RFL Electronics Inc.

I N S T R U C T I O N D A T A

RFL DS-961DE Five-Port Multi-Rate Synchronous Data Module

DESCRIPTION

The DS-961DE is a five-port multi-rate synchronous data channel module, designed for use in IMUX 2000 E1 Multiplexers. The module uses an RS-232C interface to enable transmission of up to five 9.6 kbps or two 19.2 kbps data signals over E1 and other digital communications facilities, using only one 64 kbps time slot.

The DS-961DE has three switch banks, one setup jumper, and four LEDs, one each for channels transmitting, channels receiving data, no framing bit, and transmit fault.

The DS-961DE 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.

User-adjustable switches and jumpers allow configuration of the following parameters:

- Data rate selection from 1200 bps to 19.2 kbps
- Optional three-channel operation (two at 19.2 kbps, one at 9.6 kbps)
- Selection of transmit timing or terminal timing
- Selectable transmit/receive direction for drop and insert operation
- Optional timing inversion
- Switchable loopback of all channels at the receive side
- Time slot selection

SPECIFICATIONS

As of the date this Instruction Data Sheet was published, the following specifications apply to the RFL DS-961DE module. Because all of RFL products undergo constant improvement and refinement, these specifications are subject to change without notice.

Multiple Synchronous Data Channels:	Full duplex, five independent RS-232 data ports
Clock/Data Rates:	Five channel operation: A selectable common rate of 1200 bps, 2400 bps, 4800 bps, or 9600 bps Two channel operation: A common rate of 19.2 kbps Three channel operation: Two channels at 19.2 kbps, one at 9600 bps
Timing:	Selectable, internal or external
Buffer:	Three-bit when using external timing source (terminal timing)
Time Slot:	Five channels occupy a single selectable 64 kbps time slot
RS-232 Interface:	Supports TXD, RXD, RX TIMING, TX TIMING, TERMINAL TIMING, GROUND
Remote Interface:	Compatible with SCL remote command language, allows module configuration and status access
Connector:	The DS-961DE requires the use of an MA-404A Module Adapter, which provides five RJ-11 jacks for the RS-232 interfaces
Temperature:	0° - 50°C Operating
Humidity:	0% - 90% Non-condensing
Power Consumption:	1.2 watts nominal

INSTALLATION

Before the RFL DS-961DE 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 DS-961DE 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 DS-961DE module occupies one module slot in the Main Shelf or Expansion Shelf.

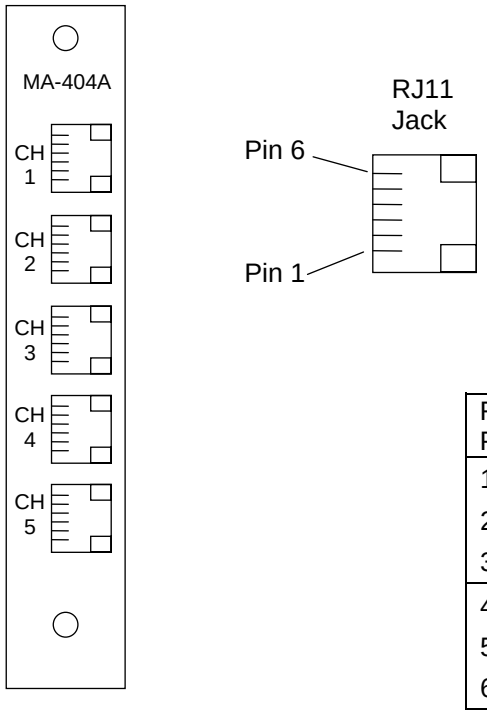
3. Each module in the IMUX 2000 multiplexer requires a Module Adapter. The module adapter provides the appropriate connector for the desired interface.

   The DS-961DE Data Module uses an MA-404A Module Adapter. The MA-404A accepts up to five RS-232C lines via RJ-11 modular input connectors. Figure 1 shows the input jack arrangement. If you are setting up the module for two channels at 19.2 kbps each, use only the first two jacks. For three channel operation, use the first two jacks for 19.2 kbps and the fifth jack for 9.6 kbps. The modes of operation are illustrated in Figure 2.

   Jumpers on the MA-404A are used to select normal or three channel mode of operation. For NORMAL mode (two or five channel), set jumpers J1, J2 and J3 to the NORMAL position. For THREE CHANNEL mode, set jumpers J1, J2 and J3 to the THREE-CHANNEL position. Figure 3 illustrates these jumper settings.

4. Insert the MA-404A Module Adapter into the rear of the slot which will hold the RFL DS-961DE module, and make all connections to the module adapter.

   Connect the RJ-11 input lines, and insert the MA-404A into the rear of the slot that will hold the DS-961DE module.



RJ11 Pin #	Signal Name	RS-232 DB25 Pin #
1	Transmit Timing	15
2	Transmit Data	2
3	Terminal Timing	24
4	Receive Data	3
5	Ground	7
6	Receive Timing	17

Figure 1. MA-404A Module Adapter Input Configuration.

5. Refer to Figure 4 and Table 2 for the location and function of DIP switches on the DS-961DE.

6. Set the module address using DIP switches SW1-1 through SW1-6 for the desired remote address (SCB address).

For remote access, each channel module in the IMUX 2000 E1 must have a distinct module address. Valid addresses are the numbers "1" to "36". In most installations the address will be set to the number of the slot the module is occupying. Table 3 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.)

7. Set the channel configuration jumpers. To use this module in five channel mode at any data rate, or in two channel mode at 19.2 kbps, set jumper J1 to the NORMAL position as shown in Table 1 and Figure 4. Set the jumpers on the module adapter to the NORMAL position as shown in Figure 3.

   To use the module in three channel mode (two channels at 19.2 kbps, and one channel at 9.6 kbps), make the following settings:

   a. Set jumper J1 to the THREE CHANNEL position.
   b. Set SW3-4 to the UP position (buffers out of circuit, uses DS-961DE module timing).
   c. Set the jumpers on the module adapter to the THREE CHANNEL position as shown in Table 1 and Figure 3.

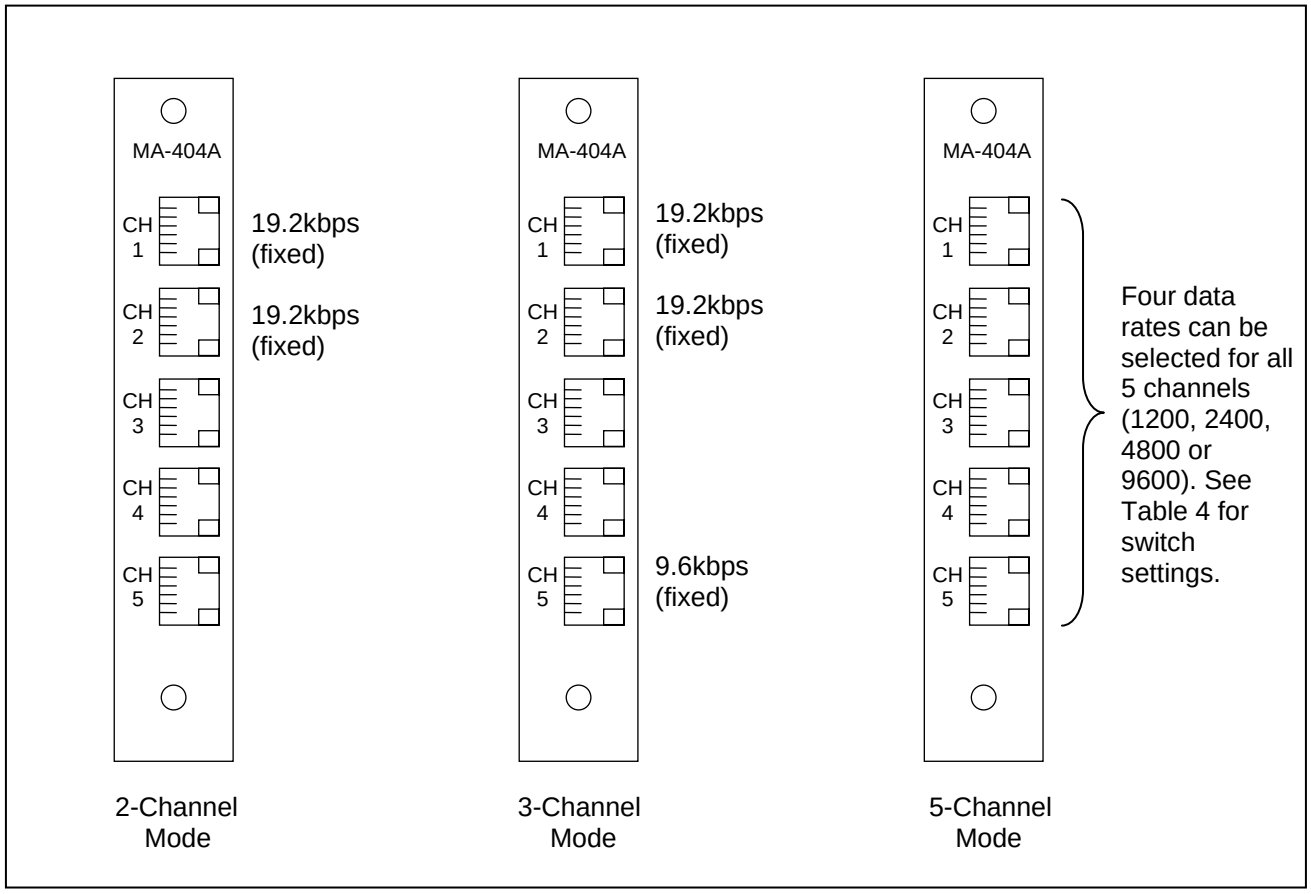


Figure 2. DS-961DE/MA-404A modes of operation

Table 1. DS-961DE/MA-404A Switch and Jumper Settings for various modes of operation

Mode Of Operation	Data Rate	DS-961D		MA-404A
		Switch Setting	Jumper Setting	Jumper Settings
2-Channel	CH1 and CH2 Fixed at 19.2kbps	SW3-3 set to UP	J1 set to NORMAL	J1, J2 and J3 set to NORMAL
3-Channel	CH1 and CH2 Fixed at 19.2kbps, and CH5 fixed at 9.6kbps	SW3-3 set to UP	J1 set to 3-CHANNEL	J1, J2 and J3 set to 3-CHANNEL
5-Channel	CH1 to CH5 all set to the same data rate as follows: 1200, 2400, 4800 or 9600. See Table 4 for switch settings	SW3-3 set to DOWN	J1 set to NORMAL	J1, J2 and J3 set to NORMAL

8. Select the time slot using DIP switches SW2-1 to SW2-5.

9. Set for use in a terminal or drop/insert multiplexer by using DIP switch SW2-6.

10. Select the data rate by using DIP switches SW3-1 and SW3-2. (See Table 5)

11. Select the buffer-in timing by using DIP switch SW3-4. If using three channel mode, this should be set to the UP position.

12. If using internal DS-961DE module timing, set each channel to normal or inverted clock by using DIP switches SW3-5 to SW3-9.

13. Set the loop switch, SW3-10, to the UP (OFF) position.

14. If you plan to operate the RFL DS-961DE 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 SW1-7 in the OFF position.

    b. Turn service on by placing DIP switch SW1-8 in the OFF 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.

15. If you plan to operate the RFL DS-961DE module under remote control, perform the following steps:

    a. Set to local control by placing DIP switch SW1-7 in the OFF position.

    b. Turn service off by placing DIP switch SW1-8 in the ON 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. Wait 15 seconds for the RFL DS-961DE module's parameter settings to be loaded into the shelf Common Module.

    e. Pull the module out of the shelf and place DIP switch SW1-7 in the ON position.

    f. Slide the module back into the shelf.

    g. Verify the module configuration through remote control by issuing a "CONFIG?" query. See the Remote Control Interface section of this Instruction Data Sheet for an explanation of the "CONFIG?" response.

    h. Turn service on through remote control by issuing a "SRVC=ON" command.

    The RFL DS-961DE's operating parameters can now be changed by remote control. See the Remote Control Interface section of this Instruction Data Sheet for more information.

    i. Go to step 16.

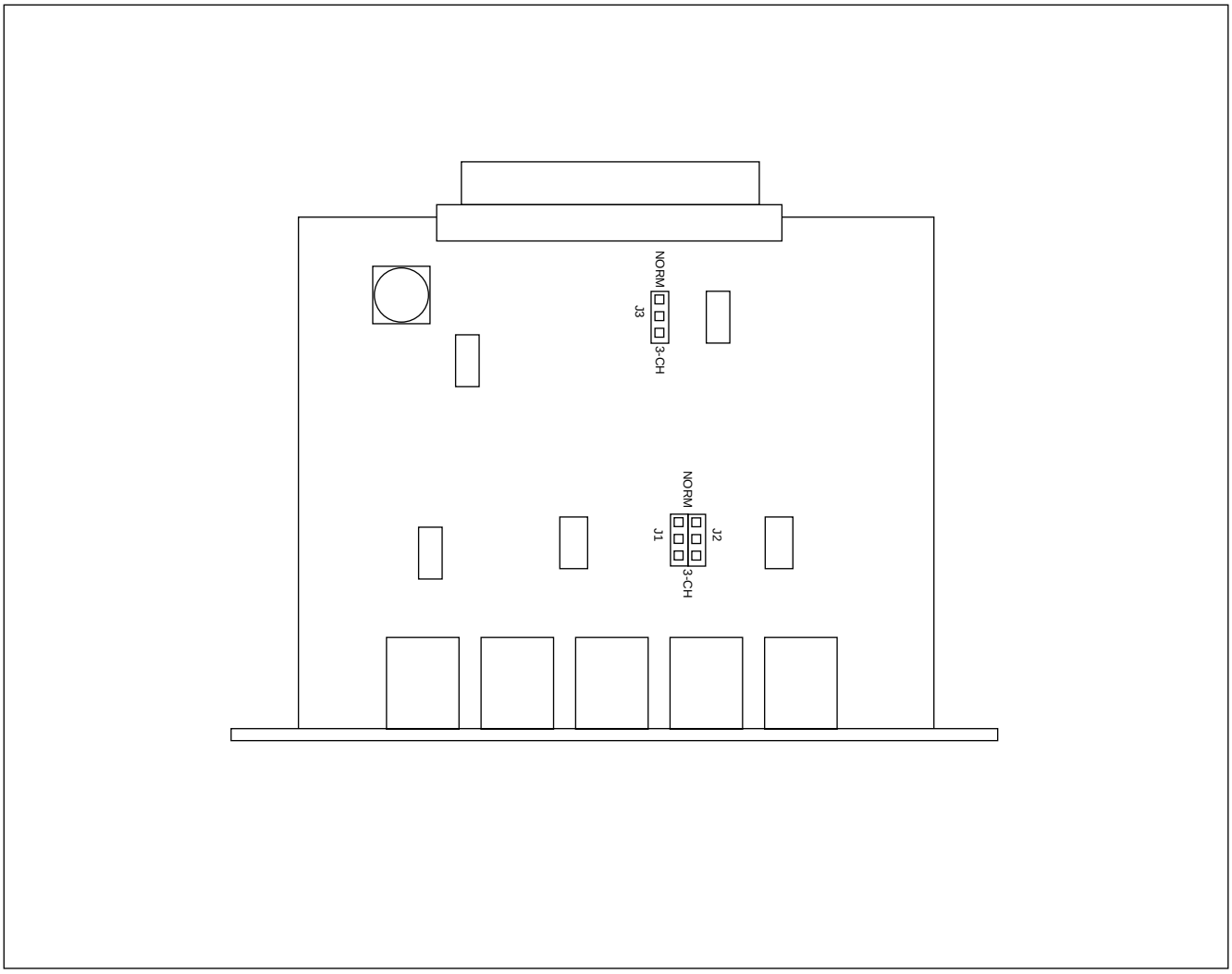


Figure 3. MA-404A Module Adapter jumper settings

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 DS-961DE 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.

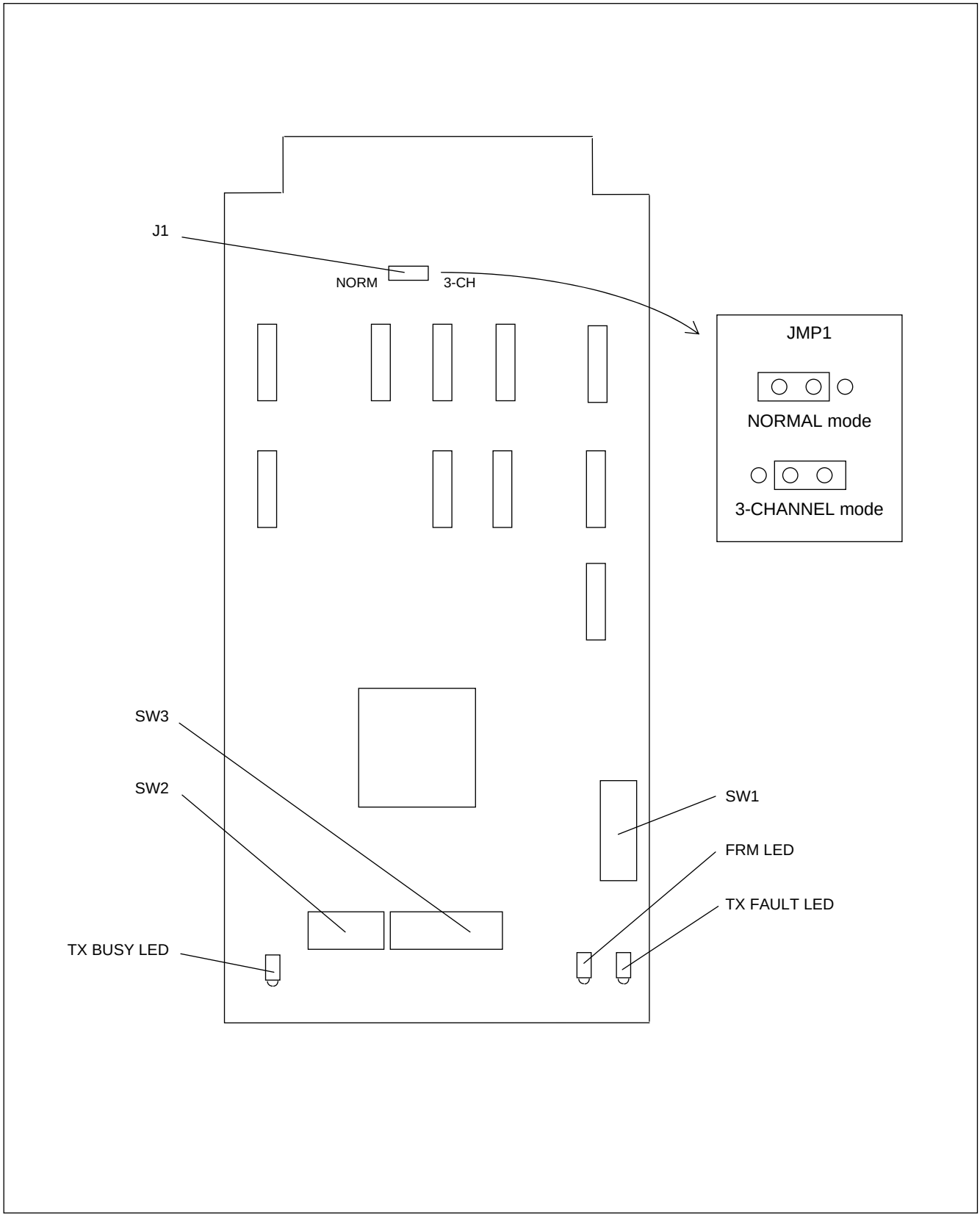


Figure 4. Controls and indicators, RFL DS-961DE Synchronous Data Module

Table 2. Controls and indicators, RFL DS-961DE Module

Control/ Indicator	Label	Setting	Description
Jumper	J1	NORMAL	Sets module to 2-channel mode or 5-channel mode.
		3-CHANNEL	Sets module to 3-channel mode.
LED DS1 (green)	TX BUSY	. . .	Indicates if one or more channels is transmitting.
LED DS3 (red)	FRM	. . .	Indicates if the receiver side of the module cannot find the proper framing bit in the receive time slot selected. A card level ALERT signal is sent to the Common Module
LED DS4 (red)	TX FAULT	. . .	Indicates if a fault is detected in the transmit circuitry of the logic array. A card level ALARM signal is sent to the Common Module.
SW1-1 to SW1-6	. . .	. . .	Sets card address for remote access in accordance with Table 3. (See Note 1 below).
SW1-7	. . .	ON	Sets module to remote control (See Note 1 below).
		OFF	Sets module to local control.
SW1-8	. . .	ON	Module service is disabled.
		OFF	Module service is enabled.
SW2-1 to SW2-5	TIME SLOT SELECT	. . .	Select time slot in accordance with Table 4.
SW2-6	TX A BUS	UP	Operate via DI-B port in a drop/insert multiplexer (see page 14).
		DOWN	Operate in a terminal multiplexer, or via DI-A port in a drop/insert multiplexer.
SW3-1 & SW3-2	RATE 1 RATE 2	. . .	Select data rate in 5-Channel mode in accordance with Table 5.
SW3-3	SEL 9.6	UP	Selects 2 or 3-Channel mode (Ports 1 & 2 = 19.2)
		DOWN	Selects 5-Channel mode
SW3-4	BUF IN	UP	Takes buffers out of circuit and sets module to use its internal timing (See Note 2 below).
		DOWN	Places buffers in circuit and sets module to use DTE device timing.
SW3-5 to SW3-9	INV A,B,C,D,E	UP	Standard timing for selected channel.
		DOWN	Inverts timing for selected channel (See Note 3 below)
SW3-10	LOOP	UP	Turns loopback off (normal operation) .
		DOWN	Turns loopback on (See Note 4 below).

1. When this module is installed in a non-remote controllable multiplexer SW1-1 to SW1-7 must be OFF.
2. The input buffers must be used when the DTE device timing is in use, so this switch sets both of these conditions.
3. These switches are active only when internal timing is selected (SW3-4).
4. When the loop switch is DOWN, all five receive channels are looped back into the transmitter (used for far end loopback during end to end testing).

Table 3. SCB address settings, RFL DS-961DE module

SCB ADDRESS	SW1-1	SW1-2	SW1-3	SW1-4	SW1-5	SW1-6
1	OFF	ON	ON	ON	ON	ON
2	ON	OFF	ON	ON	ON	ON
3	OFF	OFF	ON	ON	ON	ON
4	ON	ON	OFF	ON	ON	ON
5	OFF	ON	OFF	ON	ON	ON
6	ON	OFF	OFF	ON	ON	ON
7	OFF	OFF	OFF	ON	ON	ON
8	ON	ON	ON	OFF	ON	ON
9	OFF	ON	ON	OFF	ON	ON
10	ON	OFF	ON	OFF	ON	ON
11	OFF	OFF	ON	OFF	ON	ON
12	ON	ON	OFF	OFF	ON	ON
13	OFF	ON	OFF	OFF	ON	ON
14	ON	OFF	OFF	OFF	ON	ON
15	OFF	OFF	OFF	OFF	ON	ON
16	ON	ON	ON	ON	OFF	ON
17	OFF	ON	ON	ON	OFF	ON
18	ON	OFF	ON	ON	OFF	ON
19	OFF	OFF	ON	ON	OFF	ON
20	ON	ON	OFF	ON	OFF	ON
21	OFF	ON	OFF	ON	OFF	ON
22	ON	OFF	OFF	ON	OFF	ON
23	OFF	OFF	OFF	ON	OFF	ON
24	ON	ON	ON	OFF	OFF	ON
25	OFF	ON	ON	OFF	OFF	ON
26	ON	OFF	ON	OFF	OFF	ON
27	OFF	OFF	ON	OFF	OFF	ON
28	ON	ON	OFF	OFF	OFF	ON
29	OFF	ON	OFF	OFF	OFF	ON
30	ON	OFF	OFF	OFF	OFF	ON
31	OFF	OFF	OFF	OFF	OFF	ON
32	ON	ON	OFF	ON	ON	OFF
33	OFF	ON	OFF	ON	ON	OFF
34	ON	OFF	OFF	ON	ON	OFF
35	OFF	OFF	OFF	ON	ON	OFF
36	ON	ON	OFF	ON	ON	OFF

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

Table 4. Time Slot Selection for RFL DS-961DE module.

Time Slot	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5
0[1]	UP	UP	UP	UP	UP
1	UP	UP	UP	UP	DOWN
2	UP	UP	UP	DOWN	UP
3	UP	UP	UP	DOWN	DOWN
4	UP	UP	DOWN	UP	UP
5	UP	UP	DOWN	UP	DOWN
6	UP	UP	DOWN	DOWN	UP
7	UP	UP	DOWN	DOWN	DOWN
8	UP	DOWN	UP	UP	UP
9	UP	DOWN	UP	UP	DOWN
10	UP	DOWN	UP	DOWN	UP
11	UP	DOWN	UP	DOWN	DOWN
12	UP	DOWN	DOWN	UP	UP
13	UP	DOWN	DOWN	UP	DOWN
14	UP	DOWN	DOWN	DOWN	UP
15	UP	DOWN	DOWN	DOWN	DOWN
16[2]	DOWN	UP	UP	UP	UP
17	DOWN	UP	UP	UP	DOWN
18	DOWN	UP	UP	DOWN	UP
19	DOWN	UP	UP	DOWN	DOWN
20	DOWN	UP	DOWN	UP	UP
21	DOWN	UP	DOWN	UP	DOWN
22	DOWN	UP	DOWN	DOWN	UP
23	DOWN	UP	DOWN	DOWN	DOWN
24	DOWN	DOWN	UP	UP	UP
25	DOWN	DOWN	UP	UP	DOWN
26	DOWN	DOWN	UP	DOWN	UP
27	DOWN	DOWN	UP	DOWN	DOWN
28	DOWN	DOWN	DOWN	UP	UP
29	DOWN	DOWN	DOWN	UP	DOWN
30	DOWN	DOWN	DOWN	DOWN	UP
31	DOWN	DOWN	DOWN	DOWN	DOWN

Notes:
1. Do not use. Time slot 0 is always reserved for E1 framing use.
2. Do not use if E1 signaling is CAS. Time slot 16 is reserved for signaling and multi-frame synchronization in the CAS signaling format. If CCS signaling is used, time slot 16 is available for payload.

Table 5. Data Rate Selection for RFL DS-961DE module in 5-Channel mode

Data Rate	SW3-1	SW3-2
1200 bits/second	UP	UP
2400 bits/second	UP	DOWN
4800 bits/second	DOWN	UP
9600 bits/second	DOWN	DOWN

FUNCTIONAL DESCRIPTION

The DS-961DE Data Module has three basic configuration modes:

1. Five independent full duplex data channels with a common data rate of 1200 to 9600 bps.

2. Two independent full duplex data channels with a data rate of 19.2 kbps.

3. Two independent full duplex data channels with a data rate of 19.2 kbps, plus a third independent channel with a data rate of 9600 bps.

Figure 5 shows a block diagram of the DS-961DE.

TRANSMIT SIDE

Each input signal enters via a connection to the module adapter at the rear of the shelf. Data and timing pass to the RS-232 line receivers on the DS-961DE module. The module can be set to use transmit timing from either the Data Terminal Equipment (DTE) input signals, or the DS-961DE internal module timing. The line receivers convert each channel to TTL output. If DTE timing is in use, each channel then goes to its own three-bit buffer.

The Logic Array multiplexes the five channels together, adds a framing bit, and feeds the resulting bitstream to the main multiplexer for transmission in the desired direction. User-selectable switches on the module determine which time slot is used.

RECEIVE SIDE

The high speed multiplexed data from the receive direction enters the receive side of the Logic Array. The Logic Array feeds the framing bit to a synchronization counter, which provides the proper timing and phase to read out the five data channels.

The Logic Array and synchronization counter separate the data back into five TTL data signals. Each channel then goes to an RS-232 line driver, which converts it back to RS-232 level. Finally, the RS-232 output signal goes to the module adapter, where it passes to the output connector.

ALERTS/ALARMS

The RFL DS-961DE module reports the following module level ALERT or ALARM signals to the shelf Common Module. If the receive side cannot find a proper framing bit in the time slot selected, the DS-961DE will light its “FRM” LED and send a card-level ALERT to shelf Common Module. If a fault is detected in the transmit circuitry, the module will light its “TX FAULT” LED and send a card-level ALARM to the shelf Common Module.

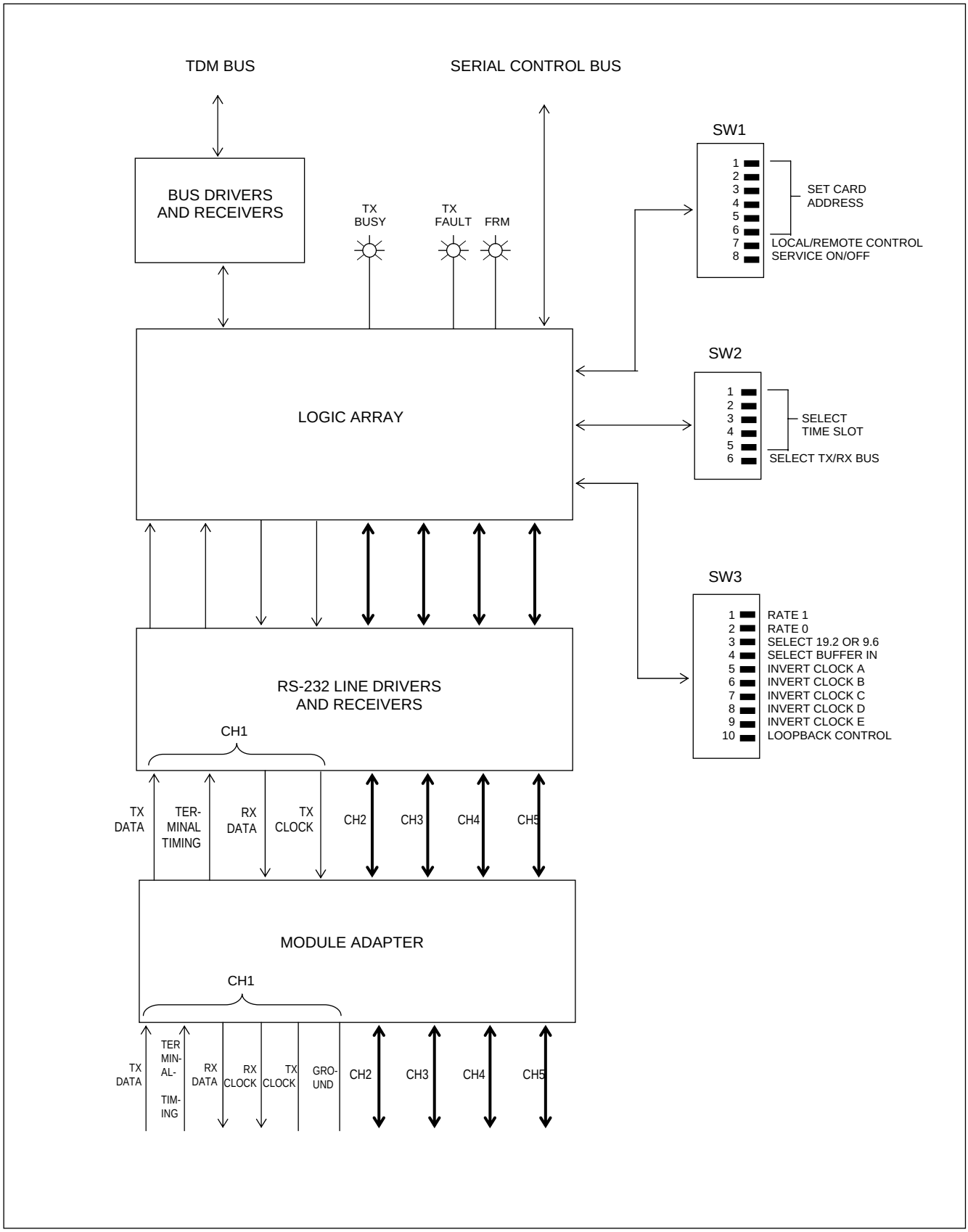


Figure 5. DS-961DE Data Module, Block Diagram

DROP AND INSERT OPERATION

A drop and insert multiplexer operates at a central node on a three (or more) node system. In the example shown in Figure 6, node 2 has a drop and insert multiplexer whose DI/A port is connected to the transmission line to node 1, and whose DI/B port is connected to the transmission line to node 3. Individual payload channels may connect nodes 1 and 2, 1 and 3, or 2 and 3.

In the drop and insert multiplexer at node 2, a DS-961DE module can be set to transmit and receive either via the DI/A port (toward node 1) or via the DI/B port (toward node 3), but not both.

When a DS-961DE is installed in a terminal multiplexer (node 1 or node 3), its TX-A switch must be set DOWN. However, when it is installed in a drop and insert multiplexer (node 2) the TX-A switch setting must be DOWN to transmit and receive via the DI/A port (toward node 1) and UP to transmit and receive via the DI/B port (toward node 3).

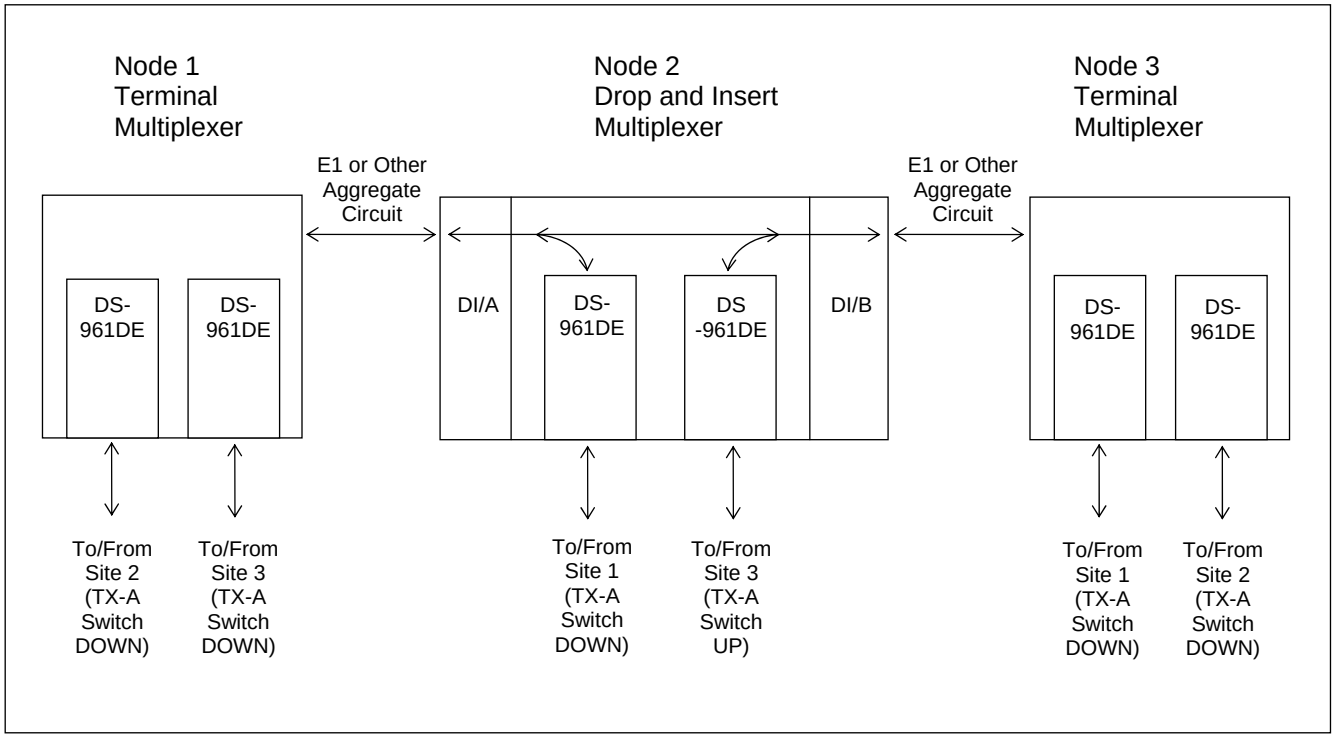


Figure 6. Example of a Three-Site System Using Drop and Insert

REMOTE CONTROL INTERFACE

When the RFL DS-961DE module is installed in an IMUX 2000 E1 multiplexer, it can be operated under local or remote control. When under remote control, most of the module setup parameters can only be changed through the RS-232 remote port on the shelf Common Module. See the IMUX 2000 manual for information on using the remote control interface.

The remote control interface for the RFL DS-961DE involves two sets of codes: "P" (parameter) codes, and "S" (status) codes. The RFL DS-961DE reports itself as a "Type 77" module.

"P" CODES

"P" codes, when used in the parameter field of an SCL "SET" command, allow the user to set certain parameters on the RFL DS-961DE by remote control, just like setting the DIP switches on a module under local control. "P" codes also appear in the response to a "CONFIG?" query, providing a list of the RFL DS-961DE's current parameter settings. A typical RFL DS-961DE response to a "CONFIG?" query looks like this:

Response:	**This line means:**
*** OK**	A valid command was received
CHANNEL CARD 1, TYPE 77	The card address is 1, it is a DS-961DE
UNDER REMOTE CONTROL	This module is under remote control
SRVC = ON	Service is turned on
P01 = 93 (B01011101)	
P02 = 128 (B10000000)	

There are two "P" codes for the DS-961DE, "P1" and "P2". Each "P" code is displayed as a decimal number from 0 to 255, followed by an eight-digit binary equivalent in parentheses. The decimal display is generally more useful for both setting and interpreting most of the "P" codes. For example, P1 sets the time slot the module will use. To set the module to use time slot 9, issue a SET command in the format:

<multiplexer address>:<card address>:SET:P1 = 9;

The binary value may be used if desired.

NOTE

When using binary numbers in the parameter field of a SET command, they must be preceded by the letter "B", as shown in the following example. To set the module to use time slot 9 in binary, issue this command:

<multiplexer address>:<card address>:SET:P1 = B00001001;

In addition to the “P” codes, it is also possible to turn service on or off for the RFL DS-961DE by sending one of the following commands in the parameter field of a “SET” command:

SRVC = ON
SRVC = OFF

Table 6 lists the meaning of the “P” codes for this module.

Table 6. Remote Configuration Settings (P Codes)

P Code	Digit(s) and Switch Equivalent	Bit Value	Description
SRVC	SERVICE ON/OFF	ON	Turns service on (module enabled)
		OFF	Turns service off (module disabled)
P1a	B00000000 ---↑↑↑↑↑ TIME SLOT SELECT	1 to 31	These five bits set the desired time slot(s). From left to right, they correspond to the five time slot select switches as shown in Table 3.
P1b	B00000000 --↑----- TERM	0	Set transmit and receive directions: 0 = Set for operation via the DI-B port of a drop/insert multiplexer.
		1	1 = Set for operation in a terminal multiplexer or via the DI-A port of a drop/insert multiplexer.
P1c	B00000000 ↑↑------	0 to 3	Low-speed rate select (inoperative when P2a is set to "0"): 0 = 1200 bps, 1 = 4800 bps, 2 = 2400 bps, 3 = 9600 bps
P2a	B00000000 -------↑	0	High-speed rate select: 0 = Sets data rate to 19.2 kbps and deactivates P1c
		1	1 = Activates P1c, low-speed rate select
P2b	B00000000 ------↑-	0	Selects buffers and timing (Note 2): 0 = Buffers out of circuit, module uses internal timing
		1	1 = Buffers in circuit, module uses DTE device timing
P2c	B00000000 -----↑--	0	Channel 1 clock: 0 = normal
		1	1 = inverted (Note 3)
P2d	B00000000 ----↑---	0	Channel 2 clock: 0 = normal
		1	1 = inverted (Note 3)
P2e	B00000000 ---↑----	0	Channel 3 clock: 0 = normal
		1	1 = inverted (Note 3)
P2f	B00000000 --↑-----	0	Channel 4 clock: 0 = normal
		1	1 = inverted (Note 3)
P2g	B00000000 -↑------	0	Channel 5 clock: 0 = normal
		1	1 = inverted (Note 3)
P2h	B00000000 ↑-------	0	Set loopback: 0 = off (Note 4)
		1	1 = on

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.
2. The input buffers must be used when the DTE device timing is in use, so this code sets both of these conditions.
3. These codes are active only when internal timing is selected (P5 = 0).
4. When the loopback is on, all five receive channels are looped back into the transmitter (used for far end loopback during end to end testing).

“S” CODES

“S” codes appear in response to a STATUS? query. There is one S code for the DS-961DE. Like the "P" codes, it is displayed as both a decimal and an eight-digit binary number. A typical response to a STATUS? query looks like this:

OK
CHANNEL CARD 1, TYPE 77
UNDER REMOTECONTROL
S01 = 2 (B00000010);

Table 7 lists the meaning of the “S” codes for this module.

Table 7. Remote Configuration Settings (S Codes)

P Code	Digit(s) and Switch Equivalent	Bit Value	Description
S1a	B00000000 -------↑	0	0 = In frame
		1	1 = Out of frame (Note 1)
S1b	B00000000 ------↑-	0	0 = Transmit alarm (Note 2)
		1	1 = No transmit alarm

1. When the card is out of frame an ALERT message is displayed.

2. When there is a transmission alarm an ALARM message is displayed.

TESTING

When the RFL DS-961DE Data Module has been configured and installed, it should be tested for proper operation before it is put into service.

There are two ways you can do the testing:

1. Local testing using loopback, with the system out of service.

2. End-to-end testing using far end loopback, with the system in service but the channel being tested taken out of service.

Use the following procedure to test the modules:

1. For loopback testing, set up the multiplexer loopback following the instructions in the section on System Checkout Procedures in your multiplexer instruction manual.

   For end to end testing, set the LOOP switch on the far end system to the ON position.

2. Connect a data error analyzer (Telecommunication Techniques Corp. Fireberd 2000 or equivalent) to the jack for channel one on the back of the module adapter, using an RJ-11 cable.

3. Check for synchronization on the output signal.

4. Send single errors on the transmit side and check for single errors on the receive side.

5. Run for 30 seconds and confirm that the signal remains error-free. Observe that the “TX FAULT” LED and the “FRM” LED are not lit.

6. Repeat test on each channel set up for use in the current configuration.

7. If you used end to end testing, return the LOOP switch at the far end to the OFF position. The system is now operational.

If there is an apparent malfunction during end to end testing, first check that the configuration at the two ends is identical.

Most problems occur at the common equipment or facility level. Refer to the Troubleshooting section in your multiplexer instruction manual for system analysis procedures.

NOTICE

Publication No. ID-9547-16551
Printed in U.S.A.
October 15, 2004

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