



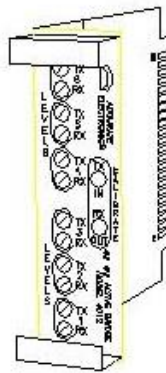
ACCURATE ELECTRONICS INC

PO BOX 1654 97075-1654 8687 SW HALL BLVD 97008 BEAVERTON OR USA 503.641.0118 FAX 503.646.3903

WWW.ACCURATE.ORG

Practice Section 10401200 Rev A

4-WIRE 6-WAY ACTIVE CONFERENCE BRIDGE MODEL 1040120000



- Zero dB loss bridge, with an adjustable gain of - 10 to + 22dB (receive-to-transmit).
- Selectable 7 dB (receive) and -16 dB (transmit) pads for each bridge port, which allows proper interfacing with carrier facilities.
- Front-panel-mounted RX and TX calibration Bantam jacks, for simplified alignment.
- SX leads for each transmit and receive port.
- Can be powered from - 48 VDC. (-22 TO -56 VDC)

3. APPLICATION

3.01 Model 10401200 is a 4-wire 6-way Active Conference Bridge. A voice (VF) or data signal received at any receive port is transmitted to all other transmit ports (minus the associated transmit port), providing leg to leg communication. Front-panel-mounted transmit and receive gain adjustments are provided for each bridge port. Proper adjustment allows all signals on the bridge to be transmitted and received at the same level.

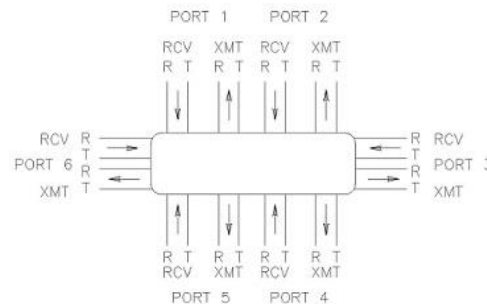
3.02 Model 10401200 mounts in one module mounting position of a Type 10 or 400 Relay Rack Shelf. They make electrical connection to the system via a 56-pin, wire-wrapped, card-edge connector, provided as part of the shelf mounting assembly.

3.03 The Model 10401200 provides jumper selected insertion loss of -7dB in each receive port and -16dB in each transmit port to facilitate interfacing with carrier channel or other standard level 4wire interface (+7dB receive, -16dB transmit). When lossless bridging is required, the 0dB jumper positions may be selected.

3.04 Terminating impedance at both the input and output ports of the bridge is 600 ohms, balanced. The modules' active circuitry allows unused ports to be left unterminated without affecting transmission performance of the ports in use.

3.05 The bridge module incorporates an internally regulated power supply that permits operation on -22 to -56 VDC input. Current requirement is 60mA when powered from a nominal -48VDC power source. Reverse-battery protection is provided in the modules' internal power supply circuits.

Figure 1. Typical Application.



CONTENTS:

| | |
|--|---|
| Section 1. General | 1 |
| Section 2. Features | 1 |
| Section 3. Application | 1 |
| Section 4. Installation | 2 |
| Section 5. Options | 2 |
| Section 6. Circuit Description | 2 |
| Section 7. Mechanical Outline | 3 |
| Section 8. Specifications | 3 |
| Section 9. Testing and Troubleshooting | 3 |
| Section 10. Maintenance | 3 |
| Section 11. Warranty | 3 |
| Figure 1. Typical Application | 1 |
| Figure 2. Circuit Description | 4 |
| Figure 3. Mechanical Outline | 4 |
| Figure 4. External Connections Layout | 5 |
| Figure 5. Testing Guide Checklist | 5 |

1. GENERAL

1.01 This practice provides application, specification, circuit and mechanical description, maintenance, installation, and warranty information relating to Accurate Electronics' 4-wire 6-way Conference Bridge, Model 10401200.

2. FEATURES

- Designed for voice conference applications for full 6-way bridging of 4-wire transmission facilities.
- Can be used with voice (VF) or data up to 9.6 kbps.



WWW.ACCURATE.ORG PO BOX 1654 97075-1654 8687 SW HALL BLVD 97008 BEAVERTON OR USA 503.641.0118 FAX 503.646.3903

3.06 The bridge may be used in tandem to increase the number of available ports in a 4-wire bridge network. This is done by connecting the input and output of one port (usually the last) of one bridge to the input and output, respectively, of one port (usually the first) of another bridge module. Tandem connection of two (2) Model 10401200 Bridges, for example, provides a 4-wire 10-way bridge. Tandem applications are generally accommodated in the lossless mode, as loss in this mode through all input and output port combinations is constant at 0 dB.

3.07 The limiting factor in the number of modules that can be used in tandem is cross-port coupling (crosstalk). The cumulative effect of cross-port coupling generally limits the number of bridge modules that can be used in tandem to three or four.

3.08 Because these are active bridges, as opposed to more conventional resistive bridges, the level and impedance control functions may also be performed by a pad-transformer module, instead of by more expensive line amplifiers. One pad/transformer is required for each input and output port used. If more gain is required at a particular port than can be provided by the bridge module's active circuitry, a line amplifier may be used instead of a pad or pad/transformer module.

3.09 The 10401200 affords a choice of port-to-port insertion loss to permit interfacing with a variety of facilities and equipment. If a carrier channel or other standard-level 4-wire interface (+7dB receive, -16dB transmit) is required, the total 23dB loss option is selected. When lossless bridging is required, the 0dB option is selected. Option jumpers on each leg permit an amount of port-to-port insertion loss to be selected: -7.0dB in receive ports and -16dB in transmit ports, or 0dB.

4. INSTALLATION

Inspection

4.01 The bridge modules should be visually inspected upon arrival in order to find possible damage incurred during shipment. If damage is noted, a claim should immediately be filed with the carrier. If stored, the module should be visually inspected again prior to installation.

Mounting

4.02 Each module mounts in one position of the Type-10 mounting Shelf. The module plugs physically and electrically into a 56-pin connector at the rear of the Type-10 Shelf.

Installer Connections

4.03 Before making any connections to the mounting shelf, make sure that power is OFF and modules are REMOVED. Modules should be put into place only AFTER they are properly optioned and after wiring is completed.

4.04 Attempts to troubleshoot the bridge internally is not recommended.

4.05 Figure 4 lists external connections to the module. All connections are made via wire-wrap at the 56-pin connector at the rear of each module's mounting shelf position. Pin numbers are found on the body of the 56-pin connector. Bridge module pin numbers are found on the printed circuit board, even numbers on the component side, odd numbers on opposite.

NOTE: External connections are compatible with other manufacturers.

Level Adjustments

4.06 The receive levels are adjusted so that the levels from each port at the input bridging point are all equal. The input bridging point is accessible at the front panel RX OUT calibration jack. The receive levels are adjusted using the front panel RX level controls and the -7dB receive pads located on the main board. The receive level adjustment range is -4dB to +12dB when the receive pad is in the 0 (zero) position and -11dB to +5dB when in the -7dB position.

4.07 Connect a terminated transmission measurement set (TMS) to the RX OUT calibration jack. Apply a tone separately to each receive port. Adjust the RX level controls / receive pads as required to achieve equal levels from each port. The specific value of the bridging level is determined by each installation. Levels in the range of -10dB to 0dB are acceptable.

4.08 The transmit levels are set to meet the requirements of the equipment connected at each transmit output port. The transmit levels are adjusted using the front panel TX level controls and the -16dB transmit pads located on the main board. The transmit level adjustment range is -6dB to +12dB when the transmit pad is in the 0 (zero) dB position and -22dB to -4dB when in the -16dB position.

4.09 Using a TMS inject a tone at the front panel TX IN calibration jack. The level of the injected tone should be equal to the bridging level used above. Adjust the TX level control / transmit pads as required to achieve the desired level at each transmit port.

5. OPTIONS

5.01 Each line CIRCUIT of Model 10401200 contains two push-on jumper options: one selects the -7 dB RCV PAD (CH1 to CH6 - RCV), and the other selects the -16 dB XMT PAD (CH1 to CH6 - XMT). Locations of these jumpers on the module's printed circuit board are shown in FIGURE 3. These jumpers are normally set for the same amount of insertion loss, although they may be set for different amounts if desired. Set all jumpers to the 0 position for lossless (0dB insertion loss) bridging or set all jumpers to select 23dB insertion loss as required for carrier-channel or other standard level (+7/-16dB) 4-wire interfacing. After jumpers are set, further optioning or alignment is required. (See Circuit Description 5.0)

Receive Pad Selection

5.02 The receive pad is normally selected when the Model 10401200 interfaces with a 4-wire carrier facility. The normal + 7 dBm receive level from the carrier facility is attenuated by 7 dB, thus presenting a 0 dBm level to the bridge.

Transmit Pad Selection

5.03 The XMT PAD is normally selected for carrier applications. The normal 0 dBm output from the bridge is attenuated by 16 dB, thus presenting a standard - 16 dBm transmit level to the 4-wire carrier facility.

6. CIRCUIT DESCRIPTION

6.01 Model 10401200 provides summing and distribution of six VF or data channels. This circuit description is intended to familiarize you with the 4-wire 6-way Active Bridge modules for engineering and application purposes only. Troubleshooting procedures should be limited to those prescribed in Section 8 of this Practice. Please refer to the block diagrams, Figure 2 as an aid in following the circuit description.

6.02 The Active Bridge circuitry is identical for each port of the bridge. This circuitry consists of five-input summing circuit and, for each port output, an integrated-circuit operational amplifier (op amp). The summing circuit provides balanced 600 ohm terminating impedance for each input port. For a particular output port, the summing circuit adds the transmission energy from all other input ports (ie. all input ports except the one with the same number as the output port) at a low-impedance summing point. The low impedance of this summing point provides input port isolation.

6.03 The op amp provides switch-controlled gain to overcome the loss of the summing circuit, and the 10401200 has six such networks.

6.04 References to transmit and receive are with respect to the bridge. All transmit line and receive line circuits for each port are identical; therefore, circuit description is based on RX Port 1 and TX Port 1.

6.05 Data or VF signals enter the Bridge on the RX Port 1 tip and ring leads and are transformer-coupled (via T1) to the input of operational amplifier U-1. A -7dB RX PAD can be selected to provide the proper level for 4-wire carrier applications. The front-panel-mounted RX 1 LEVEL potentiometer, connected in the feedback loop of U-1, provides a level of adjustment of -4 dB to + 12 dB. This is used to compensate for losses in the receive line. The output of U-1 is coupled to the operational amplifiers associated with transmit lines 2, 3, 4, 5, and 6 thru a summing network. Thus, all signals present at the RX LINE 1 input appear at the TX LINE outputs of ports 2,3,4,5 and 6 but not at the TX port of channel 1.



6.06 At the transmit side, signals from the RX Ports 2, 3, 4, 5, and 6 enter operational amplifier U-3 and are transformer-coupled to the TX Port 1 tip and ring leads via transformer T2. The front-panel-mounted TX LEVEL control provides a range of -6dB to +12 dB to compensate for line losses. A -16 dB XMT PAD can be jumpered in the circuit for carrier applications.

6.07 The circuit operation for RCV Ports 2, 3, 4, 5 and 6 is identical to RX Port 1. In all cases, the signals present on a given RCV LINE are coupled to all XMT LINE ports, except the XMT LINE port associated with the RCV LINE port that is originating the signals.

Calibration Circuits

6.08 The outputs of the six RX Port operational amplifiers appear at the input of the RX TEST AMP. This amplifier provides an impedance match for an AC voltmeter, which is plugged into the RCV CAL Bantam jack during the receive alignment.

6.09 The output of the TX TEST AMP is coupled to the inputs of the six TX LINE operational amplifiers. The TX TEST AMP, in conjunction with the TX CAL Bantam jack, provides the interface for an oscillator, which is used for the transmit level alignment on each transmit line.

5.10 An internally regulated power supply allows operation on external -22 to -56VDC input, and ground.

7. MECHANICAL OUTLINE

7.01 See FIGURE 2.

8. SPECIFICATIONS

8.01 Electrical

| | |
|--|--|
| Power Requirements: | - 48VDC (-22 to -56VDC) |
| Maximum Input current (at -48 V Battery): | 60 mA |
| Reverse Battery Protection | Ground |
| Transmission: | Insertion Loss: |
| | factory adjusted to 0 dB dB |
| | Can be adjusted from -10 dB to +23 dB |
| | jumper selectable |
| | maximum output level (overload point) +10dBm |
| Frequency Response: | +/- 5 dB, 300 Hz to 3.2 kHz |
| | (referenced to 1 kHz) |
| Harmonic Distortion: | < 5 % at + 10 dBm |
| Port Impedance: | all ports 600 ohms, +/- 10%, balanced |
| Idle Noise: | < 18 dBm C at +22 dB bridge gain |
| Envelope Delay Distortion: | < 100 microseconds, 300 Hz to 4 kHz |
| Longitudinal Balance: | > 60 dB, 200 Hz to 3.5 kHz |
| Crosstalk (receive path to transmit path): | > 60 dB, 300 Hz to 1 kHz |
| | > 50 dB, to 3.3 kHz |

8.02 Environmental

| | |
|------------------------|---------------------------------|
| Operating Temperature: | 0 - 49° C |
| Humidity: | up to 95% R.H., no condensation |
| Altitude: | up to 15,000 ft.(4,572 m) |

8.03 Physical

| | |
|---------------------------|--------------------------------------|
| Calibration /Test: | Bantam jacks |
| Potentiometer Adjust: | slotted screw |
| Dimensions: | 5.600 "H x 1.500 "W x 6.000 "D |
| | 14.224cmH x 3.810cmW x 15.240cmD |
| Weight: | 15 oz. / 0.425 kg |
| Mounting: | One module mounting position |
| | in a type 10 or 400 Relay Rack Shelf |
| Silkscreen (front panel): | white over black anodize |
| Silkscreen (PCB): | white over green |

9. TESTING AND TROUBLESHOOTING

9.01 The Testing Guide Checklist (see Figure 5) may be used to assist in the installation, testing or troubleshooting of the product. The checklist is intended as an aid in the localization of trouble to a specific product. If a product is suspected of being defective, a new one should be substituted and the test conducted again. If the substitute product operates correctly, the original product should be considered defective and returned to Accurate for repair or replacement as directed below. We strongly recommend that no internal (component-level) testing or repairs be attempted on the product. Unauthorized testing or repairs may void the product's warranty. Also, if the product is part of a registered system, unauthorized repairs will result in noncompliance with Part 68 of the FCC Rules and Regulations.

TECHNICAL ASSISTANCE

9.02 Contact Accurate Electronics, Inc. 503.641.0118, FAX: 503.646.3903; Mail: PO Box 1654, Beaverton OR 97075-1654.

RETURN PROCEDURE (FOR REPAIR)

9.03 To return equipment for repair, first contact Accurate Electronics, Inc. Enclose an explanation of the malfunction, your company's name and address, the name of a person to contact for further information, and the purchase order number for the transaction. Accurate Electronics will inspect, repair, and retest the equipment so that it meets its original performance specifications and then ship the equipment back to you. If the equipment is in warranty, no invoice will be issued.

10. MAINTENANCE

10.01 No preventive maintenance is required. General care is recommended.

11. WARRANTY

11.01 All Accurate Electronics Inc. products carry a full FIVE (5) YEAR warranty on materials and workmanship. See WARRANTY in front of catalog.

Note: Warranty service does not include removal of permanent customer markings on the front panels of Accurate Electronics' products, although an attempt will be made to do so. If a product must be marked defective, we recommend that it be done on a piece of tape or on a removable stick-on label.

11.02 If a situation arises that is not covered in the checklist, contact Accurate Customer Service as follows (telephone number are given below):

Contact Accurate Electronic Customer Service

11.03 If a product is diagnosed a defective, follow the replacement procedure in paragraph 11.04 when a critical service outage exists (e.g., when a system of a critical circuit is down and no spares are available). If the situation is not critical, follow the repair and return procedure in paragraph 11.05.

Replacement

11.04 To obtain a replacement product, notify Accurate Electronics. Be sure to provide all relevant information, including the 10401200 part number that indicates the issue of the product in question. Upon notification, we shall ship a replacement product to you. If the product in question is in warranty, the replacement will be shipped at no charge. Pack the defective product in the replacement product's carton, sign the packing slip included with the replacement, and enclose it with the defective product (this is your return authorization). Affix the preaddressed label provided with the replacement product to the carton being returned, and ship the product prepaid to Accurate Electronics.

Repair and Return

11.05 Return the defective product, shipment prepaid, to Accurate Electronics Inc. :

ACCURATE ELECTRONICS INC.
ATTN: REPAIR AND RETURN
8687 SW HALL BLVD. #100
BEAVERTON, OREGON 97008 USA

FIGURE 2. CIRCUIT DESCRIPTION.

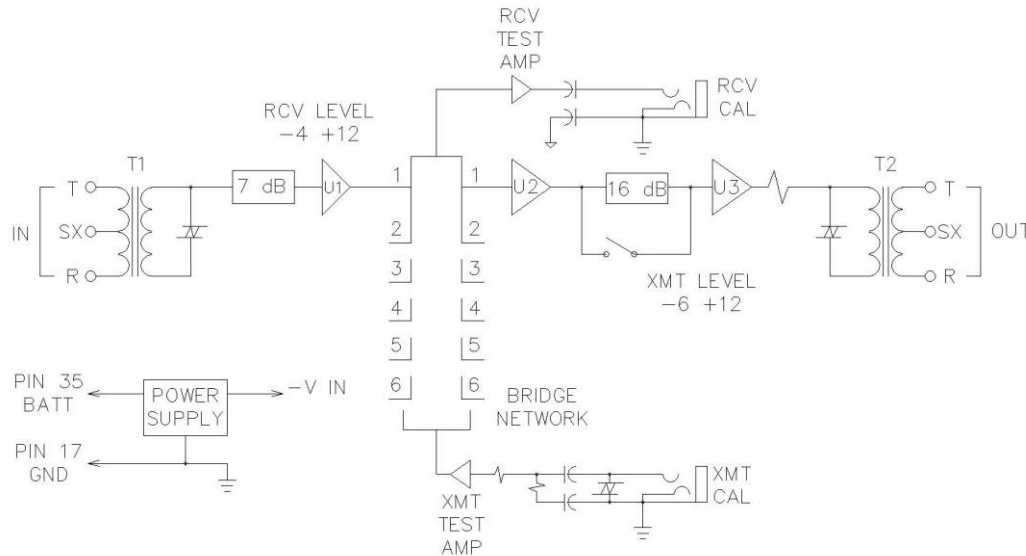


FIGURE 3. MECHANICAL OUTLINE.

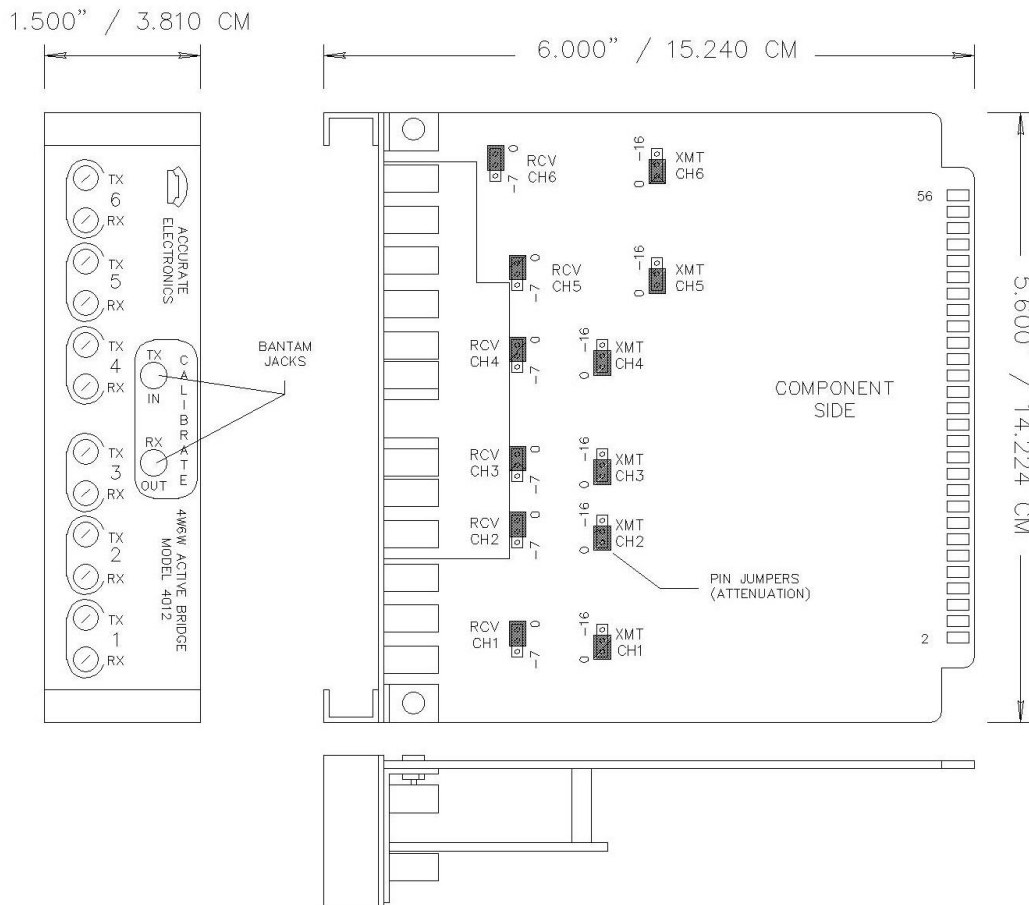




FIGURE 4. External Connections Layout.

| | | GOLD PINS | | | |
|---------------|------|-----------|----|------|---------------|
| INPUT PORT 6 | RING | 56 | 55 | TIP | INPUT PORT 6 |
| INPUT PORT 6 | Sx | 54 | 53 | RING | OUTPUT PORT 4 |
| | | 52 | 51 | TIP | OUTPUT PORT 4 |
| INPUT PORT 5 | Sx | 50 | 49 | Sx1 | OUTPUT PORT 4 |
| INPUT PORT 5 | RING | 48 | 47 | | |
| INPUT PORT 5 | TIP | 46 | 45 | | |
| | | 44 | 43 | | |
| | | 42 | 41 | | |
| OUTPUT PORT 5 | TIP | 40 | 39 | RING | OUTPUT PORT 5 |
| | | 38 | 37 | Sx1 | OUTPUT PORT 5 |
| | | 36 | 35 | BATT | -48VDC INPUT |
| | | 34 | 33 | | |
| | | 32 | 31 | | |
| INPUT PORT 4 | Sx | 30 | 29 | | |
| INPUT PORT 4 | RING | 28 | 27 | | |
| INPUT PORT 4 | TIP | 26 | 25 | Sx1 | OUTPUT PORT 6 |
| INPUT PORT 3 | RING | 24 | 23 | | |
| INPUT PORT 3 | TIP | 22 | 21 | Sx1 | OUTPUT PORT 2 |
| | | 20 | 19 | | |
| OUTPUT PORT 3 | Sx1 | 18 | 17 | GND | INPUT PWR |
| INPUT PORT 3 | Sx | 16 | 15 | Sx | INPUT PORT 1 |
| INPUT PORT 2 | Sx | 14 | 13 | TIP | OUTPUT PORT 6 |
| INPUT PORT 2 | RING | 12 | 11 | RING | OUTPUT PORT 6 |
| INPUT PORT 2 | TIP | 10 | 9 | Sx1 | OUTPUT PORT 1 |
| OUTPUT PORT 3 | TIP | 8 | 7 | RING | OUTPUT PORT 2 |
| OUTPUT PORT 3 | RING | 6 | 5 | TIP | OUTPUT PORT 1 |
| OUTPUT PORT 2 | TIP | 4 | 3 | RING | OUTPUT PORT 1 |
| INPUT PORT 1 | RING | 2 | 1 | TIP | INPUT PORT 1 |

FIGURE 5. Testing Guide Checklist.

NOTE: when a signal is inserted at any input port of the bridge and/or when measurements are made at any output port, be certain that the test equipment is arranged to accommodate the balanced 600 ohm impedance at these ports.

| Test | Test Procedure | Normal Result | If normal conditions are not met, verify: |
|----------------|---|---|---|
| Insertion Loss | Connect test oscillator arranged for 1000Hz signal at 0 dBm to any input port (see FIG 5 for pin assignments). Using transmission measuring set, measure output level first at output port 1,2,3, or 4 and then at output port 5 or 6. Do not, however, use output port with same number and input port to which oscillator is connected. | With CH1 to CH6 RCV and CH1 to CH6 XMT set to 0 position, output level approx. same as input. | <ul style="list-style-type: none"> - Power applied to module. - Wiring. - Proper impedance terminations (check for double terminations) - Jumper CH1 to CH6 RCV and/or jumper CH1 to CH6 XMT in proper positions. - Input level. |
| Noise | Connect shorting straps between tip and ring connector pins of all input ports (see Figure 4. For terminal assignments). Using noise test set, measure noise level across tip and ring connector pins of output port 1,2,3 or 4 and also across tip and ring connector pins of output port 5 or 6. | Noise level less than 18 dBm for all insertion loss settings of jumpers. | <ul style="list-style-type: none"> - All input ports shorted as directed. - Noise test set at proper terminating impedance. - High therefore environment affecting R.F. test set. |



This Page Intentionally Left Blank.