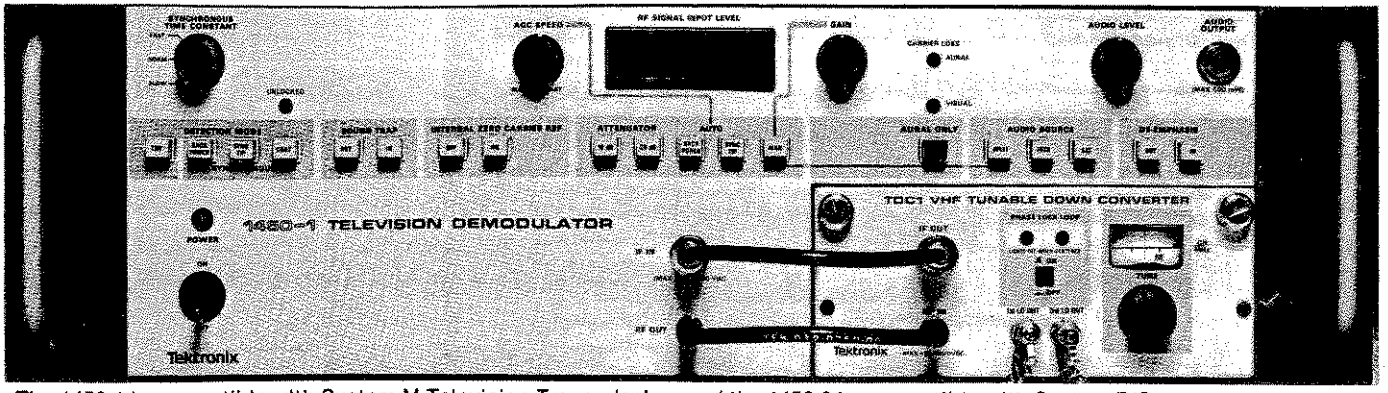
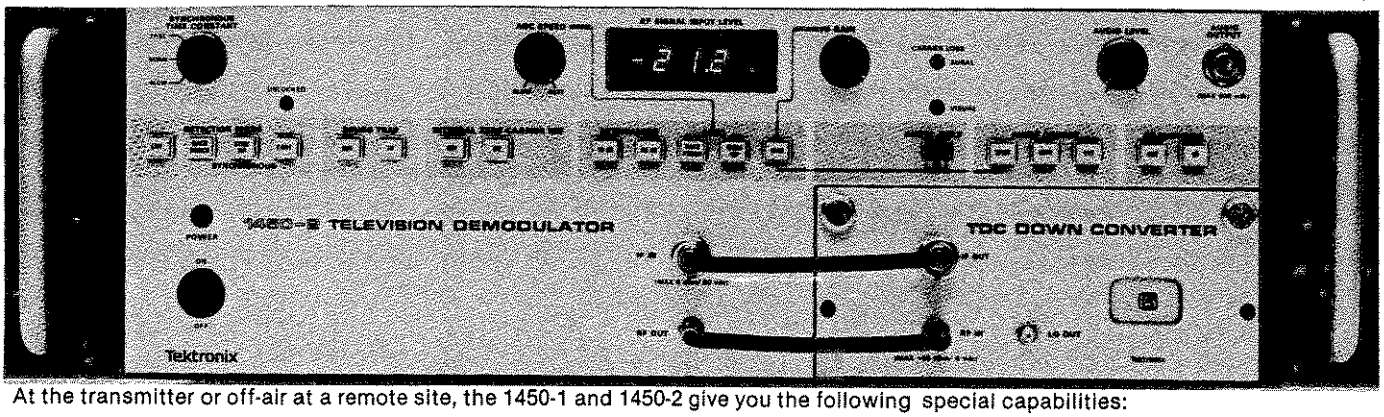
1450-1 (SYSTEM M) AND 1450-2 (SYSTEM B/G) TELEVISION DEMODULATORS



The 1450-1 is compatible with System M Television Transmission, and the 1450-2 is compatible with System B/G.



At the transmitter or off-air at a remote site, the 1450-1 and 1450-2 give you the following special capabilities:

Measurement-quality performance resulting in negligible distortion

Synchronous detection that eliminates confusing quadrature distortion

Envelope detection for accurately determining differential phase

Surface acoustic wave filter that provides precise Nyquist slope and excellent long — and short-term stability

Digital readout of input power level for easy, accurate field strength readings

Constant-bandpass characteristics over a wide dynamic range (−69 dBm to −3 dBm); 30 dB of additional attenuation available to shift input range

Any single VHF or UHF channel operation

UHF and VHF tunable down converters (System M only)

Conforms to Electronic Industries Association (EIA) Standard RS-462 (1450-1 only)

The 1450-1 (System M) and 1450-2 (System B/G) Demodulator Mainframes combine with Tektronix Television Down Converters to provide an accurate link between your transmitter's RF signals and video baseband measuring equipment. Unique components work together to identify and eliminate any possible demodulation distortion in reproduced signal characteristics. You see a transparent picture of your transmitter's performance and signal output.

TUNABLE OR FIXED-CHANNEL DOWN CONVERTERS

For demodulating an RF signal at a TV channel frequency, the 1450-1 (M) and 1450-2 (B/G) Demodulator Mainframes must be used with a Tektronix Television Down Converter (TDC). Three compatible TDCs are available for each system and provide a selection between tunable and fixed-channel performance. The TDC Fixed-Channel Down Converter supports your specified system channel number. Tunable Down Converters available for System M VHF and UHF channels are the TDC1 and TDC2 respectively.

Demodulation of the transmitter IF signal may be accomplished by using only the mainframe.

SYNCHRONOUS DETECTION AND ENVELOPE DETECTION

The 1450-1 and 1450-2 allow you to select either synchronous or envelope detection. Each method has advantages, yet both are required for full measurement capability. For instance, synchronous detection is necessary for measurements that can be seriously affected by quadrature distortion.

Both the 1450-1 and the 1450-2 have two synchronous video detectors operating in phase quadrature. One detects the in-phase signal; the other detects the quadrature component of the video signal. (The quadrature component is a measure of change in visual carrier phase resulting from a change of video level.)

However, if incidental phase modulation is present on the picture carrier, the amount of differential phase measured on a synchronously detected signal will be erroneous. Because of this, an envelope detector is necessary to determine the actual differential phase present. The envelope detector of the 1450-1 and 1450-2 has linear transfer characteristics down to 3% carrier and so provides optimum modulation depth indication.

TEKTRONIX-DEVELOPED SURFACE ACOUSTIC WAVE FILTER

The 1450-1 (System M) and 1450-2 (System B/G) feature a surface acoustic wave (SAW) filter developed by Tektronix. It provides more precise Nyquist slope characteristics without group delay distortion, improves long- and short-term stability, and lowers maintenance costs.

1450-1, 1450-2 TELEVISION DEMODULATORS

In conventional demodulators, the more precisely the bandpass characteristics approach an ideal Nyquist curve, the more complex the filter network required. In the 1450-1 and 1450-2 Mainframes however, the bandpass characteristics are determined by just a single component, the SAW filter. Precision is the result.

Conventional tuned IF circuitry must be meticulously adjusted and is subject to change with mechanical and thermal shock. But the SAW filter is in a sealed unit and accurately provides the critical selectivity characteristics of the demodulator — and requires no adjustments.

CONSTANT-BANDPASS CHARACTERISTICS

The Tektronix 1450-1 and 1450-2 offer constant-bandpass characteristics over the entire dynamic range of input signal level. Amplifiers in the mainframe operate at a constant gain, and pin-diode attenuators are used to adjust the overall gain of the demodulator. This more sophisticated approach to automatic gain control (AGC) is necessary to maintain constant-bandpass characteristics over the entire dynamic range of input power (−69 dBm to −3 dBm). 30 dB of attenuation, available in 10 dB steps, can shift the range for higher input power levels.

In addition to automatic AGC, demodulator RF/IF gain control can be set for manual operation.

DIGITAL READING OF INPUT POWER

With the accurate (to 0.1 dB) digital readout of the 1450-1 and 1450-2, you get measurements of input power you can depend on at transmitter sites, remote sites, or, for calibrated field strength measurements.

SPLIT AND INTERCARRIER SOUND

For making measurements or adjustments on aural transmitters, the 1450-1 and 1450-2 feature both split and intercarrier sound channels. The split carrier channel, which will operate without the presence of the visual carrier, may be used when making measurements on the aural transmitter only.

Four audio outputs give added measurement capability: a 600 Ω output, two low-impedance outputs for driving a speaker or headphones, and a calibrated output for making deviation measurements with an ac voltmeter or an oscilloscope.

1450-1

Quadrature distortion occurs when a single sideband signal is demodulated with an envelope detector.

Quadrature distortion most severely affects the chrominance signal, causing a loss of brightness in highly saturated colors, especially those at high luminance levels (figures 3 and 4). Narrow white picture elements against the dark backgrounds are reproduced at reduced brightness.

Note reduced pulse width in figure 2 and reduced pulse amplitude in figure 4 caused by envelope detection.

Synchronous detection of the television RF signal eliminates quadrature distortion, allowing the true performance of the transmitter to be determined.

Note in figures 5 through 8 how synchronous detection eliminates the quadrature distortion errors introduced during envelope detection. True transmitter performance may now be determined.

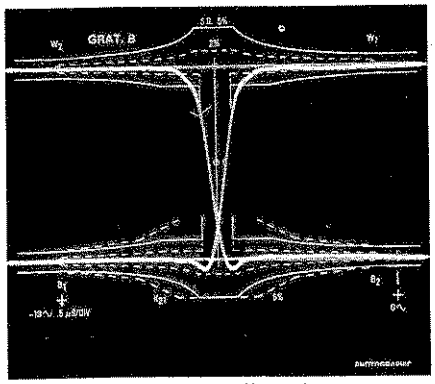


Figure 1. Quadrature distortion causes asymmetrical bar corners, making transmitter equalization difficult.

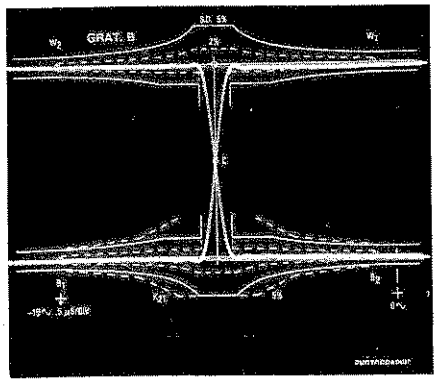


Figure 5.

1450-1 TELEVISION DEMODULATOR MAINFRAME SPECIFICATIONS

System RF Characteristics

	Fixed Channel TDC	Tunable TDC1 or TDC2
RF Input — Z:50 Ω (N).		
Return loss: with 0 dB attenuation	≥20 dB	≥10 dB
with ≤20 dB attenuation	≥30 dB	≥30 dB
Frequency:	any system M assigned carrier frequency ±20 kHz	(TDC1) All system M VHF assigned carrier frequencies, ±20 kHz. (TDC2) All system M UHF assigned carrier frequencies, ±20 kHz.
Level range:*		
(0 dB from mainframe attenuator)	−69 dBm to −3 dBm	−65 dBm to +1 dBm
(10 dB from mainframe attenuator)	−59 dBm to +7 dBm	−55 dBm to +11 dBm
(20 dB from mainframe attenuator)	−49 dBm to +17 dBm	−45 dBm to +21 dBm
(30 dB from mainframe attenuator)	−39 dBm to +27 dBm	−35 dBm to +31 dBm
AGC range:	66 dB	66 dB
Noise figure:	(VHF) ≤10 dB (UHF) ≤11 dB	(VHF) TDC1, ≤19 dB (UHF) TDC2, ≤19 dB
Image rejection ratio:	≥60 dB	(1st image) ≥50 dB (2nd image) ≥60 dB
IF rejection ratio	≥60 dB	(1st IF) (VHF) TDC1, ≤50 dB (1st IF) (UHF) TDC2, ≤30 dB
Adjacent channel cross modulation:	≥60 dB	≥60 dB
Alternate channel cross modulation:	≥60 dB	≥60 dB
Variation in system frequency response with AGC:	(VHF) ≤ ±0.1 dB (UHF) ≤ ±0.15 dB	≤0.3 dB
Readout accuracy:	±2 dB	±2 dB
Readout resolution:	±0.1 dB	±0.1 dB

*Note: In 50 Ω +27 dBm = 5 V RMS +31 dBm = 8 V RMS
−3 dBm = 158 mV RMS +1 dBm = 251 mV RMS
−69 dBm = 80 μV RMS −65 dBm = 126 μV RMS

1450-1, 1450-2 TELEVISION DEMODULATORS

ENVELOPE DETECTION

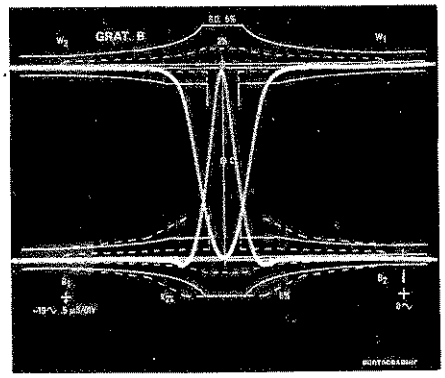


Figure 2. Asymmetry of the normal and inverted 2T sin² pulses caused by quadrature distortion.

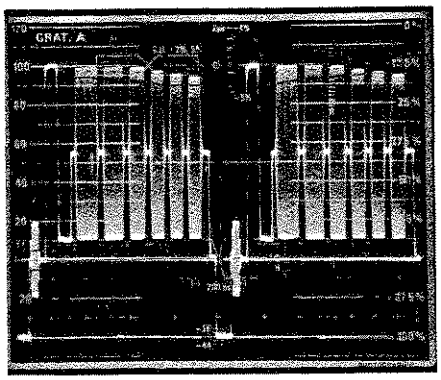


Figure 3. The Tektronix 1450-1's flat IF response and wide band phase-equalized video response minimize the effects of quadrature distortion in the envelope detected signal.

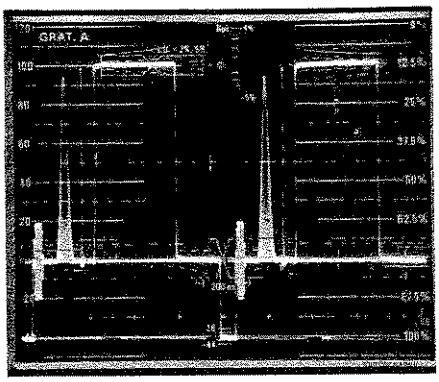


Figure 4. The Tektronix 1450-1's flat IF response and wide band phase-equalization video response minimize the effects of quadrature distortion in the envelope detected signal.

SYNCHRONOUS DETECTION

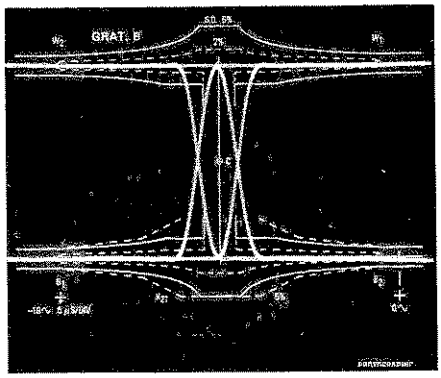


Figure 6.

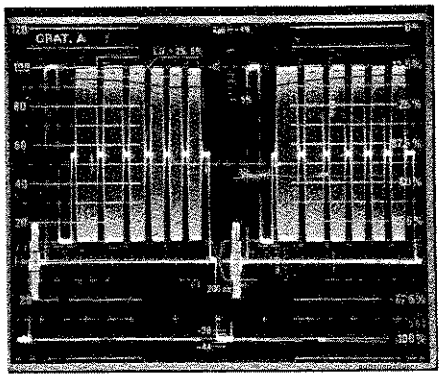


Figure 7.

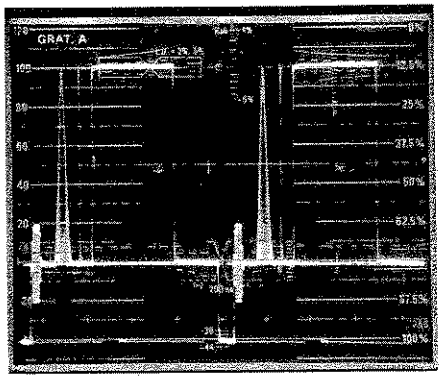


Figure 8.

IF CHARACTERISTICS

IF Input — Z_{in}: 50 Ω (BNC). Return loss: > 18 dB.

IF Level Range — −20 dBm to −64 dBm. (Signal to noise ratio deteriorates as signal level decreases.)

IF Frequency — Visual : 37, 38.9, or 45.75 MHz ± 120 kHz (If specified by the mainframe/TDC options). Aural: 4.5 MHz below visual.

VIDEO CHARACTERISTICS

Video Output — Z_o: 75 Ω (BNC, 2 each). Return loss: ≥ 34 dB. Level: 1 V p-p sync tip to peak white.

Dc Level — Back porch AGC: blanking level at 0 V ± 50 mV. Sync tip AGC: referenced to blanking level, sync tip is at −300 mV ± 6 mV.

Line Time Distortion — 2T k = 0.5% in wideband synchronous mode only. 2T k = 1% in all other modes.

Field Time Distortion — k = 0.5%.

Line Time Nonlinearity — ≤ 1%.

Differential Gain — Synchronous ≤ 1%; Envelope ≤ 4%. Peak chroma level ≤ 100 IRE.

Differential Phase — ≤ 1%.

Zero Carrier Reference Gate — Width: 30 μs ± 10%. Delay — 20 μs ± 10% from leading edge of sync. Carrier cutoff: ≥ 50 dB zero carrier ± 0.5. IRE. Timing: factory set to line 20 of both fields, internally selectable from lines 10 through 25 of both fields.

Chrominance/luminance Delay — ≤ ± 20 ns.

Chrominance/aural/carrier Intermod — ≥ 50 dB down.

Aural Signal Rejection — ≥ 46 dB.

Video Signal to Noise Ratios — Low freq (p-p video/p-p hum): ≥ 60 dB. Mid freq coherent (p-p video/p-p noise): ≥ 50 dB. White Noise (p-p video/RMS noise): ≥ 60 dB (10 kHz to 5 MHz).

Quadrature Output — Z_o: 75 Ω (BNC). Return loss: ≥ 34 dB. Quadrature Phase — 90° ± 2° (with respect to VIDEO OUT).

EXT Zero Carrier Reference Drive Input — Z_{in}: ≈ 5 kΩ (BNC). Level required: ≈ + 1 V (accepts input from Tektronix 1440).

AUDIO CHARACTERISTICS

Frequency Response — De-emphasis out: flat ± 0.4 dB (30 Hz to 15 kHz). De-emphasis in: standard 75 ns de-emphasis curve ± 0.4 dB.

Harmonic Distortion — ≤ 0.2% (50 Hz to 15 kHz at full output with ± 25 kHz deviation).

Audio Signal to Noise Ratio — Intercarrier mode: ≥ 55 dB with ± 25 kHz deviation. Split carrier mode: ≥ 75 dB with ± 25 kHz deviation. External Aural Intercarrier In: ≥ 75 dB with ± 25 kHz deviation. Aural Only Mode: ≥ 75 dB with ± 25 kHz deviation.

Deviation Output — Z_o: 600 Ω (BNC). Level: 50 mV/kHz ± 1%. (20 kHz/V ± 1%).

Aural Intercarrier In — Z_{in}: 50 Ω (BNC). Return loss: ≥ 20 dB. Level: −30 dBm ± 5 dB. Frequency: 4.5 MHz ± 1 kHz.

Aural Intercarrier Output — Z_o: 50 Ω (BNC). Return loss: ≥ 20 dB. Level: nominal −6 dBm up to 0 dBm.

600 Ω Balanced Line Output — Level: + 10 dBm (internally adjustable from ≤ − 10 dBm to + 15 dBm). Connector: XLR.

8 Ω Speaker Output — Level: up to 5 W RMS, front panel adjustable. Connector: barrier block.

Headphone Output — Level: up to 50 mW into 8 Ω headphone (stereo or mono style). Connector: phone jack.

Remote Connector — Alarm output: SPDT relay contact rated at 28 V, 3 A. External synchronous/envelope switch: ground for envelope detection.

Electromagnetic Susceptibility — up to 10 V/meter.

Damage Level at RF Input — 1 W max (any attenuator setting).

Rear Panel Outputs — Video. BNC, 2 each Quadrature. BNC Deviation, BNC 4.5 MHz. BNC 600 Ω (balanced) 8 Ω speaker.

Rear Panel Inputs — 50 Ω RF. N; 4.5 MHz, BNC; External zero carrier, BNC; remote alarm jack.

1450-1, 1450-2 TELEVISION DEMODULATORS

1450-2
Quadrature distortion occurs when a single sideband signal is demodulated with an envelope detector.

Quadrature distortion most severely affects the chrominance signal, causing a loss of brightness in highly saturated colors, especially those at high luminance levels. Narrow white picture elements against the dark backgrounds are reproduced at reduced brightness.

For true monitoring of the transmitter's performance, synchronous detection must be used to eliminate quadrature distortion.

However, envelope detection is still necessary for measuring differential phase, since it accurately determines any incidental phase modulation.

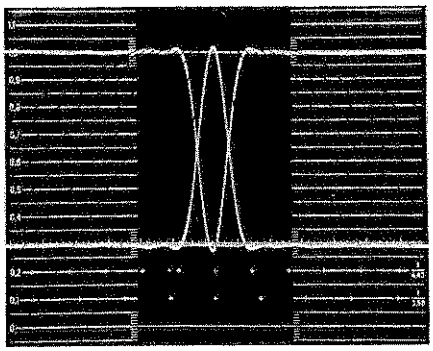


Figure 1. 2T pulses, normal and inverted, synchronously detected, narrow band IF.

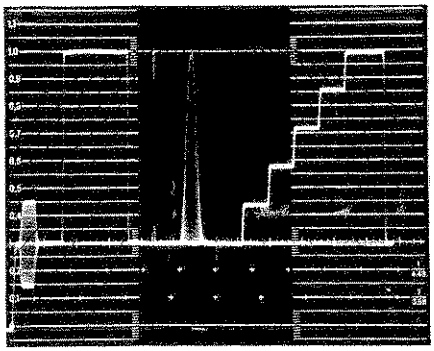


Figure 5. EBU Line 17 ITS, synchronously demodulated.

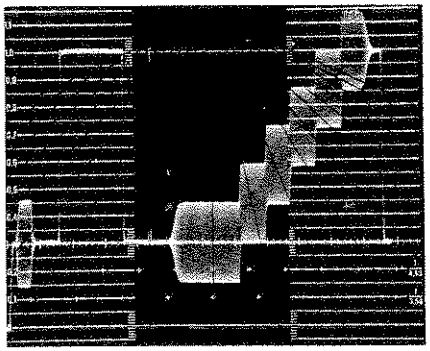


Figure 6. EBU Line 330 ITS, synchronously demodulated.

TELEVISION DEMODULATOR SPECIFICATIONS

System RF Characteristics with Fixed-Channel TDC

RF Input — Z:50 Ω (N)

Return loss — ≥20 dB with 0 dB attenuation
≥30 dB with 20 dB attenuation

Frequency — System B or System G assigned carrier frequency, ±20 kHz

Level Range — * −69 dBm to −3 dBm (0 dB mainframe attenuation)
−59 dBm to +7 dBm (10 dB mainframe attenuation)
−49 dBm to +17 dBm (20 dB mainframe attenuation)
−39 dBm to +27 dBm (30 dB mainframe attenuation)

AGC Range — 66 dB

Noise Figure — (VHF) ≤10 dB; (UHF) ≤11 dB

Image Rejection Ratio — (VHF) ≥60 dB; (UHF) ≥50 dB

IF Rejection Ratio — ≥60 dB.

Adjacent Channel Cross Modulation — ≥60 dB down.

Alternate Channel Cross Modulation — ≥60 dB down.

Variation in System Frequency Response with AGC — (VHF) ≤ ±0.1 dB; (UHF) ≤ ±0.15 dB

Readout Accuracy — ±2 dB.

Readout Resolution — ±0.1 dB.

*Note: In 50 Ω: +27 dBm = 5V RMS
−3 dBm = 158 mV RMS
−69 dBm = 80 μV RMS

IF CHARACTERISTICS

IF Input — Z_{in}: 50 Ω (BNC). Return loss: >18 dB.

IF Level Range — −20 dBm to −64 dBm. (Signal to noise ratio deteriorates as signal level decreases.)

IF Frequency — Visual: 38.9 MHz ±100 kHz; Aural: 5.5 MHz below visual.

VIDEO CHARACTERISTICS

Video Outputs — Two Z: 75 Ω (BNC, 2 each). Return loss: ≥34 dB level: 1 V p-p sync tip to peak white.

Dc Level — Back porch AGC: blanking level at 0 V ±50 mV. Sync tip AGC: referenced to blanking level, sync tip is at −286 mV ±5.7 mV.

Line Time Distortion — ≤0.5%, wideband IF, synchronous detection. 1.0% in all other IF, detection mode combinations.

Field Time Distortion — ≤0.5%.

Line Time Nonlinearity — ≥0.5%.

Differential Gain — Synchronous ≤1%. Envelope ≤1%.

Chrominance/luminance Delay — ≤ ±20 ns.

Chrominance/aural Carrier Intermod — ≥50 dB down.

Aural Signal Rejection — ≥46 dB.

1450-1, 1450-2 TELEVISION DEMODULATORS

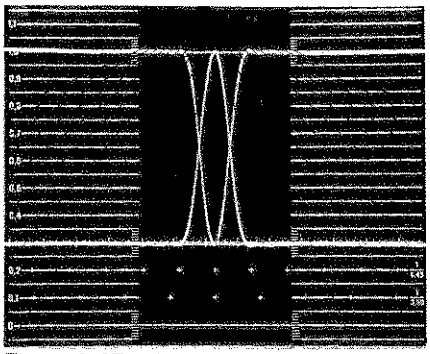


Figure 2. 2T pulses normal and inverted, synchronously detected, wide band IF.

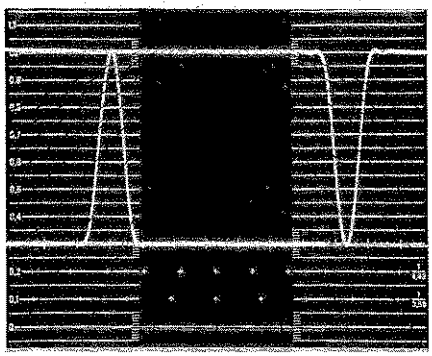


Figure 3. 2T pulse-to-bar ratio display, synchronously detected, wide band IF. Inverted 2T pulse also shown.

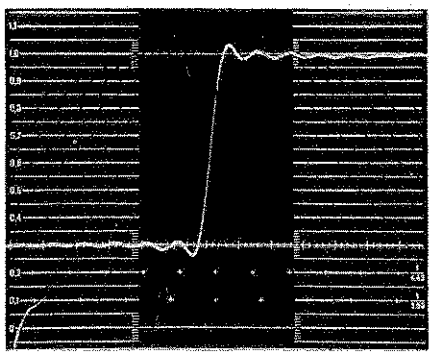


Figure 4. 100 ns T step, synchronously detected, narrow band IF. Note excellent group envelope delay, symmetrical ringing.

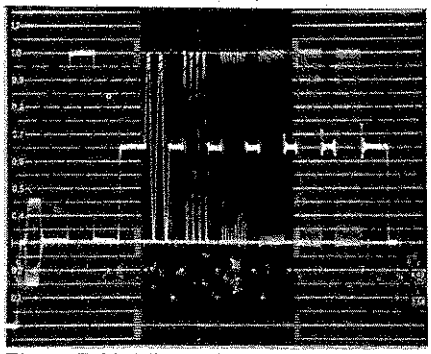


Figure 7. Multiburst 0.5, 1.0, 2.0, 4.0, 4.8 and 5.8 MHz. Synchronously detected, wide band IF.

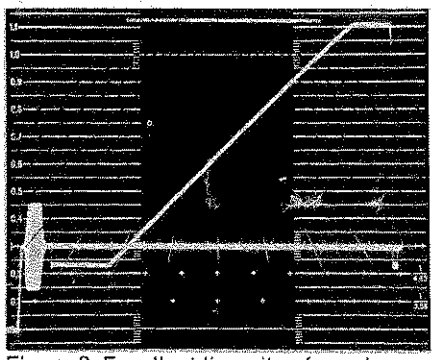


Figure 8. Excellent linearity of envelope detected video. Ramp signal extends linearity to 2% carrier. Zero carrier reference pulse is shown (top center).

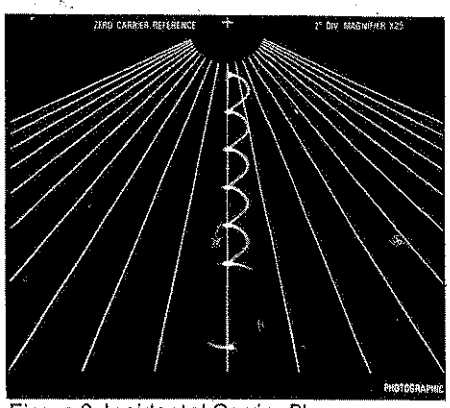


Figure 9. Incidental Carrier Phase Modulation measurement display 2°/radial. 5 step staircase shown.

Video Signal to Noise Ratio — Low freq (p-p video/p-p hum): ≥ 60 dB. Mid freq coherent (p-p video/p-p noise): ≥ 50 dB. White noise (p-p video/RMS noise): ≥ 60 dB (10 kHz to 5 MHz).

Quadrature Output — Z: 75 Ω (BNC). Return loss: ≥ 34 dB. Quadrature phase: 90° ± 2° (with respect to VIDEO OUT).

Zero Carrier Reference Gate — Width: 30 μs ± 10%. Carrier cutoff: ≥ 50 dB, zero carrier ± 5 mV. Timing: factory set to Line 16 of both fields, internally selectable from lines 10 through 25 of both fields.

EXT Zero Carrier Reference Drive Input — Z_{in}: ≈ 5 KΩ (BNC). Level required ≈ + 1 V (accepts input from Tektronix 1460).

AUDIO CHARACTERISTICS

Frequency Response — De-emphasis out: Flat ± 0.4 dB. (30 Hz to 25 kHz). De-emphasis in: standard 50 μs de-emphasis curve ± 0.5 dB.

Harmonic Distortion — ≤ 0.2% (50 Hz to 15 kHz at full output with ± 50 kHz deviation).

Audio Signal to Noise Ratio — Intercarrier mode: ≥ 55 dB with ± 50 kHz deviation and 1 kHz modulation. Split carrier: ≥ 75 dB with ± 50 kHz deviation and 1 kHz modulation. EXT aural intercarrier IN: ≥ 75 dB with ± 50 kHz deviation and 1 kHz modulation. Aural Only — ≥ 75 dB with ± 50 kHz dev and 1 kHz modulation.

Deviation Output — Z_0 600 Ω (BNC). Level: 50 mV/kHz ± 1%; 20 kHz/V ± 1%.

Aural Intercarrier IN — Z_{in}: 50 Ω (BNC). Return loss: ≥ 20 dB. Level: − 30 dBm ± 5 dB. Frequency: 5.5 MHz ± 1 kHz.

Aural Intercarrier Output — Z_0: 50 Ω (BNC). Return loss: ≥ 20 dB. Level: nominal − 6 dBm up to 0 dBm.

600 Ω Balanced Line Output — Level: + 10 dBm (internally adjustable from at least − 10 dBm to + 15 dBm). Connector: XLR.

8 Ω Speaker Output — Level: up to 5 W RMS, front panel adjustable. Connector: barrier block.

Headphone Output — Level: up to 50 mW into 8 Ω headphone (Stereo or mono style). Connector: phone jack.

Remote Connector — Alarm output: SPDT relay contact rated at 28 V. 3 A. External synchronous/envelope switch: ground for envelope detection.

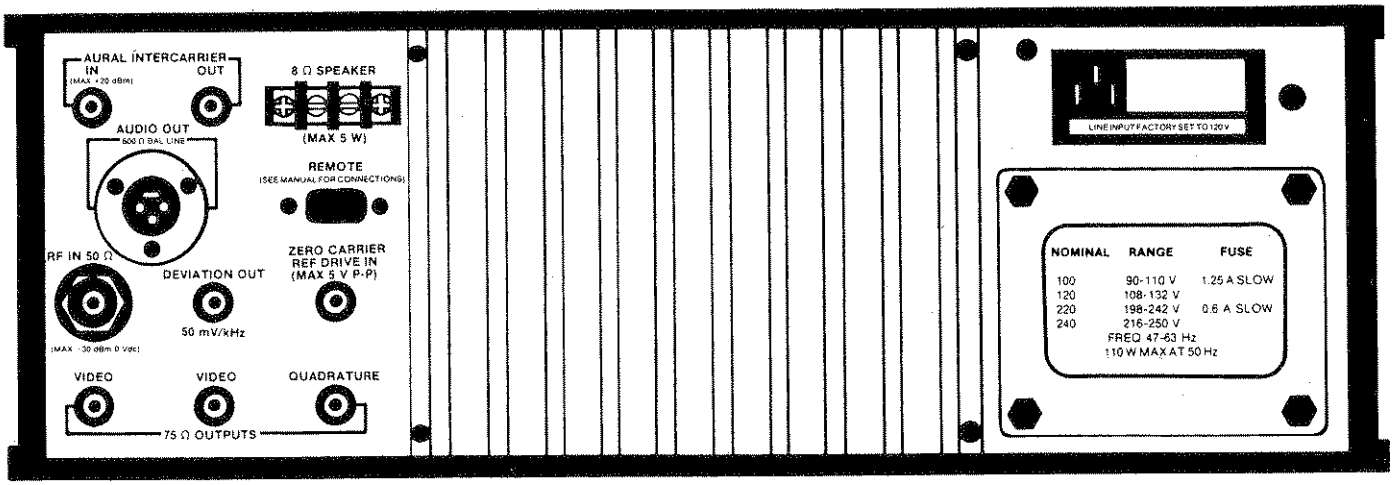
Electromagnetic Susceptibility — up to 10 V/Meter.

Damage Level at RF Input — 1 W max (any attenuator setting).

Rear Panel Outputs — Video, BNC, 2 each Quadrature, BNC, Deviation, BNC, 5.5 MHz, BNC, 600 Ω (balanced), 8 Ω speaker, Remote alarm jack.

Rear Panel Inputs — 50 Ω RF, N; 5.5 MHz, BNC; External zero carrier, BNC; Remote alarm jack.

1450-1, 1450-2 ORDERING INFORMATION



ORDERING INFORMATION, SYSTEM M

When ordering, please use the exact nomenclature given here.

1450-1: (order one vision IF option.)

Option 01: 37 MHz vision IF.

Option 02: 38.9 MHz vision IF.

Option 03: 45.75 MHz vision IF.

TDC Fixed Channel Down Converter (stipulate channel number when ordering).

TDC-1 Tunable Down Converter — System M, VHF Band.

TDC-2 Tunable Down Converter — System M, UHF Band.

Order one vision IF Option and Option 11 or 14.
If your country is not listed, contact your nearest field office for a quotation.

Option 01: 37 MHz vision IF.

Option 02: 38.9 MHz vision IF.

Option 03: 45.75 MHz vision IF.

Option 11: System M countries.

Option 14: System M countries.

ORDERING INFORMATION, SYSTEM B/G

1450-2: (Order one vision IF option and one group delay option).

Option 02: 38.9 MHz vision IF.

Option 09: +90/−170 ns group delay

TDC Fixed Channel Down Converter (stipulate channel number when ordering).

Order one vision IF option and Option 12. If your country is not listed, contact your nearest field office for a quotation.

Option 02: 38.9 MHz vision IF.

Option 12: System B/G countries.

COUNTRIES: SYSTEM M (Option 11)

Antigua, Argentina, Barbados, Bermuda, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Curacao, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Johnston Islands, Korea, Mexico, Micronesia, Netherlands Antilles, Nicaragua, Panama, Peru, Phillipines, Puerto Rico, Samoa, St. Kitts, Surinam, Taiwan, Trinidad/Tobago, Uruguay, U.S.A., Venezuela, Virgin Islands.

COUNTRIES: SYSTEM M (Option 14)

Japan and Okinawa.

COUNTRIES: SYSTEM B/G (Option 12)

Algeria, Austria, Bahrain, Bangladesh, Belgium,* Brunei, Cyprus, Denmark, East Germany, Egypt, Ethiopia, Finland, Ghana, Gibraltar, Greece, Guinea, Hong Kong,* Iceland, India, Indonesia, Iran, Israel, Italy (UHF), Jordan, Kenya, Kuwait, Lebanon, Liberia, Libya, Malta, Mauritius, Netherlands, Nigeria, Norway, Oman, Pakistan, Portugal, Qatar, Rhodesia, Saudi Arabia,* Sierra Leone, Singapore, Spain, Sudan, Sweden, Switzerland, Syria, Tanzania, Tunisia, Turkey, Uganda, United Arab Emirates, West Germany, Yemen Arab Republic, Republic of Yemen, Yugoslavia, Zambia.

*System B only.

Television Products
RF Products

CMP500/ CSS500 1450 SERIES

TDC/ TDC-10

RF Products

Low Cost Spectrum Display of Satellite Signals

Measurement Quality Television Demodulator

- CMP500/CSS500
- 1450 Series
- TDC/TDC-10

CMP500 Cable Television Measurement Package/ CSS500 Cable Television System Software

- Delivers baseband video and RF measurement performance unmatched in the industry
- Performs all recommended baseband and RF measurements including the FCC requirements
- Includes easy-to-use Windows-based control software
- Automatically monitors results and displays alarm when out-of-service measurement limits are reached
- Sequences can be defined on the computer, downloaded to the 2714, which can be removed from the system to make automatic field RF measurements
- Displays the picture of the channel being measured on the computer screen when equipped with video display board
- Compatible with standard, HCR or IRC systems up to 1 GHz
- Export data to Windows-based programs such as Lotus 1-2-3 or Microsoft Excel for more detailed analysis
- Supports many different types of printers

1450 Series Demodulators

- Measurement-quality performance resulting in negligible distortion
- Precise Nyquist slope provided by surface acoustic wave filter
- Wide dynamic range with constant band-pass characteristics
- Synchronous detection eliminates quadrature distortion
- Envelope detection for determining differential phase

1450-1 Only

- Wideband audio output for BTSC multi-channel sound applications
- Wideband audio output compatible with Japanese stereo sound with FAX channel

1450-2/1450-3A Only

- NICAM intercarrier output compatible with 728D NICAM Decoder input

TDC-10 Tunable Down Converter

- Covers all Cable TV, VHF, and UHF channels up to 1 GHz
- Built in frequency counter for visual carrier frequency and aural carrier offset
- GPIB or RS232 remote control
- User programmable channel tables

ORDERING INFORMATION

CMP500
Cable Measurement Package **$56,000**
Opt. 05 – Add Tracking Generator ..... **+$3,950**
Opt. 10 – Deletes VM700A ..... **–$21,150**
Opt. 11 – Deletes 2714 ..... **–$12,780**
Opt. 12 – Deletes 14501 ..... **–$13,410**
Opt. 13 – Deletes TDC-10 ..... **–$8,910**
Opt. 20 – Substitute RS232 on 2714 ..... **NC**
Opt. 34 – Add Rack Mount to 2714 ..... **+$595**
Opt. 40 – Add Audio to VM700A ..... **+$3,800**
Opt. 1C – Adds Cabinet version to VM700A ..... **NC**

CSS500
Cable Measurement Package Software **$2,000**

1450-1
Demodulator (System M) **$14,900**
Opt. 01 – 37 MHz Vision IF ..... **+$500**
Opt. 02 – 38.9 MHz Vision IF ..... **+$500**
Opt. 03 – 45.75 MHz Vision IF ..... **NC**

1450-2
Demodulator (System B/G) **$15,500**
Opt. NI – NICAM ..... **+$2,500**

1450-3A
Demodulator (System I) **$15,500**

TDC
Fixed Channel Down Converter (Specify Channel) **$4,950**
Opt. 01 – 37 MHz Vision IF ..... **NC**
Opt. 02 – 38.9 MHz Vision IF ..... **NC**
Opt. 03 – 45.75 MHz Vision IF ..... **NC**
Opt. 11 – System M except Japan and Okinawa ..... **NC**
Opt. 12 – System B/G/I countries ..... **NC**
Opt. 14 – Japan and Okinawa ..... **NC**

TDC-10
Tunable Down Converter **$9,900**

TV Catalog available. Please complete and return the reply card in the back of this catalog.