

3657-03 2W FXS LS/GS Channel Unit 600 Ohms

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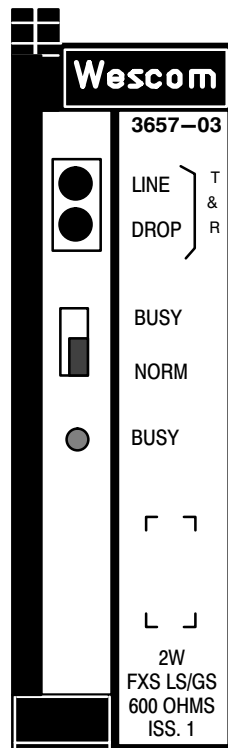


Figure 1. 3657-03 2W FXS LS/GS Channel Unit (Issue 1)

1. GENERAL

1.1 Document Purpose

This document provides information on the Charles 3657–03 2-wire FXS LS/GS channel unit, shown in Figure 1.

1.2 Document Status

This document is reprinted to include a general editorial update.

1.3 Equipment Function

This channel unit is used in the Charles 360/363 D4 Digital Carrier Terminal to provide a station-end interface for Foreign Exchange (FX) or Off-Premises Station (OPS) circuit arrangements.

1.4 Equipment Location/Mounting

Occupies one channel unit slot of a Charles 360/363 D4 Digital Carrier Terminal Channel Bank Assembly.

1.5 Equipment Features

The 3657–03 channel unit includes the following features:

- Loop-start (LS) or ground-start (GS) operation
- Compatible with distinctive alerting ringing patterns
- 600 ohm +2.15 uF 2W impedance
- Input TLP range: –16 to +0.5 dBm
- Output TLP range: –16.5 to 0.0 dBm
- Built-in hybrid-balancing network
- Front-panel manual busy switch
- Front-panel BUSY LED indicator
- Front-panel bantam breaking jacks for accessing the 2-wire facility
- Short-loop control (less than 300 ohms)

2. INSPECTION

2.1 Inspect for Damages

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

2.2 Equipment Identification

Charles Industries' 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 1 and imprinted on subsequent units manufactured. Therefore, be sure to include both the model number and its issue number when making inquiries about the equipment.

2.3 Static Concerns

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.



STATIC-SENSITIVE

This equipment contains static-sensitive electronic devices. To prevent electrostatic charges from damaging static-sensitive units:

- Use approved static preventive measures (such as a static-conductive wrist strap and a static-dissipative mat) at all times whenever touching units outside of their original, shipped static-protective packaging.
- Do not ship or store units near strong electrostatic, electromagnetic, or magnetic fields.
- Use static-protective packaging for shipping or storage.

3. APPLICATION GUIDELINES

The 3657–03 2W FXS channel unit is used at the station end of FX or OPS circuit arrangements. The 3657–03 supplies loop current and ringing toward the station and detects loop current flow from the station.

Figure 2 shows a typical FX application. The far-end FXO unit is any D3/D4 compatible unit. The circuit can be configured for either loop- or ground-start operation.

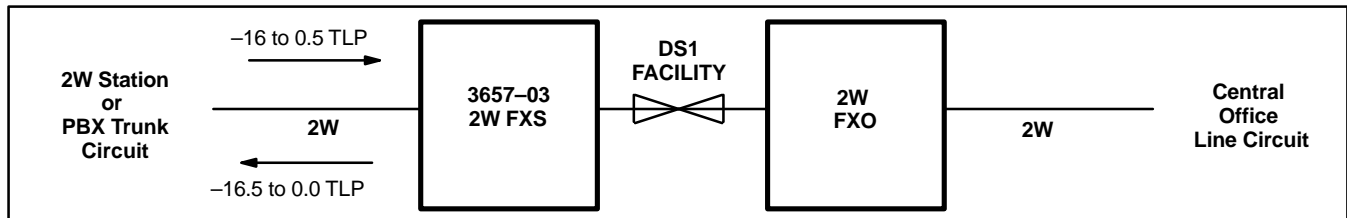


Figure 2. Typical Foreign Exchange Circuit

Figure 3 shows a typical OPS application. The far-end FXO is any D3/D4 compatible unit. OPS circuits are usually loop-start.

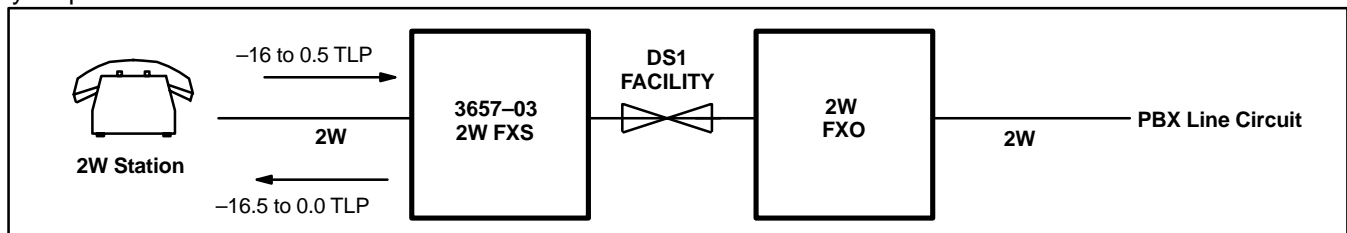


Figure 3. Typical Off-Premises Station Circuit Arrangement

4. CIRCUIT DESCRIPTION

Refer to Figure 4, the 3657–03 (Issue 1) block diagram, while reading the following circuit description.

4.1 Transmit VF Path

VF (Voice Frequency) signals applied to the input T&R (pins 50 and 48) are routed through the DROP and LINE breaking-jacks to the 2W/4W HYBRID circuit. The 2W/4W HYBRID extracts the transmit signal from the combined signal at the 2-wire input.

The transmit signal from the 2W/4W HYBRID is adjusted via the XMT PRESCRIPTION ATTN circuit which provides 0 to 16.5dB of attenuation in 0.1dB increments. The XMT PRESCRIPTION ATTN allows the input T&R leads to accept a TLP range from –16 to 0.5 dBm.

The adjusted VF signal is then applied to the XMT FILTER for suppression of frequencies that are outside the bandwidth of the standard voice frequency and prevents them from entering the ENCODER.

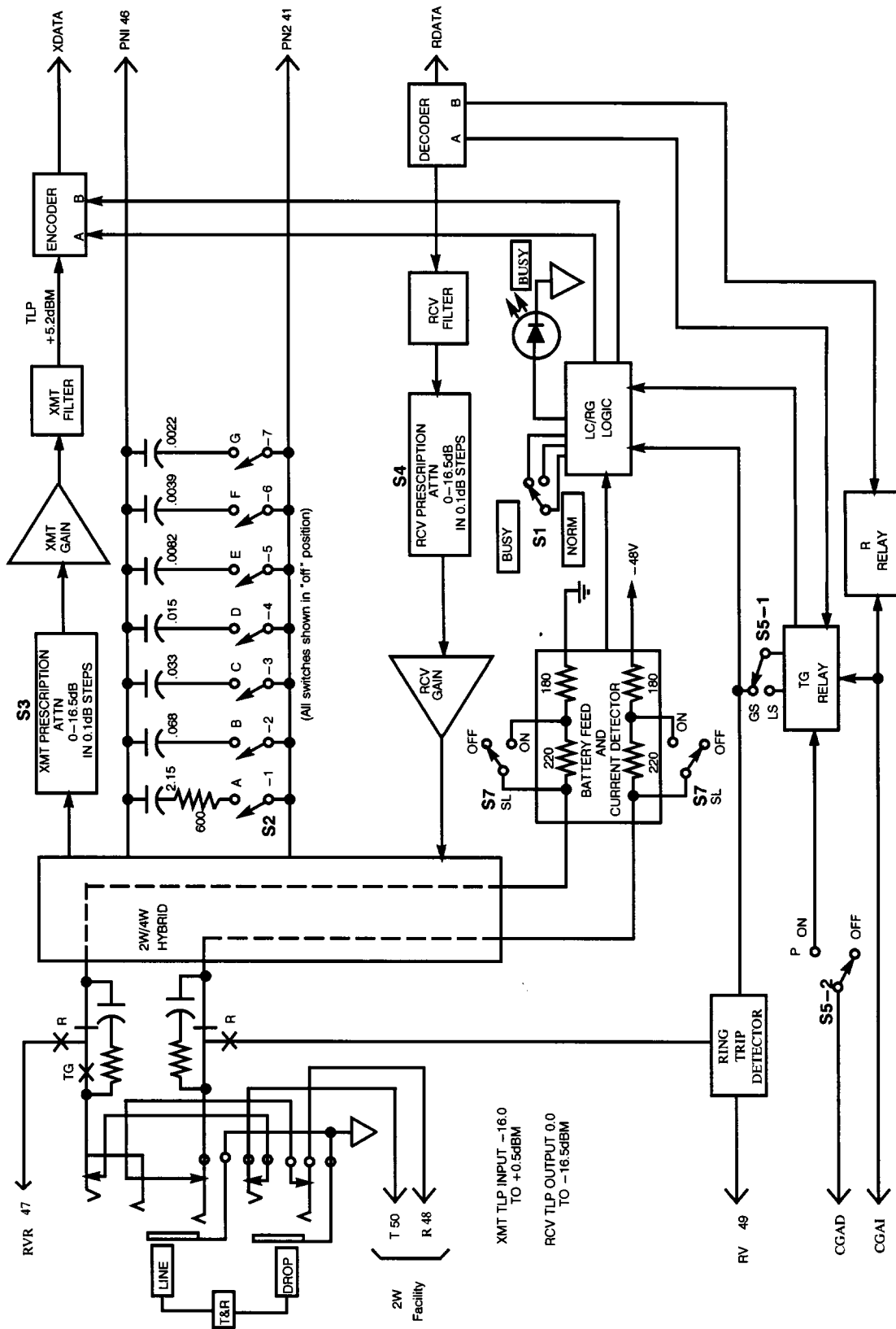


Figure 4. 3657-03 2W FXS LS/GS Channel Unit Block Diagram

The filtered VF signal is then applied to the ENCODER. The ENCODER performs an analog-to-digital (A/D) conversion of the VF signal and sends the resulting PCM signal to the 360/363 D4 terminal common equipment via the XDATA lead.

4.2 Transmit Signaling

Loop Closure (LC) and Ring Ground (RG) information is multiplexed onto the DS1 facility by the ENCODER. Signaling information is sent from the ENCODER in the sixth and 12th frame in bit 8 of the PCM word.

Loop closure or open loop and ring ground or lack of ring ground conditions of the T&R leads are detected by the BATTERY FEED AND CURRENT DETECTOR. The output of the BATTERY FEED AND CURRENT DETECTOR goes to the LC/RG LOGIC circuit which, in turn, outputs this information to the ENCODER. If current is detected and no tip ground is present, the ENCODER sends a signal out on the B signaling highway indicating a ring ground. If a tip-ground signal is present when current is detected, the LC/RG LOGIC circuit will then transmit a signal on the A signaling highway indicating loop closure. If the tip-ground signal is then removed, the LC/RG LOGIC circuit will hold the detected current as loop closure and not as ring ground. This prevents false ring-ground requests from being transmitted. Whenever loop closure is transmitted, the R RELAY is disabled.

4.3 Receive VF Path

The PCM digital signal transmitted from the far-end is received by the 360/363 D4 terminal common equipment and routed to the 3657–00/02/04/14 via the RDATA lead. The DECODER and RCV FILTER then, in turn, perform a Digital-To-Analog (D/A) conversion of the signal and suppression of frequencies that are outside the bandwidth of the standard voice frequency.

The filtered analog VF output of the RCV FILTER is then applied to the RCV PRESCRIPTION ATTN circuit which provides 0 to 16.5dB of attenuation in 0.1dB increments. This allows the output level at T&R to be adjusted from –16.5 to 0.0dBm TLP.

4.4 Receive Signaling

In the receive direction, signaling information is converted to tip-ground and ringing information for controlling the TG and R RELAYS.

Signaling information is received via the RDATA lead of the DECODER in the 6th and 12th frame in bit 8 of the PCM word.

A tip-ground signal from the far-end is output by the DECODER on its A output causing the TG RELAY to activate. When the TG RELAY is activated, filtered battery-ground is applied to the tip lead (pin 50). When optioned for loop start, the TG RELAY is activated regardless of A signaling highway activity.

A ringing signal from the far-end is output by the DECODER on its B output causing the R RELAY to activate, which allows ringing to be applied to the ring lead (pin 48). The RING TRIP DETECTOR will be connected into the loop and the BATTERY FEED AND CURRENT DETECTOR will be disconnected from the circuit. The RING TRIP DETECTOR detects the DC bias on ring voltage during ringing cycles.

Loop current is detected by either the BATTERY FEED AND CURRENT DETECTOR during silent intervals or the RING TRIP DETECTOR during ringing intervals. Detection of loop current causes the R RELAY to be disabled allowing loop closure information to be transmitted onto the A signaling highway. Note that the TG RELAY must be activated for ringing to be sent to the subscriber equipment.

4.5 Trunk Processing During A Carrier Group Alarm (CGA)

When a carrier failure occurs, the CGAI bus (pin 18) goes to ground, causing the TG and R RELAYS to be disabled. If the DIP switch S5–2 (P) position is set to ON, a tip ground will be forced by the CGAD bus approximately 2.5 seconds after the carrier failure.

5. MOUNTING

The 3657–03 mounts in any channel unit slot of a 360/363 D4 terminal. The 3657–03 is equipped with an insert/eject lever in the form of a hinged front panel which ensures a positive connection of the channel unit's card-edge connector to the backplane connector when the unit is installed. The insert/eject lever also facilitates removal of the unit.

CAUTION

Removal and installation 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 guide and connector to verify proper alignment and the absence of foreign material.

Step	Action
1.	Align the channel unit with the appropriate card-guided slot of the terminal.
2.	With the front panel in a horizontal (up) position, slide the unit into the slot.
3.	When the top portion of the hinged front panel is under the front lip of the terminal, push down on the front panel until it is in the vertical position. The channel unit's card-edge connector will begin to make contact with the inner portion of the backplane connector.
4.	Continue applying light pressure onto the bottom edge of the front panel until the unit snaps into place.

6. INSTALLER CONNECTIONS

Installer connections are made to the channel unit by wire-wrapping leads onto the associated 50-pin connectors located on the backplane assembly of the 360/363 D4 terminal. On connectorized 360/363 D4 terminals (360–10, –11, etc.) connections are made via 25-pair female connectors (CINCH 222–22–50–023 or equivalent) to the appropriate 25-pair male connectors of the 360/363 D4 terminal.

7. OPTIONS

The 3657–03 is equipped with DIP and slide switches that are used to condition the module for proper application and operation. Refer to Figure 5 for the location of these options while reading the following instructions.

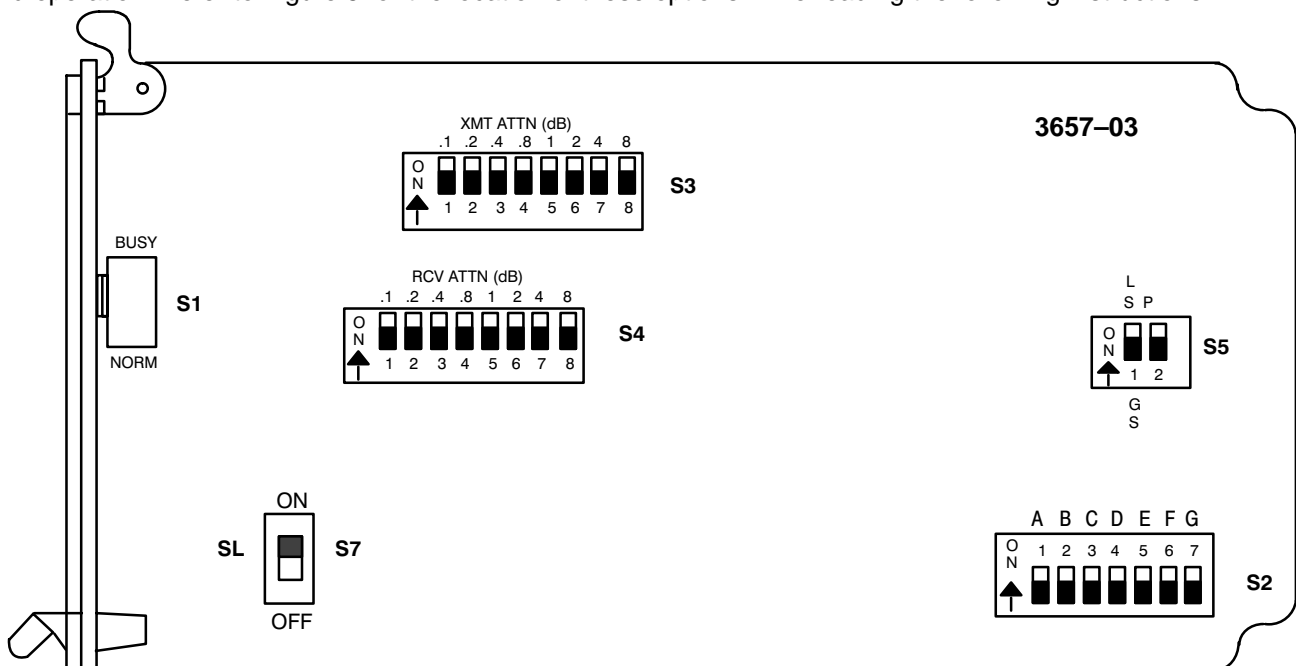


Figure 5. 3657–03 Option Locations

7.1 Signaling Mode, Switch S5–1

This switch configures the unit for either loop- or ground-start operation. Place S5–1 in the LS (on) position for loop-start, and in the GS position for ground-start signaling.

7.2 2W XMT (input) Level Adjustment, Switch S3

Switch S3 is an eight-section DIP switch that is used to set the 2W XMT (input) TLP levels between –16.0 and +0.5 dBm. To adjust the transmit path to a given TLP, switch S3 is set to a value that equals the difference between –16 and the TLP. For example, to set the input TLP to a –1.5 dBm, switch S3 would be set for a total of 14.5 dB by placing the 8, 4, 2, 0.4 and 0.1 sections in the ON position.

7.3 2W RCV (output) Level Adjustment, Switch S4

Switch S4 is an eight-section DIP switch that is used to set the 2W receive (output) TLP levels between –16.5 and 0.0 dBm. To adjust the receive path to a given TLP, switch S4 is set to a value that equals the difference between 0 and the TLP. For example, to set the output TLP to a –1.5 dBm, switch S4 would be set for a total of 1.5 dB by placing the 1, 0.4 and 0.1 sections in the ON position.

7.4 Switch S7–SL ON, OFF (Short Loop)

For a short-loop length (below 300 ohms), set S5 to the OFF position. If the loop length is 300 ohms or greater, set S5 to the ON position.

7.5 Switch S2 Hybrid Balance

Switch S2 is a seven-section DIP switch used for selecting the appropriate amount of capacitance required for balancing the 2W/4W hybrid circuit. Hybrid balance can also be provided by an external compromise network or PBN via pins 46 and 41 (PN1 and PN2, respectively).

7.5.1 Switch S2-A (Compromise Balance Network) (CBN)

Switch S2–A is used to select a compromise balance network of 600 ohms in series with a 2.15uF capacitor. To select this option, set switch S2–A to ON.

7.5.2 Switches S2 B–G (Build-Out Capacitance) (BOC)

Switches S2–B through S2–G provide up to 0.1313uF BOC for balancing the hybrid circuitry relative to the line connected to the 2-wire port of the 3657–03. By placing the individual switches to the ON position, the required amount of capacitance can be added in approximately 0.002uF increments.

7.6 CGA Operation Switch S5–2

This switch controls the unit's trunk processing under Carrier Group Alarm (CGA) processing. When S5–2 is placed in the ON (P) position, a CGA will force the unit idle for two seconds, then continuous busy. When S5–2 is OFF, the circuit will be forced idle continuously during CGA.

7.7 NORM/BUSY Front Panel Switch S1

Place switch S1 in the NORM position for in-service operation. Place S1 in the BUSY position to create an out-of-service condition for alignment.

8. TESTING

After completing Parts 4 through 8, place a call end-to-end through the facility to verify proper operation. If trouble is encountered, recheck all installer connections, options and alignment settings, and verify that the channel unit is making positive connection to the backplane connector. If trouble persists, replace the unit with a similar unit known to be in proper operating order, and retest the facility.

9. TECHNICAL ASSISTANCE

If technical assistance is required, contact Charles Industries' Technical Services Center at:

847–806–8500

847–806–8556 (FAX)

800–607–8500

techserv@charlesindustries.com (e-mail)

10. WARRANTY & CUSTOMER SERVICE

10.1 Warranty

Charles Industries, Ltd. offers an industry-leading, 5-year warranty on products manufactured by Charles Industries. Contact your local Sales Representative at the address or telephone numbers below 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.

Charles Industries, Ltd.
5600 Apollo Drive
Rolling Meadows, Illinois 60008–4049
847–806–6300 (Main Office)
847–806–6231 (FAX)

10.2 Field Repairs (In-Warranty Units)

Field repairs involving the replacement of components within a unit are not recommended and may void the warranty and compatibility with any applicable regulatory or agency requirements. If a unit needs repair, contact Charles Industries, Ltd. for replacement or repair instructions, or follow the *Repair Service Procedure* below.

10.3 Advanced Replacement Service (In-Warranty Units)

Charles Industries, Ltd. offers an “advanced replacement” service if a replacement unit is required as soon as possible. With this service, the unit will be shipped in the fastest manner consistent with the urgency of the situation. In most cases, there are no charges for in-warranty repairs, except for the transportation charges of the unit and for a testing and handling charge for units returned with no trouble found. Upon receipt of the advanced replacement unit, return the out-of-service unit in the carton in which the replacement was shipped, using the pre-addressed shipping label provided. Call your customer service representative at the telephone number above for more details.

10.4 Standard Repair and Replacement Service (Both In-Warranty and Out-Of-Warranty Units)

Charles Industries, Ltd. offers a standard repair or exchange service for units either in- or out-of-warranty. With this service, units may be shipped to Charles Industries for either repair and quality testing or exchanged for a replacement unit, as determined by Charles Industries. Follow the *Repair Service Procedure* below to return units and to secure a repair or replacement. A handling charge applies for equipment returned with no trouble found. To obtain more details of this service and a schedule of prices, contact the CI Service Center at 217–932–5288 (FAX 217–932–2943).

Repair Service Procedure

1. Prepare, complete, and enclose a purchase order in the box with the equipment to be returned.
2. Include the following information:
 - Company name and address
 - Contact name and phone number
 - Inventory of equipment being shipped
 - Particulars as to the nature of the failure
 - Return shipping address
3. Ship the equipment, purchase order, and above-listed information, transportation prepaid, to the service center address shown below.

CI Service Center
503 N.E. 15th St., P.O. Box 339
Casey, IL 62420–2054
4. Most repaired or replaced units will be returned within 30 or 45 days, depending on the product type and availability of repair parts. Repaired units are warranted for either 90 days from the date of repair or for the remaining unexpired portion of the original warranty, whichever is longer.

11. SPECIFICATIONS

11.1 Electrical

The electrical characteristics of the 3657–03 (Issue 1) are as follows:

11.1.1. Transmission

- (a) 2-WIRE IMPEDANCE: 600 ohms + 2.15uF.
- (b) TRANSMIT (INPUT) TLP RANGE: –16 to +0.5 dBm
- (c) RECEIVE (OUTPUT) TLP RANGE: –16.5 to 0.0 dBm
- (d) LONGITUDINAL BALANCE: 58.0dB minimum at 200Hz to 1kHz; 53dB minimum at 3kHz (referenced to –16dBm TLP).
- (e) SIGNAL TO DISTORTION RATIO: 35dB minimum at 0.0 to –30dBm0; 29dB minimum at –40dBm0; 25dB minimum at –45dBm0.
- (f) TRANS-HYBRID LOSS: SRL 20dB, ERL 34dB.
- (g) RETURN LOSS: SRL 20dB minimum; ERL 28dB.
- (h) TRANSMIT/RECEIVE IDLE CHANNEL NOISE: 20dBmC0 maximum.
- (i) LEVEL TRACKING (measured single- ended at 1010Hz): ± 0.25 dB from +3 to –37dBm0, ± 0.5 dB from –38 to –50dBm0.
- (j) FREQUENCY RESPONSE (referenced at 1kHz):

Frequency (Hz)	XMT (dB)	RCV (dB)
60	< 20.0	–
200	–3.0 to 0.25	–2.0 to 0.0
300	–0.5 to 0.25	–0.5 to 0.25
1000	0 (REFERENCE)	0 (REFERENCE)
3000	–0.5 to 0.25	–0.5 to 0.25
3400	–1.5 to 0.0	–1.5 to 0.0
4000	< –14.0	< –14.0

- (k) –48V CURRENT DRAW: Idle, 20mA; busy, 35mA.

11.2 Signaling

- (a) LOOP CLOSURE DETECT: Detect, less than or equal to 2k ohms; no detect, greater than or equal to 10k ohms.
- (b) SIGNALING RANGE: 2000–ohm loop.
- (c) 20Hz RINGING RANGE: 2000–ohm loop.

11.3 Physical

The physical characteristics of the 3657–03 (Issue 1) are shown in Table 1.

Table 1. Physical Specifications

Feature	U.S.	Metric
Height	4.25 inches	10.8 centimeters
Width	1.31 inches	3.3 centimeters
Depth	10.31 inches	26.2 centimeters
Weight	16 ounces	454 grams
Temperature	32° to 122°F	0° to 50°C

