WESCOM DUALINE PLUS
DIGITAL SINGLE SUBSCRIBER CARRIER SYSTEM
DDL 104 REMOTE TERMINAL

1. GENERAL

1.01 This section is a cover sheet for the Wescom DuaLine Plus DDL 104 Three Line Remote Terminal 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:

Section	Title
363-400-800SW	System Overview
502-204-800SW	DDL 102 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
363-400-804SW	DDL 230 DuaLine Plus Central Offiice 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 502-204-801SW

PROPRIETARY
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Wescom
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INSTALLATION GUIDE
Equipment Issue 1
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Wescom® DDL104 DuaLine Plus™ Remote Terminal

CLEI™ Code: SIMYAAJDAA

GENERAL

The Wescom® DDL104 DuaLine Plus™ Remote Terminal (RT) is an enclosure that can be mounted on an outside or inside wall. The RT contains circuitry to derive 2 Plain Old Telephone Service (POTS) lines from a Digital Subscriber Line (DSL). See Figure 1. An additional cable pair can be terminated in the DDL104 to provide a third POTS line. This third POTS line is connected directly to the copper facility and does not utilize the DuaLine Plus electronics. The RT provides protectors for the DSL, and terminals for connecting the DSL and subscriber lines. The RT provides separate telephone company and customer compartments. Modular jacks are provided to isolate the subscriber wiring. The RT electronics are completely powered from the DDL Central Office Terminal requiring no batteries or local power. For the Wescom DuaLine Line System Overview, see Section DDL-001-100.

STATIC SENSITIVE EQUIPMENT

STATIC-SENSITIVE

CAUTION

This equipment contains sensitive electronic devices. 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.

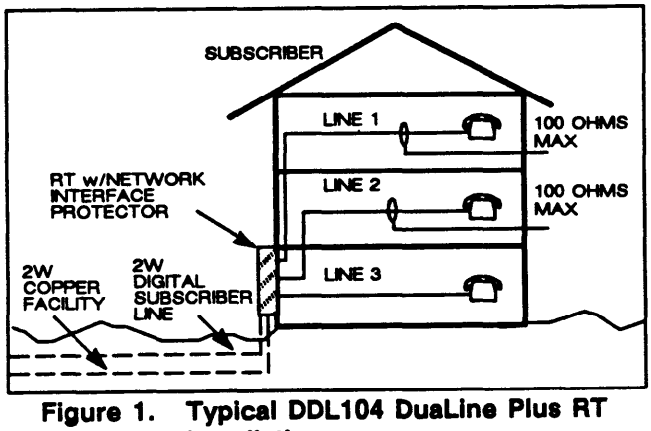

Figure 1. Typical DDL104 DuaLine Plus RT Installation

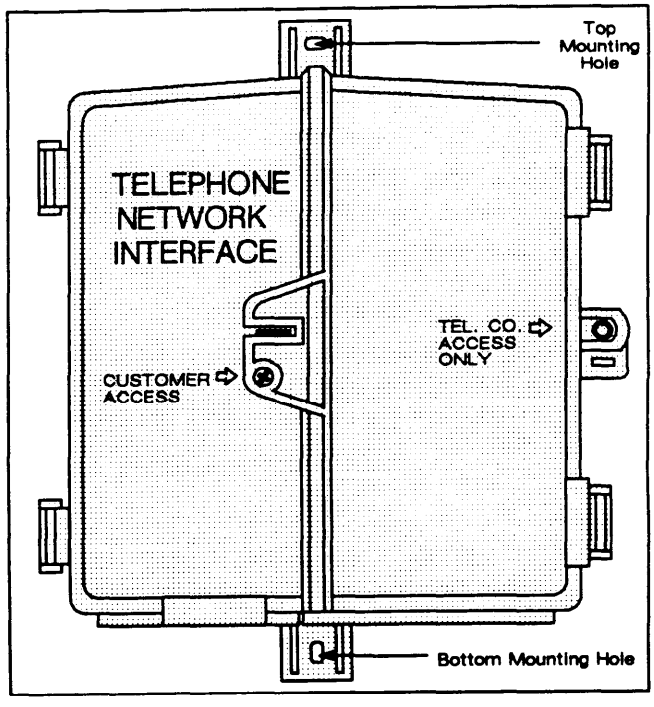

Figure 2. DDL104 DuaLine Plus Remote Terminal in the Secured Position (Closed)

INSTALLATION OF THE RT ENCLOSURE

CAUTION

Hazardous voltages exist on the Digital Subscriber Line (DSL). 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 DSL.

The DDL104 DuaLine Plus RT is designed for vertical mounting in a location that is free of obstructions. The RT is mounted at the subscriber's building near the cable drop.

Determine if the RT enclosure is to be mounted on a masonry wall, on a wood studded wall, or a hollow wall. Proceed to the appropriate installation instructions that follow. Obtain the necessary equipment, tools, and hardware for the type of installation that is to be performed. Refer to Figure 2 for RT mounting hole locations.

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Remote Terminal (RT) Mounting

Depending on the the type of mounting required, some or all of the following will be required:

- Drill bits: #25 (0.1495 dia.), 7/16-inch (0.4375 dia.), or 1/4-inch (0.250 dia.) masonry bit.
- Two #10 pan head wood screws.
- Two #10 screw expansion anchors for masonry walls.
- Two 3/16-inch hollow wall fasteners.
- Power or hand drill.
- Center punch and hammer.
- Flat-blade and/or Phillips blade screwdrivers
- 1/4-inch hex nut driver.

Using RT Enclosure as a Template

Using the 1/4-inch hex nut driver, open the TEL. CO. access cover by turning the hex screw counterclockwise until the enclosure cover can be opened. See Figure 3.

Stone, Brick, Or Masonry Wall Mounting

(1) Determine the location and the desired height where the RT is to be mounted.

(2) Using the opened RT enclosure as a template, mark the wall at the top and bottom mounting holes.

(3) Using a drill and a 1/4-inch masonry drill bit, drill two holes, as marked above, for #10 screw expansion anchors.

(4) Install the expansion anchors in the drilled holes.

(5) After completing step (4), mount the RT enclosure by using the top and bottom mounting holes and two #10 screws. Carefully tighten the top and bottom screws.

Wood Studded Wall Mounting

(1) Locate the wood stud in the desired location. Mark the stud for the desired height (top) of the RT enclosure.

(2) Using the opened RT enclosure as a template, mark the wall at the top and bottom mounting holes.

(3) Using a drill and a #25 (0.1495 dia.) drill bit, drill two holes, as marked above, for #10 wood screws.

(4) After completing step (3), mount the RT enclosure by using the top and bottom mounting holes and two #10 wood screws. Carefully tighten top and bottom screws.

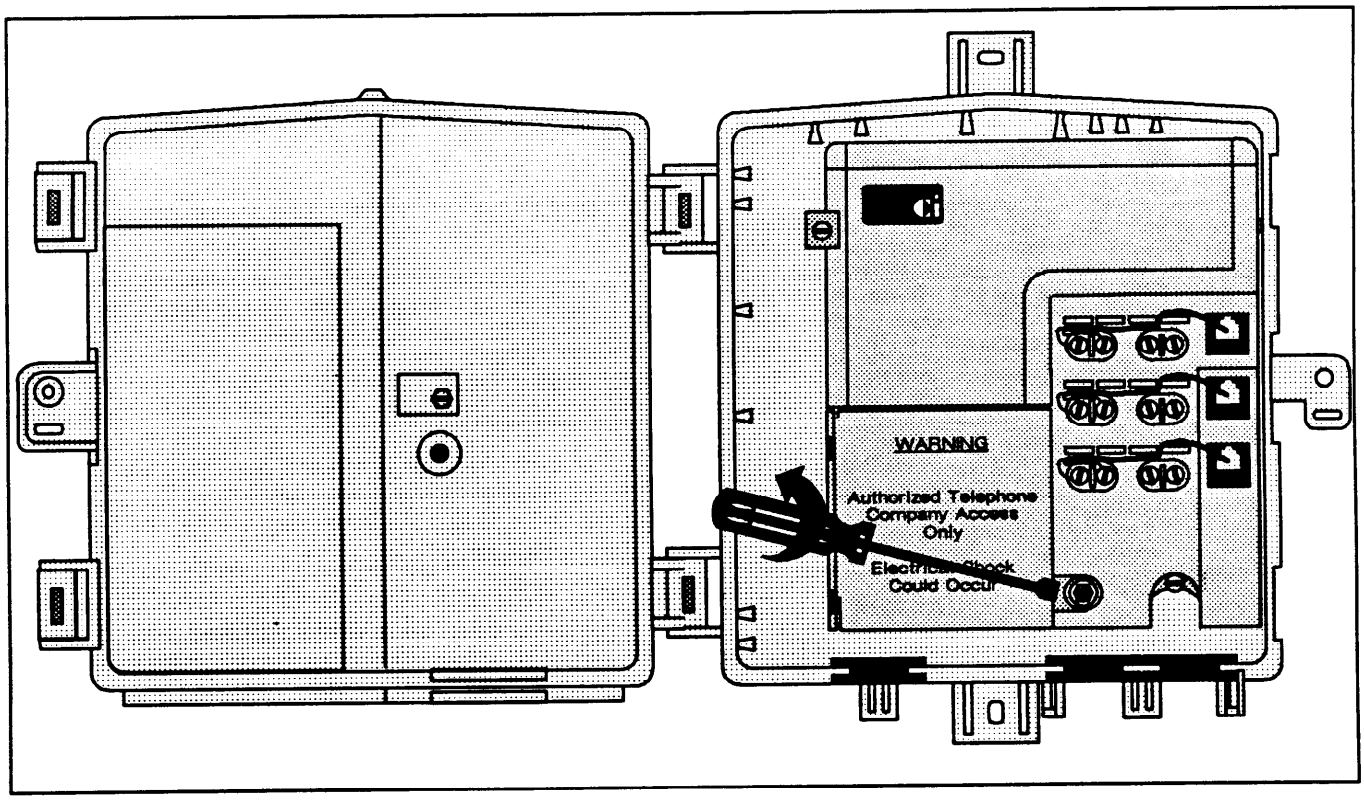

Figure 3. DDL104 in the Open Position

Hollow Wall Mounting

(1) Determine the location and the desired height where the RT is to be mounted.

(2) Using the opened RT enclosure as a template, mark the wall at the top and bottom mounting holes.

(3) Using a drill and a 7/16-inch drill bit, drill two holes marked above, for 3/16-inch hollow wall fasteners.

(4) Install the 3/16-inch hollow wall fasteners in the drilled holes.

(5) After completing step (4), mount the RT enclosure by using the top and bottom mounting holes and appropriate screws. Carefully tighten top and bottom screws.

INSTALLER CONNECTIONS

When mounting of the RT enclosure is completed, run the 2W Digital Subscriber Line cable, an earth ground wire, and the subscriber telephone lines (if required) to the RT mounting location. Refer to Figure 4.

Material and tools to complete the installation should include the following:

- Wire clips or staples
- Telephone cable wire stripper
- Flat-blade and/or Phillips blade screwdrivers
- 3/8-inch hex nut driver.
- 1/4-inch hex nut driver.

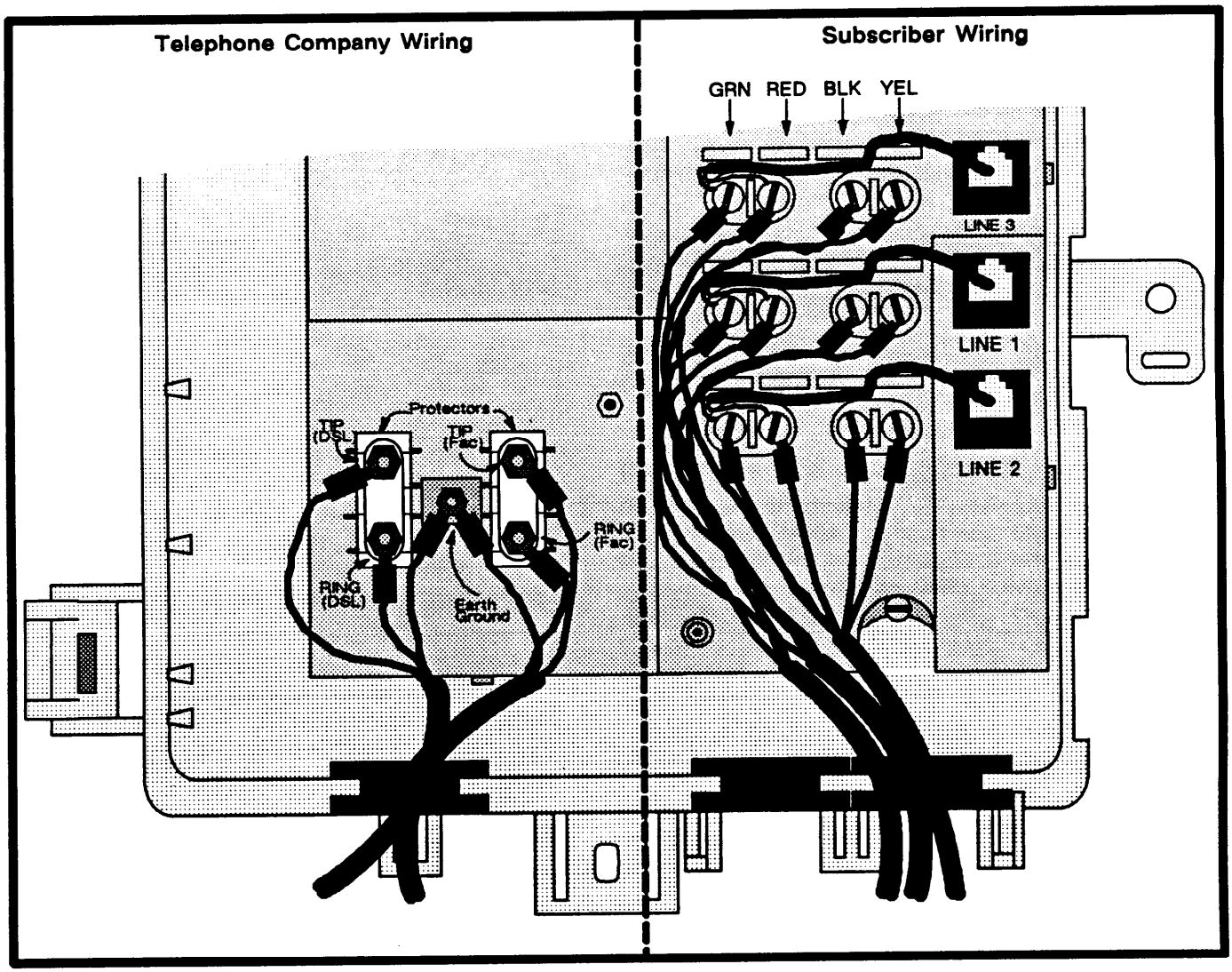

Figure 4. Partial Drawing of Remote Terminal Enclosure Showing Wiring

Connect the 2W Digital Subscriber Line And Ground Cables (Refer To Figure 4).

CAUTION

Hazardous voltages exist on the Digital Subscriber Line. 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 Line.

CAUTION

Disconnect the modular plugs from their jacks before installation of premise wiring.

(1) If not already opened at this time, open the internal TEL. CO. access cover by turning the 1/4-inch hex nut counter-clockwise. Refer to Figure 3.

(2) Pull the 2W Digital Subscriber Line and ground cables through the left side opening. Allow extra cable inside the enclosure for a service loop (this will provide strain relief).

(3) Connect the 2W Digital Subscriber Line and ground cables to the protector unit terminals as shown in Figure 4. Tighten all terminal screw connections.

Connect the 2W Copper Facility Line And Ground Cables (Refer To Figure 4).

(1) Pull the 2W Copper Facility cable and ground cables through the left side opening. Allow extra cable inside the enclosure for a service loop (this will provide strain relief).

(2) Connect the 2W Copper Facility cable and ground cables to the protector unit terminals as shown in Figure 4. Tighten all terminal screw connections.

Connect Subscriber Telephone lines (If Required)

(1) Pull the subscriber's telephone lines through the right side opening. Allow extra cable inside the enclosure for a service loop (this will provide strain relief).

(2) Properly terminate the subscriber's telephone lines on the three terminal blocks as shown in Figure 4. Tighten all terminal screw connections.

NOTE

If TESTING is to be performed, do not close the Tel. CO. access cover at this time.

TESTING

RT Service Turn-up

The following test equipment is required.

- Test telephone with clip leads
- High impedance dc voltmeter

After the 2W Digital Subscriber Line cable, the earth ground cable and the subscriber telephone lines have been installed, the following turn-up test can be performed.

(1) Connect the modular plugs to all three jacks.

(2) Connect the clip leads of the test telephone to LINE 1 Red and Green terminals.

(3) Initiate a call toward the Central Office Terminal.

(4) Then arrange to have a call initiated from the COT toward the RT.

(5) Test LINE 2 by connecting the clip leads of the test telephone to LINE 2 Red and Green terminals. Repeat Steps (2) and (3) above. When testing is completed, remove the test telephone.

If trouble is encountered with the RT turn-up, verify that the installer connections are complete and correct. With the high impedance voltmeter, verify the voltages noted in the following chart.

VOLTAGE CHECK POINTS	VOLTAGE (VDC)
DL TIP (+) & DL RING (-)	-150 TO -50
DL TIP (+) & EARTH GROUND	LESS THAN +80
DL RING (-) & EARTH GROUND	LESS THAN -80

NOTE: Check voltages with a high impedance voltmeter with both subscriber lines in the on-hook condition. Voltage reversal has no effect on RT operation.

CAUTION

Hazardous voltages exist on the Digital Subscriber Line. Always exercise caution when wiring a live circuit or when performing maintenance.

(6) Test LINE 3, the copper facility line, using standard POTS test procedures.

(7) Close both the internal and external TEL. CO. access covers by reversing procedure in shown Figure 3.

(8) Seal the TEL. CO. access cover if required. See Figure 2.

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

SPECIFICATIONS

The electrical and physical characteristics of the DuaLine Plus Remote Terminal are as follows:

(a) SYSTEM LOSS IN EACH DIRECTION OF TRANSMISSION: 3.5 ±0.5dB nominal.

(b) FREQUENCY RESPONSE: The loss relative to 1004Hz with 0dBmO input signal:

FREQUENCY	MINIMUM LOSS	MAXIMUM LOSS
300 Hz	0.0 dB	+3.0 dB
400 Hz to 3000 Hz	-0.5 dB	+1.0 dB
3200 Hz	-0.5 dB	+1.5 dB
3400 Hz	0.0 dB	+3.0 dB

(c) IDLE CHANNEL NOISE AT THE OUTPUT OF THE RT: 20dBrnC 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 either line at the RT 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 (±80V Tip to Ground/Ring to Ground); Busy condition, A3 limitations (±140V Tip to Ground/Ring to Ground).

(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 μF):
ERL> 18dB;
SRL> 10dB.

(j) OFF-HOOK CURRENT TO EACH LINE: 23mA minimum.

(k) ON-HOOK VOLTAGE TO EACH LINE: -42.5V minimum.

(l) RINGING FREQUENCY: 20 Hz.

(m) RINGING CAPACITY (TOTAL RT SYSTEM): 10 REN simultaneously.

Physical

(n) OPERATING ENVIRONMENT: Temperature, -40° to 149°F (-40° to 65°C).

(o) WEIGHT: 2.8 lbs (1.27 kg).

(p) DIMENSIONS: Height, 9.5 in. (24.1cm); width, 7.5 in. (19.1cm); depth, 3.0 in. (7.6cm).

(q) MOUNTING: Inside wall or outside wall.

CUSTOMER INFORMATION AND WIRING INSTRUCTIONS

SUBSCRIBER LINE CONNECTION

Material and tools required to complete the installation should include the following:

- Four-conductor 22/24 AWG inside/outside telephone cable
- Telephone cable wire stripper
- Flat-blade and/or Phillips blade screwdrivers
- 1/4-inch hex nut driver.
- Wire clips or staples

Connect Subscriber Telephone lines

(1) Run the telephone line(s) to the RT mounting location.

CAUTION

Hazardous voltages exist on subscriber lines. Always exercise caution when wiring.

(2) Open the CUSTOMER ACCESS cover (See Figure 5 illustration).

(3) Disconnect the modular plugs from the LINE 1, LINE 2 and LINE 3 modular jacks.

(4) Carefully follow the CUSTOMER WIRING INSTRUCTIONS as shown in the illustration.

NOTE

Allow extra cable inside the enclosure for a service loop.

(5) Test the line by following the TESTING instructions above.

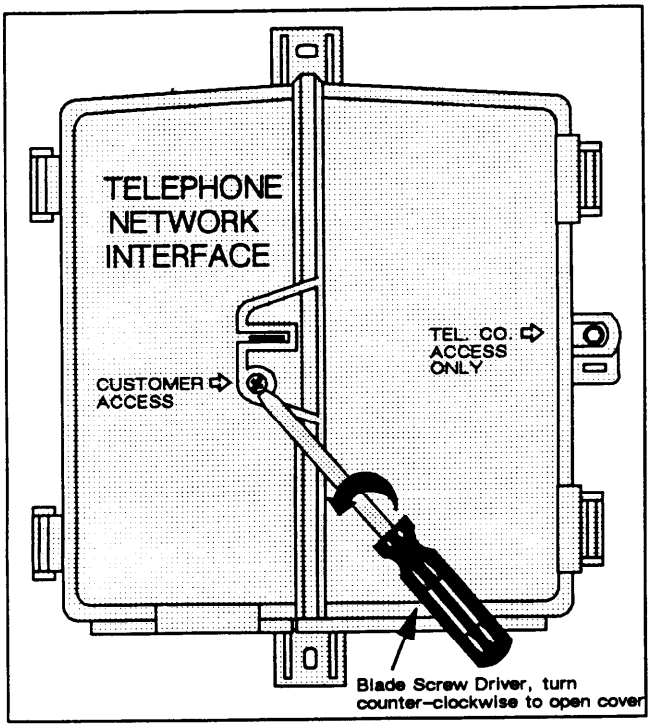

Figure 5 – Opening Customer Access Cover

(6) When testing is completed, insert all modular plugs in their respective jacks.

(7) Close the CUSTOMER ACCESS cover by reversing procedure in step (2).

(8) Lock the CUSTOMER ACCESS cover if desired (lock not supplied).

NOTE: This equipment has been tested and found to comply with the limits for Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Consult the dealer or an experienced Radio/TV technician for help

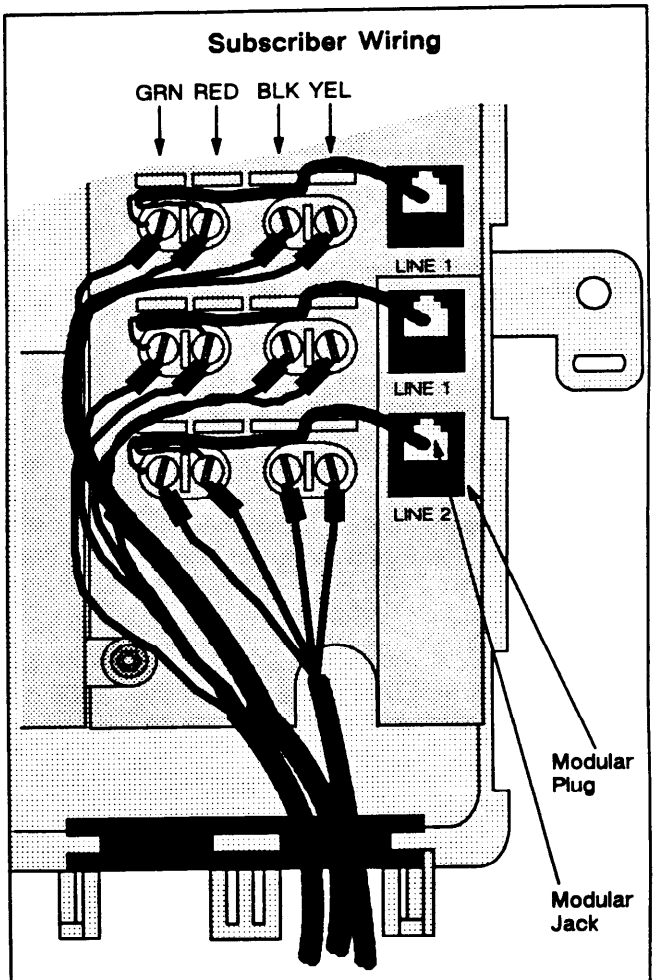

Figure 6 – Customer Wiring Instructions