2 Installing The DSU II Digital Telephone System

Section **Title** ..... **Page**

2.1 Considering The Mounting Requirements

The following requirements will help you to install the DSU II digital telephone system.

- Locate the equipment cabinet within four feet of an AC electrical outlet dedicated exclusively to the use of this equipment. The outlet must be a 117 VAC 15 AMP circuit with a third-wire ground supplied to a standard electrical outlet (NEMA 5–15R).
- Mount the common equipment within 25 feet of the TELCO/PBX jacks. The recommended nominal distance is 7 feet.
- Choose a secure and dry mounting location that has adequate ventilation. The temperature range of the location must be within 32–122 degrees F (0–50 degrees C) and that the relative humidity is less than 90 percent, non-condensing.
- If the mounting surface is damp or if it is made of concrete or masonry material, you must attach a backboard to the mounting surface for mounting the common equipment. Suitable mounting backboards are available commercially or you can construct one from 3/4-inch plywood by cutting it to size.

2.1.1 Tools And Hardware

You will need the following tools and materials to install the common equipment.

- Fasteners—wood screws (1/4 x 1-inch round head), toggle bolts, or wall anchors,
- Screwdriver—to match fasteners,
- Electric drill—if prepared holes are required,
- Connecting tool—for fastening wires to a type-66 connector block,
- Crimping tool—for 623-type modular plugs,
- Volt/Ohm Meter.

2.1.2 Underwriters Laboratories Installation Notice

Per The Underwriters Laboratories standard 1459, 2nd edition, be aware of the following precautions when installing telephone equipment that is to be directly connected to the telephone company network:

- Never install telephone wiring during a lightning storm,
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations,
- Never touch un-insulated telephone wires or terminals unless the telephone line has been disconnected at the network interface,
- Use caution when installing or modifying telephone lines.

2.1.3 Hybrid Installation

Whenever a programmer assigns lines to line groups, the digital telephone system automatically assumes the hybrid mode. Your local telephone company may charge a higher monthly fee for operation of a hybrid system; therefore, the FCC requires that you report the equipment-type category designation number (KF for key system, MF for hybrid system) to the telephone company at the time of installation.

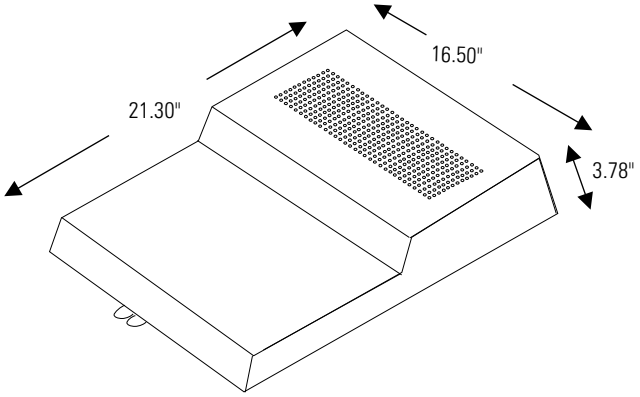
FCC Registration Numbers

Key System	CVWUSA-61535-KF-E
Hybrid System	CVWUSA-61536-MF-E

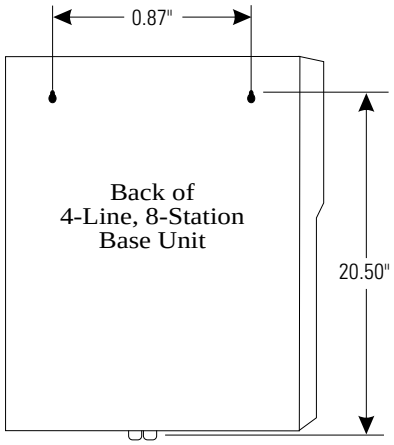
2.2 Mounting The Cabinet

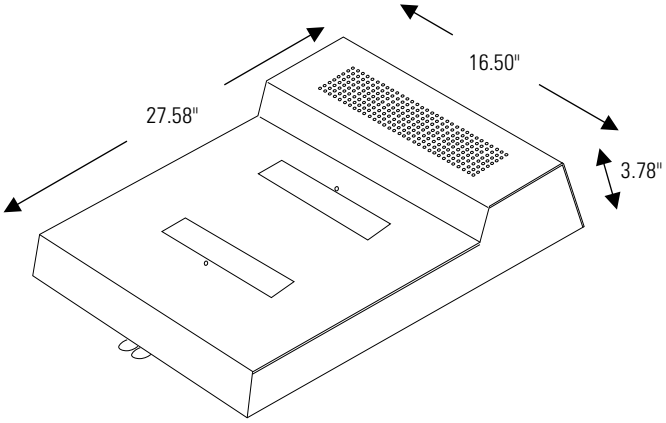
After thoroughly reviewing Section 2.1 and fully understanding its subject matter, use the following procedure to mount the common equipment cabinet

1. Unpack and carefully inspect all equipment for shipping damage. Notify the shipper immediately of any damages that you find. Verify that the packages contain all parts and accessories needed for proper installation and operation.
2. If the mounting location requires a backboard, attach it securely to provide a stable mounting surface for the equipment.
3. Refer to Figure 2-1 or to the PP032-001 mounting template included in the literature that accompanies the common equipment cabinet for the locating dimensions required for the three mounting screws, and mark their locations on the mounting surface.
4. Drill holes in the mounting surface of a proper size to accommodate the hardware being used. If necessary, prepare these holes with inserts, anchors or other attachment devices as dictated by the type of mounting surface.
5. Insert the two top screws into the mounting surface and tighten them to within approximately 1/8-inch of the surface.
6. Hang the cabinet on the top screws using the mounting holes located on the rear of the cabinet. Note that these holes are elongated with an enlargement at one end. This feature allows the cabinet to snap down on the screws to secure the mounting when the cabinet is hung on them.
7. Insert a third screw through the mounting tab located on the lower edge of the cabinet and into the mounting surface, and tighten it into place.
8. Place the individual telephone stations as desired and in keeping with accepted industry and office standards. You can wall mount a telephone station if necessary (see Section 2.5.7 for details).

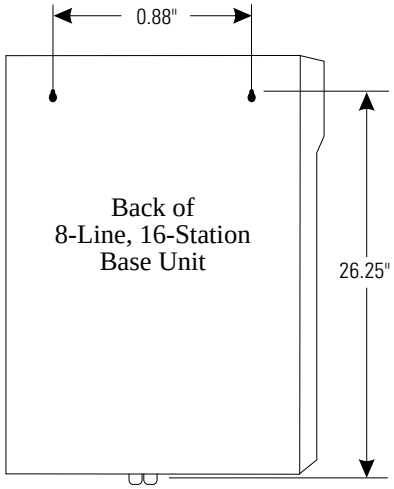


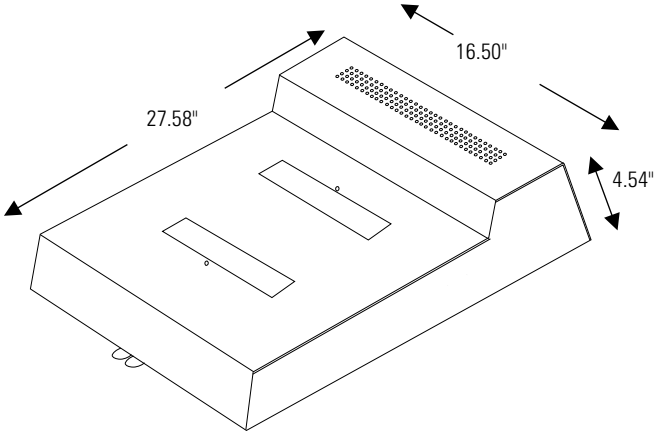
4-Line, 8-Station Base Unit



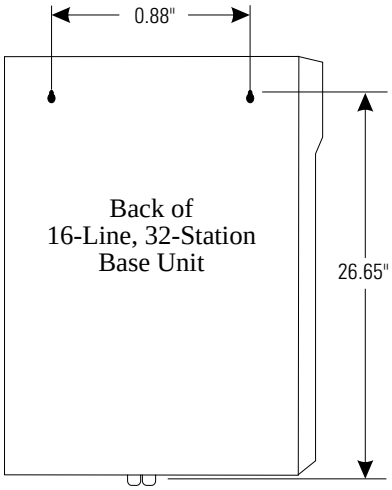


8-Line, 16-Station Base Unit





16-Line, 32-Station Base Unit



DSU250.CDR

Detailing The DSU II Cabinet Dimensions

2.3 Making The AC Power Connection

You must employ a dedicated 117VAC 15 AMP circuit, with a third-wire ground, supplied to a standard electrical outlet (NEMA 5-15R) for the AC power connection.

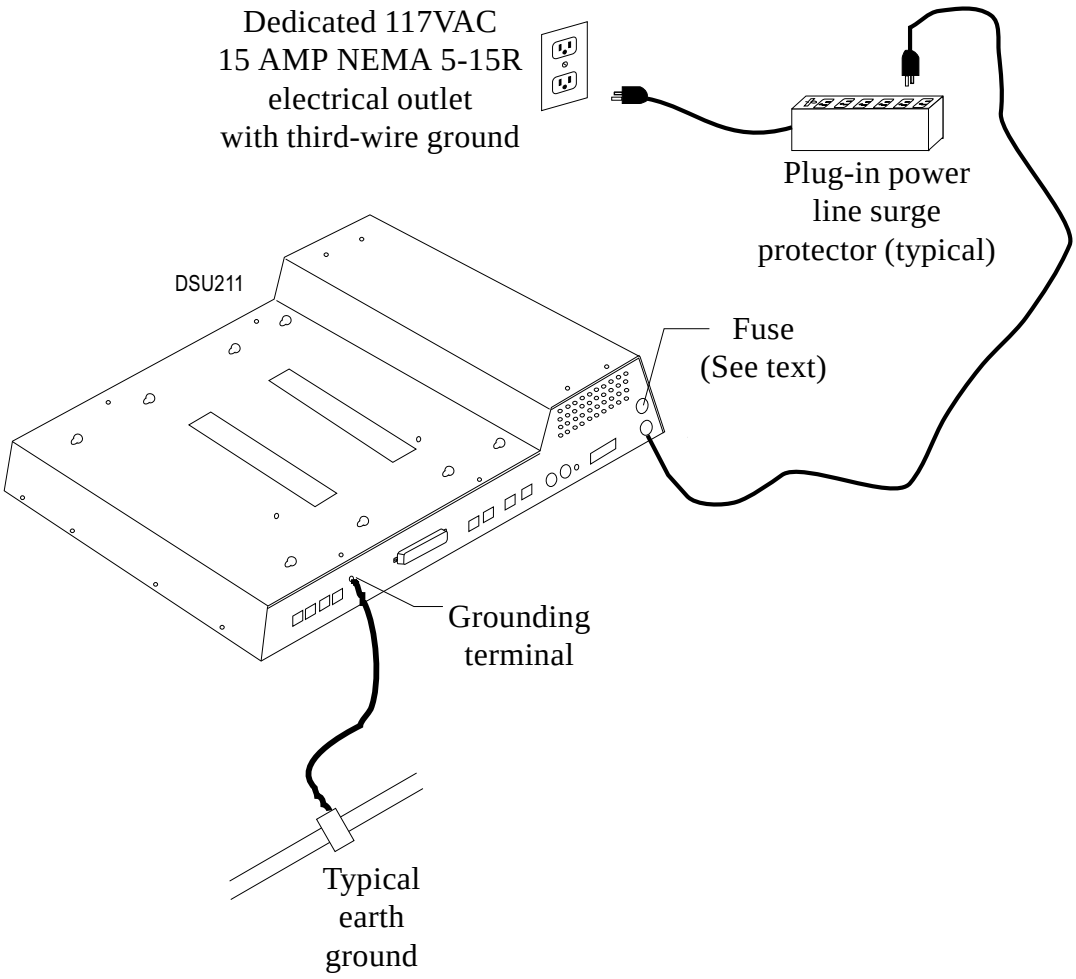
- For added equipment protection, connect a plug-in power line surge protector between the power cord and the AC outlet.
- Thoroughly check out the installation before connecting the power cord to an electrical outlet to apply AC power to the system.

2.3.1 Identifying The Fuses

The system is protected against short circuit damage by a fuse located on the right side of the common equipment cabinet. Always replace the fuse with one of the same value and type; otherwise, equipment damage could result.

Comparing Cabinets And Their Fuse Types

Cabinet	Fuse Value
J0408	1A 250V slow-blow type
J0816	3A 250V slow-blow type
J1632	3A 250V slow-blow type



Making The AC Power Connections

2.3.2 Grounding The System

If spare conductors exist in the cables between the station and the 66M-xx connector blocks, it is good practice to connect them to an earth ground. Doing this may help prevent them from inducing radio frequency and/or AC interference into the system. It is also good practice to disconnect any unused station jacks from the connector block and ground that wiring to an earth ground as well.

Transient voltage spikes, if induced onto CO or CENTREX lines, can travel through the cable and into the common equipment. The telephone company offers basic protection against this condition but it is usually designed to protect the central office circuits. While it will also provide some protection to the common equipment, you should not rely upon it for total protection. To help ensure that external over-voltage surges do not damage the system, you should install and properly ground primary protection devices, such as gas discharge tubes or similar devices, on all lines. While the line boards have internal secondary surge protection on all line ports, in order for this protection to be effective, you **MUST** connect the common equipment cabinet to a reliable, effective earth ground.

Proper DSU grounding is necessary for trouble-free operation and personnel safety. The DSU has the following three types of grounds:

- Service Ground—a neutral power line wire that is connected to the ground bus in the premises' AC power panel,
- System Ground—a non-current carrying power line wire that is connected to the ground bus in the premises' AC power panel,
- Frame Ground—a low impedance conductor that places the common equipment cabinet at reference ground potential. The frame ground provides the greatest safety by limiting electrical potential between non-current carrying parts of the system. The common equipment cabinet provides a ground stud on its cabinet for access to its frame ground.

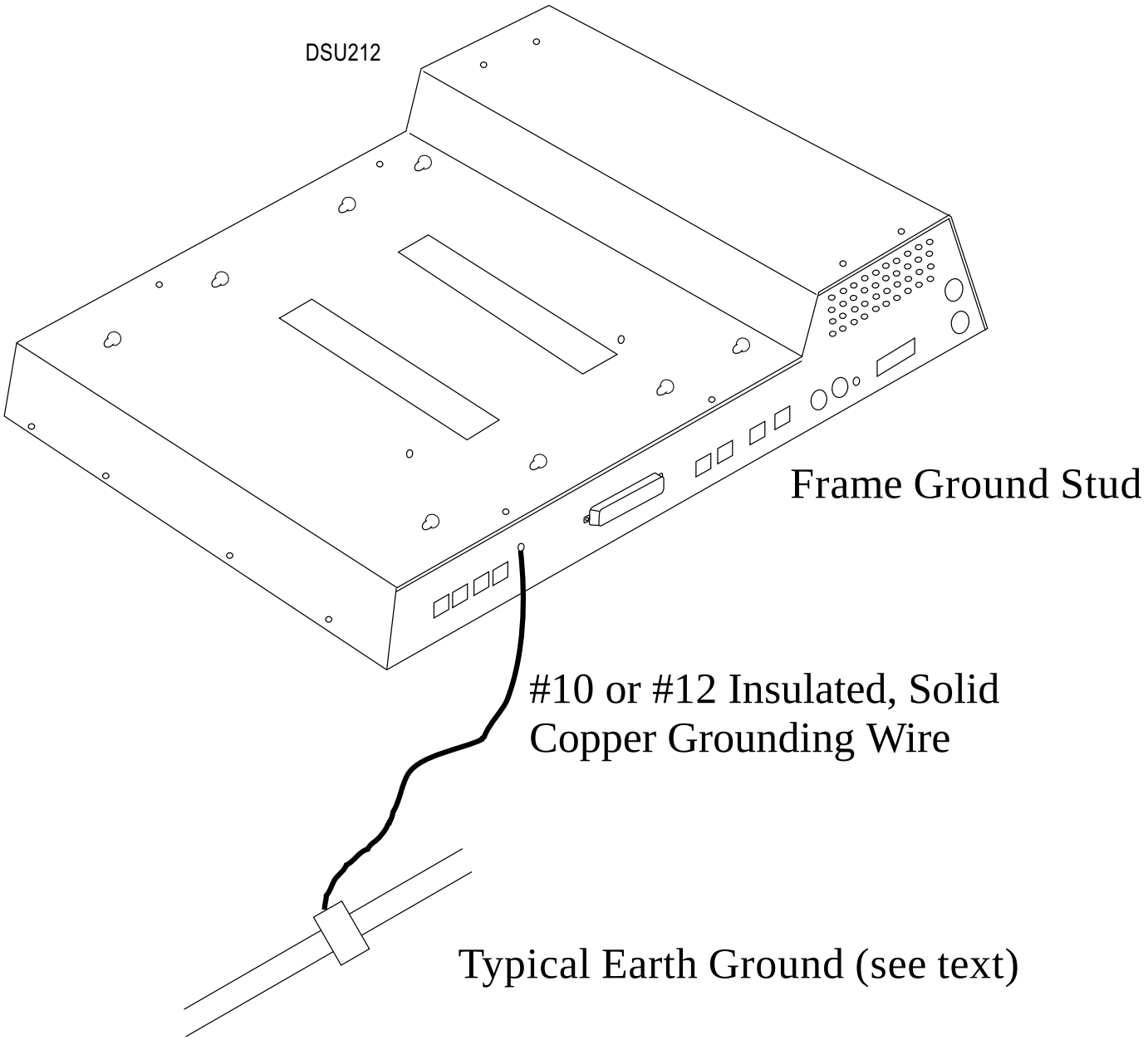
Effective grounding requires that you connect the frame ground to a good earth ground. A good earth ground is one such as the ground bus in the premises' AC power panel or a public metallic cold water pipe at a point immediately at its entrance to the premises and ahead of any meters, pumps, or insulating sections that have been added for vibration reduction. Avoid using the premises' structural steel frame as it may not be at earth ground potential. Make the ground connection with #10 or #12 insulated, solid copper grounding wire. **Keep the ground wire separate from the three-wire AC line cord ground, do not splice it, and keep it as short as possible.**

The impedance of the wiring between the common equipment cabinet and the earth ground must not exceed 0.25 ohms and the impedance between the earth ground and the power company's reference standard ground must not exceed 4 ohms. Use an acceptable low impedance measuring device to measure the impedance of these paths. The #10 or #12 wire size will minimize the wiring impedance; however, if the impedance between earth ground and the power company's standard reference ground exceeds 5 ohms, contact the local power company. The ground path must always be of sufficient current-carrying capacity to prevent a build up of voltages that may result in circuit noise, hazard to personnel, or equipment damage.

Be sure that all of the ground connections are without splices and are visible for inspection and maintenance. Tag all of the ground connections with a sign that reads: *Do Not Remove Or Disconnect*.

If you install expansion modules on the base cabinet, attach at least a #10 or #12 insulated, solid copper wire between the frame ground stud on the expansion module(s) to the frame ground stud on the base cabinet.

Remember, if spare conductors exist in the cables that run between the stations and the 66M-xx connector blocks, it is good practice to connect them to earth ground. Doing this may help prevent them from introducing radio frequency and/or AC interference into the system. Also remember that it is good practice to disconnect any unused station jacks from the connector block and ground that wiring to earth ground as well.

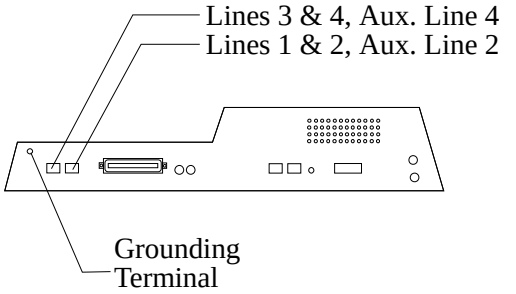


Grounding The System

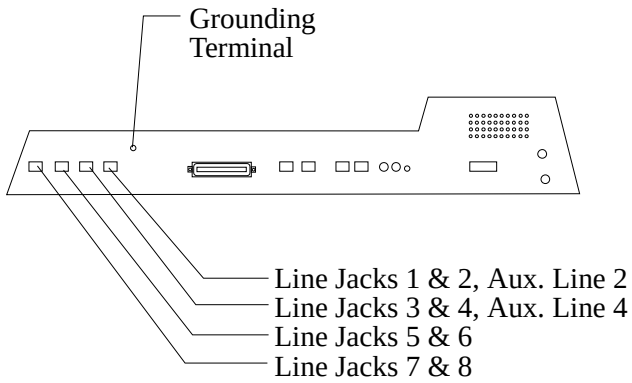
2.4 Connecting The Lines

The line terminations for the common equipment cabinet are standard modular plug/jack connections. Line configuration must be loop start only. Each modular jack provides termination for two lines. Modular line jacks 1 and 2 also provide termination for an auxiliary pair in addition to the two outside lines. The outside line termination can be a type 66M-xx connector block or individual 6-position modular jacks. The line cord that is routed between the outside line termination and the common equipment termination should be twisted-pair wiring. The J0408, J0816 and J1632 common equipment supports the installation of up to 4, 8, or 16 lines, respectively. Add-on expansion modules are available to expand the line capacity of the systems.

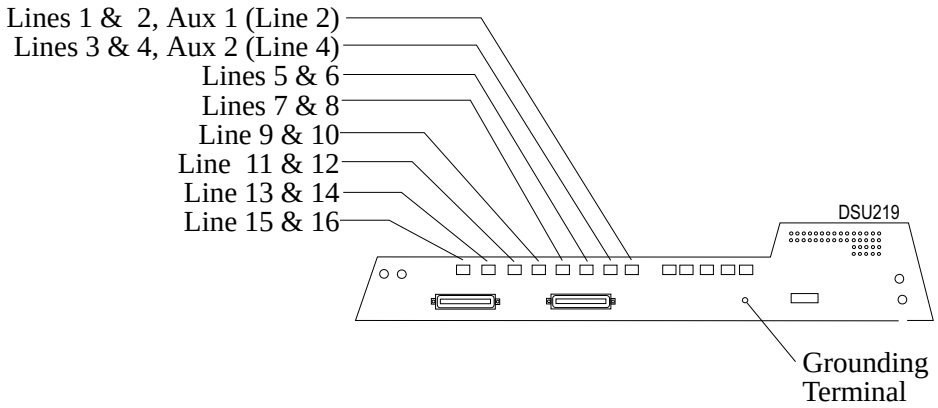
4-Line, 8-Station Base Unit



8-Line, 16-Station Base Unit

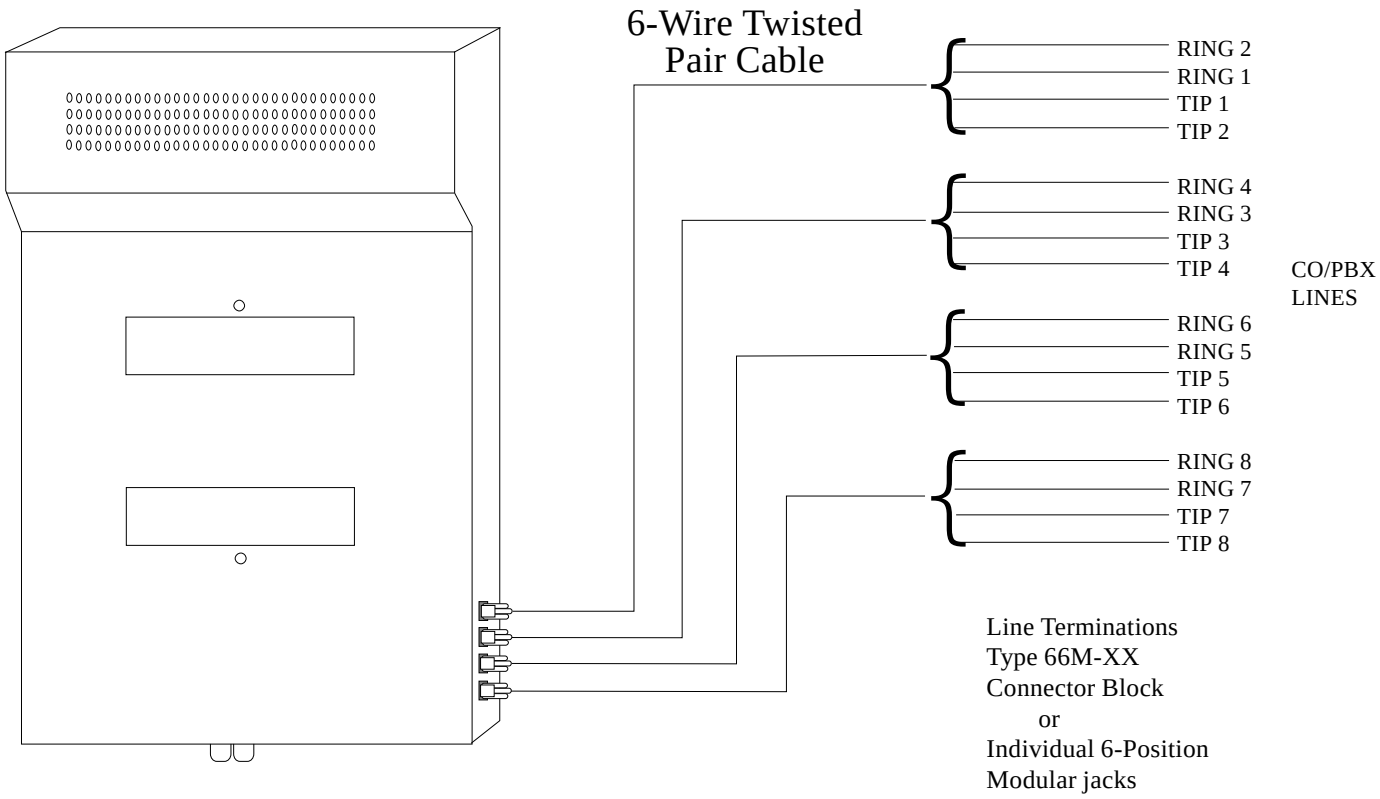


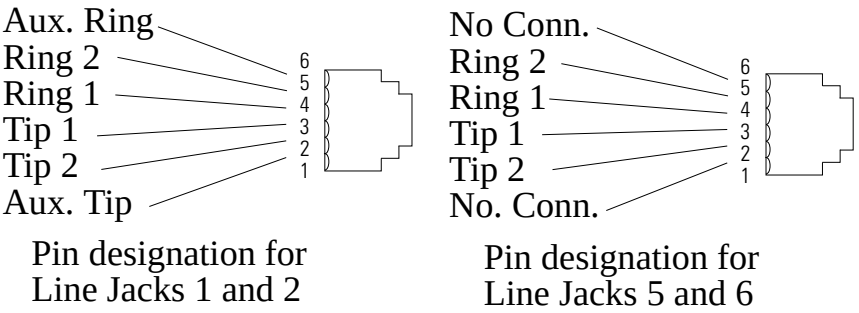
16-Line, 32-Station Base Unit



Locating The Line Connections

(Typical 8-Line, 16-Station Base Unit Shown)





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Detailing The CO Interface

2.4.1 Detailing The Line Connections

The table on the next page shows the line connection details for all three of the common equipment base units. Jacks one and two are the same for all three cabinets, jacks three and four are the same for both the J0816 and J1632 cabinets, and jacks five through eight are only available on the J1632 cabinet.

2.4.2 Reassigning The Line Ports

After you have initially connected a line to a particular line port and programmed its attributes (or left it with the system defaulted values), you can reassign the line and its attributes to a different port by programming action if you wish. Refer to Chapter 3 for the line to line port reassignment programming details.

CAUTION

While this feature allows you to make adds, moves, and changes without relocating the line wiring, it is not a substitute for correct wiring and should not be used as such. Be sure to record any reassignments that you make.

2.4.3 Protecting The Lines

Transient voltage spikes, if induced onto CO or CENTREX lines, can travel through the cable and into the common equipment. The telephone company offers basic protection against this condition but it is usually designed to protect the central office circuits. While it will also provide some protection to the common equipment, it should not be relied upon for total protection. To help ensure that external over-voltage surges do not damage the system, the manufacturer recommends that gas discharge tubes, or similar primary protection devices, be installed and properly grounded on all lines (a selection of solid-state protection devices that are useful for this purpose is available from ITW Linx, Elk Grove Village, Illinois 60007).

Understanding The Line Connection Details

Common Equipment Type	Line Jack	Pin No.	Connection	Telephone Number
J0408, J0816, and J1632	1	1	Auxiliary 1 (Line 2) Tip	
		2	Line 2 Tip	
		3	Line 1 Tip	
		4	Line 1 Ring	
		5	Line 2 Ring	
		6	Auxiliary 1 (Line 2) Ring	
	2	1	Auxiliary 2 (Line 4) Tip	
		2	Line 4 Tip	
		3	Line 3 Tip	
		4	Line 3 Ring	
		5	Line 4 Ring	
		6	Auxiliary 2 (Line 4) Ring	
J0816 and J1632	3	1	No Connection	
		2	Line 6 Tip	
		3	Line 5 Tip	
		4	Line 5 Ring	
		5	Line 6 Ring	
		6	No Connection	
	4	1	No Connection	
		2	Line 8 Tip	
		3	Line 7 Tip	
		4	Line 7 Ring	
		5	Line 8 Ring	
		6	No Connection	
J1632	5	1	No Connection	
		2	Line 10 Tip	
		3	Line 9 Tip	
		4	Line 9 Ring	
		5	Line 10 Ring	
		6	No Connection	
	6	1	No Connection	
		2	Line 12 Tip	
		3	Line 11 Tip	
		4	Line 11 Ring	
		5	Line 12 Ring	
		6	No Connection	
	7	1	No Connection	
		2	Line 14 Tip	
		3	Line 13 Tip	
		4	Line 13 Ring	
		5	Line 14 Ring	
		6	No Connection	
	8	1	No Connection	
		2	Line 16 Tip	
		3	Line 15 Tip	
		4	Line 15 Ring	
		5	Line 16 Ring	
		6	No Connection	

2.5 Connecting The Stations

The DSU II digital telephone system supports the operation of proprietary Comdial telephones.

The J0408, J0816 and J1632 common equipment supports the installation of up to eight, 16, or 32 telephones, respectively. Add-on expansion modules are available to expand the station capacity of the systems. You can add one expansion module to the J0408, and two expansion modules to the J0816 and J1632. The JM408 expansion module provides interface for eight proprietary stations (plus interface for four lines) while the JM008 expansion module provides interface for eight industry-standard devices.

Connections between the common equipment and the stations are typically via type 66M-xx connector blocks which are cable connected to the common equipment's 50–pin male connector. The connector block is, in turn, wired to modular jacks that accept the modular line cord connected between it and the telephones.

The maximum distance allowed from the common equipment to the stations is per the following list:

- Multiline Telephones—1000 feet using #24 gauge, twisted-pair cable or 2000 feet using #22 gauge cable

When installing the system telephones keep in mind that each station port supports only one proprietary telephone and the system does not allow you to bridge two stations to a single modular jack.

Always route station wiring a minimum of 12 inches from any other parallel wires or electrical devices. If electrical noise or RF energy is at a high level, you may need to use shielded cable with the shield connected to the cabinet ground lug.

2.5.1 Grounding The Unused Station Cables

Remember, if spare conductors exist in the cables that run between the stations and the 66M-xx connector blocks, it is good practice to connect them to earth ground. Doing this may help prevent them from introducing radio frequency and/or AC interference into the system. Also remember that it is good practice to disconnect any unused station jacks from the connector block and ground that wiring to earth ground as well.

Remove insulation and twist together all spare wires at the wall outlet. Ground the wires at the 66M-xx to the common equipment cabinet ground lug.

2.5.2 Relocating The Stations

The Comdial proprietary telephones identify themselves to the system when you install them. The system assigns an extension number and all other programmable attributes to station ports as a default that you can reprogram as needed. Plus, you can use programming action to reassign attributes of one station port to a different station port if you wish. Refer to the automatic station relocation programming procedure and the station-to-station programming procedure found in Chapter 3.

NOTE: The system will not allow you to relocate the station 10 to station port 10 assignment.

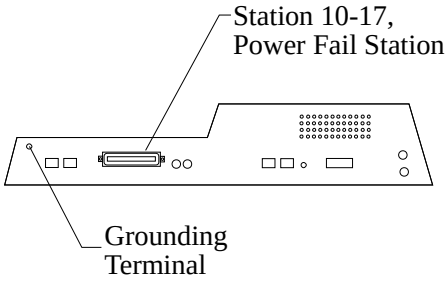
CAUTION

While this feature allows you to make adds, moves, and changes without relocating the station wiring, it is not a substitute for correct wiring and should not be used as such. Be sure to record any reassignments that you make.

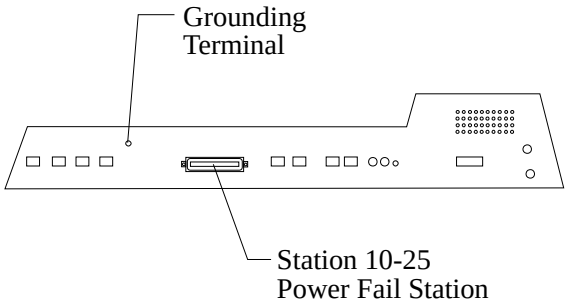
2.5.3 Installing The Cable Clips

Each cabinet-mounted 50-pin male connector is equipped with a retaining clip. This clip is designed to secure the mated connection once it is made. The clip does this by snapping into a slot on the cable-mounted connector when it is pressed together with the cabinet-mounted connector. This retaining clip must be pulled back slightly to unsnap it before the connectors can be separated.

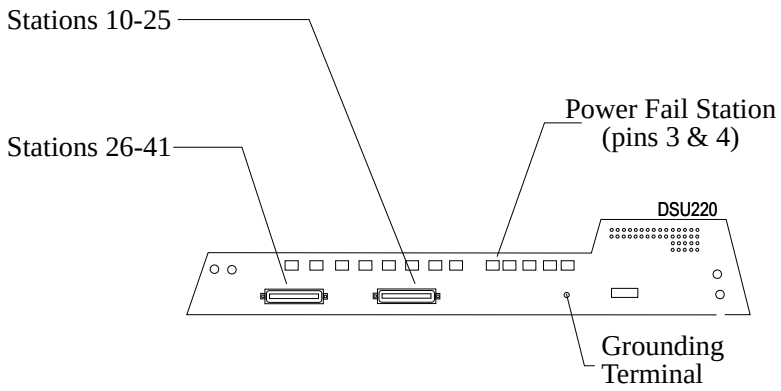
4-Line, 8-Station Base Unit



8-Line, 16-Station Base Unit



16-Line, 32-Station Base Unit



Locating The Station Connections

2.5.4 Connecting Stations To The J0408

This table shows the color-coded connections for a J0408 common equipment cabinet.

Connecting Stations To The J0408 Common Equipment Cabinet

25-Pair Connections			Two-Wire Connections			Station Connections	
Wire Color	**Pair**	**Pin No.**	**Clip Term.**	**Pair**	**Wire Color**	**Station**	**Location**
White-Blue	1	26	1	Signal Path	Green	10	
Blue-White		1	2		Red		
White-Orange	2	27	3	Signal Path	Green	11	
Orange-White		2	4		Red		
White-Green	3	28	5	Signal Path	Green	12	
Green-White		3	6		Red		
White-Brown	4	29	7	Signal Path	Green	13	
Brown-White		4	8		Red		
White-Slate	5	30	9	Signal Path	Green	14	
Slate-White		5	10		Red		
Red-Blue	6	31	11	Signal Path	Green	15	
Blue-Red		6	12		Red		
Red-Orange	7	32	13	Signal Path	Green	16	
Orange-Red		7	14		Red		
Red-Green	8	33	15	Signal Path	Green	17	
Green-Red		8	16		Red		
Red-Brown	9	34	17				
Brown-Red		9	18				
Red-Slate	10	35	19				
Slate-Red		10	20				
Black-Blue	11	36	21				
Blue-Black		11	22				
Black-Orange	12	37	23				
Orange-Black		12	24				
Black-Green	13	38	25				
Green-Black		13	26				
Black-Brown	14	39	27				
Brown-Black		14	28				
Black-Slate	15	40	29				
Slate-Black		15	30				
Yellow-Blue	16	41	31				
Blue-Yellow		16	32				
Yellow-Orange	17	42	33				
Orange-Yellow		17	34				
Yellow-Green	18	43	35				
Green-Yellow		18	36				
Yellow-Brown	19	44	37				
Brown-Yellow		19	38				
Yellow-Slate	20	45	39				
Slate-Yellow		20	40				
Violet-Blue	21	46	41				
Blue-Violet		21	42				
Violet-Orange	22	47	43				
Orange-Violet		22	44				
Violet-Green	23	48	45				Common Audible
Green-Violet		23	46				
Violet-Brown	24	49	47				Station 17 Audible
Brown-Violet		24	48				
Violet-Slate	25	50	49				Power Fail Station
Slate-Violet		25	50				

2.5.5 Connecting Stations To The J0816

This table shows the color-coded connections for a J0816 common equipment cabinet.

Connecting Stations To The J0816 Common Equipment Cabinet

25-Pair Connections			Two-Wire Connections			Station Connections	
Wire Color	Pair	Pin No.	Clip Term.	Pair	Wire Color	Station	Location
White-Blue	1	26	1	Signal Path	Green	10	
Blue-White		1	2		Red		
White-Orange	2	27	3	Signal Path	Green	11	
Orange-White		2	4		Red		
White-Green	3	28	5	Signal Path	Green	12	
Green-White		3	6		Red		
White-Brown	4	29	7	Signal Path	Green	13	
Brown-White		4	8		Red		
White-Slate	5	30	9	Signal Path	Green	14	
Slate-White		5	10		Red		
Red-Blue	6	31	11	Signal Path	Green	15	
Blue-Red		6	12		Red		
Red-Orange	7	32	13	Signal Path	Green	16	
Orange-Red		7	14		Red		
Red-Green	8	33	15	Signal Path	Green	17	
Green-Red		8	16		Red		
Red-Brown	9	34	17	Signal Path	Green	18	
Brown-Red		9	18		Red		
Red-Slate	10	35	19	Signal Path	Green	19	
Slate-Red		10	20		Red		
Black-Blue	11	36	21	Signal Path	Green	20	
Blue-Black		11	22		Red		
Black-Orange	12	37	23	Signal Path	Green	21	
Orange-Black		12	24		Red		
Black-Green	13	38	25	Signal Path	Green	22	
Green-Black		13	26		Red		
Black-Brown	14	39	27	Signal Path	Green	23	
Brown-Black		14	28		Red		
Black-Slate	15	40	29	Signal Path	Green	24	
Slate-Black		15	30		Red		
Yellow-Blue	16	41	31	Signal Path	Green	25	
Blue-Yellow		16	32		Red		
Yellow-Orange	17	42	33				
Orange-Yellow		17	34				
Yellow-Green	18	43	35				
Green-Yellow		18	36				
Yellow-Brown	19	44	37				
Brown-Yellow		19	38				
Yellow-Slate	20	45	39				
Slate-Yellow		20	40				
Violet-Blue	21	46	41				
Blue-Violet		21	42				
Violet-Orange	22	47	43				
Orange-Violet		22	44				
Violet-Green	23	48	45				Common Audible
Green-Violet		23	46				
Violet-Brown	24	49	47				Station 17 Audible
Brown-Violet		24	48				
Violet-Slate	25	50	49				Power Fail Station
Slate-Violet		25	50				

2.5.6 Connecting Stations To The J1632

The following two tables show the color-coded connections for a J1632 common equipment cabinet.

Connecting Stations To J1 On The J1632 Common Equipment Cabinet

25-Pair Connections			Two-Wire Connections			Station Connections	
Wire Color	Pair	Pin No.	Clip Term.	Pair	Wire Color	Station	Location
White-Blue	1	26	1	Signal Path	Green	10	
Blue-White		1	2		Red		
White-Orange	2	27	3	Signal Path	Green	11	
Orange-White		2	4		Red		
White-Green	3	28	5	Signal Path	Green	12	
Green-White		3	6		Red		
White-Brown	4	29	7	Signal Path	Green	13	
Brown-White		4	8		Red		
White-Slate	5	30	9	Signal Path	Green	14	
Slate-White		5	10		Red		
Red-Blue	6	31	11	Signal Path	Green	15	
Blue-Red		6	12		Red		
Red-Orange	7	32	13	Signal Path	Green	16	
Orange-Red		7	14		Red		
Red-Green	8	33	15	Signal Path	Green	17	
Green-Red		8	16		Red		
Red-Brown	9	34	17	Signal Path	Green	18	
Brown-Red		9	18		Red		
Red-Slate	10	35	19	Signal Path	Green	19	
Slate-Red		10	20		Red		
Black-Blue	11	36	21	Signal Path	Green	20	
Blue-Black		11	22		Red		
Black-Orange	12	37	23	Signal Path	Green	21	
Orange-Black		12	24		Red		
Black-Green	13	38	25	Signal Path	Green	22	
Green-Black		13	26		Red		
Black-Brown	14	39	27	Signal Path	Green	23	
Brown-Black		14	28		Red		
Black-Slate	15	40	29	Signal Path	Green	24	
Slate-Black		15	30		Red		
Yellow-Blue	16	41	31	Signal Path	Green	25	
Blue-Yellow		16	32		Red		
Yellow-Orange	17	42	33				
Orange-Yellow		17	34				
Yellow-Green	18	43	35				
Green-Yellow		18	36				
Yellow-Brown	19	44	37				
Brown-Yellow		19	38				
Yellow-Slate	20	45	39				
Slate-Yellow		20	40				
Violet-Blue	21	46	41				
Blue-Violet		21	42				
Violet-Orange	22	47	43				
Orange-Violet		22	44				
Violet-Green	23	48	45				
Green-Violet		23	46				
Violet-Brown	24	49	47				
Brown-Violet		24	48				
Violet-Slate	25	50	49				
Slate-Violet		25	50				

Connecting Stations To J2 On The J1632 Common Equipment Cabinet

25-Pair Connections			Two-Wire Connections			Station Connections	
Wire Color	Pair	Pin No.	Clip Term.	Pair	Wire Color	Station	Location
White-Blue	1	26	1	Signal Path	Green	26	
Blue-White		1	2		Red		
White-Orange	2	27	3	Signal Path	Green	27	
Orange-White		2	4		Red		
White-Green	3	28	5	Signal Path	Green	28	
Green-White		3	6		Red		
White-Brown	4	29	7	Signal Path	Green	29	
Brown-White		4	8		Red		
White-Slate	5	30	9	Signal Path	Green	30	
Slate-White		5	10		Red		
Red-Blue	6	31	11	Signal Path	Green	31	
Blue-Red		6	12		Red		
Red-Orange	7	32	13	Signal Path	Green	32	
Orange-Red		7	14		Red		
Red-Green	8	33	15	Signal Path	Green	33	
Green-Red		8	16		Red		
Red-Brown	9	34	17	Signal Path	Green	34	
Brown-Red		9	18		Red		
Red-Slate	10	35	19	Signal Path	Green	35	
Slate-Red		10	20		Red		
Black-Blue	11	36	21	Signal Path	Green	36	
Blue-Black		11	22		Red		
Black-Orange	12	37	23	Signal Path	Green	37	
Orange-Black		12	24		Red		
Black-Green	13	38	25	Signal Path	Green	38	
Green-Black		13	26		Red		
Black-Brown	14	39	27	Signal Path	Green	39	
Brown-Black		14	28		Red		
Black-Slate	15	40	29	Signal Path	Green	40	
Slate-Black		15	30		Red		
Yellow-Blue	16	41	31	Signal Path	Green	41	
Blue-Yellow		16	32		Red		
Yellow-Orange	17	42	33				
Orange-Yellow		17	34				
Yellow-Green	18	43	35				
Green-Yellow		18	36				
Yellow-Brown	19	44	37				
Brown-Yellow		19	38				
Yellow-Slate	20	45	39				
Slate-Yellow		20	40				
Violet-Blue	21	46	41				
Blue-Violet		21	42				
Violet-Orange	22	47	43				
Orange-Violet		22	44				
Violet-Green	23	48	45				
Green-Violet		23	46				
Violet-Brown	24	49	47				
Brown-Violet		24	48				
Violet-Slate	25	50	49				
Slate-Violet		25	50				

2.5.7 Wall Mounting The Telephone Stations

The DigiTech (product code 77nnn), *Impact* (product code 8nnnn), and Impression (product code 2nnnn) telephones are shipped from the factory configured for desk use. To convert them for wall-mounting, follow the procedures outlined below.

To convert the DigiTech model 77nnn telephones for wall-mounting,

1. Disconnect line cord and handset cord from telephone.

2. Turn telephone over to expose lower housing.

CAUTION

The telephone circuitry is sensitive to static electricity discharge. Be sure that your body and the workplace are properly grounded to avoid any static electricity discharge while you perform step 3.

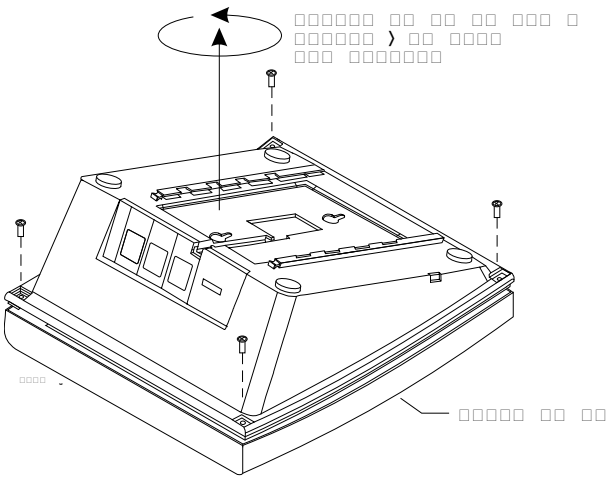
3. Remove screws that attach lower housing to upper housing. Carefully separate lower and upper housings making sure not to disconnect wiring between them.

4. Rotate lower housing 180 degrees. Do not disturb any internal wiring.

5. Refasten lower housing to upper housing. Make sure no wires are caught between upper and lower housings. Do not over-tighten screws wile refastening the housings.

6. Route line cord through appropriate channel on lower housing, and reconnect it to telephone. You may substitute a shorter line cord if you wish.

7. Reconnect the handset cord.



Rotating The Lower Housing On Model 77nnn Telephones

To convert the Impact (models 80nnn and 81nnn) and Impression (models 20nn and 21nnn) telephones for wall-mounting,

1. Turn telephone over and disconnect line cord and handset cord from telephone. Do not damage line cord on plastic dressing tabs.

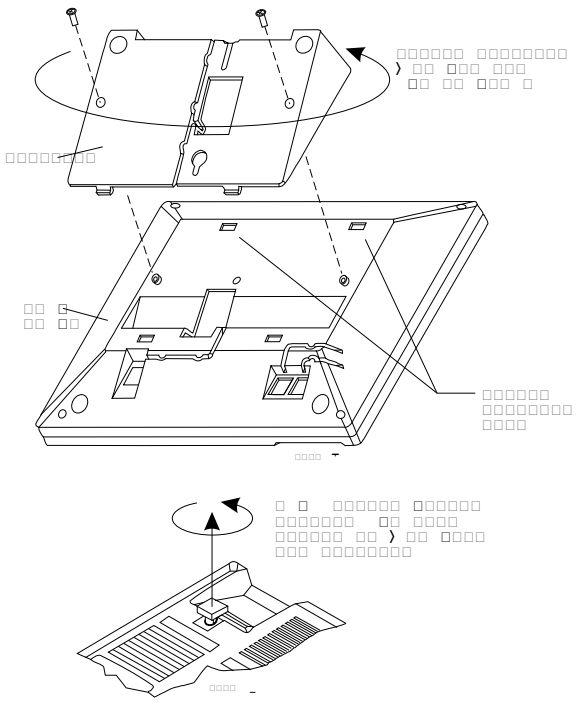
2. Remove screws from pedestal and unlatch it from telephone housing, rotate it 180 degrees, re-latch its tabs in the slots in the lower housing of the telephone, and replace screws.

3. Route line cord as appropriate, and reconnect it to telephone. Substitute shorter line cord if desired.

4. This telephone has a reversible handset retaining hook. When wall mounting, pull up this hook and rotate it 180 degrees.

5. Reconnect the handset cord.

There are wall-mounting enhancement kits available through your normal distribution channels. These kits include a handset cradle cup that you can screw-mount to the telephone's upper housing. The product codes for these enhancement kits are: HCCI for the *Impact* telephones (models 80nnn and 81nnn) and Impression telephones (models 20nnn and 21nnn), and HCCX for the DigiTech telephones (model 77nnn).



Reversing The Pedestal And Handset Hook
(Model 80nnn, 81nnn, 20nnn and 21nnn Telephones)

To wall-mount the telephones,

After configuring a telephone for wall mounting, either mount it directly on the wall using two #10 pan-head screws (obtained locally), or mount it on a wall jack cover plate. If using a wall jack cover plate, use an AT&T type 630B wall plate for best results.

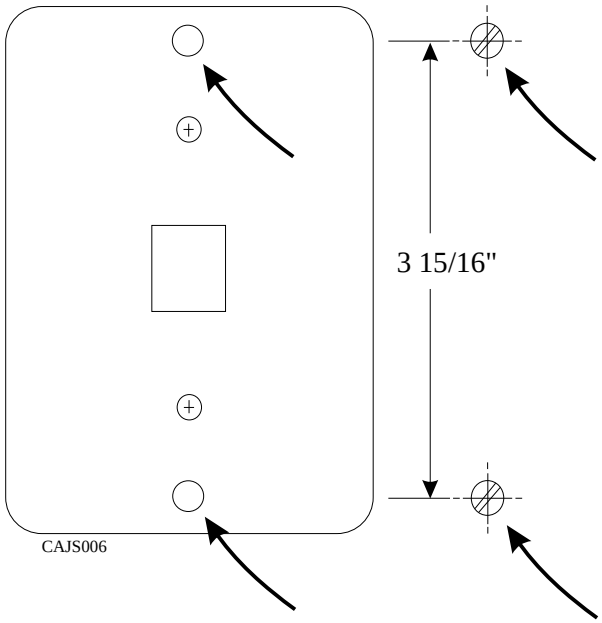
1. If #10 screws are used, thread them into the wall within 1/8-inch of the surface. Refer to the illustration for the spacing dimensions.

2. Position the keyhole-shaped holes in the bottom of the telephone over the #10 screws or the cover plate studs. Slide the telephone down until a slight click is felt.

3. To remove the telephone, lift to unsnap both screws or studs from the bottom housing, and then lift away from the wall.

Wall Plate - OR - #10 Screws

NOTE: AT&T 630B wall plate is recommended for secure mount.



Detailing The Station Wall Mounting

2.6 Installing DSS/BLF Consoles

The digital telephone system supports the installation and use of DigiTech DD32X, *Impact* IB64X, and Impression DU32X consoles at any available station port. The number of installed consoles is limited only by port availability; however, since a console complements a companion telephone located in an adjacent station port, you can use up to one-half of the available station ports for consoles. In addition, with the dual console feature (discussed later), a full two-thirds of the total station port capacity is available for console use.

You can assign two consoles to one telephone, each taking its own station port. This feature is especially useful with DigiTech DD32X and Impression DU32X consoles and a J1632 system that has one or two JM408 expansion modules included with it. This *dual console feature* allows a station user to monitor up to 48 stations from one station location using 32-button consoles.

Install the first console at the station port that is logic-paired with the station that you wish to complement. Install the second console at any station port except 10 or 11 and, using class of service programming, assign it to the same station port that is logic-paired with the first console.

Detailing The Digital Station Port Logic Pairing

10–11	26–27	42–43
12–13	28–29	44–45
14–15	30–31	46–47
16–17	32–33	48–49
18–19	34–35	50–51
20–21	36–37	52–53
22–23	38–39	54–55
24–25	40–41	56–57

You can install the DSS/BLF console at any station port and assign it to a station without first installing a console at the station's logic-paired port if you wish. This configuration is convenient for adding a console to an existing telephone installation that already has its logic-paired port occupied; however, do not use this configuration for assigning a console to station ports 10 and 12 because the console buttons will not be usable for programming. As discussed above, this feature is also useful for adding a second console to a station that already has a paired console installed with it.

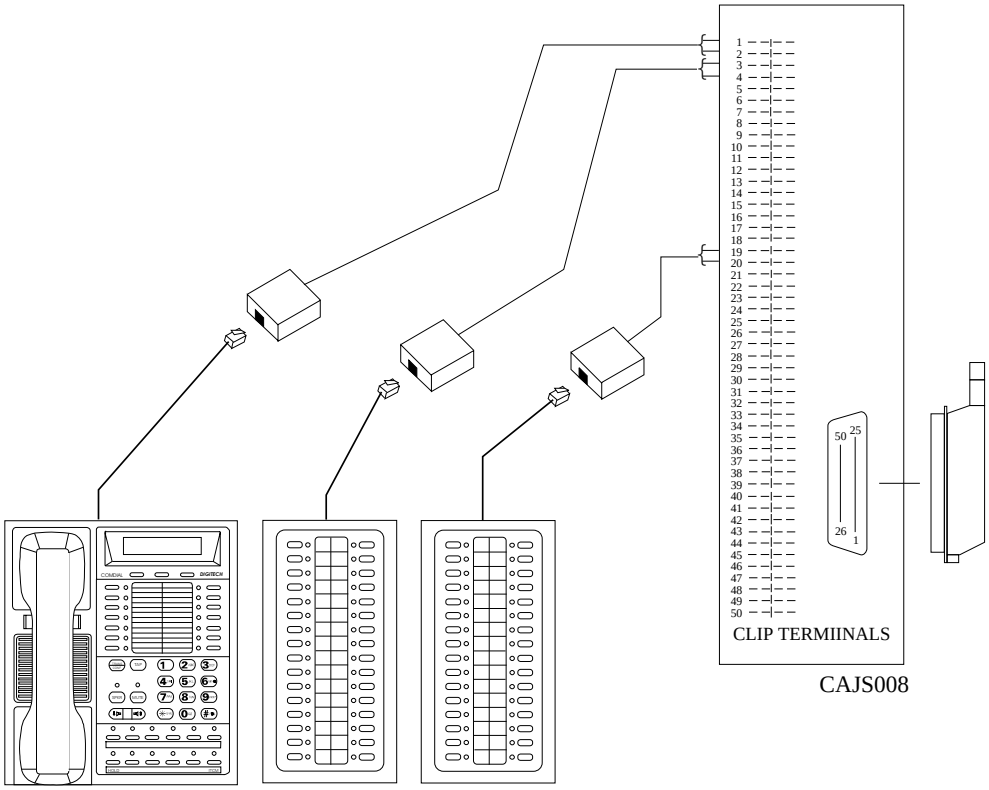
The digital telephone system automatically recognizes a console when you connect it to a station port and automatically assigns the station intercom numbers to the console buttons for direct station selection (DSS) purposes with associated busy lamp field (BLF) status lights. However, the console buttons are fully programmable and the station user can customize them as he or she sees fit by programming them as DSS buttons or as automatic dialing (autodial) buttons.

When the user programs the buttons for DSS use, autodial capability is also available at a secondary level at each DSS button.

While the first console (the one installed at the logic-paired port) extends the autodial buttons of the paired telephone by 48 and provides DSS/BLF coverage for station ports 10 through 57, the second console (the one installed at the programmed station port) provides DSS/BLF coverage as follows:

- On a 32-station system with two 8-station expansion modules, the first 16 buttons are automatically assigned (defaulted) to station ports 42 through 57 for DSS purposes.
- On a 32-station system with one 8-station expansion module, the first 8 buttons are automatically assigned (defaulted) to station ports 42 through 49 for DSS purposes.
- On any other smaller station capacity system, all buttons are unassigned.

When you install a console and program it to complement a telephone without first having a console installed at a port that is logic-paired to that telephone, its button assignment is automatically defaulted, as described above, but the user can reprogram it as required. It is important to remember that when you program for a second console, the system sets the console button mapping to that which is described above. When you clear the assignment, the system resets the button mapping to match a logic-paired console. This means that when you clear the second console feature, the console installed at that port complements the telephone that is installed at its logic-paired port instead of the telephone that is located at the program-designated port, and its buttons are automatically reassigned to station ports 10 through 57.

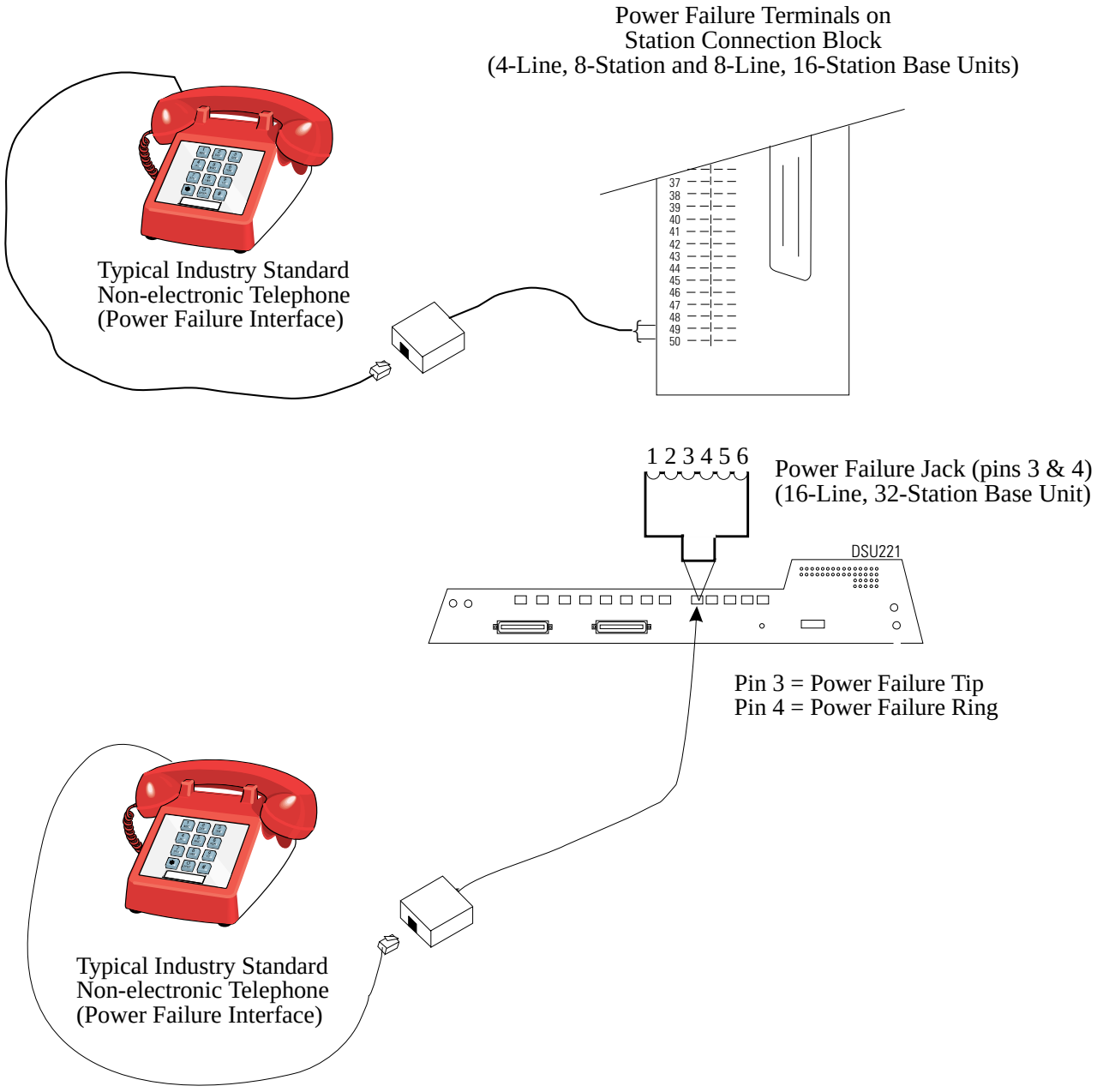


Connecting DSS/BLF Consoles

2.7 Connecting A Power Failure Station

The system provides a tip and ring pair connected to line 1 as an emergency power failure circuit. This circuit is active during a commercial AC power failure if an external battery assembly is not installed to provide battery back-up power to the system. Connect an industry standard, single-line telephone, such as a model 2500, to a power failure pair and use it to provide communications capability until the AC power to the system is restored.

NOTE: The system also provides one power failure connection with each add-on expansion module.



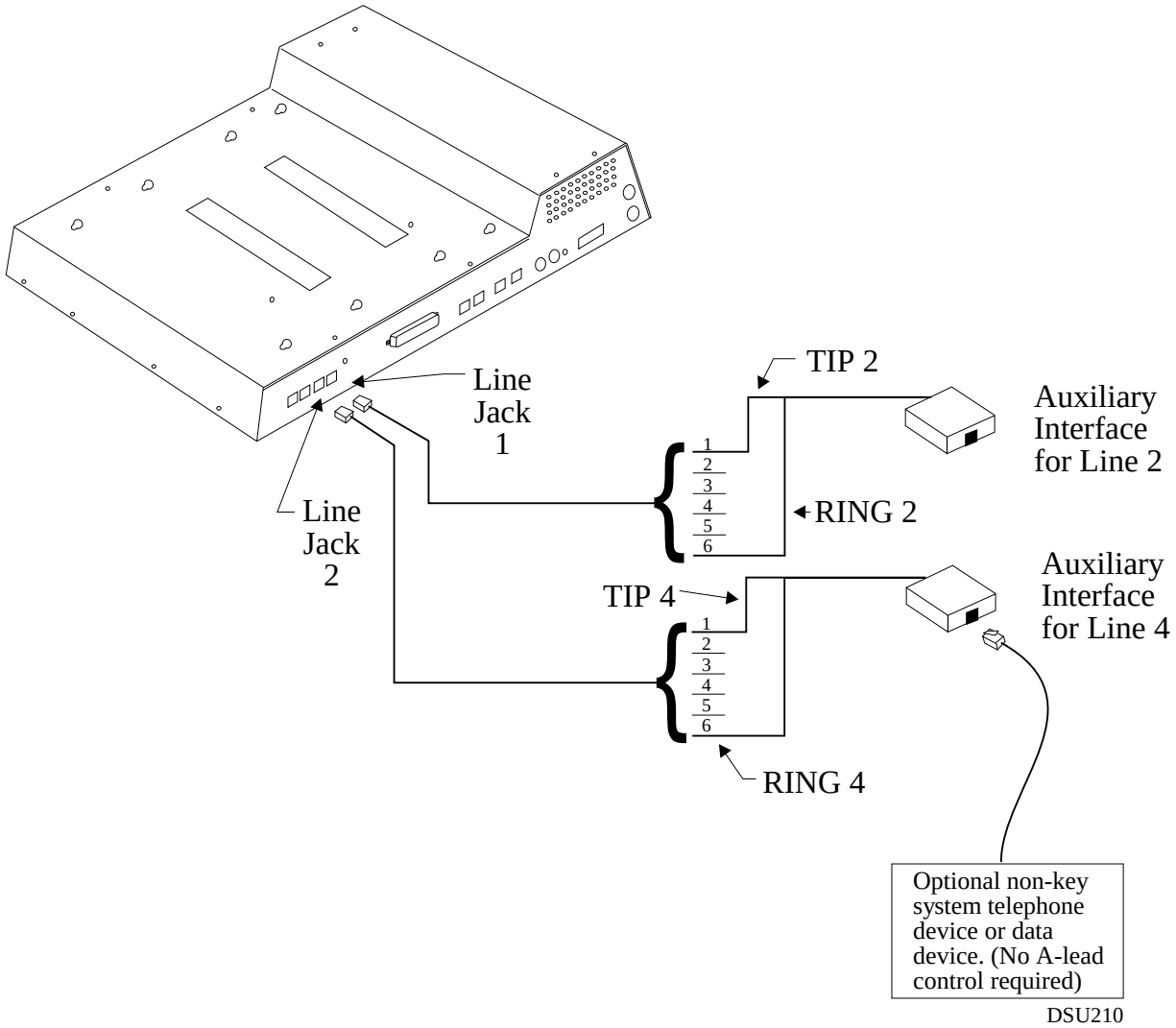
Making A Power Failure Connection

2.8 Using The Auxiliary Equipment Interface

You can connect an industry-standard telephone or a data device such as a modem or a FAX machine on a line ahead of the common equipment if you wish. If you do so, the system can detect an off-hook condition in the connected device and turn on the line status light at the system telephones to indicate that the line is busy.

Connection is across tip and ring of lines 2 and 4. The system provides the auxiliary interface connections at terminals 1 and 6 of common equipment line jacks 1 and 2.

NOTE: When you are employing this auxiliary interface feature, the line-to-line port reassignment feature (Section 2.4.2) works as described except in regard to line 2 and line 4. You can only reassign Line 2 to line port 4 and line 4 to line port 2.



Making The Auxiliary Interface Connections

2.9 Connecting The Common Audible And Auxiliary Ringing Interface

You can use the relay closure dry-contact points for controlling external audible equipment. These contact closures track the pattern of the ringing for incoming calls. The contacts are closed during the ringing period and are open during the silent period.

CAUTION

Do not exceed a 1 amp at 24 volts (0.5 amp at 48 volts) load on these control terminals. If the load requirements exceed this limit, connect the load through an external slave relay. DO NOT CONNECT THESE CONTROL TERMINALS DIRECTLY TO THE 117VAC LINE.

2.9.1 Connecting Outside Lines

Common audible terminals provide a dry-contact closure whenever any of the outside lines that you have connected to the common equipment ring with an incoming call.

2.9.2 Connecting Selected Ports

Station 17 audible terminals provide a dry-contact relay closure whenever ringing is sent to station 17 or to a programmable destination. Use class of service programming to choose either the station 17 or the programmable paging port as the ringing destination. Refer to Chapter 3 for programming details.

When you have programmed for station port 17 ringing, it is a common practice to use a customer-supplied external device to provide loud ringing and connected in a manner similar to the common audible arrangement shown in the illustration on the next page.

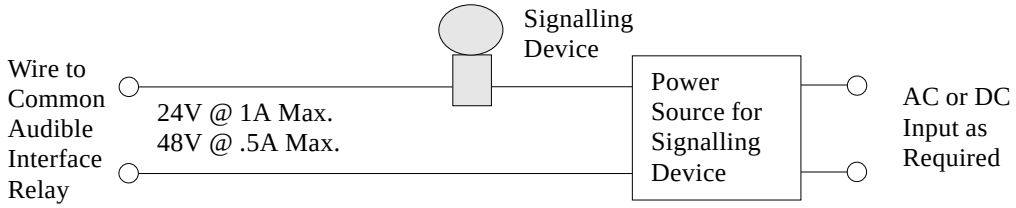
CAUTION

Do not connect an external paging device or any external ringing device to station port 17 connections.

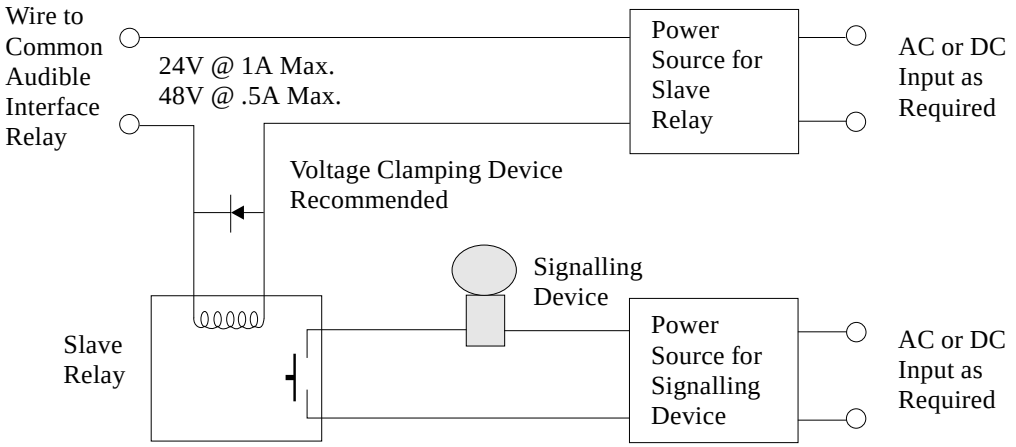
When you have programmed for paging port ringing, it is a common practice to use a customer-supplied external paging amplifier connected to the paging port to amplify and broadcast the ringing tones sent to the paging port by the system. You can employ the relay closures that appear at the ringing terminals to energize the external paging amplifier during the periods when the ringing tones are being sent if necessary.

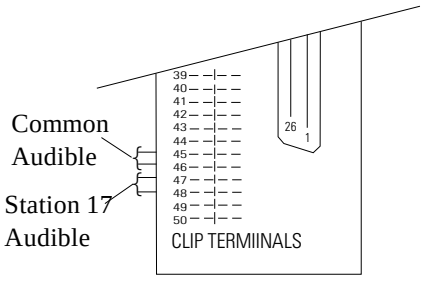
NOTE: Refer to Section 2.10 for a discussion of external paging amplifier connections and information for using the paging port ringing terminals in an alternate paging enable function.

(Wiring shown for low current application - see caution text)

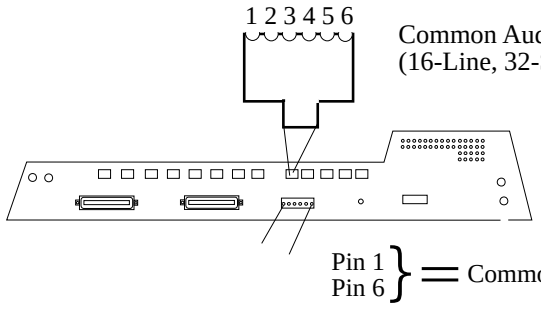


(Wiring shown with slave relay connection for high current application - see caution text)





Station Connector Block
(4-Line, 8-Station and
8-Line, 16-Station Base Units)



DSU222

Connecting Typical Common Audible Interface Wiring

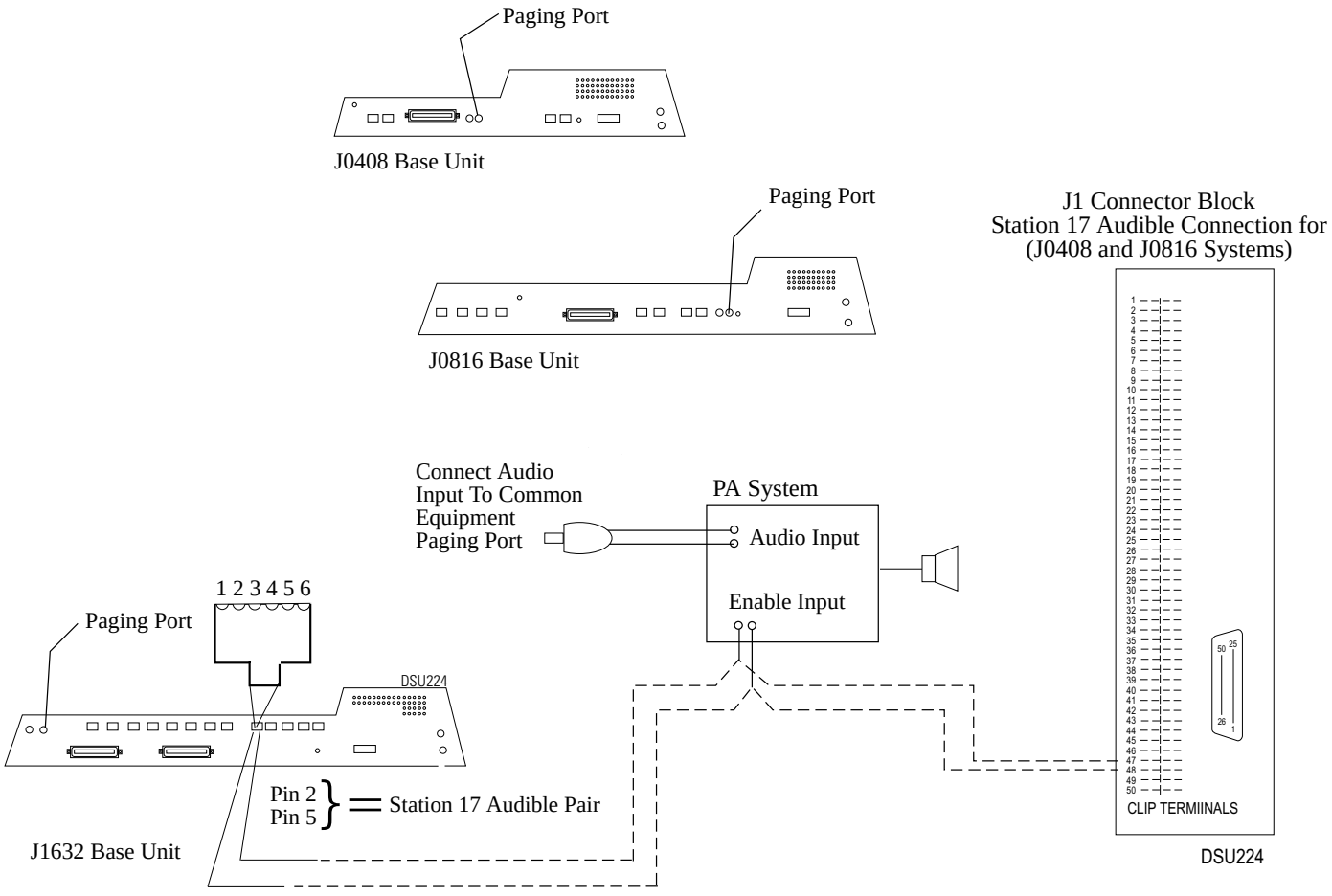
2.10 Using The External Paging Interface

The system provides a special transformer-isolated paging port that you can use to couple the system to a customer-supplied external paging amplifier. This external paging port does not provide a talk-back path nor will it recognize DTMF dial tones.

You can use the relay closure dry-contact points that the system makes available at the ringing port terminal for controlling the external paging amplifier during a paging operation. These contacts close and stay closed during the time that a paging operation is active to provide a constant enable signal path for the paging amplifier.

NOTE: This paging enable constant closure function overrides the ring pattern closure provided when ringing is sent to the paging port.

- Connect the audio input of a customer-supplied external paging amplifier to the paging port.
- If the paging amplifier requires an enable signal, connect the enable leads to the station 17 audible terminals**.**

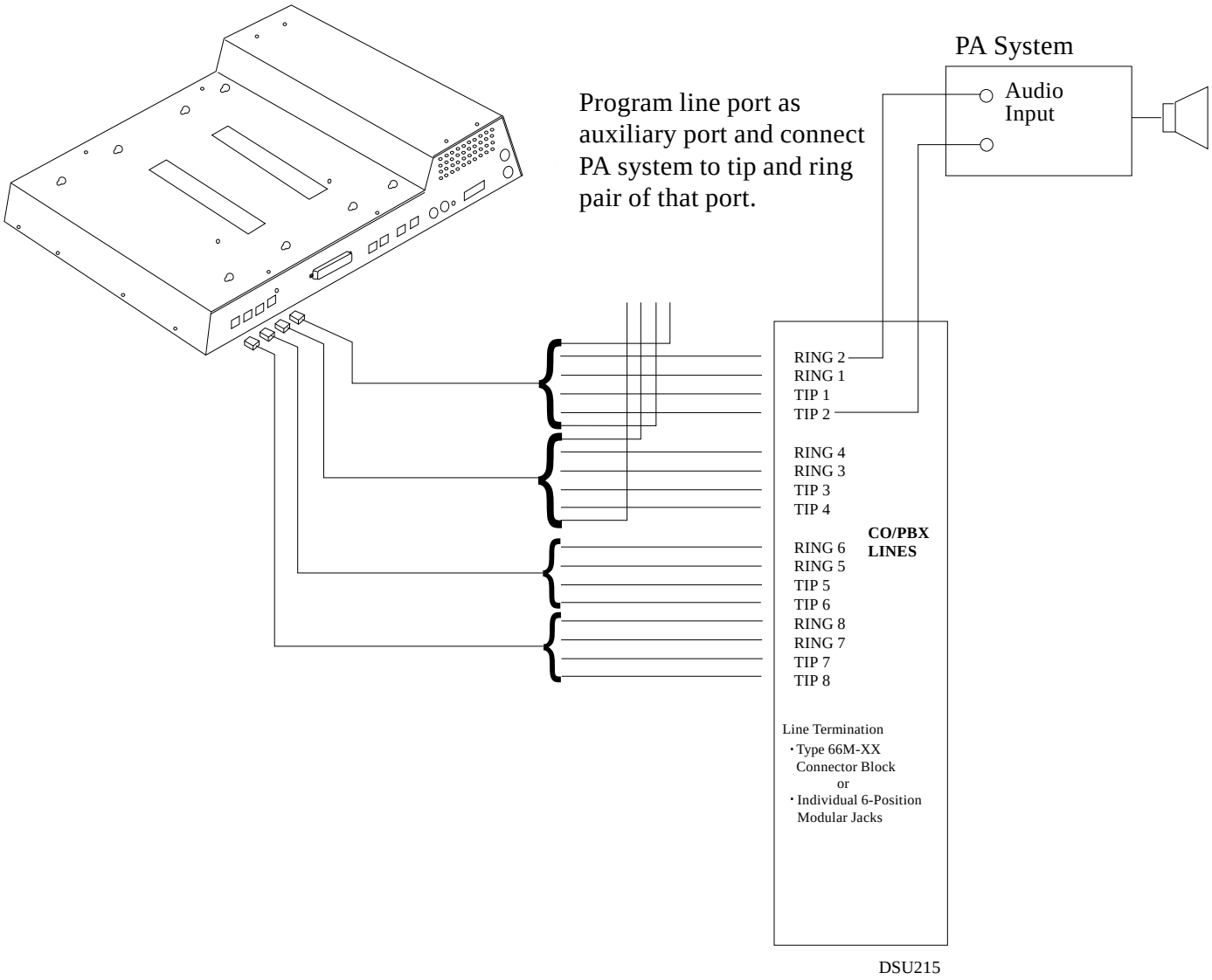


Connecting A Typical External Paging Interface

2.11 Using A Line Port As An External Paging Interface

You can use class of service programming to program a line port to be an AUXILIARY port. As an AUXILIARY port, a user can use it to couple a telephone to an external paging device that you have wired to the line port. He or she does this from any station with that line presence by pressing the proper line button to select the AUXILIARY port. The user can dial DTMF tones or dial pulses through the AUXILIARY port as needed. The paging enable relay closure feature discussed previously is not available for use with this installation.

- Connect the audio input of a customer-supplied external paging amplifier to the tip and ring leads of the AUXILIARY port.
- You can install a DTMF tone select, zone-paging amplifier if you wish. If you do install this type of amplifier, the user must dial the zone-select code after he or she presses the AUXILIARY port line select button.



Connecting A Line Port As An External Paging Port

2.12 Connecting Data Devices To The System

The DSU II includes serial data ports for use. The common equipment cabinet provides these ports as standard modular jacks labeled COM 1 and COM 2 This section contains information on two stages of wiring these connections for data devices.

Section 2.12.1 explains connections from stations to modular jacks. Section 2.12.2 details wiring from the modular jack to the DSU.

2.12.1 Making Modular Jack Data Connections

Modular jack connections are wiring connections from a station to a modular (wall) jack.

The system provides two serial data ports on the J0408 and four serial data ports on the J0816 and J1632 for use.

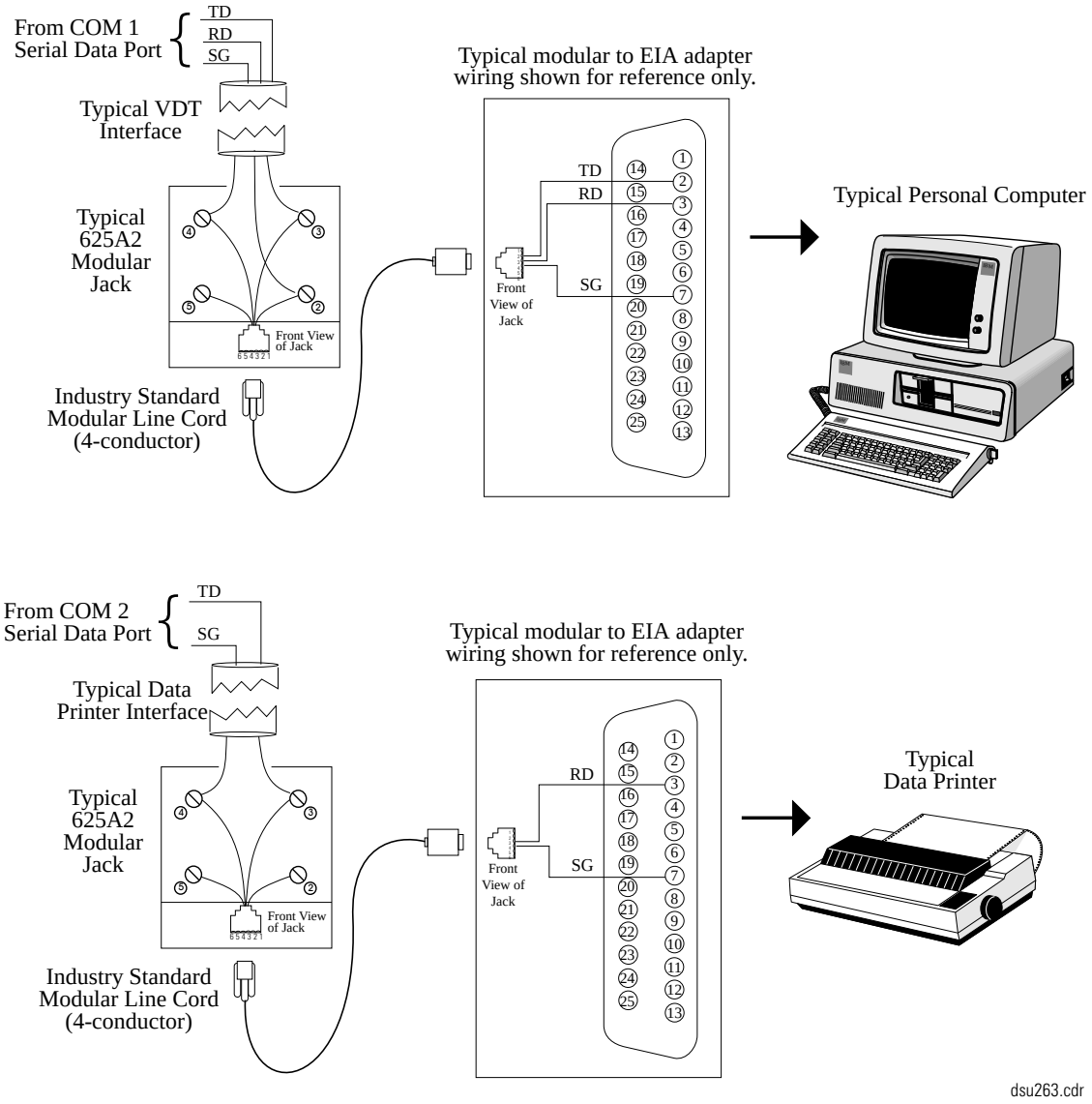
- When you use a personal computer (PC) to perform class of service programming or to load system software into the system, connect it to COM 1.
- When you use a serial data printer for SMDR, SMDA, COS printout, or Caller ID, connect it to the COM 2.

NOTE: The distance between a data device and the common equipment can be up to 500 feet in a quiet electrical environment. Some sites may require shielded cable for long runs. For longer distances, you must install limited distance modems to relay the data communications between the common equipment and a data device.

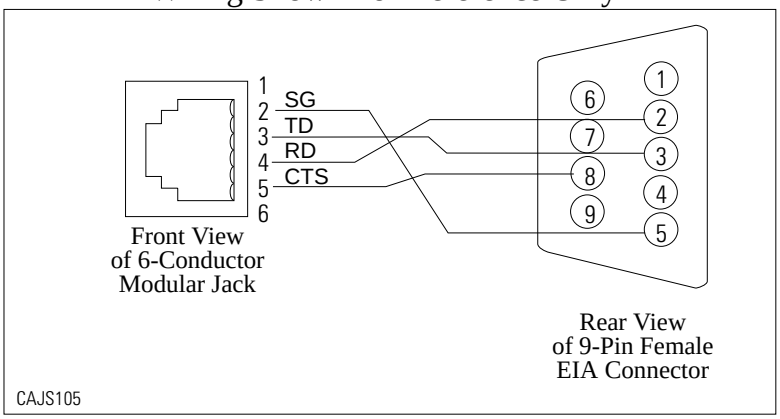
When preparing a cable for connection to a data device, refer to the manufacturer's manual for the equipment being interfaced and make the following wiring connections:

- Wire the common equipment RD (data from device to common equipment) connection to the device TD (transmit data) connection.
- Wire the common equipment TD (data to device from common equipment) connection to the device RD (receive data) connection.
- Wire the common equipment SG (signal ground) connection to the device SG (signal ground) connection.
- If required for proper operation, wire the common equipment CTS (clear-to-send status from device to common equipment) connection to the device RTS (request-to-send) connection.

NOTE: The common equipment requires a positive voltage, with respect to signal ground, in order to send data.



Typical Modular To 9-Pin EIA Adapter
Wiring Shown For Reference Only



Connecting Data Devices Through Modular Connections

2.12.2 Making The Common Equipment Data Connections

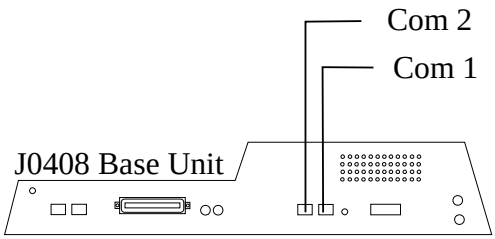
You must make wiring connections from the modular jack (wall jack) to the common equipment cabinet modular jack for the data connection.

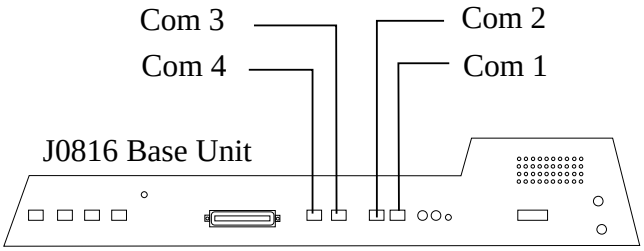
The default data communications format is as follows:

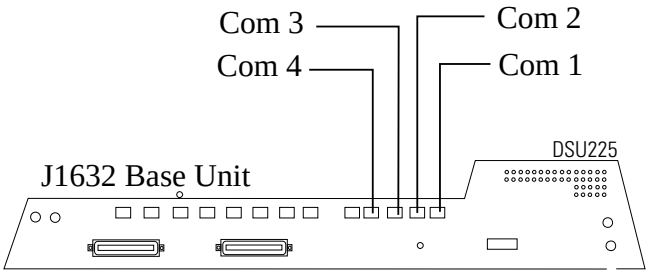
- 8-bit data with 1 stop bit and no parity
- Baud rate of 9600 baud.

Configure a data device to match this format for initial operation or reprogram the system's data format to match those of a data device. The tables below list the system's data ports.

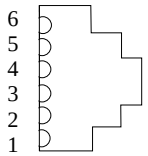
NOTE: The distance between a data device and the common equipment can be up to 500 feet in a quiet electrical environment. Some sites may require shielded cable for long runs. For longer distances, you must install limited distance modems to relay the data communications between the common equipment and a data device.







1.= Request to Send (RTS)
2.= Clear to Send (CTS)
3. = Receive Data (RD)
4. = Transmit Data (TD)
5. = Signal Ground (SG)
6. = No Connection



(Front View of Jack)

Making Data Connections To The System

2.12.3 Connecting A Personal Computer For Remote Programming

You can connect a personal computer (PC) to the DSU II digital telephone system remotely through modems as described below. (For information on direct connection, refer to Section 2.12.1.)

You will need the following customer-supplied equipment:

- PC and appropriate software program,
- Pair of data modems.

The data modems must be: “Hayes-compatible,” capable of 300-, 1200-, 2400-, or 9600-baud data speeds, and have auto-answer capability. Be sure to verify the auto-answer capability before purchasing the units. You are assured of best results if you employ modems of the same make and model at both the installation site and the remote programming site.

Make the equipment connections per the following procedure:

1. Determine the signal needs of the modem from the user’s manual for it. (The digital telephone system only requires TD, RD, and SG but the modems may require more signals. Check with the modem manufacturer for special requirements).

2. Wire the proper connector (to match the data jack) on one end of a length of multiline cable.

3. Punch down the appropriate leads on the connector block.

4. Connect the network jack of the data modem to an outside telephone line. (If a line is not reserved for remote programming, have a line switch installed so that on site personnel can switch the outside telephone line between the data modem and the digital telephone system cabinet when you are going to perform remote programming.)

5. Refer to the user’s manual for the modem, and program the modem to automatically answer after the first ring.

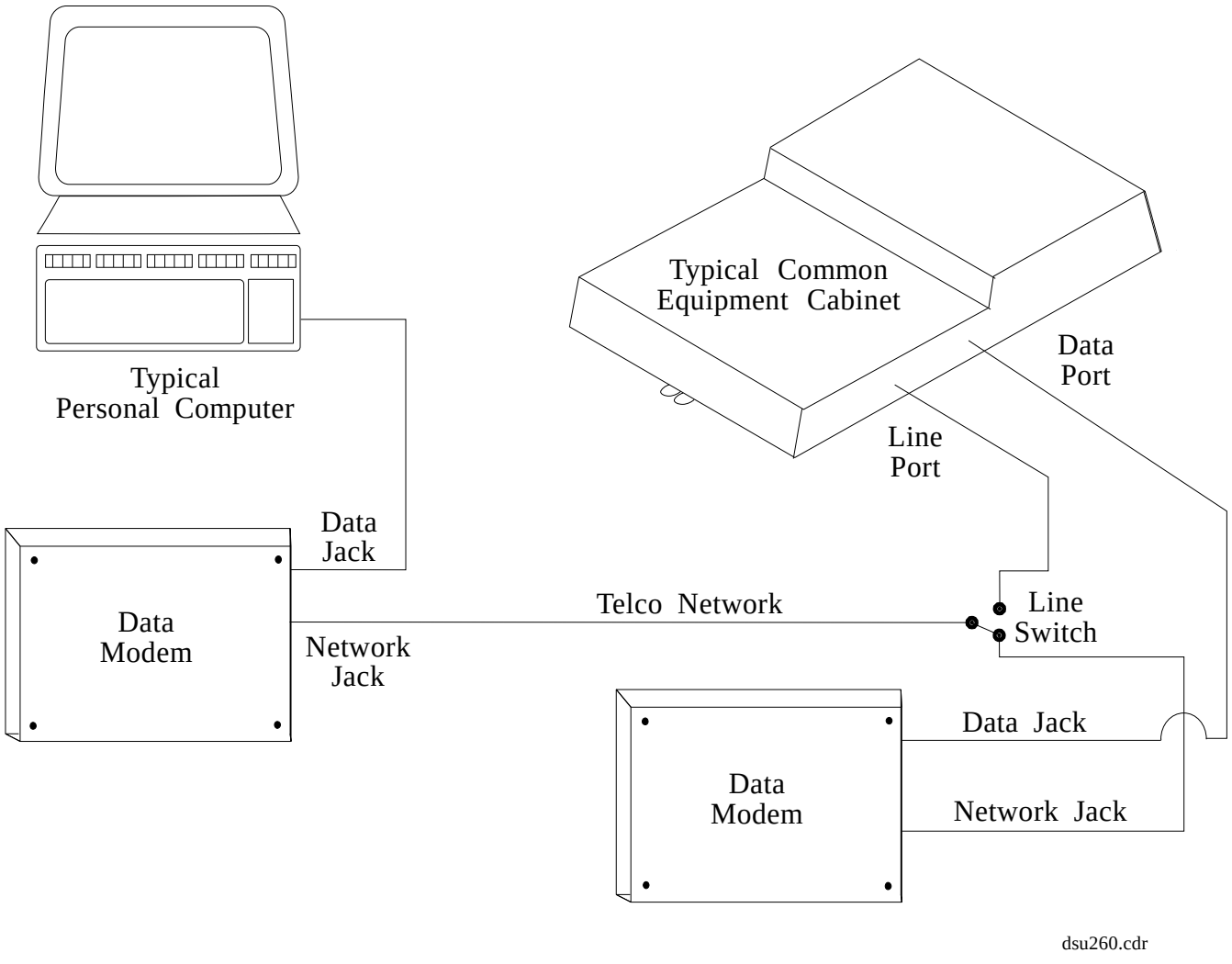
6. Interface the PC with the modem at the programming site per the user’s manuals for the equipment be used.

7. Establish a communications link for programming the system from a remote site.

   - If you have had a line switch installed at the customer site, call someone there and ask them to set it for modem operation.
   - After the outside line is connected to the modem, make the data link between the originating and the remote modems, and perform programming from your remote site just as if the PC was connected directly to the system.

If you experience difficulty in establishing a communications path between your PC, modems, and the digital telephone system, note the suggestions that are listed below.

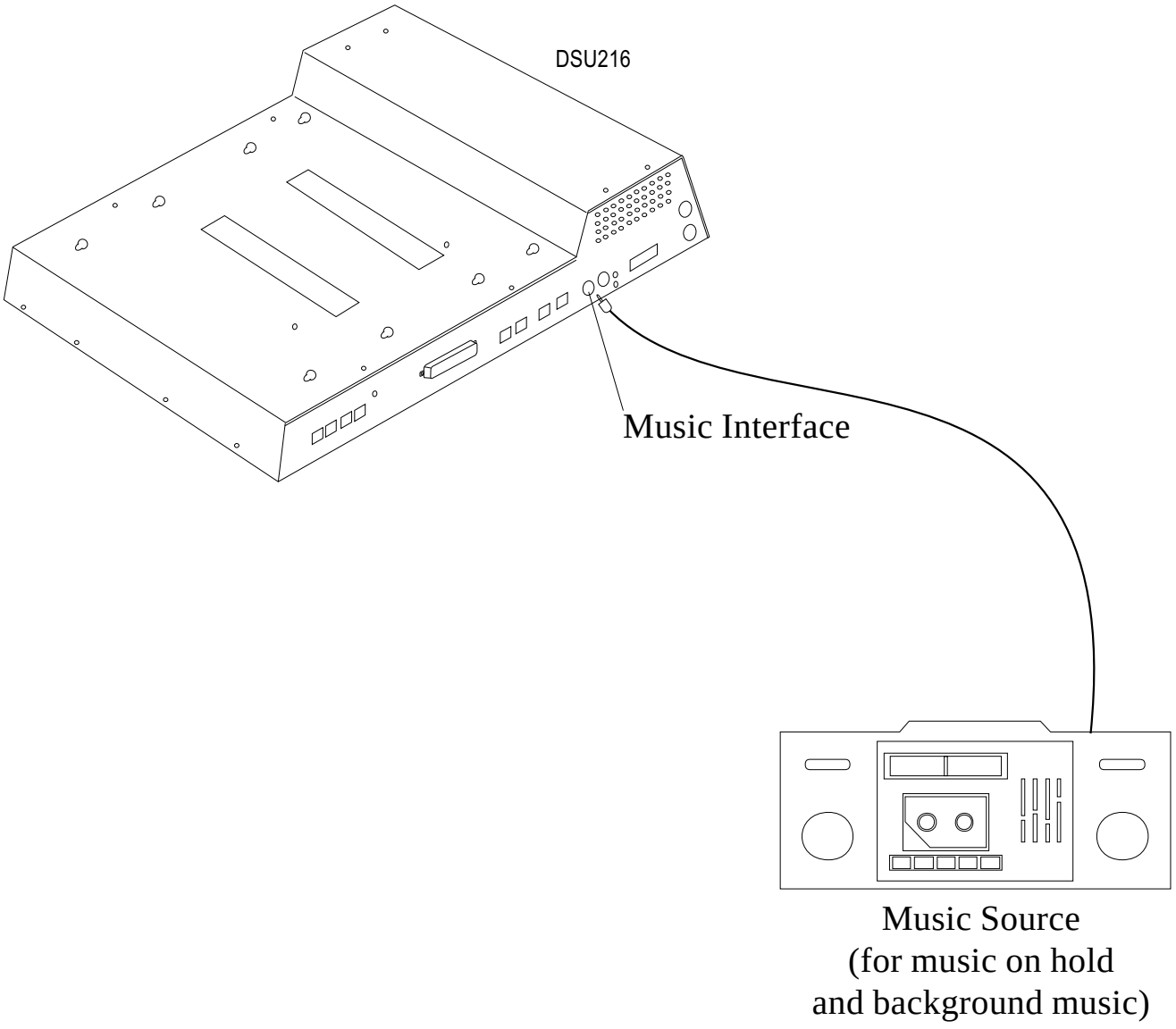
- Confirm that the modems are wired correctly. Be sure RD, TD, and SG are connected to the system's serial data connection. Reverse connections at pins 2 and 3 if necessary. Sometimes you must strap pin 4 to 5, or pin 6 to 7, or pin 6 to 8 to 20 in the modem wiring. Check the modem's installation manual for this requirement. Also check the manual for any additional wiring connections.
- Use a breakout box data tester to troubleshoot the data communications lines.
- Be sure that your modem has: auto-answer capability, DTR override, and CD override and that the Result Codes, On-Line Echo, Off-Line Echo, and Flow Control are disabled. Plus, make sure that you have enabled the modem's auto-answer feature. The way to do this is to program an initialization string into the modem. A typical initialization string that uses generic modem AT Commands for connection to a telephone system's serial data port is as follows: **AT E0 F1 L2 Q1 S0=0 &C0 &D0 &K0 &W0 &Y0.** Remember, this is a typical initialization string—not all modems will respond to it. You should refer to your modem's instruction manual if you have difficulty.



Installing A Personal Computer For Remote Programming

2.13 Using The Music Interface

If music is to be part of the system, connect a customer-provided music source to the common equipment music interface jack (phono jack) provided for this purpose. The impedance of this input is approximately 500Ω. Use the volume control on the music source to adjust the audio level of the music as required.



Using The Music Interface

2.14 Using The Add-On Expansion Modules

You can install optional add-on expansion modules to the DSU II common equipment base unit to increase the line and station capacity of an installed system.

- The JM408 expansion module provides an additional four lines and eight digital proprietary stations.
- The JM008 expansion module provides interface and ring generation for eight industry-standard telephone devices.

Base Unit Type	Base Unit Capacity		Expansion Module Type	Total System Capacity		
	Lines	System Stations		Lines	System Stations	ISTs
J0408	4	8	one JM408	8	16	-
			one JM008	4	8	8
J0816	8	16	one JM408	12	24	-
			two JM408	16	32	-
			one JM008	8	16	8
			two JM008	8	16	16
			one JM408 and one JM008	12	24	8
J1632	16	32	one JM408	20	40	-
			two JM408	24	48	-
			one JM008	16	32	8
			two JM008	16	32	16
			one JM408 and one Jm008	20	40	8

2.14.1 Using The JM408 Module

The JM408 expansion module provides to an installed system an additional four lines and eight digital proprietary stations. The default numbering of the expanded lines and stations begin with the next higher line or station port number from that provided by the host base unit. The numbering continues sequentially from top module to bottom module if two modules are installed. For example: The defaulted 8-line, 16-station base unit provides station ports 10 through 25 and lines 1 through 8. When installed, a JM408 expansion module provides station ports 26 through 33 and lines 9 through 12 thus creating a 12 line by 24 station system.

Each expansion module provides a tip and ring pair as an emergency power failure circuit. This circuit is connected to the first module-provided line.

Connecting Lines To The JM408 Expansion Module

The expansion module's line connections are available at two modular jacks. When facing the jack openings, lines 1 and 2 are provided by the jack on the right and lines 3 and 4 are provided by the jack on the left.

Line Jack	Pin Number	Connection	Telephone Number
1	1	No Connection	
	2	Line 2M Tip	
	3	Line 1M Tip	
	4	Line 1MRing	
	5	Line 2M Ring	
	6	No Connection	
2	1	No Connection	
	2	Line 4M Tip	
	3	Line 3M Tip	
	4	Line 3M Ring	
	5	Line 4M Ring	
	6	No Connection	

Connecting Stations To The JM408 Expansion Module

The station connections are available at a 50-pin connector.

25-Pair Connections			Two-Wire Connections			Station Connections	
Wire Color	Pair	Pin No.	Clip Term.	Pair	Wire Color	Station	Location
White-Blue	1	26	1	Signal Path	Green	1M	
Blue-White		1	2		Red		
White-Orange	2	27	3	Signal Path	Green	2M	
Orange-White		2	4		Red		
White-Green	3	28	5	Signal Path	Green	3M	
Green-White		3	6		Red		
White-Brown	4	29	7	Signal Path	Green	4M	
Brown-White		4	8		Red		
White-Slate	5	30	9	Signal Path	Green	5M	
Slate-White		5	10		Red		
Red-Blue	6	31	11	Signal Path	Green	6M	
Blue-Red		6	12		Red		
Red-Orange	7	32	13	Signal Path	Green	7M	
Orange-Red		7	14		Red		
Red-Green	8	33	15	Signal Path	Green	8M	
Green-Red		8	16		Red		
Red-Brown	9	34	17	Spare Pair			
Brown-Red		9	18				
Red-Slate	10	35	19				
Slate-Red		10	20				
Black-Blue	11	36	21				
Blue-Black		11	22				
Black-Orange	12	37	23				
Orange-Black		12	24				
Black-Green	13	38	25				
Green-Black		13	26				
Black-Brown	14	39	27				
Brown-Black		14	28				
Black-Slate	15	40	29				
Slate-Black		15	30				
Yellow-Blue	16	41	31				
Blue-Yellow		16	32				
Yellow-Orange	17	42	33				
Orange-Yellow		17	34				
Yellow-Green	18	43	35				
Green-Yellow		18	36				
Yellow-Brown	19	44	37				
Brown-Yellow		19	38				
Yellow-Slate	20	45	39				
Slate-Yellow		20	40				
Violet-Blue	21	46	41				
Blue-Violet		21	42				
Violet-Orange	22	47	43				
Orange-Violet		22	44				
Violet-Green	23	48	45				
Green-Violet		23	46				
Violet-Brown	24	49	47				
Brown-Violet		24	48				
Violet-Slate	25	50	49	Signal Path	Tip	Power Fail Station	
Slate-Violet		25	50		Ring		

2.14.2 Using The JM008 Module

The JM008 expansion module provides an interface for a wide variety of industry-standard telephone (IST) equipment such as 500 and 2500-type telephones, cordless telephones, voice mail systems, answering machines, FAX machines, and data modems.

Each IST port drives a load with a maximum ringer equivalence number (REN) of 2.0. Check the REN number of the connected IST equipment so you do not exceed the capacity of the IST port. Improper operation may result if you exceed the REN maximum.

The default numbering of the expansion module stations begin with the next higher station port number from that provided by the host base unit. The numbering continues sequentially from top module to bottom module if two modules are installed. For example: The defaulted 8-line, 16-station base unit provides station ports 10 through 25. When installed, a JM008 expansion module provides station ports 26 through 33. A second JM008, when installed in the bottom mounting location, provides station ports 34 through 41.

CAUTION

If you install both a JM408 and a JM008 on the same cabinet, you must install the JM408 at the upper expansion module location or the lines provided by the JM408 will not function.

When you install the JM008 and connect IST devices to it, there are several programming requirements that you must consider. Refer to Chapter 3, Section 3.10 for complete details.

Connecting Stations To The JM008 Module

The station connections are available at a 50-pin connector.

25-Pair Connections			Two-Wire Connections			Station Connections	
Wire Color	Pair	Pin No.	Clip Term.	Pair	Connection	Station	Location
White-Blue	1	26	1	Signal Path	Tip	1M	
Blue-White		1	2		Ring		
White-Orange	2	27	3	Signal Path	Tip	2M	
Orange-White		2	4		Ring		
White-Green	3	28	5	Signal Path	Tip	3M	
Green-White		3	6		Ring		
White-Brown	4	29	7	Signal Path	Tip	4M	
Brown-White		4	8		Ring		
White-Slate	5	30	9	Signal Path	Tip	5M	
Slate-White		5	10		Ring		
Red-Blue	6	31	11	Signal Path	Tip	6M	
Blue-Red		6	12		Ring		
Red-Orange	7	32	13	Signal Path	Tip	7M	
Orange-Red		7	14		Ring		
Red-Green	8	33	15	Signal Path	Tip	8M	
Green-Red		8	16		Ring		
Red-Brown	9	34	17	Spare Pairs			
Brown-Red		9	18				
Red-Slate	10	35	19				
Slate-Red		10	20				
Black-Blue	11	36	21				
Blue-Black		11	22				
Black-Orange	12	37	23				
Orange-Black		12	24				
Black-Green	13	38	25				
Green-Black		13	26				
Black-Brown	14	39	27				
Brown-Black		14	28				
Black-Slate	15	40	29				
Slate-Black		15	30				
Yellow-Blue	16	41	31				
Blue-Yellow		16	32				
Yellow-Orange	17	42	33				
Orange-Yellow		17	34				
Yellow-Green	18	43	35				
Green-Yellow		18	36				
Yellow-Brown	19	44	37				
Brown-Yellow		19	38				
Yellow-Slate	20	45	39				
Slate-Yellow		20	40				
Violet-Blue	21	46	41				
Blue-Violet		21	42				
Violet-Orange	22	47	43				
Orange-Violet		22	44				
Violet-Green	23	48	45				
Green-Violet		23	46				
Violet-Brown	24	49	47				
Brown-Violet		24	48				
Violet-Slate	25	50	49				
Slate-Violet		25	50				

Checking Industry-Standard Telephone Connections To The JM008 Module

When you connect industry-standard telephones to the JM008 expansion module, the maximum distance allowed from the common equipment to the telephone is 1500 feet if you use #24 gauge or larger, twisted pair cable.

Check the installation of industry-standard telephones for proper operation by performing the following voltage measurements under the conditions listed:
– have both the common equipment and the stations connected to the station connector block,
– have bridging clips installed on the connector block,
– have the system powered and operational.

Measure DC voltage across the tip and ring pair of each installed industry-standard telephone with a DC voltmeter. You should read: **+24 volts DC +/- 2 volts.**

Call each industry-standard telephone to stimulate the ring generator assembly, and measure the AC ringing voltage across the tip and ring pair of each called telephone.
You should read: **55 volts AC +/- 5 volts.**

If your measured voltages are different from the values shown herein, it could indicate a wiring error or equipment problem.

Installing An OPX Long Loop Adapter With The JM008

You must use an OPX long loop adapter if you wish to adapt the JM008's IST station port to support an off-premise IST application. An OPX long loop adapter connects to a single telephone line and can greatly extend the line's loop length (the Proctor Model 46222 adapter*, for example, can extend line length to 30,000 feet).

*Proctor & Associates Company, Redmond WA

CAUTION

When you connect an OPX long loop adapter to an off-premise extension (OPX), you must install primary protectors in series with the tip/ring pair of the telephone line that is routed to the OPX. This action is necessary to protect both the user and the equipment from transient voltage spikes that can travel through the cable. The telephone company offers basic protection against this condition; however, that protection is usually designed to safeguard the central office circuits and you cannot rely upon it to protect common equipment. To help insure that external over-voltage surges do not damage the system, installation specialists recommend that you install and properly ground gas discharge tubes or similar primary protection devices on the telephone line that routes between the adapter and the OPX.

To install the OPX long loop adapter:

- Follow manufacturer's instructions for unpacking, inspecting, mounting and wiring the adapter unit.
- Plug a modular cable into the system jack on the adapter and connect the opposite end of the cable to the JM008's station port.
- Plug a modular cord into the telephone jack on the adapter and connect the opposite end of the cord to the OPX line.
- Plug the adapter power cord into a standard 117 VAC, 3-wire electrical outlet.

2.14.3 Installing An Add-On Expansion Module

Each JM408 or JM008 add-on expansion module measures 15.5" wide x 9.4" high x 1.6" wide and weighs approximately 4 pounds. The modules are designed so that you can attach them to the base unit and connect them to it via cabling.

NOTE: ***If you plan to upgrade the system software at the same time that you add expansion modules, add the expansion modules first by following steps 1 through 11. Then, after you have installed the expansion modules and programmed for the new stations and line ports, upgrade the software as described in the discussion titled,*** **Loading And Up-Grading The System Software.**

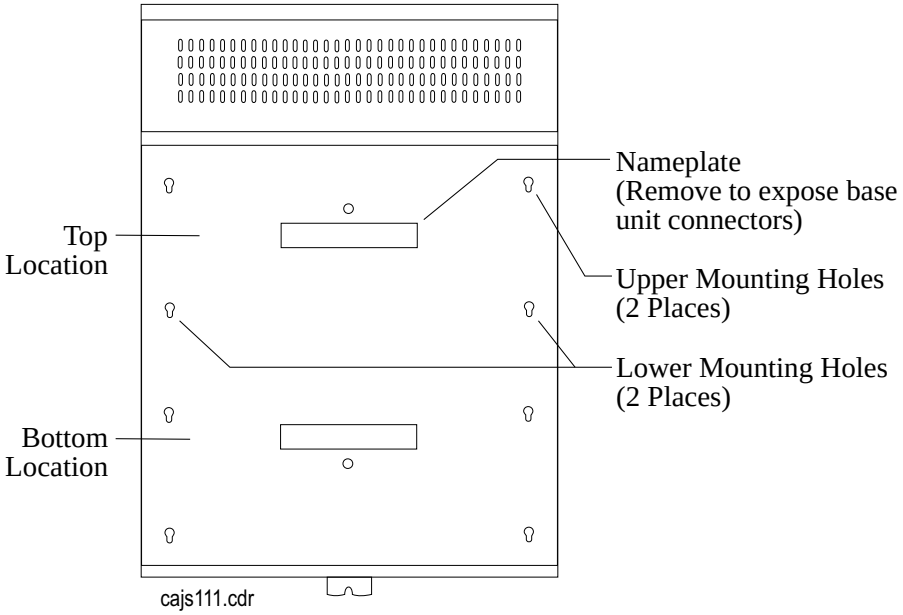
To install an expansion module to a base unit, follow the procedure detailed in steps 1–11.

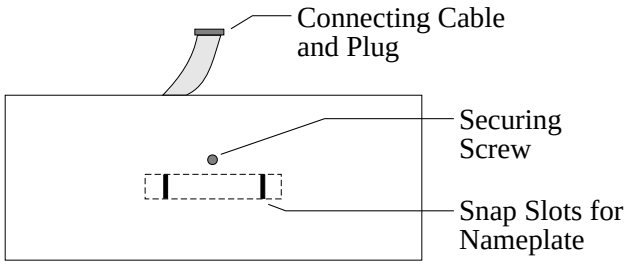
CAUTION

You must always connect the first module to the top location on the base unit.

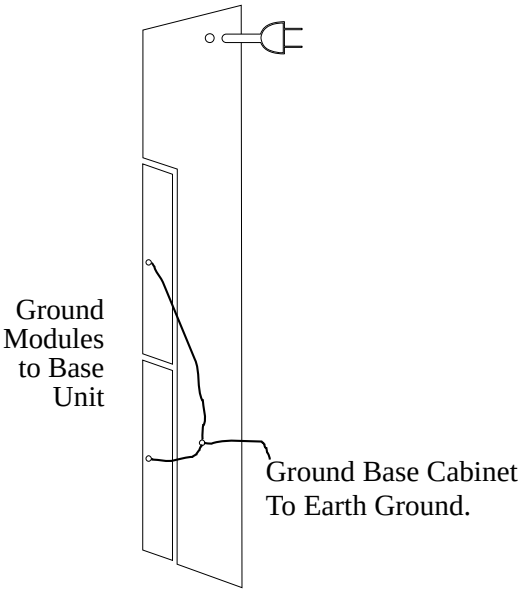
1. Disconnect both AC power and external battery back-up power from the system.
2. Remove and set aside nameplate from base unit. This action exposes internal cable connector on base unit circuit board.
3. Reach through opening in base unit and mate module cable plug with base unit circuit board connectors.
4. Push excess cable inside base unit housing through connector opening.
5. Install expansion module in place on all four mounting holes. Be sure excess cable is not pinched between add-on module and base unit.
6. Pull module down to latch in place.
7. Use appropriate screw driver to tighten module securing screw into base unit threaded fastener.
8. Snap nameplate into slots on top of module housing.
9. Attach #10 or #12 insulated, solid copper wire between the frame ground stud on the expansion module and the frame ground stud on the common equipment cabinet.
10. Reconnect the power to the system.
11. Refer to Chapter 3, and perform configuration programming for new station and line ports.

Typical Base Unit
(8-Line, 16-Station Base Unit)





Typical Add-On Module



Installing The Add-On Expansion Module

2.15 Checking The System Installation

The system operating features are set to default conditions at initial power-up. These conditions provide a basic operating system with a known set of parameters, and you should check out the system with the default conditions in place. At any time while the system is operating, you can reset default conditions from station port 10 or 12 following the instructions provided in chapter 3, *Programming*.

2.15.1 Checking The Resistance

Measure the resistance at the station connector blocks under the following conditions.

- AC power cord disconnected from electrical outlet.
- Common equipment connected to station connector blocks.
- Stations wired and wiring punched down on blocks.
- Bridging clips removed from blocks to isolate stations from common equipment.

Measure the resistance of each installed station and wiring from the station side of the connector blocks. Resistance values will vary with cable length and station type but should be within the following limits:

- Greater than 700 KΩ

2.15.2 Checking The Voltage

Make the following voltage measurements at the station connector blocks under the following conditions:

- Bridging clips installed
- AC power connected to the common equipment

Measure the voltage across the signal pair. The measured voltage for proprietary telephones must be within the following limits:

- 28–36 VDC

NOTE: Refer to Section 2.14.2 for information on testing industry-standard telephones connected through the JM008 expansion module.

2.15.3 Checking The General Operating Conditions

1. Check the green light emitting diode (LED) system status indicator. Be sure that it is on steady. If it is off or flashing, refer to the paragraph titled *Checking the System Status Indicator*.

2. Refer to the user's guide for operating information and perform a general operational test of the system by exercising the features from station port 10 or 11. Operational parameters are per the system default conditions as detailed in Chapter 4 until class of service programming is performed.

3. Once the basic system is verified as operational, perform the class of service programming as described in Chapter 3.

2.16 Isolating Failures

Section 2.17 will help you to find and identify problems that might occur in the digital telephone system.

2.16.1 Checking The System Status Indicator

A green LED located on the common equipment cabinet is the system status indicator. This indicator light comes on when power is supplied to the system. If the indicator flashes after power up, it signals that the processor has failed or that the software is not operating. Unplug and reconnect the AC power to the power supply and observe the LED indication. If it still shows a flashing indication, equipment replacement may be necessary.

2.16.2 Testing The Stations

To test the multiline stations for proper operation:

1. Disconnect line cord at station base then reconnect it.

2. On DigiTech telephones, press and hold the **MUTE** button.
   On *Impact* and Impression telephones, press and hold **1** on the keypad.
   Station will automatically perform self test routine.

3. Release test button as soon as test begins. Sequence of test is as follows:
   a. indicators will light in sequence,
   b. ringer will sound—be sure volume is set to low or high,
   c. indicators and ringer will then turn off at the same time.

4. Replace any station that does not pass the self test.

2.17 Loading And Up-Grading The System Software

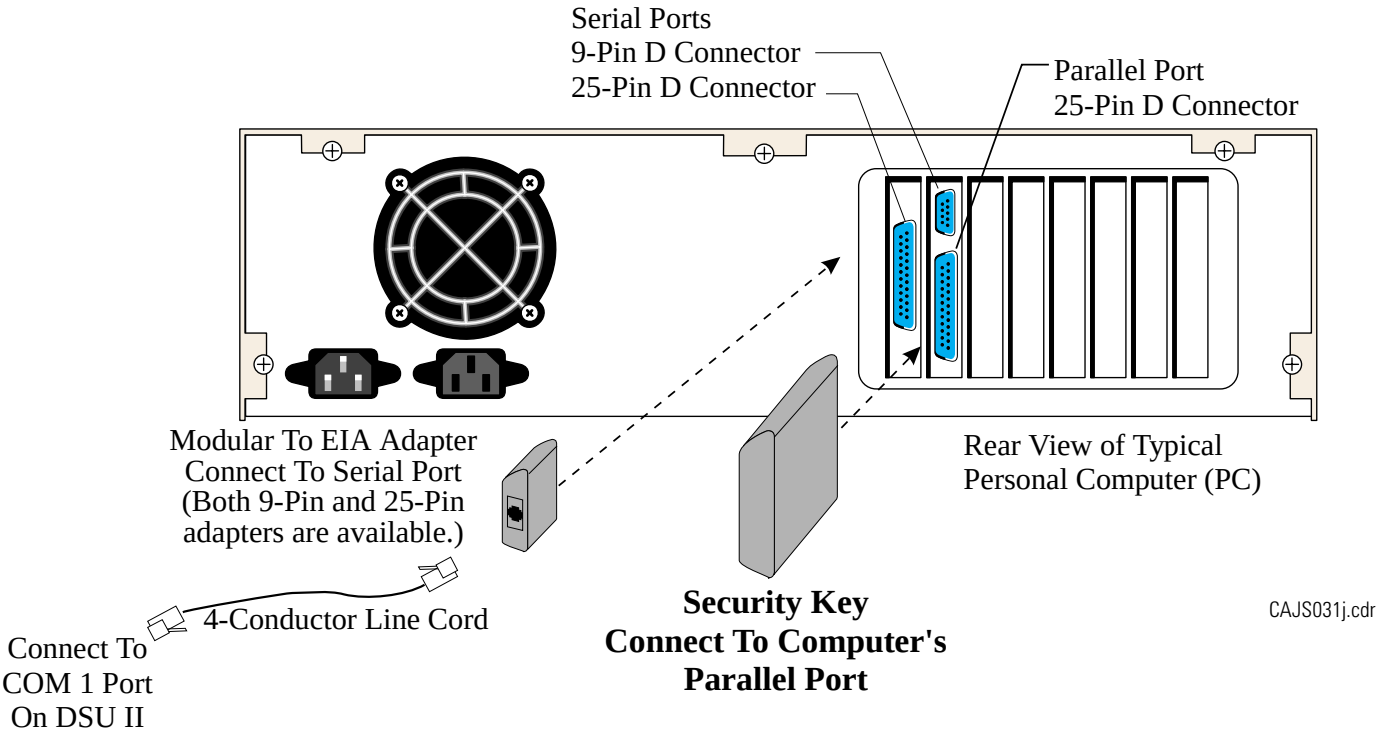
The DSU II contains flash memory that you load with operating software when you install the system and later re-load with software up-grades as they become available.

The operating software package consists of three parts: The boot-loader EPROMs that is factory-installed as part of the system, and the software key and software disks that you order separately. The software disks include the boot loader interface disk and the operating software disks.

2.17.1 Introducing The Software Key

The software key is a hardware device to un-lock the DSU II so it can accept the system operating software. Factory technicians program and initialize the software key, and make it available in several different configurations.

The configurations are as listed below:
DSUII–SW01
DSUII–SW05
DSUII–SW10
DSUII–SW25
The configurations control the number of times that you can use a key to load or up-grade operating software into a system; however, it does not matter which DSU II system you load. (For example, with a DSUII–SW01 key, you can load any DSU II system one time; however, with the DSUII–SW25, you can load or up-grade one system 25 times or load 25 different systems one time—your choice.)



Connecting The Security Key

2.17.2 Introducing The Software Disks

There are several standard 3.5-inch magnetic diskettes for each software part number. This group of diskettes include the boot loader interface and the system operating software. You place these diskettes (commonly referred to as floppy disks), into your personal computer (PC) in a certain order just as you would any set of program disks.

CAUTION

The system operating software is unique for each of the three system sizes. Be sure that you load the correct system software for the size system that you are installing.

2.17.3 Loading The Software

Installing The Bootloader Interface

You must install the boot loader interface on your PC before you can install the system operating software.

Installing The Bootloader Interface Software With Windows 95*

1. Insert the bootloader interface disk (labeled *disk1*) in your PC's disk drive.

2. From the **Start** menu, select **Run**.

3. At the prompt line, type: *<drive>:\disk1\setup* where <drive> is the letter of your source disk drive.

4. Click **Ok**. The Bootloader Interface installation window appears.

NOTE: Alternately, you can use the* Explorer View *to navigate to the source <drive> and then to the* disk1 folder. *Once there, double click on* setup.exe *and the Bootloader Interface installation window appears.

5. Remove the bootloader interface disk from you computer's disk drive.

6. From the Bootloader Interface load window, follow the on-screen prompts to finish loading the software. The installation creates a DSU II BTLDR I/F window complete with appropriate icons.

NOTE: Your PC's screen may now show the DSU II BTLDR I/F folder; however, if it does not: select* Start*, then select* Programs*, and then navigate to DSU II BTLDR I/F folder.

7. From the DSU II BTLDR I/F window, double click on the **Install SKey Driver** icon.

8. Select **Express** and follow the on-screen prompts.

9. When you reach the prompt to restart windows, do so.

**Windows 95 is a registered trademark of Microsoft Corporation, Redmond, Washington*

Installing The Bootloader Interface Software With Windows 3.1* Or Windows For Workgroups 3.11*

1. Insert the bootloader interface disk (labeled *disk1*) in your PC's disk drive.

2. From the **File Manager** menu, select **Run**.

3. At the prompt line, type: *<drive>:\disk1\setup* where <drive> is the letter of your source disk drive.

4. Click **Yes**. The Bootloader Interface installation window appears.

NOTE: ***Alternately, you can use the* File Manager *to navigate through its tree view to the source <drive> and then to the* disk1 folder. *Once there, double click on* setup.exe *and the Boot loader Interface installation window appears.***

5. Remove the boot loader interface disk from you computer's disk drive.

6. From the Boot loader Interface load window, follow the on-screen prompts to finish loading the software. The installation creates a DSU II BTLDR I/F folder complete with appropriate icons.

NOTE: ***Your PC's screen may now show the DSU II BTLDR I/F folder; however, if it does not: use the program manager to navigate to DSU II BTLDR I/F group.***

7. From the DSU II BTLDR I/F window, double click on the **Install SKey Driver** icon.

8. Select **Express** and follow the on-screen menu prompts.

9. When you reach the prompt to restart windows, do so.

**Windows 3.1 and Windows For Workgroups 3.11 area registered trademarks of Microsoft Corporation, Redmond, Washington*

Un-installing The Bootloader Interface

The software provides a means by which you can un-install it if you wish.

For Windows 95 operating systems,

1. From the **Start** menu, select **Programs**, and navigate to the DSU II BTLDR I/F folder.
2 Double click on the **Unstall** icon.
3. In the event that you were accessing the DSU II BTLDR I/F folder and its contents, you may need to manually delete the folder and its contents. From Explorer view, navigate through <drive> to **WINDOWS**, then to **START-MENU**, then to **PROGRAMS**, and finally to **DSU II BTLDR I/F**. From there, delete all short-cuts associated with the bootloader interface.

For Windows 3.1 and Windows For Workgroups 3.11,

From the **Program Manager**, navigate to **DSU II BTLDR I/F**, and double click the **Uninstall** icon.

Installing The System Operating Software

CAUTION

In this software loading sequence, the system will prompt you to save the class of service data base. ALWAYS SAVE THE DATA BASE FIRST before you proceed with the software load. Saving the data base first ensures that you will have it available should something go wrong during the software loading procedure. Later, after you have finished loading the system software, master clear the system and reload the data base that you saved before you loaded the software.

Saving The Class Of Service Data Base (Using An XMODEM-Type Communications Program)

Use the PC and an XMODEM-type communications software program to save the DSU II system's class of service data base before you load the software. The following procedure illustrates a typical data base down-load using *PROCOMM* (produced by Datastorm Technologies Inc.). Other software programs are also available that you can use for this purpose.

1. When the PC display prompts for a password, type **I✳746✳** or the current system password and press **RETURN** (This causes main COS programming menu to be displayed).

2. From main menu, make all selections necessary to perform class of service programming then return to the main menu.

3. From main menu, press **1** and **RETURN** (This causes system COS programming menu to be displayed).

4. From the system menu, press **4** and **RETURN** (This causes load/save menu to be displayed.) From load/save menu, you can down-load the COS data base to your PC (usually to some temporary location on your hard drive).

   To down-load the data base,
   (a) press **1** and **RETURN**,
   (b) press **PAGE DOWN**,
   (c) press **1** to choose XMODEM protocol,
   (d) type destination file name for the down-loaded data base—include destination drive (for example, C:\ cust.001)
   (e) press **RETURN**. The data base automatically down-loads to the destination file.

   To down-load speed dials and auto dials,
   (a) press **3** and **RETURN**,
   (b) repeat above steps b–e.

   To up-load the data base after you have up-graded the system operation software and master-cleared the system,
   (a) press **2** then **RETURN**
   (b) press **PAGE UP**
   (c) press **1** to choose XMODEM protocol
   (e) type file name of saved COS data—include source drive if necessary
   (f) press **RETURN**. The data base is automatically up-loads to the DSU II system.

   To up-load speed dials and auto dials,
   (a) press **4** and **RETURN**,
   (b) repeat above steps b–f.

   If the up-load completes properly, the screen displays: *Xmodem transfer complete, no errors.*

5. Return to the main menu and log off.

Loading The System Operating Software (Using The DSU II Bootloader Interface)

1. Connect the security key to the parallel port on the PC.

***NOTE: If you wish to view the available up-grade count and the system type supported by the security key, select* Key *from the main menu and then select* View.**

2. Install the system operating software disk (labeled *disk2*) in your PC's disk drive. (Alternately, you could have pre-loaded the disk's contents into a file location on your PC's hard drive.)

3. With Windows 3.1 click the boot loader icon to open the DSU II BTLDR I/F window and from there click the **Boot loader Interface** icon.
   With Windows 95, select **Start**, **Programs**, **DSU II BTLDRI_F**, and **DSU II Boot loader Interface**. The DSU II Boot loader Interface window will open.

4. From the **DSU II Boot loader Interface** window, select the **System** drop-down menu, and then select **Upgrade.**

5. Follow the on-screen prompts until you reach the Logon Dialog window.

6. At the Logon Dialog window, select the appropriate user type, and type **I✳746✳** or your current system programming password.

7. Follow the on-screen prompts until you reach the appropriate DSU II System Binary File Selection Dialog box.

8. Use the Drive pull-down menu to select the location where the DSU II System Binary File resides.

9. Navigate to and then select the appropriate DSU II System Binary File displayed in the File Selection Dialog box. The system software load automatically begins. A typical load will take approximately nine minutes.

Master Clearing The System

After you load the system operating software, master clear the system. Master clearing returns the entire system configuration to factory settings *and clears all stored auto and speed dial numbers.*

NOTE: Do not do this unless you want to clear all of the programmed data base.

1. Type the password **I✳746✳** (this will get you into the main menu) and **RETURN**.
2. Press **1** for System C.O.S. and **RETURN**.
3. Press **1** for System Defaults and **RETURN**.
4. Press **8** for Master Clear System Data and **RETURN**.
5. Press **y** to confirm and **RETURN**.
6. Press **CTRL C** to return to main menu and **RETURN**.
7. Up-load the class of service data base that you saved before you loaded the system operating software (see the previous paragraph titled *Saving The Class Of Service Data Base* for up-loading procedure.