

WESCOM DUALINE PLUS  
DIGITAL SINGLE SUBSCRIBER CARRIER SYSTEM  
DDL 230 CENTRAL OFFICE  
TERMINAL (COT) LINE UNIT

1 GENERAL

1.01 This section is a cover sheet for the Wescom DuaLine Plus DDL 230 Central Office Terminal (COT) Line Unit 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
363-400-801SW	DDL 201 DuaLine Plus Central Office Terminal Shelf (23 inches)
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
363-400-805SW	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 363-400-804SW.

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# Wescom® DDL230 DualLine Plus™ Central Office Terminal (COT) Line Unit

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## 1. GENERAL

1.01 This practice provides a general description of the Wescom® DDL230 DualLine Plus™ Central Office Terminal (COT) Line Unit (LU). The DDL230 COT LU is depicted in Figure 1.

1.02 This practice is reprinted to reflect the Issue 5 version of the DDL230. The DDL230 Issue 5 is identical to Issue 4 in form, fit and function, and has been reissued to improve manufacturability.

1.03 The DDL230 COT LU, which is part of the DualLine Plus System, provides an interface between two Central Office lines and a 2-wire Digital Subscriber Line. Refer to Section DDL-001-100 for a general description and features of the DualLine Plus System.

## 2. APPLICATION GUIDELINES

2.01 The Wescom DDL230 DualLine Plus Central Office Terminal (COT) Line Unit (LU) connects 2 CO POTS lines to a Digital Subscriber Line (DSL). A DualLine Plus Remote Terminal (RT), located near a subscriber's location, converts the DSL into 2 POTS lines for a subscriber's telephones (see Figure 2). Refer to Section 11 for information regarding the 2-wire range, DC supervisory range, DSL impedance, etc.

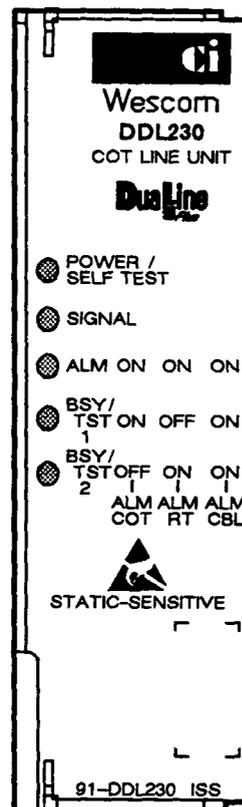


Figure 1. COT DDL230 Line Unit

## 3. CIRCUIT DESCRIPTION

3.01 The Wescom DDL230 Central Office Terminal (COT) Line Unit (LU) contains circuitry to interface two POTS CO lines to a Digital Subscriber Line (DSL). Refer to Figure 3 for a block diagram of the DDL230 COT LU.

3.02 The DDL230 COT LU provides power to the Remote Terminal over the DSL and automatically reduces line powering voltages during idle intervals and increases line powering voltages during busy and ringing conditions. The LU also provides Signature Impedances for system testing (see Table 1).

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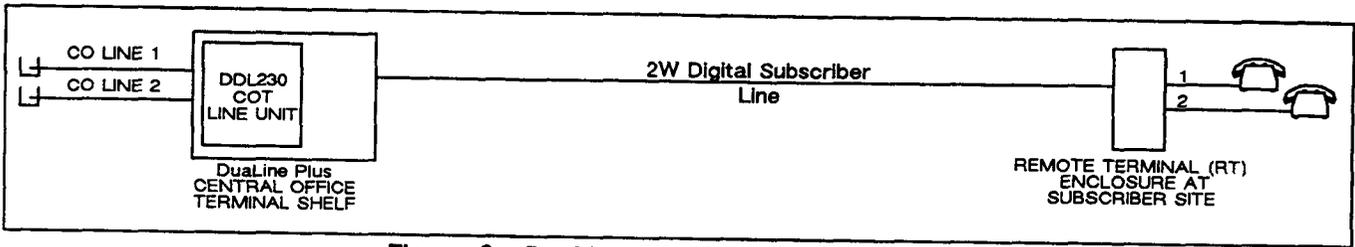


Figure 2. DualLine Plus System Configuration

SYSTEM STATUS	IMPEDANCE SIGNATURE		
	TIP-RING	TIP-GRD	RING-GRD
SYSTEM OK	200K	188K	388K
RT FAILURE	171K	162K	280K
COT FAILURE	155K	148K	218K
DSL CABLE FAILURE	144K	139K	179K

Table 1. DDL230 COT Line Unit Impedance Signatures

3.03 The Wescom DDL230 COT LU provides front panel LEDs for the following functions:

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 DualLine Plus Common Unit is operated and full idle power is present on the Digital Subscriber Line.

SIGNAL LED (Green)

(b) The SIGNAL LED lights when the LU and the associated Remote Terminal (RT) 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 Line. 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 Line as Impedance Signatures (refer to Table 1).

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 (DSL Cable) ALARM

Table 2. COT Line Unit Front-Panel Alarm Indications

BSY/TST (Busy/Test) 1 and BSY/TST (Busy/Test) 2 LEDs (Green)

(d) The BSY/TST 1 and BSY/TST 2 LEDs will light to indicate an off-hook condition on the corresponding line and will flash during the ringing period of the ring cycle.

3.04 The DDL230 LU will detect and repeat ringing and cadences from the Central Office switch. The ringing frequency and cadence information is transmitted to the Remote Terminal (RT).

4. INSPECTION

4.01 Inspect the equipment thoroughly upon delivery. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company.

4.02 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 subsequent models that are manufactured. Therefore, be sure to include both the model number and its issue number when making inquiries about the equipment.

4.03 Each module is shipped in static-protective packaging to prevent electrostatic charges from damaging static-sensitive devices. Use approved static-preventive measures, such as static-conductive wrist straps and a static-dissipative mat, when handling modules outside of their protective packaging. A module intended for future use should be tested as soon as possible and returned to its original protective packaging for storage.

CAUTION

Do not ship or store modules near strong electrostatic, electromagnetic, or magnetic fields. Also, make sure to use the original static-protective packaging for shipping or storage.

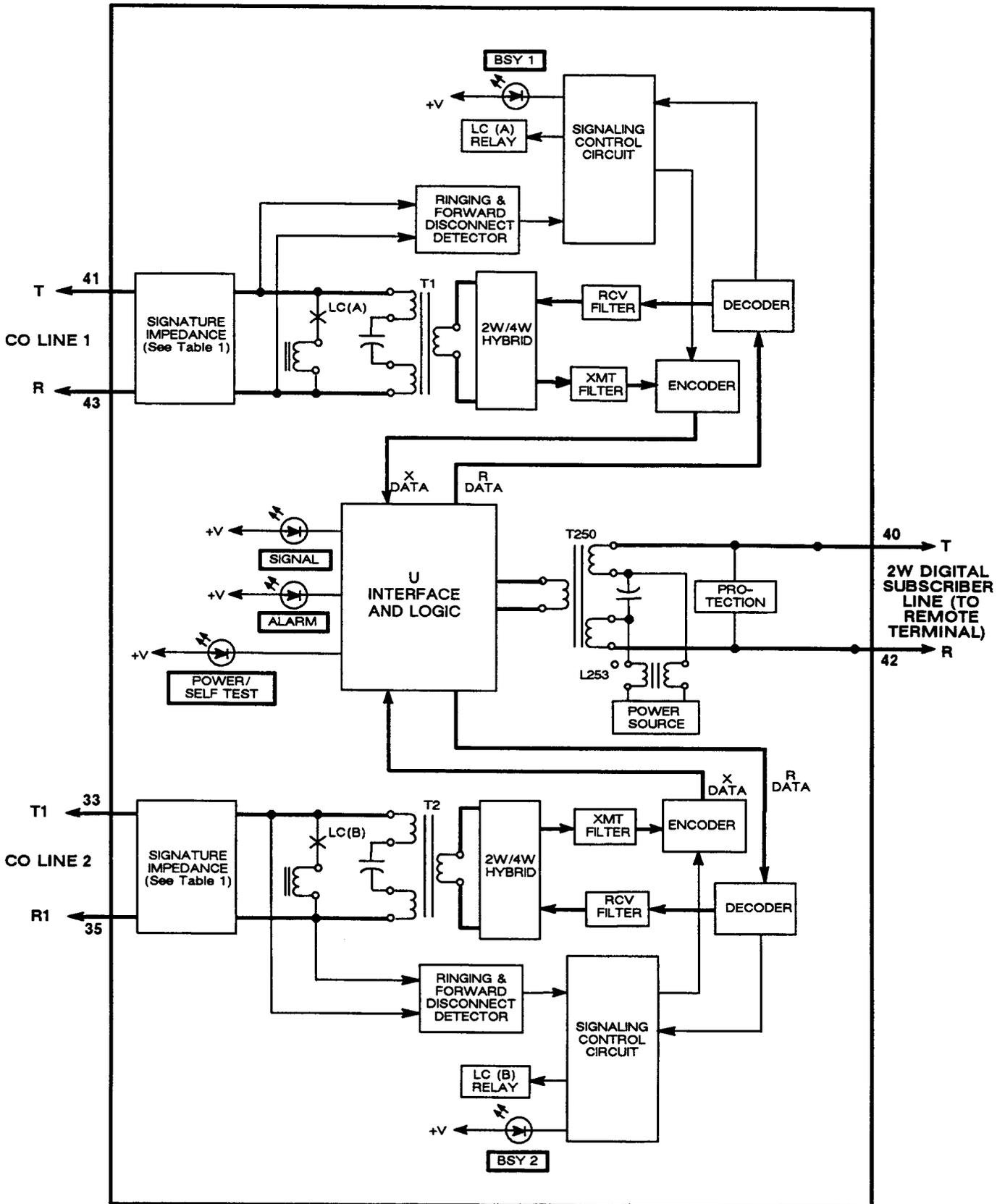


Figure 3. The DDL230 Line Unit Block Diagram

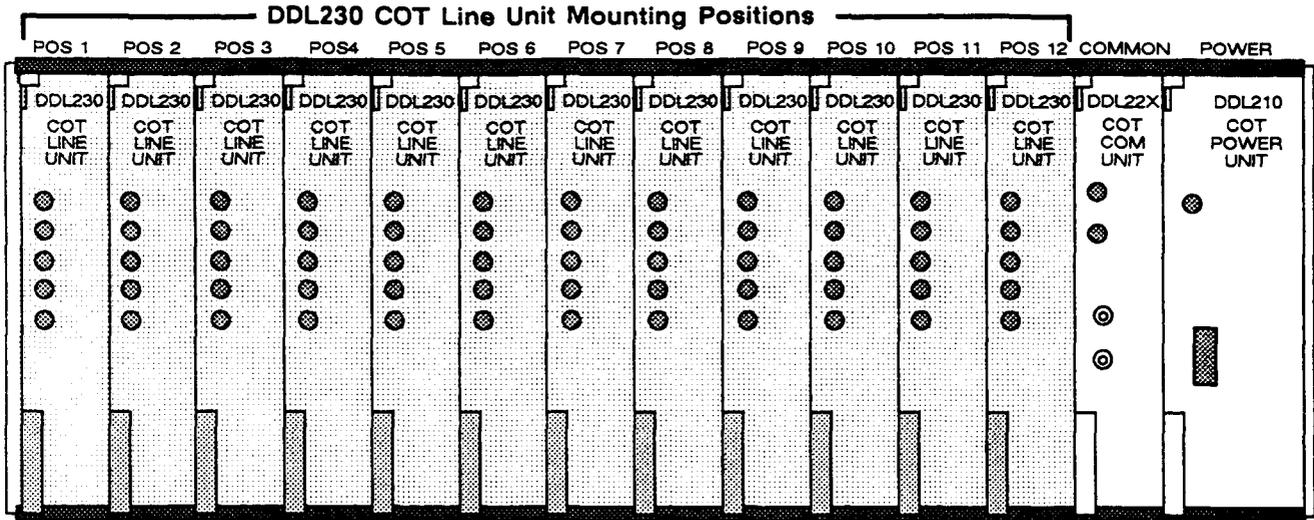


Figure 4. DuaLine Plus Central Office Terminal Shelf Showing Line Unit Module Positions (Front View)

**5. MOUNTING**

5.01 Wescom DDL230 COT LU mounts in one position of the Wescom DuaLine Plus Central Office Terminal shelf. Refer to Figure 4 for proper shelf position.

**CAUTION**

Installation and removal of channel units should be done with care. Use static-preventive measures when handling. Do not force a unit into place. If excessive resistance is encountered during installation, remove the unit and check the card guides and connector to verify proper alignment and the absence of foreign material.

**6. INSTALLER CONNECTIONS**

6.01 No installer connections are required for the DDL230 COT Line Unit. All connections are made to the shelf assembly.

**7. OPTIONS**

7.01 There are no options on the DDL230.

**8. INSTALLATION/TEST**

(a) Raise the locking bar at the top of the shelf.

(b) Insert and seat the COT Line Units in their assigned slots per facility plan (see Figure 4). 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. Press the ACO (ALARM CUT OFF) pushbutton on the COT Common Unit to cancel the alarms.

(c) 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 DDL230 COT Line Unit's POWER/SELF TEST LED will flash to indicate that full idle power is being applied to the Digital Subscriber Loop.

(d) Swing the locking bar (located at the top front of the shelf) down into the latched position.

## 9. TECHNICAL ASSISTANCE

9.01 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

## 10. WARRANTY AND CUSTOMER SERVICE

10.01 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.

10.02 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.

10.03 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.

### Repair or Exchange Services

10.04 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.

## 11. SPECIFICATIONS

11.01 The electrical and physical characteristics of the DDL230 COT Line Unit are as follows:

### Electrical

- (a) SYSTEM LOSS IN EACH DIRECTION OF TRANSMISSION:  $3.0 \pm 0.5$ 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 LINE UNIT: 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 Line Unit in the 200 and 3400Hz frequency band is less than -65dBmO.
- (e) RANGE OF THE DIGITAL SUBSCRIBER LINE: Line length equal to or less than 1300 ohms or 42dB loss at 40kHz with no load coils.
- (f) DIGITAL SUBSCRIBER LINE IMPEDANCE: 135 ohms.
- (g) VOLTAGE AND CURRENT LIMITATIONS: Idle condition, A2 limitations ( $\pm 80$ V Tip to Ground/Ring to Ground); Busy condition, A3 limitations ( $\pm 140$ V Tip to Ground/Ring to Ground).
- (h) RINGING DETECTOR SENSITIVITY AT 16 2/3Hz TO 66 2/3Hz (sinewave): 60Vrms minimum.
- (i) OFFICE SIDE LOOP CLOSURE RESISTANCE: 1000 ohms typically at 23mA. 1400 ohms maximum at 15mA.
- (j) RETURN LOSS (Ref: 900 ohms + 2.16  $\mu$ F):  
ERL > 18dB;  
SRL > 10dB.

### Physical

- (k) OPERATING ENVIRONMENT: Temperature, 32° to 122°F (0° to 50°C).
- (l) WEIGHT: 1.4 lbs. (0.64 kg), nominal.
- (m) DIMENSIONS: Height, 6.5 in. (16.5 cm); width, 1.37 in. (3.47 cm); depth, 10.54 in. (26.77 cm).
- (n) MOUNTING: Mounts in one position of a DualLine Plus Central Office Terminal shelf.