

12-Channel (3658-85) and 6-Channel (3658-86) 2-Wire Foreign Exchange Office/Dial Pulse Terminating Unit for E1

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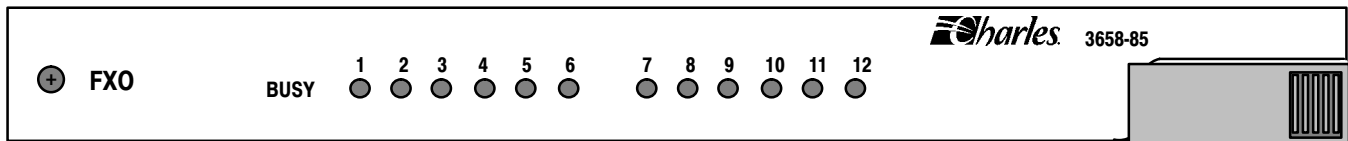


Figure 1. 3658-85 FXO/DPT Front Panel

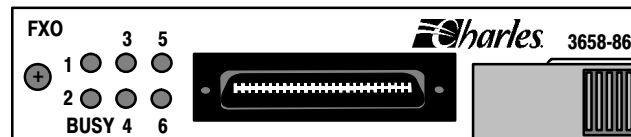


Figure 2. 3658-86 FXO/DPT Front Panel

1. GENERAL

1.1 Document Purpose

This document provides general, installation and testing information for the 12-channel and 6-Channel 2-Wire Foreign Exchange Office/Dial Pulse Terminating (FXO/DPT) unit. This document covers model number 3658-85 (12-channel) and 3658-86 (6-channel).

1.2 Equipment Function

The FXO/DPT is one of several types of channel units available for the 360-80 Integrated Channel Bank (ICB). Each of the circuits on the FXO/DPT can be independently configured as a two wire FXO, in either the loop start or ground start mode, or as a two wire dial pulse terminating (DPT) unit in a one-way trunk application.

1.3 Equipment Location/Mounting

The 12-channel unit plugs into any full-size slot of the Charles 360-80 ICB. The 6-channel unit plugs into the half-size slot of the Charles 360-80 ICB.

Note: The 6-channel unit (3658-86) must be used in an issue 3 or later ICB shelf

1.4 Equipment Features

This unit provides the following features:

- Compliance with FCC part 68 and UL 1950, FCC part 15.
- Compliance with ITU-T Q.421.
- Prescription gain settings for the transmit and receive levels.
- Loop-start or ground-start mode of operation.
- Compatibility with 100-millisecond ringing intervals.
- Optional network per-channel loopback.
- Provides 600 or 900 ohms impedance.
- Provides A-law encoding.
- Front-panel BUSY LED that indicates busy/idle status.
- Supports FXO/DPT operation.
- Temperature hardened (-40° to $+65^{\circ}$ C).

1.5 Control Interface

This unit is managed through the craft port or the Network Management Software (NMS), which controls the provisioning of the unit and obtains status information from the unit. Provisioning is described in the Optioning section of this document. For operation, see the craft port or NMS documentation.

This unit will maintain its default provisioning until that provisioning is altered through the control interface. If this unit's provisioning is changed, it will maintain the new provisioning even if power is lost. If replaced with a new unit, the new unit will default to the same provisioning as was set for the prior unit. If this unit is installed in a location that was used by a different type of unit, this unit will use its own default provisioning.

1.6 Status Indicators

This unit provides a variety of status information. The following is a list of status information available through the management interface. Busy status is also indicated by the front panel LED:

- Per channel forced busy (busy, normal)
- Per channel busy state (On, Off)
- Per channel timeslot used (1–15, 17–31, none)

- Per channel unit mode (FXO, DPT)
- Per channel FXO interface mode (loop start, ground start)
- Per channel interface impedance (600, 900)
- Per channel transmit level setting (-10 to+6 dBm TLP in 0.1 dB increments)
- Per channel receive level setting (-10 to+6 dBm TLP in 0.1 dB increments)
- Per channel loopback (active, release)
- Per channel reverse battery detected (active, none)
- Per channel CGAI action (Idle, Busy)
- Per channel CGAD action (Idle, Busy)
- Per channel DPT interface mode (normal, wink)

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 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 unit is shipped in static-protective packaging to prevent damages from electrostatic charges. Use approved static-preventive measures, such as static-conductive wrist straps and a static-dissipative mat, when handling units outside of their protective packaging. A unit 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 static-conductive wrist straps and static-dissipative mats) at all times whenever touching units outside of their original, shipped, protective packaging.**
- **Do not ship or store units near strong electrostatic, electromagnetic, or magnetic fields.**
- **Always use the original static-protective packaging for shipping or storage. Return a tested unit to its original protective packaging for storage.**

3. APPLICATION GUIDELINES

3.1 Foreign Exchange (FX) Channel Units

FX channel units are available in both station (FXS) and office (FXO) versions. All FX units operate with either loop or ground start signaling.

FXO units detect ringing from the office equipment, and send DC supervision and address information toward the office equipment. FXO units will generally connect to central office (CO) or PBX line circuits. Figure 3, Figure 4, and Figure 5 show some typical FX applications.

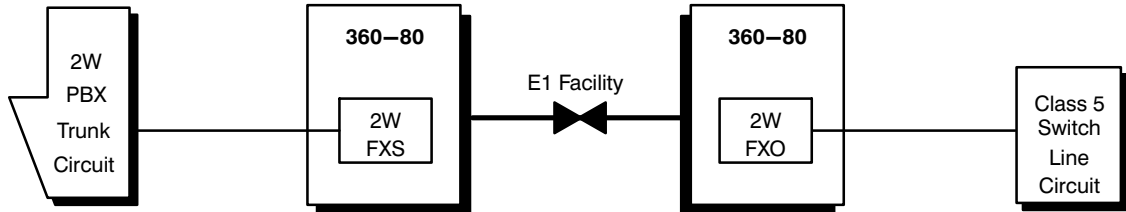


Figure 3. Typical FX (Foreign Exchange) Arrangement

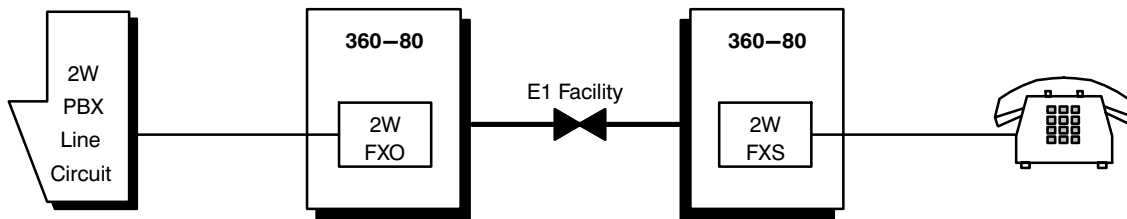


Figure 4. Typical OPX (Off-Premises Extension) Arrangement

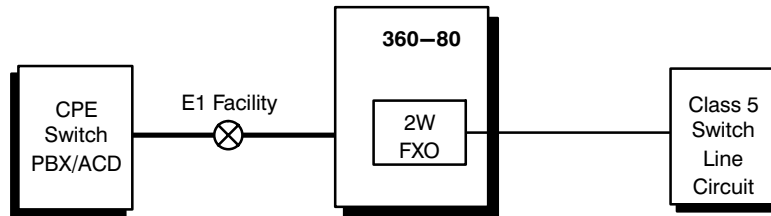
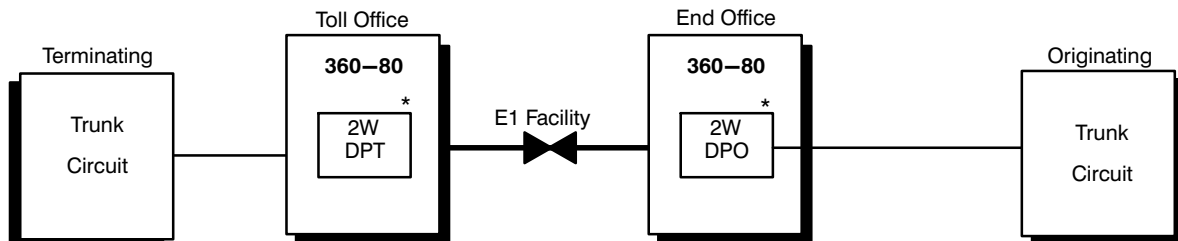


Figure 5. Access to Local Class 5 Switch for MTS Services

3.2 Loop Reverse Battery (DPO, DPT) Channel Units

These units have historically been used for one-way interoffice trunk circuits. The DPO unit provides talk battery toward the trunk circuit and reverses the battery for supervision purposes. The DPT unit provides loop open/closure toward the trunk circuit and detects battery reversals. DPO units can be used to connect to Class 5 Central Office DID trunks. See Figure 6.



*Either end could be replaced with an E&M circuit depending on the trunk interface.

Figure 6. Typical One-Way Interoffice Trunk Application

4. CIRCUIT DESCRIPTION

Note: The following describes one of the circuits on the unit and is typical of any of the circuits.

4.1 Voice Operation

4.1.1. Incoming voice operation (from E1 facility), all modes

Each circuit, or channel, of the FXO/DPT receives digital voice and signaling information from the network interface unit of the ICB. The digital voice information is converted to analog voice information and conveyed to the level adjusting circuit. The level of the receive voice information can be adjusted for a receive transmission level point (TLP) of +6 to –10 dBm. The voice information goes through a hybrid, which transmits it to the two-wire transmission facilities. The impedance of the hybrid can be configured for either a balanced 600 or 900 ohm facility.

4.1.2. Outgoing voice operation, all modes

Analog voice information presented from the two-wire transmission facility is passed to the 600 or 900 ohm impedance matching hybrid and is then conveyed to the level adjusting circuit. The transmit TLP level range that can be accommodated is from +6 to –10 dBm. The analog voice information is converted to digital and multiplexed with the other channels and sent to the network interface unit to be transmitted to far end equipment.

4.2 FXO Signaling

4.2.1. Incoming calls, ground start mode

The digital signaling information from the network interface unit is converted into the A and B signaling highway information. The A signaling highway is used to determine the presence or absence of a loop closure condition reflected on the T and R leads going to the interfacing two-wire facility and to control the busy LED on the front panel. If the A signaling highway is 0, the loop condition is open; if the A signaling highway is 1, the FXO will present a loop closure condition to the two-wire loop (see Table 1).

Table 1. Incoming calls, ground start

Analog Output	Incoming (Backward)		Call Progress	Outgoing (Forward)		Analog Input
	A	B		A	B	
On hook, no ring ground	0	1	Idle	1	1	No tip ground, no ringing
On hook, ring ground	0	0	Ring ground	1	1	No tip ground, no ringing
Off hook, no ring ground	1	1	Normal busy	0	1	Tip ground
On hook	0	1	Idle	1	1	No tip ground
Ring ground	–	–	Forced busy	0	1	–

The B signaling highway is used to determine the presence or absence of a ring ground signal going to the two-wire facility. If the B highway is 1, then the ring lead will **not** have a ground reference presented to it by the FXO; if the B highway is 0, the ring lead will have a 410 ohm resistance to ground presented as the ground start signal.

4.2.2. Incoming calls, loop start mode

In loop start mode, tip ground is always present and ring ground is not used or needed (see Table 2).

Table 2. Incoming calls, loop start

Analog Output	Incoming (Backward)		Call Progress	Outgoing (Forward)		Analog Input
	A	B		A	B	
On hook	1	0	Idle	1	0	Tip ground, no ringing
Off hook	0	0	Busy	1	0	Tip ground, no ringing
On hook	1	0	Idle	1	0	Tip ground, no ringing
Off hook	–	–	Forced busy	1	1	–

4.2.3. Outgoing calls, ground start mode

The presence or absence of a tip lead ground reference on the two wire transmission facility Tip and Ring leads is used to determine the outgoing A and B signaling highway state. If there is no ring ground, such as the idle condition on a ground start line, the B signaling highway is 1. If there is ringing voltage present between the tip and ring leads of the two-wire facility, the outgoing B highway is 0. When there is no ringing signal during the ringing quiet periods, the B highway is 1 (see Table 3).

Table 3. Outgoing calls, ground start

Analog Output	Incoming (Backward)		Call Progress	Outgoing (Forward)		Analog Input
	A	B		A	B	
On hook, no ring ground	0	1	Idle	1	1	No tip ground, no ringing
On hook, no ring ground	0	1	Tip ground	0	1	Tip ground, no ringing
On hook, no ring ground	0	1	Ringing	0	0	Ringing, tip ground
Off hook, no ring ground	1	1	Busy	0	1	No ringing, tip ground
On hook, no ring ground	0	1	Idle	1	1	No tip ground, no ringing

4.2.4. Outgoing calls, loop start mode

In loop start mode, tip ground is always present and ring ground is not needed (see Table 4).

Table 4. Outgoing calls, loop start

Analog Output	Incoming (Backward)		Call Progress	Outgoing (Forward)		Analog Input
	A	B		A	B	
On hook	1	0	Idle	1	0	No ringing
On hook	1	0	Ringing	0	0	Ringing
Off hook	0	0	Busy	1	0	No ringing
On hook	1	0	Idle	1	0	No ringing

4.3 DPT Signaling

4.3.1 Incoming Calls, normal and wink mode

The digital signaling information from the E1 facility is converted into the analog signaling highway information. The A signaling highway is used to control the presence or absence of a loop closure condition on the T and R leads going to the interfacing two-wire facility. The B signaling highway is not used (it copies the A highway). If the auto wink mode is configured, the DPT will send a momentary wink on the outgoing digital A highway after the far end sends an off-hook (receive A highway=1). The wink duration is between 100 and 350 ms. This is used in applications where the local two-wire loop equipment cannot send a reverse battery wink upon initial loop seizure but the far end equipment wants to see a wink to continue the call (see Table 5).

Table 5. Incoming calls, normal and wink mode

Analog Output	Incoming (Backward)		Call Progress	Outgoing (Forward)		Analog Input
	A	B		A	B	
On hook	0	0*	Idle	0	0*	Normal battery polarity
Off hook	1	1*	Off-hook	0	0*	Normal battery polarity
Off hook	1	1*	Wink back	0/1/0	0/1/0*	Normal/reverse/normal**
Off hook	1	1*	Busy (normal talk state)	1	1*	Reverse battery polarity
On hook	0	0*	Idle	0	0*	Normal battery polarity
On hook	0	0*	Reverse make busy (trunk out of service)	1	1*	Reverse battery polarity
Off hook	–	–	Forced busy	1	1*	–

*Highway not used—not monitored

**When automatic wink mode is selected, the normal/reverse/normal battery wink does not occur on the VF input. The wink is generated by the DPT module.

5. INSTALLATION

5.1 Installing the Unit

5.1.1 Attaching the Rear Panel

The rear panel of the 12-channel unit (3658-85) should be installed before the all units are installed in the shelf, and before wiring begins. The 6-channel unit (3658-86) does not require a new rear panel.

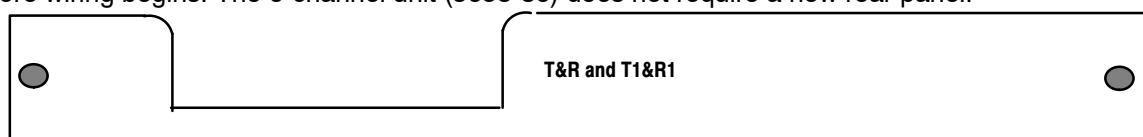


Figure 7. 12-Channel (3658-85) 2W FXO/DPT Rear Panel

5.1.2 Installing a New Unit

Use the following steps to install the unit.

Step	Action
1.	<p>If not already installed, install the rear panel, screwing it to the appropriate mounting locations on the shelf using the provided hardware.</p> <p style="text-align: center;"><u>WARNING</u></p> <p>If there is already a rear panel installed on the shelf, check for interference when mounting. The rear panel may need to be removed and replaced with the rear panel that has been shipped with the new unit.</p>
2.	Insert the unit into the shelf, making sure that the unit is aligned with the card guides inside the shelf.
3.	Slide the unit fully in to the shelf.
4.	Once the unit is fully inserted, tighten the securing screw on the front panel of the unit.
5.	The unit will perform a self-test to ensure that it is compatible with the network management software on the system.
6.	Wire the unit per the wiring information in the wiring section.
7.	After the self-test is performed, check the software provisioning of the card using either the front panel craft interface on the front of the controller unit or the network management interface on the rear of the controller (see the section on network management for more information).

5.1.3. Installing a Replacement Unit

If you are replacing a unit that is already in service, insure that the unit is the same as the unit being replaced.

Step	Action
1.	Remove the wiring connector from the rear of the unit.
2.	Unscrew the front panel securing screw to release the unit from the shelf.
3.	Using the card ejector, remove the unit from the shelf.
4.	Follow the procedure for installing a new unit.

5.2 Wiring the Unit

For the 6-channel unit (3658-86), the first six circuits are used on the Telco connector (see Table 6). Both the 12-channel unit (3658-85) and the 6-channel unit (3658-86) have specific tip and ring functionality based on channel optioning. Tip and ring lead polarity must be maintained when connecting the far-end equipment.

Table 6. Pin Chart for Male 50 pin (25 pair) TELCO Connector

		Circuit	Pins	
3 6 5 8 - 8 6	3	Circuit 1	Pin 1 = R	Pin 26 = T
			Pin 2 = Not connected	Pin 27 = Not connected
	6	Circuit 2	Pin 3 = R	Pin 28 = T
			Pin 4 = Not connected	Pin 29 = Not connected
	5	Circuit 3	Pin 5 = R	Pin 30 = T
			Pin 6 = Not connected	Pin 31 = Not connected
	8	Circuit 4	Pin 7 = R	Pin 32 = T
			Pin 8 = Not connected	Pin 33 = Not connected
	-	Circuit 5	Pin 9 = R	Pin 34 = T
			Pin 10 = Not connected	Pin 35 = Not connected
	8	Circuit 6	Pin 11 = R	Pin 36 = T
			Pin 12 = Not connected	Pin 37 = Not connected
-	Circuit 7	Pin 13 = R	Pin 38 = T	
		Pin 14 = Not connected	Pin 39 = Not connected	
8	Circuit 8	Pin 15 = R	Pin 40 = T	
		Pin 16 = Not connected	Pin 41 = Not connected	
5	Circuit 9	Pin 17 = R	Pin 42 = T	
		Pin 18 = Not connected	Pin 43 = Not connected	
	Circuit 10	Pin 19 = R	Pin 44 = T	
		Pin 20 = Not connected	Pin 45 = Not connected	
	Circuit 11	Pin 21 = R	Pin 46 = T	
		Pin 22 = Not connected	Pin 47 = Not connected	
	Circuit 12	Pin 23 = R	Pin 48 = T	
		Pin 24 = Not connected	Pin 49 = Not connected	

6. OPTIONING

Each of the channels in the FXO/DPT unit is individually controlled and optioned.

6.1 Software Optioning

Refer to the craft port or NMS documentation for software optioning information.

When installed, this unit uses the default provisioning, which can be altered through the network management interface. When this unit is inserted into a previously provisioned slot, if the card type matches, the unit's provisioning options change to match the previously provisioned unit. If the unit type does not match the unit being replaced, it assumes its default provisioning. The individual channel provisioning options are as follows:

Option	Choices	Default
Per channel forced busy	On, Off	Off
Per channel timeslot allocation	1-15, 17-31, none	Channel 1-15 = Timeslot 1-15 Channel 16-30 = Timeslot 17-31
Per channel operating mode	FXO, DPT	FXO
Per channel FXO mode	Loop start, Ground start	Loop start
Per channel DPT mode	Normal, Wink	Normal
Per channel transmit level setting	-10 to +6 dBm in 0.1 dB increments	0 dBm
Per channel receive level setting	-10 to +6 dBm in 0.1 dB increments	-3 dBm
Per channel loopback	Active, Release	Release
Per channel CGAI action	Idle, Busy	Idle
Per channel CGAD action	Idle, Busy	Busy
Per channel impedance	600 or 900 ohms	600 ohms

7. TECHNICAL ASSISTANCE

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

847-806-8500
 847-806-8556 (FAX)
 800-607-8500
 techserv@charlesindustries.com (e-mail)

8. WARRANTY & CUSTOMER SERVICE

8.1 Warranty

Charles offers a 2-year warranty on this product. 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
 5600 Apollo Drive
 Rolling Meadows, Illinois 60008-4049
 U.S.A.
 847-806-6300 (Main Office)
 847-806-6231 (FAX)

8.2 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 for replacement or repair instructions, or follow the *Repair Service Procedure* below.

8.3 Advanced Replacement Service (In-Warranty Units)

Charles 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.

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

Charles offers a standard repair or exchange service for units either in- or out-of-warranty. With this service, units may be shipped to Charles for either repair and quality testing or exchanged for a replacement unit, as determined by Charles. 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 Charles at 217-932-5292 (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.

Charles
503 N.E. 15th St, P.O. Box 339
Casey, IL 62420-2054
U.S.A.
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.

9. SPECIFICATIONS

9.1 Regulatory

Complies with FCC part 68 and UL 1950, FCC part 15.

9.2 Electrical

Parameter	Specification
Number of subscribers for each unit	For 3658-85: 12 circuits For 3658-86: 6 circuits
Quantizing Level	8 bit, A-law encoding.
Insertion Loss	0 dB \pm 0.5 dB (@ 1004 Hz)
XMT input TLP range	-10.0 to +6.0 dBm
XMT default input level	0 dBm
RCV output TLP range	+6.0 to -10.0 dBm
RCV default output level	-3.0 dBm
Gain from Frequency Change	300 to 3000 Hz: -0.25 to +0.5 dB 3000 to 3400 Hz: -0.25 to +1.5 dB
Gain from Input Level Tracking (Single circuit)	+3 to -37 dBm0: < 0.25 dB -37 to -50 dBm0: < 0.5 dB
Impedance	900 Ohm +2.15 uf or 600 Ohm +2.15 uf
Trans-hybrid loss	ERL: >34 dB SRL: >20 dB
Return Loss	ERL: >28 dB SRL: >20 dB
Longitudinal Balance	300 to 600 Hz: \geq 58 dB 600 to 2400 Hz: \geq 58 dB 2400 to 3000 Hz: \geq 58 dB 3000 to 3400 Hz: \geq 53 dB
Idle Channel Noise	Max 23 dBmC0
Signal to Quantizing Distortion ratio	0 to -30 dB: >33 dB -30 to -40 dB: >27 dB -40 to -45 dB : >22 dB
Cross Talk Attenuation	>65 dB
Loopback	Network side loopback
Ringing Voltage Circuit Sensitivity	65 Vrms at 20 Hz minimum
Tip Ground Circuit Sensitivity	850 ohm and less for detection; 10,000 ohm and more for no detection
Ring ground nominal circuit resistance	410 ohms
Circuit internal loop resistance	360 ohms minimum/ 670 ohms maximum DC resistance of circuit
Power supply current	3658-85: 0.13 amp 3658-86: 0.08 amp
Heat dissipation	3658-85: 6.5 watts 3658-86: 4.0 watts

9.3 Physical

See Table 7 for the physical characteristics of the unit.

Table 7. Physical Specifications

Feature	3658-80		3658-81	
	U.S.	Metric	U.S.	Metric
Height	0.75 inch	1.905 centimeters	0.75 inch	1.905 centimeters
Width	9.63 inches	24.46 centimeters	5.64 inches	14.32 centimeters
Depth	9.25 inches	23.49 centimeters	9.25 inches	23.49 centimeters
Weight	1 pound, 6 ounces	0.63 kilograms	13.8 ounces	0.39 kilogram
Operating Temperature	-40° to 149° F	-40° to 65° C	-40° to 149° F	-40° to 65° C
Humidity	To 95%			

