

User Manual

Tektronix

**TDM5
Television Demodulator**

070-8994-00

**Please check for change information
at the rear of this manual.**

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User Safety Summary

Please take a moment to review these safety precautions. They are provided for your protection and to prevent damage to the product. This safety information applies to all operators.

Terms Appearing in Manuals:



CAUTION. *Caution statements identify conditions or practices that could result in damage to the equipment or other property.*



WARNING. *Warning statements identify conditions or practices that could result in personal injury or loss of life.*

Terms Appearing on Equipment:

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking or a hazard to property including the equipment itself.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

Symbols Appearing on Equipment:



DANGER
High Voltage



Protective ground
(earth) terminal



ATTENTION
Refer to
manual

Precautions

Power Source

This product is designed to operate from a power source that will not apply more than 250 V_{rms} between the supply conductors or between either supply conductor and ground. A protective ground connection, through the grounding conductor in the power cord, is essential for safe operation.

Grounding the Product

This product is grounded through the grounding conductor of the power module power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product input or output terminals. A protective-ground connection by way of the grounding conductor in the power module power cord is essential for safe operation.

Without the protective ground connection, all parts of the product are potential shock hazards. This includes knobs and controls that may appear to be insulators.

Use the Proper Power Cord

Use only the power cord and connector specified for your product. Use only a power cord that is in good condition.

Use the Proper Fuse

To avoid fire hazard, use only the fuse specified for your product, matched by type, voltage rating, and current rating. Fuses are specified in Appendix C of this manual.

Do Not Operate Without a Cabinet

To avoid personal injury, do not remove covers or panels or operate this product without the protective covers installed.

Do Not Operate in Wet/Damp Conditions

To avoid electric shock, do not operate this product in wet or damp conditions.

Allow Proper Ventilation

Always allow air to flow freely through the cooling fins along the left and right sides of the TDM5

Allow Adequate Clearance

Install the TDM5 with at least 3/4" of clearance above and below its case. When installing in a rack, it is advisable to leave a space of one rack unit above and below the TDM5.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

Service

For internal service and adjustment of the TDM5, contact your local Tektronix representative. *Only qualified personnel should perform service procedures.*



Preface

Who Should Use this Manual

The TDM5 User Manual contains information necessary for daily use, and is appropriate for use by anyone who operates this product.

Manual Overview

Topics covered in this manual are as follows:

Getting Started includes a product description as well as installation and first-time turn-on procedures.

Operating Basics contains the functional overview, which describes the controls and connectors, and a tutorial, which guides the user through basic instrument operation.

Appendix A provides instrument specifications, both electrical and mechanical.

Appendix B describes remote control interfaces.

Appendix C guides the user through routine service procedures, such as replacing fuses.

An index follows Appendix C.



Introduction

The Tektronix TDM5 Television Demodulator is designed to demodulate RF or IF input signals to baseband audio and video output signals. It provides measurement quality, synchronous demodulation appropriate for cable television proof-of-performance testing. The zero carrier pulse function allows depth-of-modulation measurements when used with a waveform monitor.

SAW filter technology provides excellent adjacent channel rejection. The 50 dB AGC range allows for off-air pickups in cable television and broadcast translator applications. Automatic or manual gain control can be selected by the user.

The TDM5 is 19" wide by one rack unit high.

The two rear-panel IF input connectors are compensated for 50 Ω . In addition, there are two 75 Ω video outputs and two 6-pole audio outputs, both with adjustable output levels. Two 75 Ω BNC connectors provide a Q output and an intercarrier output. Remote control of input type (RF or IF) and remote monitoring of AGC voltage and output status (outputs available or muted) can be accomplished through the 9-pin D-type connector.

System Applications

The DS1200 Cable Television Demodulator System consists of a TDM5 Television Demodulator and a TDC5 Tunable Down Converter. The package provides accurate, tunable demodulation for cable television proof-of-performance testing, as well as operational applications, such as off-air pickups, translators, or videotaping of off-air signals. When used with a 1740A-Series Waveform/Vector Monitor or the 1780R-Series Video Measurement Set, the system can be used to make all of the FCC baseband proof-of-performance tests, as well as many others, such as depth-of-modulation and in-channel frequency response.

Standard Accessories

The following standard accessories are shipped with the TDM5. Tektronix part numbers are shown in parentheses.

Rackmount Hardware Kit

Standard North American Power Cord (161-0216-00)

6-Pin Audio Connector with Male Contacts – quantity of 2

250 V, 1 Amp Replacement Fuse – quantity of 2

Trim Adjustment Tool

User Manual (070-8994-00)

Installation

On receipt of the TDM5, open the box and verify that the following items are included:

- Power Cord
- User Manual
- 6-Pin Audio Connector with Male Contacts – quantity of 2
- Rackmount Hardware

Save the shipping carton and packing materials in case it becomes necessary to ship the TDM5 to a Tektronix Service Center for service or repair. Packaging instructions are on page C-1.



WARNING. *Before proceeding, read the Safety Summary at the front of this manual.*

Electrical Installation

The TDM5 is designed to operate from a single-phase power source having one of its current-carrying conductors at or near earth ground (the neutral conductor). Only the line conductor is fused for over-current protection.

Systems that have both current-carrying conductors live with respect to ground (such as phase-to-phase on multiphase systems) are not recommended as power sources. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

Check to see if the TDM5 mains voltage setting matches your ac power source voltage. (In Figure 1-1, the arrow that points to the small rectangle indicates the mains voltage setting.) If it does **not** match, change the mains voltage setting (instructions follow).

Changing the Mains Voltage

1. Disconnect the power cable from the TDM5.
2. Pull the voltage selector straight out of the rear panel, rotate it by 180°, then plug it back in. The fuses are automatically placed in the correct position for operation.
3. Referring to Figure 1-1, verify that the new voltage setting matches your ac supply voltage.
4. Reconnect the TDM5 to the ac power source.

Power On

Push the rear-panel Power switch to the 1 position (on). The green POWER indicator should be illuminated.

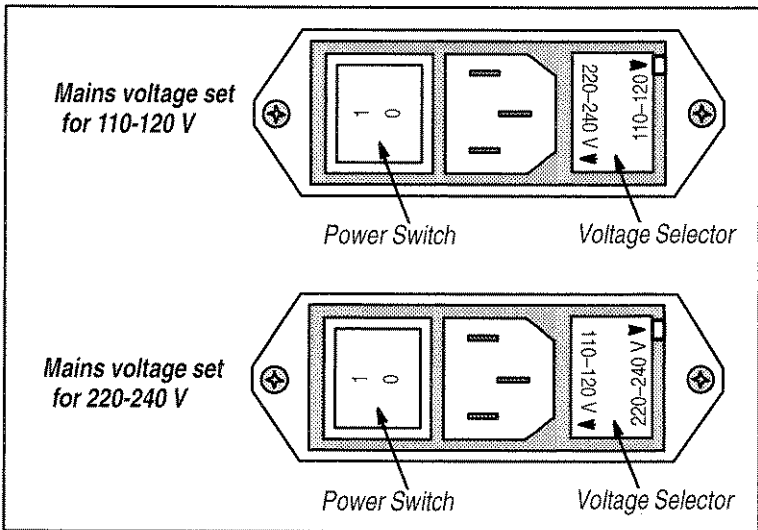


Figure 1-1: Rear-panel Input Connector

Rackmount Information

The TDM5 is 19" wide by 19.5" long, and one rack unit high. It is shipped with the hardware necessary to install it in a 19" rack.

Allowing Adequate Air Flow

To provide adequate air flow to the cooling fins along the left and right sides of the TDM5:

- Use the included rackmount hardware, which does not restrict air flow.
- Install additional components, such as combiners and netstrips, at the back of the racks only.
- Allow ventilation space on the left and right sides of the equipment rack.

It is advisable to leave about seven inches of space at the back of a the rack. At the bottom and top of the rack, ventilation profiles should be installed to allow air to enter and leave the rack.

Cooling Fans

It is advisable to leave at least one rack unit of space above and below an installed unit. When five or more units are installed above one another, a fan is necessary. Its power depends on the number of units installed. For a rack containing 15 units with one unit of free space between each unit, an airflow of 300 m³/hour is required.

Air Temperature

When installed in a rack, the TDM5 should be operated in a constant room temperature of 15° to 35° C.

Rack Installation Procedure

Rackmounting hardware is included with each TDM5. Parts are included to accommodate racks with round, square, or threaded holes. Refer to Figure 1–2 while using this procedure.

1. If the provided runners are too long, saw off the portion beyond the notch as shown.
2. Connect the runners as shown. Do not tighten the bolts yet.
3. For racks with square holes, insert the adapters into the holes, then proceed to step 4.

NOTE. *The kit contains four sets of two blocks each. For racks with round or square holes, all eight blocks will be used to secure the runners to the chassis. For racks with threaded holes, only four blocks will be used, along with the 10–32 screws, washers, and nuts.*

4. For racks with round or square holes:
 - a. Mount the pairs of blocks on the front and back of each side of the rack as shown in the illustration.
 - b. Insert the screws but do not tighten yet.
 - c. Place a runner end between each set of two blocks, adjusting the length of the runners to fit the rack. Tighten the screws at the front and back of the rack.
5. For racks with threaded holes, mount single blocks (not pairs) at the front and back corners of the rack. Insert the supplied 10–32 screws. Place a runner between each block and the rack, then install and tighten the 10–32 washers and nuts.
6. Tighten the nuts on the runners. Check that all screws and nuts have been carefully tightened.
7. Slide the TDM5 into the rack, making sure that the rack runners fit into the notch in the cooling fins (see Figure 1–2). The springs at the front of the TDM5 will click after they are past the front of the rack.
8. To remove the unit from the rack, press the springs and carefully pull the unit forward and out of the rack.

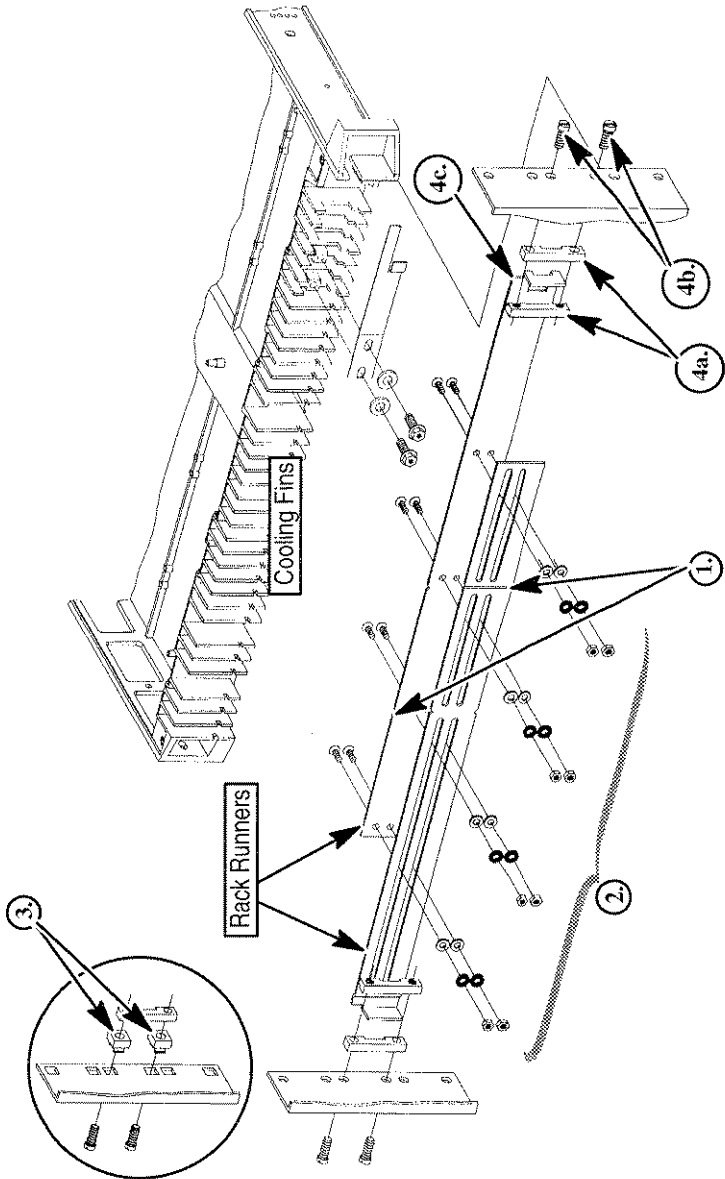


Figure 1-2: Installing Rackmount Hardware



Operator's Checkout Procedure

The TDM5 converts a modulated picture signal to baseband video. The input to the TDM5 will typically be the IF OUT signal from the companion TDC5.

The output of the TDM5 can be viewed on a picture monitor or waveform monitor. Basic operation of the TDM5 and TDC5 can be verified using the following procedure.

1. Use a television signal from either cable feed or antenna. Connect the signal to one of the four RF INPUTS on the TDC5. Be sure that the input you are using is selected (see the menu command INPUT in the TDC5 User Manual).
2. Using the 50 Ω coaxial cable supplied with the TDC5, connect the IF OUT signal from the TDC5 to the MAIN IF INPUT connector on the TDM5.
3. Connect the VIDEO OUTPUT signal of the TDM5 to the input of a picture monitor, waveform monitor, or other monitoring equipment. The Tektronix 1780R or 1740A can be used for this purpose. Connect the AUDIO OUTPUT to desired equipment for monitoring the signal. Figure 1-3 shows the pin numbers of the AUDIO OUTPUT connector; Figures 1-4 and 1-5 show two different hookups.
4. Be sure that the front-panel toggle switch is set to RF. This selects the MAIN IF INPUT as the signal source.
5. Check that the red LED labeled RF FAIL is not illuminated (that would indicate input signal failure).
6. Check for the following factory settings: AGC (automatic gain control) enabled, with the front-panel MAN GAIN indicator not illuminated, and zero carrier pulse enabled.
7. Verify that the proper audio and video signals are present on the monitoring equipment. The zero carrier pulse should be present on the monitor screen. (The factory setting is line 20.) If it is necessary to adjust the TDM5 video and audio output levels, refer to Operation in Section 2.

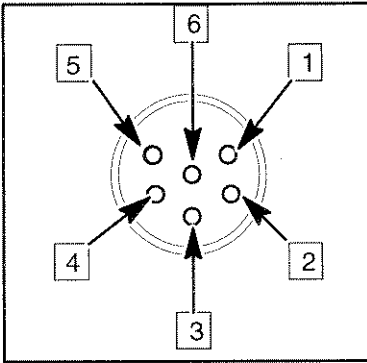


Figure 1-3: TDM5 Audio Output Pin Numbering

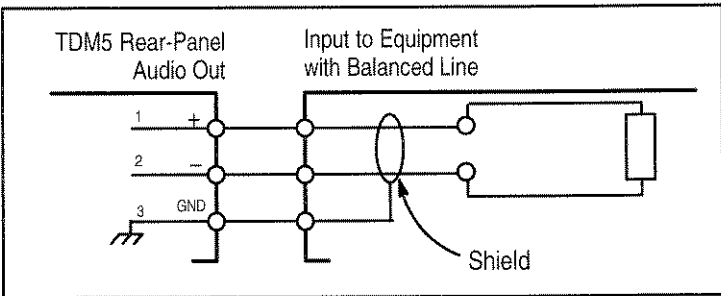


Figure 1-4: Audio Output Connection for Balanced Inputs

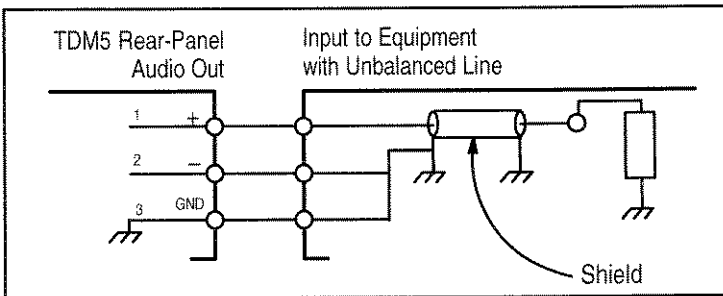


Figure 1-5: Audio Output Connection for Unbalanced Inputs



Functional Overview

Controls and Connectors

Front- and rear-panel controls, connectors, and indicators are described here, and illustrated in Figure 2-1.

1. **POWER.** The green LED is illuminated when power is present.
2. **RF/IF.** When this toggle switch is in the RF (down) position, the MAIN IF INPUT is the selected signal source. (This would be connected to the TDC5.) When the switch is in the IF (up) position, the AUX IF INPUT is the selected signal source.
3. **Red IF Indicator.** The IF LED is illuminated when IF input is selected.
4. **MAN GAIN Indicator.** The red LED lights to indicate when manual gain control is selected.
5. **RF FAIL Indicator.** The red LED lights to indicate input signal failure, with outputs muted. This indicator is not active in manual gain control mode.
6. **VIDEO OUTPUT LEVEL.** This potentiometer allows adjustment of the output level on the rear-panel video output connectors.
7. **AUDIO OUTPUT LEVEL.** This potentiometer allows adjustment of the output level on the rear-panel audio output connectors.
8. **Power Switch.** When set to 1, the rear-panel power switch turns on the TDM5. When the TDM5 is turned off, all settings and preset channels are retained in memory.

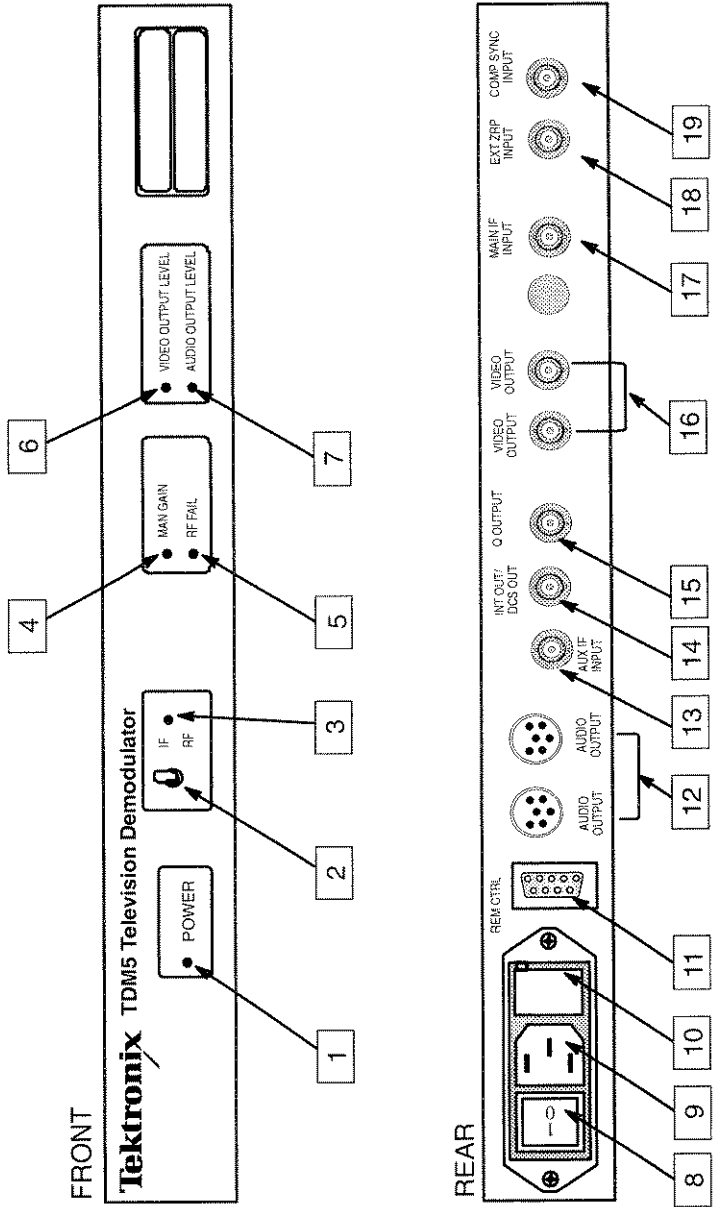


Figure 2-1: TDM5 Front and Rear Panels

9. **Power Input Connector.** Accepts AC power cord assembly that is shipped with the product.
10. **Voltage Selector.** The position of the voltage selector determines the mains voltage setting. The mains fuses (for 110-120 V and 220-240 V operation) are also located here. Fuse replacement is described in Appendix B, and instructions for changing the mains voltage setting are on page 1-4.
11. **Remote Connector.** This 9-pin D-type subminiature connector provides remote monitoring of the output status (muted or available) and the output voltage of the AGC circuit (between 0 and ± 13 V). Remote pin connections and functions are described in Appendix C.
12. **Audio Output.** The two rear-panel audio output connectors are 6-pole DIN connectors, for balanced audio output. Refer to Appendix A for specifications. Pin connections and sample hookups are shown on page 1-10.
13. **AUX IF Input.** This BNC connector is compensated in 50 Ω . Specifications are given in Appendix A.
14. **Intercarrier Output / DCS Output.** BNC connector for intercarrier output (4.5 MHz). Specifications for this output are given in Appendix A.

The intercarrier output signal is used to interface with BTSC encoders.
15. **Quadrature Output.** BNC connector for Q output, used in making ICPM measurements. Specifications for this output are given in Appendix A.

This signal can be used in conjunction with the video output of a high-frequency XY monitor, a Tektronix 1480-Series Waveform Monitor, or a Tektronix 1780R-Series Video Measurement Set, with a low-pass filter to provide a vector representation of the RF

signal. If the 1780R-Series Monitor is used, refer to ICPM measurement instructions in the 1780R-Series Operator Manual.

16. Video Output. These two BNC connectors are compensated in 75 Ω . Specifications for the video outputs are given in Appendix A.
17. Main IF Input. This BNC connector is compensated in 50 Ω . Specifications are given in Appendix A.
18. EXT ZRP Input. This BNC connector accepts an external sync feed to the zero carrier reference pulse module. The input signal can be inverted or noninverted, depending on the ZRP board jumper settings. See page 2-5 for instructions.
19. Comp Sync Output. This BNC connector provides a signal which can be used for oscilloscope triggering.

Operation

Typical Operation

The TDM5 will typically be used as part of a system that includes the Tektronix TDC5 Tunable Down Converter. The system may also include a Tektronix 1740A Waveform / Vector Monitor or 1780R Video Measurement Set. Typical equipment hookups are given in the Operator's Checkout procedure on page 1-9.

When the appropriate power is supplied to the TDM5, and the rear-panel POWER switch is set to 1 (on), the green front-panel LED is illuminated. The red front-panel LED labeled RF FAIL lights if no input signal is connected to the TDM5.

Zero Carrier Reference Pulse (ZRP)

The zero carrier pulse is used to check depth of modulation. This will allow you to properly adjust the video outputs, as described in the Adjusting Video Outputs procedure beginning on page 2-7. More information on this topic can be found in the Television Measurements book, available from Tektronix.

The zero carrier reference pulse is optional, and is factory set to appear on line 20 of field 1 and field 2. You can set it to appear on a different line, or disable it. For measurement applications, the pulse should be enabled. For off-air pickup, the pulse should be disabled. To change these settings, refer to Appendix C.

The Zero Carrier Reference board can be driven by an external sync signal. This signal can be inverted or noninverted, from 0 to 12 V (see Figure 2-2). This function is selected by internal jumper settings. Refer to Appendix C for details.

The ZRP board also provides a composite sync signal, available through the rear-panel BNC connector, COMP SYNC OUTPUT. This signal can be used for oscilloscope triggering (see Figure 2-3). The composite sync signal can be inverted by moving the plug on BR1, as shown in Figure C-1.

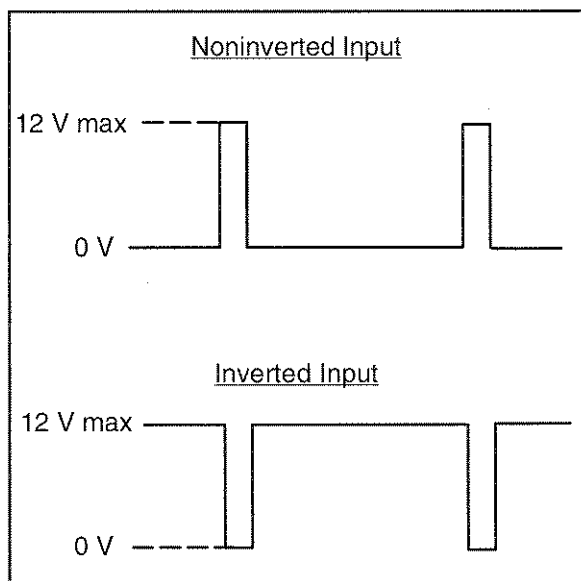


Figure 2-2: Zero Carrier Reference Pulse-external Sync Input

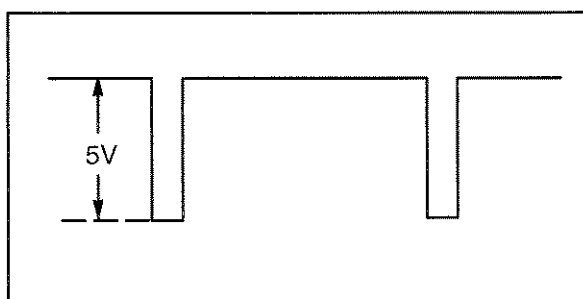


Figure 2-3: Composite Sync Output Signal

Adjusting Video Outputs

The following procedure tells how to adjust the level at the video outputs, using the front-panel potentiometer labeled VIDEO OUTPUT LEVEL.

Procedure

1. Connect the RF signal from a modulator to one of the TDC5 RF INPUTS. Use a signal with white reference, set for an amplitude of 140 IRE p-p.
2. Be sure that the TDC5 input you use is selected for output (refer to the TDC5 User Manual). Be sure that the zero carrier pulse is enabled.
3. Using a 50 Ω cable, connect the TDC5 IF OUT signal to the TDM5 IF IN.
4. Route the signal from the TDM5 VIDEO OUTPUT to the input of a waveform monitor (such as the Tektronix 1740A-Series). Be sure the waveform monitor is in the calibrated, X1 gain mode.
5. On the waveform monitor graticule, position the sync tip of the signal at -40 IRE. If all equipment is properly adjusted, the peak white should be at 100 IRE, and the zero carrier should be at 120 IRE; if they are not, then adjust the video modulation level of the modulator and the output level of the demodulator (TDM5). Adjust first one, and then the other, repeating until the specified signal amplitude is reached. To adjust the TDM5, use the front-panel potentiometer labeled VIDEO OUTPUT LEVEL. This will adjust both TDM5 video outputs to the same level, within the adjustment range of 1 V p-p \pm 3 dB.

Adjusting Audio Outputs

Adjust the audio output level as desired, using the front-panel potentiometer labeled AUDIO OUTPUT LEVEL. Both audio outputs are adjusted together, within the range of 0 dBm \pm 6 dB.

Gain Control

The TDM5 will typically be operated with automatic gain control (AGC) enabled. It is factory-set to the enable position. For special applications, an internal switch (S4 on the Gain and Phase Control board) can be used to set the unit to manual gain control. Refer to Appendix C for instructions.

Appendix A: Performance Specification

Performance Requirement. All Performance Requirements in the specification tables are identified with **REQ.** Allow a warm-up time of 20 minutes.

Performance Requirements in the electrical specifications are valid over an ambient temperature range of 15° C to 35° C. Test equipment used to verify Performance Requirements must be calibrated and working within its specified limits. These specifications apply only when using a BARCO Reference Modulator “MN.”

Reference Information. Information that amplifies a performance requirement is indicated by **RI.**

Electrical Specification

A-1. IF Input

CATEGORY	DESCRIPTION
Input Level	REQ: + 5 dBmV to + 35 dBmV (single channel; peak visual carrier).
Input Impedance	RI: 50 Ω.
Return Loss	REQ: ≥ 18 dB. RI: From 40.25 MHz to 46.5 MHz.
Video Carrier Input Frequency	RI: 45.75 MHz.
Audio Carrier Input Frequency	RI: 41.25 MHz.

A-2. Video Outputs

CATEGORY	DESCRIPTION
Output Level	<i>RI:</i> 1 V p-p. <i>RI:</i> ± 3 dB adjustable from front panel. Two outputs.
Output Impedance	<i>RI:</i> 75 Ω .
Return Loss	<i>REQ:</i> ≥ 35 dB. <i>RI:</i> From 100 kHz to 6 MHz.
Frequency Response	<i>REQ:</i> ± 0.7 dB. <i>RI:</i> From 100 kHz to 3.8 MHz, referenced to 250 kHz.
Signal-to-Noise Ratio	<i>REQ:</i> ≥ 56 dB weighted (4.5 MHz BW).
Differential Gain	<i>REQ:</i> $\leq 3\%$ peak-to-peak.
Differential Phase	<i>REQ:</i> $\leq 3^\circ$ peak-to-peak.
Chrominance-to-Luminance Delay	<i>REQ:</i> ≤ 25 ns.
Luminance Nonlinearity	<i>REQ:</i> $\leq 3\%$. <i>RI:</i> Using 5 Step Modulated Staircase.
Luminance Bar Tilt	<i>REQ:</i> $\leq 2\%$.
2T Pulse K Factor	<i>REQ:</i> $\leq 2\%$.
Baseline Distortion	<i>REQ:</i> $\leq 2\%$.
Synchronous Detector Lock and Hold Range	<i>RI:</i> ≥ 50 kHz from video carrier frequency.

A-3. Audio Outputs

CATEGORY	DESCRIPTION
Output Level	<p><i>RI:</i> 0 dBm.</p> <p><i>RI:</i> Into 600 Ω, at ± 25 kHz deviation.</p> <p><i>RI:</i> ± 3 dB adjustable from front panel. Two balanced outputs.</p>
Output Impedance	<p><i>RI:</i> $\leq 40 \Omega$.</p>
Frequency Response	<p><i>REQ:</i> ± 0.5 dB.</p> <p><i>RI:</i> 40 Hz to 15 kHz. Referenced to 1 kHz.</p> <p><i>RI:</i> According to 75 μs de-emphasis.</p>
Distortion	<p><i>REQ:</i> ≤ 0.8 %.</p>
Signal-to-Noise Ratio	<p><i>REQ:</i> ≥ 55 dB.</p> <p><i>RI:</i> Unweighted, with sync only video signal.</p>

A-4. Intercarrier Output

Output Level	<p><i>RI:</i> 47 dBmV.</p>
Output Impedance	<p><i>RI:</i> 75 Ω.</p>
Return Loss	<p><i>RI:</i> ≥ 20 dB.</p>

A-5. Quadrature Output

Output Level	<i>RI:</i> Corresponding to 1 Vp-p with standard modulation and internal phase shift of switching carrier by 90°.
Output Impedance	<i>RI:</i> 75 Ω.

A-6. Power Requirements

CATEGORY	DESCRIPTION
Line Voltage Ranges	<i>REQ:</i> 110 VAC ± 10%. <i>REQ:</i> 220 VAC ± 10%.
Power Consumption	<i>REQ:</i> 50 VA maximum.
Line Frequency	<i>REQ:</i> 48 Hz to 62 Hz.

A-7. Environmental Characteristics

CATEGORY	DESCRIPTION
Operating Temperature	<i>REQ:</i> 15° C to 35° C.
Storage Temperature	<i>REQ:</i> -20° C to 80° C.
Operating Altitude	<i>REQ:</i> To 15,000 feet maximum.
Storage Altitude	<i>REQ:</i> To 50,000 feet maximum.

A-8. Physical Characteristics

CATEGORY	DESCRIPTION
Dimensions	<i>REQ:</i> Height: 1.75 inches (44.5 millimeters). Width: 19.0 inches (483 millimeters). Depth: 19.5 inches (496 millimeters).
Weight	<i>REQ:</i> Net Weight: 15.7 pounds (7.1 kilograms).

Appendix B: Remote



CAUTION. Do not connect or disconnect cables while the TDM5 is on.

The rear-panel remote control connector is a 9-pin subminiature D-type with male contacts. See Figure B-1 and Table B-1 for remote pin assignments.

The remote control interface uses TTL levels to allow limited remote control and monitoring of instrument levels.

Remote Control

When the front-panel RF/IF selector switch is set to RF, a voltage of +5 V applied to remote pin 1 will select RF mode, and shorting pin 1 to ground (pin 6 or 7) will select IF mode. Remote control of the RF/IF selection is disabled when the front-panel switch is set to IF.

Remote Monitoring

The level at pin 2 indicates the voltage at the output of the AGC circuit. This voltage will be between 0 and ± 13 V.

When the input signal is not present, the outputs will be muted. This can be used as an indication of possible transmitter failure. When the remote connector pin 4 is high, the outputs are available. When pin 4 is low, the outputs are muted.

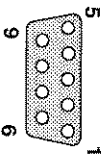


Figure B-1: Rear-panel Remote Connector

Table B-1: Remote Connector Pin Assignments

Pin	Description	Input/ Output	Function
1	RF / IF	Input	+5 VDC selects RF. Ground (connected to pin 6 or 7) selects IF.
2	AGC Voltage	Output	Level at pin 2 indicates AGC circuit output level.
3	Not Connected		
4	Outputs Muted	Output	High = outputs available. Low = outputs muted.
5	Not Connected		
6	Ground		
7	Ground		
8	Not Connected		
9	Not Connected		

Appendix C: Service



CAUTION. *Be sure that power is not supplied to the TDM5 while performing any procedures in this section.*

This section contains instructions for user and preventive maintenance, and for changing internal instrument settings. The TDM5 internal layout is shown in Figure C-1.

If the instrument does not function properly, contact Tektronix about service. If it is necessary to return the instrument to Tektronix, follow these repackaging instructions.

Repackaging for Shipment

If it becomes necessary to ship the instrument to a Tektronix Service Center for service or repair, follow these repackaging instructions:

1. Write the following on a tag attached to the product: the product owner, complete address and phone number of someone at your firm who can be contacted, the product serial number, and a description of the required service.
2. Repackage the product in the original packaging materials. If they are not available, follow these directions:
 - a. Obtain a carton of corrugated cardboard having inside dimensions six or more inches greater than the dimensions of the instrument. Use a shipping carton that has a test strength of at least 275 pounds.
 - b. Surround the product with a protective bag (antistatic preferred).
 - c. Pack dunnage or urethane foam between the product and the carton. If you use Styrofoam kernels, overfill the box and compress by closing the lid. There should be three inches of tightly packed cushioning on all sides of the instrument.
3. Seal the carton with shipping tape, industrial stapler, or both.

Zero Carrier Reference Pulse (ZRP)

There are three adjustments on the ZRP board. To make an adjustment, be sure that power is not supplied to the TDM5, then remove the top cover panel. Refer to Figure C-1 for locations and sample settings. Replace the cover before operating the TDM5.

To change the line on which the zero carrier pulse appears, set switches S1 through S4 for the desired line (DIP switch setting = line number minus 9). In Figure C-1, the switches are set for line 20.

The ZRP Enable switch is shipped in the enable position (to the left), as shown in Figure C-1. To disable the pulse, move the ZRP Enable switch to the disable (right) position. Setting all four switches (S1 through S4) to OFF (0) will also disable the pulse.

The Zero Carrier Reference module can be driven by an external sync signal. To select this input, move the plug on the ZRP Input jumper to the right position as shown in Figure C-1.

Gain Control Adjustment

Be sure power is not applied to the TDM5, then remove the top cover panel. Referring to Figure C-1, locate switch S4 on the Gain and Phase Control board, and slide the switch to the Manual Gain Control position (toward the rear of the instrument). Use P12 (shown on Figure C-1) to adjust the gain. Be sure to return the switch to the Automatic Gain Control position when normal operation is desired.

Fuse Replacement

1. Remove the power cable from the TDM5 rear panel.
2. Remove the voltage selector from the power input connector by pulling straight out. The fuse corresponding to the selected source voltage is on top of the fuse holder.
3. Pull the old fuse up and out, and replace it with a new fuse of the same type. Use only 250 V, 1 AT (slow blow) fuses.
4. Check the arrows on the fuse holder to be sure you are holding it in the correct position (110-120 V or 220-240 V), and install the fuse holder in the voltage selector.

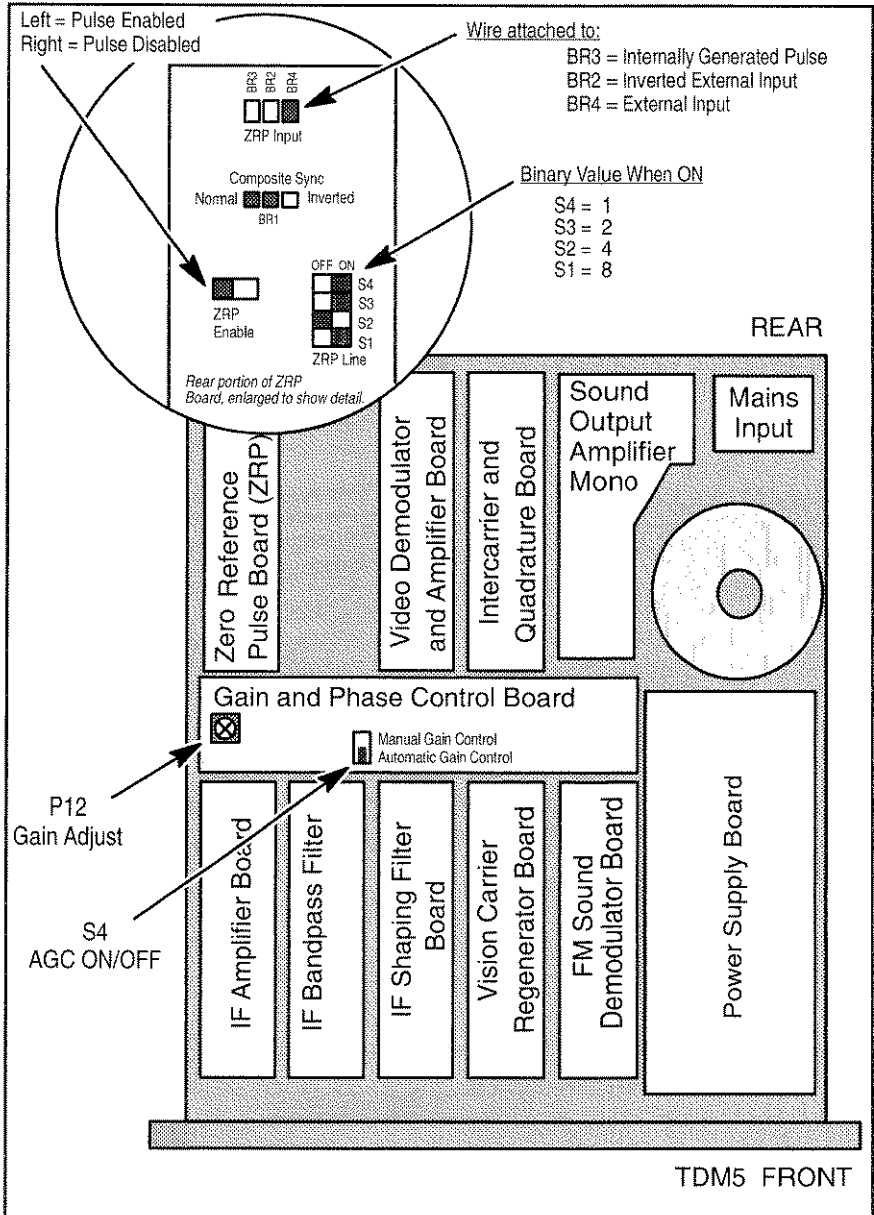


Figure C-1: Adjustment and Jumper Locations

Cleaning the TDM5

The instrument should be cleaned often enough to prevent dust and dirt from accumulating. Dirt acts as a thermal insulator, preventing effective heat dissipation, and can also provide high-resistance electrical leakage paths between conductors or components in a humid environment.



CAUTION. *Do not allow water to get inside any enclosed assembly or component. Do not clean any plastic materials with benzene, toluene, xylene, acetone, or similar compounds, because they may damage the plastic.*

Exterior Cleaning

Clean the dust from the outside of the instrument with a soft, clean cloth or small brush. A brush is especially useful for removing dust from around the buttons and connectors. Hardened dirt can be removed using a soft cloth dampened with a mild detergent and water solution. Abrasive cleaners should not be used.

Interior Cleaning

Interior cleaning and maintenance should be performed by qualified service personnel only. Do not clean rosin residue.



CAUTION. *A 2% RMA flux content solder is recommended for making repairs in this instrument. Cleaning of rosin residue is not recommended. Most cleaning solvents tend to reactivate the rosin and spread it under components where it may cause corrosion under humid conditions. The rosin residue, if left alone, does not exhibit these corrosive properties.*

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