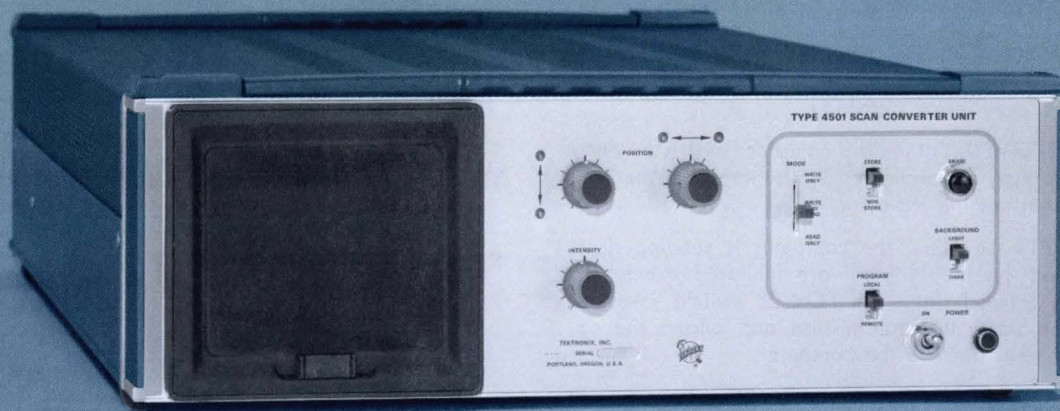


**TYPE 4501
R4501**

SCAN CONVERTER UNIT

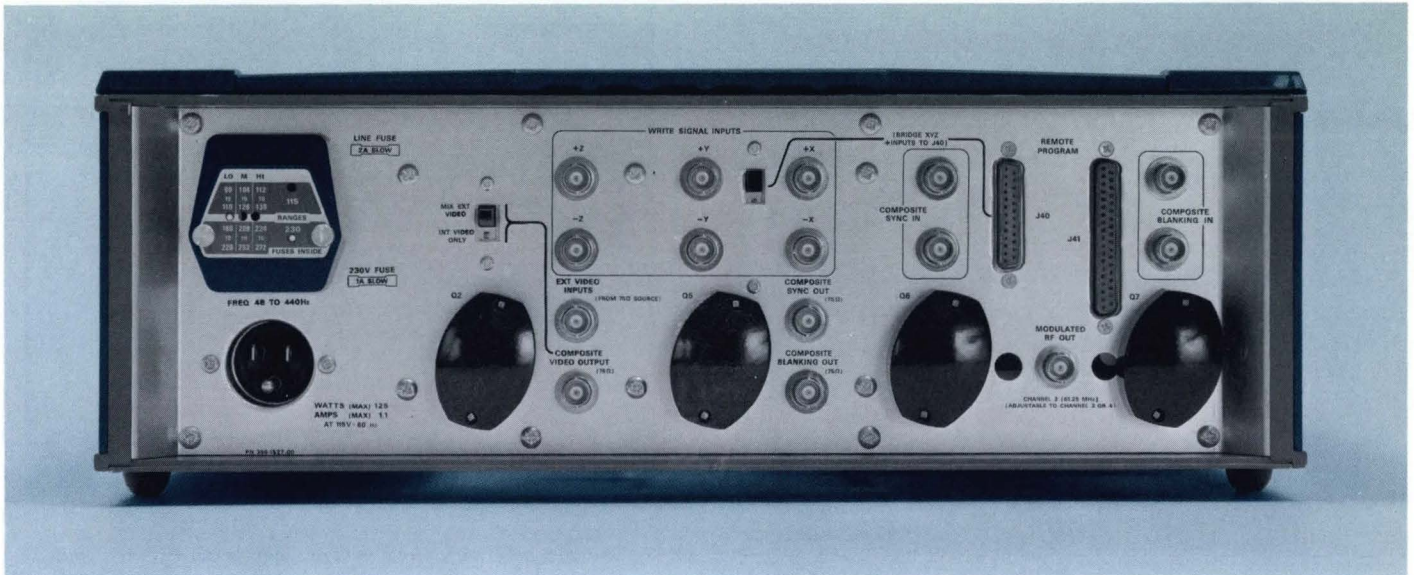
NEW



- **Conventional or stored displays are converted to composite video and modulated RF for viewing on bright, large-screen, TV monitors or receivers.**
- **Video output conforms to EIA, 525-line/60-field or CCIR, 625-line/50-field television standards.**
- **Storage capability permits convenient viewing of single-event or low-repetition rate information.**
- **Output from a single scan converter may be looped through a multiple number of monitors for viewing at remote locations.**
- **Wideband X and Y amplifiers, DC-to-10 MHz frequency response.**
- **Remotely programmable.**

The Type 4501 Scan Converter Unit is an analog memory device with readout in the form of a composite television signal. Information written on its 5-inch storage tube is converted to composite video or modulated RF for convenient viewing on large-screen television monitors or receivers. The bright displays achieved in this manner are ideal for individual or group viewing under high-ambient light conditions. A Tektronix, 5-inch rectangular bistable storage tube is utilized as the memory device and provides resolution equivalent to 100 by 125 stored line pairs.

The output video signal conforms to EIA 525-line, 60-field television standards. Provision is made to internally switch to CCIR, 625 line, 50 field to accommodate European television standards. The modulated RF output permits displaying information on Channel 2, 3, or 4 of conventional television receivers.



DISPLAY MODES

The scan converter may be operated in a STORE or NON-STORE mode. In the STORE mode, information from X, Y and Z-axis signal inputs is stored in a conventional manner on the storage CRT. Conversion is obtained by raster scanning the storage target with the CRT writing beam. The detected signal is then combined with internally generated television sync and blanking, and is provided at the rear panel as composite video or modulated RF. Operation of the Type 4501 in the NON-STORE mode is similar to operating in the STORE mode except displays are not retained. In this mode dynamic displays of changing information may be scan converted for large-screen viewing.

Associated with the STORE and NON-STORE operating modes are the WRITE ONLY, WRITE AND READ and READ ONLY operating functions. The WRITE AND READ function permits a display to be visually written and read simultaneously. This is accomplished by "time-sharing" the single electron beam. Using the same deflection amplifiers and electron beam to perform the write and read functions insures excellent input-output tracking, thus adding negligible position errors to the output monitor.

VERTICAL AND HORIZONTAL AMPLIFIERS

The DC coupled X (horizontal) and Y (vertical) differential input amplifiers provide cancellation of common-mode signal components, permit convenient polarity inversion and provide a means for mixing of two signals from separate sources. The display aspect ratio is 3 units vertical and 4 units horizontal. Access to (+) and (-) inputs is through rear-panel BNC connectors. Simultaneous access to the (+) inputs is available through the remote program connector.

DEFLECTION FACTOR

Vertical— 0.75-V full screen (7.5 cm), variable from 0.375-V full screen to 1.125-V full screen with internal adjustment.

Horizontal—1.0-V full screen (10 cm), variable from 0.5-V full screen to 1.5-V full screen with internal adjustment.

POLARITY SENSE—(+) vertical input moves beam up, (+) horizontal input moves beam to the right.

MAXIMUM INPUT VOLTAGE— ± 200 V, (DC and peak AC).

INPUT RC—1 M Ω within 2%, paralleled by 47 pF.

POSITIONAL STABILITY—Within 1% of full scale at +20°C to +30°C.

GAIN STABILITY—Within 1%.

DOT SETTLING TIME—0.15 μ s or less to within 1% of final position.

BANDWIDTH—(X and Y amplifiers) at least 10 MHz within center 7.5 division.

PHASE DIFFERENCE—Within 10° between X and Y at 10 MHz.

DIFFERENTIAL INPUT

COMMON-MODE DYNAMIC RANGE—5 V P-P sinewave.

COMMON-MODE REJECTION RATIO—500:1 from DC to 10 kHz, decreasing to 100:1 at 1 MHz and decreasing to 10:1 at 10 MHz.

Z AMPLIFIER

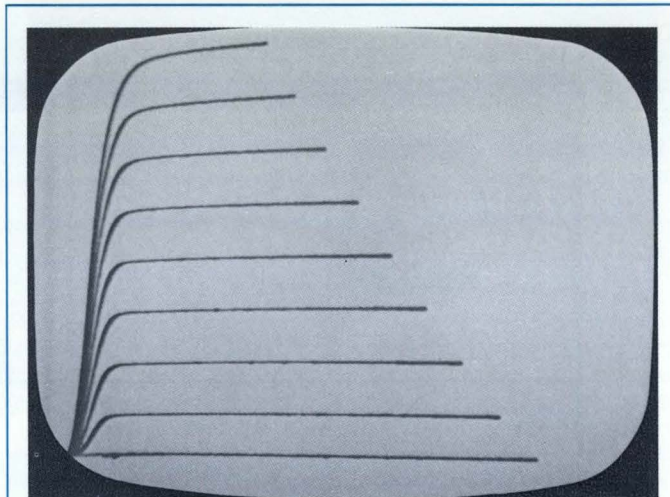
The DC-coupled Z-axis amplifier provides cancellation of common-mode signal components, permits convenient polarity inversion and provides a means for mixing of two signals from separate sources. In all WRITE modes, the CRT beam intensity is determined by the Z-axis input and the INTENSITY control. Access to (+) and (-) inputs is through BNC connectors on the rear panel. Simultaneous access to the (+) input is available through the remote program connector.

The Z amplifier input has two operating modes: LINEAR and LIMITING.

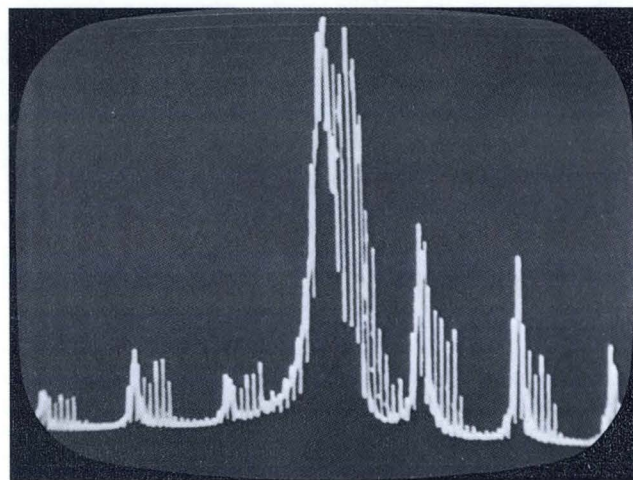
TYPE 4501 R4501



The information written on the 5-inch CRT of the scan converter (bottom) is converted to composite video and is displayed on the 17-inch CONRAC monitor (top).



Displays may be viewed with a light or dark background (top and bottom photo). The front-panel BACKGROUND switch provides a choice of LIGHT (written area is displayed dark on a light background) or DARK (written area is displayed light on a dark background).



LINEAR AMPLIFIER CHARACTERISTICS (Single ended or differential input)

POLARITY SENSE—Positive signal on the (+) input increases intensity, negative signal on the (–) input increases intensity. (Intensity modulation of the CRT beam is the resultant difference between the signal applied to the (+) and (–) Z-axis inputs).

LINEAR INPUT SIGNAL RANGE— ± 2.5 V peak.
MAXIMUM INPUT VOLTAGE— ± 200 V (DC and peak AC).
COMMON-MODE REJECTION RATIO—At least 500:1 from DC to 100 kHz, decreasing to 200:1 at 1 MHz and decreasing to 14:1 at 5 MHz. (A single-ended signal to either (+) or (–) input receives rejection of common-mode components existing on the signal lead and the signal ground.)

INPUT RC—1 M Ω , $\pm 2\%$ paralleled by 47 pF.

AMPLITUDE REQUIREMENTS—Maximum intensity is achieved at 1.0 V P-P. Normal writing intensity is produced by 0.5 V P-P and minimum useable intensity is 0.05 V P-P (50% beam current modulation).

BANDWIDTH—DC to 5 MHz.

RISETIME—75 ns.

LIMITING AMPLIFIER CHARACTERISTICS

A single-ended signal at the (+) input connector can be routed through an amplitude limiting stage by moving two internal

plugable links. The drive signal to the Z-axis amplifier is automatically limited to 1 V P-P.

INPUT REQUIREMENTS—Voltage levels from +1 V to +50 V turn the beam on to a fixed level. The fixed level can be adjusted with the intensity control. Voltage levels from –50 V to +0.5 V keep the beam turned off.

MINIMUM ON/OFF TIME—Minimum beam ON or OFF time is 5 μ s.

MAXIMUM INPUT VOLTAGE— ± 50 V (DC and peak AC).

CRT AND DISPLAY

TEKTRONIX CRT—5-inch, flat-faced bistable storage tube, phosphor similar to P1.

DISPLAY SIZE—7.5 divisions vertical by 10 divisions horizontal (1 div equals 1 cm).

CONTRAST RATIO—At least 3:1.

TYPE **4501** **R4501**

STORED RESOLUTION—Equivalent to 100 line pairs along the vertical axis. Equivalent to 125 line pairs along the horizontal axis.

ASPECT RATIO—Three units vertically by four units horizontally.

STORAGE TIME—15 minutes or less.

ERASE TIME—200 ms or less.

DOT WRITING TIME—8 μ s or less.

LINE WRITING SPEED—At least 5 div/ms (at specified resolution).

READ RASTER

Readout is accomplished by scanning the CRT storage target with a TV raster. The necessary TV sync, blanking and raster scanning voltages are developed in the scan converter unit. Sync and video are combined to assemble a composite TV signal. An internal switch permits selection of either EIA 525-line, 60-field or CCIR 625-line, 50-field TV standards. Provision is made to automatically utilize external sync and blanking when these signals are connected to the scan converter.

SYNC FREQUENCY

	EIA	CCIR
Vertical	60 Hz	50 Hz
	or $\frac{1}{525}$ H	or $\frac{1}{625}$ H
Horizontal	31.5 kHz within 0.012%	31.250 kHz within 0.012%

COMPOSITE SYNC AND BLANKING OUTPUTS

Conforms to EIA or CCIR timing requirements. Amplitude is — 4 volts into 75 Ω .

COMPOSITE SYNC AND BLANKING INPUTS

Inputs must meet EIA or CCIR timing requirements. Loop-through connections or terminated in 75 Ω are required.

READOUT

VIDEO OUTPUT

Composite video amplitude is 1.0 V P-P (0.714 V video plus 0.286 V sync). Video polarity is black negative.

MODULATED RF OUTPUT

The carrier frequency is set to 61.25 MHz (TV Channel 3) and is internally adjustable from 55.25 MHz (TV Channel 2) to 67.25 MHz (TV Channel 4). Frequency stability is within 250 kHz of carrier frequency over stated environmental range. Amplitude is at least 10 mV P-P into 75 Ω .

REMOTE PROGRAMMING

Remote programming of the Type 4501 Scan Converter Unit is accomplished through 2 rear-panel program connectors. The NON-STORE, ERASE, READ ONLY, WRITE ONLY and BACK-GROUND are externally programmable by grounding or switching to 0 volts on the appropriate program line. The (+) inputs to the X, Y and Z amplifiers are also available at the remote program connectors.

OTHER CHARACTERISTICS

POWER REQUIREMENTS

90 to 136 V AC or 180 to 272 V AC, 48 to 448 Hz, 125 watts maximum at 115 V 60 Hz. Rear-panel selector provides rapid accommodation for 6 line voltage ranges.



Rackmount version, Type R4501

TEMPERATURE

Performance characteristics are valid over an operating temperature range of 0°C to +50°C.

DIMENSIONS AND WEIGHTS

Type 4501	Height	5 $\frac{3}{4}$ in	14.7 cm
	Width	16 $\frac{3}{4}$ in	42.6 cm
	Depth	18 $\frac{5}{8}$ in	47.4 cm
	Net weight	30 lb	13.6 kg
Type R4501	Height	5 $\frac{1}{4}$ in	13.4 cm
	Width	19 in	48.3 cm
	Depth	18 $\frac{5}{8}$ in	47.4 cm
	Net weight	30 lb	13.6 kg

INCLUDED STANDARD ACCESSORIES

Connector, 25-pin (131-0570-00); connector cover (200-0821-00); cable, 25-ft. 75- Ω , BNC (012-0157-00); connector, 37-pin (131-0422-00); connector cover (200-0660-01); 3-to-2 wire adapter (103-0013-00); two instruction manuals (070-0943-00). Type R4501 also includes rackmounting hardware.

TYPE 4501 SCAN CONVERTER UNIT \$2200

TYPE R4501 SCAN CONVERTER UNIT (rackmount model) \$2200

TELEVISION MONITORS

The Type 4501 Scan Converter Unit provides an output in the form of composite video or modulated RF. Satisfactory displays can be achieved using any good quality TV monitor or receiver. The following monitors are especially recommended for their advanced performance characteristics.

TRANSISTORIZED 23-INCH DISPLAY MONITOR

CONRAC TYPE RVC23/C

Net weight	99 lb	44.9 kg
Shipping weight	112 lb	50.8 kg

Order Tektronix 119-0193-00 \$525

TRANSISTORIZED 14-INCH DISPLAY MONITORS

CABINET MODEL: CONRAC TYPE RKC14

Net weight	44 lb	20 kg
Shipping weight	60 lb	27.2 kg

Order Tektronix 119-0194-00 \$480

RACKMOUNT MODEL: CONRAC TYPE RLC14

Net weight	51 lb	22.7 kg
Shipping weight	60 lb	27.2 kg

Order Tektronix 119-0195-00 \$470

U.S. Sales Prices FOB Beaverton, Oregon
Please refer to Terms and Shipment, General Information page.