

# 3632-11 Multi-Rate Office Channel Unit Dataport

CLEI™ Code: D4D1FF02AA

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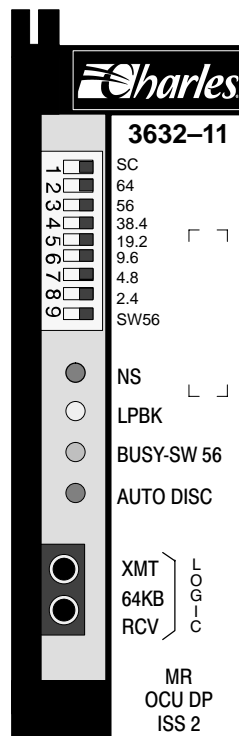


Figure 1. 3632-11 MR OCU DP

## 1. GENERAL

### 1.1 Document Purpose

This document provides general, circuit, installation and testing information for the 3632–11 Multi-Rate Office Channel Unit Dataport (MR OCU DP) unit, which is a channel unit for the 360/363 Channel Bank System. The 3632–11 is shown in Figure 1.

### 1.2 Document Status

This document is reprinted to correct the unit's front panel and to provide a general editorial update.

### 1.3 Equipment Function

The 3632–11 allows digital data services to be provisioned over 4W loop facilities. Standard rates from 2.4 KB to 64 KB can be provided. The unit can be used in point-to-point or multipoint network configurations, and can be used for dedicated or Switched 56 (SW 56) service offerings.

### 1.4 Equipment Location/Mounting

The 3632–11 can be deployed in any channel unit position of any Charles Industries 360/363 channel bank assembly. One exception is when operating at the 38.4, 56 or 64 KB rate with *second channel error correction* enabled, the 3632–11 cannot be used in slot/timeslot 24.

### 1.5 Equipment Features

The 3632–11 provides the following features:

- Selectable data rates of 2.4, 4.8, 9.6 19.2, 38.4, 56 and 64 KB/s
- Supports SW 56 and “Enhanced” SW 56
- Secondary channel operation at all rates except SW 56 and 64 KB/s
- In-channel facility error correction at 2.4, 4.8, 9.6 and 19.2 KB rates
- Optional second (DS0) channel error correction at 38.4, 56 and 64 KB/s
- Supports latching and nonlatching loopbacks
- Extended loop receiver range to 45 dB at all rates
- Automatic disconnect upon loss of loop sealing current, or loss of loop signal from CSU/DSU
- Compatible with “DDS” network control codes, error correction, and multiplexing as defined in Bellcore TR–TSY–000077, TR–TSY–000083, and ANSI T1.107B 1991
- A *Loop Quality Monitor Circuit*, which may be optioned to provide an automatic disconnect if illegal control codes with BPVs are detected on the loop facility. This feature is useful in multipoint networks to prevent a problem circuit leg from affecting the Multi-Junction Unit (MJU) and network operation.
- Optional “Hardware A/B” signaling in the SW 56 mode. This option allows SW 56 circuits to be tandemed via DCS machines in their E&M mode, facilitating circuit testing in some applications.
- Optional latching loopback at the SW 56 rate

## 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 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 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.

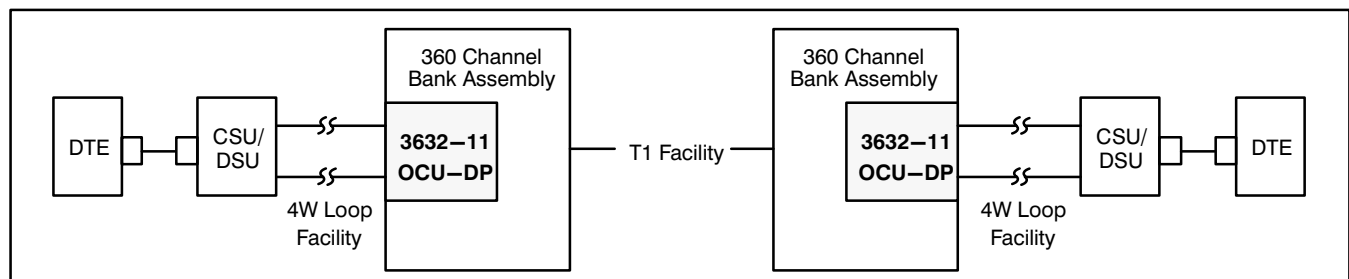


**This equipment contains static-sensitive electronic devices. To prevent electrostatic charges from damaging static-sensitive units:**

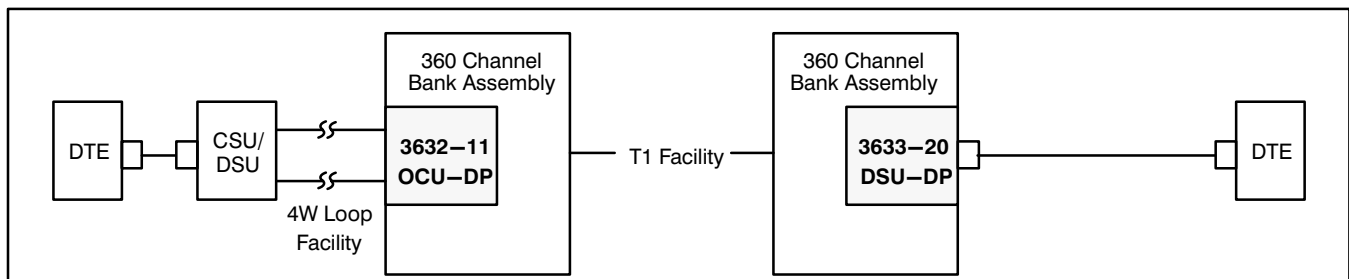
- Use approved static preventive measures (such as a static-conductive wrist strap and a static-dissipative mat) at all times whenever touching units outside of their original, shipped static-protective packaging.
- Do not ship or store units near strong electrostatic, electromagnetic, or magnetic fields.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

## 3. APPLICATION GUIDELINES

The 3632–11 Multi-Rate Office Channel Unit Dataport (MR OCU DP) is intended to provide digital data services over 4W cable facilities. Figure 2 through Figure 5 show some typical applications. In all applications, the 4W cable facility will terminate on a compliant “DDS” CSU/DSU.



**Figure 2. Point-to-Point Leased or Private T1 Facility OCU-OCU**



**Figure 3. Point-to-Point Leased or Private T1 Facility OCU-DSU**

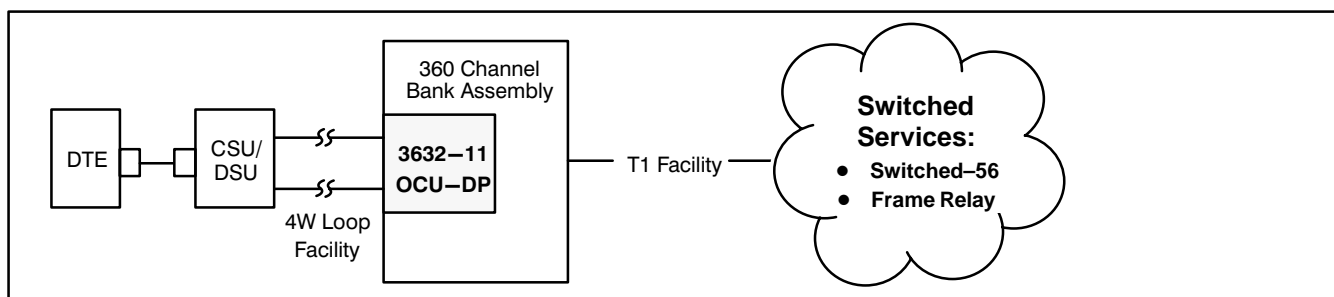


Figure 4. Switched Network Application

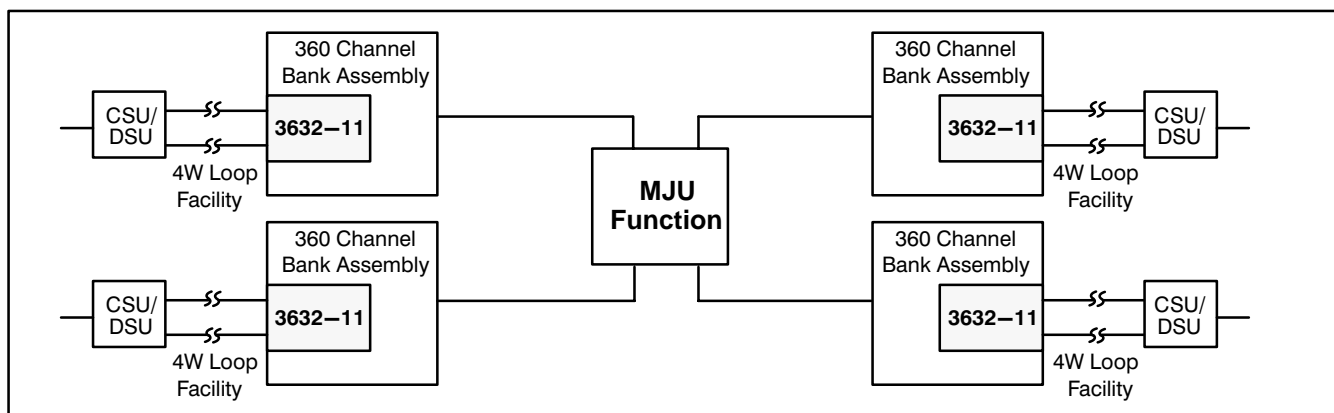


Figure 5. Multipoint Application

## 4. CIRCUIT DESCRIPTION

Refer to Figure 6 when reading the following description.

### 4.1 4W Loop Interface

This circuit provides an interface to the 4W metallic loop facility. It provides signal coupling transformers and secondary protection circuitry to protect the equipment from lightning and power cross disturbances. When the 3632–11 is connected to outside plant cable facilities, external primary protection must be equipped at the building entrance terminal.

The 4W loop interface also provides a source of sealing current to the loop. This helps prevent resistance buildup in metallic spliced connections. The polarity of this sealing current will be reversed to signal the terminating DSU or CSU to initiate a channel loopback test. Sealing current is nominally 12 mA depending on loop length.

The loop interface includes a circuit that detects loss of sealing current. If a loss is detected, the 3632–11 will send Abnormal Station Code (10011110) toward the T1 network.

The 3632–11 provides a *Loop Quality Monitor Circuit* that is used to supervise the data integrity on the customer loop. If the *Quality Monitor* feature is activated (SW–7 ON) and the unit detects illegal control codes with BPVs on the loop, then the unit will initiate an auto disconnect and turn on the AUTO DISC LED on the front panel while transmitting Abnormal Station (10011110) to the network. Illegal control codes with BPVs may arise as a result of noise on the customer loop or improperly optioned customer equipment. If the unit is in a multipoint circuit and does not perform an auto disconnect, it may likely result in a blocked branch of a Multi-Junction Unit (MJU) which will adversely affect the network. If the unit has performed an auto disconnect and the problem clears and remains clear for 30 seconds, the unit will return to normal service passing data.

To accomplish an OCU loopback, a relay is provided to loop the 3632–11 output signal back toward the input and disconnect the loop facility for testing purposes. To accomplish a CSU loopback, a relay is provided to reverse the loop sealing current toward the CSU. When either a CSU loopback or OCU loopback is in effect, the front panel LPBK LED is ON.

## 4.2 Transmit Signal Path

This section describes the 3632–11 transmit signal path. The transmit path receives signals from the loop and **transmits** them toward the network.

### 4.2.1. Receiver

Signals transmitted by the customer’s DSU are processed by the 3632–11 receiver. The receiver can accommodate up to 45 dB of cable loss at the service rate. Table 1 shows the maximum loop length for various cable gauges at a given service rate.

### 4.2.2. Loop-To-Network Code Conversion

At the 2.4 through 38.4 KB rates, data from the loop is formed into eight-bit bytes by assembling six bits of data, appending a logic 1 to the front, and adding a network control bit at logic level 1 (denoting data) at the end. At the 56 KB/s service rate, seven data bits, with a 1 added for the control bit, form the eight-bit network bytes. Control codes received from the customer loop are mapped into network control codes as shown in Table 2 (designated by a 0 network control bit). Also, reception at any service rate of a 000X0V sequence is decoded as six 0’s.

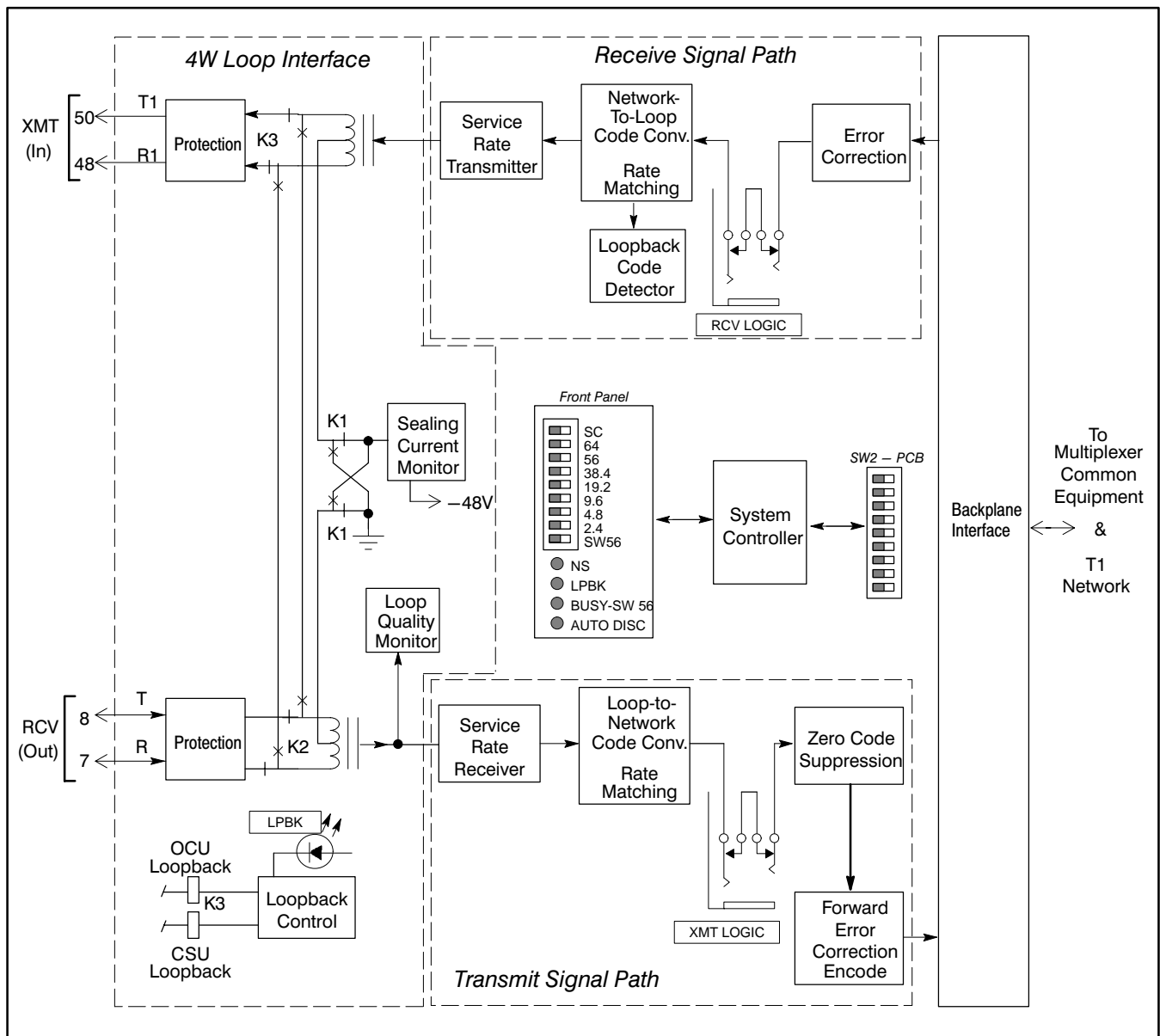


Figure 6. 3632–11 Block Diagram

### 4.2.3. Rate Matching

At 2.4, 4.8, and 9.6 KB rates, the DS0 signal is formed by repeating the byte enough times to achieve the 64 KB/s rate. The data is repeated five times at 9.6 KB, 10 times at 4.8 KB and 20 times at 2.4 KB. For the 19.2, 38.4, 56 or 64 KB/s rates, this byte stuffing is not required to achieve the DS0 rate.

For 19.2 KB/s with error correction disabled, the DS0 format consists of a five-byte frame composed of two data bytes (D1 and D2) containing a 1 in the most significant bit (MSB), and three bytes containing a 0 in the MSB. The MSBs of these five bytes form a five-bit pattern (011100) which is used for framing the 19.2 KB/s channel.

### 4.2.4. DS0 Test Access

The 3632–11 provides a front panel test jack labelled XMT LOGIC for logic level testing with standard “DDS” test sets.

**Table 1. Data Rate vs. Maximum Distance (45dB)**

Loop Rate (KB/s)		Length (In KFT)/Wire Gauge			
Base Rate	Secondary Channel Rate (SCR)	19 ga	22 ga	24 ga	26 ga
2.4		168.0	112.0	85.0	65.0
	3.2	150.0	99.5	75.5	57.5
4.8		127.0	84.0	64.0	48.5
	6.4	114.0	75.0	57.0	43.0
9.6		99.0	63.5	48.5	36.5
	12.8	90.0	57.0	43.0	32.5
19.2		81.0	49.5	37.0	27.5
	25.6	75.5	45.0	33.0	24.5
38.4		69.5	40.0	29.0	21.5
	51.2	65.0	37.5	26.5	19.0
56.0		64.0	37.0	26.0	18.5
	72.0	60.5	35.0	24.5	17.0
64	NA	60.5	35.0	24.5	17.0

**Table 2. Loop-to-Network Code Conversion**

Definition	Code from Loop	DS0 Code to Network
Bit Sequence	a <sub>1</sub> .. .... a <sub>8</sub>	b <sub>1</sub> ..... b <sub>8</sub>
Idle	* 111X0V 0	b <sub>1</sub> 111111 0
Channel Loopback	* 010X0V 0	1 010110 0
Abnormal Station		1 001111 0
* = Don't care bit. X = 1 or 0 to force violation to alternate polarity of previous violation. V = Loop bipolar violation.		

### 4.2.5. Zero Code Suppression

If the Zero Code Suppression (ZCS) option is enabled when an All-0's DS0 byte is encountered, it is replaced by a 00011000 byte in the bit stream outbound for the DS1 facility. This feature is automatically disabled when operating at the 64 KB rate.

### 4.2.6. Forward Error Correction

For a 38.4, 56, or 64 KB/s service rate with error correction enabled, a separate 64 KB/s stream (second DS0 channel) of parity bytes is generated by encoding the data bytes with a shortened (16,8) Bose-Chaudhuri-Hocquenghem (BCH) coding algorithm. Operation of 38.4, 56, or 64 KB/s with error correction enabled uses **two** 64 KB/s DS0 channels.

For a 19.2 KB/s service rate with error correction enabled, only one 64 KB/s DS0 channel is used. A parity byte is calculated using a BCH coding algorithm. The two data bytes and their calculated parity bytes are combined with a framing byte which is the 1's complement of the second parity byte. The resultant 5-byte group (DATA 1, DATA 2, PARITY 1, PARITY 2, FRAMING) is sent toward the T1 network.

## 4.3 Receive Signal Path

This section describes the 3632–11 receive signal path that **receives** DS0 signals from the T1 network and transmits them toward the loop.

### 4.3.1. Error Correction

At the 2.4, 4.8, and 9.6 KB rates with error correction enabled, errors are corrected in the received DS0 data stream by applying a 3-out-of-5 majority vote algorithm on the individual bits of each grouping of five DS0 bytes.

During 19.2, 38.4, 56, and 64 KB/s operation with Error Correction enabled, errors are corrected by finding the 16-bit code word (data plus parity bytes) having the smallest Hamming distance from the actual 16-bit word received. This error correction scheme will correct all 1 and 2 bit errors and some 3 bit errors.

### 4.3.2. DS0 Test Access

The 3632–11 provides a front panel test jack labelled RCV LOGIC for logic level testing with standard “DDS” test sets.

### 4.3.3. Rate Matching

For the 2.4, 4.8, and 9.6 KB rates, the network bytes that were repeated to form the DS0 signal are extracted. The service rate transmit clock is generated by integral division of a high-speed clock, phase-locked to the DS0 bit clock provided by the channel bank common equipment.

### 4.3.4. Network-To-Loop Control Code Conversion

For the 2.4, 4.8, and 9.6 KB rates, the network bytes which have a “1” in the network control bit (bit position 8) are translated into loop signal elements by using bits 2–7 to generate element TxB directly. Similarly, for 38.4, 56, or 64 KB/s service, bits 1–7 in a data byte (network control bit set to a 1) form element TxB.

Network bytes with the network control bit set to 0 are translated to loop signal elements TxB, TxX, and TxV, as detailed in Table 3 Network-to-Loop Control Code Mapping. If the OCU loopback sequence is decoded, the 3632–11 will respond by initiating a loopback at the interface to the customer loop. Similarly, if the Channel Loopback sequence is decoded, the 3632–11 will respond by reversing the polarity of the DC sealing current. If switch SW2–4 (CSU/DSU) is in the CSU position and a DSU loopback sequence is decoded, the 3632–11 will respond by treating this request as a channel loopback and reverse the polarity of the DC sealing current.

### 4.3.5. Loopback Code Detector

The 3632–11 will always respond to network initiated *nonlatching* loopback control sequences. If SW2–3 *latching* loopback is ON, the 3632–11 will also respond to latching loopback control sequences. Latching loopback can be used at all service rates, including SW56. Only latching loopback is available at 64 KB/s.

Latching loopback for OCU loopback and channel loopback is activated by utilization of the specific latching loopback sequence (per Bellcore publication TR–TSY–000077) as follows:

Enable:

TIP (min. 35 bytes) – Transition In Progress  
 LSC (min. 35 bytes) – Loopback Select Code  
 LBE (min. 100 bytes) – Loopback Enable  
 FEV (min. 32 bytes) – Far End Voice

Disable:

TIP (min. 35 bytes) – Transition In Progress

**Note:** For a DSU Latching Loopback, the unit must be in the Secondary Channel mode.

A 10-second watchdog timer is activated between the LSC bytes and FEV bytes. The timer requires the correct receipt of the LBE sequences in less than 10 seconds after recognition of the LSC bytes. This ensures a termination of the latching loopback sequence if it is incorrectly started by receipt of random data/errors. In addition, the timer prevents the long-term latch due to receipt of Enable sequences which may be embedded in data over a long period of time.

Whenever the unit is in the loopback mode, the front panel LPBK LED is ON.

**Table 3. Network-to-Loop Code Conversion**

Definition	DS0 Code from Network	Code to Loop
Bit Sequence	b <sub>1</sub> ..... b <sub>8</sub>	a <sub>1</sub> .. .... a <sub>7</sub>
Idle	* 111111 0	b <sub>1</sub> 111X0V
Channel Loopback (Note 1)	* 010100 0	b <sub>1</sub> 010100
DSU Loopback	* 010110 0	b <sub>1</sub> 010X0V
OCU Loopback	* 010101 0	b <sub>1</sub> 010X0V
Abnormal Station	* 001111 0	b <sub>1</sub> 001X0V
Mux-Out-of-Sync	* 001101 0	b <sub>1</sub> 001X0V
Unassigned Mux Channel	* 001101 0	b <sub>1</sub> 001X0V
Test Code	* 001110 0	b <sub>1</sub> 001X0V
Test Alert	* 110110 0	b <sub>1</sub> 110X0V
MJU Alert	* 111001 0	b <sub>1</sub> 111001
Loopback Enable (LBE)	* 101011 0	b <sub>1</sub> 101011
Far-End Voice (FEV)	* 101101 0	b <sub>1</sub> 101X0V
Transition in Progress (TIP)	* 011101 0	b <sub>1</sub> 011X0V
Block Code	* 000101 0	b <sub>1</sub> 000X0V
Release Code	* 111100 0	b <sub>1</sub> 111X0V
Note 1 = Sealing current is reversed to effect this loopback. * = Don't care bit. X = 1 or 0 to force violation to alternate polarity of previous violation. V = Loop bipolar violation.		

#### 4.3.6. Transmitter

The transmitter sends information to the loop and DSU/CSU at the service rate using a bipolar line coding format. The amplitude of the signal is 1.5V peak at all rates except 9.6 KB, where it is 0.75 V peak.

#### 4.4 64 KB Operation

The 3632–11 can be provisioned to operate at the 64 KB “clear channel” rate. When operating at 64 KB, the associated channel bank common equipment and the connecting T1 facility must be arranged for B8ZS line coding. At 64 KB, only latching loopbacks are allowed. Also, the unit overrides the Zero Code Suppression (ZCS) option and does not perform ZCS at this rate.

#### 4.5 Secondary Channel Operation

Secondary Channel (SC) capability is an optional feature of the 3632–11. This feature provides a companion digital transmission channel, independent of the primary channel. The DSU/CSU multiplexes the primary and secondary channel data, along with control information, into a single bipolar signal for transmission over the local loop to the CSU/DSU. Secondary channel operation is not available at SW 56 or 64 KB rates.

Using SC requires the loop signal to be structured in such a way as to allow primary and secondary channel information to be differentiated. The loop signal is formatted in eight-bit bytes containing six primary channel Data (D) bits for the primary channel rates of 2.4, 4.8, 9.6, 19.2, and 38.4 KB/s; or nine-bit bytes containing seven D-bits for 56 KB/s.



Because the loop format with the SC capability entails two additional bits beyond what is required in the basic DDS service, the loop speed is increased by 8/6 at the subrate speeds, and 9/7 at 56 KB/s.

#### 4.6 Switched 56 Operation

Switched 56 (SW 56) is an extension of the dedicated DDS technology where the loop rate is fixed at 56 KB/s. NO TAG, SW 56 3632–11 Application, shows a typical 4-wire SW 56 arrangement. The key to the SW 56 method of operation is the ability of the SW 56 DSU and SW 56 3632–11 to communicate call status information. The SW 56 DSU is responsible for dialing telephone numbers of outbound calls, monitoring the progress of the call and establishing the data link once the remote end answers. It is also responsible for recognizing incoming calls and answering them by manual or automatic means.

The 3632–11 in the SW 56 mode is responsible for interpreting the call establishment information originating in the DSU and converting it into a format that is understood by the switched public network. It is also responsible for converting signaling information from the network into a format understood by the DSU.

“A” Bit signaling is used on the DS1 data stream to transport the signaling information between the 3632–11 and the Public Switched Digital Network. The Least Significant Bit (LSB) of every sixth data byte contains the “A” signaling bit which is decoded by the 3632–11 and the public network digital switch. CMI/DMI transitions between the SW56 DSU and the 3632–11 are used to pass signaling information.

## 5. MOUNTING

The 3632–11 Multi-Rate Office Channel Unit Dataport (MR OCU DP) plugs into any one channel unit slot of any Charles Industries 360 or 363 Digital Carrier Terminal (DCT). However, when operating at the 38.4, 56 or 64 KB rate, with second channel error correction enabled, the 3632–11 cannot be used in slot/timeslot 24.

## 6. OPTIONS & FEATURES

The 3632–11 Multi-Rate Office Channel Unit Dataport (MR OCU DP) contains DIP-type switches on the front panel and the Printed Circuit Board (PCB) that must be optioned before the unit is placed in service. See Figure 7 for the location of these switch options.

### 6.1 Front Panel Options/Features

The front panel of the 3632–11 contains two jacks, four LEDs, and a 9-position switch (SW1) which sets the data rate and/or service type provided by the 3632–11.

#### 6.1.1 Switch SW1–1 SC (Secondary Channel)

If the service is to be provided with secondary channel operation, place SW1–1 ON. Secondary channel operation cannot be provided at 64 KB or for SW 56 KB service.

#### 6.1.2 Switch SW1–2 to SW1–9 Rate

These switch positions select the service data rate. Select only one position. For SW 56 operation select the SW56 position only.

#### 6.1.3 NS LED

The red NS (no signal or no sealing current) LED, when on steady, indicates that the loop sealing current path is open or that the 3632–11 is receiving no signal from the loop.

#### 6.1.4 LPBK LED

The yellow LPBK (loopback) LED, when on steady, indicates that the 3632–11 is in OCU loopback or is sending CSU loopback (sealing current reversal) toward the CSU.

#### 6.1.5 BUSY SW56 LED

The green BUSY (busy) SW56 LED, when on steady, indicates that the circuit is configured for SW 56 *and* the circuit is busy.

### 6.1.6. *AUTO DISC LED*

The red AUTO DISC (automatic disconnect) LED, when on steady, indicates that the 3632–11 has initiated an auto disconnect and is sending abnormal station code toward the network.

### 6.1.7. *64 KB XMT & RCV Jacks*

These two front panel bantam breaking jacks are provided for connection to standard “DDS” test sets.

## 6.2 **PCB Options/Features**

The 3632–11 PCB contains switch SW2 that controls the features described below (also see Figure 7).

### 6.2.1. *Switch SW2–1, Error Correction*

If error correction is required, place SW2–1 in the ERROR CORRECTION (ON) position. Typically, at the 2.4, 4.8, 9.2, and 19.2 KB rates, ERROR CORRECTION is ON. When operating at the 38.4, 56, and 64 KB rates, error correction requires an additional 64 KB time slot and is typically not used (OFF).

### 6.2.2. *Switch SW2–2, Zero Code Suppression*

Zero Code Suppression (ZCS), when enabled, will cause any all zero data byte to be replaced with the code 00011000 toward the T1 network, guaranteeing adequate “1s” density. Normally, at rates below 64 KB, this option is ON. At the 64 KB rate, where clear channel operation is desired, ZCS is automatically disabled. The associated multiplexer common equipment and the T1 facility must be configured for B8ZS operation.

### 6.2.3. *Switch SW2–3, Latching Loopback*

When this switch is ON, in the LATCHING LOOPBACK position, the 3632–11 will respond to latching loopback code sequences received from the T1 network. When SW2–3 is OFF, the 3632–11 will ignore latching loopback sequences but will still respond to nonlatching loopback codes. Normally SW2–3 is ON.

### 6.2.4. *Switch SW2–4, DSU/CSU*

If the 4W loop facility is terminated in a DSU, place SW2–4 in the DSU (OFF) position. If only a CSU is provided, place SW2–4 in the CSU (ON) position. With SW2–4 in the CSU (ON) position, any DSU loopback code received from the network will be sent to the loop as a CSU loopback code. Normally SW2–4 is in the DSU (OFF) position.

### 6.2.5. *Switch SW2–5, Remote Customer Loopback (RCL)*

This option, when ON, will cause the 3632–11 to convert a DSU loopback code received from the loop (near end DSU/CSU) to a network initiated DSU loopback code toward the T1 facility and far end DSU/CSU. This allows the near end DSU/CSU to control a loopback at the far end DSU/CSU. Normally RCL is OFF.

### 6.2.6. *Switch SW2–6, Alternate CMI Enable*

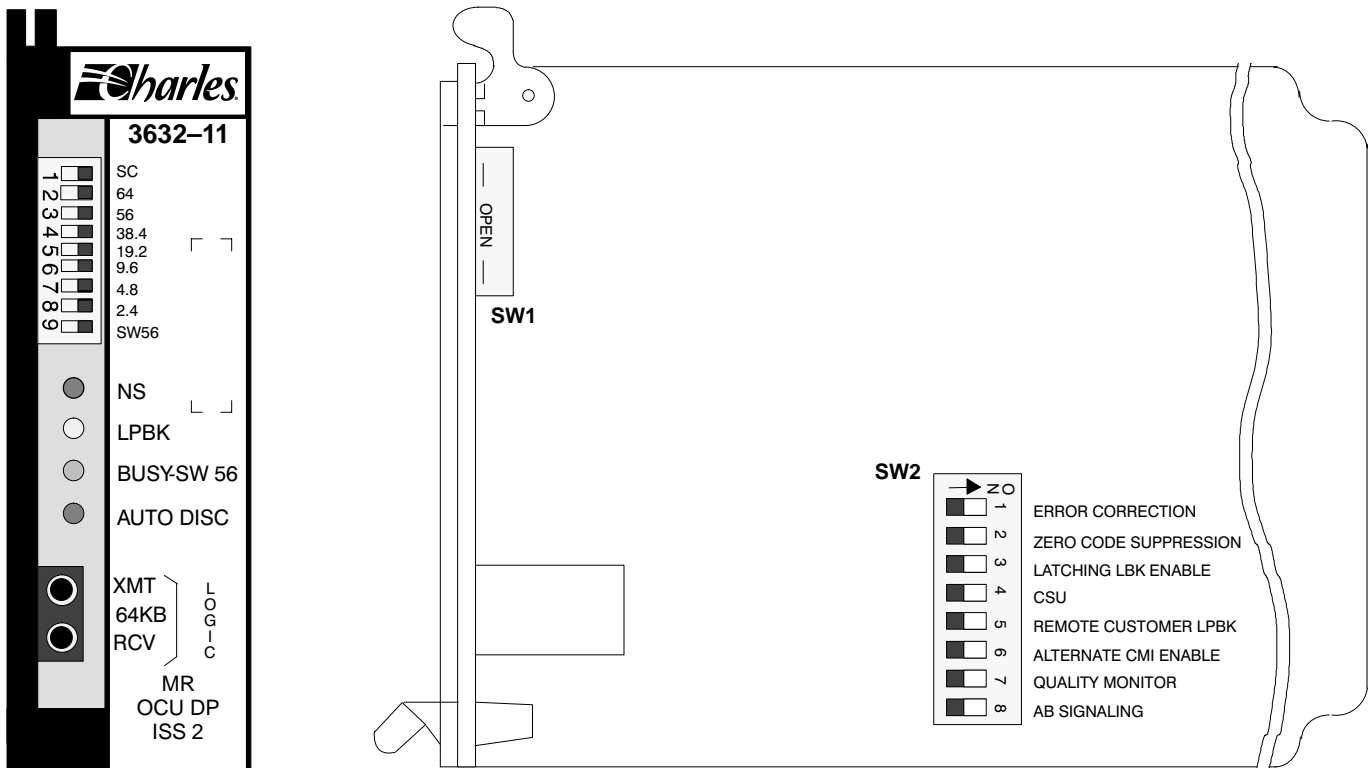
This option is only used when the unit is set for the Switched 56 (SW 56) service rate. When alternate CMI Enable is ON, the 3632–11 will send an alternate CMI code to the DSU during on-hook states. This allows some DSUs to detect call progress tones. This feature is also known as “Enhanced” SW 56. For “Enhanced” SW 56 operation, this option and the front panel SW56 must be ON.

### 6.2.7. *Switch SW2–7, Quality Monitor*

This switch, when ON, enables the *Loop Quality Monitor circuit*. This circuit will monitor the signal quality of the loop and cause an automatic “Disconnect” if poor quality is detected. The “Disconnect” is achieved by the 3633–11 sending the Abnormal Station Code (10011110) toward the T1 network. Normally, on multipoint networks, switch SW2–7 Quality Monitor should be ON.

### 6.2.8. *Switch SW2–8, A/B Signaling*

This option is only applicable when the unit is configured for SW 56 operation. If the SW56 circuit is tandemed via DS0–DP or a DCS machine in a transparent mode, SW2–8 should be OFF (default mode). If the SW 56 circuit is tandemed via a DCS machine in its E&M mode, the SW2–8 should be in the A/B signaling (ON) position. Normally SW2–8 is OFF.



Switch	Position (check one)		Function
SW1-1 SC	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	ON for secondary channel operation. Not applicable at SW 56 or 64 KB rates.
SW1-2 64	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	Uses selected data rate. Place only one switch position (section) ON.
SW1-3 56	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	
SW1-4 38.4	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	
SW1-5 19.2	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	
SW1-6 9.6	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	
SW1-7 4.8	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	
SW1-8 2.4	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	
SW1-9 SW56	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	
SW2-1	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	
SW2-2	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	When ON enables zero code suppression.
SW2-3	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	When ON enables latching loopback.
SW2-4	<input type="checkbox"/> DSU	<input type="checkbox"/> ON	OFF = DSU, ON = CSU
SW2-5	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	When ON enables remote customer loopback.
SW2-6	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	When ON enables alternate CMI enable (enhanced SW 56).
SW2-7	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	When ON enables quality monitor.
SW2-8	<input type="checkbox"/> OFF	<input type="checkbox"/> ON	When ON enables A/B signaling.

Figure 7. Switch Option Locations and Summary

## 7. INSTALLER CONNECTIONS

### 7.1 Module Installation

Set the options located on the side panel (PCB) of the 3632–11 before inserting it in the channel unit slot.

When the 3632–11 is installed in a channel bank, it makes electrical connection to the associated equipment through a card-edge connector provided as part of the mounting assembly.

#### **CAUTION**

**Installation and removal 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 guides and connector to verify proper alignment and the absence of foreign material.**

## 8. TESTING

If trouble is encountered with the operation of the unit, verify that all the installer connections have been properly made and that all options have been conditioned as required. With power removed, make certain that the unit is making good connection with the mounting assembly card connector; remove and reinsert the module.

## 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

The specifications and characteristics of the 3632–11 Multi-Rate Office Channel Unit Dataport (MR OCU DP) are as follows:

### 11.1 Local Loop Interface Specifications

- (a) LINE: 4-wire (XMT pair and RCV pair).
- (b) DATA RATE: 2.4, 4.8, 9.6, 19.2, 38.4, 56, SW56, or 64 KB/s, and all secondary channel rates.
- (c) OPERATING MODE: Baseband, full duplex.
- (d) SIGNAL FORMAT: Bipolar, return-to-zero, 50% duty cycle.
- (e) TRANSMIT OUTPUT AMPLITUDE:  $\pm 1.5V$  peak for rates 2.4, 4.8, 19.2, 38.4, 56, and 64 KB/s;  $\pm 0.75$  peak for 9.6 KB/s.
- (f) XMT SOURCE IMPEDANCE: 135 ohms ( $\pm 20\%$ ).
- (g) RCV INPUT IMPEDANCE: 135 ohms ( $\pm 20\%$ ).
- (h) RECEIVER SENSITIVITY: 0 to 45 dB loop loss measured at a frequency of 1/2 the data rate.
- (i) SEALING CURRENT: 4 to 20 mA with polarity reversal capability.
- (j) PROTECTION: Meets criteria of Bellcore TR–TSY–001089.

**11.2 Network Compatibility**

(k) INTERFACE: DDS Network and other basic digital service as defined in Bellcore TR–TSY–000077 and TR–TSY–000083; AT&T 62310 and 61330; ANSI T1.107B 1991

**11.3 Agency Compliance**

(l) FCC P.15 Class A.

(m) Recognized under Underwriters Laboratories Standard 1459, Second Edition. Field repairs may void compliance.

**11.4 Physical Characteristics**

See Table 4 for the physical characteristics of the 3632–11 Multi-Rate Office Channel Unit Dataport.

**Table 4. Physical Specifications**

<b>Feature</b>	<b>U.S.</b>	<b>Metric</b>
Height	4.3 inches	10.9 centimeters
Width	1.36 inches	3.5 centimeters
Depth	10.4 inches	26.4 centimeters
Weight, nominal	9 ounces	255 grams
Operating Temperature	32 to 122° F	0 to 50° C
Storage Temperature	–40 to 185° F	–40 to 85° C
Mounting	Occupies one channel unit slot of 360/363 Channel Bank	
Humidity	To 95% (no condensation)	
Altitude	15,000 feet, maximum	

