3652-80 12-Channel and 3652-81 6-Channel 2/4-Wire E&M/Transmission-Only Channel Unit

CONTENTS PAGE

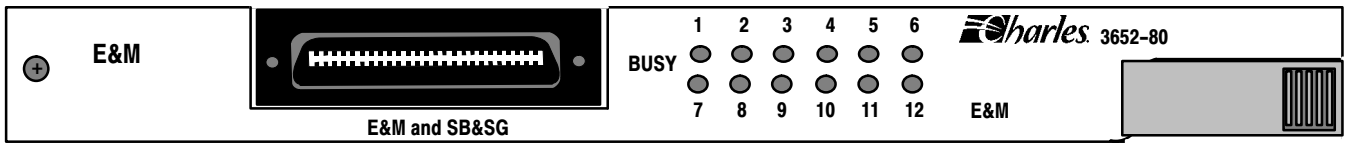


Figure 1. 3652-80 Front Panel

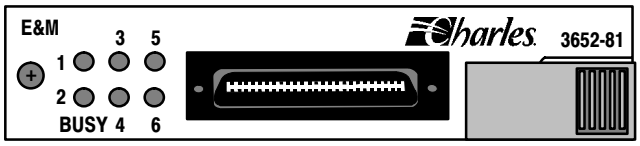


Figure 2. 3652-81 Front Panel

1. GENERAL

1.1 Document Purpose

This document provides general, installation and testing information for the 12-channel and 6-Channel 2/4-Wire E&M/Transmission Only (TO) Channel Units. This document covers model numbers 3652-80 and 3652-81.

1.2 Document Status

This document is reprinted to add E&M circuit diagrams.

1.3 Equipment Function

The 2/4-wire E&M/TO unit is part of the 360-80 Intelligent Channel Bank (ICB).

1.4 Equipment Location/Mounting

The 3652-80 plugs into any full size slot of the Charles Industries 360-80 ICB. The 3652-81 plugs in to the half-size slot of the ICB. This unit can only be used in issue 3 or later ICB shelves.

1.5 Equipment Features

This unit provides the following features:

- Supports 2/4-wire E&M and TO operation
- Supports E&M signaling types (I, II, III, IV or V)
- Supports E&M tandem operation with signaling type V
- Provides E&M type DC signaling that is separate from the voice leads
- Supports bidirectional per channel loopback
- Supports both 2-wire and 4-wire interfaces for either 600 or 900 ohm operation
- Supports non-signaling transmission only (TO) operation using full 8-bit encoding/decoding
- Accommodates transmit and receive TLP levels from −19 to +13 dBm (extended range) in 4 wire mode
- Prescription attenuation control of up to 32 dB in 0.1 dB increments in both the transmit and receive paths
- Provides Mu-law encoding for T1 and A-law encoding for E1
- Temperature hardened (−40 to +65 C)
- UL/CSA approved and FCC verified.

1.6 Indicators

This unit is able to provide a variety of status information. The following is a list of status information available through the management interface:

- Per channel forced busy (yes, no)
- Per channel Busy LED state (On, Off)
- Per channel time slot used (T1=1−24, none) (E1=1−15, 17−31, none)
- Per channel unit configuration (2-wire, 4-wire)
- Per channel interface impedance (600, 900)
- Per channel unit mode (E&M, TO)
- Per channel signaling mode (I, II, III, IV, V)

- Per channel transmit level setting (−19 to +13 dBm in 0.1 dB increments in 4-wire mode and −19 to +7 dBm in 0.1 dB increments in 2-wire mode)
- Per channel receive level setting (−19 to +13 dBm in 0.1 dB increments in 4-wire mode and −19 to +7 dBm in 0.1 dB increments in 2-wire mode)
- Per channel loopback (loopback, release)
- Per channel CGAI action (Idle, Busy)
- Per channel CGAD action (Idle, Busy).

1.7 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.

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 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 E&M Channel Units

These channel units provide E&M type DC signaling. Both 2W and 4W modes are available. E&M units are typically used to provide PBX tie trunk channels, but are widely used for other services and applications that require a separate signaling path. See Figure 3.

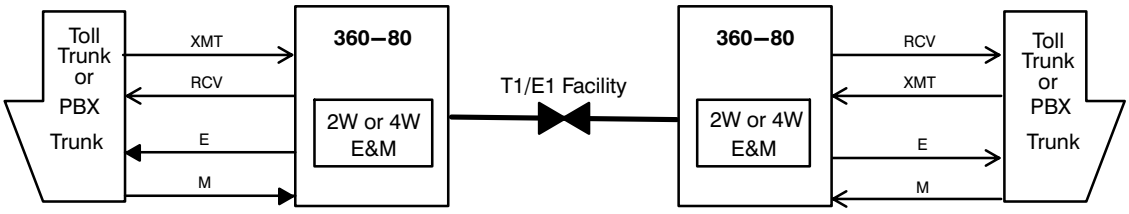


Figure 3. Typical PBX Tie Trunk Application Using E&M Channel Units

The units can also be used in a tandem configuration if only two-state signaling is needed (see Figure 4). Signaling type V would be selected for both units in this application.

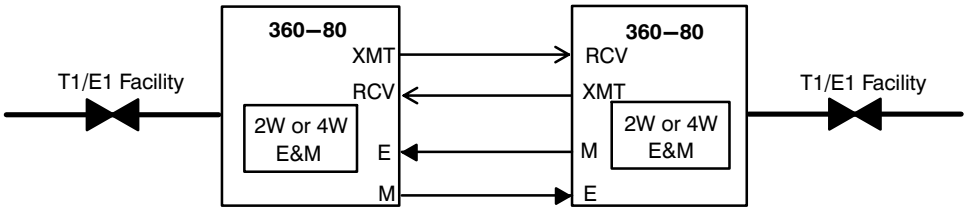


Figure 4. Tandem Office Pulse Link Repeater (PLR) Application

Signalling types II and IV can also be used in a tandem configuration, but would require the wiring of the EB and MB leads in addition to the E and M leads.

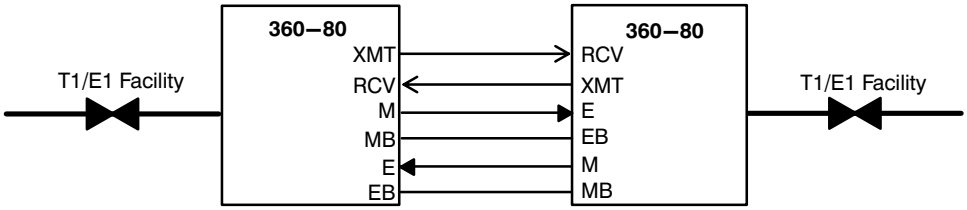


Figure 5. Tandem Office Pulse Link Repeater (PLR) Application Using Type II or IV

3.2 Transmission Only (TO) Channel Units

TO channel units are used for circuits where DC signaling is not required. The unit can be optioned for 2-wire (2W) or 4-wire (4W) mode. Typical applications include providing channels for 4W voiceband modems in point-to-point or multipoint networks. See Figure 6.

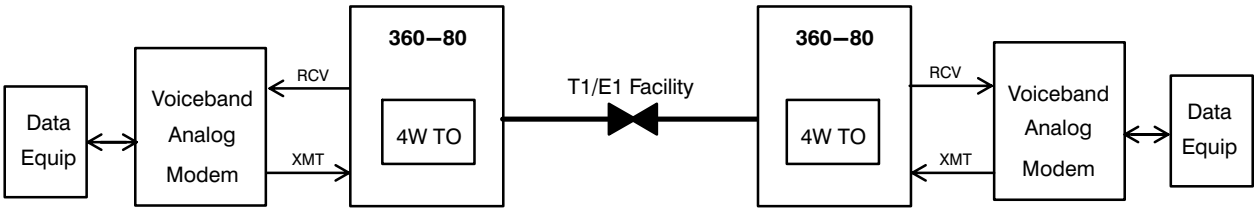


Figure 6. Typical Voiceband Modem Data Application

4. CIRCUIT DESCRIPTION

The following describes one of the circuits on the unit and can be considered typical of any of the circuits.

4.1 Incoming Voice Operation (From the Network)

Each circuit, or channel, of the unit receives digital voice and signaling information from the ICB's network interface unit. The digital voice information is converted to analog voice information and conveyed to the receive level adjusting circuit. Receive Transmission Level Point (RTLP) is the level of the analog signal that is output when a 0bBm signal is received from the digital network. If the RTLP is set to +6.0 dB, then a 0dBm0 signal received from the network will be output as a +6.0 analog signal. The signal then goes through a hybrid, which transmits the voice information to the two wire transmission facilities. The impedance of the hybrid can be configured for either a balanced 600 or 900 ohm facility. In the 4W mode, the voice information does not use the hybrid; it goes directly to the line transformer, which can be configured for either a balanced 600 or 900 ohm facility.

4.2 Outgoing Voice Operation (To the Network)

In the 2W mode, analog voice information presented from the 2W transmission facility is passed to the 600 or 900 ohm impedance matching hybrid and is then conveyed to the level adjusting circuit. In the 4W mode, the analog voice information is presented from the 4W facility to the line transformer that can match either a 600 or a 900 ohm facility. The voice information is then conveyed to the level adjusting circuit. Transmit Transmission Level Point (TTLP) is the level of analog signal that is transmitted toward the digital network or 0dBm0. Therefore, if the TTLP is set to −16.0 dBm, then a −16.0 dBm0 analog signal will be transmitted onto the network as 0dBm0. From the level adjusting circuit, 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 the far end equipment.

4.3 Incoming E&M Signaling Operation

The digital signaling information from the network interface unit is converted into the A and B signaling highway information. Although both the A and B signaling highways are supposed to be the same, in the event they are not, only the A highway is observed. The incoming A signaling highway is used to illuminate the busy LED and operate the relay to change the signaling leads on the analog output of the unit. The unit is compatible with E&M modes type I through V (see figure 6). When the incoming A signaling highway changes states from idle (0) to busy (1), the relay is operated and the output E, or E and SG lead, change states from idle to busy.

4.4 Outgoing E&M Signaling Operation

When the M, or M and SB leads to the unit are changed from their idle to busy conditions, the unit will change the outgoing A&B signaling highways' states from idle (0) to busy (1).

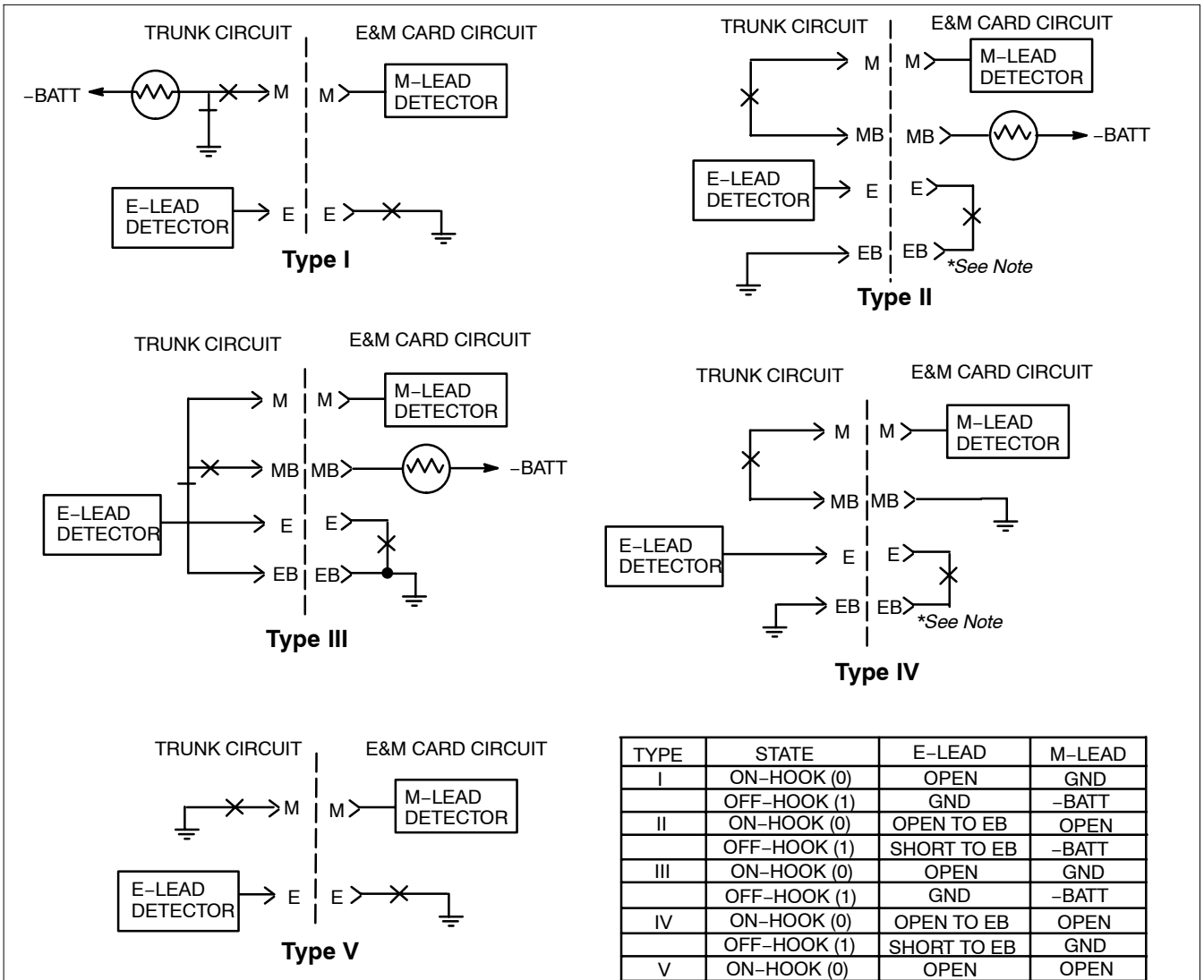
Type I and V E&M signaling only require the use of the E and M leads. Type II, III, and IV require the use of both the E&M and SG and SB leads on the unit (see figure 6). For types I and V, it is also essential that the power return ground connected to the ICB be the same reference as the power return ground used by the interfacing local E&M equipment. The transmission and signaling leads are designed to be used only in local, in-house wiring facilities and not to outside plant wiring facilities.

In transmission only (TO) applications, only the transmissions lead, T&R or T&R and T1R1, are used. The unit, when configured for TO, is configured for full 8 bit encoding and decoding. There is no signaling with transmission-only. To allow tandem operation, use E&M signaling type 5. Connect the E-lead of the ICB to the M-lead of a second E&M card, and the E-lead of the second E&M card to the M-lead of the ICB.

4.5 CGAI/CGAD Operation

Each circuit can be configured for a different operation in a Carrier Group Alarm. It is important the E and EB leads are wired correctly to prevent incorrect signaling if a channel bank power failure occurs.

When a T1 Carrier Group Alarm is detected, CGAI will immediately initiate the signaling condition defined for the circuit under the CGAI signaling state. This signaling condition will be present for 2.5 seconds. At 2.5 seconds, the Carrier Group Alarm Delayed signaling condition will become active and the signaling state under CGAD remains active until the T1 Carrier Group Alarm is removed.



TYPE	STATE	E–LEAD	M–LEAD
I	ON–HOOK (0)	OPEN	GND
	OFF–HOOK (1)	GND	–BATT
II	ON–HOOK (0)	OPEN TO EB	OPEN
	OFF–HOOK (1)	SHORT TO EB	–BATT
III	ON–HOOK (0)	OPEN	GND
	OFF–HOOK (1)	GND	–BATT
IV	ON–HOOK (0)	OPEN TO EB	OPEN
	OFF–HOOK (1)	SHORT TO EB	GND
V	ON–HOOK (0)	OPEN	OPEN
	OFF–HOOK (1)	GND	GND

Note: For safety reasons, the EB lead will default to channel bank battery ground with no power applied to the 360-80 channel bank. It is important that the E & EB polarity be maintained when connecting with far end equipment.
For signaling types I & V to function correctly, it is important to connect the battery return to earth ground.

Figure 7. E&M Signaling Circuit Diagrams

5. INSTALLATION

5.1 Installing the Unit

5.1.1. Attaching the Rear Panel

The rear panel of the full size unit (3652-80) should be installed before all the units are installed in the shelf, and before wiring begins. The half size unit (3652-81) does not require a new rear panel.

Figure 8. 3652-80 2W/4W E&M/TO Rear Panel

5.1.2. Installing a New Unit

Make sure that all manual optioning is done on the new unit. See Figure 9 and Figure 10 for option locations.

Note: Any manual optioning that is not done before the card is installed will require the system to discontinue service on all circuits when the card is removed for optioning in the future.

Step	Action
1.	Set hardware options as described in the *Optioning* section of this document.
2.	If not already installed, install the rear panel, screwing it to the appropriate mounting locations on the shelf using the provided hardware. **WARNING** **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.**
3.	Align the unit with the card guides and slide it all the way into the shelf.
4.	Once the unit is fully inserted, tighten the securing screw on the front panel of the unit.
5.	Wire the unit according to the wiring instructions provided in this document.
6.	Once the unit has been inserted properly, a self-test is performed to ensure that it is compatible with the network management software on the system. 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 Network Management section for more information on the operation of this interface).

5.1.3. Installing a Replacement Unit

If you are replacing a unit that is already in service, make sure the unit is the same type and that the hardware has been optioned the same as the previous unit.

Step	Action
1.	Remove the wiring connectors from the front and 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.	Before installing the new unit, make sure the optioning is the same as the unit removed.
5.	Follow the procedure for installing a new unit.

5.2 Wiring the Unit

The pin chart for the full size (3652-80) appears in Table 1.

Note: T/R is analog into the card, transmitted toward the network. T1/R1 is analog output that is received from the network.

Table 2. Pin Chart for 50-pin Male (25-pair) TELCO Connector on the Back Panel of the Full Size Unit (3652-80)

Circuit	Pin	
Circuit 1	Pin 1 = R	Pin 26 = T
	Pin 2 = R1	Pin 27 = T1
Circuit 2	Pin 3 = R	Pin 28 = T
	Pin 4 = R1	Pin 29 = T1
Circuit 3	Pin 5 = R	Pin 30 = T
	Pin 6 = R1	Pin 31 = T1
Circuit 4	Pin 7 = R	Pin 32 = T
	Pin 8 = R1	Pin 33 = T1
Circuit 5	Pin 9 = R	Pin 34 = T
	Pin 10 = R1	Pin 35 = T1
Circuit 6	Pin 11 = R	Pin 36 = T
	Pin 12 = R1	Pin 37 = T1
Circuit 7	Pin 13 = R	Pin 38 = T
	Pin 14 = R1	Pin 39 = T1
Circuit 8	Pin 15 = R	Pin 40 = T
	Pin 16 = R1	Pin 41 = T1
Circuit 9	Pin 17 = R	Pin 42 = T
	Pin 18 = R1	Pin 43 = T1
Circuit 10	Pin 19 = R	Pin 44 = T
	Pin 20 = R1	Pin 45 = T1
Circuit 11	Pin 21 = R	Pin 46 = T
	Pin 22 = R1	Pin 47 = T1
Circuit 12	Pin 23 = R	Pin 48 = T
	Pin 24 = R1	Pin 49 = T1

5.2.1. E&M Signaling TELCO Connector

Note: MB is also known as SB, and EB is also known as SG

Table 3. Pin Chart for 50-pin Male (25-pair) TELCO Connector on the Front of the Full Size (3652-80)

Circuit	Pin	
Circuit 1	Pin 1 = M	Pin 26 = E
	Pin 2 = MB	Pin 27 = EB
Circuit 2	Pin 3 = M	Pin 28 = E
	Pin 4 = MB	Pin 29 = EB
Circuit 3	Pin 5 = M	Pin 30 = E
	Pin 6 = MB	Pin 31 = EB
Circuit 4	Pin 7 = M	Pin 32 = E
	Pin 8 = MB	Pin 33 = EB
Circuit 5	Pin 9 = M	Pin 34 = E
	Pin 10 = MB	Pin 35 = EB
Circuit 6	Pin 11 = M	Pin 36 = E
	Pin 12 = MB	Pin 37 = EB
Circuit 7	Pin 13 = M	Pin 38 = E
	Pin 14 = MB	Pin 39 = EB
Circuit 8	Pin 15 = M	Pin 40 = E
	Pin 16 = MB	Pin 41 = EB
Circuit 9	Pin 17 = M	Pin 42 = E
	Pin 18 = MB	Pin 43 = EB
Circuit 10	Pin 19 = M	Pin 44 = E
	Pin 20 = MB	Pin 45 = EB
Circuit 11	Pin 21 = M	Pin 46 = E
	Pin 22 = MB	Pin 47 = EB
Circuit 12	Pin 23 = M	Pin 48 = E
	Pin 24 = MB	Pin 49 = EB

Table 4. Pin Chart for 50-pin Male (25-pair) TELCO Connector on the Front of Half Size (3652-81)

Circuit	Pin			
Circuit 1	Pin 1 = R	Pin 26 = T	Pin 13 = M	Pin 38 = E
	Pin 2 = R1	Pin 27 = T1	Pin 14 = MB	Pin 39 = EB
Circuit 2	Pin 3 = R	Pin 28 = T	Pin 15 = M	Pin 40 = E
	Pin 4 = R1	Pin 29 = T1	Pin 16 = MB	Pin 41 = EB
Circuit 3	Pin 5 = R	Pin 30 = T	Pin 17 = M	Pin 42 = E
	Pin 6 = R1	Pin 31 = T1	Pin 18 = MB	Pin 43 = EB
Circuit 4	Pin 7 = R	Pin 32 = T	Pin 19 = M	Pin 44 = E
	Pin 8 = R1	Pin 33 = T1	Pin 20 = MB	Pin 45 = EB
Circuit 5	Pin 9 = R	Pin 34 = T	Pin 21 = M	Pin 46 = E
	Pin 10 = R1	Pin 35 = T1	Pin 22 = MB	Pin 47 = EB
Circuit 6	Pin 11 = R	Pin 36 = T	Pin 23 = M	Pin 48 = E
	Pin 12 = R1	Pin 37 = T1	Pin 24 = MB	Pin 49 = EB

6. OPTIONING

Each of the channels in the E&M unit is individually controlled and optioned.

6.1 Hardware Optioning

To set hardware options, the E&M unit must be removed from service. Hardware options should be set prior to installing the unit to prevent further interruption of service.

Table 5. Hardware Options

Option	Choices	Set Jumpers...
2W/4W Mode. Set using 8 jumpers. All 8 jumpers for that circuit must be changed together when the module is removed from the slot.	2W	Jx05 through Jx12 to jumper pins 2–3 (black jumpers)
	4W (default)	Jx05 through Jx12 to jumper pins 1–2 (black jumpers)
Per channel hybrid impedance. Set using 4 jumpers. All 4 jumpers for that circuit must be changed together when the module is removed from the slot.	600 ohms (default)	Jx01 through Jx04 to jumper pins 1–2. (yellow jumpers)
	900 ohms	Jx01 through Jx04 to jumper pins 2–3. (yellow jumpers)
Note: The x in Jx represents any of the channels.		

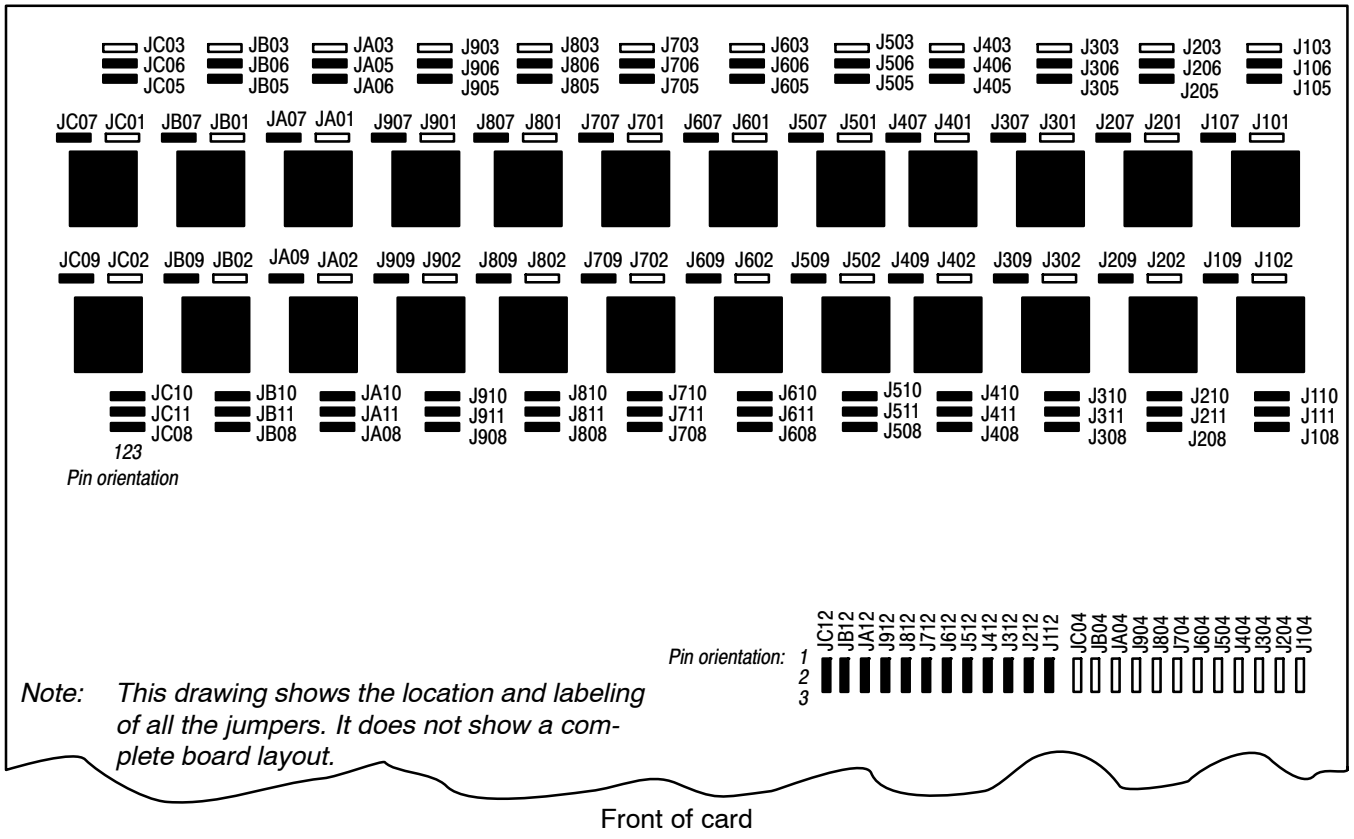


Figure 9. Location of Optioning Jumpers—Full Size Unit (3652-80)

Note: This drawing shows the location and labeling of the jumpers. It does not show a complete board layout.

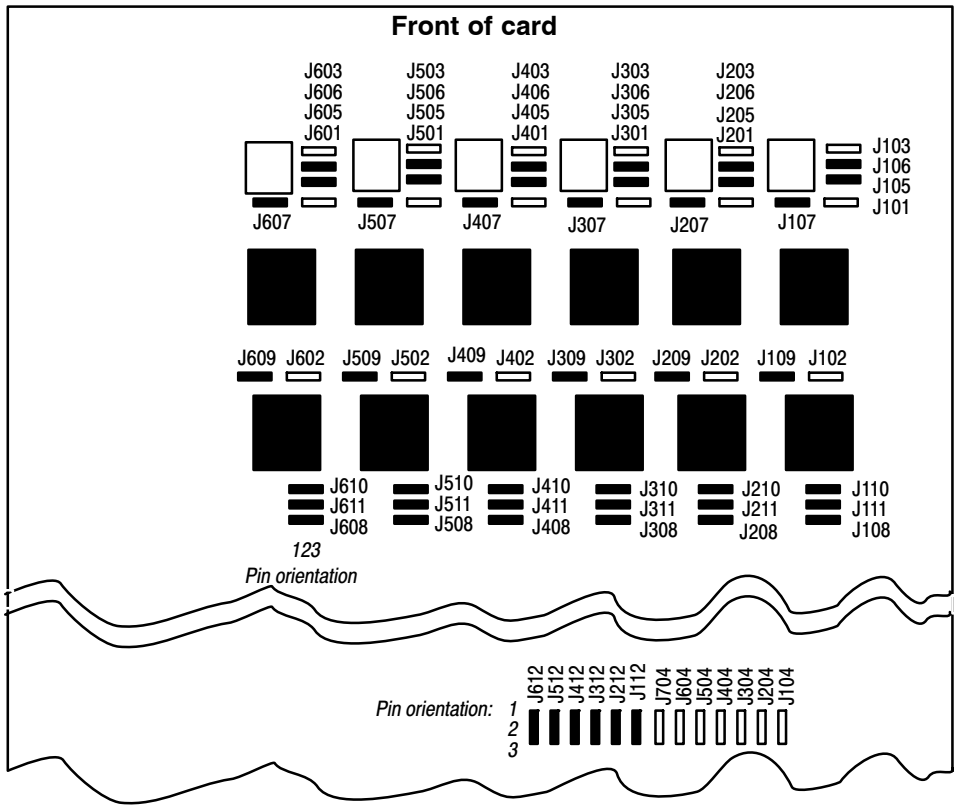


Figure 10. Location of Optioning Jumpers—Half Size Unit (3652-81)

6.2 Software Optioning

Refer to the craft interface or Network Management software 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 time slot allocation	T1=1–24, none E1=1–15, 17–31, none	3652-80: timeslot=channel # 3652-81: timeslot=none (for T1) channel number (for E1)
Per channel unit configuration	2-wire, 4-wire	4-wire per card jumper setting
Per channel operating mode	E&M, TO	E&M
Per channel signaling mode	I, II, III, IV, V	V
For 4W mode: Per channel transmit level setting	–19 to +13 dBm	–16 dBm
Per channel receive level setting	–19 to +13 dBm	+7 dBm
For 2W mode: Per channel transmit level setting	–19 to +7 dBm	0 dBm
Per channel receive level setting	–19 to +7 dBm	–3 dBm
Per channel loopback	active, none	None
Per channel CGAI action	Idle, Busy	Idle
Per channel CGAD action	Idle, Busy	Busy

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 the Charles Service Center 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 Service Center
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

UL/CSA listed and FCC verified.

9.2 Electrical

Parameter	Function Specification	
Number of subscribers for each unit	3652-80: 12 circuits 3652-81: 6 circuits	
Operating mode	TO with full 8 bit encoding, EM type I, II, III, IV, V. 2 or 4 wire for each type.	
Quantizing Level	8 bit, U-law encoding for T1. 8 bit, A-law encoding for E1	
Insertion Loss	0 dB ± 0.5 dB (@ 1004 Hz)	
XMT Input TLP Range	4W Mode: –19.0 to +13.0 dBm (in 0.1 dBm steps) 2W Mode: –19.0 to +7.0 dBm (in 0.1 dBm steps)	
Transmit Default Input Level	4W Mode: –16.0 dBm for 4 wire option 2W Mode: 0 dBm for 2 wire option	
RCV Output TLP Range	4W Mode: –19.0 to +13.0 dBm (in 0.1 dBm steps) 2W Mode: –19.0 to +7.0 dBm (in 0.1 dBm steps)	
Receive Default Output Level	4W Mode: +7.0 dBm 2W Mode: –3.0 dBm	
XMT AND RCV prescription ATTN	4W Mode: 0 to 32.0dB (in 0.1 dB steps) 2W Mode: 0 to 26.0dB (in 0.1 dB steps)	
Loss with Frequency Change (maximum) 300 – 3000 Hz 3000 to 3400 Hz	2 wire: –0.25 to +0.5 dB –0.25 to +1.5dB	4 wire: –0.15 to +0.15dB –0.15 to +1.5 dB
Loss with input level tracking (single circuit)	+3 to –37 dBm0: < 0.25 dB –37 to –50 dBm0: < 0.5 dB	
Impedance (each channel has individual switch or strap)	4W Mode: 600 Ohm or 900 Ohm. 2W Mode: 600 ohm + 2.16uf or 900 + 2.16 uf.	
TRANS-HYBRID loss (2w only)	ERL: > 28 dB SRL: > 20 dB	
Return Loss (minimum) ERL SRL	2 wire: 28 dB 20 dB	4 wire: 28 dB 23 dB

Parameter	Function Specification	
Longitudinal Balance	2 wire:	4 wire:
300 – 600 Hz	≥ 58 dB	≥ 64 dB
600 – 2400 Hz	≥ 58 dB	≥ 64 dB
2400 – 3000 Hz	≥ 58 dB	≥ 64 dB
3000 – 3400 Hz	≥ 53 dB	≥ 69 dB
Idle Channel Noise	Max 20 dBrnCO	
Signal to Quantizing Distortion Ratio	0 to – 30 dB = > 33 dB –30 to – 40 dB = > 27 dB –40 to – 45 dB = > 22 dB	
Signal Distortion	–40 dBm0 in band single frequency –28 dBm0 out of band single frequency	
Cross Talk Attenuation	> 65 dB	
Group Delay Distortion	500 to 600 Hz: <1500 μs 600 to 1000 Hz: <750 μs 1000 to 2600 Hz: <250 μs 2600 to 2800 Hz: <1500 μs	
SB Lead current limiting protection resistor	1000 ohm or less	
M lead sensitivity	Off hook	
Loopback	PC interface control loopback for codec to network side loopback.	
LED	Busy LED will be lit to indicate busy status	
Power Supply Current	3652-80: 0.175 amp. 3652-81: 0.10 amp.	
Heat Dissipation	3652-80: 8.75 watts 3652-81: 5.0 watts	

9.3 Physical

See Table 6 for the physical characteristics of the unit.

Table 6. Physical Specifications

Feature	3652-80		3652-81	
	U.S.	Metric	U.S.	Metric
Height	0.75 inch	1.9 centimeters	0.75 inch	1.9 centimeters
Width	9.625 inches	24.45 centimeters	5.64 inches	14.32 centimeters
Depth	9.25 inches	23.49 centimeters	9.25 inches	23.49 centimeters
Weight	1 pound, 10 ounces	.737 kilogram	13.8 ounces	0.39 kilogram
Temperature	–40° F to + 149° F	–40° C to + 65° C	–40° F to + 149° F	–40° C to + 65° C
Humidity	<95% (non-condensing)		<95% (non-condensing)	