3652–69 4-Wire Tandem Channel Unit (4W TDM)

CONTENTS PAGE

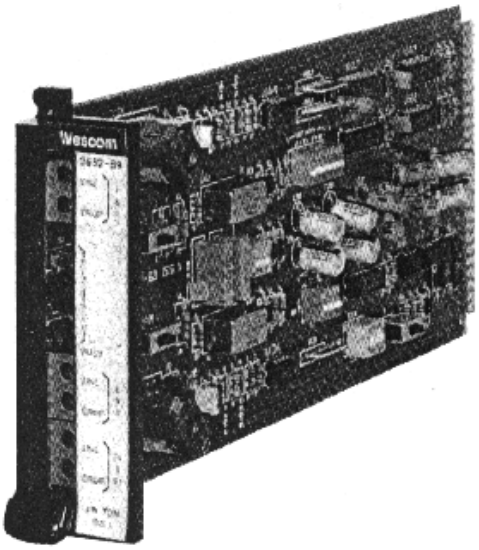


Figure 1. 3652–69 4W TDM Channel Unit

1. GENERAL

1.1 Document Purpose

This document provides general, application, installation and optioning information for the Charles Industries 3652–69 4W TDM Channel Unit, shown in Figure 1.

1.2 Document Status

This document is reprinted to include a general editorial update.

1.3 Equipment Function

The3652–69 4W TDM Channel Unit operates in a Charles Industries 360/363 D4 Digital Carrier Terminal to provide an interface to another 4-wire TDM channel unit.

1.4 Equipment Location/Mounting

The 3652–69 4W TDM occupies one channel unit slot of a Charles Industries 360/363 D4 Digital Carrier Terminal.

1.5 Equipment Features

The 3652–69 features include the following:

- Compliance with AT&T Publication 43801
- Prescription attenuation adjustments for the transmit and receive levels
- 600-ohm impedance at the 4-wire interface
- Front panel bantam breaking jacks for accessing the transmit and receive ports
- Front panel BUSY switch
- Front panel BUSY LED
- Compatible with Type I, II, and III signaling
- Optionable for 2- or 3-state signaling
- Switch-selectable compatibility with station or central office channel units at the far end

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.

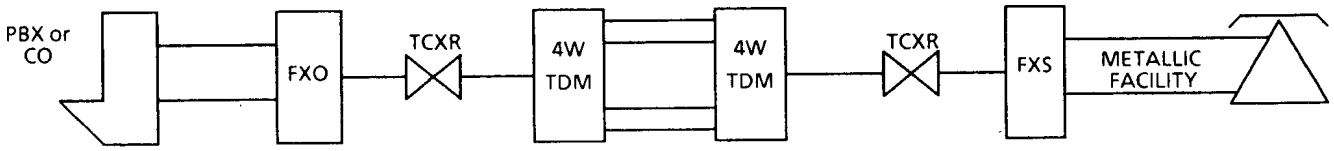
STATIC-SENSITIVE

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

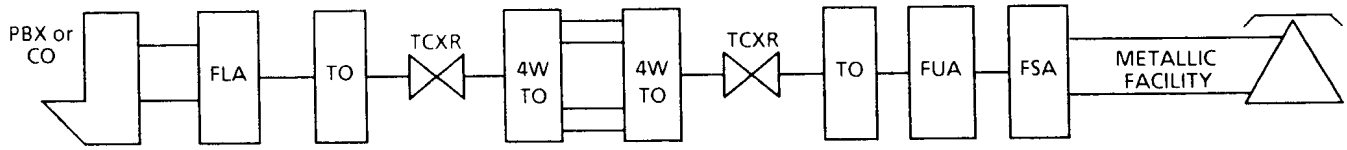
- **Use approved static preventive measures (such as a static-conductive wrist strap and a static-dissipative mat) at all times whenever touching units outside of their original, shipped static-protective packaging.**
- **Do not ship or store units near strong electrostatic, electromagnetic, or magnetic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

3. APPLICATION GUIDELINES

Typical applications for the 3652–69 4W TDM channel unit are for facility interfaces requiring two- or three-state signaling. A typical application is shown in Figure 2 with its equivalent circuits.



3652-69 4W TDM Typical Application



Equivalent Circuit Not Using TDM Channel Units

Figure 2. 3652-69 Typical Application And Equivalent Circuit

4. CIRCUIT DESCRIPTION

Refer to the 3652–69 block diagram in Figure 3 and the signaling diagrams in Figure 5 while reading the following circuit description.

4.1 Transmit VF Path

VF signals applied to T and R are routed through the front panel DROP and LINE jacks to the XMT transformer which provides dc isolation from the line.

The output of the XMT transformer is applied to the XMT PRESCRIPTION ATTN and XMT GAIN circuits which, acting together, set the transmit path gain to the proper level required to interface with a range of office TLPs. The XMT PRESCRIPTION ATTN allows for the input level from –3.6 to + 12.9dBm in 0.1dB increments.

The adjusted VF signal is then applied first to the XMT FILTER for suppression of frequencies outside the bandwidths of the standard voice frequency and then to the ENCODER which provides the A/D conversion and sends the resulting PCM signal to the 360/363 common equipment via the XDATA lead.

4.2 Receive VF Path

The PCM digital signal from the far end is received by the 360/363 common equipment and routed to the channel unit via the RDATA lead. The DECODER then performs a digital-to-analog conversion on this data and outputs an analog signal.

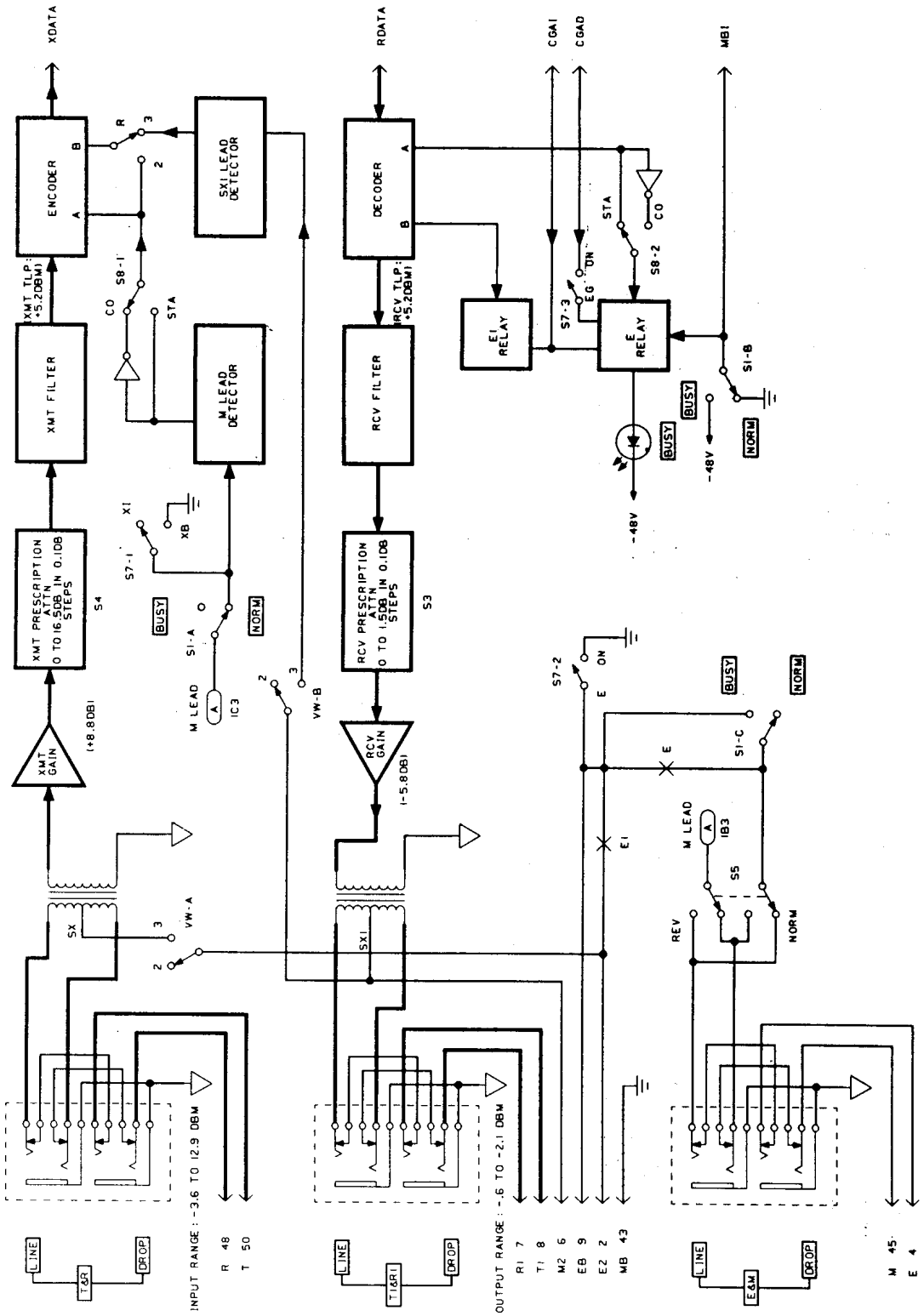


Figure 3. 3652-69 4-Wire TDM Channel Unit (4W TDM) Block Diagram (Sheet 1 of 2)

NOTES:

1. ⟵ PC BOARD CONNECTOR PIN
2. XXXX FRONT PANEL MARKING
3. ⟵ SIGNAL FLOW DIRECTION
4. ——— PRIMARY TRANSMISSIOM PATH
5. (X)— ALL LIKE-DESIGNATED POINTS ARE CONNECTED
6. —X—|— N.O.,N.C. RELAY CONTACT.
7. GANGED SWITCHES ARE INDICATED BY DASHED CONNECTION LINE OR ALPHABETICALLY SUFFIXED REF. DESIG.:NUMERICAL SUFFIX DENOTES DISCRETE SWITCH WITHIN A PACKAGE.
8. FRONT PANEL TEST JACKS:

MARKING	FUNCTION
T & R LINE	ACCESS TOWARDS CHANNEL UNIT
T & R DROP	ACCESS TOWARDS OFFICE EQUIPMENT
TI & RI LINE	ACCESS TOWARDS CHANNEL UNIT
TI & RI DROP	ACCESS TOWARDS OFFICE EQUIPMENT
E & M LINE	ACCESS TOWARDS CHANNEL UNIT
E & M DROP	ACCESS TOWARDS OFFICE EQUIPMENT

9. THE XMT INPUT RANGE AT T & R IS -3.6 TO 12.9 DBM.
10. THE XMT PRESCRIPTION ATTN PROVIDES FROM 0 TO 16.5DB OF ATTENUATION IN 0.1DB INCREMENTS TO COMPENSATE FOR INPUT LEVEL VARIATIONS.
11. THE RCV OUTPUT RANGE AT TI & RI IS -0.6 TO -2.1 DBM.
12. THE RCV PRESCRIPTION ATTN PROVIDES FROM 0 TO 1.5DB OF ATTENUATION IN 0.1DB INCREMENTS TO COMPENSATE FOR OUTPUT LEVEL VARIATIONS.
13. BUSY SWITCH:
SWITCH HANDLE DOWN IS NORMAL [NORM] POSITION.

SWITCH HANDLE UP IS BUSY [BUSY] POSITION.

THE BUSY SWITCH PERFORMS THE FOLLOWING FUNCTIONS:

A. DISCONNECTS THE E & M LEADS FROM THE OFFICE EQUIPMENT.
B. ILLUMINATES THE FRONT PANEL BUSY LED.
C. APPLIES A BUSY CONDITION ON THE E LEAD TO THE OFFICE EQUIPMENT.
D. SENDS A BUSY SIGNAL TO THE FAR END. THIS FUNCTION MAY BE DISABLED BY OPTIONING S7-1 TO X1.
E. ILLUMINATES THE BUSY LED ON THE ALARM LOGIC UNIT.

14. XMT SIGNALING CONDITIONS: (M LEAD & SX1 LEAD)
GROUND = BUSY
OPEN = IDLE

THE MB LEAD (PIN 43) PROVIDES A GROUND WHICH MAY BE RETURNED TO THE M LEAD THRU AN OFFICE CONTACT FOR A TYPE II INTERFACE.

15. RCV SIGNALING CONDITIONS: (E LEAD & SX LEAD)
BUSY = SHORTS E LEAD TO EB LEAD, SX LEAD TO EB LEAD
IDLE = OPENS E LEAD TO EB LEAD, SX LEAD TO EB LEAD

OPTION S7-2 (E) WHEN OPTIONED TO THE 'ON' POSITION GROUNDS THE EB LEAD FOR TYPE II INTERFACES.

16. UPON CARRIER GROUP ALARM THE E AND E1 RELAYS ARE IMMEDIATELY IDLED. WITH OPTION S7-3 (EG) TO THE 'ON' POSITION, THE E RELAY WILL BE BUSIED APPROXIMATELY 2.5 SECONDS LATER.
17. OPTION S5 PROVIDES E & M LEAD REVERSAL

S5	CONDITION
NORM	M LEAD TO PIN 45 E LEAD TO PIN 4
REV	M LEAD TO PIN 4 E LEAD TO PIN 45

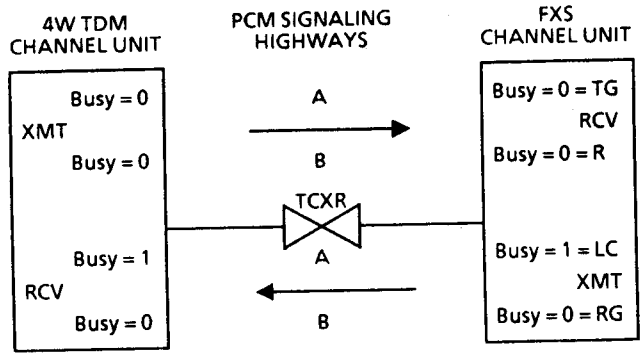
18. OPTIONS VW AND R PROVIDE FOR SELECTING 2 OR 3 STATE SIGNALING. OPTIONED FOR 2 STATE SIGNALING PROVIDES THE FOLLOWING:
A. DISCONNECTS THE SX1 LEAD FROM THE SIGNALING CIRCUITRY.
B. DISCONNECTS THE SX LEAD FROM THE E1 RELAY.
C. CONNECTS THE XMT B SIGNALING HIGHWAY TO THE XMT A SIGNALING HIGHWAY.

OPTIONED FOR 3 STATE SIGNALING PROVIDES THE FOLLOWING:
A. CONNECTS THE SX1 LEAD TO THE SIGNALING CIRCUITRY TO THE XMT B SIGNALING HIGHWAY.
B. CONNECTS THE SX LEAD TO THE E1 RELAY CONTACT CONTROLLED BY THE RCV B SIGNALING HIGHWAY.

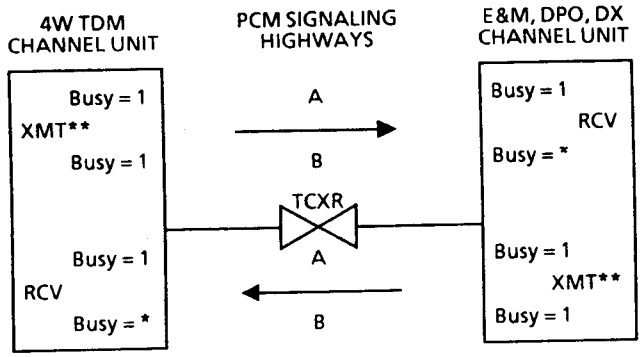
19. OPTION S8 (STA/CO) PROVIDES FOR SIGNALING COMPATIBILITY FOR FXS OR FXO CHANNEL UNITS AT THE FAR END.

FAR END CHANNEL UNIT	S8
FXS	STA
FXO	CO

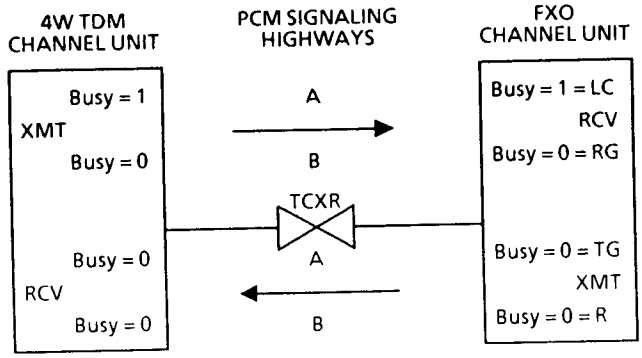
Figure 4. Notes for Figure 3



Station Mode Signaling Logic



2-State Mode Signaling Logic (E&M, DPO, DX, RPT)



CO Mode Signaling Logic

Figure 5. Signaling Logic

The output of the DECODER is fed to the RCV FILTER which suppresses frequencies outside the standard voice frequency bandwidth (0 to 4kHz). The filtered analog output of the RCV FILTER is applied to the RCV PRESCRIPTION ATTN and the RCV GAIN circuits which, acting together, set the receive path gain to the proper level required to interface with a range of office TLPs. The RCV PRESCRIPTION ATTN allows an adjustment for the output level from –0.6 to –2.1dBm in 0.1dB increments.

The output of the RCV PRESCRIPTION ATTN is applied to the RCV transformer which provides dc isolation. The signal is then fed through the LINE and DROP breaking jacks to the T1 and R1 output pins.

4.3 Signaling

4.3.1. Transmit

Ground and open conditions on the M-lead (pin 45) are detected as busy and idle conditions, respectively, and are transmitted on the XMT A signaling highway toward the far end. Depending on whether STA or CO signaling is selected by switch S8, the A highway is inverted to provide compatibility with station and office channel units located at the far end (see Table 1).

Table 1. Transmit Signaling Options

FAR-END CHANNEL UNIT	OPTIONS			
	S2	S6	S8–1	S8–2
All 2-state signaling units	2	2	CO	STA
FXO	3	3	CO	CO
FXS	3	3	STA	STA

Ground and open conditions on the simplex lead of the RCV transformer (SX1) are detected as busy and idle conditions and are transmitted on the XMT B signaling highway when 3-state signaling is selected. With the channel unit optioned for 2-state signaling, the XMT B signaling highway is connected to the XMT A signaling highway and the SX1 lead is disconnected from the detector circuitry.

4.3.2. Receive

RCV A signaling information is extracted from the PCM bit stream by the DECODER circuit and is applied to the E RELAY circuit. Busy and idle conditions cause the E lead (pin 4) to short to the EB lead (pin 9) and to open the E lead from the EB lead, respectively. Depending on whether STA or CO signaling is selected by option S8, the RCV A highway is inverted to provide compatibility with station and office channel units located at the far end. Option E is provided for Type 11 signaling compatibility.

RCV B signaling information is extracted from the PCM bit stream by the DECODER circuit and is applied to the El RELAY circuit. Busy and idle conditions cause the simplex lead of the XMT transformer (SX) to short to the EB lead (pin 9) and to open the SX lead from the EB lead.

For test and maintenance purposes, the simplex leads of the XMT and RCV transformers (SX and SX1) are also brought out on the E2 (pin 2) and M2 (pin 6) leads, respectively.

4.4 NORM/REV Switch

In order to accommodate interoffice wiring, the pinouts of the E and M leads may be reversed as shown in Table 2.

Table 2. E&M Lead Options

S5 POSITION	E LEAD	M LEAD
NORM	Pin 4	Pin 45
REV	Pin 45	Pin 4

4.5 NORM/BUSY Switch

In the NORM position, the NORM/BUSY switch provides continuity between the E and M leads and the signaling circuitry. in the BUSY position, the signaling circuitry will:

1. Short the E lead to the EB lead.

2. Illuminate the BUSY LED.

3. Send a busy signal on the XMT A highway with option S7–1 in the XB position, or send an idle signal on the XMT A highway with option S7–1 in the XI position.

4. Illuminate the BUSY LED on the Alarm Logic Unit (ALU).

4.6 Carrier Group Alarm (CGA)

When the ALU of the common equipment receives a carrier group alarm signal, the 3652–69 idles out the E and E1 RELAY circuits. if option S73 (EG) is set to the ON position, the E RELAY circuit is forced to the busy condition approximately 2.5 seconds after the start of the alarm condition.

5. MOUNTING

The 3652–69 mounts in one channel unit slot of a 360/363 D4 Terminal. The 3652–69 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 makes the channel unit easier to remove.

CAUTION

Install and remove modules 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 guides and connector to verify proper alignment and the absence of foreign material. If the module is packed with a slip-on plastic static guard over the module card-edge connector, remove the static guard before inserting the module into the mounting slot.

6. INSTALLER CONNECTIONS

Installer connections are made to the channel unit by wire-wrapping leads onto the associated 50-pin connectors 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. Refer to Section 360–000–200 for the wiring diagrams of the female connectors with respect to the 360/363 D4 Terminal being utilized. Electrical connections are made when the unit is installed.

7. OPTIONS

The 3652–69 is equipped with switch options that condition the module for proper operation. Refer to Figure 6 for the location and description of these options.

7.1 NORM/BUSY (Sl)

For normal channel unit operation, place Sl in the NORM position. For test and alignment purposes, place Sl in the BUSY position.

7.2 RCV Prescription Attenuation (S3)

S3 is a DIP switch that adjusts attenuation from 0 to 1.5dB in 0.1dB increments. These switches adjust the output range from –0.6 to –2.1dBm.

7.3 XMT Prescription Attenuation (S4)

S4 is a DIP switch that adjusts transmit attenuation from 0 to 16.5dB in 0.1dB increments. These switches adjust the XMT level to an input range from –3.6 to 12.9dBm.

7.4 Normal/Reverse (S5)

55 is a 2–position slide switch that reverses the E and M lead pinouts to accommodate interoffice wiring and test equipment (see Table 2).

7.5 Busy/Idle (S7–1)

Option S7–1 (XI/XB) provides the ability of sending either a busy signal (XB) or an idle signal (XI) on the XMT A signaling highway when the BUSY switch is in the BUSY position.

7.6 Type I, II, III Signaling (S7–2)

Option S7–2 (E) provides Type 11 signaling compatibility when set in the OFF position. For Type I and II signaling compatibility, place S7–2 in the ON position.

7.7 E Relay (S7–3)

Option S7–3 (EG), in the ON position, activates the E relay to send a near-end busy signal, approximately 2.5 seconds after the detection of a carrier group alarm. In the OFF position, the E relay is idle.

7.8 CO/Station (S8)

Option S8 is a 2-section DIP switch that provides signaling compatibility with FXO, FXS and 2-state channel units at the far end (see Table 1).

7.9 2-State/3-State Signaling (S6–R)

Option R is a two-position slide switch that ties the XMT B signaling highway to the XMT A signaling highway when placed in position 2 for two-state signaling operation. For three-state signaling operation, place option R in position 3; the XMT B highway is then independent of the XMT A signaling highway.

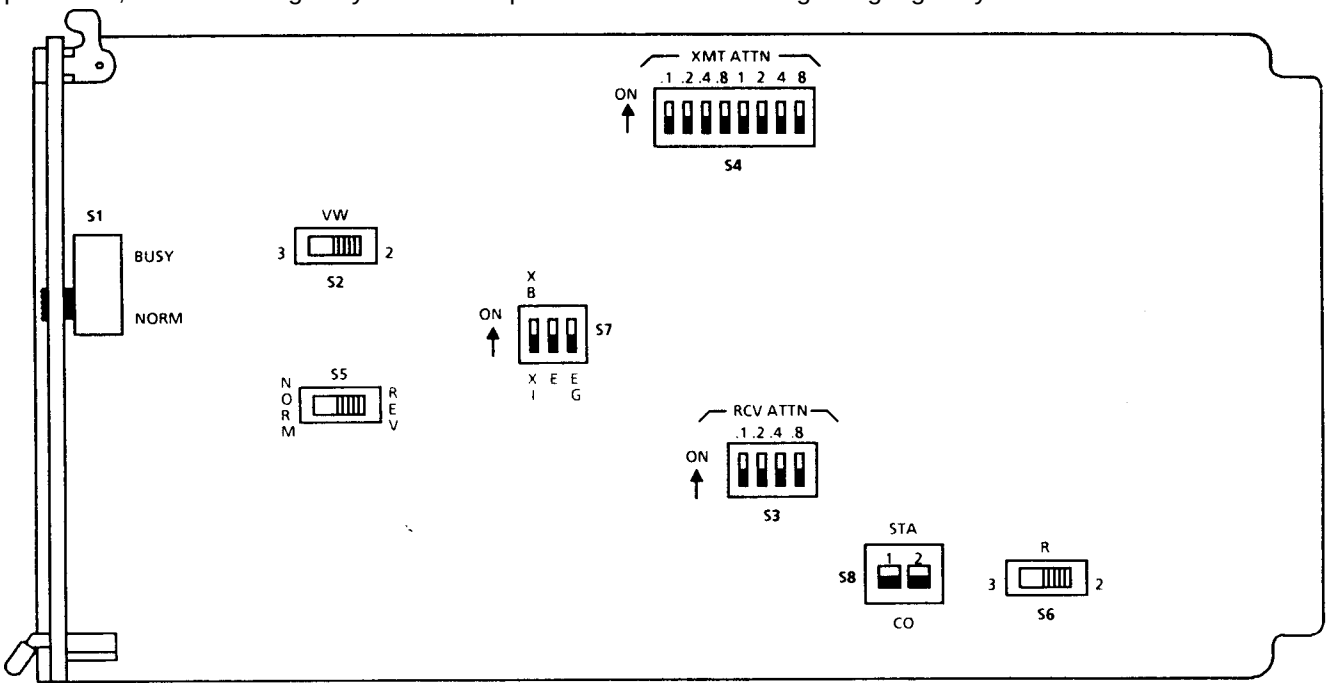


Figure 6. 3652–69 4W TDM Channel Unit Options

OPTION	FUNCTION	POSITION
S1 NORM/ BUSY	Normal channel unit operation. Busies the channel unit for test and alignment purposes.	NORM BUSY
S2 VW 2/3	Disconnects simplex leads from the signaling circuitry for 2-state signaling. Connects simplex leads to the signaling circuitry for 3-state signaling.	2 3

OPTION	FUNCTION	POSITION
S3 RCV ATTN	Selects 0 to 1.5dB of receive attenuation in 0.1dB increments.	See Para. 8.02
S4 XMT ATTN	Selects 0 to 16.5dB of transmit attenuation in 0.1dB increments.	See Para. 8.01
S5 NORM/REV	Normal E&M signaling connections. Reverses the E&M lead connections.	NORM REV
S6 R 2/3	Connects XMT B highway to XMT A signaling highway for 2-state signaling. Independent XMT A and B signaling highways.	2 3
S7–1 XB/XI	Busies the XMT A highway when S1 = BUSY. Idles the XMT A highway when S1 = BUSY.	XB XI
S7–2 E	Type I and III signaling compatibility. Type II signaling compatibility.	ON OFF
S7–3 EG	To condition the E-lead idle during CGA. To condition the E-lead busy 2.5 seconds after CGA.	OFF ON
S8–1 & 2 STA/CO	For FXS far-end signaling compatibility. For FXO far-end signaling compatibility. For 2-state signaling compatibility S8–1 = CO; S8–2 = STA.	STA CO

7.10 2-State/3-State Signaling (S2–VW)

Option VW is a two-position slide switch that disconnects the simplex leads from the signaling circuitry when placed in the 2 position for two-state signaling. For three-state signaling, set option VW to the 3 position; the XMT and RCV simplex leads are then connected to the signaling circuitry.

8. ALIGNMENT

8.1 Transmit

The XMT ATTN switch S4 is a prescription control that provides attenuation from 0 to 16.5dB in increments of 0.1dB to accommodate an input TLP range from –3.6 to + 12.9dB. To adjust the transmit path to the proper operation level, the difference between –3.6 and the transmit TLP at T and R must be obtained.

[XMT ATTN = TLP–(–3.6)]

For an input TLP of 7dBm, the XMT ATTN is [7 (–3.6)) or 10.6dB. Set the sum of the switch settings on S4 to 10.

8.2 Receive

S3 is a prescription control that provides attenuation from 0 to 1.5dB in increments of 0.1dB to accommodate an output TLP range from –0.6 to –2.1dBm. To adjust the receive path to the proper operation level, the difference between –0.6 and the receive TLP at T1 and R1 must be obtained.

[RCV ATTN = –0.6–TLP]

For an output TLP of –2dBm, the RCV ATTN is [–0.6 – (–2)] or 1.4dB. Set the sum of the switch settings on S3 to 1.4.

9. TESTING

After completing Parts 4 through 8, place a call end-to-end through the facility to verify proper operation. If trouble is encountered, re-check 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. Additional channel unit testing for fault diagnosis or verification of circuit operation is provided in Section 360–001–205.

10. 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)

11. WARRANTY & CUSTOMER SERVICE

11.1 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)

11.2 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.

11.3 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.

11.4 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.

12. SPECIFICATIONS

The electrical and physical characteristics of the 3652–69 are as follows:

12.1 Electrical (Single-Ended)

(a) PERMISSIBLE MODES: 4T-4T

(b) POWER REQUIREMENTS: Operating range, -44 to -56Vdc.

(c) CURRENT DRAIN: Busy, 50mA maximum at -48Vdc; idle, 25mA maximum at -48Vdc.

12.1.1. Transmission

(a) XMT INPUT TLP RANGE: -3.6 to + 12.9dBm.

(b) RCV OUTPUT TLP RANGE:-0.6 to-2.1dBm.

(c) XMT PRESCRIPTION ATTN: 0 to 16.5dB in increments of 0.1dB.

(d) RCV PRESCRIPTION ATTN: 0 to 1.5dB in increments of 0.1dB.

(e) XMT & RCV PORT IMPEDANCE: 600 ohms.

(f) FREQUENCY RESPONSE (REFERENCED AT 1010Hz):

Freq (Hz)	XMT (dBm0)	XMT (dBm0)
60	–14 maximum	———
200	–1 to 0.15	–1 to 0
300	–0.15 to 0.15	–0.15 to 0.15
1000	0 (reference)	0 (reference)
3000	–0.15 to 0.15	–0.15 to 0.15
3400	–.15 to 0	–.15 to 0
4000	–14 maximum	–14 maximum

(g) LONGITUDINAL BALANCE: 74dB minimum at 200Hz to 1kHz; 69dB minimum at 3kHz (-16dBm REF).

(h) SIGNAL TO DISTORTION: 35dB minimum from 0 to -30dBm0; 29dB minimum at -40dBm0; 25dB minimum at -45dBm0.

(i) RETURN LOSS: 23dB minimum at 300Hz and 3000Hz; 28dB minimum at 1kHz.

(j) XMT/RCV IDLE CHANNEL NOISE: 20dBmC0 maximum.

12.1.2. Signaling

(k) THRESHOLD VOLTAGES (M AND SX1 LEADS):

Ground (Busy): 1k between M or SX1 lead and -9V
Open (idle): 30k between M or SX1 lead and + 9V.

(l) DIAL PULSING (XMT & RCV): Input, 8 to 12pps, 30 to 90% break; output distortion, ± 2%.

(m) SIGNALING INTERFACE: Type I, II, and III.

12.2 Physical

See Table 3 for the physical characteristics of the unit.

Table 3. Physical Specifications

Feature	U.S.	Metric
Height	4.3 inches	10.9 centimeters
Width	1.36 inches	3.5 centimeters
Depth	10.4 inches	26.4 centimeters
Weight	8.8 ounces	250 grams
Temperature	32° to 122° F	0° to 50°C