

WESCOM DUALINE PLUS  
DIGITAL SINGLE SUBSCRIBER CARRIER SYSTEM  
SYSTEM OVERVIEW

1 GENERAL

1.01 This section is a cover sheet for the Wescom DuaLine Plus System Overview. 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>
502-204-800 SW	DDL 102 DuaLine Plus Remote Terminal
502-204-801 SW	DDL 104 DuaLine Plus Remote Terminal
502-204-802 SW	DDL 112 DuaLine Plus Remote Terminal
363-400-801 SW	DDL 201 DuaLine Plus Central Office Terminal Shelf (23 Inches)
363-400-802 SW	DDL 210 DuaLine Plus Central Office Terminal (COT) Power Unit
363-400-803 SW	DDL 221 DuaLine Plus Central Office Terminal (COT) Common Unit
363-400-804 SW	DDL 230 DuaLine Plus Central Office Terminal (COT) Line Unit
363-400-805 SW	DDL 391 DuaLine Plus Line Unit
502-204-803 SW	DDL 190 DuaLine Plus Remote Terminal Simulator
502-204-804 SW	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 363-400-800SW.

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# Wescom® DualLine Plus™ System Overview

## (MLT Compatible System Components)

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### 1. GENERAL

1.01 The Wescom® DualLine Plus™ System is a general purpose digital pair gain system that can be used for cable relief and to bring the digital network closer to the POTS customer. It can be equipped in a modular fashion so that only the Central Office Terminal/Remote Terminal (COT/RT) modules that are necessary for current demands are required. The COT line unit interfaces directly to the outside-plant (twisted pair) lines.

1.02 This practice is reprinted to reflect MLT compatible system components and to reflect the latest DDL equipment issues.

1.03 This practice provides a general description of the Wescom DualLine Plus System. The DualLine Plus System consists of Central Office Terminal (COT) equipment and a Remote Terminal (RT) connected by a two-wire (2W) local loop using 2B1Q line coding. See Figure 1 for a system configuration.

1.04 The DualLine Plus System includes the following major components:

(a) DDL101 RT, or DDL102 RT (in alternate enclosure); the complete housing and circuitry

installed at the subscriber location to provide two POTS lines to the subscriber location. Issue 2 of the DDL101 RT or Issue 1 of the DDL102 RT replaces the DDL101 Issue 1 and the DDL100 Issue 5.

(b) DDL103 RT, or DDL104 RT (in alternate enclosure); the complete housing and circuitry installed at the subscriber location to provide three POTS lines from two 2W local loops.

(c) DDL111 RT, or DDL112 RT (in alternate enclosure); the complete housing and circuitry for mounting on a telephone pole to provide POTS service to two subscribers. The DDL111 or DDL112 replaces the DDL110.

(d) DDL201 COT shelf; the rack-mountable 23-inch shelf installed in a Central Office (CO) or Controlled Environment Vault (CEV) which can contain up to 12 COT line units.

(e) DDL205 COT shelf; the rack-mountable 19-inch shelf installed in a CO or CEV which can contain up to 9 COT line units.

(f) DDL210 COT Power Unit; the plug-in power supply in the COT shelf (one per shelf).

(g) DDL221 COT Common Unit; the plug-in unit which performs common functions, such as alarms, for the DDL201/DDL205 COT shelf (one per shelf).

(h) DDL230 COT Line Unit; the plug-in unit which connects two CO lines or two lines from a DLC RT POTS channel unit to the 2-wire local loop (up to 12 in 23-inch shelf; up to 9 in 19-inch shelf). Issue 5 of the DDL230 replaces Issue 4.

(i) DDL391 COT Line Unit; plugs into R-Tec AML-II® or AML-III® shelves. Interfaces to DDL101, DDL102, DDL103, DDL104, DDL111 or DDL112 RTs.

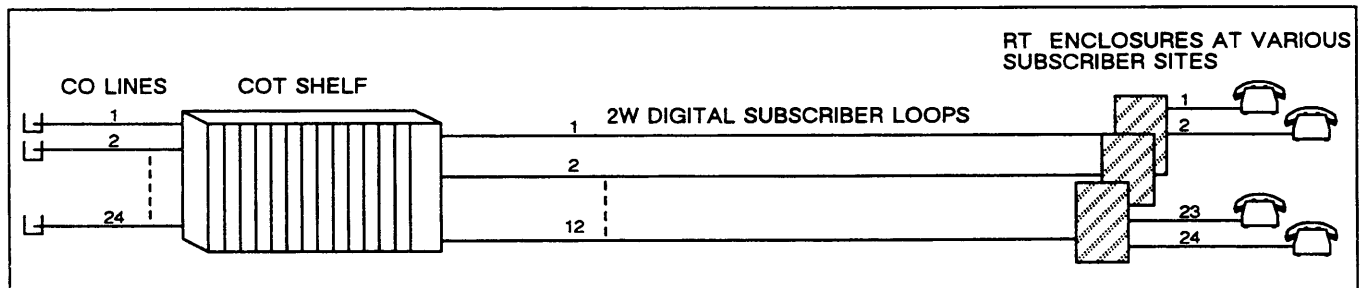


Figure 1. DualLine Plus System Configuration

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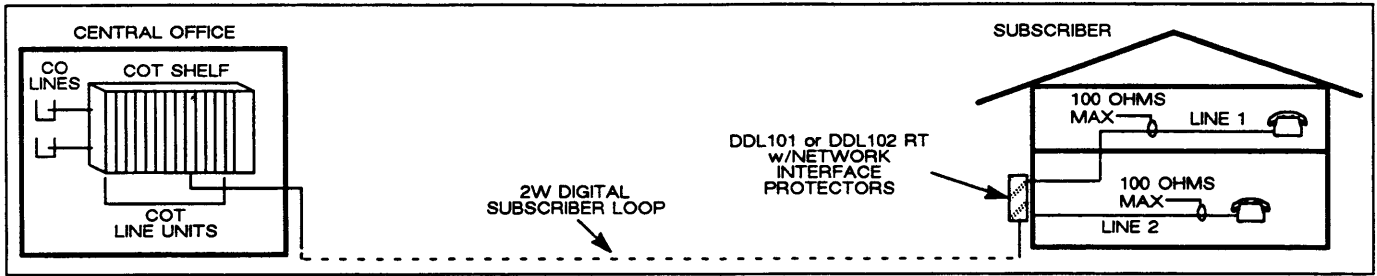


Figure 2. Typical DDL101 or DDL102 RT Application Showing Two Lines For One Subscriber

1.05 The DuaLine Plus System features include the following:

- Digital 2B1Q line coding compatible with the Bell Communications Research (Bellcore) Technical Reference TR-TSY-000397 and American National Standards Institute (ANSI) T1.601-1988
- Standard interface with CO equipment and subscriber telephone equipment
- Compatible with CLASS<sup>sm</sup> Service
- Forward disconnect
- On-Hook transmission
- Automatic testing of both the COT and RT with failures reported automatically
- Compatible with Automated Subscriber Loop Testing Systems (MLT)
- COT Common Unit provides alarms and other functions for the shelf
- COT Power Unit converts CO -48Vdc to voltages required by the COT Line Units and RTs
- Each COT Line Unit provides an interface to 2 POTS lines and one Digital Subscriber Loop
- Back-plane mounted connectors for quick and easy installation
- COT equipment can operate over an ambient temperature range of 32 to 122°F (0° to 50°C)
- No alarm suppressors are required in unequipped COT units or unequipped COT shelves
- FCC Part 15 Class A compliant (DDL201 and DDL205)
- LED lamp status indicators on each plug-in module

Central Office Terminal (COT)

- Mounts in a standard 19-inch or 23-inch relay rack
- COT shelf is equipped with a COT Common Unit, COT Power Unit, and up to 9 COT Line Units (19-inch shelf) or up to 12 COT Line Units (23-inch shelf)

Remote Terminal (RT)

- Enclosure that can be mounted on an outside or inside wall, or on a telephone pole
- Each RT enclosure module provides two POTS lines from one Digital Subscriber Loop (DSL)
- A three-line RT provides a third line using an additional copper pair.

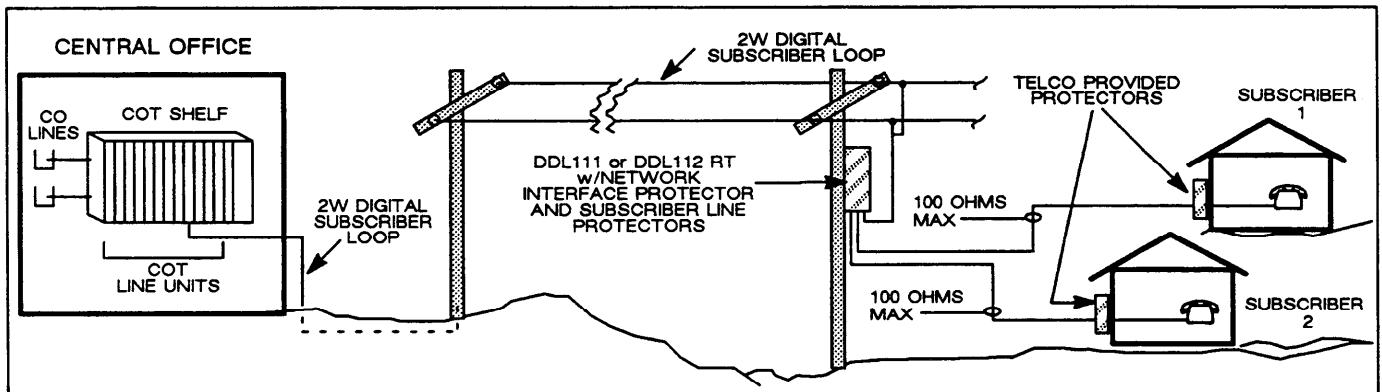


Figure 3. Typical DDL111 or DDL112 RT Application Showing One Line Each For Two Subscribers

CLASS is a service mark of Bellcore.

- Line powered RT requires no batteries
- RT enclosure contains barrier terminal strip for subscriber connections
- Network interface protectors are provided in the RT enclosure
- The DDL101, DDL102, DDL103 and DDL104 RT enclosures provide a tamper resistant telco access compartment and a subscriber access compartment. RJ11 jacks are provided for demarcation to the subscriber
- The DDL111 and DDL112 RT enclosures provide a tamper resistant telco access compartment and additional surge protection for the subscriber lines
- FCC Part 15 Class B (residential use) compliant
- Designed for UL 1459 compliance (DDL101, DDL102, DDL103 and DDL104)
- Remote Terminal can operate over an ambient temperature range of  $-40$  to  $149^{\circ}\text{F}$  ( $-40^{\circ}$  to  $65^{\circ}\text{C}$ )

## 2. APPLICATION GUIDELINES

2.01 Typical applications of the Wescom DualLine Plus System are shown in Figures 2 and 3. Figure 2 shows an application providing one subscriber with two telephone lines. Figure 3 shows an application providing telephone service to two different sub-

scribers. For information regarding the digital loop range, DC supervisory range, digital loop impedance, etc. refer to the Specifications in Part 7 of this Practice.

## 3. SYSTEM OPERATION

### General Description

3.01 The DualLine Plus System allows 2 POTS lines to be transmitted over a single pair of wires.

3.02 The RT (Remote Terminal) voice frequency analog signal from the subscriber line is applied to a 2-wire/4-wire hybrid circuit (see Figure 5). The hybrid circuit separates the transmit analog signal from the receive analog signal. The transmit analog signal is applied to an encoder which converts the signal to a  $\mu$ -law 64 kb/s digital signal. The encoder combines the 64 kb/s signal with the subscriber on-hook, off-hook status. This signal is then applied to the U interface.

3.03 The U interface circuitry combines the 64 kb/s signal from the 2 subscriber lines, the (optional) 16 kb/s D channel and the 16 kb/s overhead signal into a 160 kb/s 2B1Q signal. The 2B1Q signal is then applied to the Digital Subscriber Loop.

3.04 The receive data from the U interface is separated into two 64kb/s signals, one for each subscriber, and the optional 16 kb/s D channel. The

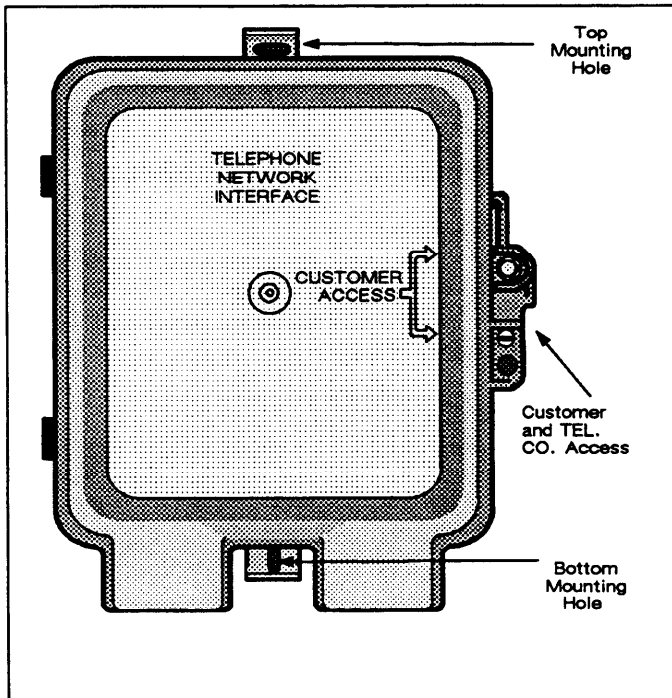


Figure 4a. DDL101/103/111 RT in the Secured Position (Closed)

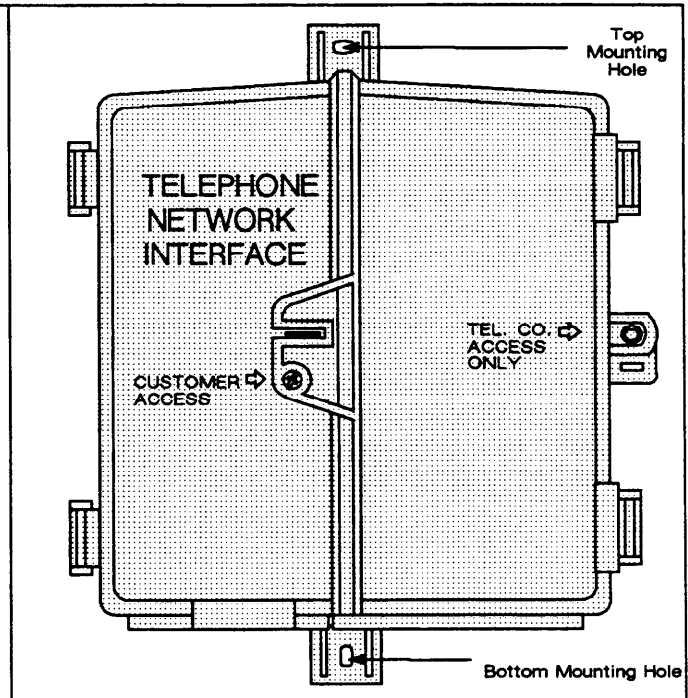


Figure 4b. DDL102/104/112 DualLine Plus Remote Terminal in the Secured Position (Closed)

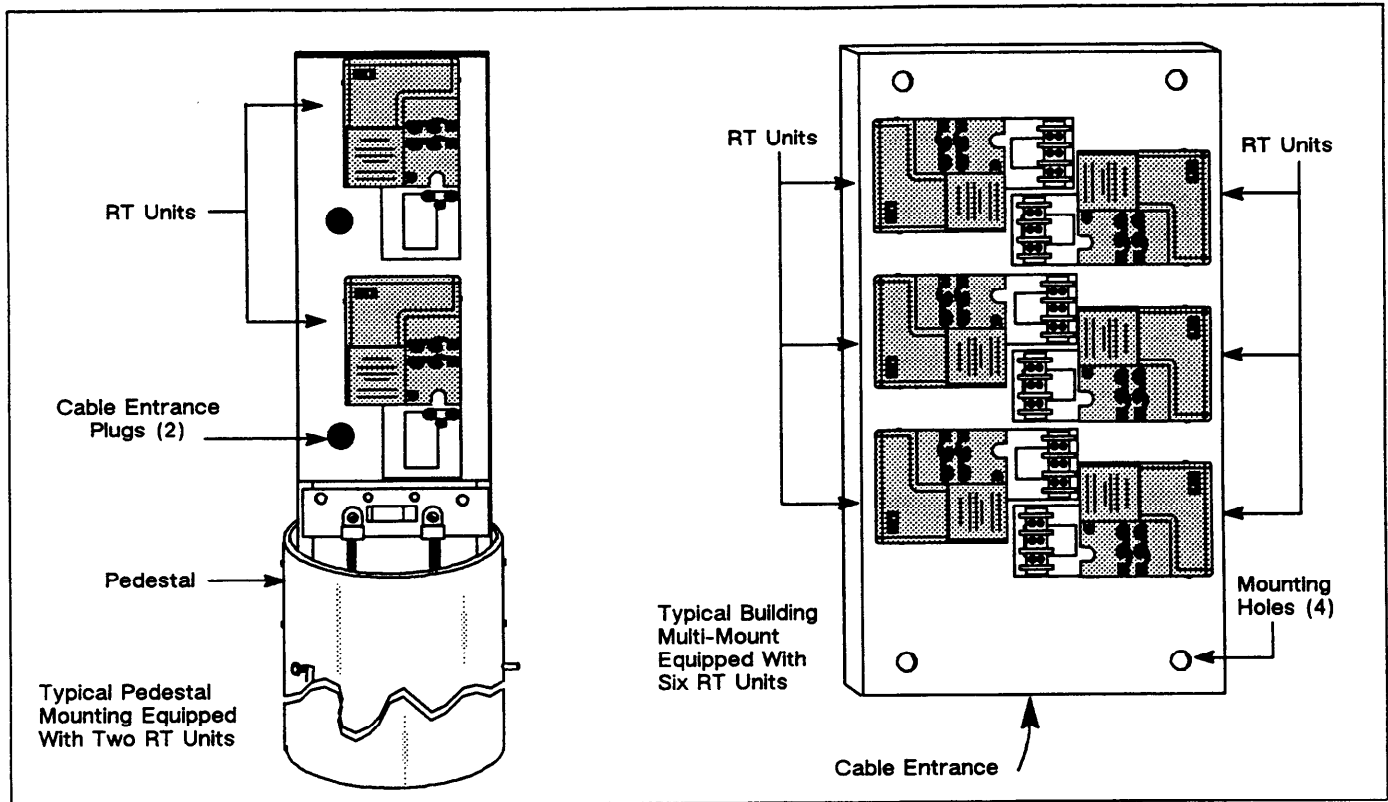


Figure 6. Typical Pedestal and Multi-Mount Building Configurations

64kb/s signal for each subscriber is applied to a mu-law decoder. The decoder creates an analog voice signal that is applied to the 2W/4W hybrid which is then sent to the subscriber's line. The decoder also separates out the ringing status. The status is used to enable/disable the ringing generator as required.

**3.05** At the COT (see Figure 14), the receive data from the U interface is again separated. The operation of the Voice Frequency circuit is similar to that of the RT circuit. The subscriber's on-hook, off-hook status is decoded and applied to the loop closure circuitry. The hook-switch status is transmitted to the Central Office. In the transmit direction, the Voice Frequency circuit is also similar to the RT circuit. The ringing status of the Central Office lines is detected by the COT Line Unit and encoded into the transmit data stream.

**3.06** The COT Line Unit detects certain failure conditions of the DualLine Plus System. The failures are indicated to the Central Office as Impedance Signatures on the CO lines and on LEDs on the Line Unit front panel.

### Digital Subscriber Loop (DSL)

**3.07** The DSL is a nonloaded 2-wire local loop transporting a digital full duplex 160 kb/s signal of which 16 kb/s is used for system overhead, and 144 kb/s is used for subscriber service. The 144 kb/s is divided into two 64 kb/s B channels and a 16 kb/s D Channel. The two 64 kb/s B channels are used to provide POTS service. The 16 kb/s D Channel is available as an option for transporting data.

### Transmission

**3.08** Voice Frequency (VF) Transmission is provided on the 64 kb/s B channels with standard  $\mu=255$  law coding. On-hook transmission is also provided on each POTS line.

### Signaling

**3.09** On-hook, off-hook, dial pulsing, and ringing intervals are repeated by the system. Standard A & B robbed bit signaling is used within the B channels to transport signaling information.

### Powering

**3.10** The DualLine Plus RT is powered by the COT equipment without the use of batteries or any power source at the RT location. The COT Power Unit converts  $-48\text{Vdc}$  to the voltages required to power the RT and the COT equipment. Idle line voltage is within

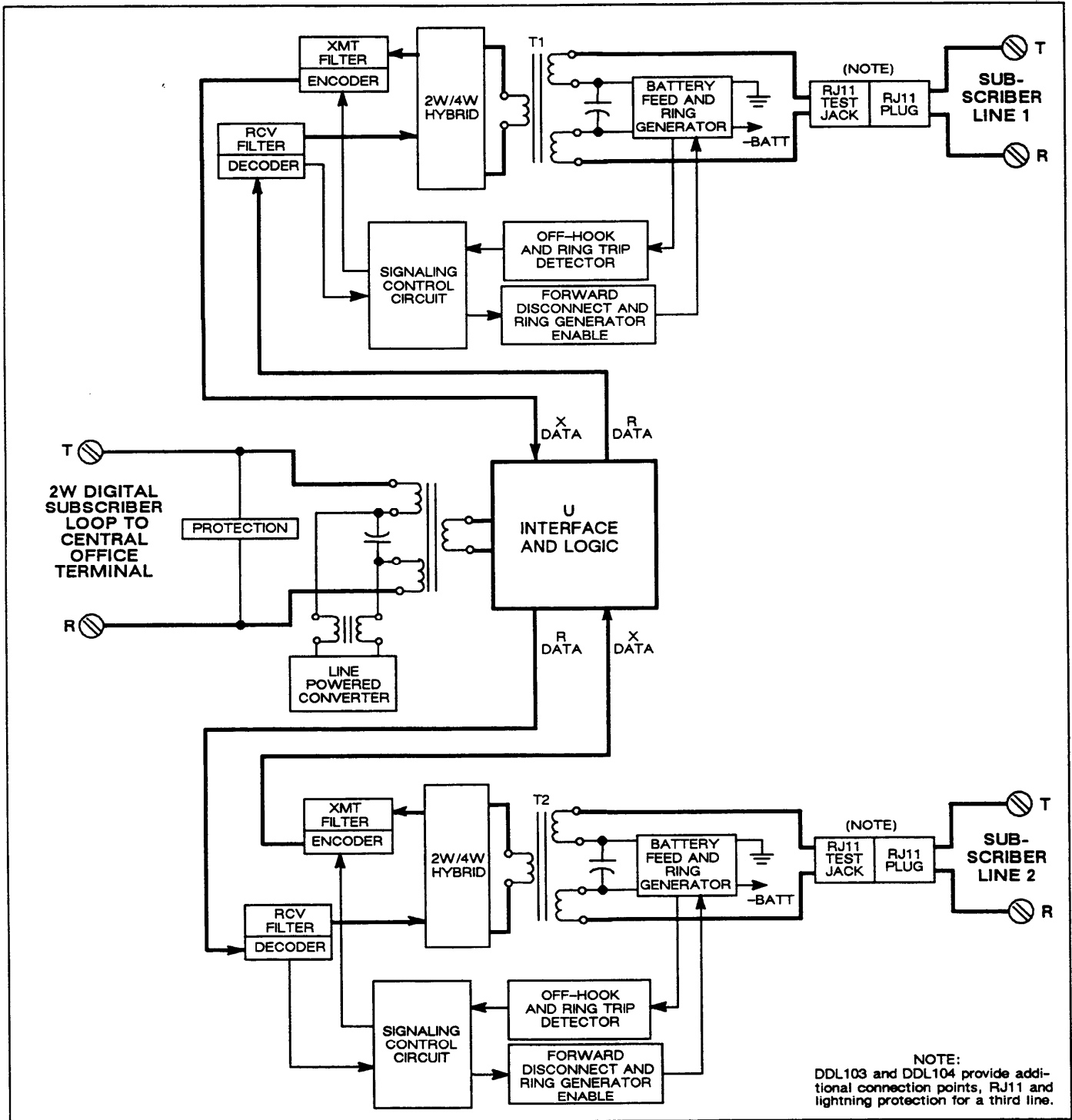


Figure 5. DDL101, DDL102, DDL111 and DDL112 RT Block Diagram

COT SHELF	MOUNTING	DDL230 COT LINE UNITS	DDL221 COT COM. UNIT	DDL210 COT POWER UNIT	RT (REMOTE TERMINAL) CAPACITY
DDL201	23-INCH	UP TO 12	1	1	12
DDL205	19-INCH	UP TO 9	1	1	9

Table 1. Equipment Required for COT DDL20X Shelves

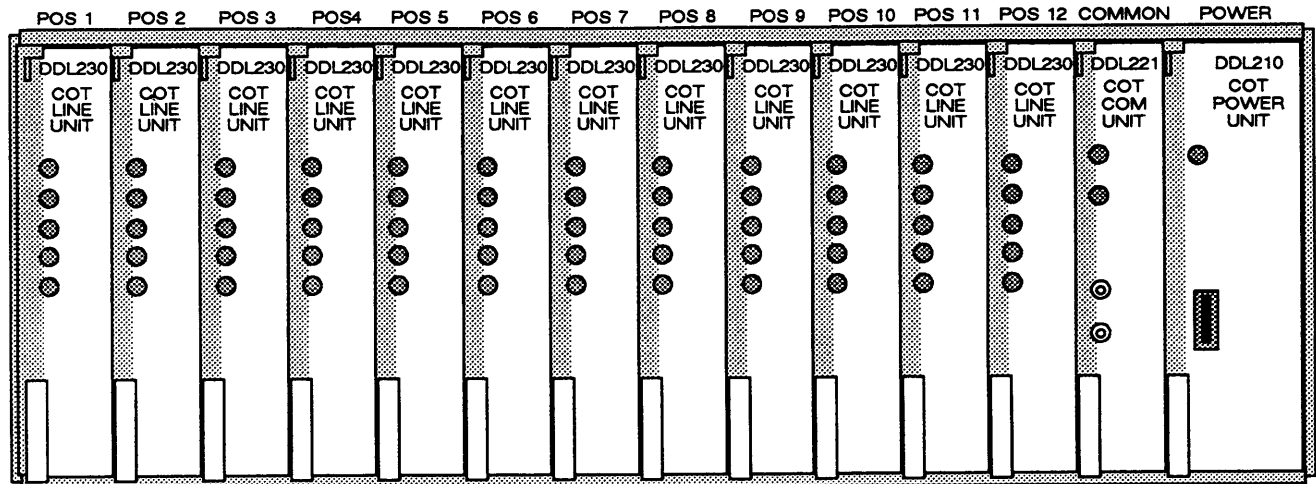


Figure 7. Fully Equipped DDL201 COT 23-inch Shelf

A2 limits;  $\pm 80V$  Tip to Ground or Ring to Ground. Busy and ringing line voltage is within A3 limits;  $\pm 140V$  Tip to Ground or Ring to Ground.

3.11 The RT uses the line powering voltage to power the 2B1Q transmission, provide battery to the subscriber, and to generate ringing voltage.

**Alarms**

3.12 The COT Line Unit provides front-panel LEDs that express the condition of the COT Line Unit, the Digital Subscriber Loop, and the Remote Terminal. The COT Common Unit provides front panel LEDs for minor and major alarm indications. The COT shelf backplane provides contacts for connecting to external alarm indicators, or to alarm surveillance equipment for remote monitoring.

**4. SYSTEM COMPONENTS**

**DDL101, DDL102, DDL103 and DDL104 RT (Remote Terminal)**

4.01 The Wescom DDL101 or DDL102 RT DuaLine Plus Remote Terminal is an enclosure that can be mounted on an outside or inside wall, to provide two POTS lines to a subscriber location. The RT contains circuitry to interface 2 POTS lines to the Digital Subscriber Loop. The RT provides protectors for the Digital Subscriber Loop, and terminals for connecting the Digital Subscriber Loop and subscriber lines. The RT provides separate Telco and customer compartments. Modular jacks are provided to isolate the subscriber wiring. The RT is completely powered from the Central Office Terminal requiring no batter-

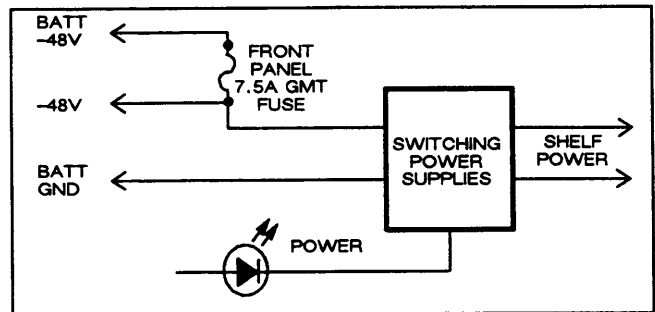


Figure 8. DDL210 COT Power Unit Block Diagram

ies or local power. See Figures 4 and 5. The DDL103 and DDL104 provide additional lightning protection and terminals for connecting to a second copper pair so three POTS lines can be supported.

**DDL111 and DDL112 RT (Remote Terminal)**

4.02 The Wescom DDL111 or DDL112 RT DuaLine Plus Remote Terminal is an enclosure that is normally mounted on a telephone pole. It can also be mounted on an outside or inside wall. The RT contains circuitry to interface 2 POTS lines to the Digital Subscriber Loop. The RT provides protectors for both the Digital Subscriber Loop and subscriber drop lines. Terminals for connecting the Digital Subscriber Loop and subscriber lines are also provided. The RT is completely powered from the Central Office Terminal requiring no batteries or local power. See Figures 4 and 5. Additional mounting options, such as pedestal mounting and multi-mount building, etc. are available. See Figure 6.

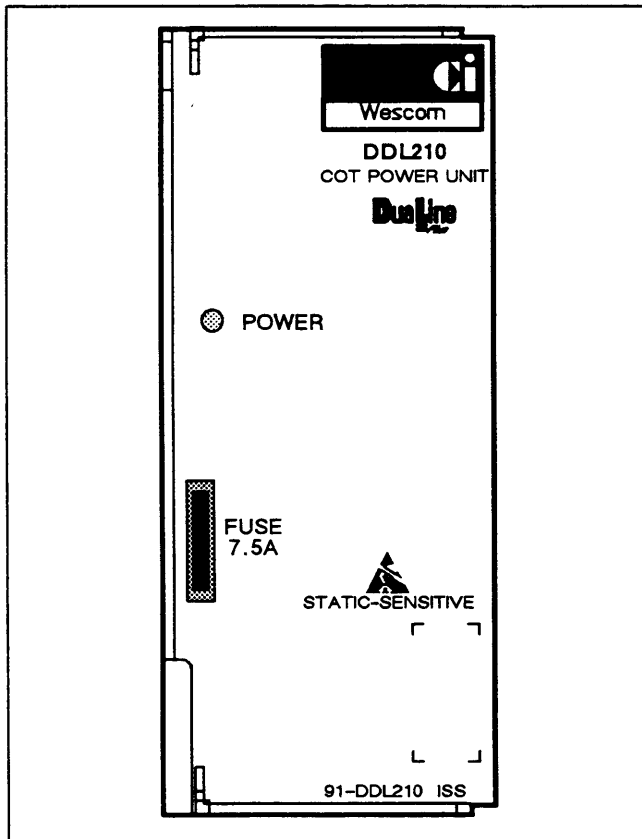


Figure 9. DDL210 COT Power Unit

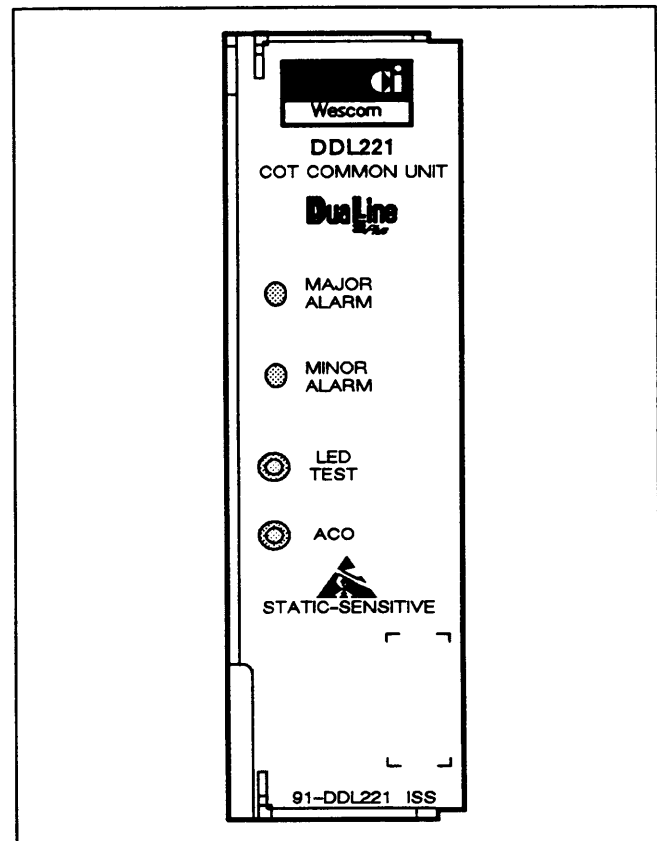


Figure 10. DDL221 COT Common Unit

#### DDL201 and DDL205 COT (Central Office Terminal) Shelves

4.03 The Wescom DDL20X COT (Central Office Terminal) is a rack mountable 19-inch or 23-inch shelf unit located at the CO or CEV. Table 1 shows the equipment required and size of each available COT shelf. See Figure 7 for a fully equipped COT DDL201 shelf. 25-Pair Amphenol-type connectors are used for CO lines, Digital Subscriber Loop lines, and optional D-Channel connections.

#### 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.

#### DDL210 COT (Central Office Terminal) Power Unit

4.04 The Wescom DDL210 COT Power Unit converts -48Vdc to voltages required to power the COT equipment and the DDL101, DDL103 or DDL111 RTs.

4.05 The plug-in Power Unit mounts in the right most shelf position and is equipped with a POWER LED and a fuse accessible from the front panel. One Power Unit is required per shelf. See Figures 8 and 9.

#### DDL221 COT (Central Office Terminal) Common Unit

4.06 The Wescom DDL221 COT Common Unit, depicted in Figure 10, provides following features:

##### MAJOR ALARM LED (Red)

(a) The MAJOR ALARM LED lights when all installed Digital Subscriber Loops are out of service. The Common Unit contains a Power Monitoring circuit which will generate a Major alarm if power is lost to the COT shelf.

##### MINOR ALARM LED (Yellow)

(b) The front-panel MINOR ALARM LED lights when there is LOS (Loss of Service) on one or more installed Digital Subscriber Loops. LOS could be caused by loss of the signal synchronization, or by



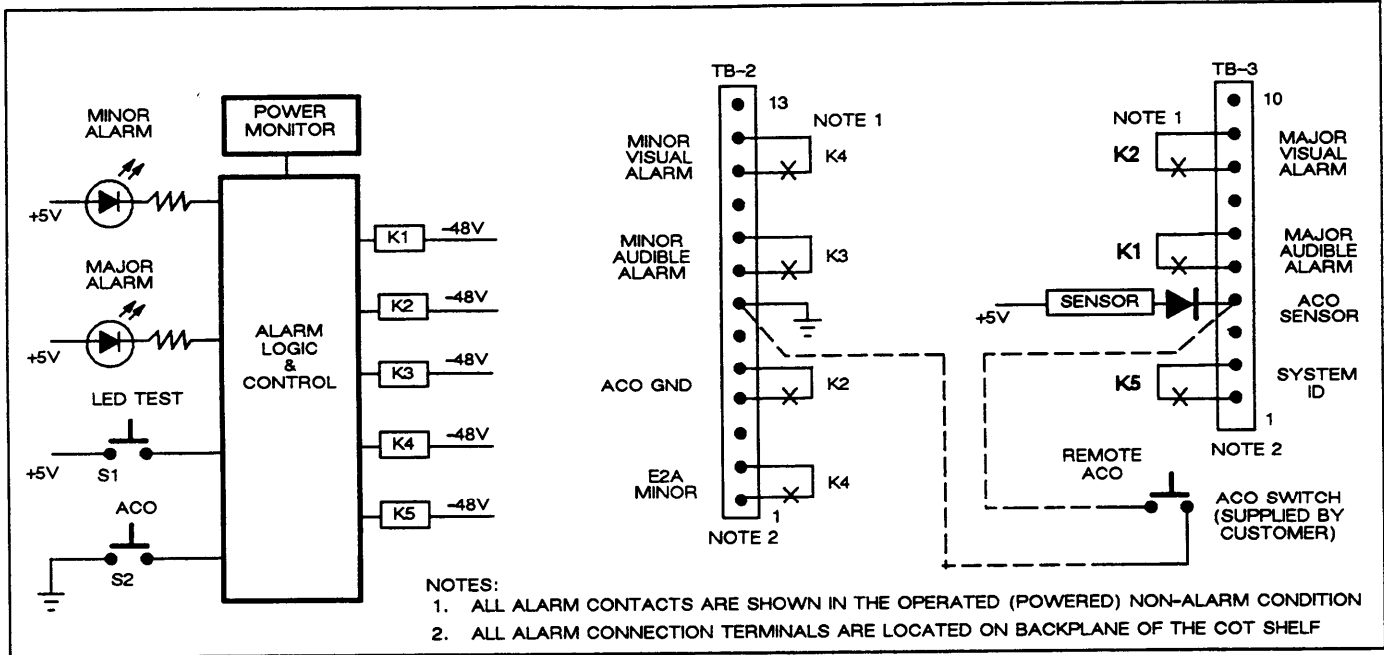


Figure 11. DDL221 COT Common Unit Block Diagram

an open or short on the Digital Subscriber Loop's tip and ring. A Major alarm condition will override a Minor alarm condition.

LED TEST Switch

(c) A front-panel LED TEST switch is provided to periodically verify that all LEDs are functioning.

ACO (Alarm Cut Off) Switch

(d) A front-panel ACO switch is provided to cancel all alarms except System ID. A remote ACO switch can also be connected via terminals on the backplane of the COT shelf. Refer to Figure 11.

Alarm Contacts

(e) The DDL221 COT Common Unit provides open relay contacts for external alarm indicators. See Figure 11.

Pre-Provisioning

(f) The DDL221 COT Common Unit provides a pre-provisioning feature that 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

anceled and normal alarm reporting resumes. Detailed information for activating the pre-provisioning feature is provided in Section DDL-221-201.

**DDL230 COT Line Unit**

4.07 The Wescom DDL230 COT Line Unit contains circuitry to interface two POTS CO lines to the Digital Subscriber Loop. The Line Unit provides power to the Remote Terminal over the Digital Subscriber Loop. The Line Unit automatically reduces line powering voltages during idle intervals and increases line powering voltages during busy and ringing conditions. The Line Unit provides Signature Impedances for system testing (see Figures 12 and 13). The Line Unit also provides front panel LEDs for the following functions:

LEDs			TROUBLE INDICATION
ALM	BSY 1	BSY 2	
ON	ON	OFF	COT (CENTRAL OFFICE TERMINAL) ALARM
ON	OFF	ON	RT (REMOTE TERMINAL) ALARM
ON	ON	ON	CBL (DIGITAL SUBSCRIBER LOOP) ALARM

Table 2. COT Line Unit Front-Panel Alarm Indications

POWER/SELF TEST LED (Green)

(a) The POWER/SELF TEST LED lights when power is applied. The LED will flash on and off when the Self Test fails. NOTE: The POWER/SELF TEST LED will also flash when the LED TEST push-button on the DDL221 Common Unit is operated and full idle power is present on the Digital Subscriber Loop.

SIGNAL LED (Green)

(b) The SIGNAL LED lights when the COT Line Unit and the Remote Terminal are synchronized.

ALM LED (Yellow)

(c) The ALM (Alarm) LED lights when there is an open, short or loss of signal on the Digital Subscriber Loop. The ALM LED, in conjunction with the BSY 1 and BSY 2 LEDs, provide the alarm indications noted in Table 2. These indications are also present on the CO POTS lines as Impedance Signatures (refer to Figure 13).

BSY (Busy) 1 AND BSY (Busy) 2 LEDS (Green)

(d) The BSY 1 and BSY 2 LEDs will light to indicate an off-hook condition on the corresponding line. The LEDs will flash on and off during the ringing cycle on the corresponding line. The BSY 1 and BSY 2 LEDs, in conjunction with the ALM LED, provide alarm indications noted in Table 2.

**5. COT(CENTRAL OFFICE TERMINAL) SITE REQUIREMENTS**

5.01 The following are the typical requirements for installation of the COT shelves:

- (a) A standard 19-inch or 23-inch relay rack (even or uneven flange) is required for mounting COT shelves.
- (b) The COT shelf is locally powered with -48Vdc Battery and ground connections.
- (c) Power source should from a fused battery distribution panel.
- (d) Primary protection should be provided for all exposed lines.

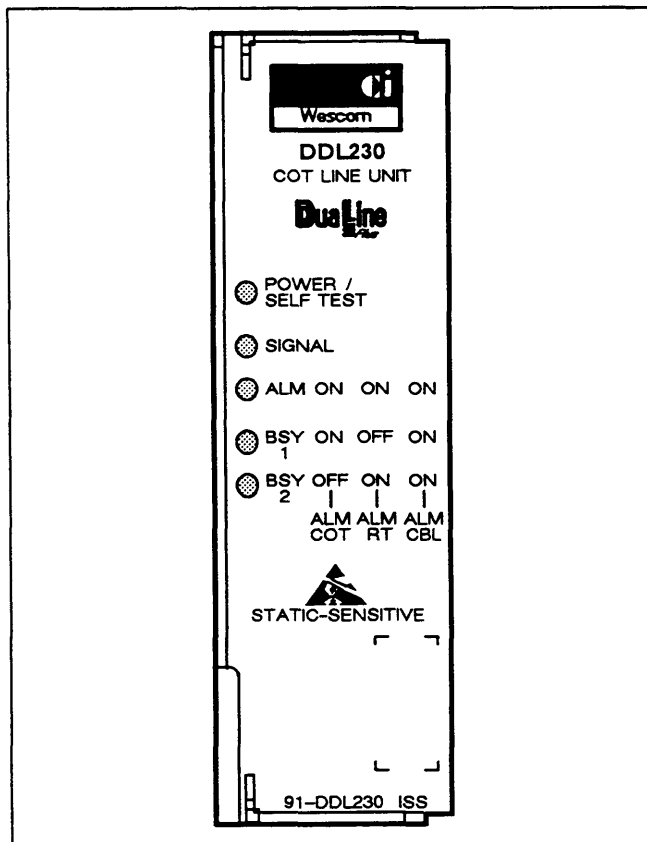


Figure 12. COT DDL230 Line Unit

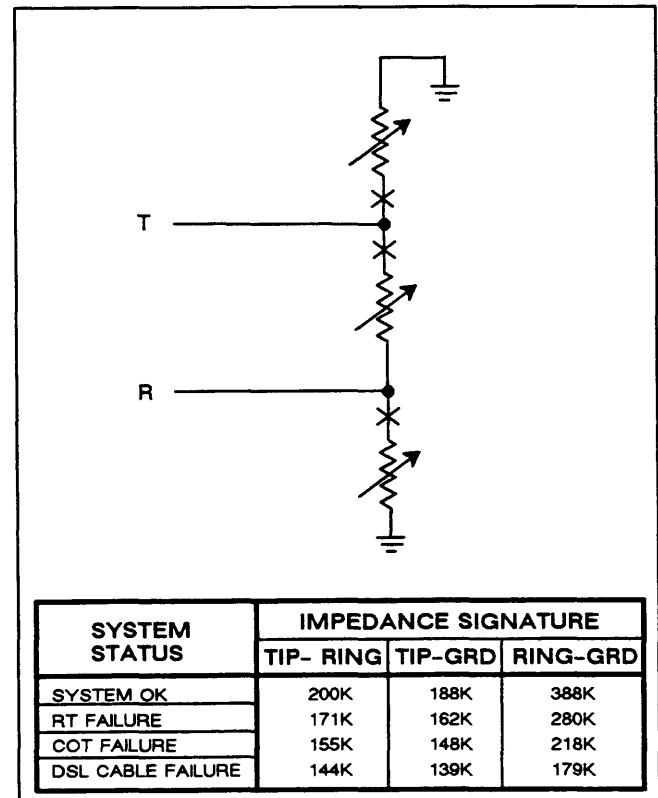


Figure 13. DDL230 and DDL391 COT Line Unit Impedance Signatures

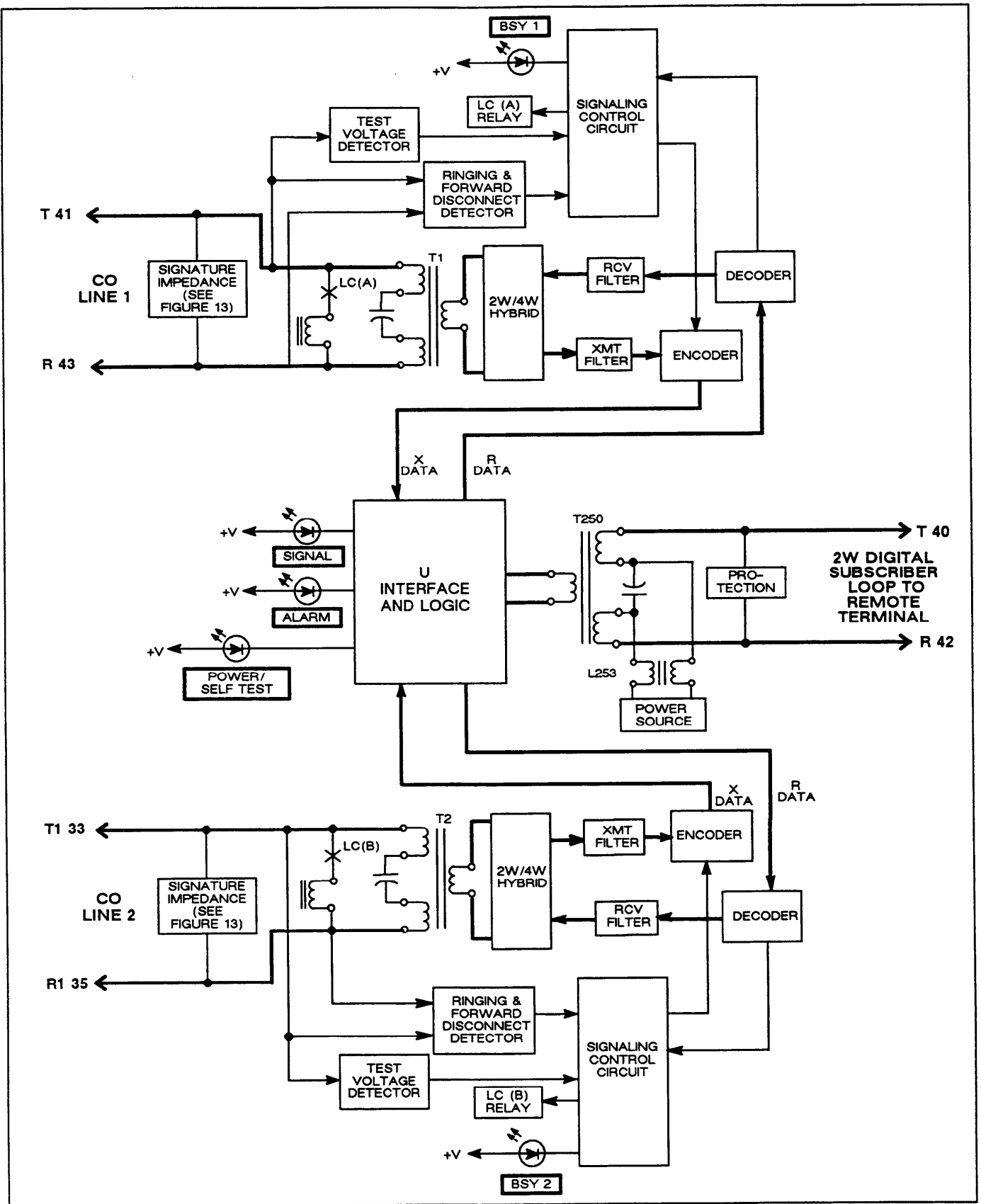


Figure 14. The DDL230 COT Line Unit Block Diagram

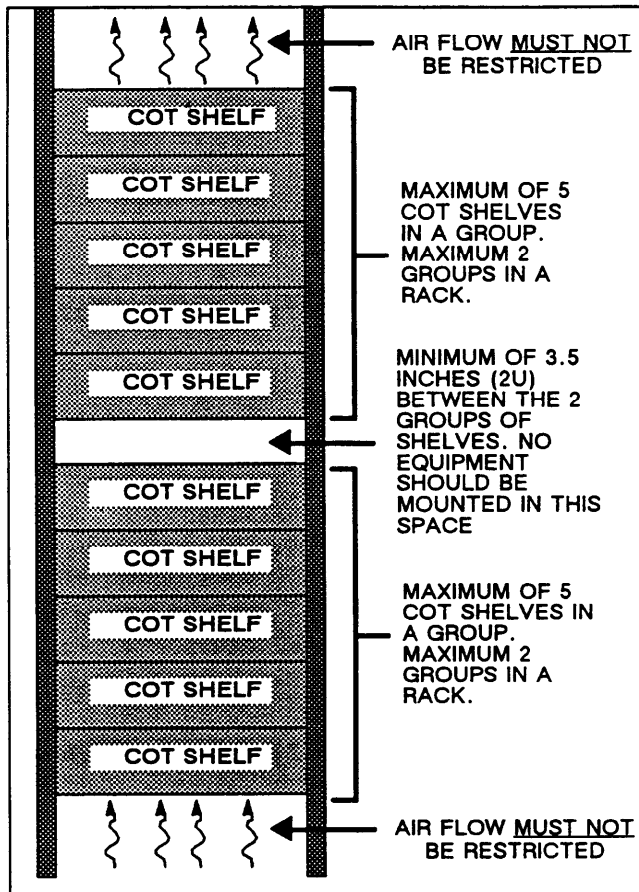


Figure 15. Typical COT Shelf Orientation For Proper Heat Dissipation

- (e) Sufficient space should be provided in front of the shelf to allow free access to the equipment.
- (f) For proper heat dissipation the maximum number of shelves per relay rack is 10. See Figure 15 for typical COT shelf orientation for proper heat dissipation.

## 6. WARRANTY AND CUSTOMER SERVICE

**6.01** Wescom offers an industry-leading, 5-year warranty on products manufactured by Wescom. Contact your local Sales Engineer for warranty details. The warranty provisions are subject to change without notice. The terms and conditions applicable to any specific sale of product shall be defined in the resulting sales contract.

**6.02** Field repairs involving the replacement of components within a unit are not recommended. If a unit is in need of repair, contact Wescom by telephone, letter, or FAX for instructions regarding replacement or repair.

**6.03** If a replacement is required, it will be shipped in the fastest manner consistent with the urgency of the situation. Upon receipt of the replacement unit, return the out-of-service unit in the carton in which the replacement was shipped, using the pre-addressed shipping label provided.

### 6.04 Repair or Exchange Services

Wescom offers a repair or exchange service for those units out of warranty. Under this arrangement, out-of-service units may be shipped to Wescom and either completely repaired and quality tested or exchanged for a replacement unit. To obtain details of this service and a schedule of prices, contact your local Sales Engineer.

#### Technical Assistance

**6.05** If technical assistance is required, contact the Technical Services Department of Charles Industries-Wescom, by calling:

1-708-806-8500

FAX 1-708-806-6231

**6.06** Canadian customers call (416) 821-7673 for technical assistance. After October 1993, use area code 905 in place of area code 416.

## 7. SPECIFICATIONS

**7.01** The electrical and physical characteristics of the DuaLine Plus System are as follows:

### DuaLine Plus System

- (a) SYSTEM LOSS IN EACH DIRECTION OF TRANSMISSION:  $3.5 \pm 0.5$ dB nominal.
- (b) FREQUENCY RESPONSE: The loss at any frequency from 400Hz to 2800Hz with 0dBmO input signal; -1.0 to +3.0dB at 1004Hz.
- (c) IDLE CHANNEL NOISE AT THE OUTPUT OF THE COT OR THE RT: 20dBmC maximum.
- (d) CHANNEL CROSSTALK: With 0dBmO single frequency input signals between 200 and 3400Hz applied to any line, the C-message weighted total output of any line at the COT or RT in the 200 and 3400Hz frequency band is less than -65dBmO.
- (e) RANGE OF THE DIGITAL SUBSCRIBER LOOP: Loop length equal to or less than 1300 ohms or 42dB loss at 40kHz with no load coils.

- (f) DIGITAL SUBSCRIBER LOOP IMPEDANCE: 135 ohms.
- (g) VOLTAGE AND CURRENT LIMITATIONS: Idle condition, A2 limitations ( $\pm 80V$  Tip to Ground/Ring to Ground); Busy condition, A3 limitations ( $\pm 140V$  Tip to Ground/Ring to Ground).

**DDL101, DDL103, DDL111 RT or DDL102, DDL104, DDL112**

- (h) DC SUPERVISORY RANGE: Rdc is the maximum external loop resistance capability of the system. The Rdc for the RT is 530 ohms, specified as a 430 ohm telephone instrument plus a 100 ohm cable. Approximate cable length for 100 ohms:

Cable Gauge	Length
26 gauge	1,200 feet
24 gauge	1,900 feet
22 gauge	3,100 feet

- (i) RETURN LOSS (Ref: 600 ohms + 2.16  $\mu F$ ):  
ERL > 18dB;  
SRL > 10dB.
- (j) OFF-HOOK CURRENT TO EACH LINE: 20mA minimum.
- (k) ON-HOOK VOLTAGE TO EACH LINE: -42.5V minimum.
- (l) RINGING FREQUENCY: 20 Hz.

**Physical**

- (m) OPERATING ENVIRONMENT: Temperature, -40° to 149° F (-40° to 65° C).
- (n) WEIGHT: 2.8 lbs (1.27 kg).
- (o) DIMENSIONS (DDL101, DDL103, DDL111): Height, 10.25 in. (26.0 cm); width, 8.375 in. (21.3 cm); depth, 3.0 in. (7.6 cm).  
  
DIMENSIONS (DDL102, DDL104, DDL112): Height, 12.0 in. (30.5 cm); width, 10.5 in. (26.7 cm); depth, 4.375 in. (11.1 cm).
- (p) MOUNTING: Inside wall, outside wall or pole.

**COT (Central Office Terminal)**

- (q) RINGING DETECTOR SENSITIVITY AT 16 $\frac{2}{3}$  Hz TO 66 $\frac{2}{3}$  Hz (sinewave): 60Vrms minimum.
- (r) OFFICE SIDE LOOP CLOSURE RESISTANCE: 1000 ohms typically at 23mA. 1400 ohms maximum at 15mA.
- (s) RETURN LOSS (Ref: 900 ohms + 2.16  $\mu F$ ):  
ERL > 18dB;  
SRL > 10dB.

DDL201/205 COT Shelf

- (t) OPERATING ENVIRONMENT: Temperature, 32° to 122°F (0° to 50°C).
- (u) WEIGHT:  
DDL201  
13.0 lbs. ( 5.9 kg) shelf only; 34 lbs. (15.42 kg) fully equipped.  
DDL205  
11.0 lbs. (5.0 kg) shelf only; 28.0 lbs. (12.7 kg) fully equipped.
- (v) DIMENSIONS:  
DDL201  
Height, 7.0 in. (17.8 cm); width, 21.31 in. (54.12 cm); depth, 12.0 in. (30.48 cm).  
DDL205  
Height, 7.0 in. (17.8 cm); width, 17.1 in. (43.43 cm); depth, 12.0 in. (30.48 cm).
- (w) MOUNTING: DDL201, 23 inch relay rack; DDL205, 19 inch relay rack.

COT Power Unit

- (x) OPERATING ENVIRONMENT: Temperature, 32° to 122°F (0° to 50°C).
- (y) WEIGHT: 2.3 lbs. (1.04 kg), nominal.
- (z) DIMENSIONS: Height, 6.5 in. (16.5 cm); width, 2.75 in. (6.985 cm); depth, 10.54 in. (26.77 cm).
- (aa) MOUNTING: Position 14, 23-inch COT shelf; Position 12, 19-inch COT shelf.

COT Common Unit

- (bb) OPERATING ENVIRONMENT: Temperature, 32° to 122°F (0° to 50°C).
- (cc) WEIGHT: 8.64 oz. (.225 kg), nominal.
- (dd) DIMENSIONS: Height, 6.5 in. (16.5 cm); width, 1.37 in. (3.47 cm); depth, 10.54 in. (26.77 cm).
- (ee) MOUNTING: Position 13, 23-inch COT shelf; Position 10, 19-inch COT shelf.

COT Line Unit

- (ff) OPERATING ENVIRONMENT: Temperature, 32° to 122°F (0° to 50°C).
- (gg) WEIGHT: 25.12 oz. (.712 kg), nominal.
- (hh) DIMENSIONS: Height, 6.5 in. (16.5 cm); width, 1.37 in. (3.47 cm); depth, 10.54 in. (26.77 cm).
- (ii) MOUNTING: One position (1 through 12), 23-inch COT shelf; one position (1 through 9), 19-inch COT shelf