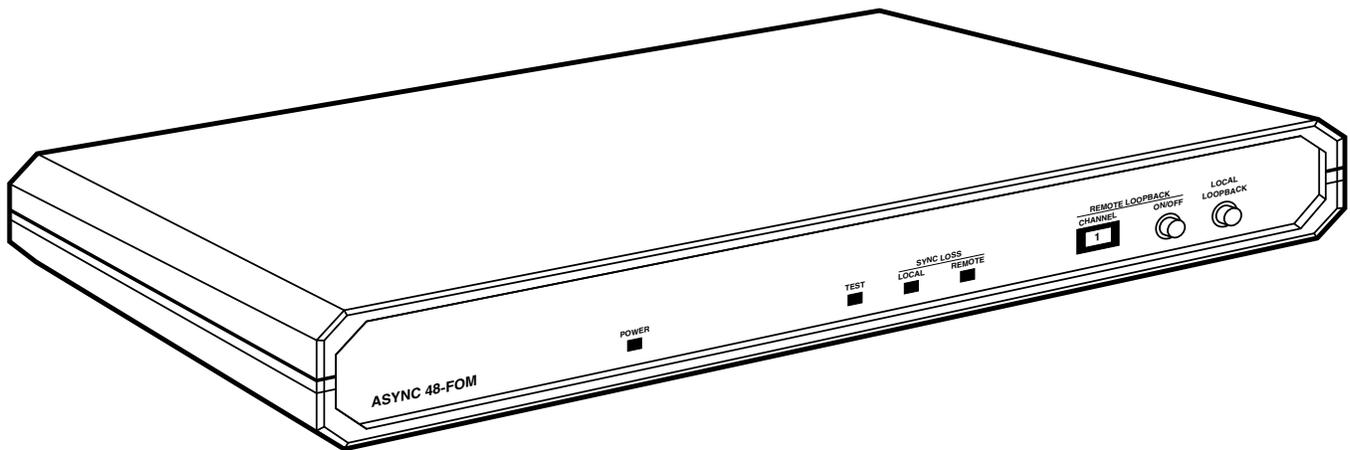




Async 48 FOM-ST

Async 48 FOM-SMA



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**FEDERAL COMMUNICATIONS COMMISSION
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RADIO FREQUENCY INTERFERENCE STATEMENTS**

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

INSTRUCCIONES DE SEGURIDAD (Normas Oficiales Mexicanas Electrical Safety Statement)

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico debe ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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1. Specifications

Transmission Format —	Asynchronous
Speed —	Up to 38.4 kbps
Interface —	EIA RS-232C/CCITT V.24
Connectors —	(4) 50-pin telco, female, (requires 50-pin telco to 12 DB 25 connectors for connection to devices); (2) fiberoptic SMA or ST® (depending on the model ordered)
Number of Subchannels —	48
Mode of Operation —	Full duplex
Main Channel Transmission Line —	Fiberoptic cable (unit is available in either SMA or ST)
Transmission Distance —	Up to 2.5 miles (4 km)
Indicators —	(4) LEDs: Remote Sync Loss, Local Sync Loss, Power, Test
Power —	115 or 230 VAC, 47-63 Hz
Size —	1.7"H x 19"W x 8.5"D (4.3 x 48.3 x 21.6 cm)
Weight —	5.3 lb. (2.4 kg)

2. Introduction

The Async 48-FOM is a full-duplex, time-division, fiberoptic multiplexor, enabling up to 48 async terminals to be multiplexed onto a single channel in point-to-point or ring-type applications. The Async 48-FOM contains a built-in modem which drives the high-speed multiplexed data over fiberoptic cable at distances up to 2.5 miles (4 km).

Multiplexing is performed by sampling all sub-channels many times per bit-interval, interleaving the samples into a frame. The Async 48-FOM transmits the frame onto the main channel. At the other end, the samples are recombined to form the original bits. The high sampling rate of the Async 48-FOM enables transmission of async data and control signals at low distortion and with minimum delay. It also enables transmission of synchronous signals at lower rates.

The Async 48-FOM has four 50-pin female connectors, located on the rear panel, each supporting 12 channels. Connection of individual units is via octopus-type cables, available from various vendors. These cables split the cable that extends from the 50-pin connector into 12 individual cables, each terminating with a D-type or RJ-11 connector. Alternatively, an MDF can be used.

The Async 48-FOM operates in point-to-point or ring-type configurations. The operation mode of each unit is field-selectable by the user.

2.1 Point-to-Point Configuration

In a point-to-point configuration, each operating unit supports up to 48 subchannels. In the transmit path, each subchannel's transmit signal is oversampled and gathered into a common frame, which is then directed to the optical transmitter. In the receiver path, the received data stream is directed to the PLL circuit which generates the received clock, phase-locked to the receive data. By means of the recovered clock, the received frame is examined, and bits are directed to the appropriate subchannels.

A typical application is demonstrated in Figure 2-1, where a cluster of terminals is connected to a host computer through a single optical link.

2.2 Ring-Type Configuration

A ring-type configuration is used for installations involving clusters of terminals which are distributed in several locations.

The host computer site unit supports up to 48 ports. It is possible to bypass groups of 12 sub-channels at each of the end-users' sites, by setting the bypass switch at each unit. In this configuration, the transmission clock of the host computer site unit is automatically selected as the master clock of the system. At each of the remaining end-user sites, the transmit clock is synchronized to the received clock, thus enabling the units to be slaved to the host computer unit. Figure 2-2 demonstrates a typical ring-type configuration.

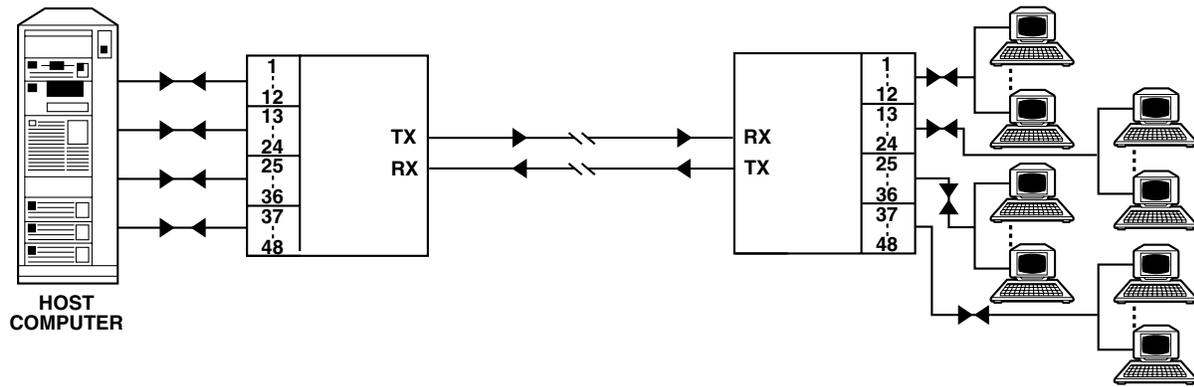


Figure 2-1. Typical Point-to-Point Installation.

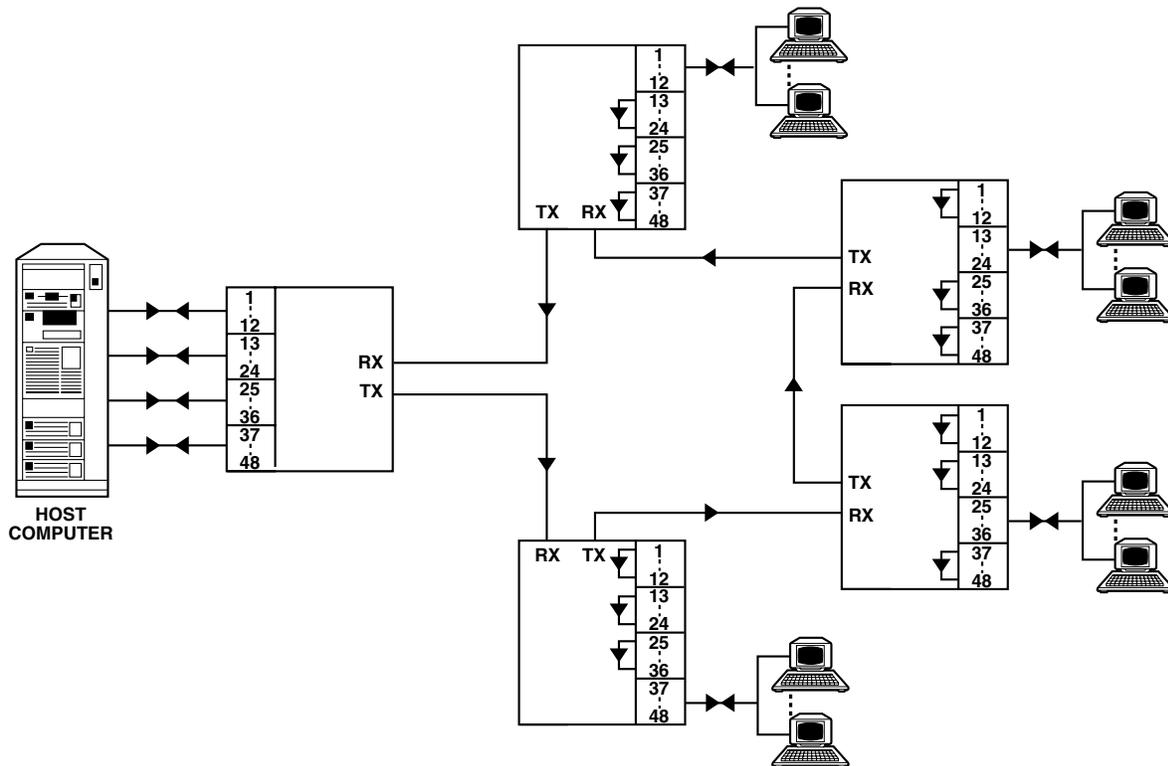


Figure 2-2. Typical Ring-Type Installation.

3. Installation

The Async 48-FOM is delivered completely assembled. It is designed for direct installation in a 19-inch rack. Mechanical and electrical installation procedures for the Async 48-FOM are provided in this chapter.

After installing the unit, go to **Chapter 4** for system configuration information. If you have any problems, go to **Chapter 5** for testing and diagnostic instructions.

3.1 Unpacking

Unpack the equipment and make sure you have all the following items in your package:

- Async 48-FOM
- Rack brackets
- A power cord (attached to the Async 48-FOM)

Any damage should be reported to your carrier immediately.

3.2 Site Requirements

The Async 48-FOM should be installed within 5 feet (1.5 m) of a grounded AC outlet capable of furnishing 110 or 220 VAC. Any adjustment, maintenance or repair of the opened instrument under voltage should be avoided. If necessary, these repairs should be carried out only by a skilled technician who is aware of the hazards involved.

Allow at least 36 inches (91 cm) of frontal clearance for operator access. Allow at least 4 inches (10 cm) clearance at the rear of the unit for interface cable connections.

The operating temperature should be 32 to 122°F (0 to 50°C), at a relative humidity of up to 90%, non-condensing.

3.3 Setup

Two setup procedures are required prior to operation: operation mode and grounding.

3.3.1 OPERATION MODE

The Async 48-FOM subchannels can be set for “Active” (normal operation) or “Bypassed” (required for Ring Configuration).

Unscrew the two upper cover screws located at the back of the unit, and slide the upper cover backward and set the 4-position DIP switch (see Figure 3-1) according to your installation and the specific unit site as described in Table 3-1.

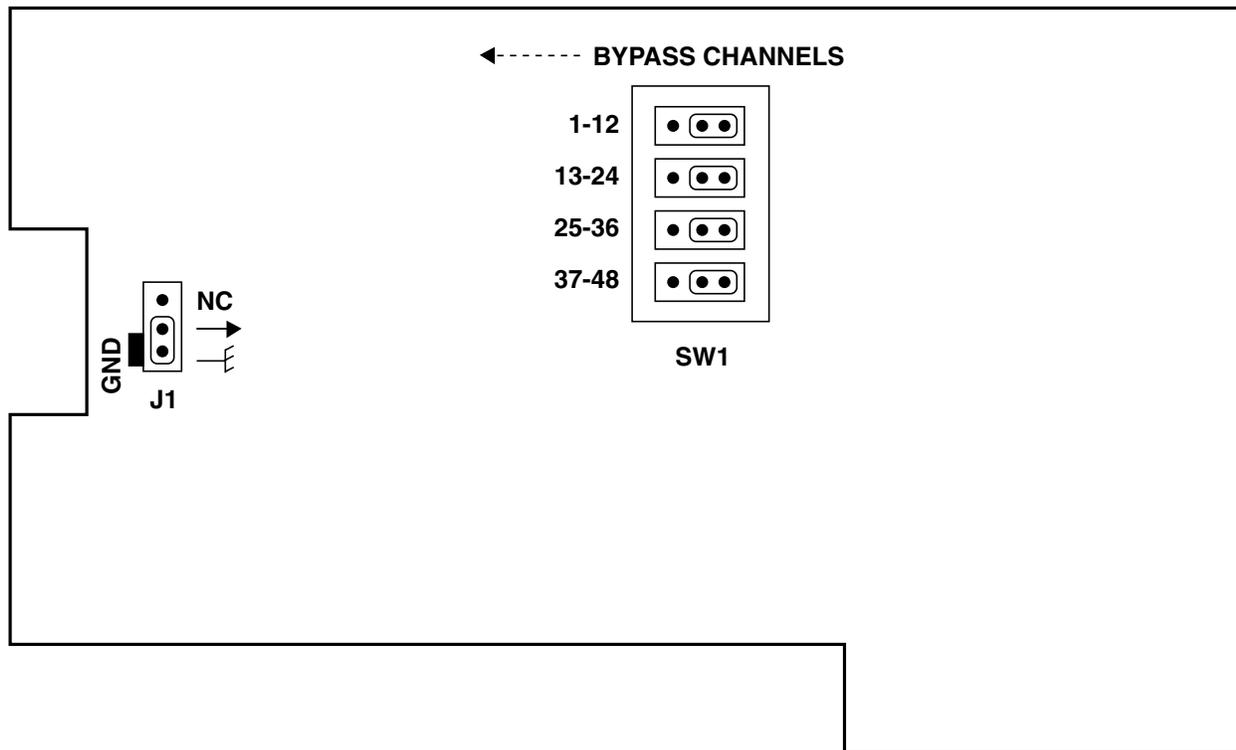


Figure 3-1. Strap Location.

Table 3-1. Optional Operation Mode

DIP Switch Number	Sub-channel Group	Switch State	Subchannel Status	Subchannel Output	Normal Factory Setting
1	1–12	ON OFF	Active Bypassed	Data OFF	ON
2	13–24	ON OFF	Active Bypassed	Data OFF	ON
3	25–36	ON OFF	Active Bypassed	Data OFF	ON
4	37–48	ON OFF	Active Bypassed	Data OFF	ON

3.3.2 GROUNDING

Refer to Figure 3-1. Locate the strap marked “GND.” According to your requirements, select the signal ground to be either connected to or disconnected from the shielding (chassis) ground. Slide the upper cover back to its place and fasten the screws.

3.4 Electrical Installation

AC power should be supplied to the Async 48-FOM through the 5-foot (1.5 m) standard power cable terminated by a grounded 3-wire plug. The AC cord is fused at the rear-panel AC power receptacle of the unit. A 0.25A Slo-Blo fuse is required for 230V operation, and a 0.5A fuse is required for 115V operation.

Four 50-pin telco connectors on the rear panel enable the end-users to be connected to the unit via an octopus-type cable. Detailed information about the signals present at these connectors is given in Table A-1 (in the **Appendix**).

Two fiberoptic SMA or ST type connectors are located on the rear panel, marked TX and RX. Remove the protective caps from the connectors and keep them in a safe place for later use. You should apply some freon spray to both the TX and RX connectors to clean the optical surfaces. Connect the transmit fiber to the SMA connector marked TX, the received fiber to the SMA connector marked RX and secure fastening nuts tightly. At the remote unit, the transmit fiber must be connected to RX and the receive fiber to TX.

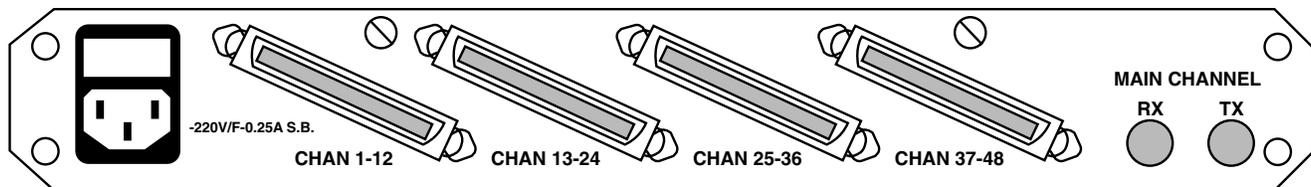


Figure 3-2. Rear Panel.

4. Operation

4.1 Front-Panel Controls and Indicators

The front panel of the Async 48-FOM is shown in Figure 4-1. The Async 48-FOM’s controls and indicators are listed below:

- **LLB Pushbutton** — When this button is depressed, the Async 48-FOM performs local loopback on all subchannels.
- **RLB Pushbutton** — When this button is depressed, the Async 48-FOM performs remote loopback on one of the four sub-channel groups which is selected by the Channel selector, and not bypassed by the unit.
- **Channel Selector Switch** — Enables selection of one out of four subchannel groups on which the remote loopback is carried out (see Table 4-1).
- **Remote Sync Loss LED** — Red. Lights when synchronization is lost at the remote unit.
- **Local Sync Loss LED** — Red. Lights when synchronization is lost at the local unit.
- **Test LED** — Yellow. Lights when either local or remote unit is performing a test.
- **Power LED** — Green. Lights when unit is powered.

NOTE

Do not depress the RLB and LLB switches simultaneously.

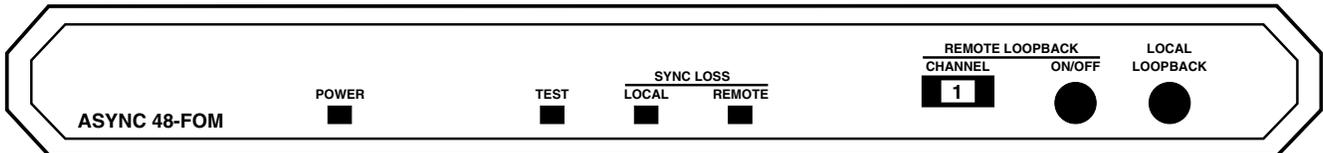


Figure 4-1. Async-48 Front Panel.

4.2 Operating Procedure

WARNING

Before you plug this instrument into a wall outlet, you must connect the protective ground (earth) terminals to the protective conductor of the mains power cord. The mains plug should be inserted only in a socket outlet provided with a protective ground (earth) contact. Do not use an extension cord without a protective conductor.

Make sure that only fuses with the required rated current and specified type are used for replacement. The use of repaired fuses, and the short-circuiting of fuse holders, must be avoided. An extra fuse is normally supplied with the instrument.

Whenever it is likely that the protection offered by fuses has been impaired, the instrument must be made inoperative and secured against any unintended operation.

Apply AC power by connecting the AC power cord to an acceptable AC source. The POWER LED lights when you apply power to the Async-48. If the local and remote units are in operation and properly connected via the main channel, no other LED should be on. If another condition exists, please refer to **Section 4.4**.

The Async 48-FOM operates unattended except when performing system tests.

To turn the Async 48-FOM off, remove the AC power cord from the power source.

If it is necessary to reconfigure the Async 48-FOM for the MASTER or SLAVE mode of operation, simply follow the appropriate setup procedure given in **Section 4.4**.

4.3 System Tests

Two system tests are available in the Async 48-FOM.

4.3.1 LOCAL LOOPBACK

Figure 4-2 is an example of Local Loopback testing.

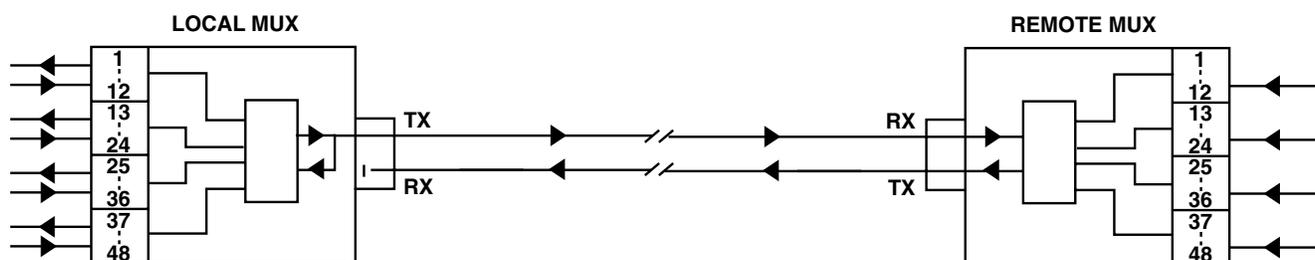


Figure 4-2. Local Loopback Testing Diagram.

ASYNC 48-FOM (ST AND SMA)

When the Async 48-FOM is performing local loopback testing, the data from the local transmitter is looped back to the local receiver at the digital level, thus checking all local digital circuitry for correct operation. You can start this test by depressing the LLB pushbutton switch on the front panel. If the local unit is operating correctly, the yellow Test LED should be lit, leaving all other LEDs turned off.

If local and remote units are correctly connected via the main channel, the yellow Test LED on the remote unit (or remote units, in case of a ring-type configuration) should be lit too, thus checking the local transmitter analog interface and analog and digital remote receiver's sections. When the local loopback test is being performed the Received Data Signals (circuit 104) at the remote units are set to off.

NOTE

All Async 48-FOM units operating in the system can perform local loopback regardless of the configuration at any time.

4.3.2 REMOTE LOOPBACK

Figure 4-3 is an example of Local Loopback testing.

Remote loopback is performed at the 12-sub-channel group level by looping back data from the remote receiver to the remote transmitter, thus checking all local digital circuitry, as well as both local and remote analog interfaces, main channel link and remote digital receivers. This test is performed by selecting the corresponding sub-channel group with the CHANNEL selector switch and depressing the RLB push button switch, both located on the front panel.

NOTE

In a ring-type configuration, it must be verified that the selected group has not been bypassed at the tested unit; otherwise the test will not be performed.

If local and remote units are operating properly, the yellow test LEDs should be lit. The remaining LEDs, with the exception of POWER, should be off. When remote loopback is being performed, the Received Data Signals, (Circuit 104) of the selected subchannels, at the remote unit, are set to off.

Table 4-1 lists the remote loopback options.

4.4 Fault Isolation and Troubleshooting

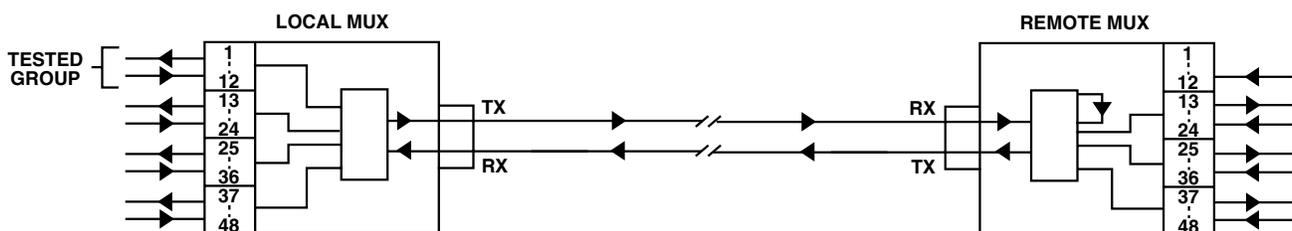


Figure 4-2. Remote Loopback Testing Diagram.

Table 4-1. Various Remote Loopback Options

RLB Switch	Channel Selector Position	Tested Channels
OFF	X	None
ON	1	1–12
ON	2	13–24
ON	3	25–36
ON	4	37–48

The symptoms and corresponding procedures listed in Table 4-2 will help you identify faults.

WARNING

These service instructions are for use by qualified personnel only. To avoid shock, do not perform any servicing other than that described in the operating instructions unless you are qualified to do so.

Table 4-2. Fault Isolation and Troubleshooting

Symptom	Action
All front panel indicators are off.	<ul style="list-style-type: none"> a. Check that unit is powered. b. Check the fuse inside the AC receptacle on the rear panel and replace it with a new one if necessary. c. Replace the unit. The fault is probably in the unit's power supply circuits.
Red Local Sync Loss LED is on.	a. Perform LLB.
Red Remote Sync Loss LED is on.	a. Perform all the tests as in the case of Local Sync Loss starting at the remote site.

5. Block Diagram Analysis

The Async 48-FOM is comprised of five main blocks:

- a. Subchannel multiplexers and interface
- b. Main multiplexer and coder
- c. Main channel interface
- d. Controls and indicators
- e. Power Supply

Figure 5-1 at the end of this chapter displays the functional block diagram of the Async 48-FOM.

5.1 Sub channel Multiplexers and Interface

This sub-system is connected by four similar multiplexing circuits. Each circuit supports twelve asynchronous RS-232 subchannels. The sub-channels are connected to the rear panel via telco 50-pin connectors. In the transmit process, the data signals are oversampled and multiplexed into four sub-frames; while in the receive process, the sub-frames are directed outward and the bits are applied to the appropriate circuit.

5.2 Main Multiplexer and Coder

In the transmit path, the four serial bit streams (from four sub-multiplexers) are multiplexed and applied to the CDP encoder together with the 10-MHz transmit clock. The CDP encoder directs the encoded data stream to the main channel.

In the receive path, the incoming bit stream is directed to the CDP decoder and PLL. These circuits recover the data and clock from the received bit stream. The decoded data is then directed to the main demultiplexer which distributes the received bit stream to four bit streams directed to the sub-demultiplexers.

5.3 Main Channel Interface

In the transmit path, the transmit bit stream directly modulates the optical output power of the LED transmitter.

In the receive path, the optical signal is converted back to TTL logic levels by the receiver. This receiver has a high-sensitivity pre-amplifier, and AGC (Automatic Gain Control) circuit with a wide dynamic range. The received signal is then applied to the PLL circuit and to the CDP decoder.

5.4 Controls and Indicators

This block monitors the system operation and operates the alarm indicators in the event of malfunction. When loopback switches are activated, this block produces the required logic inputs/outputs.

5.5 Power Supply

The Async 48-FOM power supply provides the internal voltages. The power supply operates on 230 VAC or 115 VAC. A 0.25A Slo-Blo fuse is required for 230-VAC operation and an 0.5A for 115-VAC operation.

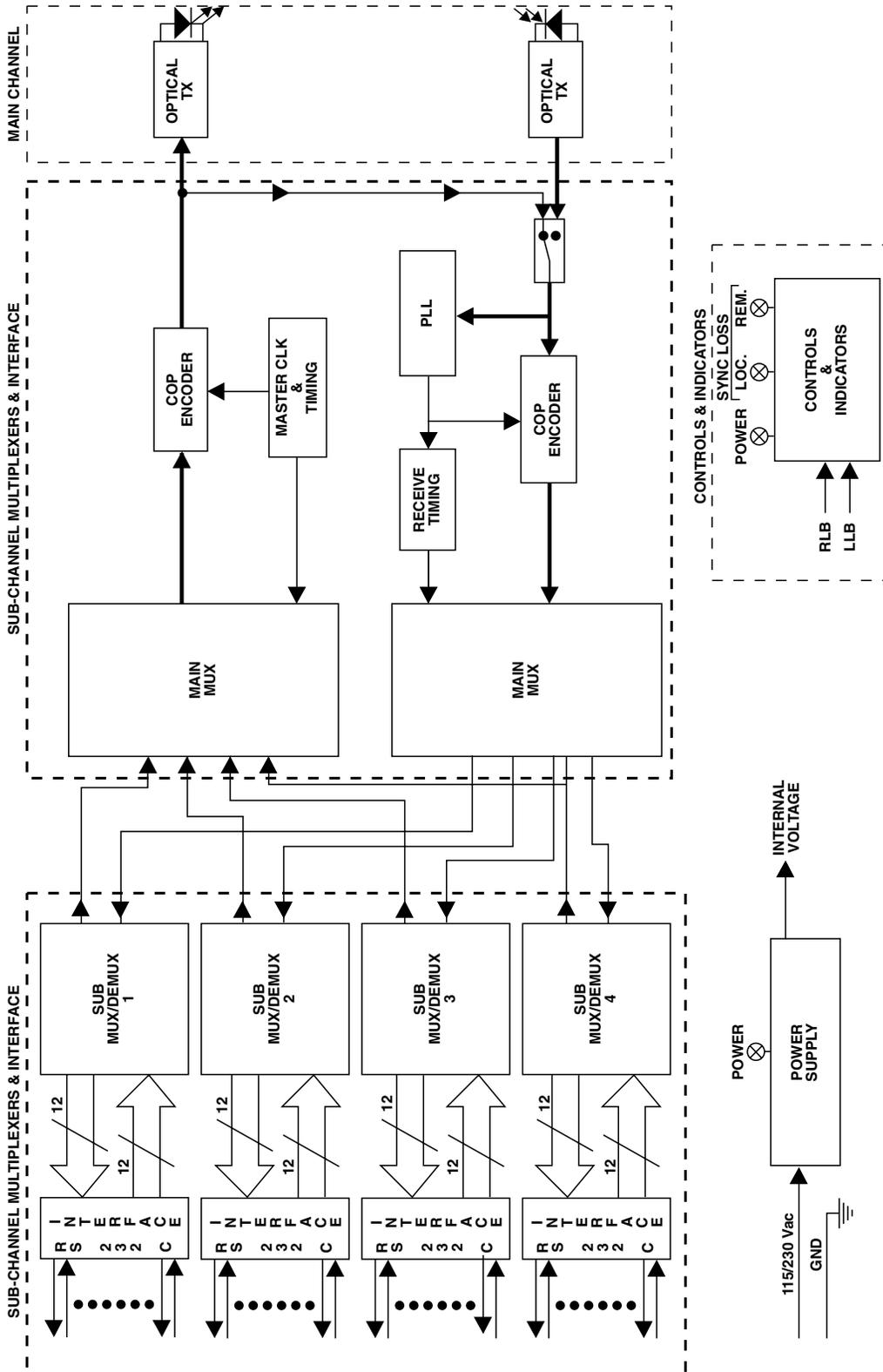


Figure 5-1. Block Diagram.

Appendix. Pinning

Table A-1. Subchannel Connector Pin Assignment

Channel No.	Pin No.	Signal Name	Pin No.	Signal Name
1	1	GND	26	RX1
	2	Shield	27	TX1
2	3	GND	28	RX2
	4	Shield	29	TX2
3	5	GND	30	RX3
	6	Shield	31	TX3
4	7	GND	32	RX4
	8	Shield	33	TX4
5	9	GND	34	RX5
	10	Shield	35	TX5
6	11	GND	36	RX6
	12	Shield	37	TX6
7	13	GND	38	RX7
	14	Shield	39	TX7
8	15	GND	40	RX8
	16	Shield	41	TX8
9	17	GND	42	RX9
	18	Shield	43	TX9
10	19	GND	44	RX10
	20	Shield	45	TX10
11	21	GND	46	RX11
	22	Shield	47	TX11
12	23	GND	48	RX12
	24	Shield	49	TX12

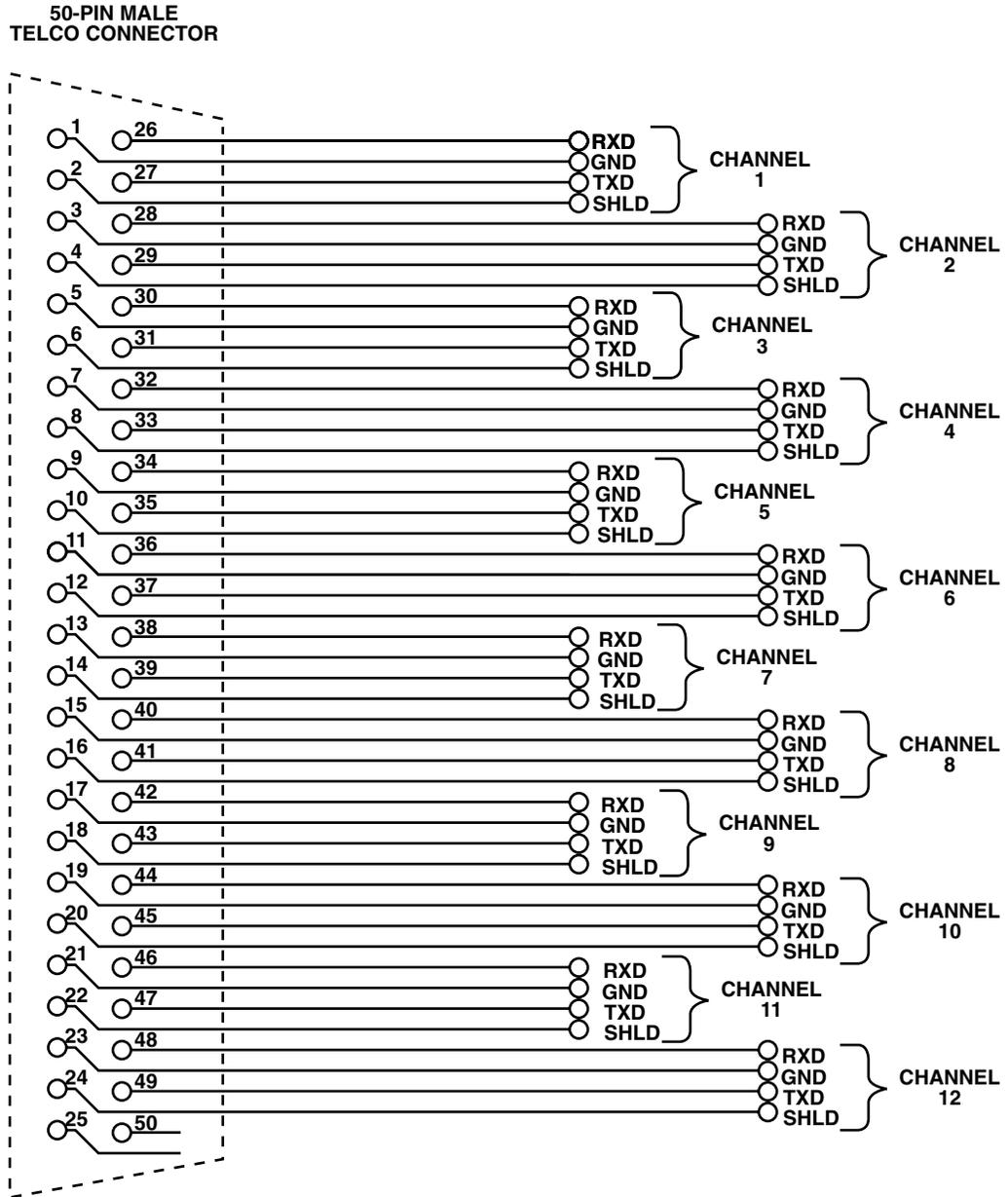


Figure A-1. Connection of Octopus-Type Cable to Async 48-FOM Subchannel.



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