

WESCOM DUALINE PLUS
DIGITAL SINGLE SUBSCRIBER CARRIER SYSTEM
DDL 201 CENTRAL OFFICE
TERMINAL SHELF (23 INCHES)

1. GENERAL

- 1.01 This section is a cover sheet for the Wescom Dualine Plus DDL 201 Central Office Terminal Shelf for use at the subscriber location. This section is copyrighted and reproduced with the permission of Charles Industries.
- 1.02 Whenever this section is reissued the reason(s) for reissue will be listed in this paragraph.
- 1.03 The Wescom Dualine Plus System is a general purpose digital single subscriber carrier (DSSC) system that provides pair gain capability over a non-loaded, two wire, copper facility.

The Dualine Plus requires installation of a central office terminal and a field module, located at or near the subscriber premise.

- 1.04 Associated practices for installation and maintenance of the system are:

<u>Section</u>	<u>Title</u>
363-400-800SW	System Overview
502-204-800SW	DDL 102 Dualine Plus Remote Terminal
502-204-801SW	DDL 104 Dualine Plus Remote Terminal
502-204-802SW	DDL 112 Dualine Plus Remote Terminal
363-400-802SW	DDL 210 Dualine Plus Central Office Terminal (COT) Power Unit
363-400-803SW	DDL 221 Dualine Plus Central Office Terminal (COT) Common Unit
363-400-804SW	DDL 230 Dualine Plus Central Office Terminal (COT) Line Unit
363-400-805SW	DDL 391 Dualine Plus Line Unit
502-204-803SW	DDL 190 Dualine Plus Remote Terminal Simulator
502-204-804SW	Digital Signal Trak-A-Tone Model 92-5

- 1.05 If corrections are required in the attached document, use Form-3973 as described in Section 000-010-015.
- 1.06 If manufacturing and/or design problems are encountered, refer to Section SW 010-522-906 for procedures on filing an Engineering Complaint.
2. ORDERING PROCEDURES
- 2.01 Components of the Dualine Plus System may be ordered via the Southwestern Inventory Management System (SWIMS).
- 2.02 To order additional copies of this practice, use WSCM 363-400-801SW.

PROPRIETARY
Not for use or disclosure outside Southwestern Bell
Telephone Company except under written agreement.



**Wescom® DDL201 DualLine Plus™
 Central Office Terminal Shelf (23-Inch)
 General Description, Installation And Turn-Up Procedures
 CLEI™ Code: SIMCWU09RA**

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**FCC PART 15 SUBPART B, CLASS A
 REQUIREMENTS**

The A92-DDL201 COT Shelf, when configured with the C91-DDL210 Power Supply Unit, the A91-DDL221 Common Control Unit, and C91-DDL230 Line Units, (or their later issues), complies with the limits for a Class A digital device pursuant to Subpart 15 of FCC Rules. These requirements are designed to provide reasonable protection against interference when operated in a commercial environment. This equipment generates and uses radio frequency energy, and if not installed and used properly in accordance with this user's manual, may cause interference to radio communications. 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 required to correct the interference.

GENERAL

The Central Office Terminal (COT) is a rack mount shelf unit and is located in the CO or CEV. One fully equipped shelf is capable of supporting 12 DDL1XX RT units. The COT is comprised of the following units:

- DDL201 COT (23-Inch) Shelf; the rack mountable shelf is installed in a Central Office (CO) or Controlled Environment Vault (CEV) which contains the COT units.
- DDL210 COT Power Unit; the plug-in power supply in the COT shelf (one per shelf).
- DDL221 COT Common Unit; the plug-in unit which performs common functions, such as alarms, for the COT shelf (one per shelf).
- DDL230 or DDL235 COT Line Unit; the plug-in unit which connects two lines from a co-located CO or Digital Loop Carrier Remote Terminal (DLC RT) to the local loop which is being used as a 2-wire Digital Subscriber Line (1 to 12 per shelf).

This practice is reprinted to make reference to the DDL235 COT Line Unit. An editorial update is also included.

SITE REQUIREMENTS

The COT (23-Inch) Shelf mounts in a standard 23-inch relay rack and occupies 7 inches of vertical rack space (four 1.75 inch rack mounting spaces). One shelf has positions for one DDL221 COT Common Unit, one DDL210 COT Power Unit and up to 12 DDL230 or DDL235 COT Line Units. 25-Pair Amphenol type connectors are used for CO line and DSL (Digital Subscriber Line) connections.

The shelf is locally powered with -48Vdc Battery and ground connections.

Tool Requirements

The following tools are required for mounting the Shelf:

- A flat blade screwdriver for Number 6 screws used on the COT mounting bracket.
- A fastening tool for whatever rack fasteners are used.
- Wire cutting and stripping tools for power wiring.
- Tools for fabricating 25-pair cables with Amphenol-type connectors.
- Test gear for checking COT voltages.

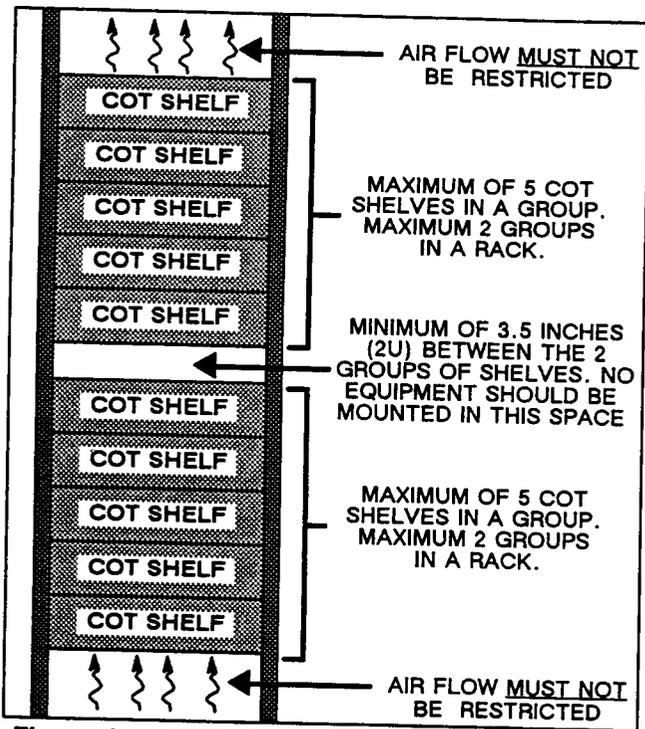


Figure 1. COT Shelf Orientation For Proper Heat Dissipation

Rack Requirements

- A standard 23-inch relay rack (channel or unequal flange) for COT mounting.
- Maximum of 10 shelves per rack for proper heat dissipation. See Figure 1.
- Primary surge protection should be provided for any exposed lines.
- Power from a fused battery distribution panel.

Environmental Requirements

- A sheltered temperature-controlled environment.
- An ambient temperature within the range of 32° to 122° F (0° to 50° C).
- Sufficient space should be provided both in front of and behind the shelf to allow free access to the equipment.

INSPECTION

Inspect the equipment thoroughly upon delivery. If the equipment has been damaged in transit,

immediately report the extent of damage to the transportation company.

Wescom equipment is identified by a model and issue number imprinted on the front panel or located elsewhere on the equipment. Each time a major engineering design change is made on the equipment, the issue number is advanced by one number on any following models that are manufactured. Therefore, be sure to include both the model number and its issue number when making inquiries about the equipment.

Each COT module is shipped in a static-protective package to prevent electrostatic charges from damaging CMOS devices. A unit intended for future use should be tested as soon as possible and returned to its protective package for storage.



CAUTION

COT modules contain sensitive electronic devices. do not ship or store modules near strong electrostatic, electromagnetic or magnetic fields. Use static-preventive measures for storage and handling. Also, make sure to use the original static-protective packaging for shipping or storage.

COT SHELF INSTALLATION

After the site requirements have been verified, the COT shelf may be installed at the specified location.

- Locate the COT shelf and obtain the appropriate shelf mounting hardware.
- Determine and obtain the tools required for the shelf mounting hardware.

NOTE

The COT shelf should be empty during the shelf mounting procedures. If any modules are in the COT, remove and store them in accordance with static sensitive device storage procedures.

CAUTION

Hazardous voltages exist on the Digital Subscriber Loop. Always exercise caution when wiring a live circuit or when performing maintenance. Unplugging the COT Line Unit from the COT shelf will remove the hazardous voltages from the Digital Subscriber Loop.

COT Shelf Mounting Brackets

The position and orientation of the shelf mounting brackets is dependent on the type of rack used for COT mounting. The shelf may be front mounted in a standard channel rack (5 inch projection) or rear mounted in an unequal flange duct type rack. The shelf may be shipped with the mounting brackets installed in one of two mounting positions or shipped loose (see Figure 2).

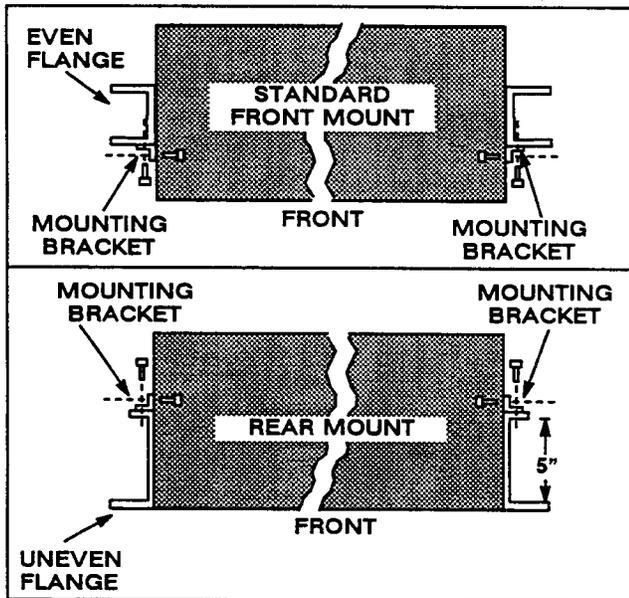


Figure 2. Mounting Bracket Orientation (Top View)

If the COT shelf mounting brackets are shipped loose or need to be reinstalled, use the following procedures.

Front Mount Bracket Position

For a standard front mount rack, the mounting bracket must be fastened to the two mounting holes closest to the front of the shelf.

- Position one of the mounting brackets at the first set of holes (Figure 3). The flange of the bracket is toward the rear of the shelf.
- Screw the bracket in place from inside the shelf using the two #6 mounting screws for the bracket.
- Fasten two #6 nuts to mounting bracket screws.
- Repeat for the other side of the shelf.

Rear Mount Bracket Position

The shelf is mounted from the rear of the rack and the second set of shelf mounting holes (second position from front) is used for the two shelf mounting brackets.

- Position one of the mounting brackets at the second set of holes (Figure 4). The flange of the bracket is toward the front of the shelf.
- Screw the bracket in place from inside the shelf using the two #6 mounting screws for the bracket.
- Fasten two #6 nuts to mounting bracket screws.
- Repeat for the other side of the shelf.

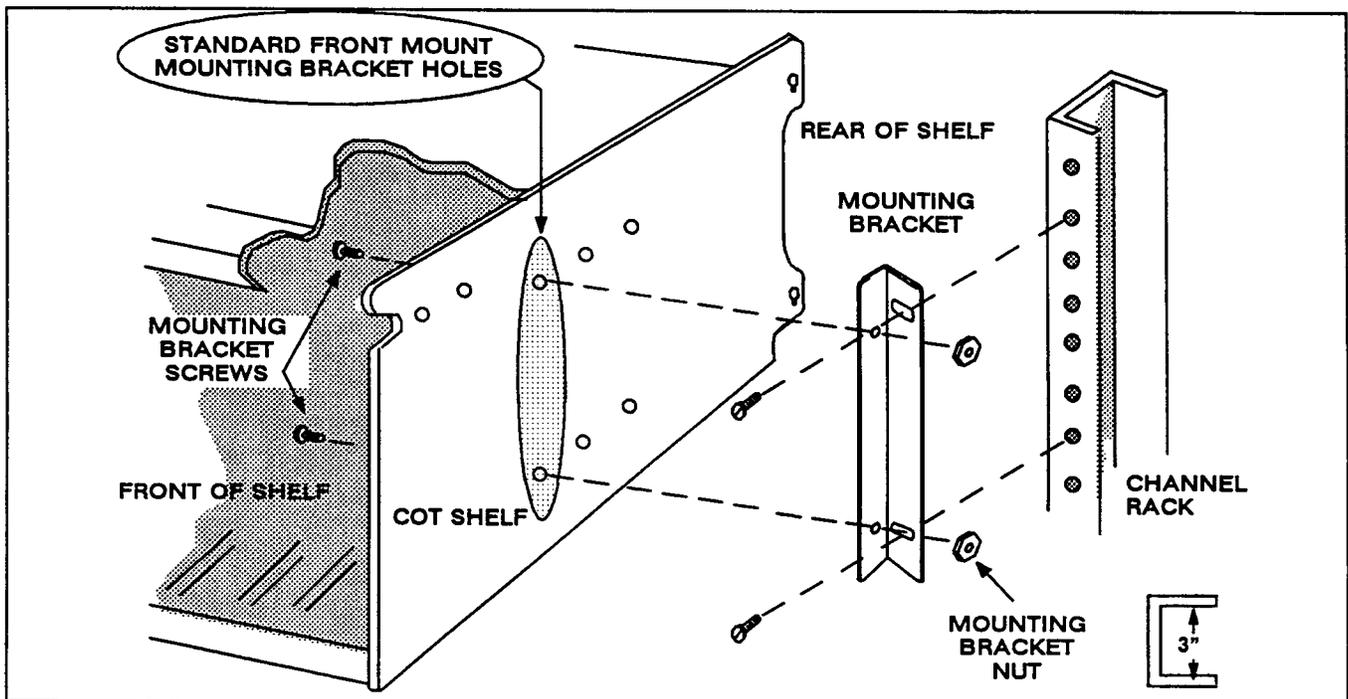


Figure 3. Shelf Mounting Bracket Position for Standard Front Mount

Rack Mounting, Front mount

- (a) From the front of the relay rack, position the COT shelf in its relay rack mounting location (Figure 5).
- (b) Secure the COT shelf in its relay rack location using the appropriate rack mounting hardware in the left and right mounting bracket.

Rack Mounting, Rear Mount

- (a) From the rear of the relay rack, position the COT shelf in its relay rack mounting location (Figure 6).
- (b) Secure the COT shelf in its relay rack location using the appropriate rack mounting hardware in the left and right mounting bracket.

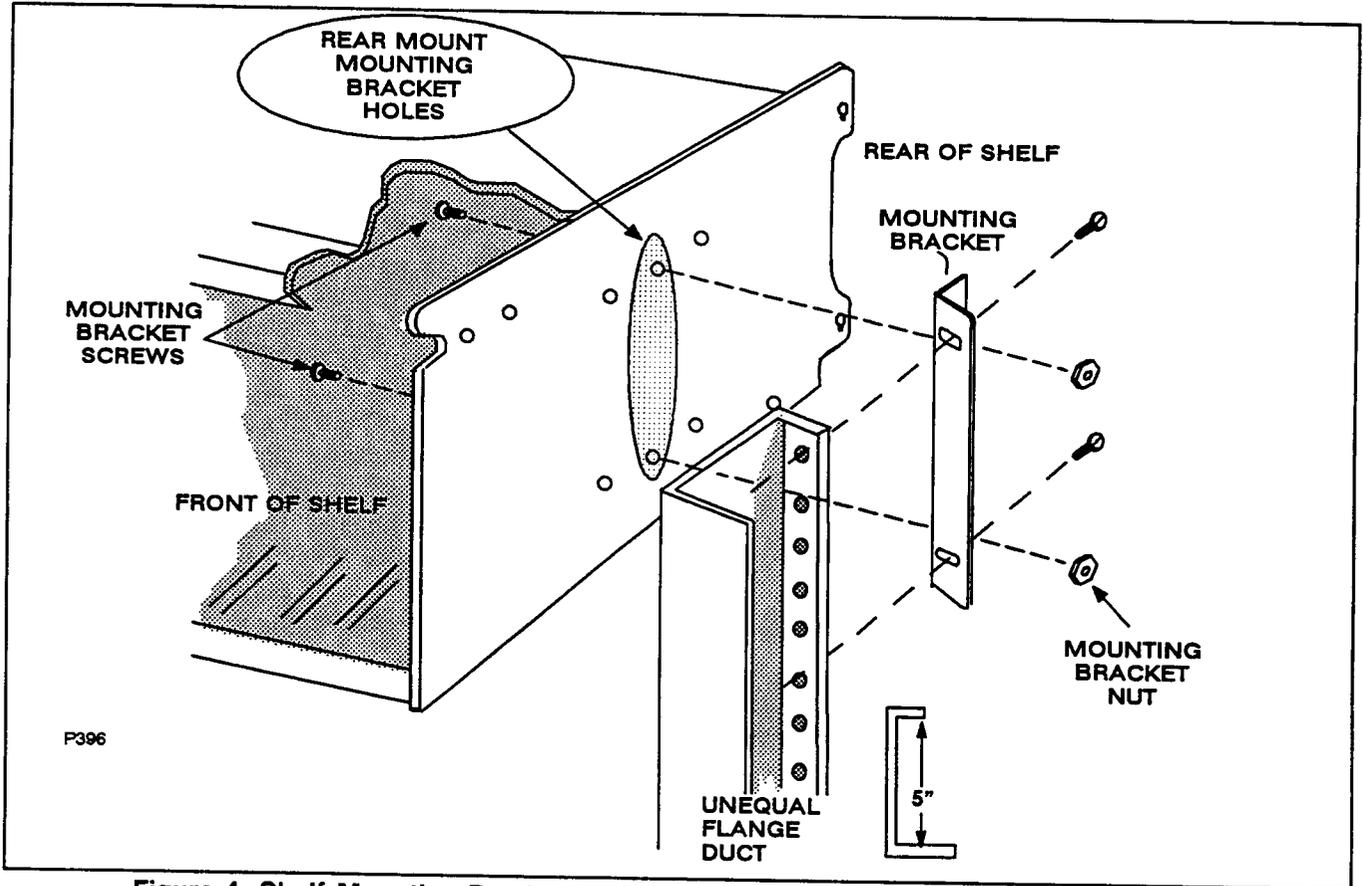


Figure 4. Shelf Mounting Bracket Positions for Uneven Flange Rack, Rear Mount

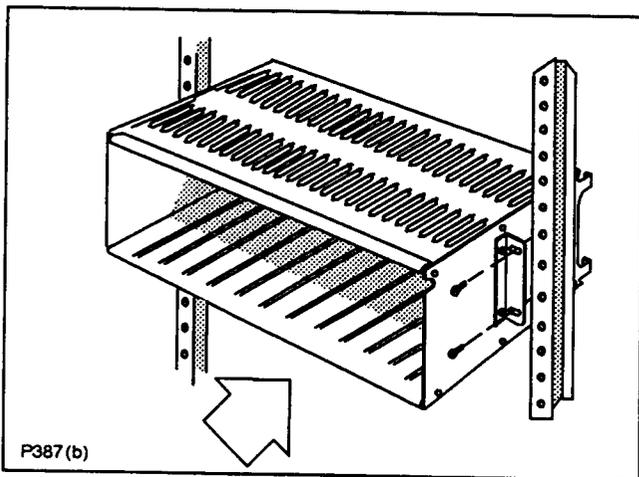


Figure 5. Front Rack Mount

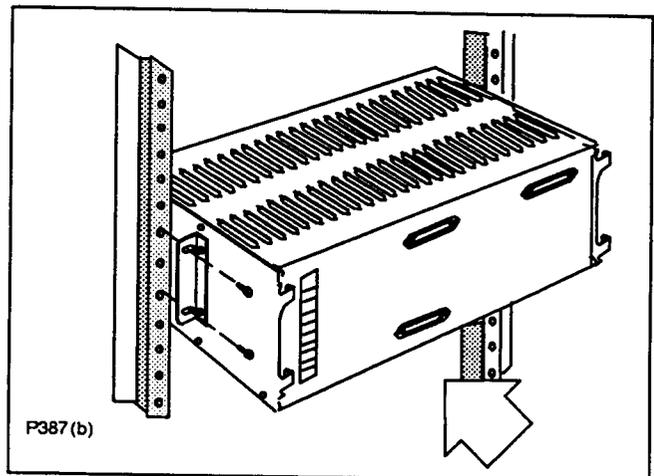


Figure 6. Rear Rack Mount

POWER CONNECTIONS

The COT is powered from the CO battery. It is recommended that the shelf be powered from a fused power distribution panel. Locate the COT shelf power terminal strip and connect the shelf power wiring as shown in Figure 7. It is recommended that 14 or 16 AWG stranded wire be used for -48V and ground. DO NOT exceed 14 feet of 16 AWG.

CAUTION

Ensure that all power to the COT shelf power source (power distribution panel, etc.) is turned off.

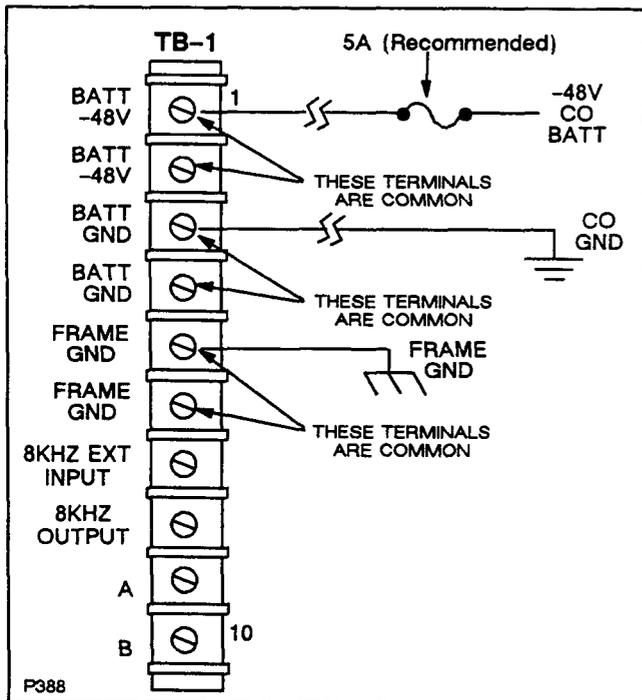


Figure 7. COT Shelf Power Terminal Strip

- (a) Obtain the appropriate gauge and length wire for the frame ground (#14 AWG is recommended). Connect one end to one of the FRAME GND terminals of the COT shelf TB-1 terminal block (see Figure 7). Connect the other end to office frame ground.
- (b) Obtain the appropriate gauge and length wire for the power ground. Connect one end to one of the BATT GND terminals of the COT shelf TB-1 terminal block (see Figure 7). Connect the other end to the power ground source (power distribution panel).
- (c) Obtain the appropriate gauge and length wire for the -48Vdc battery. Connect one end to one of the BATT-48V terminals of the COT shelf TB-1 terminal block (see Figure 7). Connect the other end to the CO -48Vdc battery source (power distribution panel).

SIGNAL CABLING

Central Office line terminations and Digital Subscriber Loop terminations are accessed through connectors J15 and J16 respectively (Figure 8).

CAUTION

Hazardous voltages exist on the Digital Subscriber Loop. Always exercise caution when wiring a live circuit or when performing maintenance. Unplugging the COT Line Unit from the COT shelf will remove the hazardous voltages from the Digital Subscriber Loop.

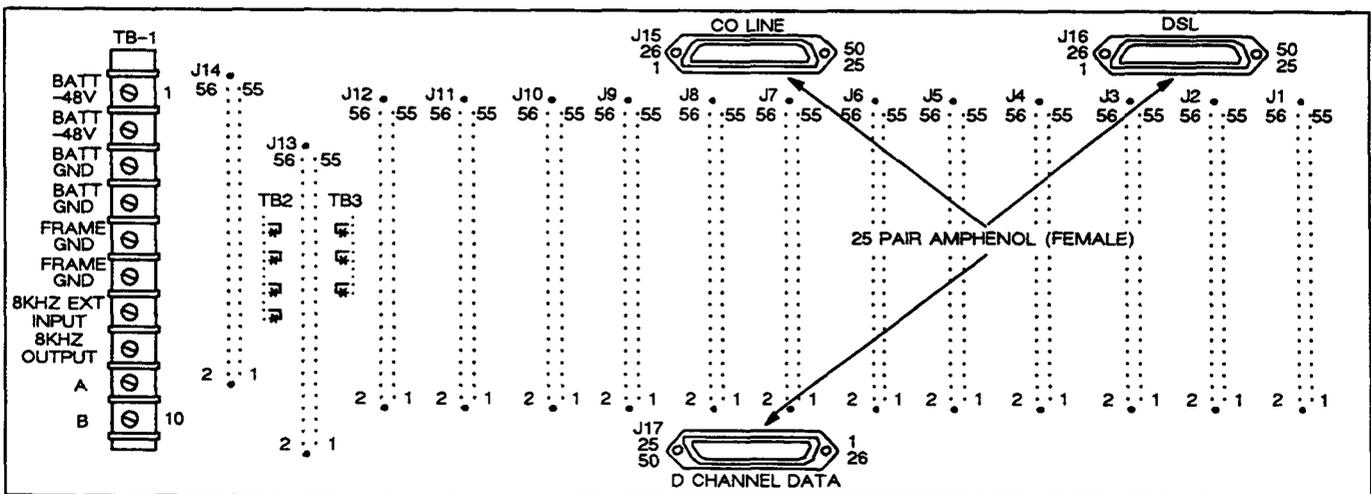


Figure 8. COT Shelf Backplane Connectors

CO Line Terminations

The CO line terminations are made via a 25-pair Amphenol connector (J15) on the COT shelf backplane (Figure 8).

- (a) Obtain the appropriate type 25-pair cable for the CO lines between the COT shelf and the frame. Connect the cable to an appropriate 25-pair Amphenol-type male connector. Refer Table 1 for wiring information.
- (b) Secure the connector to the J15 female connector of the COT backplane.
- (c) Terminate the other end of the cable at the distribution frame.

Digital Subscriber Loop Terminations

The 2-Wire Digital Subscriber Loop terminations are made via a 25-pair Amphenol connector (J16) on the COT shelf backplane (Figure 8).

- (a) Obtain the appropriate type 25-pair cable for the DSL lines between the COT shelf and the frame. Connect the cable to an appropriate 25-pair Amphenol-type male connector. Refer Table 1 for wiring information.
- (b) Secure the connector to the J16 female connector of the COT backplane.
- (c) Terminate the other end of the cable at the frame.

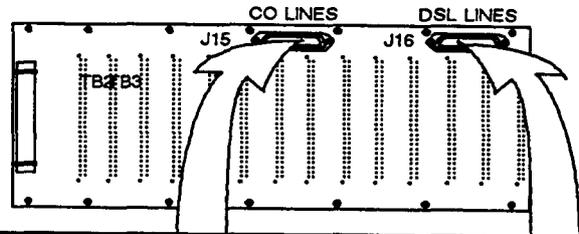
Alarm Connections

The COT MAJOR/MINOR AUDIBLE COAS (Central Office Alarm System), MAJOR/MINOR VISUAL COAS, ACO (Alarm Cut-Off), MAJOR/MINOR E2A, and SYSTEM ID alarm points are accessible at the COT shelf backplane. Open relay contacts indicate non-alarm condition. Wire-wrap to the backplane pins of TB2 and TB3. It is recommended that 22 AWG wire be used. Refer to Figure 9.

COT MODULE INSTALLATION AND POWER UP

There are three types of DualLine Plus modules used in the COT shelf; DDL210 COT Power Unit, DDL221 COT Common Unit, and DDL23X (DDL230 or DDL235) COT Line Unit (depicted in Figure 10). One COT Common Unit and one COT Power Unit are necessary for each shelf. They can power and control from one to twelve COT Line Units and their respective DDL1XX Remote Terminals (RT) at the subscriber sites. Each COT Line Unit provides the interface between two POTS lines and the DDL1XX RT.

Table 1. COT Shelf CO Line and 2W Digital Subscriber Loop Terminations



CO LINE	COT J15	2W DIGITAL SUBSCRIBER LOOP	COT J16
1	T 26 R 1	1	T 26 R 1
2	T 27 R 2		
3	T 28 R 3	2	T 27 R 2
4	T 29 R 4		
5	T 30 R 5	3	T 28 R 3
6	T 31 R 6		
7	T 32 R 7	4	T 29 R 4
8	T 33 R 8		
9	T 34 R 9	5	T 30 R 5
10	T 35 R 10		
11	T 36 R 11	6	T 31 R 6
12	T 37 R 12		
13	T 38 R 13	7	T 32 R 7
14	T 39 R 14		
15	T 40 R 15	8	T 33 R 8
16	T 41 R 16		
17	T 42 R 17	9	T 34 R 9
18	T 43 R 18		
19	T 44 R 19	10	T 35 R 10
20	T 45 R 20		
21	T 46 R 21	11	T 36 R 11
22	T 47 R 22		
23	T 48 R 23	12	T 37 R 12
24	T 49 R 24		

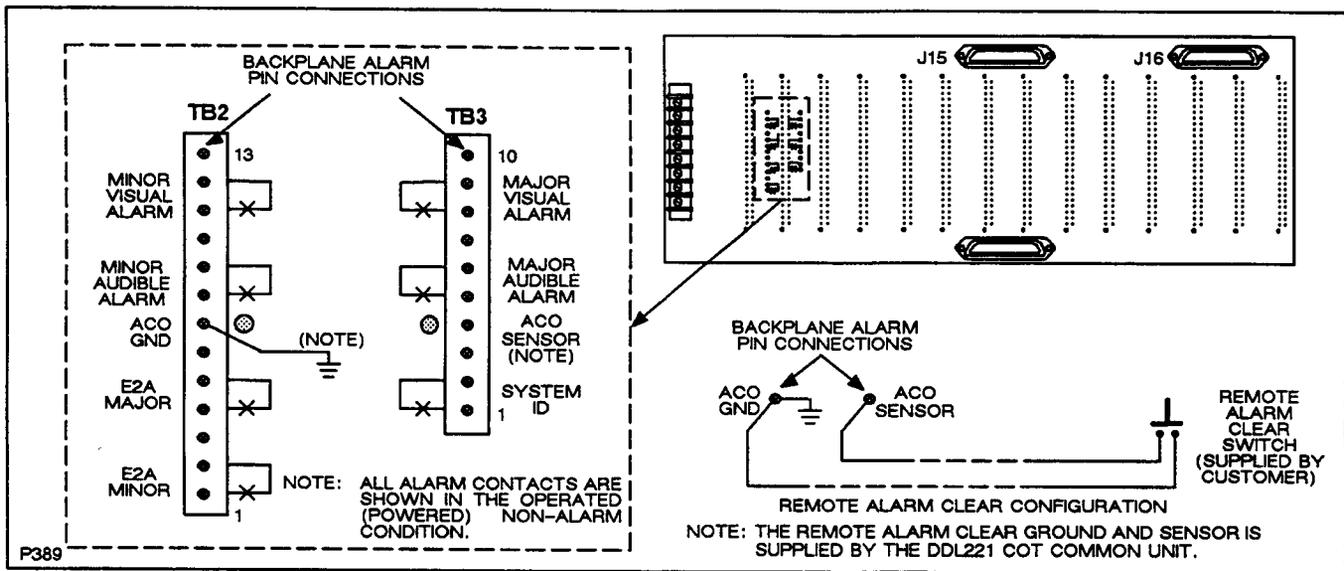


Figure 9. COT Common Unit Backplane External Alarm Pinout

Power-Up COT Shelf

Apply power to the fused power distribution panel feeding the COT shelf. Using a DC voltmeter, check for proper voltage across terminals 1 (BATT-48V) and 3 (BATT GND) of the Shelf Power Terminal Strip (TB-1). Verify a voltage between -42 and -56Vdc.

Install/Test COT Modules

After verification of proper voltage at the power terminal strip (TB-1), COT module installation/test can occur:

CAUTION

Installation and removal of modules should be done with care. Do not force a module into place. If excessive resistance is encountered while installing a module, remove the module and check the card guides and connector to verify proper alignment and the absence of foreign material.

- (a) Raise the locking bar at the top of the shelf.
- (b) Insert and seat the COT Power Unit into its slot (see Figures 10 and 11). The POWER LED lights steady. If it does not light, there is a problem with the module or shelf power. Check the COT Power Unit fuse and shelf power at the shelf power terminal strip.

- (c) Insert and seat the COT Common Unit in its slot next to the Power Unit (see Figures 10 and 11).
- (d) Insert and seat the COT Line Units in their assigned slots per facility plan (see Figures 10 and 11). The POWER/SELF TEST LED of each module lights steady. If the POWER/SELF TEST LED blinks continuously (self test fail) or does not light for any COT Line Unit, replace that module.

NOTE

If no corresponding DDL1XX RT unit is installed and connected to the Digital Subscriber Loop, the COT Common Unit Audible and Visual Alarms will activate unless the COT Common Unit has been placed in the 'Pre-provision' mode. Press the ACO (ALARM CUT OFF) pushbutton on the COT Common Unit to cancel the alarms.

- (e) After all equipped COT modules are installed, press the LED TEST pushbutton on the Common Unit. All module LEDs should light. If all LEDs do not light, replace module. NOTE: The DDL23X COT Line Unit's POWER/SELF TEST LED will flash to indicate that full idle power is being applied to the Digital Subscriber Loop.
- (f) Swing the locking bar (located at the top front of the shelf) down into the latched position.

PRE-PROVISIONING

The Pre-provisioning feature allows the user to install COT Line Units in the COT Shelf without generating alarms prior to the Line Units being synchronized with the associated Remote Terminal (RT). This allows the installation of the Line Units and the RTs at different times. When a Line Unit synchronizes with an RT, the Pre-provisioning feature for that line is canceled and normal alarm reporting resumes. To activate this feature, the following three-step procedure must be performed.

Step 1

Prepare the DDL221 COT Common Unit for Pre-provisioning

- (a) Depress and hold the front panel LED TEST push-button switch (DO NOT release).
- (b) Depress and hold the front panel ACO push-button switch (DO NOT release).
- (c) Observe that the MAJOR AND MINOR LEDs flash three times at a fast rate and then extinguish.
- (d) Release the LED TEST and ACO push-buttons.
- (e) Observe that the Common Unit MAJOR AND MINOR LEDs flash at a slow rate.
- (f) The DDL221 COT Common Unit is now "Ready" for pre-provisioning.

Step 2

Install COT Line Units

- (a) Install the DDL Line Units in the shelf that are to be pre-provisioned.

NOTE

Any Line Units that were previously installed will not be pre-provisioned unless they are unplugged at this time (for at least five seconds) and then re-installed.

Step 3

Activate Pre-provisioning

- (a) Observe that the Common Unit MAJOR AND MINOR LEDs are flashing at a slow rate.
- (b) Depress and hold the front panel LED TEST push-button switch (DO NOT release).
- (c) Depress and hold the front panel ACO push-button switch (DO NOT release).
- (d) Observe that the Common Unit MAJOR AND MINOR LEDs flashes three times at a fast rate and then extinguish.
- (e) Release the LED TEST and ACO push-buttons.

NOTE

If the "Ready" period of the COT Common Unit is allowed to time out before the pre-provisioning is Activated, all Line Units installed in the shelf (in Step 2) will not be pre-provisioned and will report alarm conditions. The "Ready" period of the DDL221 COT Common Unit times out in twenty minutes.

NOTE

If power to the shelf is interrupted, any Line Unit installed in the shelf will not be pre-provisioned and will report alarm conditions.

Alarm LEDs on pre-provisioned COT Line Units will be lit. However the COT Common Unit will not report alarms from these COT Line Units (LEDs or Relays). The COT Common Unit will report alarms from in-service COT Line Units.

Technical Assistance

If difficulty is encountered with the installation of the mounting assemblies or modules, and technical assistance is required, contact the Technical Services Department of Charles Industries-Wescom, by calling:

1-708-806-8500

FAX 1-708-806-6231

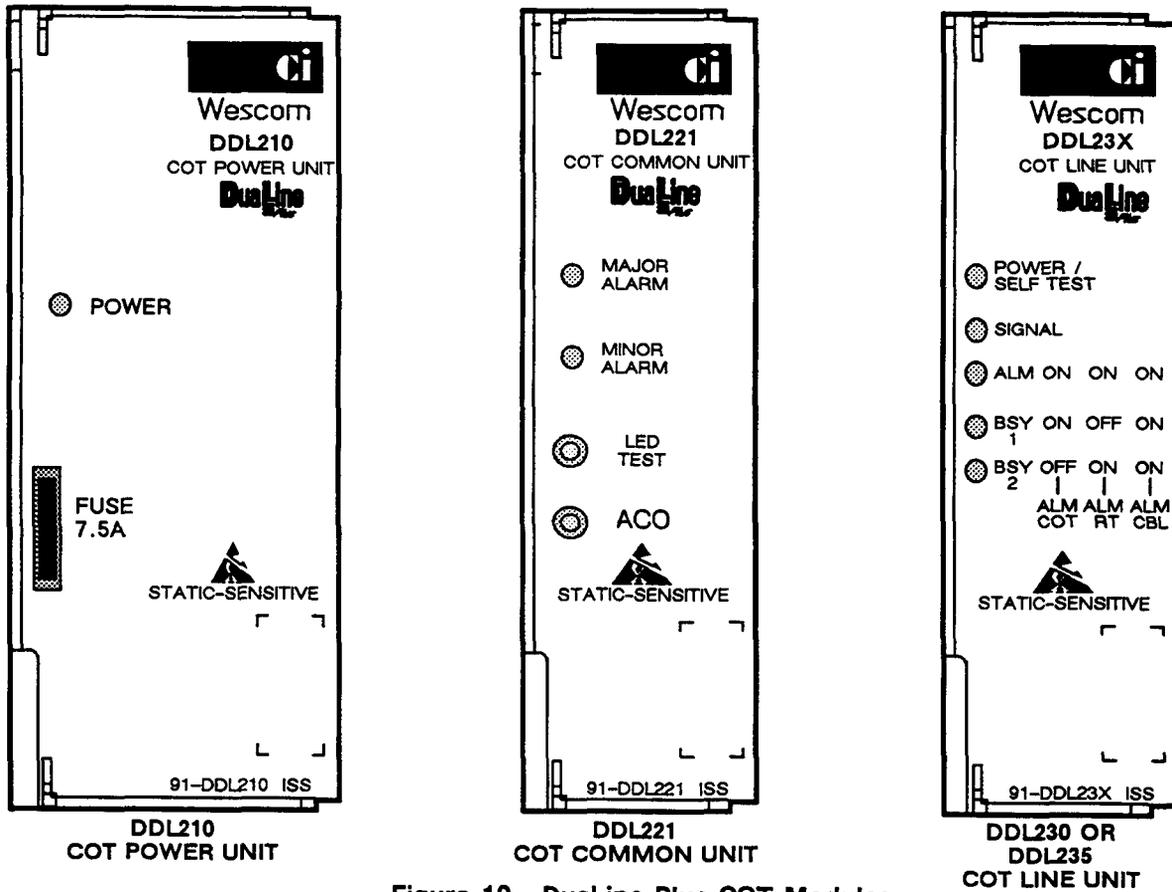


Figure 10. DualLine Plus COT Modules

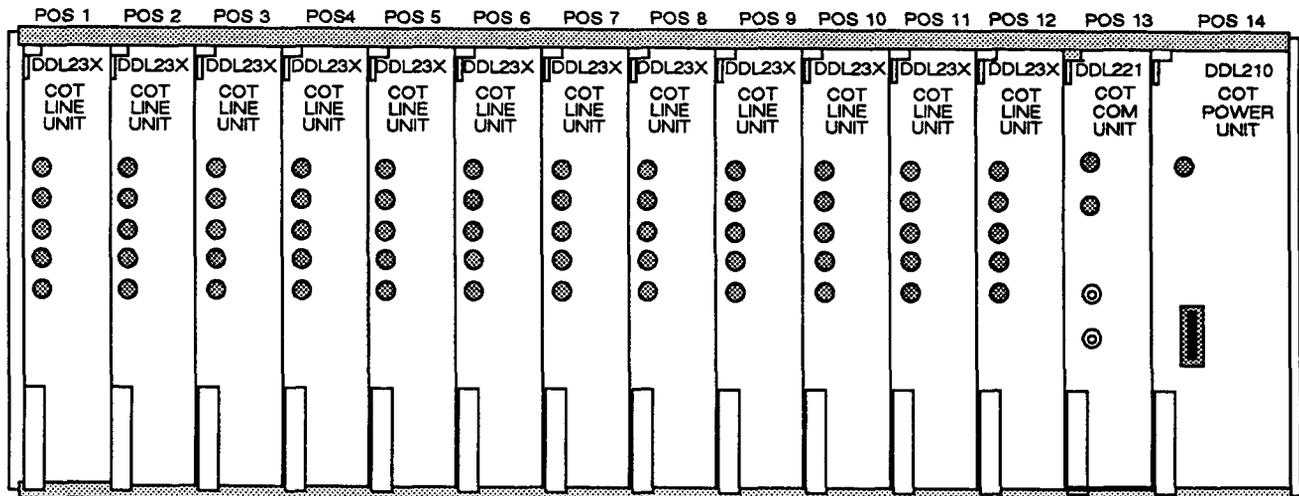


Figure 11. Fully Equipped COT Shelf Module Positions