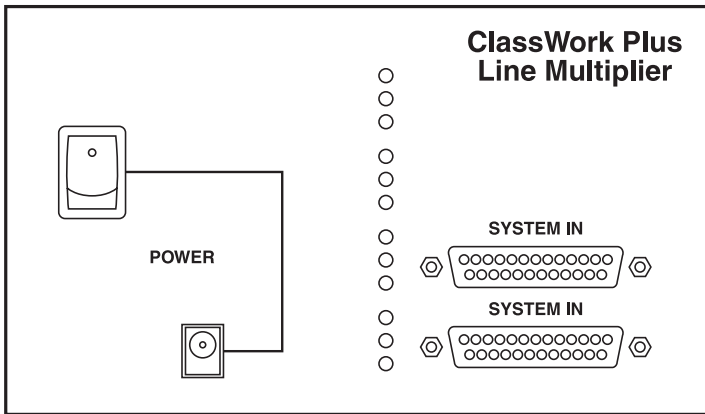


Figure 3-1. The ClassWork Plus Line Multiplier's front panel.

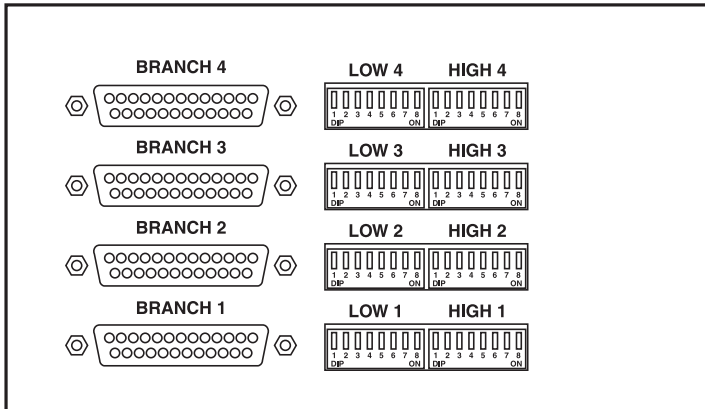


Figure 3-2. The ClassWork Plus Line Multiplier's rear panel.

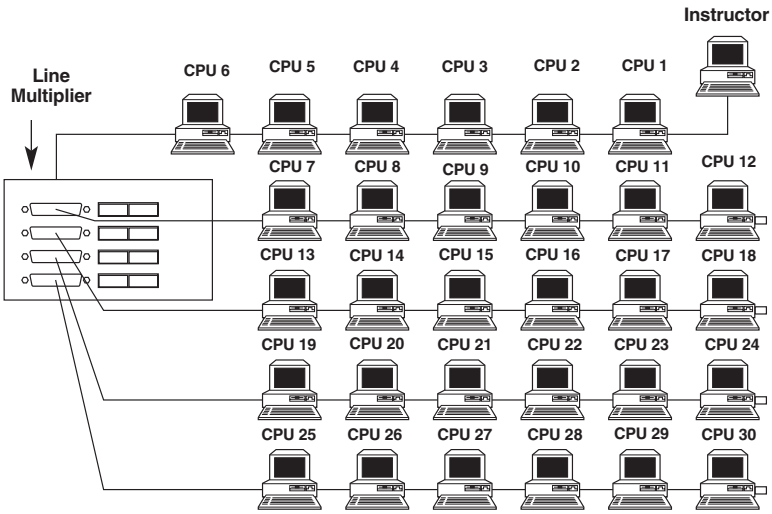


Figure 3-3. The ClassWork Plus Line Multiplier system.

### 3.3 Connecting the Line Multiplier

To connect the Line Multiplier to the ClassWork Plus system: Connect the DB25 male connector from the System cable (see Figure 3-4) to the System In port of the Line Multiplier.

System Cable

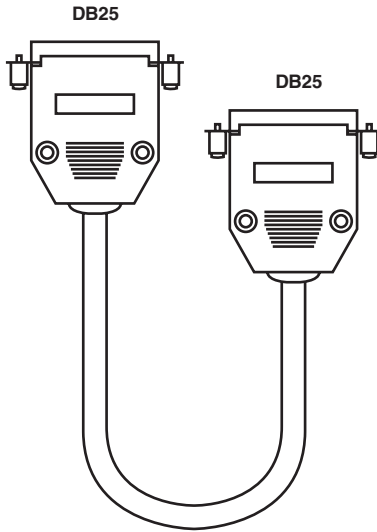


Figure 3-4. System cable.

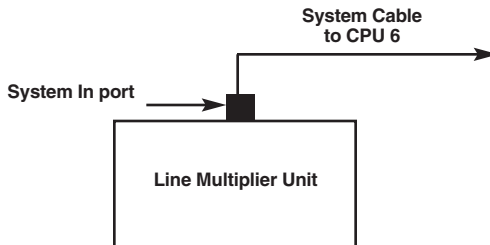
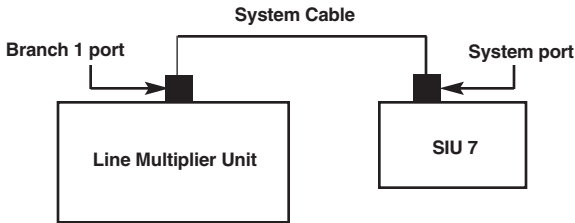


Figure 3-5. System In port connection.

### 3.4 Connecting Branch 1

The System cable from Student Interface Unit (SIU) 7 is used to connect Branch 1 to the Line Multiplier (see Figure 3-6). To connect this cable:

1. Connect the DB25 male connector of the System cable (see Figure 3-4) to the Branch 1 port of the Line Multiplier.
2. Connect the other DB25 male connector of the System cable to the System port of SIU 7 in Branch 1.

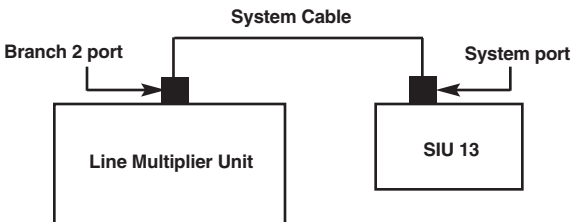


**Figure 3-6. System In port connection.**

### 3.5 Connecting Branch 2

The System cable from Student Interface Unit (SIU) 13 is used to connect Branch 2 to the Line Multiplier (see Figure 3-7). To connect this cable:

1. Connect the DB25 male connector of the System cable (see Figure 3-4) to the Branch 2 port of the Line Multiplier.
2. Connect the other DB25 male connector of the System cable to the System port of SIU 13 in Branch 2.



**Figure 3-7. System In port connection.**

### 3.6 Connecting Branch 3

The System cable from Student Interface Unit (SIU) 19 is used to connect Branch 3 to the Line Multiplier (see Figure 3-8). To connect this cable:

1. Connect the DB25 male connector of the System cable (see Figure 3-4) to the Branch 3 port of the Line Multiplier.
2. Connect the other DB25 male connector of the System cable to the System port of the SIU 19 in Branch 3.

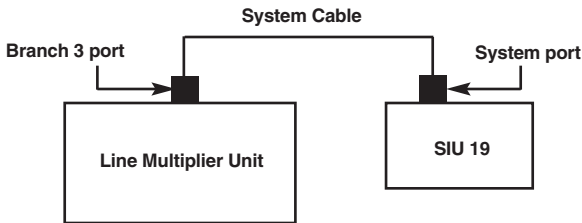


Figure 3-8. System In port connection.

### 3.7 Connecting Branch 4

The System cable from Student Interface Unit (SIU) 25 is used to connect Branch 4 to the Line Multiplier (see Figure 3-9). To connect this cable:

1. Connect the DB25 male connector of the System cable (see Figure 3-4) to the Branch 4 port of the Line Multiplier Unit.
2. Connect the other DB25 male connector of the System cable to the System port of SIU 25 in Branch 4.

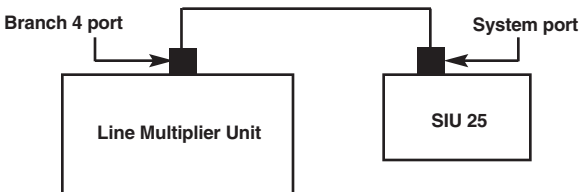


Figure 3-9. System In port connection.

### 3.8 Connecting the Terminators

Terminators are connected to the System ports of the last Student Interface Unit (SIU) in each branch, and to the System Out port of the Line Multiplier.

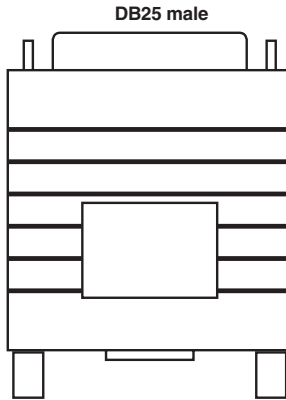


Figure 3-10. Terminator.

### 3.9 Connecting the Power Supply

Insert the power-supply plug into the 9-VAC power port on the rear of the ClassWork Plus Line Multiplier, and plug the cord into a wall socket.

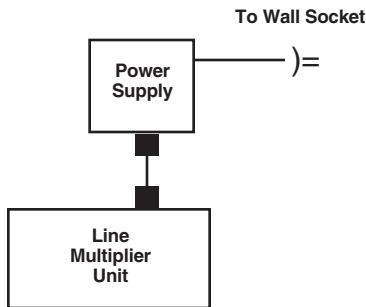
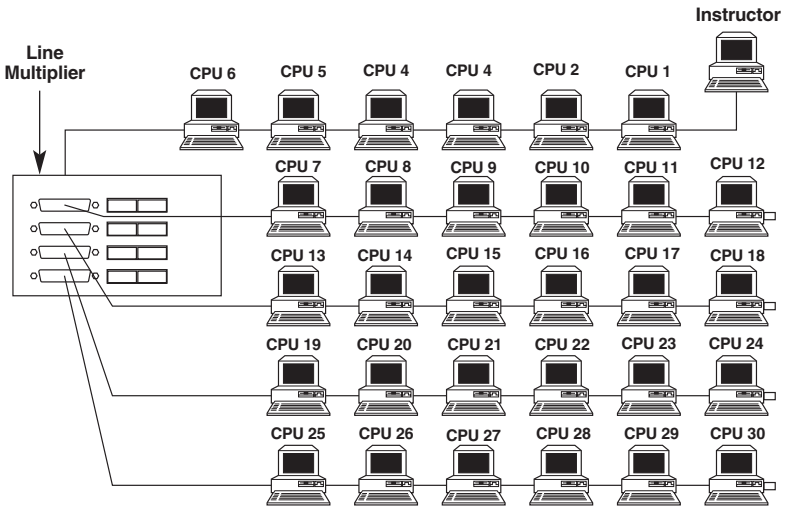


Figure 3-11. Power supply connector.

After making the connection described in **Sections 3.2** through **3.9**, the ClassWork Plus Line Multiplier will operate.

### 3.10 Setting the DIP Switches

Each branch of the ClassWork Plus Line Multiplier contains two DIP switches. You must set these DIP switches to the Student Number of the first and last student in each branch. Take a look at Figure 3-12. Tables 3-1 and 3-2 show you how to set the DIP switches for this application.



**Figure 3-12. Typical ClassWork Plus classroom with 30 students connected to one Line Multiplier.**

Table 3-1 indicates how to set the Line Multiplier DIP switches in the example shown in Figure 3-12.

**Table 3-1. Setting the DIP switches.**

DIP-Switch Number	DIP-Switch Setting
Switch 1	7
Switch 2	12
Switch 3	13
Switch 4	18
Switch 5	19
Switch 6	24
Switch 7	25
Switch 8	30



**NOTE**

All of the Line Multiplier's unused branches must have their DIP switches set to that of a Virtual Branch (student station numbers that do not exist in the system).

If your system consists of 16 student stations (8 student stations connected to Branch #1 and 8 student stations connected to Branch #2), then the DIP switches on Branch #3 and Branch #4 should be set to 17/18 and 19/20 consecutively.

Table 3-2 shows how to set the Student Number.

**Table 3-2. Setting the Student Number.**

Student No.	Switch Number							
	1	2	3	4	5	6	7	8
0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0
2	0	1	0	0	0	0	0	0
3	1	1	0	0	0	0	0	0
4	0	0	1	0	0	0	0	0
5	1	0	1	0	0	0	0	0
6	0	1	1	0	0	0	0	0
7	1	1	1	0	0	0	0	0
8	0	0	0	1	0	0	0	0
9	1	0	0	1	0	0	0	0
10	0	1	0	1	0	0	0	0
11	1	1	0	1	0	0	0	0
12	0	0	1	1	0	0	0	0
13	1	0	1	1	0	0	0	0
14	0	1	1	1	0	0	0	0
15	1	1	1	1	0	0	0	0
16	0	0	0	0	1	0	0	0
17	1	0	0	0	1	0	0	0
18	0	1	0	0	1	0	0	0
19	1	1	0	0	1	0	0	0
20	0	0	1	0	1	0	0	0
21	1	0	1	0	1	0	0	0
22	0	1	1	0	1	0	0	0
23	1	1	1	0	1	0	0	0

**Table 3-2 (continued). Setting the Student Number.**

Student No.	Switch Number							
	1	2	3	4	5	6	7	8
24	0	0	0	1	1	0	0	0
25	1	0	0	1	1	0	0	0
26	0	1	0	1	1	0	0	0
27	1	1	0	1	1	0	0	0
28	0	0	1	1	1	0	0	0
29	1	0	1	1	1	0	0	0
30	0	1	1	1	1	0	0	0
31	1	1	1	1	1	0	0	0
32	0	0	0	0	0	1	0	0
33	1	0	0	0	0	1	0	0
34	0	1	0	0	0	1	0	0
35	1	1	0	0	0	1	0	0
36	0	0	1	0	0	1	0	0
37	1	0	1	0	0	1	0	0
38	0	1	1	0	0	1	0	0
39	1	1	1	0	0	1	0	0
40	0	0	0	1	0	1	0	0
41	1	0	0	1	0	1	0	0
42	0	1	0	1	0	1	0	0
43	1	1	0	1	0	1	0	0
44	0	0	1	1	0	1	0	0
45	1	0	1	1	0	1	0	0
46	0	1	1	1	0	1	0	0
47	1	1	1	1	0	1	0	0
48	0	0	0	0	1	1	0	0
49	1	0	0	0	1	1	0	0
50	0	1	0	0	1	1	0	0
51	1	1	0	0	1	1	0	0
52	0	0	1	0	1	1	0	0
53	1	0	1	0	1	1	0	0
54	0	1	1	0	1	1	0	0
55	1	1	1	0	1	1	0	0
56	0	0	0	1	1	1	0	0

**CLASSWORK PLUS LINE MULTIPLIER****Table 3-2 (continued). Setting the Student Number.**

<b>Student No.</b>	<b>Switch Number</b>							
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
57	1	0	0	1	1	1	0	0
58	0	1	0	1	1	1	0	0
59	1	1	0	1	1	1	0	0
60	0	0	1	1	1	1	0	0
61	1	0	1	1	1	1	0	0
62	0	1	1	1	1	1	0	0
63	1	1	1	1	1	1	0	0

**0=OFF, 1=ON**

# 4. Operation

To operate the ClassWork Plus Line Multiplier:

1. Turn on all CPUs.
2. Turn on the Power switch on the rear of the ClassWork Plus Line Multiplier.

## LED Indicators

The ClassWork Plus Line Multiplier's front panel contains three LED indicators for each branch. Figure 4-1 shows a diagram of the front panel. Table 4-1 explains the LEDs.

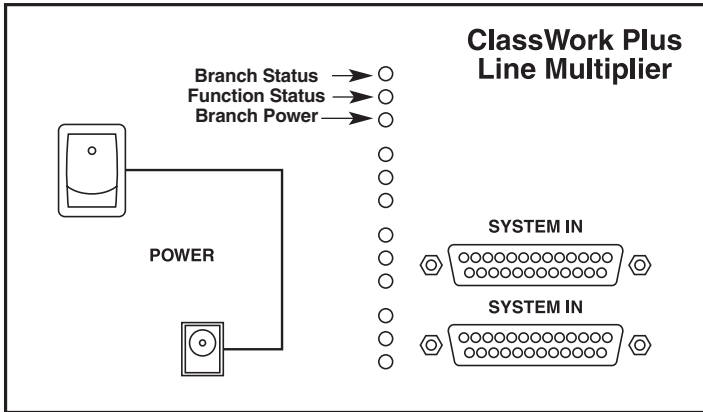


Figure 4-1. The ClassWork Plus Line Multiplier's front panel.

**Table 4-1. LED status.**

<b>LED Name</b>	<b>LED Status: ON</b>	<b>LED Status: OFF</b>
Branch Status	Indicates that the branch is functioning properly.	Indicates that the branch is <i>not</i> functioning properly.
Function Status	Indicates that a ClassWork function is being performed on one of the CPUs in the branch.	Indicates that <i>no</i> ClassWork function is being performed on any of the CPUs in the branch.
Branch Power	Indicates that the branch is receiving power.	Indicates that the branch is <i>not</i> receiving power.



© Copyright 2001. Black Box Corporation. All rights reserved.

---

1000 Park Drive • Lawrence, PA 15055-1018 • 724-746-5500 • Fax 724-746-0746