INSTRUCTION DATA

RFL OCUDP (Office Channel Unit Data Port) Module

Frame Relay Users (DYMEC Dynaster 2000): See Application Note at the end of this document

DESCRIPTION

The RFL OCUDP is a single slot module designed for use in IMUX 2000 T1 multiplexers and provides the interface between a DS0 timeslot of the T-carrier data stream and the 4-wire metallic loop extending to a midspan DDS repeater or the customer premises. The OCUDP can interoperate over the carrier system with another OCUDP or a DS0DP at a central office. The card can transmit and receive data at a rate of 56 kbps.

The OCUDP module has eight LEDs, one each for receiving idle code, no sealing current, OCU loopback, CSU loopback, line loopback, and three presently unused. There is also a green LED to show when the card is in service.

The OCUDP is remote-controllable when installed in an RFL remote controllable shelf. The following module parameters can be configured remotely via SCB or locally via DIP switches.

o	Local/Remote	Use DIP switches or SCB
o	Transmit timeslot	Sets the transmit T1 channel slot
o	Receive timeslot	Sets the receive T1 channel slot
o	Baud rate	Sets the DDS data baud rate
o	Zero code suppression	Ensures pulse density for an AMI T1 data stream
o	AB signaling enable	Determines the state of the A and B signaling bits
o	Latched loopback	Enables loopback response capability for the OCUDP

SPECIFICATIONS

As of the date this Instruction Data Sheet was published, the following specifications apply to the RFL OCUDP module. Because all of RFL products undergo constant improvement and refinement, these specifications are subject to change without notice.

Operational:

ANSI T1.410	Metallic interface
AT&T TR62310	DS0 digital local channel interface
Bellcore TA-TSY-000077	Dataport channel unit functions
Baud rate	56 kbps user rate and 64 kbps clear-channel user rate.
OCUDP Channel Loopback 56 kbps ONLY	Responds to code from CO to reverse loop current thereby causing customer equipment to loopback signal to OCUDP. Latching loopbacks supported only.
OCU Loopback 56 kbps ONLY	Responds to code from CO to loop 4 wire circuit back to CO on output of OCUDP. Latching loopbacks supported only.
OCU Cable Loss	Up to 45 dB
Interface connector	RJ-48S

Environmental:

ANSI C37.90 – 1989	Service conditions
Operating Temperature	-20^{o}C to +55^{o}C
Storage Temperature	-40^{o}C to +75^{o}C
Humidity	95% at 40^{o}C, non-condensing

SWC/Fast Transient:

ANSI C37.90 – 1989	Dielectric
ANSI C37.90.1 – 1989	SWC and fast transient

RFI Susceptibility:

ANSI C37.90.2 – 35 V/M

System Performance:

Power consumption	2 watts nominal
MTBF	>500,000 hours at 25^{o}C

INSTALLATION

Before the RFL OCUDP module can be placed in service, it must be installed in a multiplexer shelf. Installation involves determining the module slot in the Main Shelf or Expansion Shelf where the module will be installed, inserting a Module Adapter into the rear of the shelf behind the module slot, connecting all signal and power wiring to the Module Adapter, checking the settings of all switches, and inserting the module into the front of the shelf.

NOTES

Power supply and time slot considerations may affect the installation of this module into an existing multiplexer shelf. Refer to the multiplexer manual for more information.

The following instructions are provided for installing an RFL OCUDP module into an existing system. If the module was included as part of a system, installation was done at the factory. Otherwise, proceed as follows:

1. Carefully inspect the module for any visible signs of shipping damage. If you suspect damage to the module, immediately call RFL Customer Service at the number listed at the bottom of this page.

2. Determine the module slot in the Main Shelf or Expansion Shelf where the module will be installed.

   The RFL OCUDP module occupies one module slot in the Main Shelf or Expansion Shelf.

3. Determine which Module Adapter will be used to make connections to the RFL OCUDP module.

   Each module in the IMUX 2000 multiplexer requires a Module Adapter. The module adapter provides the appropriate connector for the desired interface. The Module Adapter that is used with the RFL OCUDP is the MA-455. The MA-455 provides one RJ-48S jack for connection to the circuit as shown in Figure 1.

4. Insert the MA-455 Module Adapter into the rear of the slot which will hold the RFL OCUDP module, and make all connections to the module adapter.

   Connect the RJ-48S plug into the MA-455's jack. The only electrical interface connections that have to be made to the RFL OCUDP are RX RING, RX TIP, TX TIP and TX RING, which are made to terminals 1, 2, 7 and 8 on the RJ-48S connector, as shown in Figure 1.

5. Refer to Figure 2 and Table 1 for the location and function of DIP switches on the OCUDP.

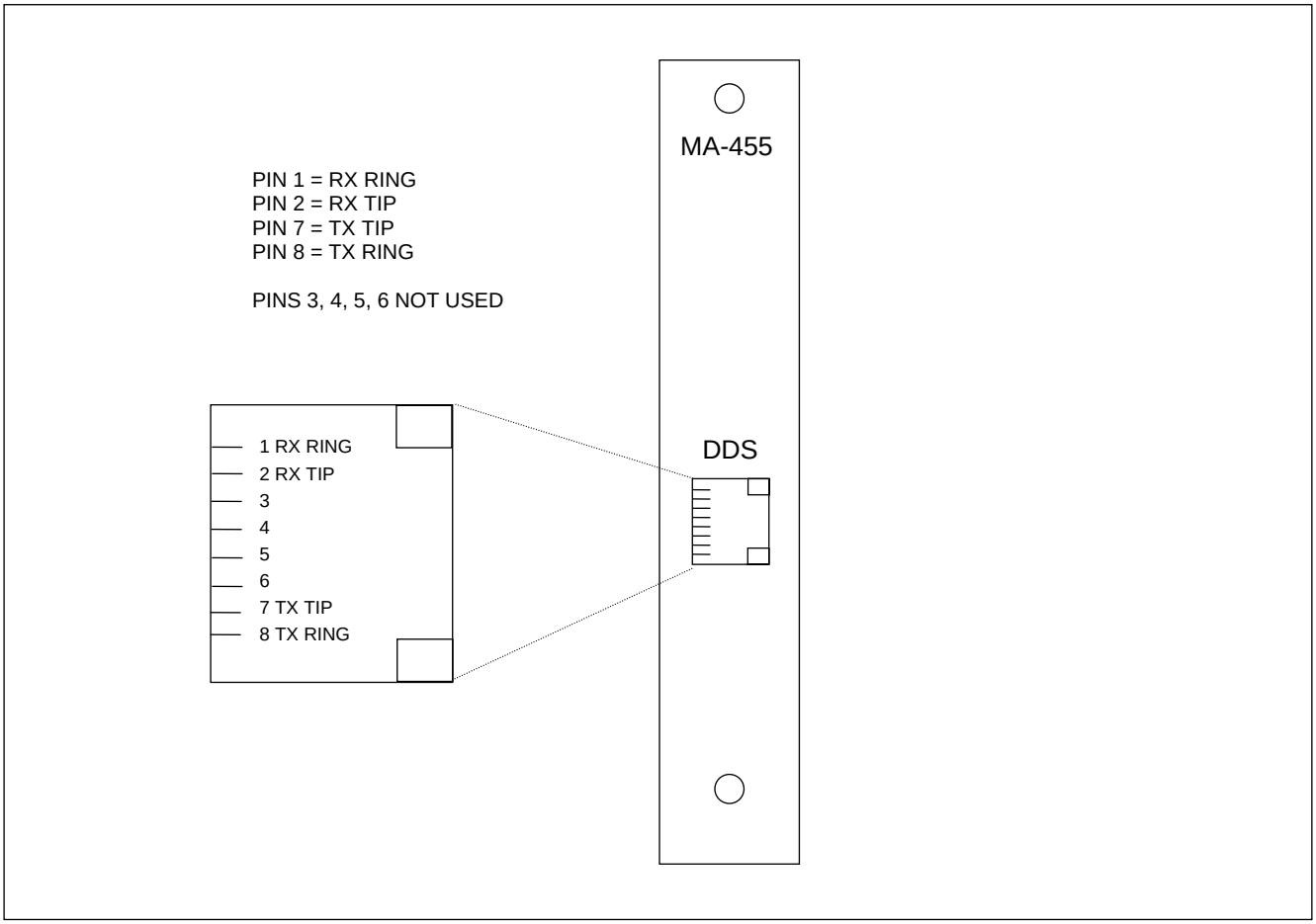

Figure 1. MA-455 Module Adapter.

6. Set the module address using DIP switches SW1-3 through SW1-8 for the desired remote address (SCB address).

   For remote access, each channel module in the IMUX 2000 must have a distinct module address. Valid addresses for the OCUDP Module are the numbers "1" to "31." In most installations the address will be set to the number of the slot the module is occupying. Table 2 shows the switch settings for the module address. (Consult your multiplexer manual for details on using the remote access and configuration features of the system.)

NOTE

After changing DIP switch settings on the OCUDP card, the card must be hot inserted, or the local/remote DIP switch (SW1-2) must be toggled from local to remote and then back to local. If this is not done, the changed settings will not be recognized by the common module. After the card is either hot inserted, or SW1-2 is toggled, it will take approximately 10 seconds for the new settings to be recognized by the common module.

NOTE

The RFL OCUDP Module can be operated in local or remote control mode. In local-control mode its configuration is determined by on-board DIP-switches.

Under remote control, the switch positions are ignored and the module is remotely configured by the user, using terminal or Network Management Systems. Presetting local-control switches is not required for remote-control mode. If local-control switches are not preset, the channel module will not operate correctly until remotely configured.

The only configuration switches that **must** be set for remote-control mode are those for the SCB address (SW1-3 through SW1-8).

If you are planning to operate the RFL OCUDP Module under local control, continue to Step 7. on page 10 to set the positions of the on-board DIP-switches.

Although remote control mode does not require it, RFL recommends setting local-control switches to the required configuration at this time. Doing this allows the Common Module to discover the desired settings and activate the channel module during initial commissioning, without the need for remote access by the user or Network Management System. This also enhances operation reliability by providing a configuration backup in case of NMS file loss or equipment failure.

If you do not intend to preset local-control switches for remote-control mode, go to Step 15 on page 11.

The following pages show the location of the various configuration DIP switches and LED indicators on the OCUDP board with an explanation of their function.

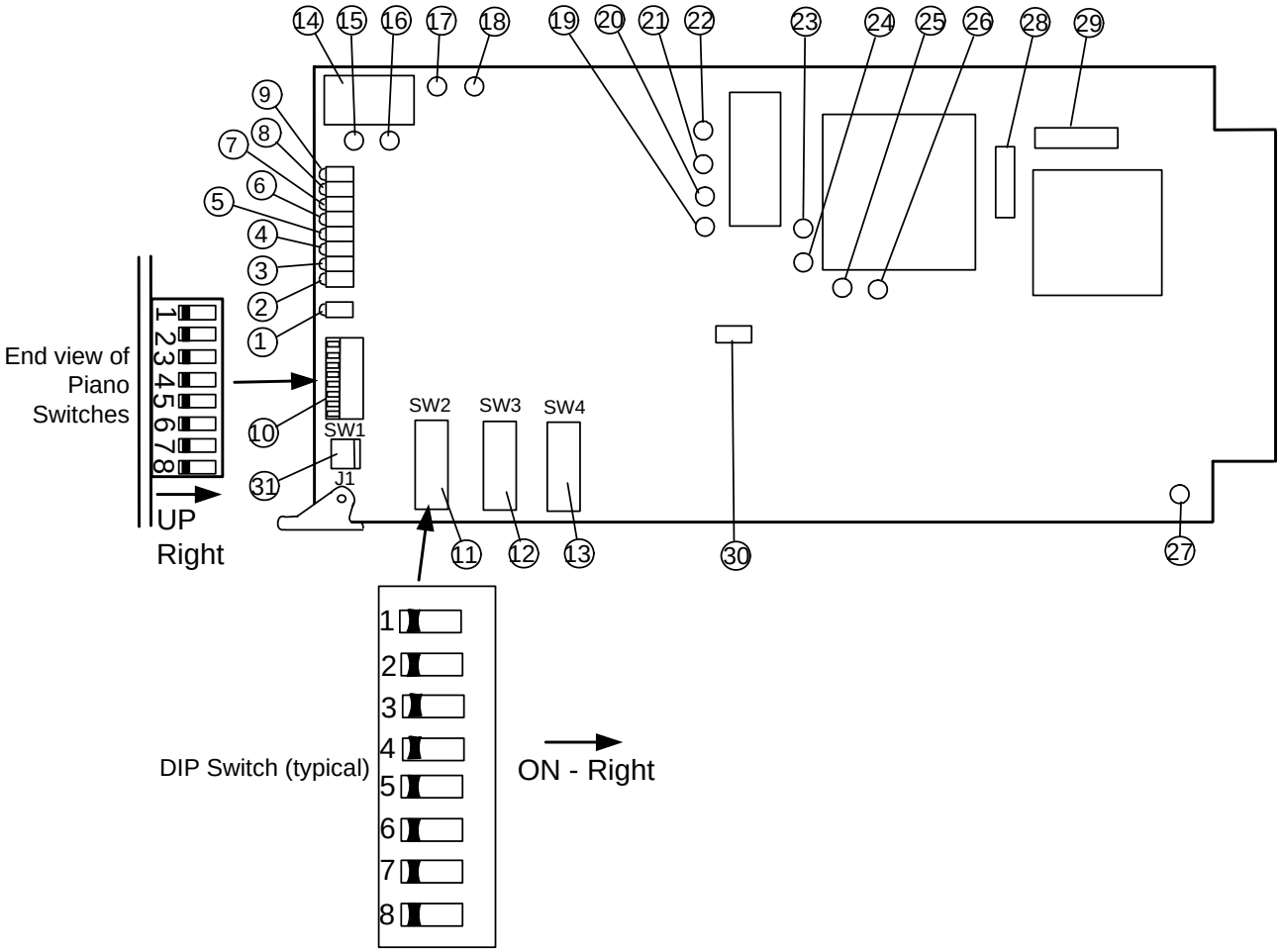

Figure 2. Controls and indicators, RFL OCUDP Selective Calling Unit

Table 1. Controls and indicators, RFL OCUDP Module

Item	Name/Description	Function
1	SVC LED, DS17	Lights green when card is in service
2	SPARE LED, DS8	Presently not used
3	SPARE LED, DS7	Presently not used
4	LN LB LED, DS6	Lights yellow when line loopback (local loopback) is active
5	CSU LB LED, DS5	Lights yellow when CSU (Channel Service Unit) loopback is active
6	OCU LB LED, DS4	Lights yellow when OCU (Office Channel Unit) loopback is active
7	ADIS LED, DS3	Presently not used
8	NOSX LED, DS2	Lights red when there is a sealing current
9	IDLE LED, DS1	Lights yellow when receiving idle code from customer loop
10	Piano Switch, SW1	SW1-1 Not used – Set to UP/RIGHT SW1-2 Local/Remote (Local=UP/RIGHT, Remote=DOWN/LEFT) SW1-3 to SW1-8 Sets SCB address (See Table 2)

Table 1 - continued. Controls and indicators, RFL OCUDP Module

Item	Name/Description	Function	
11	DIP Switch, SW2	SW2-1 to SW2-5	Sets Transmit Channel timeslot (See Table 3)
		SW2-6	Module Service ON/OFF switch. SW2-6 in the ON/RIGHT position turns Service OFF.
			SW2-6 in the OFF/LEFT position turns Service ON.
		SW2-7 to SW2-8	Not used.
12	DIP Switch, SW3	SW3-1 to SW3-5	Sets Receive Channel timeslot (See Table 3)
		SW3-6	Sets the transmit bus direction. Set to OFF/LEFT to transmit in direction A and receive from direction B (default). Set to ON/RIGHT to transmit in direction B and receive from direction A.
			When the OCUDP Module is in a terminal-end multiplexer, the OCUDP Module must be configured to transmit in direction A.
		SW3-7	Not used.
		SW3-8	Alert on loss of Sealant Current. To enable set to OFF/LEFT. To disable set to ON/RIGHT (default)
13	DIP Switch, SW4	SW4-1 to SW4-4	Sets baud rate (See Table 4)
		SW4-5	Switched – 56k mode – not supported, must be set to ON/RIGHT for normal mode.
		SW4-6	ZCS (zero code suppression). Set to OFF/LEFT to enable, Set to ON/RIGHT to disable.
		SW4-7	AB signaling enable. Set to OFF/LEFT to enable, set to ON/RIGHT to disable.
		SW4-8	Latched loopback Functionality . Set to OFF?LEFT to enable, Set to ON/RIGHT to disable.
14	J5	Bantam Test Jacks	(J5-A Input, J5-B Output)
15	Test Point TP13	TX-	Negative side of transmitted bipolar signal
16	Test Point TP12	TX+	Positive side of transmitted bipolar signal
17	Test Point TP10	RX+	Positive side of received bipolar signal
18	Test Point TP11	RX-	Negative side of received bipolar signal
19	Test Point TP6	TCLK	Timing clock for transmitted logic signals
20	Test Point TP7	RPOS	Logic signal from received bipolar positive pulse
21	Test Point TP8	RNEG	Logic signal from received bipolar negative pulse
22	Test Point TP9	RCLK	Timing clock for received logic signals
23	Test Point TP4	TPOS	Logic input which generates positive pulse of bipolar output signal
24	Test Point TP5	TNEG	Logic input which generates negative pulse of bipolar output signal
25	Test Point TP3	FRAME	Frame pulse
26	Test Point TP2	ADDR OK	Channel address pulse
27	Test Point TP1	Ground	Signal ground
28	J3	ACTEL connector	Used for factory testing
29	J4	ACTEL connector	Used for factory testing
30	J2	Test/Run jumper	Set to RUN position
31	J1	Serial port	Used for factory testing

Table 2. SCB address settings, RFL OCUDP module

SCB ADDRESS	SW1-3	SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
1	DOWN	DOWN	DOWN	DOWN	DOWN	UP
2	DOWN	DOWN	DOWN	DOWN	UP	DOWN
3	DOWN	DOWN	DOWN	DOWN	UP	UP
4	DOWN	DOWN	DOWN	UP	DOWN	DOWN
5	DOWN	DOWN	DOWN	UP	DOWN	UP
6	DOWN	DOWN	DOWN	UP	UP	DOWN
7	DOWN	DOWN	DOWN	UP	UP	UP
8	DOWN	DOWN	UP	DOWN	DOWN	DOWN
9	DOWN	DOWN	UP	DOWN	DOWN	UP
10	DOWN	DOWN	UP	DOWN	UP	DOWN
11	DOWN	DOWN	UP	DOWN	UP	UP
12	DOWN	DOWN	UP	UP	DOWN	DOWN
13	DOWN	DOWN	UP	UP	DOWN	UP
14	DOWN	DOWN	UP	UP	UP	DOWN
15	DOWN	DOWN	UP	UP	UP	UP
16	DOWN	UP	DOWN	DOWN	DOWN	DOWN
17	DOWN	UP	DOWN	DOWN	DOWN	UP
18	DOWN	UP	DOWN	DOWN	UP	DOWN
19	DOWN	UP	DOWN	DOWN	UP	UP
20	DOWN	UP	DOWN	UP	DOWN	DOWN
21	DOWN	UP	DOWN	UP	DOWN	UP
22	DOWN	UP	DOWN	UP	UP	DOWN
23	DOWN	UP	DOWN	UP	UP	UP
24	DOWN	UP	UP	DOWN	DOWN	DOWN
25	DOWN	UP	UP	DOWN	DOWN	UP
26	DOWN	UP	UP	DOWN	UP	DOWN
27	DOWN	UP	UP	DOWN	UP	UP
28	DOWN	UP	UP	UP	DOWN	DOWN
29	DOWN	UP	UP	UP	DOWN	UP
30	DOWN	UP	UP	UP	UP	DOWN
31	DOWN	UP	UP	UP	UP	UP

NOTE: For SW1, ON = UP/RIGHT and OFF = DOWN/LEFT.

Table 3. Tx/Rx Time Slot Select for RFL OCUDP module.

T1 Tx/Rx Time Slot	Switch Settings				
	SW2-5/SW3-5	SW2-4/SW3-4	SW2-3/SW3-3	SW2-2/SW3-2	SW2-1/SW3-1
1	OFF	OFF	OFF	OFF	OFF
2	OFF	OFF	OFF	OFF	ON
3	OFF	OFF	OFF	ON	OFF
4	OFF	OFF	OFF	ON	ON
5	OFF	OFF	ON	OFF	OFF
6	OFF	OFF	ON	OFF	ON
7	OFF	OFF	ON	ON	OFF
8	OFF	OFF	ON	ON	ON
9	OFF	ON	OFF	OFF	OFF
10	OFF	ON	OFF	OFF	ON
11	OFF	ON	OFF	ON	OFF
12	OFF	ON	OFF	ON	ON
13	OFF	ON	ON	OFF	OFF
14	OFF	ON	ON	OFF	ON
15	OFF	ON	ON	ON	OFF
16	OFF	ON	ON	ON	ON
17	ON	OFF	OFF	OFF	OFF
18	ON	OFF	OFF	OFF	ON
19	ON	OFF	OFF	ON	OFF
20	ON	OFF	OFF	ON	ON
21	ON	OFF	ON	OFF	OFF
22	ON	OFF	ON	OFF	ON
23	ON	OFF	ON	ON	OFF
24	ON	OFF	ON	ON	ON

See Note following Table 5. on equivalency between DIP-switch settings and remote control P-codes for time slot selection.

NOTE: For SW2 and SW3, ON = RIGHT and OFF = LEFT.

Table 4. User Baud Rate Selection for RFL OCUDP module.

Baud Rate	SW4-4	SW4-3	SW4-2	SW4-1
56 kbps	OFF	ON	ON	ON
64 kbps	OFF	OFF	OFF	OFF

NOTE: For SW4, ON = RIGHT and OFF = LEFT.

7. Select an unused transmit channel time slot using DIP switches SW2-1 through SW2-5 using direct binary coding as shown in Table 3. Select an unused receive channel time slot using DIP switches SW3-1 through SW3-5 using direct binary coding as shown in Table 3. Refer to the multiplexer manual for guidelines on time slot selection.

   Note that selecting an invalid time slot will disable the module. In T1 systems, only time slots 1 through 24 are allowed. Time slot 24 is not available for a T1 system using fast reframing.

8. Select transmit bus direction by using DIP switch SW3-6.

   Place SW3-6 in the OFF/LEFT position to transmit in the A direction and receive from the B direction (default). Place SW3-6 in the ON/RIGHT position to transmit in the B direction and receive from the A direction.

   Note: When the OCUDP Module is in a terminal-end multiplexer, the OCUDP Module must be configured to transmit in direction A.

9. Select the baud rate by using DIP switches SW4-1 to SW4-4 in accordance with Table 4.

10. Set DIP switch SW4-5 to the ON/RIGHT position. OFF/LEFT is currently not supported.

11. Select ZCS (zero code suppression) enable or disable by using DIP switch SW4-6.

    Set DIP switch SW4-6 to the OFF/LEFT position to enable ZCS.
    Set DIP switch SW4-6 to the ON/RIGHT position to disable ZCS.

12. Select AB signaling enable or disable by using DIP switch SW4-7.

    Set DIP switch SW4-7 to the OFF/LEFT position to enable AB signaling.
    Set DIP switch SW4-7 to the ON/RIGHT position to disable AB signaling.

13. Select latched loopback functionality by using DIP switch SW4-8.

    Set DIP switch SW4-8 to the OFF/LEFT position to enable latched loopback functionality.
    Set DIP switch SW4-8 to the ON/RIGHT position to disable latched loopback functionality.

    Note: Latched Loopback Functionality allows the OCUDP Module to act upon inline commands to force OCU/DSU loopbacks.

    DIP Switch SW4-8 does not cause these loopbacks; it only permits the function.

14. If you plan to operate the RFL OCUDP module under **local control**, perform the following steps; otherwise, go to step 15 for remote control.

    a. Set to local control by placing DIP switch SW1-2 in the UP/RIGHT position.

    b. Turn service on by placing DIP switch SW2-6 in the OFF/LEFT position.

    c. Slide the module into the selected module slot until it is firmly seated and the module front panel is flush with the top and bottom of the shelf.

    d. Go to step 16.

    Notes:

    - Switch SW1-1 has no user functionality.
    - DIP Switch settings go into effect when the module is reset by either re-powering or toggling SW1-2 from remote to local.

15. If you are planning to operate the RFL OCUDP Module under remote control, perform the steps shown below.

    If you **intend to store** the preset local-control Channel Module DIP-switch settings into the Common Module, in order to use as initial module configuration for remote-control mode further on, **continue with step a)**.

    If you **do not intend to store** the local-control DIP-switch settings into the Common Module **skip to step e)**.

    a. Set to Local Control by placing DIP switch SW1-2 in the UP/RIGHT position.

    b. Turn Module Service off by placing DIP switch SW2-6 in the ON/RIGHT position.

    c. Slide the module into the selected module slot until it if firmly seated and the module front panel is flush with the top and bottom of the shelf.

    d. Wait 15 seconds for all of the channel module's DIP-switch settings to be read and stored into the shelf Common Module. This saves the preset configuration without activating the channel module (since service is off).

    e. Set the remote control mode on by placing DIP switch SW1-2 into the DOWN/LEFT position. The OCUDP Module does not have to be pulled out or reset for this change.

    f. At this point, the Common Module is downloading saved (if any) configurations into the channel module.

    g. Verify module configuration, either through remote control "CONFIG?" user query or through the Network Management System.

h. Turn Module Service on, either through the remote control P4 parameter or through the Network Management System.

The RFL OCUDP's operating parameters can now be changed by remote control. See Remote Control Interface section of this Instruction Data Sheet for more information.

i. Go to step 16.

16. On the Module Record Card located to the right of the shelf, record the channel bank type, time slot, and any other pertinent information.

The RFL OCUDP is now installed. If your multiplexer is set up for remote access and control, you can now change the operating parameters of the module by using simple commands. For more information on remote access and control, consult your multiplexer operation manual.

PHYSICAL DESCRIPTION

The OCUDP module consists of a Level One LXT400 Transceiver integrated circuit, a logic Actel chip, an SCB Actel chip, an 80C320 microprocessor with associated memory chips, DIP switches, LEDs, and some interface and isolation circuitry. A functional block diagram of the OCUDP module is shown in Figure 3.

The LXT400 performs the transmitter and receiver functions at the metallic bipolar interface, including transmit pulse shaping, receive signal detection and timing recovery, line equalization, digital back-end loopback, and monitoring of line status and equalizer performance. The chip conforms to the AT&T, ANSI and Bellcore specifications. The logic Actel chip handles the channel interface to the T1 backplane signals, the digital logic to process the data, and the interface and control circuits to communicate with the LXT400 and the microprocessor. The SCB Actel handles the interface between the microprocessor and the SCB bus. The microprocessor performs the function of monitoring the data and status information, communicating with the SCB bus, and controlling the functions of the board. The main data flow remains within the logic Actel chip.

The OCUDP card also provides both the source and the sink for DC sealing current that is circulated in the cable pairs to reduce splice resistance. In addition, polarity reversal of the sealing current is required to signal the terminating DSU/CSU to initiate channel loopback. Sealing current should be in the range of 4 to 20mA. Normal polarity is for the transmit pair to be negative with respect to the receive pair. The card initiates channel loopback upon receiving the channel loopback code from upstream by reversing sealing current. Both normal and latching loopback capability are provided. The unit also loops the transmit pair back into the receive pair, disconnecting it from the customer loop.

Bantam access jacks permit module testing using a portable test set.

ALERTS/ALARMS

The RFL OCUDP module reports no module level ALERT or ALARM signals to the shelf Common Module.

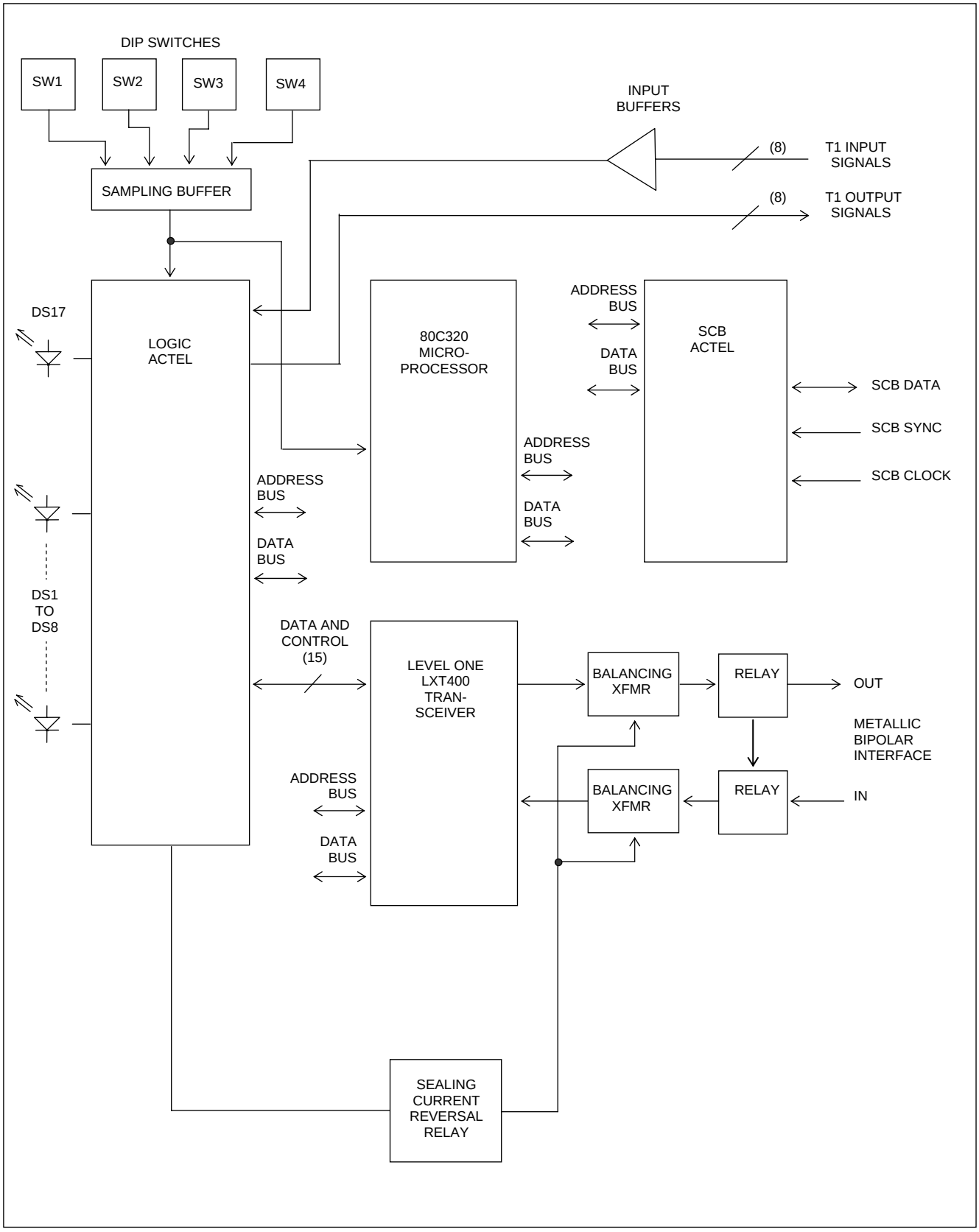

Figure 3. Functional block diagram, RFL OCUDP module.

REMOTE CONTROL INTERFACE

When installed in an IMUX 2000 remote controllable shelf, the RFL OCUDP module can be operated under local or remote control. When under remote control, certain configuration parameters can only be changed through the RS-232 remote port on the multiplexer. The remote interface for these modules involves two codes: a “P” (parameter) code, and an “S” (status) code. See the IMUX 2000 instruction manual for more information on the remote control interface.

The RFL OCUDP reports itself as a “Type 124” module when installed in a T1 system.

“P” CODES

“P” codes, when used in the parameter field on a “SET” command, allow the user to set certain parameters on the module by remote control, just like setting the switches on a module under local control. “P” codes also appear in the response to a “CONFIG?” query, showing the current parameter settings on the module.

There are six “P” codes for the RFL OCUDP when operated in T1 systems: P1 through P6. Each of these P codes can be a decimal number from 0 to 255, which can also be represented as an eight-digit binary number (in parenthesis). The binary representation is more useful for setting and interpreting the “P” codes, since each binary digit (0 or 1) corresponds to the ON or OFF setting for a particular switch on the module. Table 5 describes the meanings of the “P” codes for the RFL OCUDP module.

The RFL OCUDP Module may be queried about its current configuration as follows.

User command:

<MULTIPLEXER ADDRESS>:<CARD ADDRESS>:CONFIG?:;

Typical OCUDP Module response (actual values depend on current configuration):

***OK**
CHANNEL CARD 3, TYPE 124
UNDER REMOTE CONTROL
SRVC = ON
P01 = 1 (B00000001)
P02 = 104 (B01101000)
P03 = 118 (B01110110)
P04 = 246 (B11110110)
P05 = 0 (B00000000)
P06 = 0 (B00000000)
P07 = 1 (B00000001)

NOTE

Unlike other RFL IMUX Modules, Module Service for the OCUDP Module is **not controlled** by parameter SRVC = ON/OFF. The value of parameter SRVC returned in response a configuration inquiry has no meaning for the OCUDP Module.

Module Service for the OCUDP Module is controlled by bit 5 of [7:0] of configuration parameter P4.

The RFL OCUDP Module may be configured as follows:

User command:

<MULTIPLEXER ADDRESS>:<CARD ADDRESS>:SET:<PARAMETER>=<VALUE>;

The value may be in decimal format or in binary (binary value preceded by B).

For example, Module Service for the OCUDP with Card Address 3, located in Multiplexer Shelf 2, may be set as follows:

2:C3:SET:P4=B00110110;

Note that the complete parameter must be set; in this particular example, parameter P4 configured Module Service to be ON and Receive Time Slot = 10.

The RFL OCUDP Module may be interrogated about its status, as follows.

User command:

<MULTIPLEXER ADDRESS>:<CARD ADDRESS>:STATUS?:;

Typical OCUDP Module response (actual values depend on current status):

***OK**
FROM NET ADDRESS 2
CHANNEL CARD 3, TYPE 124
S01 = 67 (B01000011)
S02 = 47 … (etc.)
…

For convenience, status values are returned both in decimal and binary format.

Table 5. Remote configuration settings ("P" codes) for OCUDP module

P Code	Bit positions	Value [1]	Description
P1	B 0 0 0 0 0 0 0 0 . . .	. . .	Spare
P2	B 0 0 0 0 0 0 0 0 - - - - ↑ ↑ ↑ ↑ **BAUD RATE**	0000 to 1111	1000 = 56.0 kbps user rate 1111 = 64.0 kbps user rate Other values invalid
	B 0 0 0 0 0 0 0 0 - - - ↑ - - - - **SW56**	1	Not used
		0	Disable switch 56 operation (must be set to this value)
	B 0 0 0 0 0 0 0 0 - - ↑ - - - - - **ZERO CODE SUPPRESSION**	1	Enable zero code suppression
		0	Disable zero code suppression
	B 0 0 0 0 0 0 0 0 - ↑ - - - - - - **AB SIGNALING**	1	Enable AB signaling
		0	Disable AB signaling
	B 0 0 0 0 0 0 0 0 ↑ - - - - - - - . . .	. . .	Not used
P3	B 0 0 0 0 0 0 0 0 ↑ ↑ ↑ ↑ ↑ **RECEIVE TIME SLOT**	00000 to 11111	Sets receive time slot in accordance with Table 3, with "OFF" equivalent to 1 and "ON" equivalent to 0.
	B 0 0 0 0 0 0 0 0 - - ↑ - - - - - **A/B DIRECTION**	1	Transmit on A, receive on B
		0	Transmit on B, receive on A
	B 0 0 0 0 0 0 0 0 - ↑ - - - - - - **QUALITY MONITOR**	. . .	Not used
	B 0 0 0 0 0 0 0 0 ↑ - - - - - - - **SEALING CURRENT ALERT**	1	Loss of sealing current causes alert
		0	Loss of sealing current does not cause alert

1. These are the only legal values for setting the parameters. Setting any parameter to a value outside its specified range will produce an unpredictable result.

Table 5. - continued. Remote configuration settings ("P" codes) for OCUDP module

P Code	Bit positions	Value [1]	Description
P4	B 0 0 0 0 0 0 0 0 - - - ↑ ↑ ↑ ↑ ↑ **TRANSMIT TIMESLOT**	00000 to 11111	Sets transmit timeslot in accordance with Table 3 With "OFF" equivalent to 1 and "ON" equivalent to 0
	B 0 0 0 0 0 0 0 0 - - ↑ - - - - - **MODULE SERVICE ENABLE**	1	Module service enabled
		0	Module service disabled
	B 0 0 0 0 0 0 0 0 ↑ ↑ - - - - - -	. . .	Not Used
P5	B 0 0 0 0 0 0 0 0 - - - - - - - ↑ **DIGITAL LOOPBACK**	1	Loopback enabled
		0	Loopback disabled
	B 0 0 0 0 0 0 0 0 - - - - - - ↑ - **LATCHING LOOPBACK FUNCTIONALITY**	1	Latching loopback functionality for DSU and channel, enable (this permits reception of inline control codes)
		0	Latching loopback functionality for DSU and channel, disable
	B 0 0 0 0 0 0 0 0 ↑ - - - - - - - **RESET LATCHED STATUS**	1	0 to 1 transition resets latching status, Contained in Status Bytes S4 through S7
		0	
	B 0 0 0 0 0 0 0 0 - ↑ ↑ ↑ ↑ ↑ - -	. . .	Not used
P6	B 0 0 0 0 0 0 0 0	. . .	Spare

Notes:

For time slot selection, the setting of switches shown in Table 3.are equivalent to Remote Control Settings as follows:

TX Slot: Local Control SW2 – Positions 5 through 1
Remote Control P4 – Bits 4 through 0.

RX Slot: Local Control SW3 – Positions 5 through 1
Remote Control P3 – Bits 4 through 0.

Example: Time slot 10:

SW2/3 =	X	X	X	OFF	OFF	OFF	OFF	ON
P4/3 =	X	X	X	1	0	1	1	0

Note:

- OCUDP Module Service is controlled by P4, bit 5 of [7:0].
- Module Service is not controlled by parameter SRVC = ON/OFF, unlike some of the other RFL IMUX modules.
- Value of parameter SRVC shown in response to a configuration inquiry has no meaning for the OCUDP Module.

"S" CODES

"S" codes appear in response to a "STATUS?" query. There are seven "S" codes for the RFL OCUDP when operated in T1 systems. Like the "P" code, this number is displayed in both decimal and binary form. Table 6 describes the meanings of the "S" codes for the RFL OCUDP module.

A typical response to a "STATUS?" query looks like this:

*** OK**
CHANNEL CARD 3, TYPE 124
S01 = 3 (B00000011);

Table 6. Remote status messages ("S" codes) for OCUDP module

S CODE	Bit positions	Value	Description
S1	B 0 0 0 0 0 0 0 0 - - - - - - - ↑ **MULTIPLEXER TROUBLE**	1	Multiplexer backplane status normal
		0	Multiplexer backplane trouble condition
	B 0 0 0 0 0 0 0 0 - - - - - - ↑ - **SEALING CURRENT**	1	Sealing current detected
		0	Sealing current NOT detected
	B 0 0 0 0 0 0 0 0 - -↑↑↑↑- -	. . .	Not used
	B 0 0 0 0 0 0 0 0 ↑↑- - - - - -	. . .	Hardware generation ID code 00 = Design capable of 56 kbps only 01 = Design capable of 56 and 64 kbps

Table 6. – continued, Remote status messages (“S” codes) for OCUDP module

S CODE	Position	Value	Description
S2	B 0 0 0 0 0 0 0 0 - - - - ↑ ↑ ↑ ↑ **LOOP LENGTH**		See Table 7
	B 0 0 0 0 0 0 0 0 - - - ↑ - - - - **RECEIVER CONVERGING**	1	Receiver converging process (condition exists during link synchronization)
		0	Synchronization complete or failed
	B 0 0 0 0 0 0 0 0 - - ↑ - - - - - **FULL OPERATION**	1	Full operation of metallic line receiver
		0	metallic line receiver operation impaired
	B 0 0 0 0 0 0 0 0 - ↑ - - - - - - **LEVEL DETECTION**	1	Level detection
		0	NO level detection
	B 0 0 0 0 0 0 0 0 ↑ - - - - - - - **RECEIVE LOSS OF SIGNAL**	1	Receive loss of signal
		0	NO receive loss of signal
S3	B 0 0 0 0 0 0 0 0 ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ **RX SIGNAL MAGNITUDE**	00000000 to 11111111	See LEVEL ONE LXT400 data sheet

Table 6. – continued, Remote status messages (“S” codes) for OCUDP module

S CODE	Position	Value	Description
S4*	B 0 0 0 0 0 0 0 0 - - - - - - - ↑ **TEST CODE**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - - - - - - ↑ - **UNASSIGNED MUX CHANNEL**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - - - - - ↑ - - **MUX-OUT-OF-SYNC**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - - - - ↑ - - - **ABNORMAL STATION**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - - - ↑ - - - - **OCU LOOPBACK**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - - ↑ - - - - - **DSU LOOPBACK**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - ↑ - - - - - - **CHANNEL LOOPBACK**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 ↑ - - - - - - - **RECEIVING IDLE CODE**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.

* S4 Remote Status Message from T1 side. **Not used in 64 kbps mode.**

Note:

Status bits in S4 latch events occurred since the last reset of the Latched Status. To refresh S4, toggle P5 – Bit 7 (Reset Latched Status) from 0 to 1.

Table 6. – continued, Remote status messages (“S” codes) for OCUDP module

S CODE	Position	Value	Description
S5*	B 0 0 0 0 0 0 0 0 - - - - - - - ↑ **RELEASE CODE**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - - - - - - ↑ - **BLOCK CODE**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - - - - - ↑ - - **TRANSIT IN PROGRESS**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - - - - ↑ - - - **FAR-END VOICE**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - - - ↑ - - - - **LOOPBACK ENABLE**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - - ↑ - - - - - **MULTIPOINT UNIT ALERT**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - ↑ - - - - - - **TEST ALERT**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.

* S5 Remote Status Message from T1 side. **Not used in 64 kbps mode.**

Note:

Status bits in S5 latch events occurred since the last reset of the Latched Status. To refresh S5, toggle P5 – Bit 7 (Reset Latched Status) from 0 to 1.

Table 6. – continued, Remote status messages (“S” codes) for OCUDP module

S CODE	Position	Value	Description
S6**	B 0 0 0 0 0 0 0 0 - - - - - - - ↑ **TRANSMITTING IDLE**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - - - - - - ↑ - **TRANSMITTING LOOPBACK**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
	B 0 0 0 0 0 0 0 0 - - - - - ↑ - - **TRANSMITTING ABNORMAL STATION**	1	Code detected in data stream.
		0	Code not detected in data stream since last reset.
S7	B 0 0 0 0 0 0 0 0	. . .	Spare

** S6 Remote Status Message from data port side. **Not used in 64 kbps mode.**

Note:

Status bits in S6 latch events occurred since the last reset of the Latched Status. To refresh S6, toggle P5 – Bit 7 (Reset Latched Status) from 0 to 1

Table 7. LS Loop Length Bits LL3-LL0

User Rate Kbps	Approximate line loss in dB/Loop length in km (24 AWG, no bridged taps) *								
	0111	**1000**	**1001**	**1010**	**1011**	**1100**	**1101**	**1110**	**1111**
56.0	50.5/8.5	44.4/7.5	38.4/6.4	32.3/5.3	26.0/4.2	19.7/3.2	13.6/2.1	7.3/1.1	0.0/0.0
64.0	50.7/8.0	45.0/7.0	38.8/6.0	32.5/5.0	26.3/4.0	20.0/3.0	14.0/2.0	7.4/1.0	0.0/0.0

* Based on received signal strength/filter selection, assuming far-end pulse transmission compliant with AT&T Pub 62310 or T1E1/90-051. See LEVEL ONE LXT400 data sheet, Revision 3.2 for more information.

LOOPBACK TESTING

A local loopback test should be performed when the module is first installed, or any time the integrity of the module needs to be checked. The loopback test can be performed on modules in terminal systems or drop/insert systems. The loopback test is a tool for locating problems, but is no substitute for troubleshooting expertise.

Before starting a loopback test, make sure the following three conditions have been met:

1. The OCUDP module and I/O adapter must be installed in an RFL IMUX 2000 chassis.

2. Power must be applied to the system.

3. The module must be out of service.

A telecommunications CSU/DSU test set that can accept DDS loop signals will be required for the loopback test (Black Box Corporation CSU/DSU MS or equivalent).

LOCAL LOOPBACK TEST PROCEDURE

1. Press the Group toggle switch on the CM-3 left or right until the function display reads LPBK. Then push the SET toggle switch left until the function display reads EqLB. At this time push the SET toggle switch twice to the right.

> **NOTE**
>
> Equipment Loopback on the CM-3 will loopback all DS0 channels within that shelf

The green LED above the SET toggle switch should blink after the first push and should be steady after the second push.

The yellow loopback LED on the CM-3 and the yellow LED on the power supply should be lit, indicating that the system is in local loopback.

2. Connect the test set to the cable assembly in accordance with the manufacturers procedures. Then perform a bit error rate test.

3. Observe that zero errors are indicated on the receive side of the test set.

If an error count occurs, check all option selections and repeat steps 1 through 3. If the error count persists, check the following:

a. Make sure the test set is correctly set up.

b. Make sure the test set cable is correctly connected.

c. Make sure the module under test is correctly installed.

d. Make sure the cable assembly is firmly and correctly connected.

If the error source is localized to the module or the cable assembly, return the defective component to RFL for repair. If an error count persists after these steps have been taken, check for an outside error source.

TROUBLESHOOTING

If there is an apparent malfunction, first check that the configuration is appropriate for the transmission system in use, and that the transmit and receive configurations are identical.

Problems may occur at the common equipment or facility level that may affect the operation of this module. Refer to the "Maintenance" section in your multiplexer manual for system analysis procedures.

Use the following procedure to determine whether a problem is being caused by the OCUDP or by some other part of the system.

1. If more than one module is on the same time slot, remove those modules that are known to be good.

2. Perform a local loopback test, as described in steps 1 through 3 of the Local Loopback test procedure.

3. If the loopback test indicates that the module is functioning properly, then check that the terminal equipment is functioning properly. If so, then the test is complete. If not, then check for an outside error source.

4. If the error count persists, then swap modules. Replace the module with another that is known to be functioning properly. If the replacement module is OK, then use the Repair/Return procedure in the General Information Section of the manual to return the defective module to RFL for repair.

5. If proper function is not obtained, perform individual multiplex tests as described in the multiplexer manual. If an error count still persists after these steps have been taken, then check for an outside error source.

RFL Electronics, Inc.

IMUX Application Note AN2000-020 Reference Ass'y 106960-5

IMUX 2000

OCUDP for Frame Relay Applications

This Application Note is specific to customers that use the RFL IMUX 2000 OCUDP to carry 56 kb/s Frame Relay circuits such as the DYMEC Dynaster 2000

The data content in certain frame relay circuits can mimic the in-band control codes in a 56 kb/s OCUDP link and cause the OCUDP to erroneously go into loopback. This severs the link and requires the OCUDP to be power cycled to recover.

To prevent this, a special version of the OCUDP Module has been developed that does not react to in-band control codes. The part number is 106960-5.

- When the 106960-5 is set to 56 kb/s it will not accept in-band control codes originating from the customer's frame relay equipment or the T1 data stream.
- Operation at 64 kbps is unaffected.
- Configuration settings in the OCUDP are un-changed from the standard module.

First Release March 1, 2010

Notes

NOTICE

Publication No. ID OCUDP
Printed in U.S.A.
Revised July 15, 2010

RFL Electronics Inc.
353 Powerville Road
Boonton Township, NJ 07005-9151
Phone: (973) 334-3100
Fax: (973) 334-3863