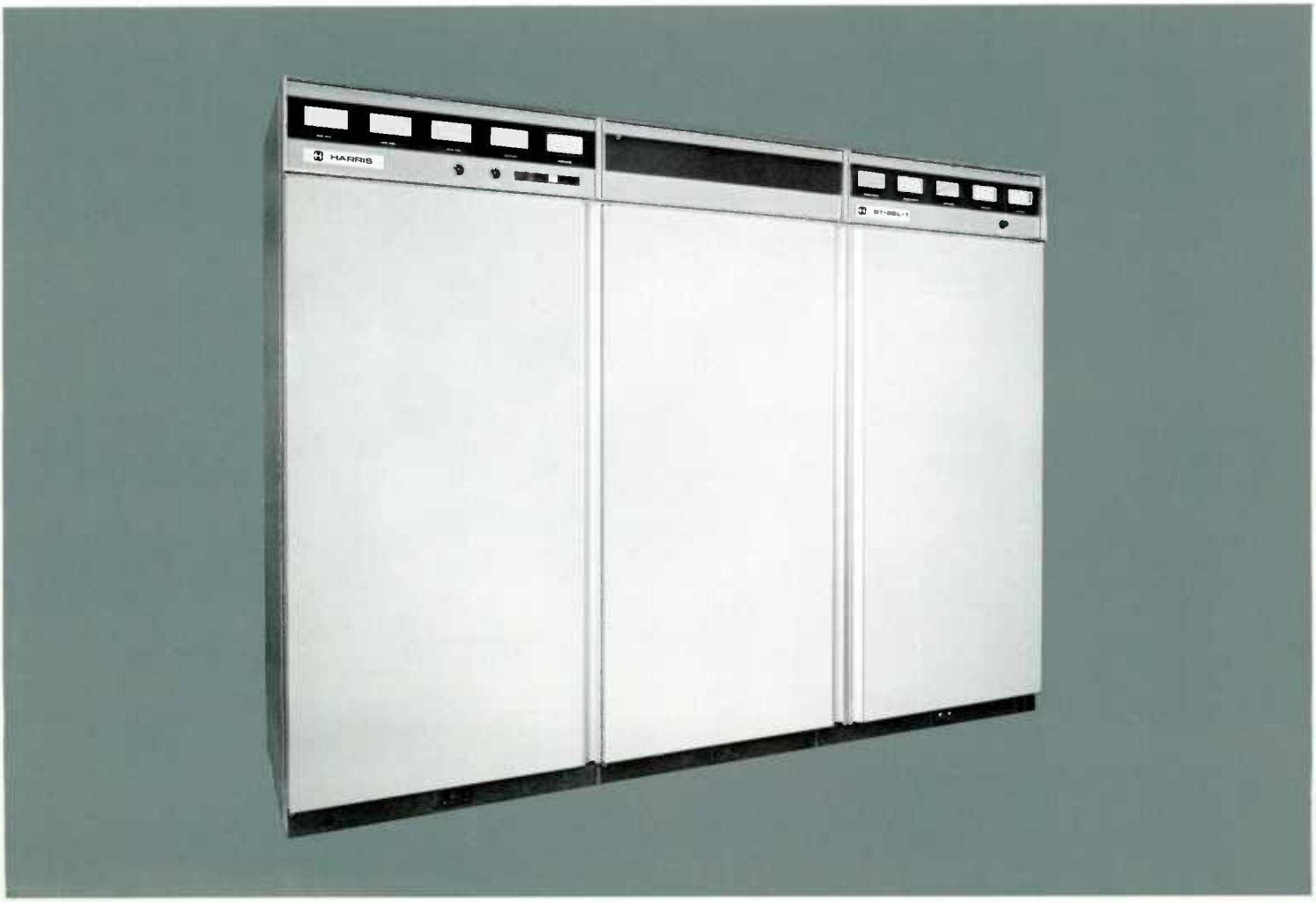
HARRIS
COMMUNICATIONS AND
INFORMATION HANDLING

BT-25L1

25-Kilowatt VHF Low Band Color Television Transmitter

- Intermediate frequency modulation of the visual and aural carriers for superb color quality.
- Efficient low-power sideband filtering
- Superior IF envelope delay compensation
- Simple solid-state control logic
- Lower power consumption
- Latest design for unattended operation
- Easy, plug-in installation
- Less maintenance
- Most modern compact design



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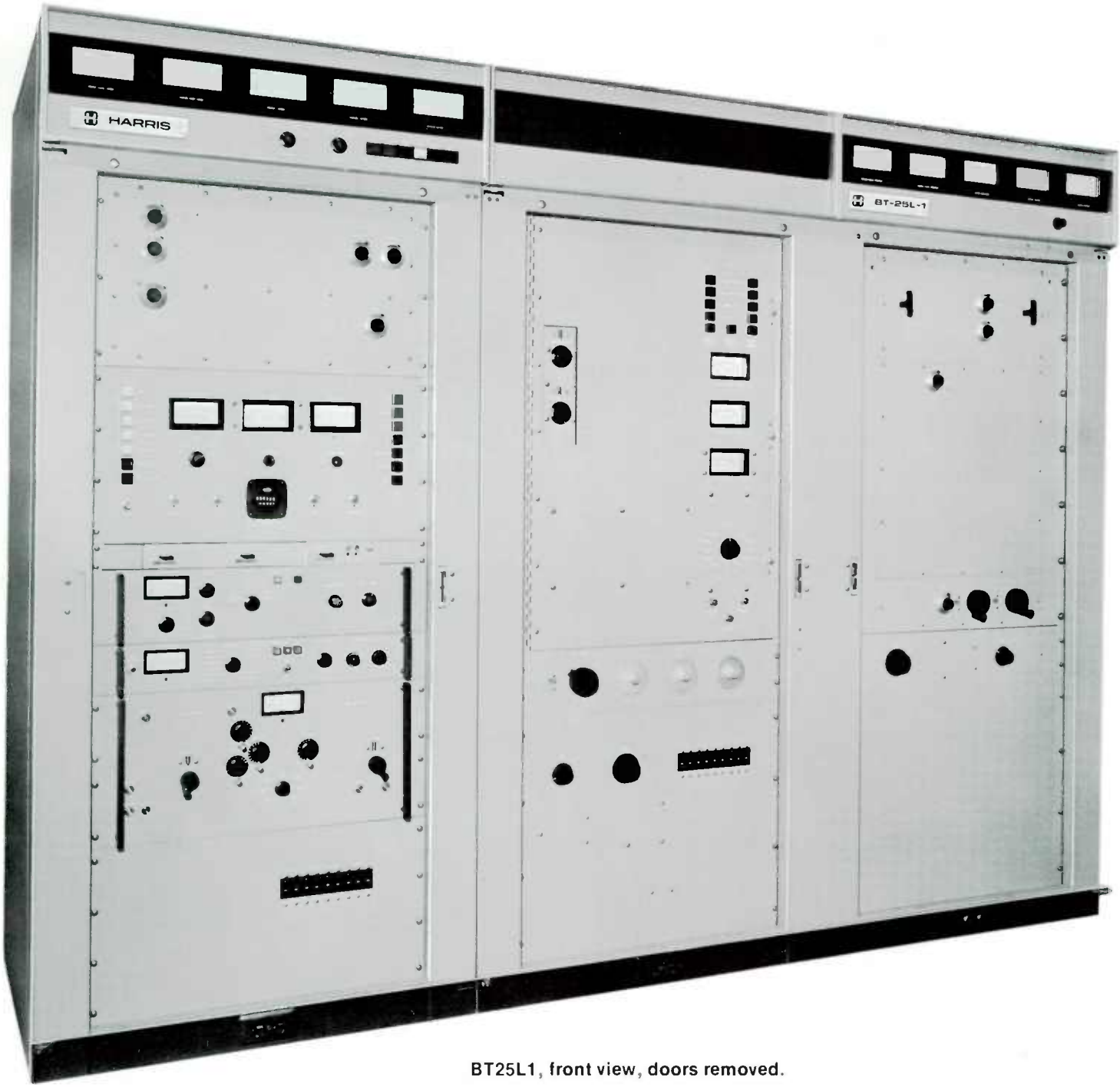
BT-25L1--UNSURPASSED COLOR



BT25L1, front view, doors removed.

PERFORMANCE, HIGHEST LONG TERM STA

Harris' BT-25L1 is a modern TV transmitter, designed to meet the high performance standards demanded by today's discriminating television broadcaster.

This 25 kilowatt VHF low band color transmitter incorporates the latest state-of-the-art features to bring you the finest overall television broadcast performance now available. The BT-25L1 consists of a 1.3 kilowatt exciter/driver, an aural power amplifier, a visual power amplifier-- and an external power supply. It is FCC type accepted, and meets or exceeds CCIR specifications. Complete factory power testing, at full rated power, assures performance to specifications.

IF (intermediate frequency) Modulation, low-level sideband filtering, true linear operation of power amplifiers and solid state visual and aural exciter/modulators combine to provide outstanding color fidelity. In the BT-25L1 there are no excessive video envelope delay or phase matching networks to burden the generation and transmission of the color signal. Frequency adjustment, power output control and amplifier tuning are straightforward. The simplicity of design and conservatively rated components assure highest long-term stability and reliability.

Lower power consumption and a more compact transmitter design result from the use of a single ended visual PA (8916 tetrode). An improved signal-to-noise ratio is provided by DC filaments on the visual stages, and improved plate supply filtering.

IF MODULATION. One of the most important features of the BT-25L1 is its true low-level IF Modulation, which excels in electrical performance, reliability and simplicity of operation--and offers a top quality color picture.

In the BT-25L1 the visual and aural exciters generate fully modulated low-level IF signals. The output of a common crystal controlled reference oscillator is used to raise the individual IF signal to the desired "on channel" output frequency.

As it occurs at much lower power levels than conventional designs, intermediate frequency modulation needs fewer circuits to produce a fully processed, quality picture signal. Less than one volt of video signal is needed to modulate the RF carrier.

The Harris ring modulator design permits modulation percentages to approximately 2% without compromising transmitter performance--and eliminates most pre-distortion circuitry. This results in exceptional color performance and nearly perfect signal linearity. Even such colors as highly saturated yellow and cyan are faithfully reproduced with IF Modulation.

Due to the low-level techniques, which include the use of devices such as an extremely linear broadband diode ring modulator, active delay compensation, low-level sideband filtering and very linear broadband amplifiers, the broadcast signal is a faithful reproduction of the signal applied to the transmitter input. IF Modulation results in the elimination of many transmission problems at their source, rather than using half-way measures to eliminate the effects of these problems later on.

LOW-LEVEL VESTIGIAL SIDEBAND FILTERING. Visual sidebands are shaped at the IF frequency, rather than "on frequency" at the full output power of the transmitter. Thus, there is no need for a bulky, conventional sideband filter, which can cause a power loss and takes up valuable space in the transmitter building. The sideband filter employed in the BT-25L1 is a removable module housed in the visual exciter.

VISUAL AND AURAL EXCITER/MODULATORS. Solid-state, self-contained visual and aural exciter/modulators furnish fully processed signals of approximately 1.0 watt visual and 10 watts aural. The output of these exciters is a complete TV signal ready for further amplification and "on channel" transmission for any specified channel.

A single knob on each exciter will set the level of transmitter power without any retuning. A similar procedure is used for adjusting the carrier frequency. The frequency of the master oscillator (located in the visual exciter) can be varied ±500 Hz by means of a front panel control. With one knob the station engineer can make precise

Aural and Visual Exciter/Modulators and IPA

SPECIFICATIONS

VISUAL PERFORMANCE	FCC	CCIR (System "B")
POWER OUTPUT:	25 kW peak.	21 kW peak.
OUTPUT IMPEDANCE:	50 ohms. Output connector: 3⅛ EIA standard.	50 ohms. Output connector: 3⅛" EIA standard.
FREQUENCY RANGE:	54-88 MHz (Channels 2-6).	54-68 MHz (channels 3 and 4, Band 1).
CARRIER STABILITY: [1]	± 250 Hz (maximum variation over 30 days).	± 250 Hz (maximum variation over 30 days).
REG. OF RF OUTPUT POWER (Black to white picture):	3% or less.	3% or less.
VARIATION OF OUTPUT (over one frame):	Less than 2%.	Less than 2%.
VISUAL SIDEBAND RESPONSE:	—3.58 MHz .....—42 dB or better —1.25 MHz and lower .....—20 dB or better Carrier to —0.5 MHz .....+0.5, —1 dB Carrier .....0 dB reference Carrier to +4.18 MHz .....+0.5, —1 dB +4.75 MHz and higher .....—20 dB or better	—4.43 MHz .....—30 dB or better —1.25 MHz .....—20 dB or better —0.75 MHz .....+0.5, —4 dB —0.50 MHz .....+0.5, —1 dB Carrier .....+0.5, —0.5 dB +1.5 MHz .....Reference +3.0 MHz .....+0.5, —1 dB +4.43 MHz .....+0.5, —1 dB +5.0 MHz .....+0.5, —2.5 dB +5.5 MHz .....—20 dB or better
FREQUENCY RESPONSE VS. BRIGHTNESS: [2]	± 0.75 dB.	± 0.75 dB.
VISUAL MODULATION CAPABILITY:	3% or better.	3% or better.
DIFFERENTIAL GAIN: [3]	0.5 dB or better.	0.5 dB or better.
LINEARITY (LOW FREQUENCY):	0.5 dB or better.	Amplitude dev. $^{S}min/^{S}$ max better than 0.85 mod. with signal No.3 CCIR, from 10% to 85% in frequency range 1 to 5 MHz.
DIFFERENTIAL PHASE: [4]	± 3° or better.	± 3° or better.
SIGNAL-TO-NOISE RATIO:	-55 dB or better (RMS) below sync level.	-40 dB pp below black to white transition.
K FACTORS:	2t 2%, 12.5t less than 10% baseline disturbance.	2t 2%, 20t 3% or better.
ENVELOPE DELAY:	.05 to 2.1 MHz: ± 40 ns at 3.58 MHz: ± 30 ns at 4.18 MHz: ± 70 ns (referenced to standard curve—FCC)	up to 4.5 MHz: ± 50 ns. from 4.5 MHz to 4.8 MHz: ± 100 ns. (measured with Nyquist demodulator meeting ARD specifications).
VIDEO INPUT: [5]	75 ohm system.	75 ohm system.
HARMONIC RADIATION:	—80 dB.	—80 dB.
INTERCARRIER PHASE MODULATION (noise):	(Not applicable).	—40 dB or better with ref. to ± 50 kHz dev.
HIGH FREQUENCY TRANSIENT RESPONSE, 15 kHz and 250 kHz:	(Not applicable).	± 75 ns —10% ± 200 ns +7% ± 100 ns +11% ± 400-1000 ns ±5% 400-1000 ns ±3% for LF variation

AURAL PERFORMANCE		
POWER OUTPUT:	5 kW at diplexer output.	Up to 5 kW at diplexer output.
OUTPUT IMPEDANCE:	50 ohms. Output connector: 3⅛" EIA Std.	50 ohms. Output connector: 3⅛" EIA Std.
AUDIO INPUT:	+10 dBm, ± 2 dB	+10 dBM, ± 2 dB.
FREQUENCY DEVIATION:	± 25 kHz	± 50 kHz
INPUT IMPEDANCE:	600 ohms.	600 ohms.
PRE-EMPHASIS:	75 microseconds.	50 microseconds ± 5 microseconds.
FREQUENCY RESPONSE:	± 0.5 dB rel. to pre-emphasis (30-15,000 Hz).	± 0.5 dB rel. to pre-emphasis (30-15,000 Hz).
DISTORTION:	0.5% or less after 75 microseconds de-emphasis with ± 25 kHz deviation.	Less than 1% from 30 to 15,000 Hz with ± 50 kHz dev. (Less than twice measured amount at 70 kHz deviation).
FM NOISE:	—60 dB or better rel. to ± 25 kHz dev.	—60 dB or better rel. to ± 50 kHz dev.
AM NOISE:	—50 dB relative to 100% modulation.	—50 dB relative to 100% modulation.
SYNCHRONOUS AM NOISE: [6]	(Not applicable).	—40 dB or better.
FREQUENCY STABILITY: [7]	± 250 Hz.	± 250 Hz.

SERVICE CONDITIONS		
AMBIENT TEMPERATURE:	-10° to +50°C (14° to 122°F).	—10° to +50°C.
AMBIENT HUMIDITY RANGE:	0 to 95% relative humidity.	0 to 95% relative humidity.
ALTITUDE:	Sea level to 7,500 ft.	Sea level to 2,400 meters.
PHYSICAL AND MECHANICAL DIMENSIONS:	94½" W x 31½" D x 72" H. Weight: 2,195 lbs. Power supply: 48" W x 24" D x 60⅜" H. Weight: 1,475 lbs.	240cm W x 80cm D x 183cm H. Weight: 998 kg. Power supply: 122cm W x 61cm D x 153cm H. Weight: 670 kg.
ELECTRICAL REQUIREMENTS:	Power input: 208/240 Volts, ±11 Volts, 3 phase, 60 Hz. Power consumption: 57 kVA, black picture; 49 kVA, average picture. Power factor: .96 typical.	Power input: 380/415 Volts, 3 phase, 50 Hz. Power consumption: 53 kVA, black picture; 45 kVA, average picture (10:1 vision to sound ratio). Power factor: .96 typical.

1 After initial aging of 60 days.
2 Measured at 65% and 15% of modulation. Reference 100% = peak of sync.
3 Maximum variation of sub-carrier amplitude from 75% to 10% of mod. Sub-carrier mod. percentage: 10% peak to peak.
4 Maximum variation of sub-carrier phase with respect to burst for mod. percentage from 75% to 10% . Sub-carrier mod. percentage: 10% peak to peak.
5 Bridging, loop through input with —30 dB or better return loss up to 5.5 MHz.
6 Rel. to 100% AM modulation at ± 50 kHz deviation.
7 Relative to frequency offset by 4.5 MHz (FCC), 5.5 MHz (CCIR) from the visual carrier.

ORDERING INFORMATION

BT-25L1 25 kW VHF-TV transmitter for FCC standards service, Channels 2-6, with operating tubes, transistors, IC's, solid-state rectifiers, crystals, required pre-correction circuitry, low-level vestigial sideband filter, harmonic and color notch filters 994-7763-001

BT-25L1 21 kW VHF-TV transmitter for CCIR System "B" service, 54 to 68 MHz [Band I], 380/415 volts, 50 Hz, equipped as above 994-7763-003

HARRIS CORPORATION Broadcast Products Division
123 Hampshire Street, Quincy, Illinois 62301

CP-2.5M-1275

ADV. 445 PTD. IN U.S.A.

BILITY AND RELIABILITY

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frequency adjustments to both the visual and aural carriers.

A 12-position switch mounted on the visual exciter panel permits readings of all paramenters. A separate meter on the aural exciter permits monitoring of aural parameters.

CONTROL LOGIC. Complete and foolproof control of all transmitter functions is achieved through the use of solid-state memory, timing and logic circuits. A self-charging emergency power source is provided to maintain control logic memory during periods of power-line failure.

The solid-state control logic and protective circuitry, in addition to commanding normal AC control functions, is also used to visually indicate, through pilot lights, the operating status of the transmitter system. The indicator lights allow easy isolation of circuit faults.

AUTOMATIC RECYCLING. The BT-25L1's built-in memory circuitry enables the entire transmitter to return to the air automatically in the stage it was operating immediately prior to a partial or full power failure.

REMOTE CONTROL. All control, metering and monitoring circuits have been designed specifically for remote control operation. The power controls are motor driven and the necessary remote control sampling points are built-in on accessible terminal boards.

EXCITER/DRIVER CABINET. The exciter/driver cabinet is an entire 1300-watt transmitter and can be used as such should it be desirable. This feature is most valuable during an emergency when the whole cabinet can be operated from a 5-kilowatt, 3-phase, 220-volt generator.

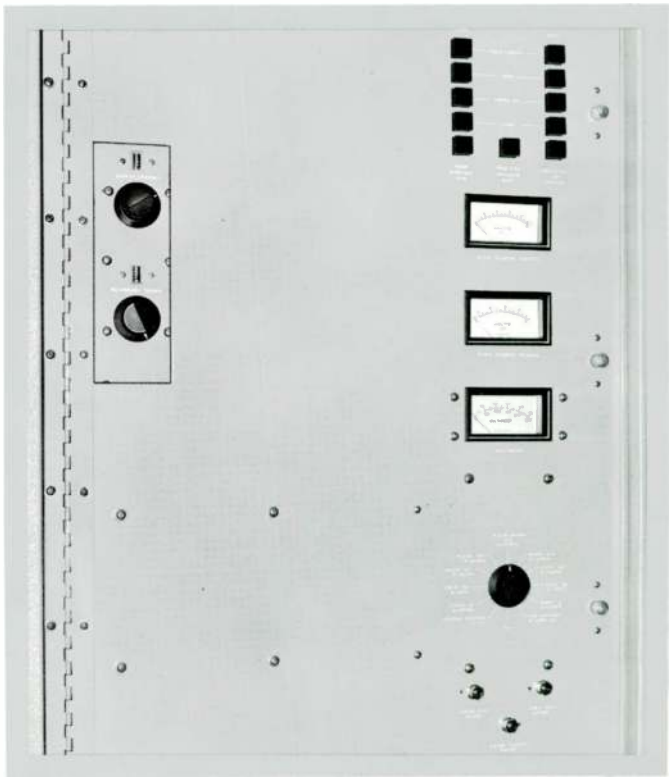
STABILITY. One factor insuring RF stability is the use of conservtively rated Type 8792 and 8916 ceramic tetrodes operating as VHF linear amplifiers. These amplifier stages operate in a common grid and screen configuration and tube neutralization is not required.

6-PHASE POWER SUPPLY. A polyphase rectifier system is used in the BT-25L1 high voltage power supply to efficiently provide large amounts of pure DC energy to the final amplifiers. Rectifiers have three-to-one P.I.V. safety factors. The HV power supply (including the transformer) is housed in a single assembly, mounted externally from the transmitter. Routine maintenance access is provided by a removable panel.

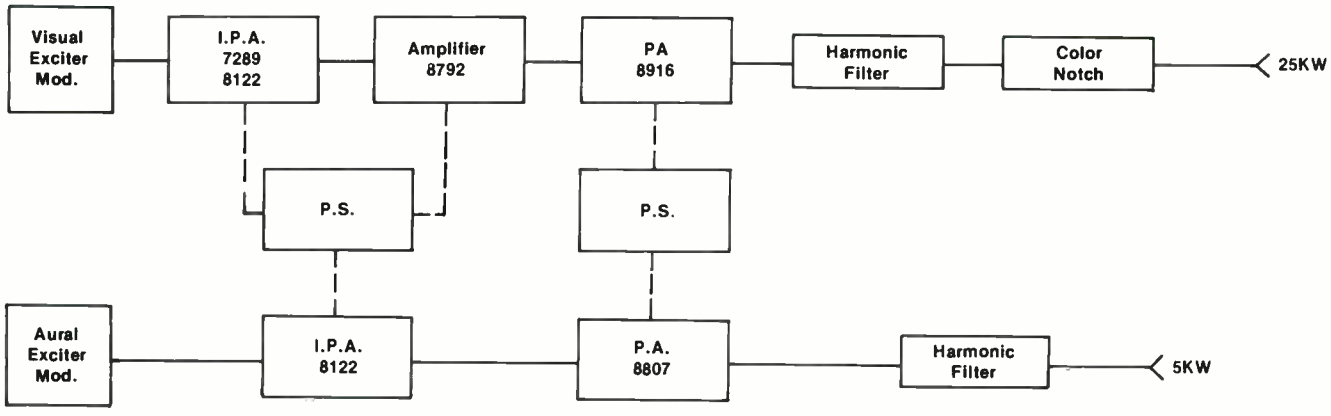
EASE OF MAINTENANCE. Total transmitter component accessibility is provided, front and back. Visual and aural exciters slide out and can operate independently from the transmitter outside the exciter/driver cabinet. Various exciter circuits, such as oscillators, modulators and processing circuitry, are of modular construction and can be removed for maintenance or replacement.

Easy-to-read, eye-level, 4-inch meters are used to monitor required transmitter functions. The meter panel is of double-hinged construction for convenient fold-down access during maintenance.

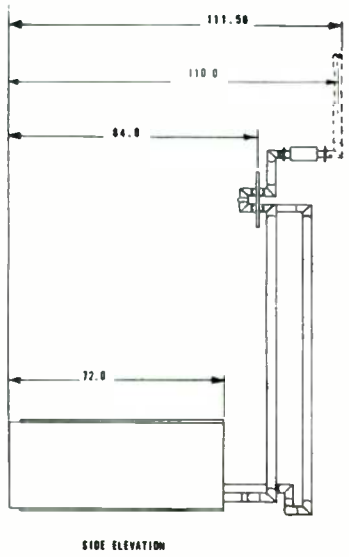
RF Monitoring, Metering and Status Light System

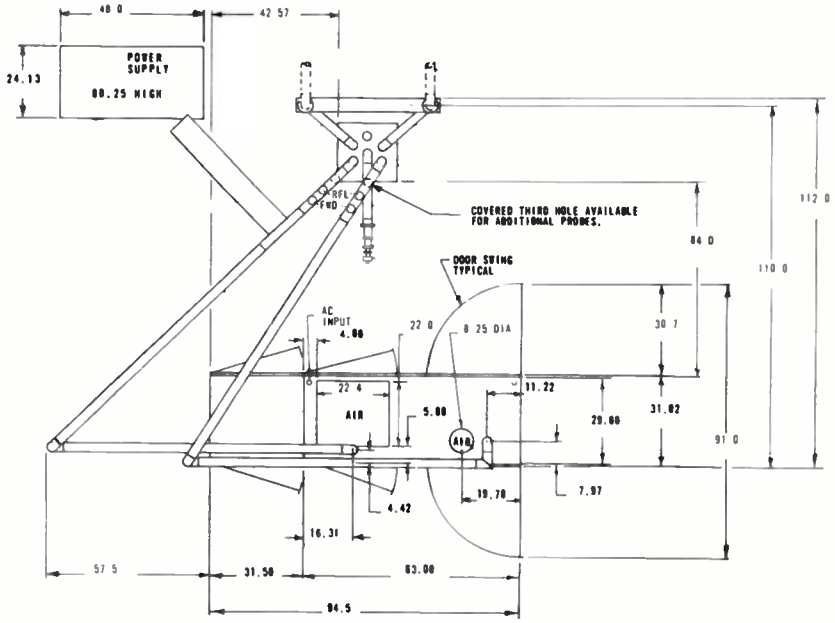


Metering and overload indicators for Aural and Visual P.A.'s.

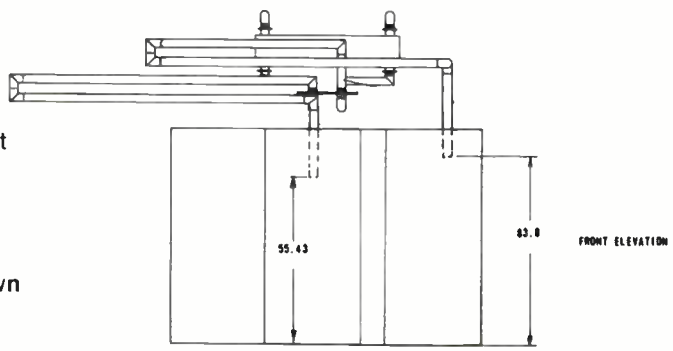


BLOCK DIAGRAM BT-25L1





FLOOR PLAN BT-25L1



NOTES:

Location of power supplies with respect to rest of transmitter is not critical.

All 3⅛ inch components not flanged.

For clarification color notch and load not shown in front and side elevation.

All measurements in inches.

HARRIS
COMMUNICATION AND INFORMATION PROCESSING

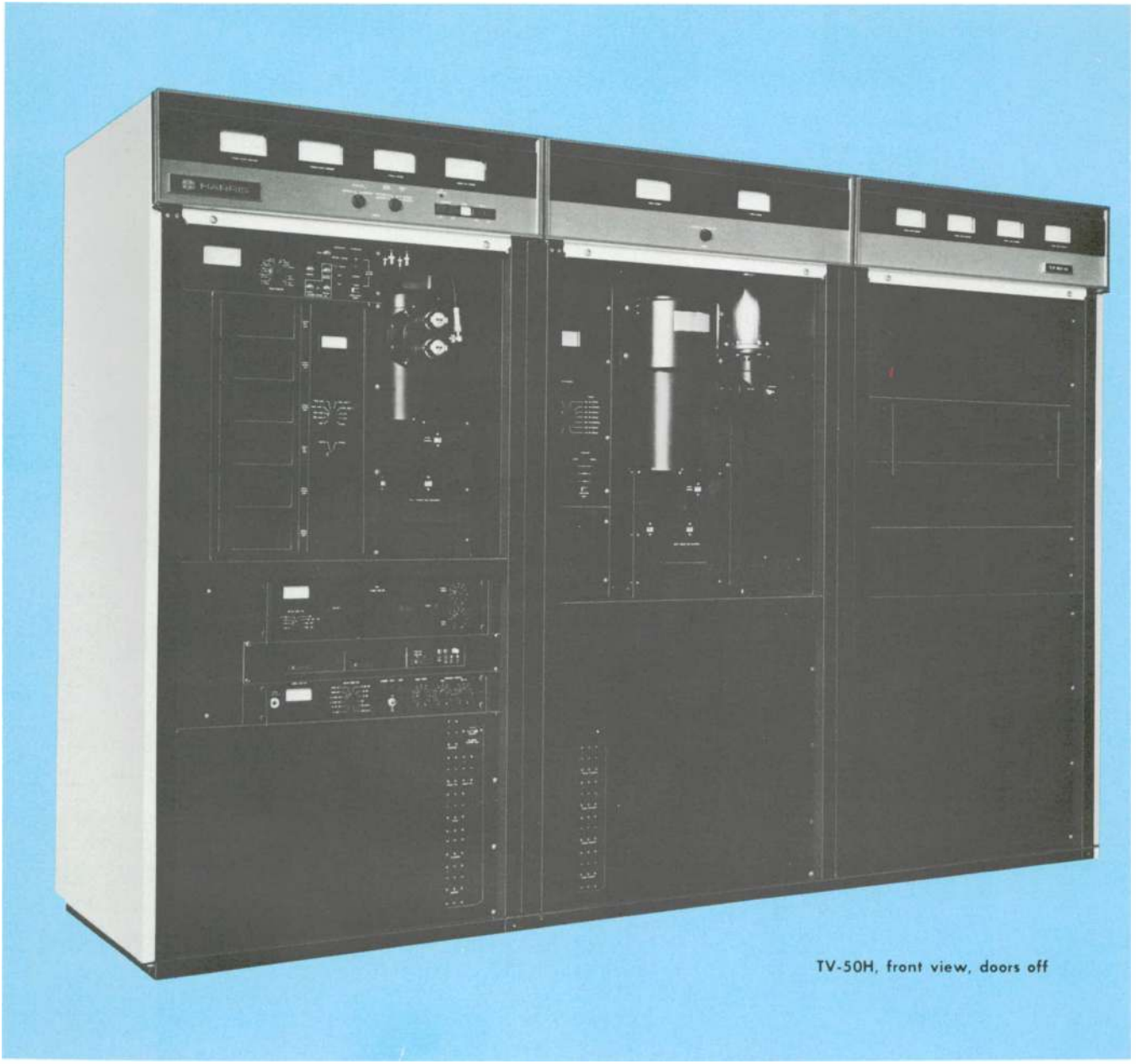
TV-50H

50-Kilowatt VHF High Band Color Television Transmitter

TVD-100H

100-Kilowatt Dual VHF High Band Color Television Transmitter

- Compact TV-50H design permits 100-kW dual configuration for CP use in approximately same floor space as existing 50-kW transmitters
- Solid-State IPA's
- Only 3 tubes (TV-50H)/6 tubes (TVD-100H)
- Transversal SideBand filter—no group delay, no tuning adjustments required
- IF Modulation of the visual and aural carriers
- Automatic power control standard
- Excellent cooling system
- Latest design for unattended operation
- Modular, pre-wired cabinets for easiest installation



TV-50H, front view, doors off

TV-50H... SOLID-STATE IPA/ THREE-TUBE DESIGN

The Harris TV-50H features a solid-state IPA and a three-tube design to greatly enhance reliability, reduce tuning requirements and allow an unusually compact cabinet configuration.

This advanced high band VHF-TV transmitter requires only one aural and two visual tubes to provide a 50-kilowatt visual and a 5-kilowatt aural output. A circulator between the visual stages minimizes retuning requirements after a tube change.

The solid-state IPA contains broadband amplifiers so that no tuning is required—and it is fully protected against damage caused by overloads or load variations. Gradual (1 to 2 seconds) RF turn-on permits DC voltage stabilization before RF drive application to power amplifiers, for added transmitter protection. The IPA is fully metered for monitoring and maintenance, while excellent cooling helps maintain long transistor life.

DUAL CONFIGURATION FOR CP APPLICATIONS

The compact design of the TV-50H makes it ideal for 100-kilowatt dual configurations for use with circularly polarized TV antennas. A 100-kilowatt configuration, employing two TV-50H's and a center control cabinet, would require only about the same floor space as one existing 50-kilowatt transmitter!

SUPERB PERFORMANCE

In addition to a solid-state IPA, the TV-50H incorporates such state-of-the-art features as Harris' Transversal SideBand (TSB) filter; IF (intermediate frequency) Modulation; true linear operation of power amplifiers; and solid-state visual and aural exciter/modulators, to provide the finest color performance and sound fidelity available today. As no envelope delay correction or adjustments are required for the sideband filter, stability, reliability and color quality are greatly enhanced. Frequency adjustment, power output control and amplifier tuning are straightforward and uncomplicated, while design simplicity and conservatively rated components assure long-term "hands-off" operation and minimum maintenance.

The TV-50H consists of a 1.7-kilowatt exciter/driver, an aural power amplifier, a visual power amplifier, and an external HV power supply. The transmitter employs a single-ended visual PA

TV-50H SPECIFICATIONS

(NOTE: TVD-100H visual and aural perfarmance specificatians same as belaw except far visual pawer autput and aural pawer autput.)

VISUAL PERFORMANCE

	FCC
POWER OUTPUT:	50 kW peak.
OUTPUT IMPEDANCE:	50 ahms. Output cannectar: 3⅛" EIA standard.
FREQUENCY RANGE:	174-216 MHz (Channels 7-13).
CARRIER STABILITY:[1]	±250 Hz (maximum variatian aver 30 days).
REG. OF RF OUTPUT POWER (Black to white pic.):	3% ar less.
VARIATION OF OUTPUT (over one frame):	Less than 2%.
VISUAL SIDEBAND RESPONSE:	—3.58 MHz . . . . . —42 dB ar better —1.25 MHz and lawer . . . . . —23 dB ar better Carrier ta —0.75 MHz . . . . . ±0.5 dB Carrier . . . . . 0 dB reference Carrier ta +4.20 MHz . . . . . ±0.5 dB +4.75 MHz and higher . . . . . —30 dB ar better
FREQUENCY RESPONSE VS. BRIGHTNESS:[2]	±0.75 dB.
VISUAL MODULATION CAPABILITY:	1% af sync peak.
DIFFERENTIAL GAIN:[3]	0.5 dB ar better.
LINEARITY (LOW FREQUENCY):	1.0 dB ar better.
DIFFERENTIAL PHASE:[4]	±1° ar better.
INCIDENTAL PHASE MODULATION:	±3° ar better.
SIGNAL-TO-NOISE RATIO:	—55 dB ar better (RMS) belaw sync level.
K FACTORS:	2t 2%, 12.5t less thon 5% baseline disturbonce.
EQUIVALENT ENVELOPE DELAY:	.05 ta 2.1 MHz: ±40 ns at 3.58 MHz: ±30 ns at 4.18 MHz: ±60 ns (referenced ta standard curve—FCC).
VIDEO INPUT:[5]	75 ahm system.
HARMONIC RADIATION:	—80 dB.

AURAL PERFORMANCE

POWER OUTPUT:	5 kW at diplexer output. (10 kW aptianal).
OUTPUT IMPEDANCE:	50 ahms. Output cannectar: 3⅛" EIA Std.
AUDIO INPUT:	+10 dBm, ±2 dB.
FREQUENCY DEVIATION:	±25 kHz.
INPUT IMPEDANCE:	600 ahms.
PRE-EMPHASIS:	75 micrasecands.
FREQUENCY RESPONSE:	±0.5 dB rel. ta pre-emphasis (30-15,000 Hz).
DISTORTION:	0.5% ar less after 75 micrasecands de-emphasis with ±25 kHz deviatian
FM NOISE:	—60 dB or better rel. ta ±25 kHz dev.
AM NOISE:[6]	—55 dB relative to 100% madulatian.
FREQUENCY STABILITY:[7]	±250 Hz.

SERVICE CONDITIONS

AMBIENT TEMPERATURE:	0° ta +45°C (at sea level).
AMBIENT HUMIDITY RANGE:	0 ta 95% relative humidity.
ALTITUDE:	Sea level ta 7500 ft.
PHYSICAL AND MECHANICAL DIMENSIONS:	106"W x 32.1"D x 72"H. Weight: 2600 lbs. Pawer supply: 70"W x 35"D x 52"H. Weight: 2600 lbs.
ELECTRICAL REQUIREMENTS:	Pawer input: 480 Valts, ±25 Valts and 208/240 valts, ±11 valts, 3 phase, 60 Hz. Pawer cansumptian: 125 kVA, black picture. Pawer factar: .9 ar better.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

[1] After initial aging af 60 days.
[2] Measured at 65% and 15% af madulatian. Reference 100% = peak af sync.
[3] Maximum variatian af sub-carrier amplitude fram 75% ta 10% af mad. Sub-carrier mad. percentage: 10% peak ta peak.
[4] Maximum variation of sub-carrier phase with respect ta burst far mad. percentage fram 75% ta 10%. Sub-carrier mad. percentage: 10% peak ta peak.
[5] Bridging, loap thraugh input with—30 dB ar better return lass up ta 5.5 MHz.
[6] After de-emphasis.
[7] Relative ta frequency affset by 4.5 MHz (FCC) fram the visual carrier.

ORDERING INFORMATION

TV-50H, 50 kW VHF-TV transmitter for FCC standards service, Channels 7-13, with operating tubes, transistors, IC's, solid-state rectifiers, crystals, required pre-correction circuitry, low-level vestigial sideband filter, harmonic and color notch filters 994-8225-001

TVD-100H, 100 kW dual VHF-TV transmitter for FCC standards service, Channels 7-13, equipped as above 994-8457-001

HARRIS CORPORATION Broadcast Products Division
P. O. Box 4290, Quincy, Illinois 62301 U.S.A.

JK-2M-979

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(8984 tetrode) for low power consumption, and DC filaments in the visual and aural stages for improved signal-to-noise ratios.

TRANSVERSAL SIDEBAND (TSB) FILTER

The Harris solid-state sideband filter is an advanced surface acoustic wave design, and shapes visual sidebands at the IF frequency, rather than "on frequency" at the full output power of the transmitter. Unlike previous VSB filters, which require from 600 to 1000 nsec of group delay correction and many adjustments, the TSB filter has an inherent linear phase characteristic and requires no group delay correction. Other VSB filters need 6 to 12 tuning controls, while the Harris TSB filter needs no tuning controls as it requires no tuning adjustments—ever!

Additionally, the TSB filter has steeper skirts and higher attenuation outside the channel passband for improved VSB wave shaping.

Only 1½ square inches in size, the TSB filter is mounted on a PC board in the visual exciter.

SOLID-STATE VISUAL AND AURAL EXCITER/MODULATORS

The Harris solid-state MCP-1V visual exciter/modulator is an independent, self-contained unit which provides a fully processed on-channel picture signal. Power output can be varied up to one watt with a single front panel control, or from a remote location, without retuning of any kind.

The exciter is mounted in a pull-out drawer and may be operated outside the main transmitter for test purposes. A switch and meter mounted on the front panel permit monitoring exciter parameters. Power and video gain controls are motor driven with manual override provision.

The MCP-1V provides great reliability and stability, excellent frequency response, and truest color quality. It is also designed for minimum maintenance and set-up time, and for remote control and unattended operation. This is all made possible through the use of the latest design techniques, including Harris' solid-state TSB filter.

The Harris aural exciter/modulator is a solid-state self-contained unit which furnishes a fully processed aural signal at a level up to 10 watts. Power output can be set with a single knob on the front panel, or by remote control, with no need for retuning. The aural exciter/modulator is mounted in a pull-out drawer, and may be operated with the drawer extended for test purposes.

The MCP-1V visual exciter/modulator is a solid-state, independent, self-contained "on-channel" signal source. Harris' TSB filter (right) is mounted on a PC board in the visual exciter, and measures only 1½ inches square.

IF MODULATION

One of the important features of the TV-50H is its true low-level IF Modulation, which offers a top quality picture, and excels in electrical performance, reliability and simplicity of operation.

In the TV-50H the visual and aural exciters generate fully modulated low-level IF signals. The output of a common crystal controlled reference oscillator is used to raise the individual IF signal to the desired "on channel" output frequency.

As it occurs at much lower power levels than other designs, intermediate frequency modulation needs fewer circuits to produce a fully processed, quality picture signal. Less than one volt of video signal is needed to modulate the RF carrier.

The Harris ring modulator design permits modulation percentages to approximately 2% without compromising transmitter performance—and eliminates most pre-distortion circuitry. This results in exceptional color performance and nearly perfect signal linearity. Even such colors as highly saturated yellow and cyan are faithfully reproduced with IF Modulation.

Due to the low-level techniques, which include the use of devices such as an extremely linear broadband diode ring modulator, low-level sideband filtering and very linear broadband amplifiers, the broadcast signal is a faithful reproduction of the signal applied to the transmitter input. IF Modulation results in low incidental phase noise, and the elimination of many transmission problems at their source. This means that no half-way measures—such as numerous correction, compensation and feedback circuits—are required to eliminate the effects of these problems later.

SOLID-STATE CONTROL CIRCUITS

Solid-state memory, timing and logic circuits—employing CMOS IC's for design simplicity and enhanced reliability—offer complete and foolproof control of all transmitter functions. Built-in memory circuitry enables the entire transmitter to return to the air automatically in the stage it was operating prior to a partial or full power failure. The memory is continuous, and is maintained without an emergency power source during power failures.

The control logic and protective circuitry, in addition to commanding normal AC control functions, is also used to visually indicate, through indicator lights, the operating status of the transmitter system. These indicator lights allow isolation of circuit faults, and are easily remoted.

REMOTE CONTROL, UNATTENDED AND AUTOMATIC OPERATION

All control, metering and monitoring circuits have been designed specifically for remote control and unattended operation. The power controls are motor driven and the necessary remote control sampling points are built-in on accessible terminal boards.

Today, Harris TV transmitters are being operated successfully worldwide in an unattended mode, with and without remote control access. In addition, Harris' transmitter design is consistent with anticipated automatic transmitter needs in the future.

AUTOMATIC POWER CONTROL

Automatic gain control of all RF amplifier stages, in conjunction with the exciters' automatic power control, insures constant power output, even with variations in line voltages. This feature is standard in the TV-50H.

STABILITY

One factor assuring RF stability is the use of a solid-state IPA and conservatively rated Type 8988 and 8984 ceramic tetrodes operating as VHF linear amplifiers. These amplifier stages operate in a common grid and screen configuration and tube neutralization is not required.

EXCELLENT COOLING SYSTEM

The cooling system of the TV-50H is quiet and efficient, and employs direct drive blowers, with motors fully protected by automatic reset devices. Tube manufacturers' recommendations are met or exceeded at altitudes up to 7,500 feet, enhancing tube life without power derating.

POWER SUPPLIES

The HV power supply is a multi-phase full wave rectifying system exhibiting very low ripple content prior to output filtering. It is designed for excellent regulation and low video impedance for optimum picture performance. This power supply, including transformer and solid-state rectifiers, is housed in a single assembly, mounted externally from the transmitter. Routine maintenance access is provided by a removable panel.

Vacuum tube filaments are fed with DC to maximize the output signal-to-noise ratio. Grid and screen supplies use solid-state regulators.

The 1700-watt driver cabinet has an independent solid-state HV power supply, and the visual and aural exciters have their own independent, solid-state regulated power supplies.

EASE OF MAINTENANCE AND INSTALLATION

Total transmitter component accessibility is provided, front and back. Visual and aural exciters slide out and can operate independently from the transmitter outside the exciter/driver cabinet. Various exciter circuits, such as oscillators, modulators and processing circuitry, are of modular construction and can be removed for maintenance or replacement.

Easy to read, and mounted at eye-level, 4-inch meters are provided to monitor required transmitter functions. Meter panels are double-hinged for convenient access during maintenance. A complete system of overload indicators is also provided in each cabinet for monitoring transmitter operation. In the event of a transmitter malfunction, an examination of the indicators will locate the problem area.

The transmitter has been built in a modular fashion so that cabinets may be separated into convenient, easy-to-handle sub-assemblies to facilitate installation. Additionally, the compact design of the TV-50H minimizes space requirements in the transmitter building.

TVD-100H - 100-KILOWATT DUAL HIGH BAND COLOR TV TRANSMITTER

Designed for use with circularly polarized television antennas, the TVD-100H furnishes a 100-kilowatt visual power output, yet occupies approximately the same floor space as existing 50-kilowatt TV transmitters! This dual transmitter consists of two completely independent 50-kilowatt transmitters (TV-50H's) operating in parallel, combined through the Harris unique-design Dualtran RF switching system.

With the TVD-100H you get two aural exciter/modulators, two visual exciter-modulators, two TSB filters, two solid-state visual and aural IPA's, two visual and aural PA's and two HV power supplies—in short, total redundancy. Complete reliability.

The Dualtran switching system is factory assembled in one cabinet, and can interface with either a hybrid or a notch diplexer.

AUTOMATIC SWITCHING. In the event of a malfunction of one-half of the parallel combination, the Harris TVD-100H offers automatic and instantaneous reduction to one-fourth authorized power. This function will occur without interruption of the carrier. With the touch of a button, half-power operation is achieved in less than three seconds.

Visual and aural exciters are connected in a hot standby condition, and will automatically switch in less than 10 milliseconds in case of failure in either unit. In all modes, aural follows visual for simplified logic control and reliable operation.

OPERATING VERSATILITY. Four modes of operation may be obtained electrically by means of control pushbuttons on the output switcher; by control buttons on the transmitter control panel; or by remote control. These are:

- Transmitters A and B combined and diplexed to the antenna (normal operating mode).
- Transmitter A diplexed to the antenna and transmitter B to the station loads (alternate/main or emergency operation).
- Transmitter B diplexed to the antenna and transmitter A to the station loads (alternate/main or emergency operation).
- Transmitters A and B combined to the station loads (test mode).

The switching operation from one mode to any other mode requires less than three seconds.

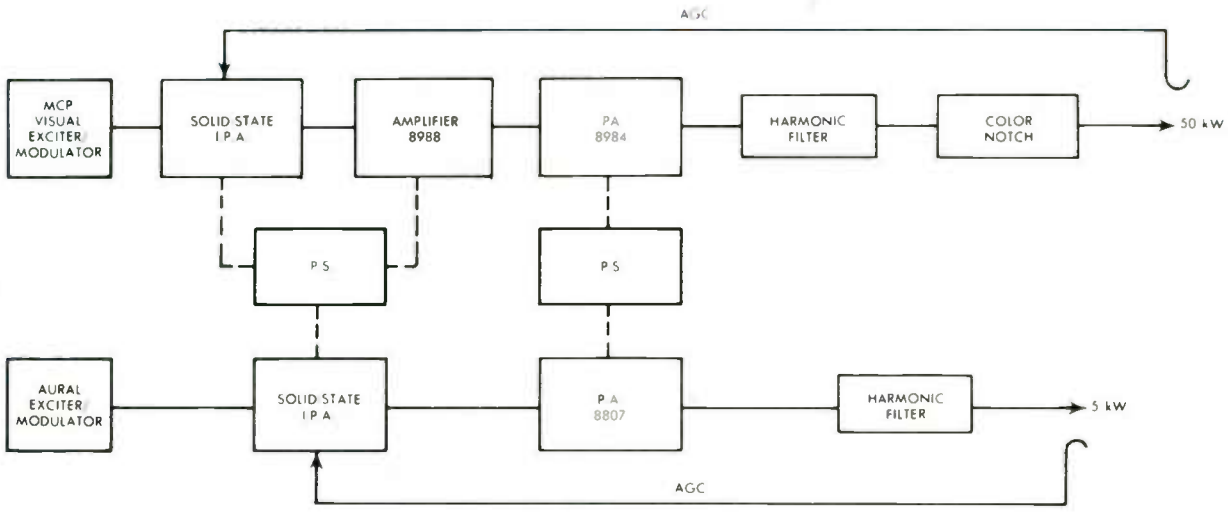
When using a notch diplexer, three other operating modes may be selected manually by changing links on the Dualtran output switching cabinet; transmitters A and B combined and diplexed to the station loads; transmitter A diplexed to the station loads; and transmitter B diplexed into station loads.

CONTROL CABINET. The RF Phasing and Control Panel and the Automatic Exciter/Modulator Switcher are standard equipment with the TVD-100H, and are located in a control cabinet that is typically placed between the two independent 50-kilowatt transmitters. The cabinet is the same height as the transmitters, and the same color, to provide a pleasing installation. All adjustments for dual operation may be made at this cabinet.

The Harris exciter/modulators, with IF Modulation, allow phasing of transmitters for dual operation to be accomplished simply and reliably at low power levels from the RF Phasing and Control Panel. In addition to phasing control, the panel has provisions for monitoring total combined aural power and total combined visual power in forward and reflected modes.

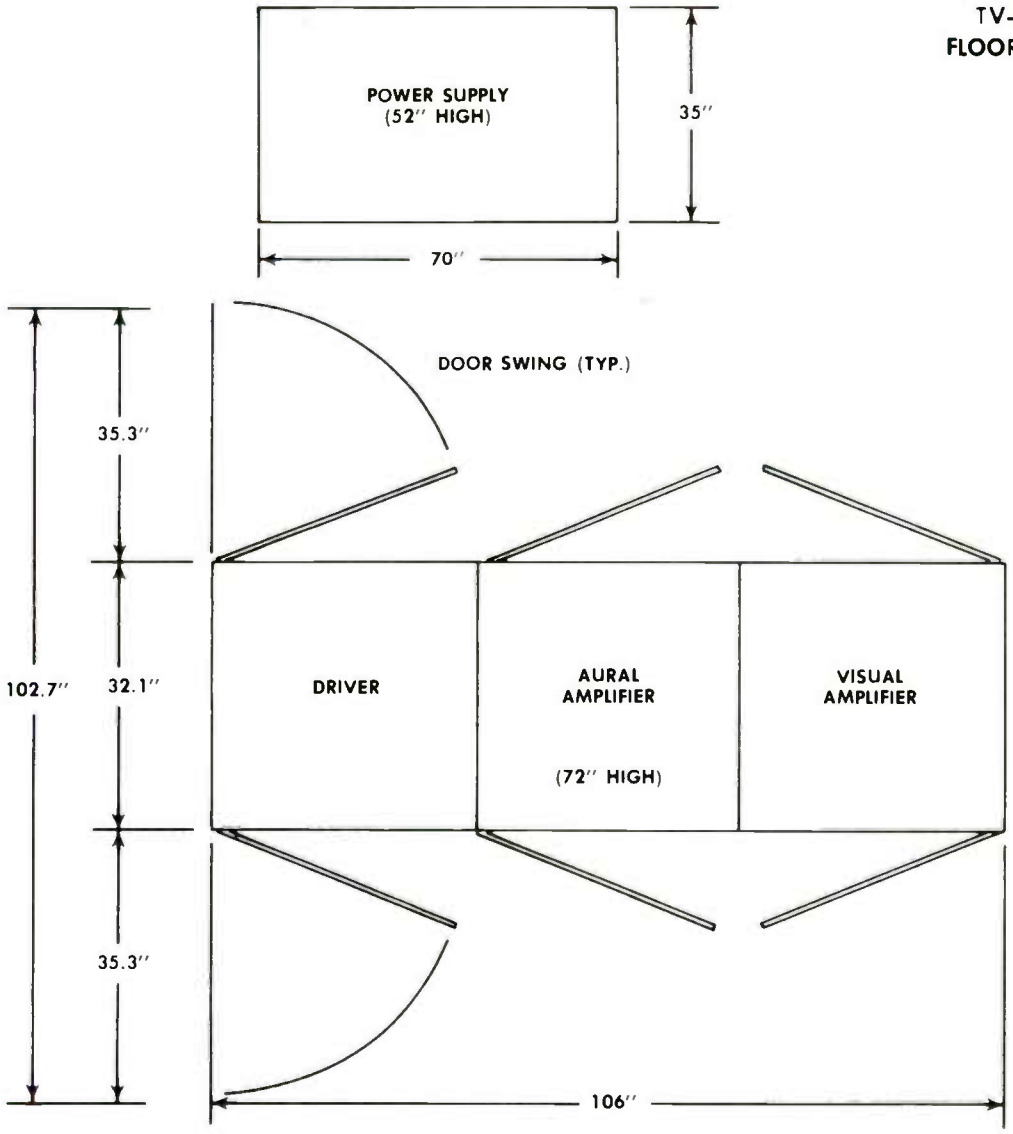
The Automatic Exciter/Modulator Switcher is also a standard part of the control cabinet, and allows for either manual or automatic selection of exciters.

SPECIFICATIONS. Visual and aural performance specifications of the TVD-100H are the same as those of the TV-50H (with the exception of visual power output and aural power output).



TV-50H BLOCK DIAGRAM

TV-50H FLOOR PLAN



HARRIS

TV-30H

30-Kilowatt VHF High Band Color Television Transmitter

- Straightforward design for high reliability and stability
- Advanced SAW filter—built-in receiver equalizer eliminates separate correction modules
- Quadrature Corrector cancels tube distortions
- Ultra-linear driver with solid-state IPAs for maximum reliability and signal transparency
- Highly linear IF Modulation of the visual and aural carriers for superior color and sound reproduction
- Automatic power control insures constant power output
- Emergency multiplex option

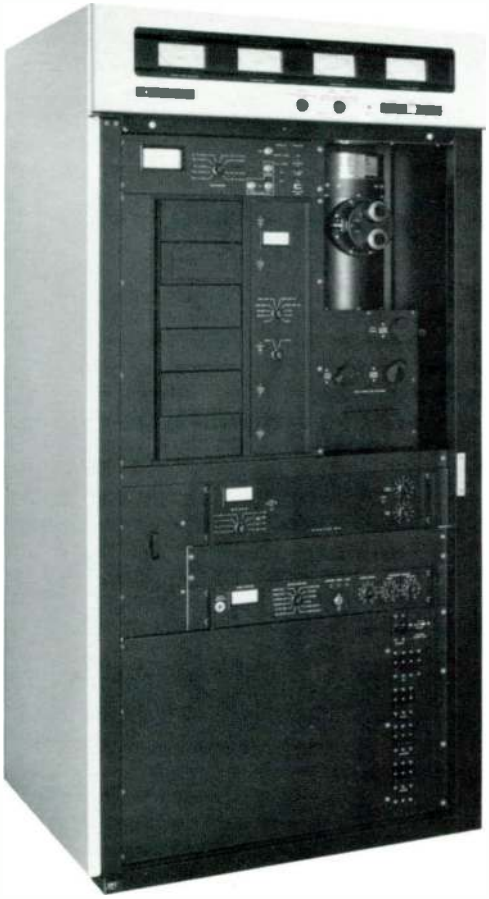
TV-30H . . . straightforward design for top reliability and color performance

Harris' TV-30H, 30-kilowatt high band VHF television transmitter, is the most cost-effective TV transmitter available in its power range. Its straightforward design requires less complicated circuitry to meet the high performance standards demanded by today's discriminating broadcaster. And less complicated circuitry means greater reliability...the type of year-in, year-out dependability broadcasters need for impressive bottom line results.

The TV-30H, like all Harris transmitters, provides the best performance possible from a television transmitter, with specifications approaching the measuring limits of the very best television test demodulators. This high level of performance not only provides the finest quality video and audio performance on today's receivers, but offers the broadcaster the assurance that the Harris transmitter will easily handle the demands of new technology, such as comb filters and synchronous detectors in newer high performance receivers; multi-channel (stereo) television sound; teletext; and higher quality transmission techniques.

MAXIMUM COLOR PERFORMANCE MCP-2V EXCITER

The MCP-2V exciter is the heart of the Harris transmitter, where signal processing, modulation and up-conversion are accomplished.



Ultra-linear driver with solid-state IPA, and aural and visual exciters.

The MCP-2 visual exciter features a highly linear ring diode modulator with a unique compensation circuit that permits modulation to zero carrier with negligible incidental phase, differential gain and differential phase distortions.

Harris' VIDEO* SAW vestigial sideband filter (CCIR-M) provides a smooth, ripple-free amplitude response that is virtually flat from −0.75 MHz to +4.10 MHz. This wide, planar amplitude response, along with the steep filter skirts and high out-of-band attenuation, give the VIDEO SAW filter a nearly ideal characteristic for television transmission. The VIDEO SAW filter is also designed to minimize video splatter into the aural carrier region, a characteristic that insures high signal-to-noise ratios on audio baseband and sub-carrier channels.

The advanced design VIDEO SAW filter also provides the required receiver group delay pre-correction that eliminates the need for external receiver equalizer circuits. Thus, the VIDEO SAW filter offers excellent performance year after year with absolutely no costly and time consuming periodic readjustments.

The VIDEO SAW filter's echo-free transient response, ideal filter characteristic and precise equalization insure the highest degree of transparency to all types of television video signals and test waveforms.

Highly effective pre-correction circuits are included in the MCP-2 visual exciter to compensate for the small amount of distortion that is present in the transmitter visual PA stage. Differential phase, differential gain and incidental phase distortions are effectively reduced to insignificantly low levels by the correctors. A unique Harris-designed Quadrature Corrector, operating at the Intermediate Frequency, cancels out tube amplitude and phase nonlinearities and also reduces the intermodulation products that create lower sideband regeneration.

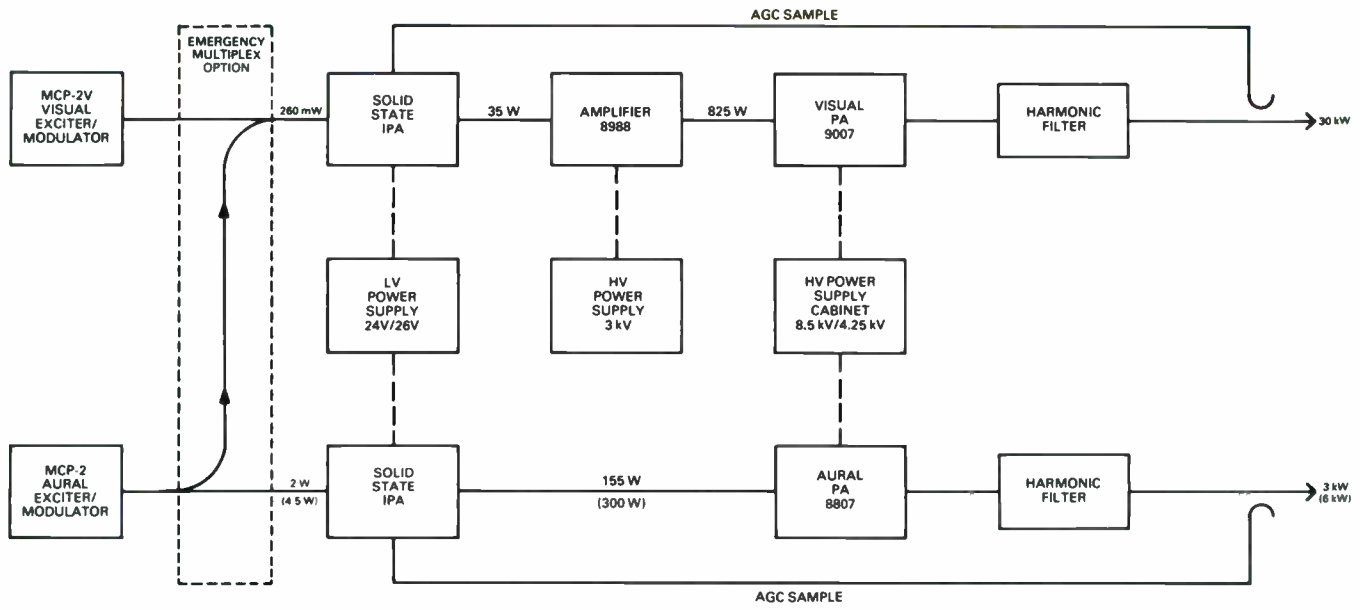
The Harris aural exciter provides highly linear modulation that is necessary to realize exceptional audio quality in today's transmitters. In addition, the wideband low-distortion modulator has been successfully tested with all sub-carrier multi-channel systems, insuring future compatibility with new aural broadcasting standards. A sub-carrier input is provided for today's telemetry or ENG communications.

ULTRA-LINEAR VISUAL DRIVER

To preserve the quality of the MCP-2 exciter signal, the visual signal is amplified by the ultra-linear visual driver to the power level required by the 9007 visual PA tube.

Broadband Class A solid-state amplifiers and a single conservatively operated 8988 tetrode were specifically selected to provide the drive for the final visual power amplifier. This ultra-linear design insures the maximum signal transparency required for premium quality broadcasting.

*Visual IF Delay Equalized Output



Note: 20% aural powers shown in parentheses.

TV-30H BLOCK DIAGRAM

The ultra-linear driver minimizes the amount of correction required for high quality transmitter performance. Consequently, Harris transmitters can be expected to operate over extended time periods without adjustment...which means low maintenance costs for the broadcaster.

REMOTE CONTROL, UNATTENDED AND AUTOMATIC OPERATION

All control, metering and monitoring circuits have been designed specifically for remote control and ATS. The power controls are motor driven and the necessary remote control sampling points are built in and connected to accessible terminal boards. Today, Harris TV transmitters are successfully operated worldwide with a variety of remote control systems, including the versatile, cost-saving Harris 9100 Facilities Control.

EMERGENCY MULTIPLEX OPTION

This mode of operation enhances the reliability of the transmitter and minimizes lost air time by permitting common amplification of the visual and aural signals in the visual RF amplifier chain in the event of an aural amplifier failure.

This is possible in the TV-30H because of the highly linear, low distortion broadband circuits that are used in the visual amplifier chain.

AUTOMATIC POWER CONTROL

Automatic gain control of all RF amplifier stages, in conjunction with the exciters' automatic power control, insures constant output, even with variations in line voltages. This feature is standard in the TV-30H.

EXCELLENT COOLING SYSTEM

The cooling system in the TV-30H is engineered to be quiet and efficient, employing direct drive blowers with fully protected motors.

POWER SUPPLIES

The HV power supply for the visual and aural PAs exhibits very low ripple content. It is designed for excellent regulation and low video impedance for optimum picture performance. In addition, for ease of maintenance, the power supply, including transformer and solid-state rectifiers, is housed in a single assembly, mounted externally from the transmitter. Routine maintenance access is provided by a removable panel.

Vacuum tube filaments in the visual and aural transmitters are operated from DC power supplies to maximize the output signal-to-noise ratios. Grid and screen supplies are 100% solid state.

The visual and aural exciters have their own independent, solid-state regulated power supplies.

EASE OF MAINTENANCE

Convenient access to components is provided, permitting the transmitter to be easily maintained. Visual and aural exciters slide out and can operate independently from the transmitter outside the cabinet. Various exciter circuits, such as oscillators, modulators and processing circuitry are of modular construction and can be removed for maintenance or replacement.

TV-30H SPECIFICATIONS

	System M/NTSC	Systems B/PAL and B/SECAM
VISUAL POWER OUTPUT:	30 kW peak.	25 kW peak.
AURAL POWER OUTPUT:	Up to 6 kW.	Up to 5 kW.
ELECTRICAL REQUIREMENTS:	208/240 Volts, ±5%, 3 phase, 60 Hz, or 380/415 Volts, ±5%, 3 phase, 50 Hz.	280/240 Volts, ±5%, 3 phase, 60 Hz, or 380/415 Volts, ±5%, 3 phase, 50 Hz.
POWER CONSUMPTION (Typical at 10% aural):		
Average Picture (50% APL):	50 kW.	50 kW.
Black Picture:	61 kW.	61 kW.
PHYSICAL AND MECHANICAL DIMENSIONS:	Transmitter cabinet: 106" W × 32" D × 72" H. Weight: 2385 lbs. Power supply: 57" W × 34" D × 54" H. Weight: 1,500 lbs.	Transmitter cabinet: 269 cm W × 82 cm D × 183 cm H. Weight: 1082 kg. Power supply: 145 cm W × 86 cm D × 138 cm H. Weight: 680 kg.
VISUAL PERFORMANCE		
TYPE EMISSION:	A5C Negative.	A5C Negative.
FREQUENCY RANGE:	174-216 MHz, Channels 7-13.	174-216 MHz, Channels E5-E10.
VIDEO INPUT IMPEDANCE:	75 Ohms.	75 Ohms.
VIDEO INPUT LEVEL:	0.7 to 2.0 volts, peak to peak, sync negative.	0.7 to 2.0 volts, peak to peak, sync negative.
RF LOAD IMPEDANCE:	50 Ohms, diplexer output connector: 3⅛" EIA, unflanged.	50 Ohms, diplexer output connector: 3⅛" EIA, unflanged.
AM NOISE:		
Total random and periodic noise unweighted:	−55 dB RMS or better relative to sync peak.	−55 dB RMS or better relative to sync peak.
Hum and low frequency:	−52 dB or better peak to peak.	−52 dB or better peak to peak.
Periodic noise 10 kHz to 5.2 MHz:	−40 dB peak to peak.	−40 dB peak to peak.
MODULATION CAPABILITY:	0%, sync equal to 100%.	0%, sync equal to 100%.
REGULATION OF OUTPUT POWER:	Less than 2% (black to white picture).	Less than 2% (black to white picture).
VARIATION OF OUTPUT OVER ONE FIELD:	Less than 2% at sync peak (measured with a field square wave signal with reference to sync peak voltage.)	Less than 2% at sync peak (measured with a field square wave signal with reference to sync peak voltage.)
FREQUENCY RESPONSE VARIATION:	Less than ±.75 dB.	Less than ±.75 dB.
LUMINANCE NONLINEARITY:	10% or better.	10% or better.
VISUAL SIDEBAND RESPONSE: (Not including diplexer)	−3.58 MHz ..... −42 dB. −1.25 MHz ..... −26 dB. −0.75 to 4.10 MHz ..... ±0.4 dB. 4.18 MHz ..... +0.4, −1 dB. 4.5 MHz ..... −15 dB or better. 4.75 MHz and higher ..... −30 dB.	−4.43 MHz ..... −30 dB. −1.25 MHz ..... −22 dB. −0.75 to 5.0 MHz ..... ±0.5 dB. +5.5 MHz ..... −22 dB.
DIFFERENTIAL GAIN:	3% or better.	3% or better.
DIFFERENTIAL PHASE:	±1° or better.	±1° or better.
2t K FACTOR:	2% maximum.	2% maximum.
20t GAIN AND DELAY RESPONSE:	5% or less total baseline disturbance.	5% or less total baseline disturbance.
CHROMINANCE INTERMODULATION:	Less than 2% total distortion.	Less than 2% total distortion.
FIELD FREQUENCY SQUARE WAVE TILT:	Less than 2% total variation.	Less than 2% total variation.
INCIDENTAL PHASE MODULATION:	±1.5° or less relative to blanking.	±1.5° or less relative to blanking.
ENVELOPE DELAY:	0.5 to 2.1 MHz ±40 ns at 3.58 MHz ±25 ns at 4.18 MHz ±60 ns	Complies with system requirements.
CARRIER STABILITY:	±250 Hz (maximum variation over 30 days).	±250 Hz (maximum variation over 30 days).
HARMONIC RADIATION:	−80 dB or better below peak of sync.	−80 dB or better below peak of sync.
AURAL PERFORMANCE		
TYPE EMISSION:	F3.	F3.
FREQUENCY STABILITY:	±20 Hz (for 30 days relative to frequency offset of 4.5 MHz from visual carrier).	±20 Hz (for 30 days relative to frequency offset of 5.5 MHz from visual carrier).
RF LOAD IMPEDANCE	50 Ohms, output connector: 3⅛" EIA, unflanged.	50 Ohms, output connector: 3⅛" EIA, unflanged.
AUDIO INPUT IMPEDANCE:	600 Ohms, balanced.	600 Ohms, balanced.
AUDIO INPUT LEVEL:	+10 dBm, ±2 dB.	0 to +20 dBm.
FREQUENCY DEVIATION:	±25 kHz.	±50 kHz.
FREQUENCY RESPONSE:	±.5 dB relative to 75 microsecond pre-emphasis.	±.5 dB relative to 50 microsecond pre-emphasis.
AUDIO DISTORTION:	Less than 0.5% from 30 to 15,000 Hz with ±25 kHz deviation.	Less than 1% from 30 to 15,000 Hz with ±50 kHz deviation; less than 2% for ±70 kHz deviation.
AM NOISE:	−55 dB or better relative to 100% AM modulation.	−55 dB or better relative to 100% AM modulation.
FM NOISE:	−60 dB or better relative to ±25 kHz deviation.	−60 dB or better relative to ±50 kHz deviation.
SYNCHRONOUS AM NOISE:	Less than 1% relative to 100% AM modulation from 30 to 15,000 Hz, with ±25 kHz deviation.	Less than 1% relative to 100% AM modulation from 30 to 15,000 Hz, with ±50 kHz deviation.
INTERCARRIER NOISE:	−46 dB or better relative to ±25 kHz deviation.	−46 dB or better relative to ±50 kHz deviation.
EMERGENCY AURAL/VISUAL MULTIPLEX (optional):		
Output power:	17 kW visual @ 10% aural.	14 kW visual @ 10% aural.
Spurious radiation at visual carrier + and −920 kHz:	−50 dB or better below visual carrier (typical).	−50 dB or better below visual carrier (typical).
SERVICE CONDITIONS		
AMBIENT TEMPERATURE:	−10° to +50°C (14° to 122°F).	−10° to +50°C (14° to 122°F).
AMBIENT HUMIDITY RANGE:	0 to 95% relative humidity.	0 to 95% relative humidity.
ALTITUDE:	Sea level to 7500 feet (2286 meters). (Derate 2°C per 1000 feet above sea level).	Sea level to 2286 meters (7500 feet). (Derate 2°C per 300 meters above sea level).

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

ORDERING INFORMATION

TV-30H, 30 kW VHF-TV transmitter for System M service, Channels 7-13, complete with operating tubes, semiconductors, crystals, required pre-correction circuitry, low-level vestigial sideband filter, harmonic and color notch filters, 60 Hz 994-8863-001

TV-30H, 25 kW VHF-TV transmitter for System B service, 174-216 MHz (Channels E5-E10, Band III), complete with operating tubes, semiconductors, crystals, required pre-correction circuitry, low-level vestigial sideband filter, harmonic filter, 50 Hz 994-8863-002

HARRIS CORPORATION BROADCAST TRANSMISSION DIVISION
P. O. BOX 4290, QUINCY, ILLINOIS 62305-4290 U.S.A. 217/222-8200

HARRIS

TV-30L

30-Kilowatt VHF Low Band Color Television Transmitter

- Straightforward design for high reliability and stability
- Advanced SAW filter—built-in receiver equalizer eliminates separate correction modules
- Unique Quadrature Corrector cancels tube distortions
- Ultra-linear driver with solid-state IPAs for maximum reliability and signal transparency
- Highly linear IF Modulation of the visual and aural carriers for superior color and sound reproduction
- Automatic power control insures essentially constant power output
- Emergency multiplex option

TV-30L...straightforward design for top reliability and superb color performance

Harris' TV-30L, 30-kilowatt low band VHF television transmitter, is the most cost-effective TV transmitter available in its power range. Its straightforward design requires less complicated circuitry to meet the high performance standards demanded by today's discriminating broadcaster. And less complicated circuitry means greater reliability ...the type of year-in, year-out dependability broadcasters need for impressive bottom line results.

The ultra-linear driver employs a broadband Class A solid-state IPA and a single conservatively-operated tetrode to drive the final visual amplifier. This linear design insures the maximum signal transparency required for premium quality broadcasting.

The solid-state visual and aural IPAs not only enhance reliability, but also reduce tuning requirements, as they contain broadband amplifiers so that periodic bandpass adjustment is not required. They are fully protected against damage caused by overloads or load variations. For added transmitter protection, RF drive is applied over a one to two second interval, which permits DC voltage stabilization before full RF drive application to power amplifiers. The IPAs are fully metered for monitoring and maintenance, while excellent cooling helps maintain long transistor life.

In the visual exciter, Harris employs its advanced VIDEO* SAW vestigial sideband filter (CCIR M only) and a unique Quadrature Corrector to insure the highest level of picture quality.

This compact transmitter requires only three tubes—visual PA, visual driver and aural PA—to provide a 30-kilowatt visual and a 6-kilowatt aural output. Under normal operating conditions the quick heat tubes permit transmitter turn-on within 120 seconds; faster turn-on times are possible in an emergency. A circulator between the visual stages minimizes retuning requirements after a tube change.

In addition to the ultra-linear driver, solid-state IPAs and VIDEO SAW filter, Harris' TV-30L incorporates such features as IF Modulation, true linear operation of power amplifiers, and a solid-state visual exciter/modulator to provide the finest color performance available today.

As no envelope delay correction or adjustments are required for the sideband filter and receiver equalizer, stability, reliability and color quality are greatly enhanced. Frequency adjustment, power output control and amplifier tuning are straightforward and uncomplicated, while conservatively-rated components assure long-term "hands-off" operation and minimum maintenance.

The transmitter employs a single-ended visual PA (9007 tetrode) and DC filaments in every visual stage for an excellent signal-to-noise ratio.

MAXIMUM COLOR PERFORMANCE WITH MCP-2V EXCITER. The MCP-2V visual exciter, incorporating the advanced-design receiver equalized SAW vestigial sideband filter and the Quadrature Corrector, provides the television industry with the best color specifications ever offered in VHF-TV transmitting equipment.

Harris' VIDEO SAW filter (CCIR M only) provides vestigial sideband shaping plus the required FCC group delay pre-correction. This advanced filter eliminates conventional receiver equalizers that require periodic maintenance with special test equipment. The equalized VIDEO SAW filter offers excellent performance year after year with absolutely no costly and time-consuming periodic realignment.

Ultra-linear driver with solid-state IPAs.

The precise equalization and the smooth, planar amplitude response of the filter insure a high degree of transparency to all types of video signals and test waveforms.

The MCP-2V visual exciter uses a unique Quadrature Corrector that compensates for several types of tube non-linearities, such as differential gain, incidental phase and intermodulation distortions. This highly versatile corrector supplies the quality of transmitter performance that is required by modern receivers and subscription television decoders. Correction for incidental phase distortion reduces sync buzz and sync tip spikes, and also provides the low intercarrier noise performance that will be required for multi-channel TV sound in the future.

The MCP-2V is a completely self-contained unit that furnishes a fully processed on-channel picture signal. The unit contains an IF Modulator, vestigial sideband (SAW) filter, up-converter, power supplies and all video and IF corrector circuits necessary to produce the on-channel signal.

The MCP-2V visual exciter is mounted in a pull-out drawer which offers quick access to all adjustments and modules for setup and troubleshooting.

The MCP aural exciter is also a solid-state, self-contained unit

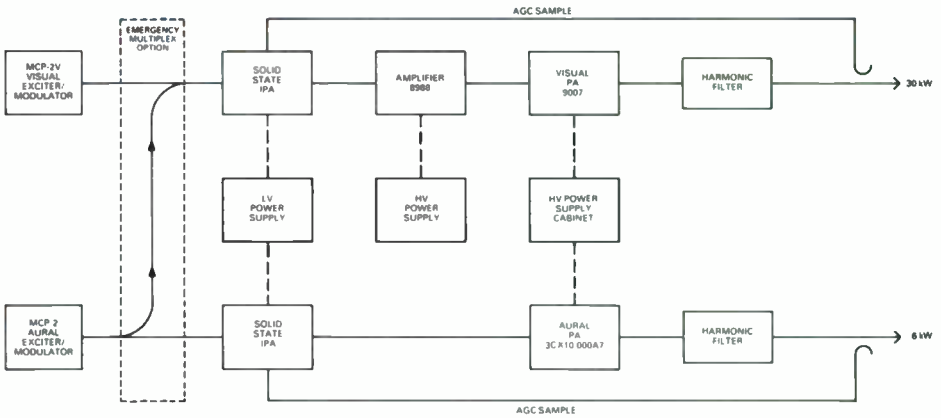
*Visual IF Delay Equalized Output

which furnishes a fully processed aural signal at a level up to 10 watts. Power output can be set with a single knob on the front panel, or by remote control, with no need for retuning.

Highly linear direct FM modulation provides exceptional audio quality in today's transmitters. In addition, the wideband modulator is ready for tomorrow's multichannel (stereo) sound.

A subcarrier input is provided for telemetry or ENG communications.

INTERMEDIATE FREQUENCY (IF) MODULATION. One of the important features of the TV-30L is its true low-level IF Modulation, which offers a top quality picture, and excels in electrical performance, reliability and simplicity of operation.



TV-30L BLOCK DIAGRAM

In the TV-30L, the visual and aural exciters generate fully modulated low-level IF signals. The output of a common crystal controlled reference oscillator is used to raise the individual IF signal to the desired "on channel" output frequency.

Due to the low-level techniques, which include the use of devices such as an extremely linear broadband diode ring modulator, low-level sideband filtering and very linear broadband amplifier, the color signal is a faithful reproduction of the signal applied to the transmitter input.

SOLID-STATE CONTROL CIRCUITS. Solid-state memory, timing and logic circuits offer complete and foolproof control of all transmitter functions. Built-in memory circuitry enables the entire transmitter to return to the air automatically in the state it was operating prior to an AC power interruption.

The control logic, in addition to commanding normal AC control functions, is also used to visually indicate, through indicator lights, the operating status of the transmitter system. These indicator lights allow isolation of circuit faults, and are easily remoted.

REMOTE CONTROL, UNATTENDED AND AUTOMATIC OPERATION. All control, metering and monitoring circuits have been designed specifically for remote control and ATS. The power controls are motor driven and the necessary remote control sampling points are built-in and connected to accessible terminal boards. Today, Harris TV transmitters are successfully operated worldwide with a variety of remote control systems, including the versatile, cost-saving Harris 9100 Facilities Control.

AUTOMATIC POWER CONTROL. Automatic gain control of all RF amplifier stages, in conjunction with the exciters' automatic power control, insures constant output, even with variations in line voltages. This feature is standard in the TV-30L.

STABILITY. One factor assuring RF stability is the use of solid-state IPAs and conservatively rated Type 8988 and 9007 ceramic tetrodes operating as VHF linear amplifiers. These amplifier stages operate in a common grid and screen configuration and tube neutralization is not required. The 3CX10000A7 aural PA is a grounded grid triode requiring no screen or bias supplies.

EMERGENCY MULTIPLEX OPTION. This mode of operation enhances the reliability of the transmitter and minimizes lost air time by permitting common amplification of the visual and aural signals in the visual RF amplifier in the event of an aural amplifier failure. This is possible in the TV-30L because of the low distortion and broadband circuits that are designed into the visual amplifier chain.

EXCELLENT COOLING SYSTEM. The cooling system of the TV-30L is quiet and efficient and employs direct drive blowers, with the motors fully protected by automatic reset devices.

POWER SUPPLIES. The HV power supply for the visual and aural PAs exhibits very low ripple content. It is designed for excellent regulation and low video impedance for optimum picture performance. In addition, for ease of maintenance, this power supply, including transformer and solid-state rectifiers, is housed in a single assembly, mounted externally from the transmitter. Routine maintenance access is provided by a removable panel.

Vacuum tube filaments in the visual transmitter are operated from DC power supplies to maximize the output signal-to-noise ratios. Visual amplifier grid and screen supplies are 100% solid state. The aural PA filament supply is AC for maximum reliability and exhibits an excellent AM signal-to-noise ratio.

The visual and aural exciters have their own independent, solid-state regulated power supplies.

EASE OF MAINTENANCE. Convenient access to components is provided, permitting the transmitter to be easily maintained. Visual and aural exciters slide out and can operate independently from the transmitter outside the cabinet. Various exciter circuits, such as oscillators, modulators and processing circuitry are of modular construction and can be removed for maintenance or replacement.

Easy-to-read, eye-level 4-inch meters are used to monitor required transmitter functions. Meter panels are of double-hinged construction for easy access during maintenance.

DUAL TRANSMITTER. The TV-30L is also available in a dual transmitter configuration, the TVD-60L, with 60 kW peak visual power. Using the famous Harris "Dualtran" RF switching concept, the TVD-60L can be used as main/alternate 30-kilowatt transmitters or as a full parallel 60-kilowatt transmitter for high power circularly polarized applications.

TV-30L SPECIFICATIONS

	System M/NTSC	Systems B/PAL and B/SECAM
VISUAL PERFORMANCE		
POWER OUTPUT:	30 kW peak.	25 kW peak.
LOAD IMPEDANCE:	50 ohms. Output connectors: 3⅛" EIA standard.	50 ohms. Output connector: 3⅛" EIA standard.
FREQUENCY RANGE:	54-88 MHz (Channels 2-6).	54-68 MHz (Channels E3 and E4, Band I).
CARRIER FREQUENCY STABILITY:[1]	±250 Hz (maximum variation over 30 days). ±2 Hz with optional precise frequency control.	±250 Hz (maximum variation over 30 days).
REG. OF RF OUTPUT POWER (All black to all white pic.):	3% or less relative to sync peak.	3% or less relative to sync peak.
VARIATION OF OUTPUT (over one frame):	Less than 2%.	Less than 2%.
VISUAL SIDEBAND RESPONSE:[2]	−3.58 MHz .....−42 dB or better −1.25 MHz and lower .....−26 dB or better −0.75 MHz to +4.10 MHz .....±0.4 dB +4.18 MHz .....+0.4, −1 dB +4.5 MHz .....−15 dB or better +4.75 MHz to +5.0 MHz .....−30 dB or better +5.0 MHz and higher .....−40 dB or better	−4.43 MHz .....−30 dB or better −1.25 MHz .....−22 dB or better −0.75 MHz to 5.0 MHz .....±0.5 dB +5.5 MHz .....−22 dB or better
FREQUENCY RESPONSE VS. BRIGHTNESS:[3]	±0.75 dB.	±0.75 dB.
VISUAL MODULATION CAPABILITY:	0%.	0%.
DIFFERENTIAL GAIN:[4]	3% or better.	3% or better.
INCIDENTAL PHASE MODULATION:	±1.5° or better relative to blanking.	±1.5° or better relative to blanking.
SYNC OVERSHOOT:	2% or less of sync peak within 200 nsec of leading/trailing edge.	2% or less of sync peak within 200 nsec of leading/trailing edge.
LINEARITY (LOW FREQUENCY):[5]	1.0 db or better.	10% or better.
DIFFERENTIAL PHASE:[4]	±1° or better.	±1° or better.
SIGNAL-TO-NOISE:		
Hum and low frequency:[6]	−55 dB or better peak to peak.	−55 dB or better peak to peak.
Periodic noise 10 kHz to 5.2 MHz:[6]	−40 dB peak to peak.	−40 dB peak to peak.
Total random and periodic noise unweighted:	−55 dB RMS or better relative to sync peak.	−55 dB RMS or better relative to sync peak.
K-FACTORS:	2T 2%, 20T less than 5% baseline disturbance.	2T 2%, 20T less than 5% baseline disturbance.
EQUIVALENT ENVELOPE DELAY:	0.2 to 2.1 MHz ±40 ns at 3.58 MHz ±25 ns at 4.18 MHz ±60 ns (referenced to FCC standard curve)	Transmitter supplied with receiver equalizer compliant with CCIR Report 624, Figure 3, Curve A or B.
VIDEO INPUT LEVEL:	75 ohm, −30 dB or better return loss up to 5.5 MHz.	75 ohm, −30 dB or better return loss up to 5.5 MHz.
HARMONIC RADIATION:	−80 dB relative to peak of sync.	−80 dB relative to peak of sync.
AURAL PERFORMANCE		
POWER OUTPUT:[7]	6 kW.	Up to 6 kW.
LOAD IMPEDANCE:	50 ohms. Output connector: 1⅝" EIA standard, unflanged.	50 ohms. Output connector: 1⅝" EIA standard, unflanged.
AUDIO INPUT LEVEL:	+10 dBm, ±2 dB.	0 to +12 dBm.
FREQUENCY DEVIATION:	±25 kHz.	±50 kHz.
INPUT IMPEDANCE:	600 ohms, balanced.	600 ohms, balanced.
PRE-EMPHASIS:	75 microseconds.	50 microseconds.
FREQUENCY RESPONSE:	±0.5 dB rel. to pre-emphasis curve, (30-15,000 Hz).	±0.5 dB rel. to pre-emphasis curve, (30-15,000 Hz).
DISTORTION:[8]	0.5% THD or less with ±25 kHz deviation from 30-15,000 Hz.	1% THD from 30 to 15,000 Hz with ±50 kHz deviation. Less than 2% at ±70 kHz deviation.
FM NOISE:[8]	−60 dB RMS or better rel. to ±25 kHz dev.	−60 dB RMS or better rel. to ±50 kHz dev.
INTERCARRIER PHASE MODULATION (noise):[8]	−46 dB RMS or better rel. to ±25 kHz dev.	−46 dB RMS or better rel. to ±50 kHz dev.
AM NOISE:	−55 dB RMS rel. to 100% amplitude modulation of aural carrier.	−55 dB RMS rel. to 100% amplitude modulation of aural carrier.
SYNCHRONOUS AM NOISE:[9]	−40 dB RMS or better.	−40 dB RMS or better.
FREQUENCY STABILITY:[10]	±20 Hz (maximum variation over 30 days).	±20 Hz (maximum variation over 30 days).
EMERGENCY AURAL/VISUAL MULTIPLEX (Optional):		
Spurious radiation at visual carrier + and −920 kHz:	−50 dB or better below visual carrier (typical).	−50 dB or better below visual carrier (typical).
Output power:	17 kW visual @ 10% aural.	14 kW visual @ 10% aural.
SERVICE CONDITIONS		
AMBIENT TEMPERATURE:[11]	−10° to +50°C (14° to 122°F).	−10° to +50°C.
AMBIENT HUMIDITY RANGE:	0 to 95% relative humidity.	0 to 95% relative humidity.
ALTITUDE:	Sea level to 7,500 feet.	Sea level to 2286 meters.
PHYSICAL AND MECHANICAL DIMENSIONS:	Trans.: 98.3" W × 32" D × 72" H. Weight: 2,200 lbs. Power supply: 57" W × 34" D × 54.25" H. Weight 1,500 lbs.	Trans.: 249.7 cm W × 81.3 cm D × 182.9 cm H. Weight: 998 kg. Power supply: 144.8 cm W × 86.4 cm D × 137.8 cm H. Weight: 680 kg.
ELECTRICAL REQUIREMENTS:	Power input: 208/240 volts, ±11 volts, 3 phase, 50/60 Hz. Power consumption: 60 kW, black picture, 10% aural; 50 kW, average picture (50% APL), 10% aural; 67 kW, black picture at 20% aural; 58 kW, average picture at 20% aural.	Power input: 380/415 volts, ±17 volts, 3 phase, 50/60 Hz. Power consumption: 60 kW, black picture, 10% aural; 50 kW, average picture (50% APL), 10% aural; 67 kW, black picture at 20% aural; 58 kW, average picture at 20% aural.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

1. After initial aging of 60 days.
2. Response specified for transmitter operating into a resistive load of 1.05 VSWR or better.
3. Measured using 20% p.p. amplitude swept video modulation with pedestal set at black 10%, white 90% with reference to grey level 50%. All percentages relative to blanking to white excursion.
4. Measured with 5-step riser signal from 75% to 12.5% of sync peak. Sub-carrier mod. percentage 12.5% peak to peak.
5. Measured with a 5-step riser signal. Test signal No. 3 CCIR REC 421-3.
6. Noise measured with respect to a blanking to white transition.
7. Capable of additional 0.5 dB power output above rated output to compensate for diplexer loss.
8. After de-emphasis.
9. Rel. to 100% amplitude modulation at rated deviation.
10. Relative to frequency offset of 4.5 MHz (System M), 5.5 MHz (System B), from the visual carrier, after initial aging of 60 days.
11. Derate 2°C per 1000 feet (305 meters) altitude above sea level.

ORDERING INFORMATION

TV-30L, 30 kW VHF-TV transmitter for System M service, Channels 2-6, complete with operating tubes, semiconductors, crystals, required pre-correction circuitry, low-level vestigial sideband filter, harmonic and color notch filters, 208/240 volts, 50/60 Hz 994-8532-001

TV-30L, 25 kW VHF-TV transmitter for System B service, 54-68 MHz (Channels E3 and E4, Band I), complete with operating tubes, semiconductors, crystals, required pre-correction circuitry, low-level vestigial sideband filter, harmonic filter, 308/415 volts, 50/60 Hz 994-8532-002

HARRIS CORPORATION BROADCAST TRANSMISSION DIVISION
P. O. BOX 4290, QUINCY, ILLINOIS 62305-4290 U.S.A. 217/222-8200

HARRIS

TVD-60L

60-Kilowatt Dual VHF Low Band Color Television Transmitter

- Ultra-linear drivers with solid-state IPAs for maximum reliability and signal transparency
- Two independent, complete 30-kilowatt transmitters for total redundancy and on-the-air reliability
- "Hot" standby exciters, modulators and sideband filter for maximum redundancy
- Harris' Dualtran output switching system allows parallel, single transmitter or alternate/main operation
- Advanced Transversal SideBand (TSB) filters—no group delay, no tuning adjustments required
- IF Modulation of the visual and aural carriers
- Superior color performance, with minimal correction circuitry
- Ideal for circularly polarized applications
- Easily interfaced with ATS and remote control systems

TVD-60L

TOTAL REDUNDANCY . . . COMPLETE RELIABILITY

The Harris TVD-60L, 60-kilowatt dual low band VHF TV transmitter, is designed for television broadcasters who want the utmost in reliability and performance—with the flexibility for remote control or automatic operation. Ideal for circularly polarized applications, this powerful dual transmitter incorporates such state-of-the-art features as ultra-linear drivers with solid-state IPAs, and Harris' Transversal SideBand (TSB) filters. The TVD-60L consists of two completely independent 30-kilowatt transmitters operating in parallel, combined through the Harris Dualtran RF switching system.

Each of the two ultra-linear drivers employs a broadband Class A solid-state IPA and a single conservatively-operated tetrode to drive the final visual amplifier. This means maximum linearity and signal transparency without the need for complicated correction circuitry . . . for unmatched reliability and maintainability.

Surface acoustic wave technology is applied to vestigial sideband filtering in the visual exciters. The Harris Transversal SideBand filter displays a near-ideal bandpass function for Systems M (FCC) and B bandwidths. This, combined with the filter's true linear phase characteristic, offers excellent reproduction of pulse waveforms and encoded information.

With the TVD-60L you get two visual exciter/modulators, two aural exciter/modulators, two TSB filters, two solid-state visual and aural IPAs, two visual and aural PAs, and two HV power supplies—in short, total redundancy! Complete reliability!

The Dualtran switching system is factory assembled in one cabinet, and can be supplied to interface with either a hybrid or a notch diplexer.

IF (intermediate frequency) Modulation, low-level sideband filtering, true linear operation of power amplifiers and solid-state visual and aural exciter/modulators combine to provide outstanding color and sound fidelity. As no envelope delay correction or adjustments are required for the solid/state Transversal SideBand filter(s), stability, reliability and color quality are greatly enhanced.

Frequency adjustment, power output control and amplifier tuning are straightforward and uncomplicated, while conservatively rated components in the TVD-60L assure long-term "hands-off" operation.

AUTOMATIC SWITCHING

In the event of a malfunction of one-half of the parallel combination, the Harris TVD-60L offers automatic and instantaneous reduction to one-fourth authorized power. This function will occur without interruption of the carrier. With the touch of a button, half-power operation is achieved in less than two seconds.

Visual and aural exciters are connected in a hot standby condition, and will automatically switch in less than 10 milliseconds in case of failure in either unit. In all modes, aural follows visual for simplified logic control and reliable operation.

OPERATING VERSATILITY

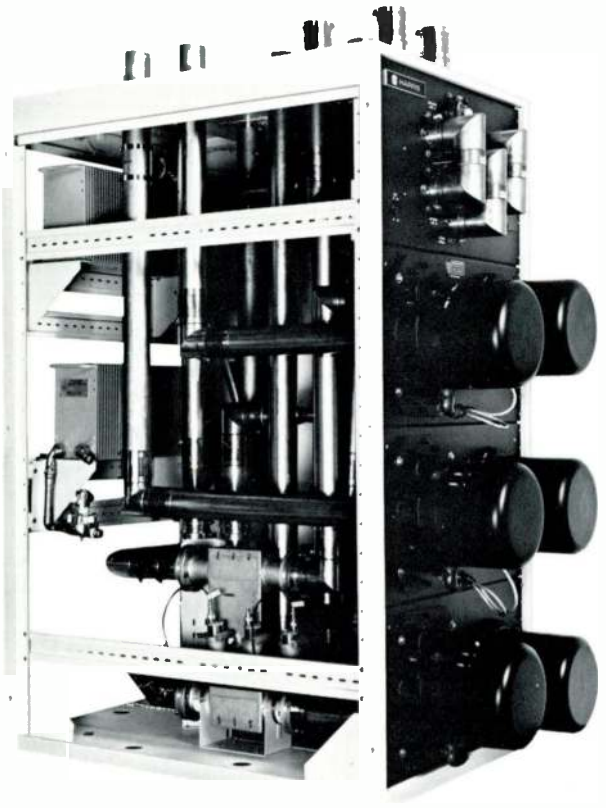
Four modes of operation may be obtained electrically by means of control pushbuttons on the output switcher; by control buttons on the transmitter control panel; or by remote control.

These are:

- Transmitters A and B combined On-Air.
- Transmitter A On-Air and transmitter B into the station loads.
- Transmitter B On-Air and transmitter A into the station loads.
- Transmitters A and B combined to the station loads (test mode).

The switching operation from one mode to any other mode requires less than two seconds.

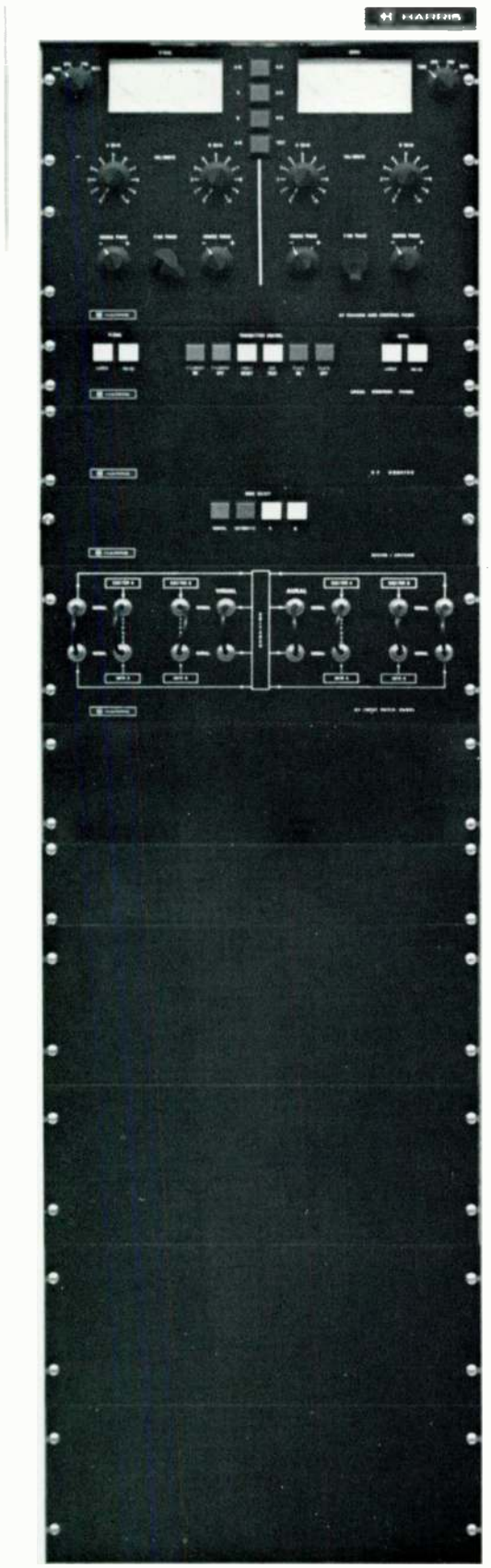
When using a notch diplexer, three other operating modes may be selected manually by changing links on the Dualtran output switching cabinet: transmitters A and B combined and diplexed to the station load; transmitter A diplexed into the station load; and transmitter B diplexed into the station load.



DUALTRAN OUTPUT SWITCHER CABINET

All switches, patch panels, combiners, reject and dummy loads, couplers, sensors and control logic are factory assembled, tested and optimized for best VSWR across the channel. The only external transmission line connections are for the transmitters, antenna and diplexer. This saves installation labor and time, and insures excellent performance without field optimization. Motorized coaxial switches accomplish RF switching at the push of a button on the output switcher control panel, center transmitter control cabinet or via remote control. Solid-state control logic automatically routes command signals to turn off plate voltages, operate proper coaxial switches and re-apply plate voltage . . . all in two seconds or less.

TVD-60L



CENTER CONTROL CABINET

All adjustments and control of dual transmitter operation can be accomplished from the control cabinet, supplied as standard equipment in all Harris Dualtran systems. This cabinet is normally mounted between the two independent transmitters to provide a pleasing installation. The RF phasing and control panel, the exciter/modulator switcher, and the local control panel are standard equipment with the Harris Dualtran systems.

RF PHASING AND CONTROL PANEL

Here the output of the on-air exciter/modulator is split to drive the two transmitters. Phasing controls and attenuators provide adjustment of the two signals to assure maximum combined transmitter output. Switchable visual and aural power meters are provided to monitor combined forward, combined reflected and reject power levels. Also, Dualtran output switcher control logic pushbuttons on this panel can select "A + B Air", "A Air", "B Air" or "A + B Test" modes.

LOCAL CONTROL PANEL

Provides simultaneous control of both transmitters including filament and plate on/off and aural and visual raise/lower functions. All system remote control terminals are available on this panel.

EXCITER/MODULATOR SWITCHER

Solid-state control logic provides manual or automatic switching of the two exciter/modulators from "hot standby" to "on-air" status in case of exciter failure. Switching occurs in 10 milliseconds for no perceptible loss of signal.

INPUT PATCH PANEL (Optional)

Permits bypassing the exciter/modulator switcher via BNC cables to patch any combination of aural/visual exciters to any transmitter. This provides extra flexibility for emergency situations and for system maintenance and testing.

RF INPUT BYPASS SWITCHER (Optional—Not Shown)

In single transmitter modes this switcher removes the 3 dB coupler in the RF phasing/control panel from input circuitry, thereby putting full rated power of any one transmitter on the air.

TVD-60L SPECIFICATIONS

	System M/NTSC
VISUAL PERFORMANCE	
POWER OUTPUT:	60 kW peak.
LOAD IMPEDANCE:	50 ohms. Output connectors: 3⅛" EIA standard.
FREQUENCY RANGE:	54-88 MHz (Channels 2-6).
CARRIER FREQUENCY STABILITY:[1]	±250 Hz (maximum variation over 30 days). ±2 Hz with optional precise frequency control.
REG. OF RF OUTPUT POWER (All black to all white pic.):	3% or less relative to sync peak.
VARIATION OF OUTPUT (over one frame):	Less than 2%.
VISUAL SIDEBAND RESPONSE:[2]	−3.58 MHz ..... −42 dB or better −1.25 MHz and lower ..... −26 dB or better −0.75 MHz to +4.10 MHz ..... ±0.5 dB +4.18 MHz ..... +0.5, −1 dB +4.75 MHz and higher ..... −30 dB or better
FREQUENCY RESPONSE VS. BRIGHTNESS:[3]	±0.75 dB.
VISUAL MODULATION CAPABILITY:	0%.
DIFFERENTIAL GAIN:[4]	3% or better.
INCIDENTAL PHASE MODULATION:	±3° or better relative to blanking.
LINEARITY (LOW FREQUENCY):[5]	1.0 dB or better.
DIFFERENTIAL PHASE:[4]	±1° or better.
SIGNAL-TO-NOISE:	
Hum and low frequency:[6]	−55 dB or better peak to peak.
Periodic noise 10 kHz to 5.2 MHz:[6]	−40 dB peak to peak.
Total random and periodic noise unweighted:	−55 dB RMS or better relative to sync peak.
K-FACTORS:	2T 2%, 20T less than 5% baseline disturbance.
EQUIVALENT ENVELOPE DELAY:	0.2 to 2.1 MHz ±40 ns at 3.58 MHz ±25 ns at 4.18 MHz ±60 ns (referenced to FCC standard curve)
VIDEO INPUT LEVEL:	75 ohm, −30 dB or better return loss up to 5.5 MHz.
HARMONIC RADIATION:	−80 dB relative to peak of sync.
AURAL PERFORMANCE	
POWER OUTPUT:[7]	12 kW.
LOAD IMPEDANCE:	50 ohms. Output connector: 1⅝" EIA standard, unflanged.
AUDIO INPUT LEVEL:	+10 dBm, ±2 dB.
FREQUENCY DEVIATION:	±25 kHz.
INPUT IMPEDANCE:	600 ohms, balanced.
PRE-EMPHASIS:	75 microseconds.
FREQUENCY RESPONSE:	±0.5 dB rel. to pre-emphasis curve, (30-15,000 Hz).
DISTORTION:[8]	0.5% THD or less with ±25 kHz deviation from 30-15,000 Hz.
FM NOISE:[8]	−60 dB RMS or better rel. to ±25 kHz dev.
INTERCARRIER PHASE MODULATION (noise):[8]	−46 dB RMS or better rel. to ±25 kHz dev.
AM NOISE:	−55 dB RMS rel. to 100% amplitude modulation of aural carrier.
SYNCHRONOUS AM NOISE:[9]	−40 dB RMS or better.
FREQUENCY STABILITY:[10]	±20 Hz (maximum variation over 30 days).
SERVICE CONDITIONS	
AMBIENT TEMPERATURE:[11]	−10° to +50° C (14° to 122° F).
AMBIENT HUMIDITY RANGE:	0 to 95% relative humidity.
ALTITUDE:	Sea level to 7,500 feet.
PHYSICAL AND MECHANICAL DIMENSIONS:	Transmitters (2): each 98.3" W x 32" D x 72" H. Weight each: 2,200 lbs. Switcher cabinet (without side panels): 22⅛" W x 24⅝" D (with front and rear doors) x 72" H. Weight: 300 lbs. RF Output Switcher: 48" W x 34" D x 72" H. Weight: 1,350 lbs. Power Supplies (2): each 57" W x 34" D x 54.25" H. Weight each: 1,500 lbs.
ELECTRICAL REQUIREMENTS:	Power input: 208/240 volts, ±11 volts, 3 phase, 50/60 Hz. Power consumption: 132 kW, black picture; 108 kW, average picture.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

1. After initial aging of 60 days.
2. Response specified for transmitter operating into a resistive load of 1.05 VSWR or better.
3. Measured using 20% p.p. amplitude swept video modulation with pedestal set at black 10%, white 90% with reference to grey level 50%. All percentages relative to blanking to white excursion.
4. Measured with 5-step riser signal from 75% to 12.5% of sync peak. Sub-carrier mod. percentage 12.5% peak to peak.
5. Measured with a 5-step riser signal. Test signal No. 3 CCIR REC 421-3.
6. Noise measured with respect to a blanking to white transition.
7. Capable of additional 0.5 dB power output above rated output to compensate for diplexer loss.
8. After de-emphasis.
9. Rel. to 100% amplitude modulation at rated deviation.
10. Relative to frequency offset of 4.5 MHz (System M), from the visual carrier, after initial aging of 60 days.
11. Derate 2° C per 1000 feet (305 meters) altitude above sea level.

ORDERING INFORMATION

TVD-60L, 60 kW dual VHF-TV transmitter for System M standards service, Channels 2-6, with operating tubes, semiconductors, crystals, VSB filter, harmonic and color notch filters, output combiner, input and output switchers 994-8616-001

HARRIS CORPORATION BROADCAST GROUP
P. O. BOX 4290, QUINCY, ILLINOIS 62305-4290 U.S.A. 217/222-8200

ADV. 582A PTD. IN U.S.A.

TVD-60L

SOLID-STATE IPAs

The solid-state visual and aural IPAs contain broadband amplifiers, so that periodic bandpass adjustments are not required—and they are fully protected against damage caused by overloads or load variations. For added transmitter protection, RF drive is applied over a one to two second interval, which permits DC voltage stabilization before full RF drive application to power amplifiers. The IPAs are fully metered for monitoring and maintenance, while excellent cooling helps maintain long transistor life.

The two 30-kilowatt transmitters each employ a single-ended visual PA (9007 tetrode) and DC filaments in every visual stage for an excellent signal-to-noise ratio.

TRANSVERSAL SIDEBAND (TSB) FILTER

The Harris solid-state sideband filter is an advanced surface acoustic wave design, and shapes visual sidebands at the IF frequency, rather than "on frequency" at the full output power of the transmitter. Unlike previous VSB filters, the TSB filter has an inherent linear phase characteristic and requires no group delay correction or tuning.

SOLID-STATE VISUAL AND AURAL EXCITER/MODULATORS

The Harris solid-state MCP-1V visual exciter/modulator is an independent, self-contained unit which provides a fully processed on-channel picture signal. Power output can be varied up to one watt with a single front panel control, or from a remote location, without retuning of any kind.

The MCP-1V provides great reliability and stability, excellent frequency response, and truest color quality. It is designed for minimum maintenance and setup time, and for remote control and unattended operation. This is all made possible through the use of the latest design techniques, including Harris' solid-state TSB filter.

The Harris aural exciter/modulator is a solid-state, self-contained unit which furnishes a fully processed aural signal at a level up to 10 watts. Power output can be set with a single knob on the front panel, or by remote control, with no need for retuning. It is mounted in a pull-out drawer, and may be operated with the drawer extended for test purposes.

INTERMEDIATE FREQUENCY (IF) MODULATION

One of the features of the TVD-60L is its true low-level IF Modulation, which offers a top quality picture, and excels in electrical performance, reliability and simplicity of operation.

Due to the low-level techniques, which include the use of devices such as an extremely linear broadband diode ring modulator, low-level sideband filtering and very linear broadband amplifiers, the color signal is a faithful reproduction of the signal applied to the transmitter input.

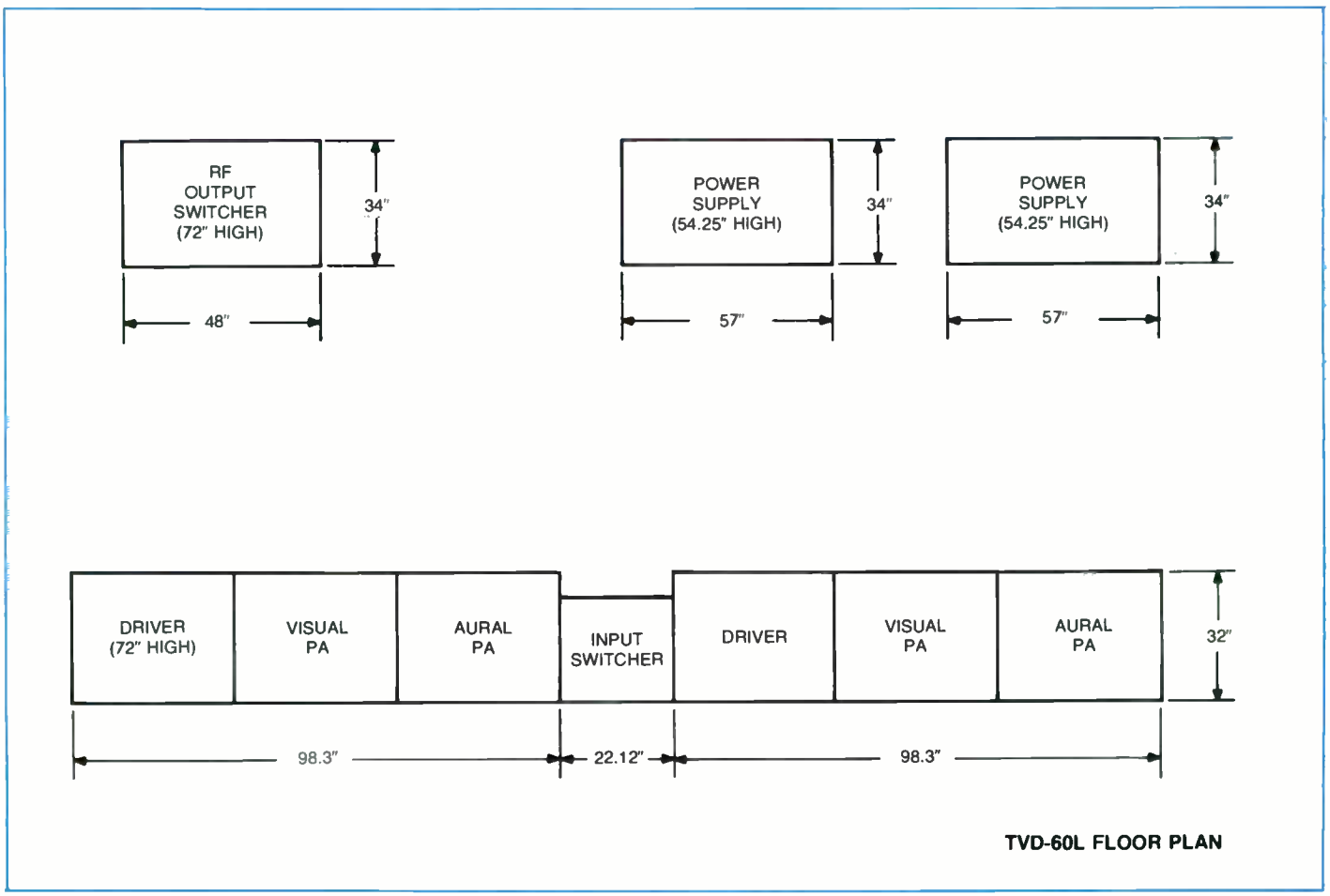
SOLID-STATE CONTROL CIRCUITS

Solid-state memory, timing and logic circuits offer complete and foolproof control of all transmitter functions. Built-in memory circuitry enables the entire transmitter to return to the air automatically in the state it was operating prior to an AC power interruption.

The control logic, in addition to commanding normal AC control functions, is also used to visually indicate, through indicator lights, the operating status of the transmitter system. These indicator lights allow easy isolation of circuit faults, and are easily remoted.

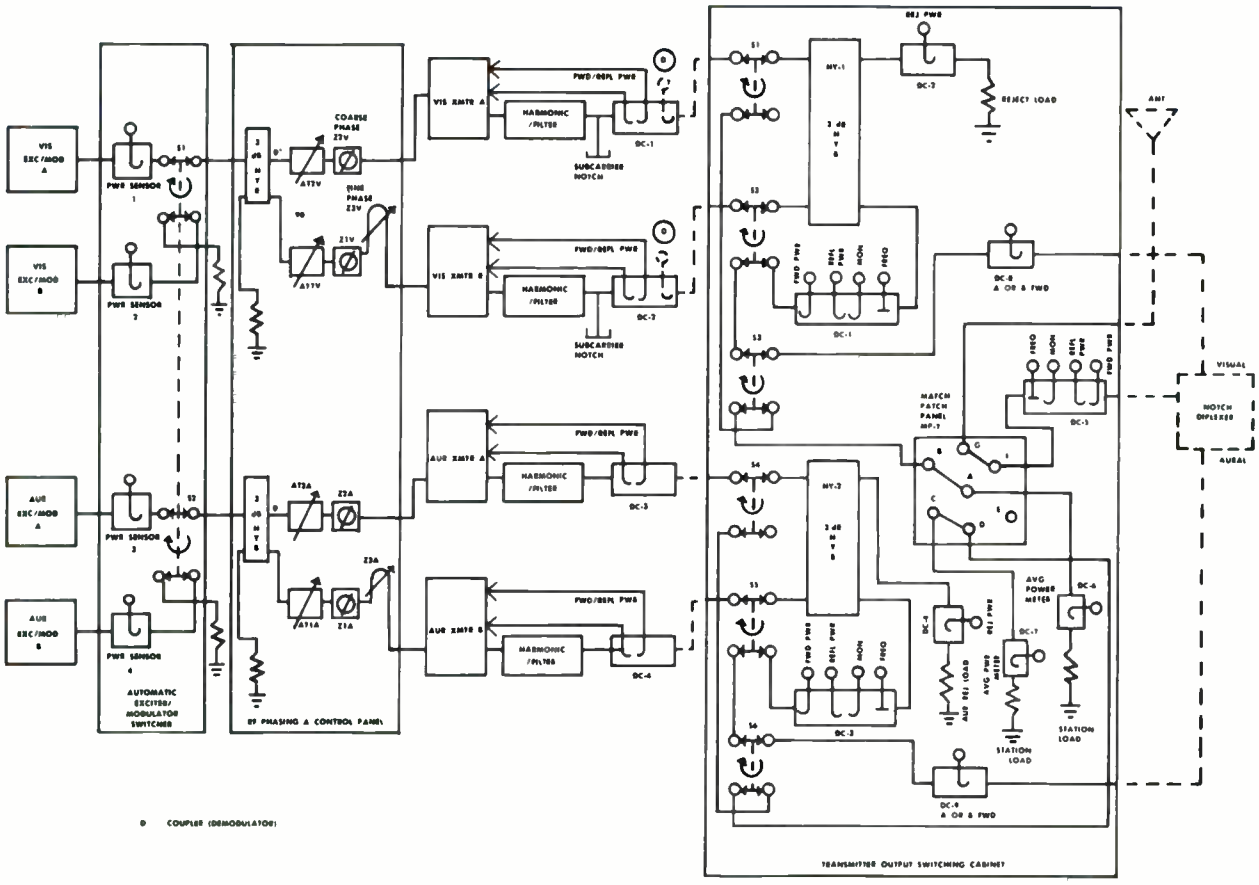
REMOTE CONTROL, UNATTENDED AND AUTOMATIC OPERATION

All control, metering and monitoring circuits have been designed specifically for remote control and ATS. The power controls are motor driven and the necessary remote con-



TVD-60L FLOOR PLAN

TVD-60L



RF FLOW TVD-60L WITH NOTCH DIPLEXER

trol sampling points are built-in on accessible terminal boards. Today, Harris TV transmitters are being operated successfully worldwide with a variety of remote control systems, including the versatile, cost-saving Harris 9100 Facilities Control.

AUTOMATIC POWER CONTROL

Automatic gain control of all RF amplifier stages, in conjunction with the exciters' automatic power control, insures essentially constant power output, even with variations in line voltages. This feature is standard in the TVD-60L.

STABILITY

One factor assuring RF stability is the use of solid-state IPAs and conservatively rated Type 8988 and 9007 ceramic tetrodes operating as VHF linear amplifiers. These amplifier stages operate in a common grid and screen configuration and tube neutralization is not required.

EXCELLENT COOLING SYSTEM

The cooling system of the TVD-60L is quiet and efficient, and employs direct drive blowers, with the motors fully protected by automatic reset devices.

POWER SUPPLIES

The HV power supplies for the TVD-60L visual and aural PAs exhibit very low ripple content. They are designed for excellent regulation and low video impedance for optimum picture performance. In addition, for ease of maintenance, the two power supplies, including transformers and solid-state rectifiers, are housed in two separate assemblies, mounted externally from the transmitter. Routine maintenance access is provided by removable panels.

Vacuum tube filaments in the visual transmitters are operated from DC power supplies to maximize the output signal-to-noise ratio. Grid and screen supplies are 100% solid state.

The visual and aural exciters have their own independent, solid-state regulated power supplies.

EASE OF MAINTENANCE

Convenient access to components is provided, permitting the transmitter to be easily maintained. Visual and aural exciters slide out and can operate independently from the transmitter outside the cabinet. Various exciter circuits, such as oscillators, modulators and processing circuitry, are of modular construction and can be removed for maintenance or replacement.

Easy-to-read, eye-level 4-inch meters are used to monitor required transmitter functions. Meter panels are of double-hinged construction for easy access during maintenance.

HARRIS INTERTYPE CORPORATION

GATES
A DIVISION OF HARRIS-INTERTYPE

Product Information Bulletin

TELEVISION DIODE DEMODULATOR

Transmission line mounted

Rear View

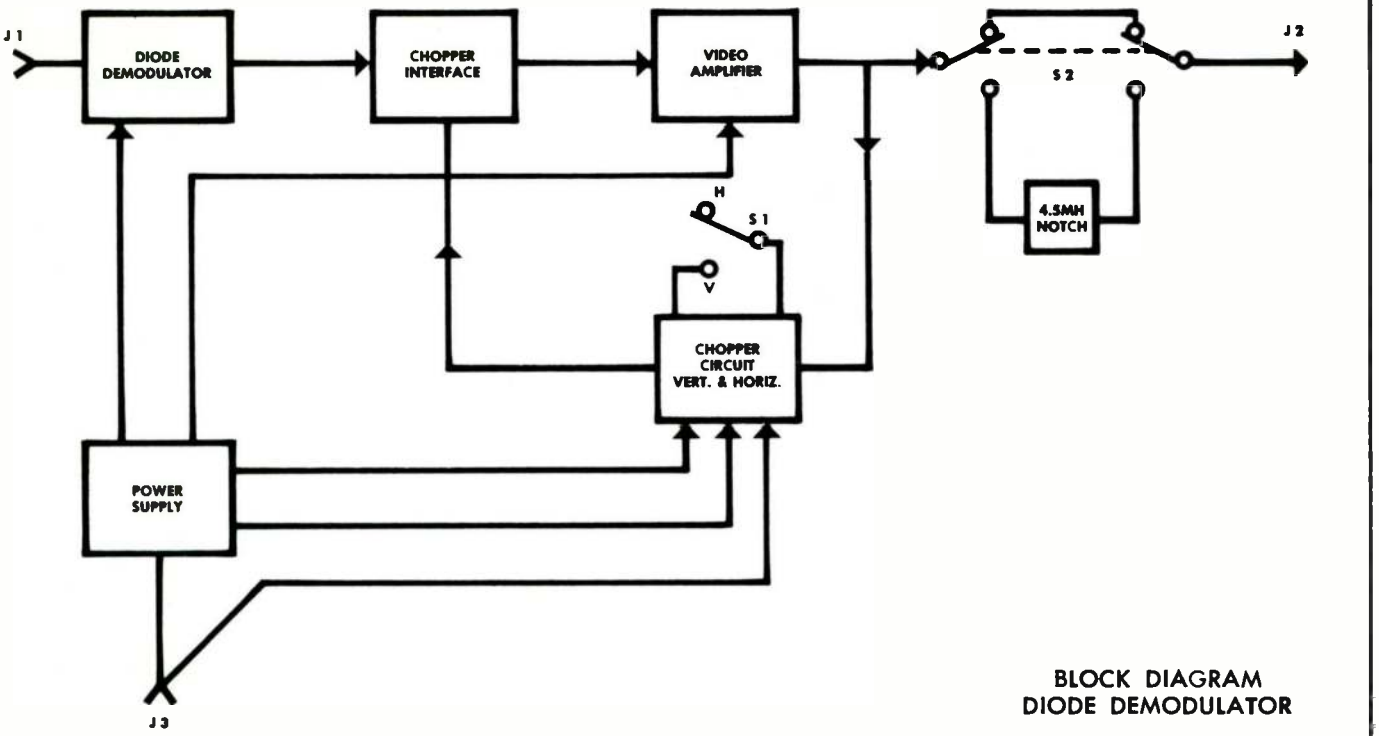
GENERAL: Gates' Double Sideband Diode Video Demodulator is designed to provide a high quality means to measure and monitor the transmission performance of a VHF visual transmitter. The demodulator is completely solid state, and includes an electronic vertical interval or line rate zero reference chopper with remote control on/off provisions.

As the demodulator has excellent linearity performance, the linearity of the transmitted signal can be determined between 5% and 100% modulation. The wide bandwidth allows the frequency response of the transmitted signal to be evaluated, keeping in mind the 6 dB drop above 1.25 MHz when monitoring a vestigial sideband signal.

Video output is adjustable to provide a standard 1 volt peak-to-peak into 75 ohms with 80 to 250 milliwatts RF input from a visual sampling point.

A switchable aural notch filter allows visual transmission measurements to be made in portions of the system that have both aural and visual signals present.

APPLICATION: The diode demodulator may be used with any VHF television visual transmitter, Channels 2 through 13. The demodulator can be mounted on the transmission line or rack mounted (with optional shelf) in a remoted location. It must be used with a 50 ohm adjustable directional coupler and probe assembly and interconnected with a 50 ohm cable such as RG-8U.



BLOCK DIAGRAM
DIODE DEMODULATOR

SPECIFICATIONS

RF INPUT LEVEL: 80 to 250 milliwatts into 50 ohms.

INPUT CONNECTOR: BNC.

INPUT FREQUENCY: Any VHF Channel 2-13, 37-88 MHz and 174-216 MHz.

OUTPUT: 1.0 volt peak-to-peak, adjustable ±2.5 dB into 75 ohms, sending end terminated.

OUTPUT CONNECTOR: BNC.

VIDEO RESPONSE: Aural notch out: ±0.2 dB over 5 MHz. Aural notch in: −0.5 dB at 4 MHz, −40 dB at 4.5 MHz.

DIFFERENTIAL GAIN: ±0.5 dB for modulation depth of 5% to 100%.

DIFFERENTIAL PHASE: ±1° for modulation depth of 5% to 100%.

MODULATION DEPTH INDICATOR: Zero carrier reference pulse switchable between horizontal and vertical rate, with provision for on/off remote switch.

INPUT POWER REQUIREMENT: 115V AC, 60 Hz, 8 watts.

SIZE: 11½ inches long overall, 3 inches high, 2½ inches wide.

WEIGHT: 2 pounds, 14 ounces.

MOUNTING: Saddle mount on transmission line or rack mount with optional shelf.

ACCESSORIES

Directional Coupler and Probe Assembly, 3⅛ inches	**620-0500-001**
Directional Coupler and Probe Assembly, 6⅛ inches	**620-0548-001**
Shelf for rack mounting up to 5 units	**994-6689-001**

ORDERING INFORMATION

Gates' VHF-TV Double Sideband Diode Video Demodulator with electronic chopper	**994-6789-001**

HARRIS INTERTYPE CORPORATION
GATES
A DIVISION OF HARRIS-INTERTYPE
QUINCY, ILLINOIS · 62301 · U.S.A.

HARRIS TELEVISION MONITOR PACKAGE

The Harris Station TV Monitor Package forms a versatile family of precision test and monitoring equipment for use in TV transmitter performance measurements. High input sensitivity also allows its use as a high quality off-air receiver for transmitter monitoring at a remote location. The entire package features the latest advances in design and components, and meets all FCC requirements where applicable.

The package consists of four 19" rack mounted units: TD-80 TV Down Converter; TN-80 Visual Demodulator; TA-80 TV Aural Demodulator; and TF-80 TV Frequency Monitor.

The advanced Harris TV Monitor Package is used with standard test equipment to make the following measurements ...

...of the visual signal

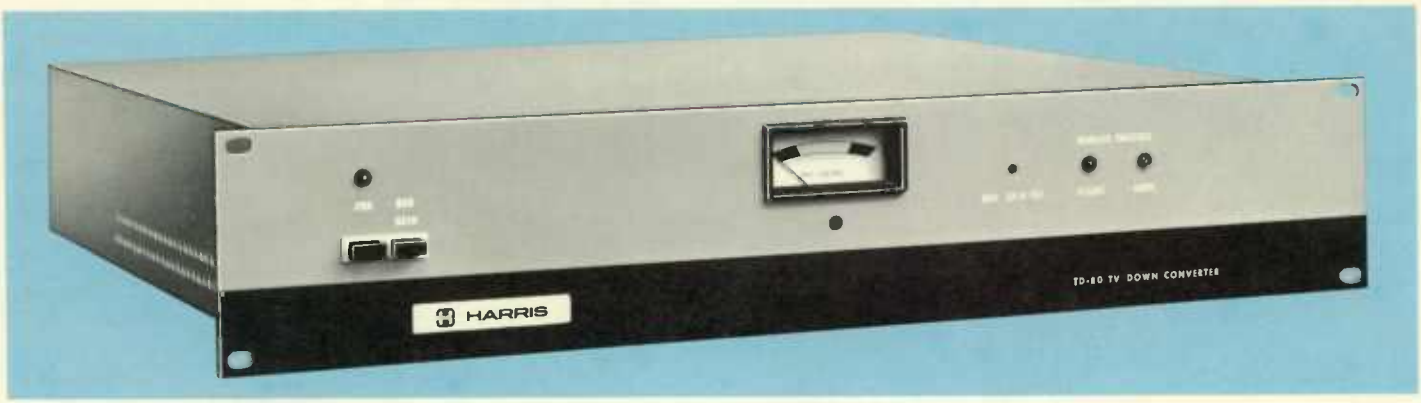
- Transmitter frequency response
- Transmitter envelope delay
- Transmitter linearity
- Visual signal-to-noise ratio
- Visual modulation depth
- Transmitter $\sin^2$ pulse performance
- Carrier and intercarrier frequencies
- Differential phase measurements
- Differential gain measurements
- Incidental phase modulation

...of the aural signal

- Modulation percentage
- Transmitter frequency response
- Harmonic distortion
- AM noise measurements
- FM noise measurements
- Intercarrier noise measurements

HARRIS COMMUNICATIONS AND INFORMATION HANDLING

TD-80 TV DOWN CONVERTER



The Harris TD-80 Down Converter is crystal controlled, and with the proper crystal can convert any TV channel from 2 through 83 to the Harris standard IF frequencies of 37 MHz for visual and 32.5 MHz for aural. The IF signal from the down converter is used to drive the Visual Demodulator, the Aural Demodulator and the Frequency Monitor--simultaneously, one at a time, or in any combination.

The Harris Down Converter employs state-of-the-art techniques similar to those used in Harris' IF exciters, to allow the Visual and Aural Demodulators to provide the same superior performance characteristics that have made Harris' IF transmitters the industry standard.

The Down Converter features a double balanced untuned mixer followed by a double tuned first IF amplifier and a low-pass filter. The output is supplied to the second IF amplifier or to a rear panel BNC connector.

The second IF amplifier is the AGC stage. The signal is amplified by 20 dB and attenuated by AGC controlled pin diodes to a level dependent upon the applied AGC control voltage setting and the level of the RF input signal. The range of the AGC is at least 20 dB. Over this range, the amplitude and group delay versus frequency response remains within 0.2 dB, and the two-tone IM distortion products are down at least 60 dB. For special tests, the automatic AGC can be bypassed by a switch on the front panel and manual adjustment can then be used to control the input signal.

The third IF amplifier has two outputs; one connects to the Visual Demodulator, the other to the AGC control circuitry and IF drive. The IF drive feeds two bandpass filters which separate the visual from the aural carrier. A sample of these signals is peak-detected and used as a carrier presence indicator. IF samples for both the visual and aural carrier are available on the rear panel for driving the Aural Modulation and Frequency Monitors.

Harris' TV monitor equipment can be used in a variety of packages, as indicated (by X's) below:

Unit	Package						
TD-80 Down Converter	X	X	X	X	X	X	X
TN-80 Visual Demodulator	X	X	X				X
TA-80 Aural Demodulator	X	X		X		X	
TF-80 Frequency Monitor	X				X	X	X

HARRIS COMMUNICATIONS AND INFORMATION HANDLING

HARRIS TELEVISION MONITOR PACKAGE

Specifications

INPUT LEVEL:
.12 to 1.2 volts (High Level) 50 ohms; 2 mV to 20 mV (Low Level) 75 ohms. AGC range: 20 dB. Optional preamplifier and filter available for remote use.

FREQUENCY RANGE:
Any single FCC channel.

IF FREQUENCY:
Visual: 37 MHz; Aural: 32.5 MHz.

VIDEO CHARACTERISTICS

OUTPUTS:
Synchronous detector (2); envelope detector (2); double sideband detector. All are 1 volt P-P, 75 ohms. Nominal voltage at output of envelope detector and double sideband detector is 0 volts DC for 0 carrier. Offset voltage at output of synchronous detector is adjustable.

FREQUENCY RESPONSE:
± 0.4 dB, to 6 MHz, any output, without aural notch. ± 0.5 dB to 3.8 MHz. -4 dB or better at 4.18 MHz (with sound notch).

ENVELOPE DELAY:
± 20 ns to 6 MHz without aural notch. Within ± 20 ns of complement of FCC curve 73.687 (a) (5) to 3.8 MHz; within ± 100 ns from 3.8 MHz to 4 MHz (with sound notch).

DIFFERENTIAL PHASE:
1° or less. Measured with 10-step staircase waveform with ± 10 IRE units superimposed subcarrier (3.58 MHz). Luminance modulated to 12.5% of sync peak.

DIFFERENTIAL GAIN:
4% or better. Measured with same test signal as differential phase.

SIGNAL TO NOISE:
44 dB peak-to-peak below black to white transition at 20 mV input level.

LOW FREQUENCY TILT:
2% or less.

ZERO CARRIER REFERENCE:
Switchable vertical rate reference pulse on envelope and double sideband detector.

AUDIO CHARACTERISTICS

OUTPUT VOLTAGE LEVEL:
0 dBm ± 2 dB, 600 ohms, balanced.

FREQUENCY RESPONSE:
(30 Hz to 40 kHz direct mode; 30 Hz to 15 kHz intercarrier made.) ± .5 dB relative to 75 us de-emphasis. ± .5 dB without de-emphasis.

DISTORTION:
.5% at ± 25 kHz deviation, direct mode.

FM NOISE:
Direct: 63 dB RMS below 0 dBm after 75 usec de-emphasis. Intercarrier: 50 dB RMS below 0 dBm after 75 usec de-emphasis.

AM NOISE:
55 dB RMS below 100% modulation of aural carrier measured after de-emphasis.

FREQUENCY MONITOR CHARACTERISTICS

RESOLUTION:
10 Hz.

DRIFT RATE:
7.5×10^{-9} per day.

RANGE:
± 3 kHz.

OPERATING CHARACTERISTICS

SUPPLY VOLTAGE:
115 V ± 10% or 230 V ± 10%, 50/60 Hz.

AMBIENT TEMPERATURE RANGE:
0° to 55° C.

HUMIDITY:
0 to 95%.

ALTITUDE:
0 to 7500 feet.

MOUNTING:
Standard 19-inch rack mount. Down Converter, Aural Demodulator, Frequency Monitor - each 3½ inches high; Visual Demodulator - 5¼ inches high.

Ordering Information

TD-80 Down Converter	
Low Band	**994-7184-001**
High Band	**994-7184-002**
UHF	**994-7184-003**
TN-80 Visual Demodulator	**994-7185-001**
TA-80 Aural Demodulator	**994-7186-001**
TF-80 Frequency Monitor	**994-7187-001**

HARRIS CORPORATION Broadcast Products Division
123 Hampshire Street, Quincy, Illinois 62301

CP-1.5M-575

ADV. 427A PTD. IN U.S.A.

TN-80 TV VISUAL DEMODULATOR

Harris' all solid state TV Visual Demodulator is designed to provide the characteristics of an ideal television receiver, and may be used for precision measurement and monitoring of visual transmitter performance as required by FCC regulations. It is also designed to measure other important transmitter parameters, such as incidental phase modulation, that up to now have been difficult to measure with existing equipment.

For the first time, three types of detectors are included in one visual demodulator. These are: diode double sideband envelope detector; standard Nyquist envelope detector; synchronous Nyquist detector.

The diode detector provides an ideal diode response characteristic with no bandpass limiting, for the purpose of making measurements conforming to FCC requirements. An aural notch is included in this detector to allow measurement without interference from the aural transmitter.

The Nyquist envelope detector provides detection with standard Nyquist filter characteristics to allow conventional monitoring and measurement of the transmitted visual signal.

The advance-design synchronous Nyquist detector enables visual transmitter measurements to be made through an ideal receiver, with a detection method free from quadrature distortion inherent in envelope detectors.

Both the Nyquist envelope detector and the synchronous Nyquist detector feature an aural notch that may be switched in or out of the circuit.

Harris' TV Visual Demodulator provides full-time video outputs, on the back panel, for each of the three detectors. A front panel output is switchable between the two Nyquist detectors. This allows greater versatility and ease of operation in monitoring and measurements.

A common vertical interval chopper, driven from internal sync separators or from an external signal, provides a zero carrier reference pulse to each of the envelope detectors for measurement of modulation depth.

The TN-80 Visual Demodulator operates at standard 37 MHz visual and 32.5 aural IF frequencies. The TD-80 Down Converter is used to enable the TN-80 to be used at the transmitter site or studio for monitoring any VHF or UHF channel.

HARRIS COMMUNICATIONS AND INFORMATION HANDLING

TA-80 TV AURAL DEMODULATOR

The Harris TA-80 is a solid-state TV Aural Demodulator designed to meet FCC requirements for measuring total modulation of the TV aural signal. It is one of the new generation of Harris solid-state TV monitors, and operates in conjunction with the Harris TD-80 TV Down Converter.

The TA-80 is FCC type approved and furnishes accurate measurement, due to the inherent stability of the circuit design. Reliability has been proven by rugged environmental chamber tests with varying line voltage.

Another important feature of the TA-80 is the "easy-to-use-and-understand" design. Frequently used controls and terminals are on the front panel; occasionally used controls and terminals are on the rear; and alignment controls are easily accessible inside.

Front panel controls are: a polarity knob switch, a flasher "% Modulation" adjustment knob, a switchable "De-emphasis" pushbutton, and four interlocked function pushbuttons for "AM Calibrate", "FM Calibrate", "Direct", and "Intercarrier" modes of operation. Also included on the front panel are the modulation meter, a power indicator light, and a BNC monitor jack for convenient connection of meters and oscilloscopes.

The rear panel of the TA-80 includes the IF level adjustment, and clearly marked fuses and terminals. Outputs for composite audio, a multiplexed subcarrier and AM noise are provided on BNC jacks on the rear panel. The rear panel terminal strip has a balanced audio output and connections for a remote meter and flasher.

All circuits of the TA-80 are easily accessible for maintenance. The layout of the seven printed circuit boards permits any component or subassembly to be removed without disturbing other circuit elements.

In the "Direct" mode of demodulation, the aural IF signal is directly demodulated. This mode is used for measurements of frequency response, distortion, and signal-to-noise on the aural transmitter.

In the "Intercarrier" mode of demodulation, the aural IF signal is mixed with the visual IF signal and the intercarrier signal is demodulated. This mixing process is similar to that used in home receivers and allows the effects of incidental phase noise of the visual transmitter to be measured. Thus, the "Intercarrier" mode is used for normal monitoring and for measurements of intercarrier noise.

The FM detector is a pulse-counting type and is characterized by wide bandwidth and low distortion. Excellent stability is achieved by the use of temperature-stable components. Phase linear mixers and limiters are used throughout the design to minimize incidental phase noise.

In the "AM Calibrate" mode, the signal level is calibrated by the front panel meter so that AM noise on the aural carrier can be read directly on a voltmeter attached to the rear panel "AM Noise" output.

In the "FM calibrate" mode, an accurate FM signal is generated to verify the instrument accuracy.

HARRIS COMMUNICATIONS AND INFORMATION HANDLING

TF-80 TV FREQUENCY MONITOR

The Harris TF-80 solid-state TV Frequency Monitor is a completely new design offering high-quality performance, exceptional reliability, and economical operation and maintenance. The TF-80 is designed to meet FCC visual and aural carrier frequency monitoring requirements, and operates in conjunction with the TD-80 TV Down Converter.

Besides supplying continuous frequency monitoring with digital readout, the TF-80 provides an immediate indication and alarm in case of transmitter frequency error for any cause. The unit has auxiliary contact closures at ± 1kHz for remote alarms in unattended operation. It also provides an instant indication and alarm in case of insufficient visual transmitter RF output or visual transmitter failure.

A major advantage of the TF-80 is its ease of readout and interpretation. The digital presentation requires no time-consuming adjustments and interpretations, and no special operator training is required. The TF-80 is a specialized unit--it performs continuous and accurate TV frequency monitoring, and its design is not compromised by the addition of modulation monitoring functions.

A three-digit display indicates the magnitude of the frequency error, and a "plus-minus" indicator shows error direction. Resolution of the TF-80 is 10 Hz. The characteristics of the monitor provide a non-ambiguous display, and allow a transmitter to be quickly tuned back to frequency if a sudden offset occurs. A frequency error of ± 1 kHz activates an "Alarm" LED (light-emitting diode). Above ±5.11 kHz error, the digits are blanked. From ± 5.11 kHz to ± 40 kHz error, only the "plus-minus" indicator is displayed. For frequency deviations greater than ± 40 kHz, the "plus-minus" indicator is blanked.

The TF-80 utilizes high-reliability TTL integrated circuitry, and the unit has been thoroughly proven by environmental chamber testing. All TTL logic integrated circuits are easily accessible in sockets and are protected from over voltages by clamper circuitry.

The frequency standard and timing circuit generates the following: one-second "counting" pulses for the frequency counter circuit; "store" pulses which store the error information in the memory and decoding circuitry; and "reset" pulses that initialize the counter for the next one-second counting period. A crystal-controlled oscillator mounted in a proportionally-controlled oven provides a 2.097152 MHz signal from which the one-second pulse is derived. The incoming RF signal is averaged for one second once every two seconds.

The additional warning of visual transmitter output failure or overmodulation of the visual carrier is provided by the "Low Input" light-emitting diode on the front panel. This circuit is activated if the incoming RF signal falls below the required threshold of the circuit. Unlike other designs, there is no loss of indication when the visual carrier is overmodulated beyond 5%. A unique circuit "remembers" the last valid measurement until the modulation of the visual carrier returns to normal for the one-second counting period.

HARRIS COMMUNICATIONS AND INFORMATION HANDLING

CVS 504B NTSC "universal" digital video signal corrector

CVS Consolidated Video Systems

Whatever your needs are–the CVS 504B Digital TBC will dramatically maximize the video output of your VTR

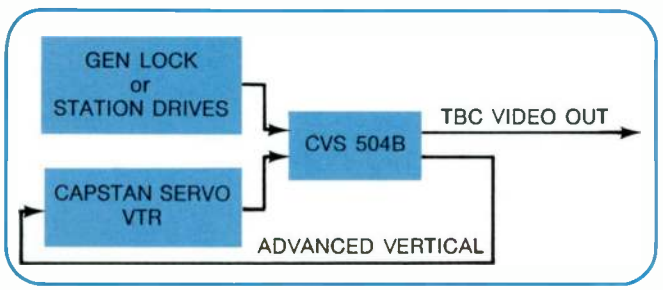
GENERAL

The CVS 504B Digital Video Signal Corrector employs digital techniques to improve NTSC full-bandwidth color signals, heterodyned color signals and monochrome signals from helical-scan VTR's with or without capstan servos. An output signal from almost any helical-scan VTR can be made into a broadcast-quality signal or significantly improved by the CVS 504B.

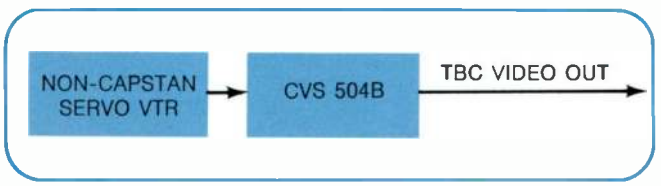
Broadcasters, Cable TV operators, Educational TV producers, Industrial TV producers and all others involved in the generation of helical video signals have a genuine opportunity to maximize the video output of their VTR's.

Capstan Servo VTR's (V Lock) When processing mono or color video signals from capstan servo'd VTR's, the resulting time base corrected output of the CVS 504B will meet FCC broadcast quality standards. When externally driven or gen-locked, the output video signal will be synchronous to station sync, allowing this signal to be treated as a camera source. With full-bandwidth (direct) VTR's the CVS 504B inherently corrects low frequency color velocity errors. (For total velocity correction see options.)

The CVS 504B video output of the heterodyne (process) color VTR's will be phased and color interlaced with the external sync sources.



Non-Capstan Servo VTR's (Line Lock) With non-capstan servo'd VTR's, the CVS 504B will stabilize the video signal. Since the VTR contains horizontal lock only, it cannot be locked to an external timing reference. Because of this, the CVS 504B must be operated in the "Internal Sync" and "Line Lock" modes which will provide all the necessary timing signals. The "Internal Sync" can also supply drives to auxiliary equipment allowing inexpensive VTR's to be used for live-production sources. The heterodyne color VTR output from the CVS 504B will remain a heterodyne color video signal. By engaging the color interlace switch, time base corrected tapes can be dubbed to any master recorder, including quads. When played back, these tapes will contain color interlaced signals.



Monochrome VTR Signals The CVS 504B has a built-in color sensing circuit. When burst is not present, the CVS 504B will automatically function in the monochrome mode of operation. In addition, the front panel has an override feature which will allow the CVS 504B to function in the "Monochrome" mode of operation at any time it is desired.

FOR PRODUCTION

Virtually any VTR can be used as a camera source By using the built-in sync generator in the CVS 504B to externally drive either a camera of a film chain, even a non-capstan servo'd heterodyne color VTR can be used as a camera source. In effect, the recorder and the camera will be gen-locked. Inexpensive VTR's can easily become a live production source. Even "Rover" type recordings can be integrated into production.

Permits fades, wipes, and special effects never possible from many VTR's Again by locking the output signal from the 504B together with other sources through a special effects generator, it is now possible to use a signal from a relatively inexpensive VTR in a production . . . fades from recorder scenes to live cameras or any special effect can now be well within the capability of the simplest studio system.

Enables lightweight portable remote recordings With a CVS 504B in the studio, remote field recordings need no longer require a van of equipment. Simply pick up a lightweight recorder and camera, take them in the station wagon, and when you return to the studio, the CVS 504B will permit dubs up to your master recorder.

Breathes new life into old tapes Incorrect video levels, improper color phase, sloppy time base errors—all these problems of the past can be eliminated with the CVS 504B and its built-in processing amplifier.

FOR GENERAL PLAYBACK

Whether for broadcast or cable, mono or color, heterodyne or wideband color, capstan servo or non-capstan servo, the CVS 504B will improve the playback of a non-segmented helical VTR.

FOR POST PRODUCTION

Takes hours away from editing chores Tension errors, time base errors, excessive skew, and incorrect video and chroma levels are just a few of the editor's nightmares. The CVS 504B can handle them all while easily frame locking vertical interval edits.

Duplicating Making acceptable copies from unstable masters is a constant problem. The CVS 504B now offers the practical and simple solution.

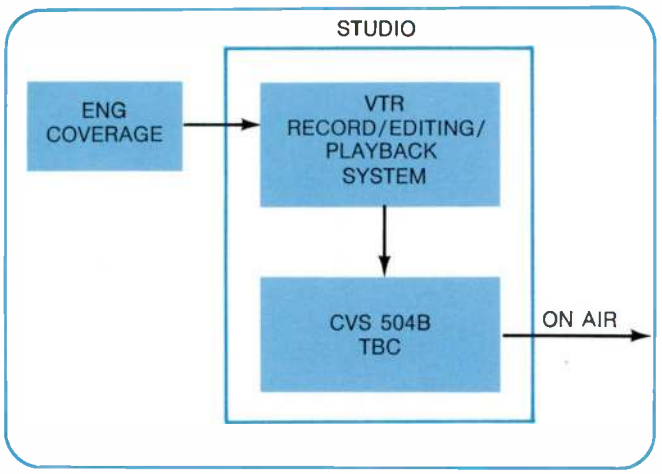
Dubbing helical signals up to mastering recorders including quads Virtually any recording can now be made more useful by the "color interlace" capability of the CVS 504B. The dubbing of non-capstan servo'd heterodyne signals up to any master recorder with a capstan servo is no problem.

Here are but a few specific applications of the CVS 504B

ELECTRONIC JOURNALISM

Electronic Journalism (EJ) is a hot topic in the broadcast industry. The CVS digital TBC continues to play an important role in this rapidly developing technology. Now more than ever, with continued rising costs and fierce competition, EJ has become a must. And why not? . . . It reduces your capital investment requirements, allows total flexibility and simplicity in field coverage, and provides the most powerful and dynamic communication tool right at your fingertips.

Electronic News Gathering (ENG) is currently the most visible aspect of EJ. The CVS TBC plays an integral part in allowing very little, if any, delay in getting material on the air. Use an inexpensive portapak for on the spot news coverage, deliver video tape back to the studio, edit and play back tape directly on the air through a CVS 504B TBC. For time-delay coverage, microwave the event to the studio, record it on an inexpensive helical machine and play it back through a CVS 504B TBC for broadcast.



NETWORK DELAY BACK-UP WITH HELICAL VTR

The CVS 504B with an inexpensive helical VTR can be used as a back up for all network delay recordings. Simply record the program on one quad and simultaneously record the same program on a helical VTR. Your second quad is now released from back-up duty, allowing more efficient utilization of this machine for in-house productions (commercials, etc.). The net result is a reduction in your operation cost.

PRODUCE TRAINING AND OTHER EDUCATIONAL PROGRAMS IN YOUR OWN FACILITY

The CVS 504B with an inexpensive portable helical VTR (B/W or color) can now be utilized in training and other educational programs. You will have instant results, allowing immediate playback for editing, review or actual training purposes, at CVS 504B quality. If duplicates are required, simply use the 504B TBC to dub-up to any master recorder. Total expenses in labor and material required for production by other means, such as film, are significantly reduced.

PRODUCTION OF ADS, DOCUMENTARIES, SPECIAL FEATURES, ETC.

Utilizing an inexpensive helical VTR and a CVS 504B will enable you to produce commercials, special documentaries, or any special assignments at substantial savings. Immediate playback of the video tape allows quick review for evaluation. Many laborious and time consuming steps are eliminated reducing total possible time requirements significantly. Simply dub the finished product up to quad or any other master recorder for duplication and final distribution. In addition to cost and time savings, you have much greater flexibility in managing production requirements. The net result . . . a more efficient operation, happy customers and . . . more business for you.

CORRECTING PROBLEM TAPES WHETHER FOR CATV OR CCTV

With a CVS 504B, you now have the ability of correcting problem tapes at the "head end" of a broadcasting system. The CVS 504B will lock up within seconds, allowing switching from variable inputs. This enables the use of one CVS 504B TBC for several VTR's. What this means to you is a higher quality product eliminating those continuous complaints about "hooking," "tearing," and overall poor picture quality.

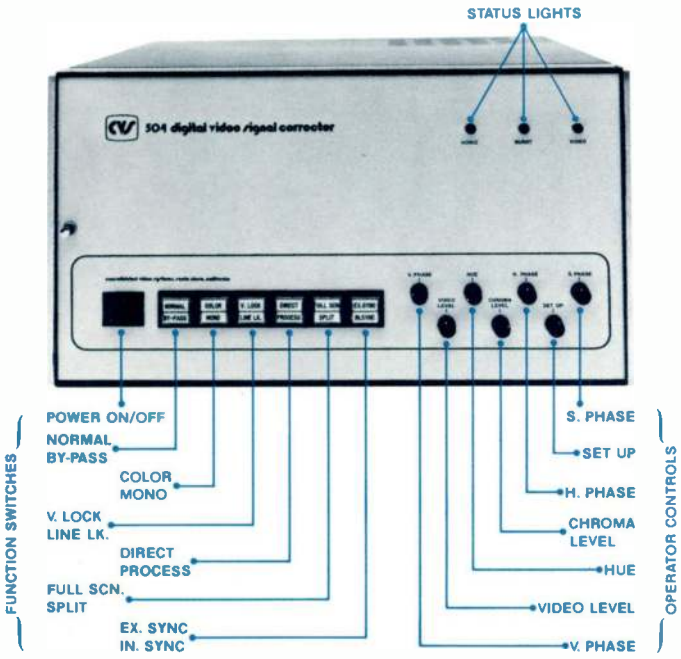
THE CVS 504B IS MUCH MORE THAN JUST A TBC!

The CVS 504B will interface with helical VTR's without requiring any modification to the VTR. Interface with any of the editing systems on the market is possible offering total flexibility in production, editing and broadcasting of those signals.

The CVS 504B is much more than a TBC, it is a full gen-lockable sync generator and NTSC Proc Amp. Not only is the video signal time base corrected, but the Proc Amp allows correction for hue, burst level and sync; proper pedestal and sync levels are re-inserted. The gen-lock generator in conjuction with a capstan servo VTR allows the VTR to be completely synchronous with your present system.

As you can see, the CVS 504B is a necessity in any video facility . . . and there is much, much more the CVS 504B can do for you. Is there a unique application problem? . . . Contact CVS application engineering department. We are anxious to assist.

The CVS 504B digital Vide combines an extraordinary standard features



FRONT PANEL CONTROLS

The front panel controls of the CVS 504B allow operation and interface with many types of VTR's, requiring only front panel operator control.

Functional switches on the front panel light up to indicate which mode of operation has been engaged.

- ☐ "Normal / Bypass" mode allows the operator to go to "by-pass" to check video input or "normal" to check the TBC output.
- ☐ "Color / Mono" mode controls color-lock and reinsertion of color burst. Has no effect when processing a monochrome signal.
- ☐ "V-Lock / Line-Lock" mode configures circuits to process video from capstan servo (V-Lock) or non-capstan servo (Line-Lock) VTR's.
- ☐ "Direct / Process" mode allows the CVS 504B to time base correct a wideband (direct) color VTR in the "Direct" mode regardless of whether it is a capstan or non-capstan servo'd VTR. The "Process" mode is for standard heterodyne color video signals from capstan and non-capstan servo'd heterodyne VTR's.
- ☐ "Full Screen / Split Screen" mode selects normal operation in "Full-screen" or inhibits time base correction during top half of each frame in "Split Screen."
- ☐ "Internal / External" mode allows the operator to select the subcarrier drive the CVS 504B is to be locked to.

Status Lights The status lights indicate whether or not input requirements to the TBC are correct.

Operator Controls The CVS 504B front panel is equipped with seven operator controls designed to optimize efficiency in set-up and adjustment.

Additional secondary switches are available behind the front panel, accounting for still greater flexibility and capability of the CVS 504B. For example, at the "flip of a switch," the CVS 504B can: (1) work with a non-standard sync source, (2) engage its color interlace feature for dubbing a heterodyne VTR to a master recorder, (3) compensate for re-inserted sync inherent in VTR's with built-in DOC, . . .

NOTE: All operator controls work on DC voltage, allowing you to provide your own remote control installation.

More than ±95 microsecond window of correction. Until now, the correction of helical video signals has been severely limited by the conventional window of correction of no more than 4 microseconds. CVS has changed all that by providing a digital storage and processing capability to enlarge microseconds in either direction. From here all the good things begin.

The CVS 504B Locks Up in Milliseconds With a capstan servo'd VTR, the CVS 504B literally color locks within milliseconds once the VTR reaches vertical lock. The total lock up time required from the time you hit the play button to full color lock varies from 2 to 5 seconds depending on the tape path of the recorder involved.

Total Flexibility Monochrome signals, heterodyne color signals, direct color signals — with and without a capstan servo — the CVS 504B can improve the time base errors and add an entirely new dimension to the utilization of what you probably already own or have already recorded.

Simplicity The CVS 504B requires no complex "conversational loop" back to a VTR. It can operate within a system using "house sync," or by itself providing its own sync. To gen-lock a recorder, simple output connections are provided to feed sync information to the VTR.

Vertical Interval Editing Made Easy Vertical interval edits have presented a problem for a long time. With the odd and even fields present, one originating at the beginning of a horizontal line and the other beginning in the middle of a horizontal line, the chances of hitting the correct even-odd fields are not good. The average helical VTR might hit odd-even or even-even or odd-odd.

The CVS 504B could not care less whether it is even or odd when it edits into the fields. It has a sufficiently large window to correctly reproduce the field sequence regardless of where the edit falls.

Velocity Compensation Perhaps the most misunderstood aspect of a VTR's recording is its velocity error. In general, a velocity error is a frequency error, not an error in time. Since the CVS 504B locks to both the horizontal sync and the color burst frequencies of the input video, it can correct to the average of the frequency error of what the signal is whether V locked or not. Inherent, therefore, in the CVS approach to time base correction, is velocity compensation. (See options for total velocity correction.)

Color Interlace In the color interlace mode, the CVS 504B can literally create phased, interlaced color signals from heterodyne color VTR's without a capstan servo. By engaging the color interlacer switch, tapes played on such machines as Sony ¾" Umatic cassette recorders can now be dubbed to a quad (or any other capstan servo'd recorder) and, when they are played back, they will contain phased interlace color signals. This feature produces a signal which interlaces and phases heterodyne color recordings. The frequency of this signal is well within the tolerance of any capstan servo'd recorder to capture.

Signal Corrector
array of

Built-In Gen-Lock EIA Sync Included in the CVS 504B is a full EIA sync generator with normal Horizontal and Vertical drives, burst flag, 3.58 subcarrier composite blanking, composite sync and advance vertical signal outputs.

Gen Lock This will allow the CVS 504B to lock to a composite NTSC color signal or a black burst signal, eliminating the need to supply composite sync, composite blanking and subcarrier to synchronize the CVS 504B to an external sync source. This function lets you gen-lock to your present systems without the normal timing problems.

Built-in Processing Amplifier Included in the CVS 504B is a self-contained processing amplifier. The output signal contains re-inserted sync, blanking, and (if color) burst information.

Re-Generated 3.58 MHz A unique feature of the CVS 504B, not a necessity, is its ability to convert all heterodyne VTR's to "Direct" interlace color before time base correction. The CVS 504B re-builts and interlaces burst off the heterodyne VTR and supplies this "re-generated" signal to a special 3.58 MHz rear panel connector. Now you can remove the active 3.58 MHz crystal in a heterodyne VTR and replace it with the "re-generated" 3.58 MHz from the CVS 504B. This modification standardizes the 3.58 heterodyne process of the VTR, resulting in a burst stable signal. The net result is an improved video signal from the VTR. Since the CVS 504B does not degrade the input, the TBC output will reflect this higher quality input from the VTR, improving play-back performance.

Modular design of CVS 504B The engineering design of the CVS 504B pays strict adherence to ease of operation and maintenance for the end-user. For example: all circuitry is based on a modular concept with most intra-related circuitry on individual plug-in boards and common board interchangeability; power transistors are mounted on the rear case to eliminate heat problems; the CVS 504B is portable and easy to carry (total weight, 45 lbs.), or is easily rack-mounted in any standard 19 inch rack (19″ wide x 8¾″ high x 16″ deep) plus many other special features.

CVS 504B Operation and Maintenance Manual Included with each CVS 504B is a complete operation/maintenance manual. This manual is divided into six major sections with each section supported by actual photographs and/or diagrams: (1) General information, (2) Installation, (3) Operation, (4) Theory of operation, (5) Maintenance, (6) Drawings (both assembly and schematic diagrams on one fold out page.)

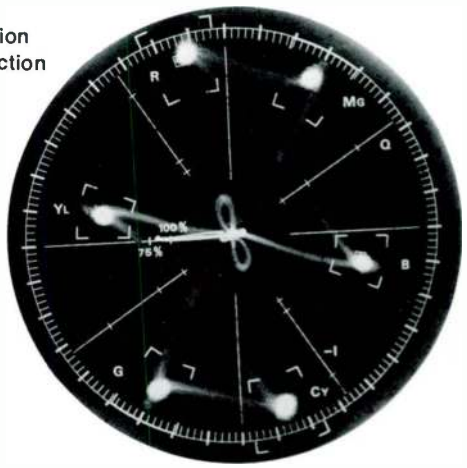
Complete Service Network CVS and its distributors each offer you several years of field experience in digital video technology. Clearly, we have much more to offer in the support functions of the digital TBC than any one else. Most important, our distributors are required to complete extensive training programs to insure the qualified service you are entitled to. In addition, training seminars are offered on a regular basis at many different locations.

Options

CVS Model 5042 Velocity Corrector

Color Bar Presentation
Without Velocity Correction

Color Bar Presentation
With Velocity Correction



The CVS Model 5042 Option has been designed to work in conjunction with Model 504A & B series of Time Base Correctors to correct the velocity errors which remain after the correction which inherently takes place in the TBC.

The basic CVS Model 504B inherently corrects color velocity errors across a field of video and shows changing errors across each horizontal line. There are additional velocity errors across each horizontal line which are much higher in frequency. These are the errors which CVS Model 504B Time Base Corrector cannot correct by itself, and consequently must be removed by the CVS Velocity Corrector.

Typically the improvement in performance from the Model 5042 Option can be observed as a lessening of "color streaking." In a color bar test pattern, this is usually most visible on the blue or magenta color bars. A color bar pattern observed on a vectorscope gives a measurable display of the improvement. Since the yellow vector is on the left side of a monitor display and the blue is on the right, then the desired effect is a vector display of blue and yellow of the same size on a vectorscope. This would tend to indicate that no velocity errors remain uncorrected across a line of video from left to right.

Model 5042 Option will work only with a recorder input signal of the wideband or direct color recovery type. In other words, for the Model 5042 Option to perform its function, the VTR signal being fed to the TBC cannot be a heterodyne color signal.* (Ampex Models 7900, 7800 and 5800 and IVC Models 960, 870, 825, 800 are examples of VTR's with color signals ideally suited for the Model 5042 Option). The VTR input signal may be either capstan servo'd (V-locked) or non-capstan servo'd (line locked).

Shown on the previous page are 2 photographs taken of a vectorscope presentation of an Ampex Model 5800 VTR playing back a color bar pattern through a Model 504B TBC with or without Model 5042 Velocity Corrector.

*Under certain conditions, in conjunction with Model 5044 Heterodyne Phase Corrector, Model 5042 Option can be made to work with a heterodyne VTR signal. Please see the literature for Model 5044 for details.

CVS Model 5044 Heterodyne Phase Corrector

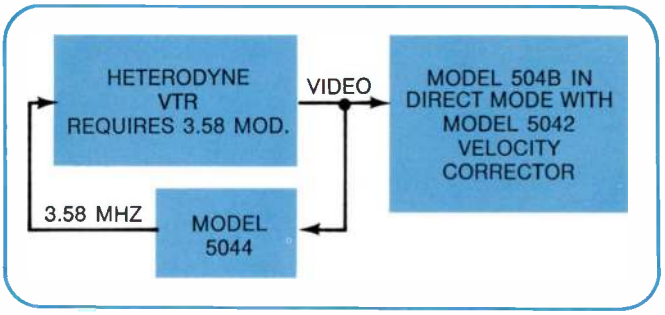
The purpose of the Model 5044 is to work in conjunction with the CVS 504A & B Time Base Correctors and with the CVS Model 5042 Velocity Corrector, to permit the correction of velocity errors from a heterodyne color VTR. The Model 5044 is a stand-alone device that corrects the phase relationship of a heterodyne color signal and permits the 504B to be operated in the wide band "Direct" mode. To understand how the Model 5044 accomplishes this, we must examine the heterodyne color signal.

A heterodyne color signal, by its very defnition, contains color information that is not in the proper phase relationship to its accompanying Vertical and Horizontal pulses. The Model 5044 accepts the output color signal of a heterodyne VTR and develops a reference 3.58 MHz signal. It is this reference 3.58 MHz signal, when fed back to the VTR, that establishes the relationship between the color information, H and V. The resultant VTR signal now has color in the correct phase with the rest of the video signal. Accordingly, the color will probably not appear locked on a monitor due to time base errors within the VTR, but its phase relationship will be correct and the signal may be treated as a direct color signal. The CVS 504B TBC can correct the frequency errors of a capstan servo'd VTR and produce a color signal from a heterodyne VTR which is both correct in phase and frequency. As a result, the VTR has an enhanced signal to noise ratio.

Additional Capability

The Model 5044 can help correct low frequency velocity errors in heterodyne VTR's without the Model 5042 Velocity Corrector. This is possible because the input to the TBC will be at 3.58 MHz. The TBC process can now occur in the wide band "Direct" mode, which utilizes the inherent capability of the basic CVS TBC to correct low frequency velocity errors. The net result will be equivalent to that of a direct color VTR processed through the basic CVS TBC.

To provide standard operation of the heterodyne VTR, simply switch the Model 5044 to the "By Pass" mode. An internal crystal oscillator now provides the 3.58 MHz feed, which establishes normal heterodyne color output from the VTR.



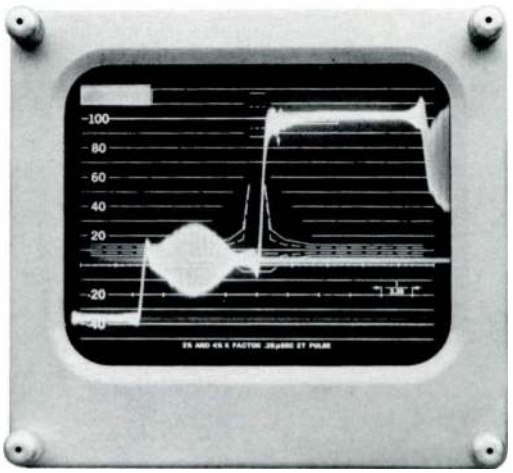
Shown below are two photographs taken of a waveform monitor presentation of a Sony 1600 VTR output with and without the Model 5044 Heterodyne Phase Corrector.

The Model 5044 is a stand-alone device approximately 3″ high, 7½″ wide and 11″ deep:

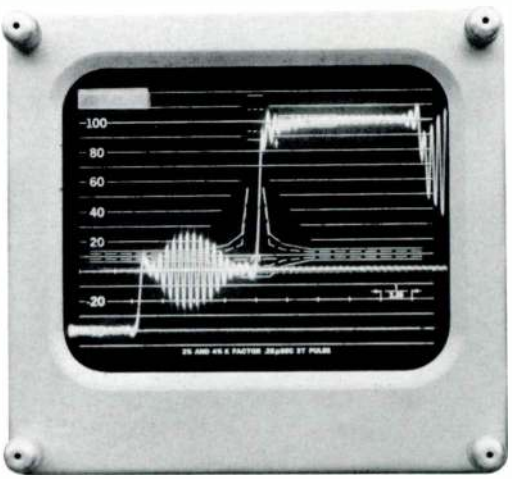
Input: Loop through video
Output: 3.58 MHz
Power Consumption: 115 V/60 Hz, 6 watts
Weight: Approximately 6 lbs.

Rack Slides

The CVS 504B is easily installed in any standard 19 inch rack. A complete rack mount kit is available as an option.

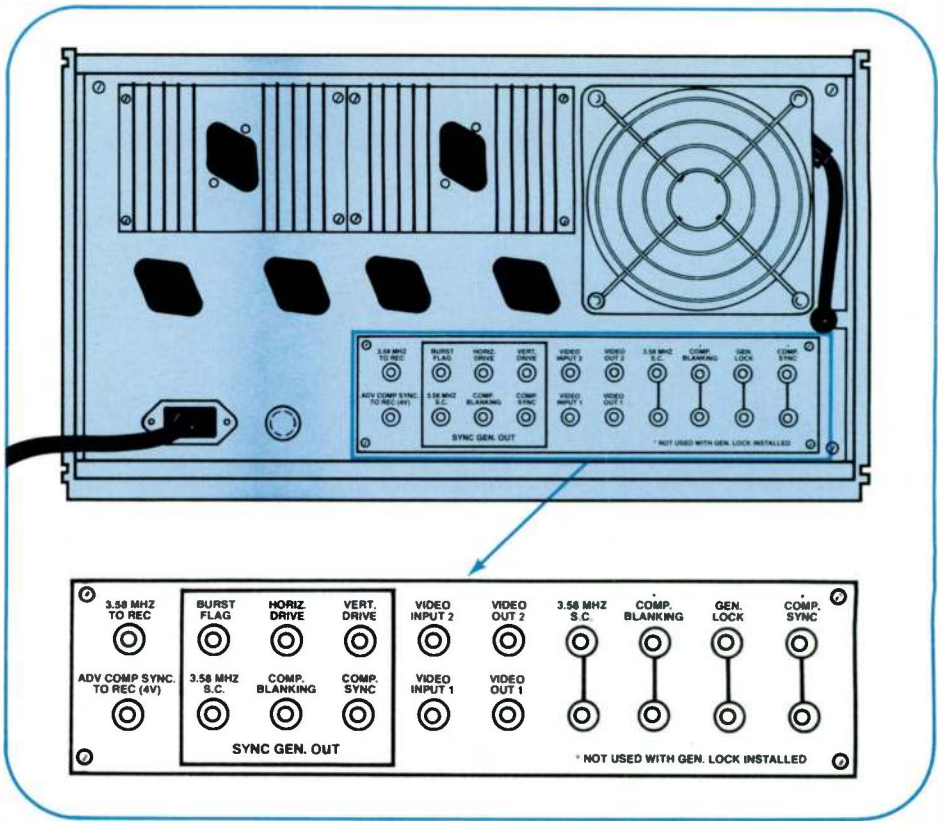


Burst presentation without Model 5044.



Burst presentation with Model 5044.

CVS 504B specifications



VIDEO

Television Signal Standard Accepts NTSC standard, 525 line/60 Hz signals

Recorder Interface Requires a standard signal from any non-segmented helical VTR with or without capstan servo and/or with or without color. If color is present, it may be direct color or heterodyne color.

Window of Correction ±1.5 h (horizontal line). 9 h memory.

Resultant Time Base Correction* If capstan servo recorder, result will be h-lock ±25 ns. If direct color from capstan servo recorder, the result is ±4 ns (average time base error over 360° at color subcarrier).
If heterodyne color, color subcarrier meets FCC requirements.

K-Factor 1% (2T pulse) if capstan servo'd direct color signal.

Differential Phase Less than 3°.

Differential Gain Less than 3%.

Signal-to-noise >57 dB (p-p signal to rms noise) as measured on Rohde and Schwarz noise meter.

Bandwidth Bandwidth is a function of the recorder, and if color signals are present, the resultant signal is dependent upon whether the color coming from the recorder is direct or heterodyne.
If wideband capstan servo recorder, ±½ dB to 3.58 MHz, down no more than 3 dB at 5.0 MHz.
If color is heterodyne, the resultant bandwidth will be more than 2.5 MHz.

Velocity Compensation The time base corrector locks internally to both horizontal sync and color burst components of the input video, affording time base correction according to the average measurement of the frequency error. Velocity compensation is inherent in this approach.

Color/Mono Compatibility If burst is not present, the CVS 504B automatically selects mono mode.

Lock Time If a capstan servo recorder is used, the CVS 504B will typically, completely color lock a signal in less than 2 seconds. The CVS 504B color locks in less than 1 millisecond once vertical lock is supplied.
If a non-capstan servo recorder is used, normal performance for color lock will be within 2 seconds once the recorder has reached normal operating speed.

EIA Processing Amplifier Included.

Gen Lock EIA Sync Generator Included and may be used as source (single output). Accepts composite video for Gen Lock operation.

Frame Lock Will automatically frame lock segments edited randomly at vertical interval with capstan servo recorder.

Inputs

A. Composite video (Gen Lock input).
B. 3.58 subcarrier (loop through).
C. Video input #1 terminates internally except in by-pass mode.
D. Second switchable video input for timing reference only.

Outputs

A. Two video outputs, switchable composite or non-composite.
B. H, V, composite sync, composite blanking, 3.58 subcarrier, burst flag.
C. Advanced vertical output, 4 volt. RS-170 comp. sync

GENERAL

Size 19″ wide x 8¾″ high x 16″ deep. Shipped as stand-alone unit with rack slides and mounting brackets optional.

Power Approximately 230 W: 110 V, 60 Hz

Weight 45 pounds.

Ambient Operating Conditions
Temperature: 10° to 40° Centigrade
Humidity: 10% to 80%

OPTIONS

Model 5042 Velocity Corrector
Model 5044 Heterodyne Phase Corrector
Rack Slide Kit

*NOTE: Recorder and tape signal to noise capabilities do affect time base stability. The specifications quoted here reflect typical results from high energy tape and are subject to change without notice.

The Company

Consolidated Video Systems, Inc. (CVS) is a private company located in Santa Clara, California USA.

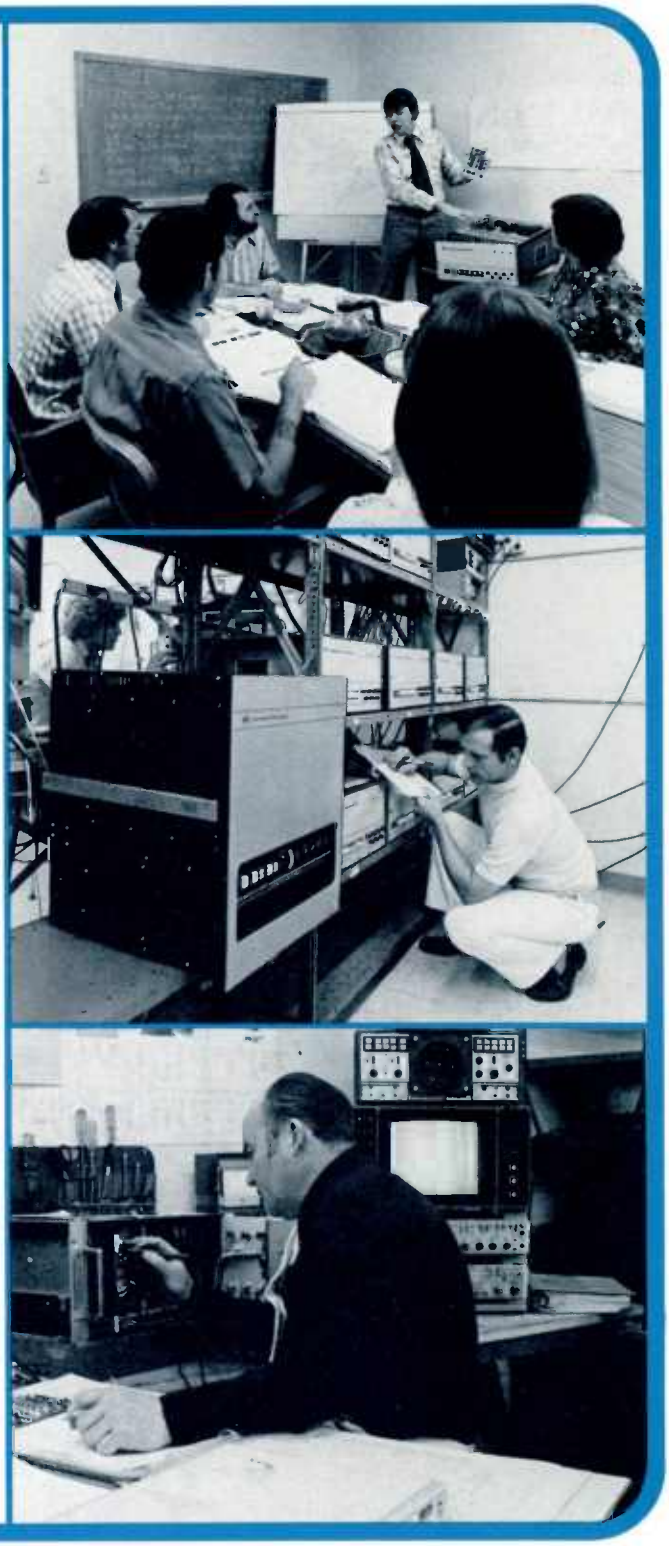
CVS is the original and largest manufacturer of digital video time base correctors. CVS NTSC digital time base correctors are distributed world wide — over 1,200 are now in use. CVS is pleased to include among its customers all four major US TV networks (ABC, CBS, NBC and PBS), many independent commercial and educational stations, most duplicating facilities in the US, and a large number of educational and industrial organizations.

CVS has established a series of quality control functions and procedures to be performed on all CVS products. Workmanship standards are rigid and strictly adhered to. Quality is the first criteria for acceptance.

Pre-testing components helps eliminate infant mortality problems. Point-to-point inspection insures quality of workmanship at every level of production. "Burn-in" of individual printed circuit boards check performance reliability of each assembly. After complete testing and calibration of the end item, the unit is submitted to an extensive final test. This includes a "vibration" test, a "heat" test and a minimum "burn-in" cycle of 100 hours. Complete documentation on each unit is maintained to establish a history of reliability. After final alignment and visual inspection the unit is ready to ship.

CVS distributors are highly qualified to support service needs of CVS products. In addition, CVS field offices offer continuous service and training support dedicated to meet your needs.

CVS is proud to have received the coveted Emmy Award for "outstanding achievement in engineering development" in May, 1974. In addition, CVS has been issued a basic U.S. patent covering the general technique of correcting certain video signals by means of a digital time base corrector.



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DISTRIBUTOR

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HARRIS

WaveStar™

UHF Television Slotted Waveguide Transmitting Antenna

WaveStar™ UHF antenna . . . virtually eliminates

- **Simple, maintenance free waveguide construction**
- **Virtually eliminates lost air time due to superior reliability over coaxial designs**
- **Optimum coverage from available range of horizontal and vertical patterns**
- **No-Cost radome ice protection**
- **Antenna performance accurately verified on comprehensive Harris antenna test range**

The limitations of coaxial transmission line components at UHF frequencies—such as reduced power handling capability, poor reliability and low efficiency—are well known. This is why UHF broadcasters often choose waveguide transmission line for cost effective, trouble-free performance. These same advantages of waveguide transmission line are now available in the Harris WaveStar™ UHF television transmitting antenna.

ULTIMATE RELIABILITY FROM ULTIMATE SIMPLICITY

The Harris WaveStar™ antenna is a slotted array traveling wave antenna made entirely of waveguide. The antenna's waveguide design uses no inner conductors, bullets, insulators, end seals, sliding shorts or other coaxial components that are subject to arcing, burn-out or other catastrophic failures that can take you off the air indefinitely. Fewer parts mean a long life, highly reliable antenna that probably will never fail. Think of it: no repair bills and no lost air time!

TROUBLE-FREE HIGH POWER OPERATION

Like waveguide transmission line, the WaveStar™ antenna is capable of handling input powers in excess of 1000 kilowatts. This means a WaveStar™ antenna can easily handle a 240 kilowatt UHF transmitter without fear of antenna failure.

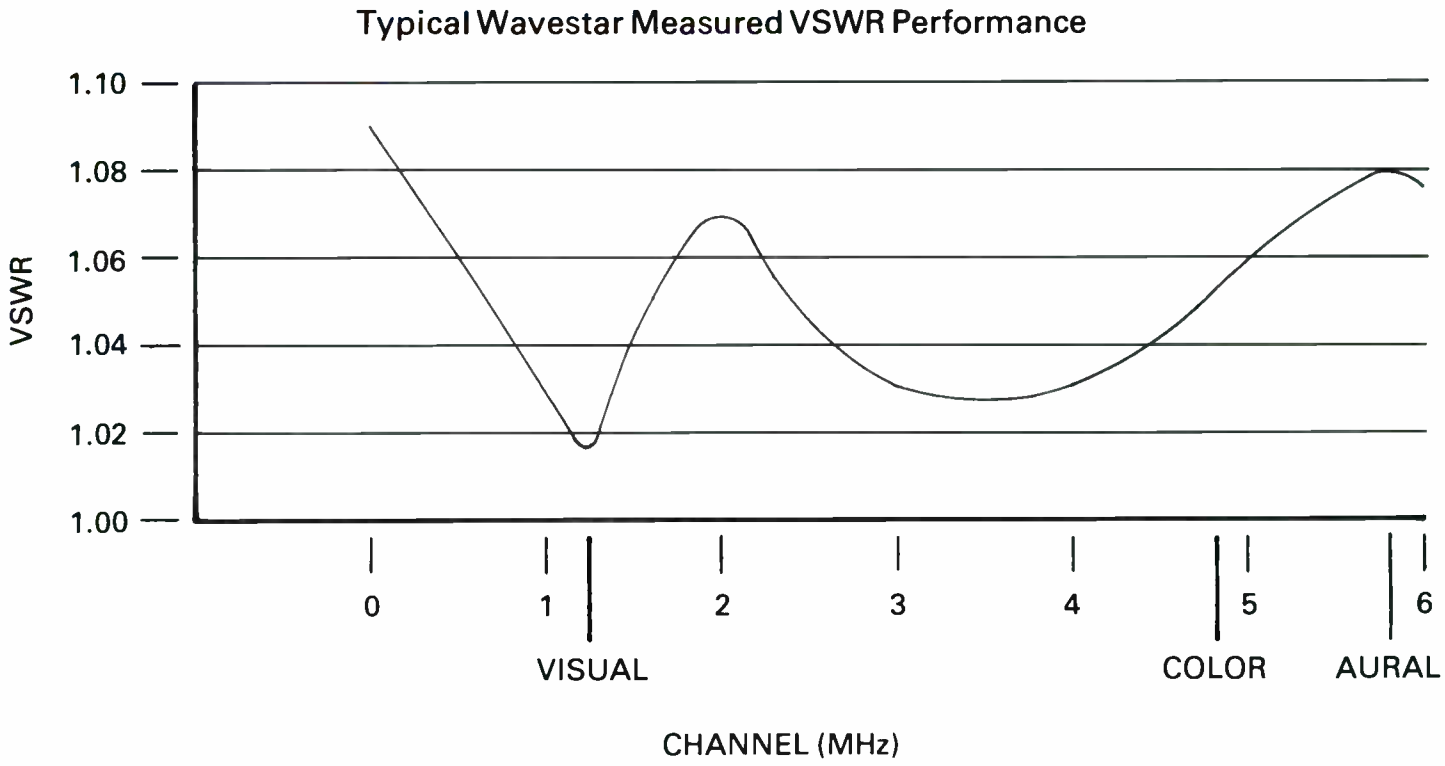
Actual input power ratings of the WaveStar™ antennas are limited by the type of input connection. All antennas are available as standard with 6⅛", 8-3/16" and 9-3/16" coaxial inputs and, except for cardioid pattern antennas, all sizes of rectangular and circular waveguide inputs. Waveguide inputs for the cardioid pattern antennas are available on special request.

PATTERNS TO MEET YOUR REQUIREMENTS

Wavestar™ antennas are available in a highly circular (within +/– 1.0 db) omnidirectional pattern along with cardioid, trilobe and peanut shape directional patterns to meet most coverage requirements. An unlimited range of elevation patterns closely approximating the ideal cosecant squared shape with up to 33% null fill and 2 degrees of beam tilt is easily provided at no additional cost to ensure uniform signal strength throughout your coverage area.

Typical patterns and gain values are shown elsewhere in this brochure.

antenna maintenance costs.



WaveStar™ antennas are precisely optimized for extremely low VSWR. VSWR is specified to be less than 1.05:1 at visual carrier, 1.08:1 at color subcarrier and 1.1:1 across the channel. Maintaining low VSWR at aural carrier is important for optimum stereo separation.

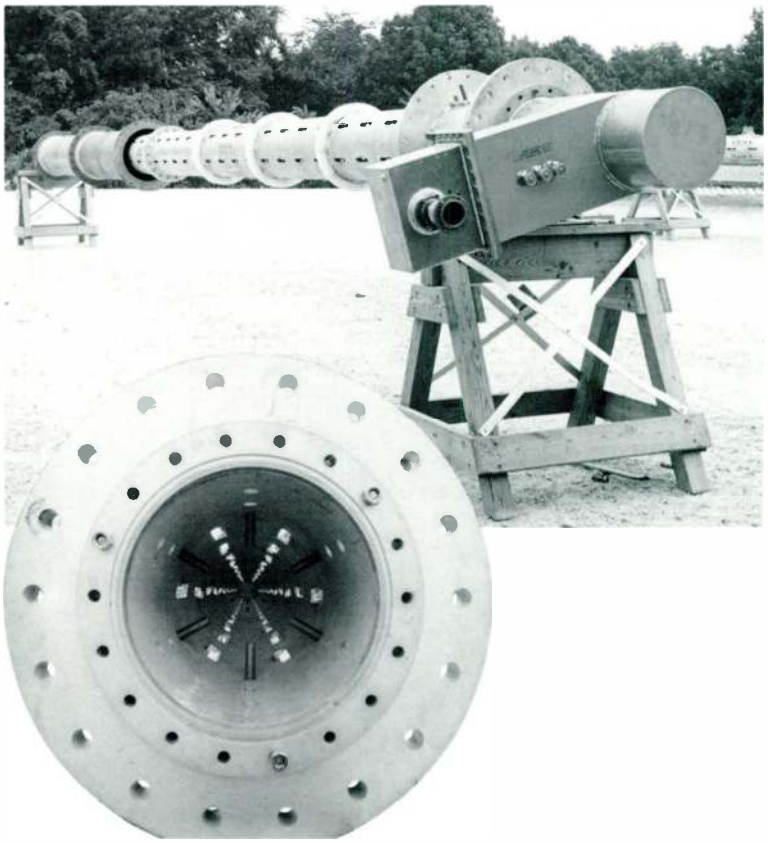
Actual pattern and gain can be varied depending on channel to meet specific customer requirements. Contact your Harris representative for details.

LONG LIFE, HIGH PERFORMANCE MECHANICAL DESIGN

In addition to its simple waveguide design, the WaveStar™ antenna's mechanical construction also greatly contributes to its overall reliability and performance.

Each antenna is simply a hollow, structural steel pipe with radiating slots precisely flame-cut directly into it. The cardioid pattern antenna employs a single row of slots up the length of one side of the pipe while the omnidirectional, trilobe and peanut pattern antennas incorporate a six-around slot arrangement. The cylinder is then hot dipped galvanized as a single unit providing complete and effective corrosion protection of the antenna's internal and external surface areas as well as the slot edges. Hardware and other components are stainless steel or other corrosion-resistant materials. After assembly, the antenna is primed and finish painted, saving you the expense and effort at your site.

All WaveStar™ antennas are designed for 65 psf (approximately 125 mph) windloading conditions as standard. This extra rigidity reduces the chance of mechanical failure, and also minimizes signal strength variations due to tip deflection during high winds. As a result, the WaveStar™ antenna is capable of providing superior, trouble-free performance while withstanding even the harshest environments for many decades.



Typical omnidirectional, trilobe or peanut WaveStar™ antenna construction. The antenna is a slotted length of circular waveguide propagating energy in the TM_{01} mode (same mode as in coaxial transmission line).

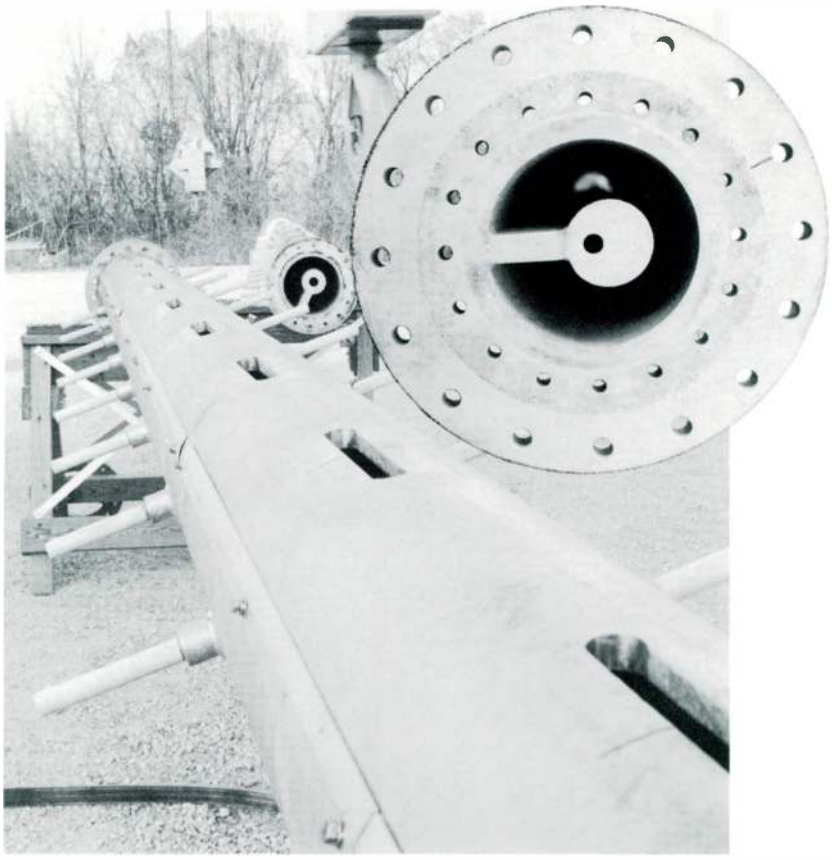
NO-COST ICE PROTECTION

WaveStar™ antennas require no expensive electrical de-icing equipment or AC power. The cardioid pattern antennas all include as standard fiberglass slot covers. Omnidirectional, trilobe and peanut pattern antennas are completely fiberglass, pressure-tight radome enclosed. Full radome enclosed antennas can be pressurized through the transmission line requiring no gas barrier at the tower top. Slot covered cardioid pattern antennas are not pressurized and must have a gas barrier at the input flange.

These radome covers effectively prevent performance-degrading ice build-up around the radiating slots under most icing conditions. For areas that experience extreme icing, special radome coatings are available for even greater ice protection.

WITH A WAVESTAR™, YOU GET CONFIDENCE AT NO EXTRA COST

Each WaveStar™ antenna is completely assembled and thoroughly tested on Harris' 15,000 foot test range. This unique facility is a specially contoured site at the edge of a 230-foot bluff overlooking a flat, unobstructed river flood plain. This almost free-space, reflection-free condition allows measurement accuracy unmatched by any other antenna test facility in the world. Using the most sophisticated test and measurement equipment available, Harris verifies azimuthal and elevation patterns, VSWR and other electrical parameters assuring you of the performance you paid for.

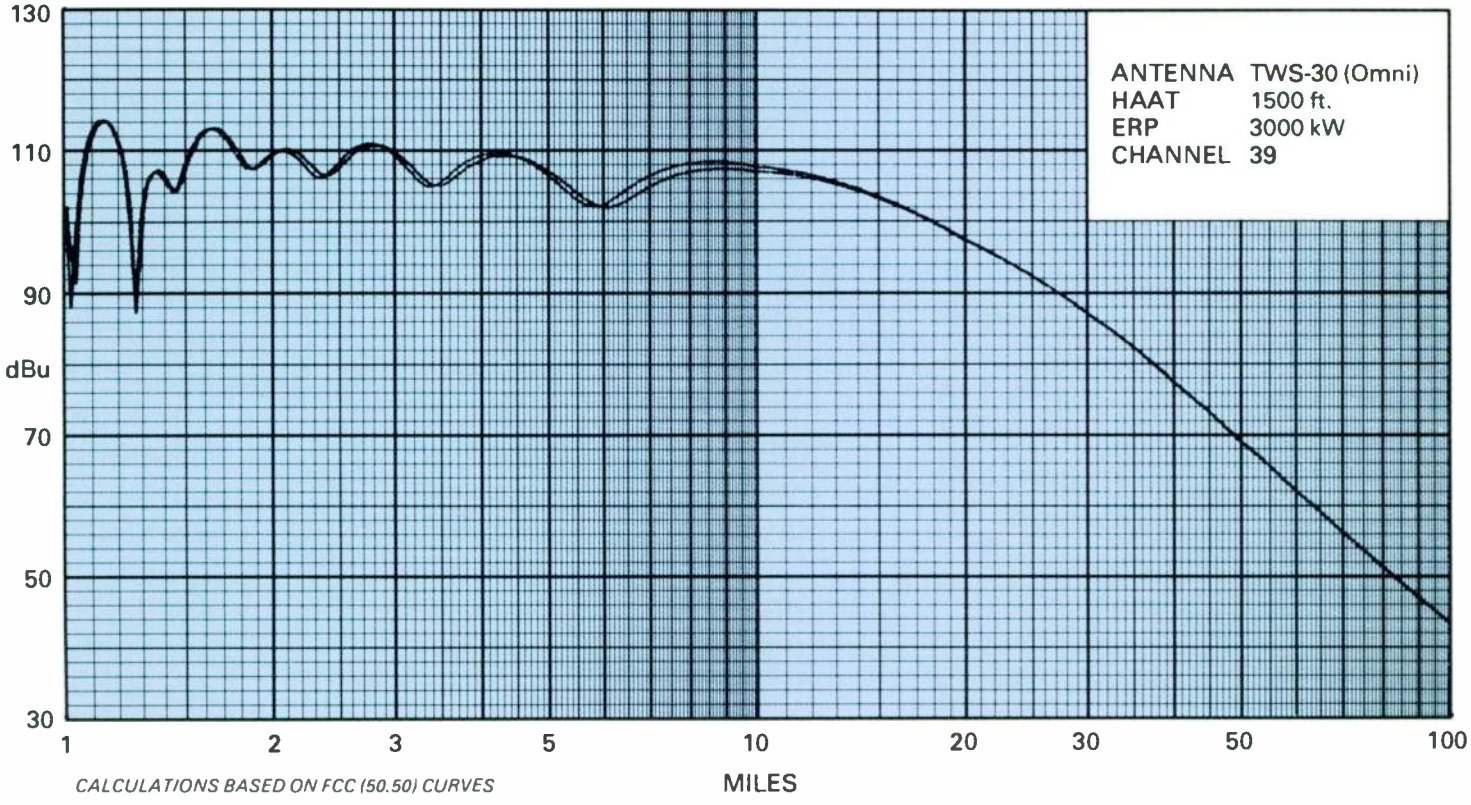


Typical cardioid WaveStar™ antenna construction. The antenna is a slotted length of wrapped rectangular waveguide with a "lunar" cross section (the internal component is a ridge, not a coaxial center conductor) propagating energy in the TE_{10} mode.

Effect of 50 mph Wind Sway on Omnidirectional WaveStar™ Antennas

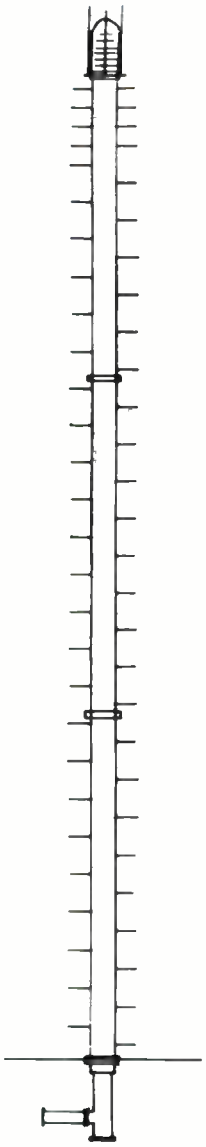
FIELD STRENGTH VERSUS DISTANCE FROM TRANSMITTER

(Based on Computed Data)

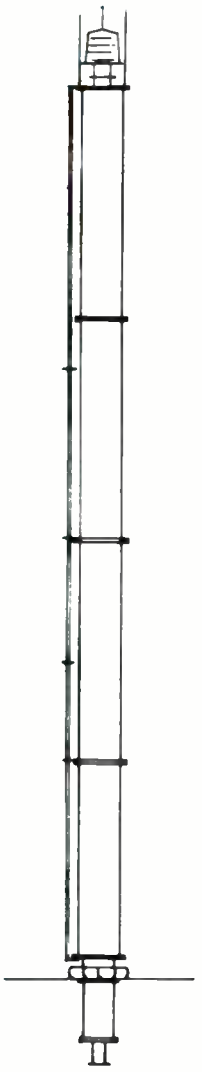


CALCULATIONS BASED ON FCC (50,50) CURVES

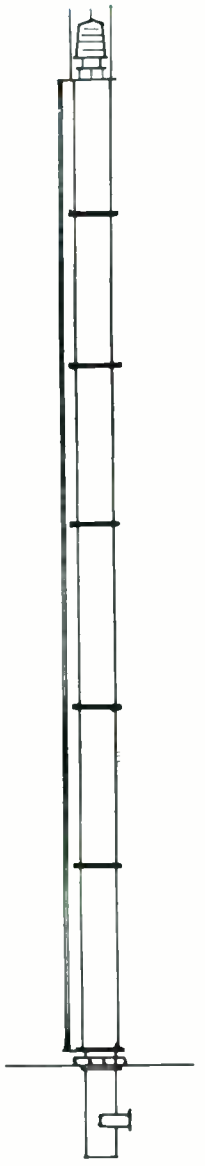
WaveStar™ Antenna Typical Outline Drawings



Cardioid
w/coax input



Omni/Peanut/Trilobe
w/coax input



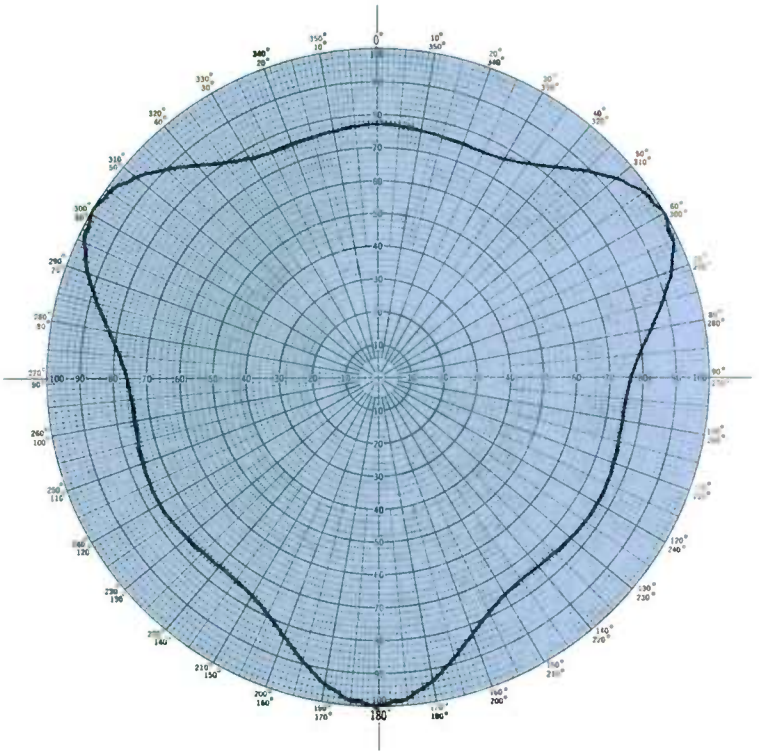
Omni/Peanut/Trilobe
w/rectangular input

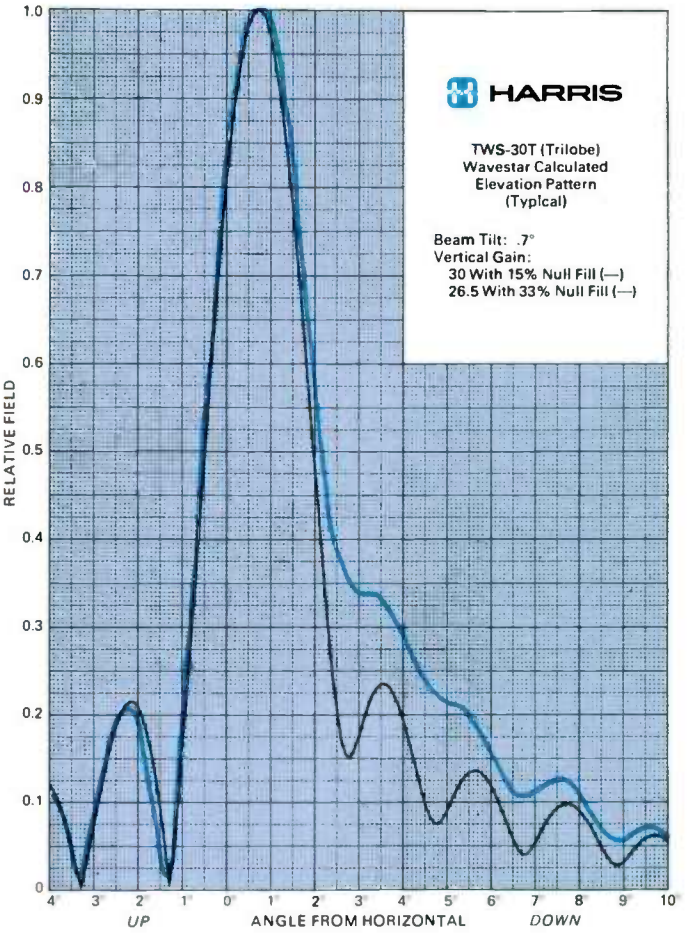
WAVESTAR™ ANTENNA INPUT CONNECTIONS/POWER RATINGS

ANTENNA PATTERNS	CH.'s	AVAILABLE INPUT CONNECTIONS	INPUT POWER RATINGS*
All Patterns	14-69	6⅛" 75 Ohm	80 kW to 56 kW
All Patterns	14-56	8-3/16" 75 Ohm	136 kW to 104 kW
All Patterns	14-40	9-3/16" 75 Ohm	157 kW to 132 kW
All Patterns Except Cardioid	14-69	Rectangular WG	Greater than 240 kW
All Patterns Except Cardioid	14-69	Circular WG	Greater than 240 kW

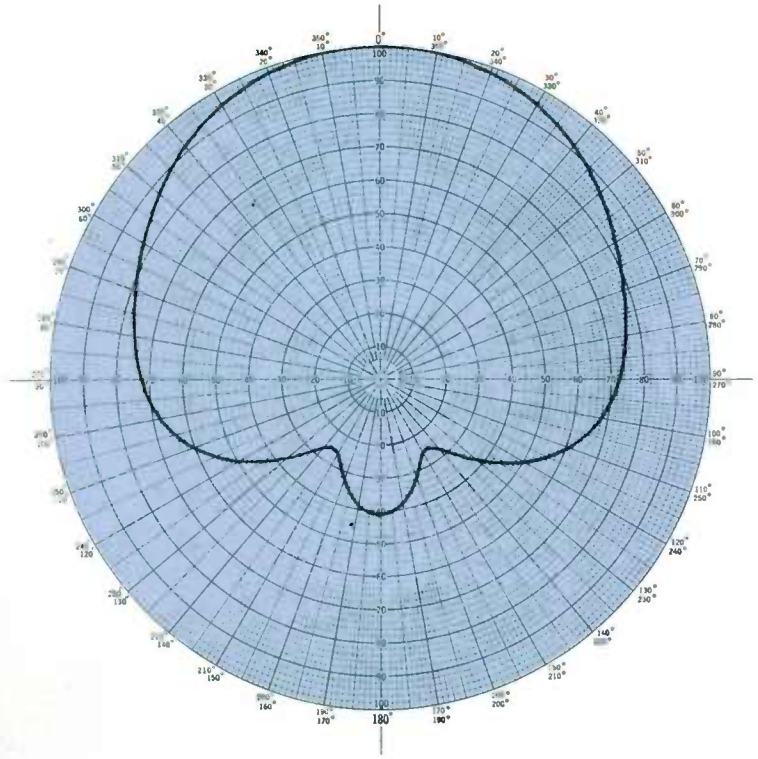
*Peak visual power with 20% average aural.

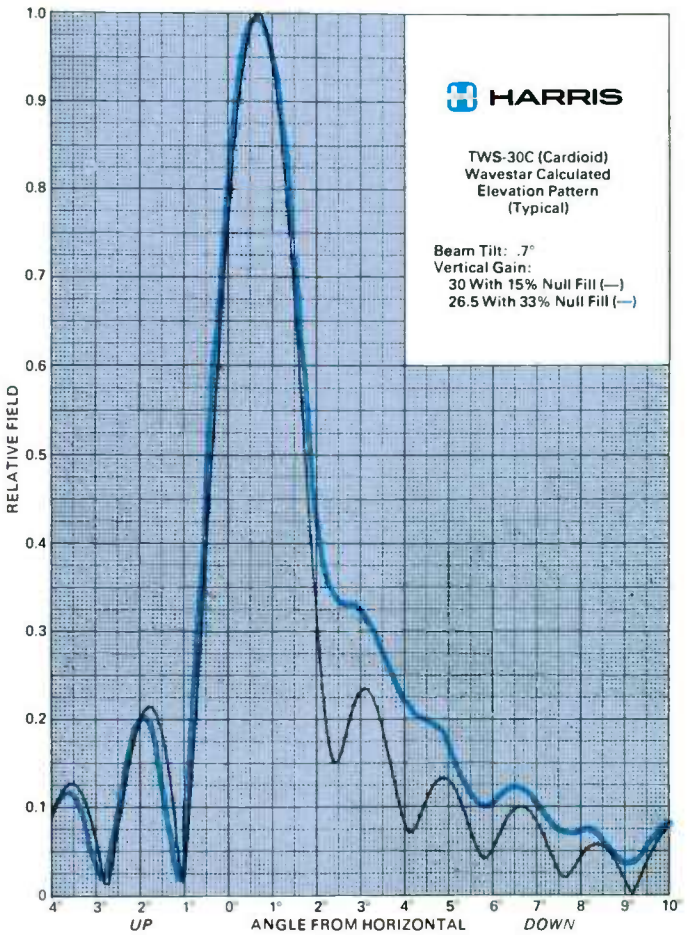
TWS-30T (Trilobe)
Wavestar Calculated Patterns



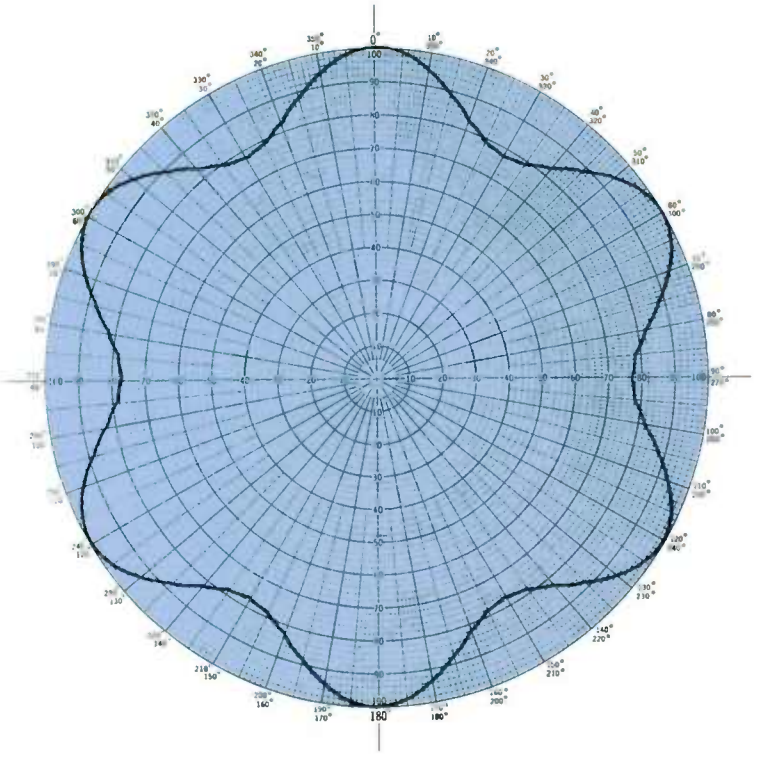


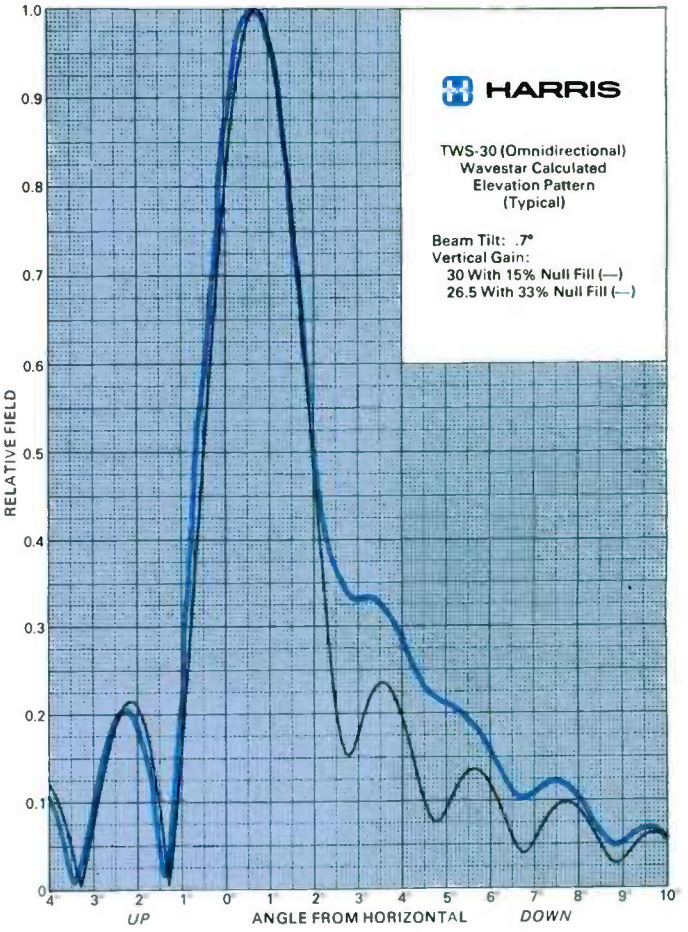
TWS-30C (Cardioid)
Wavestar Calculated Patterns



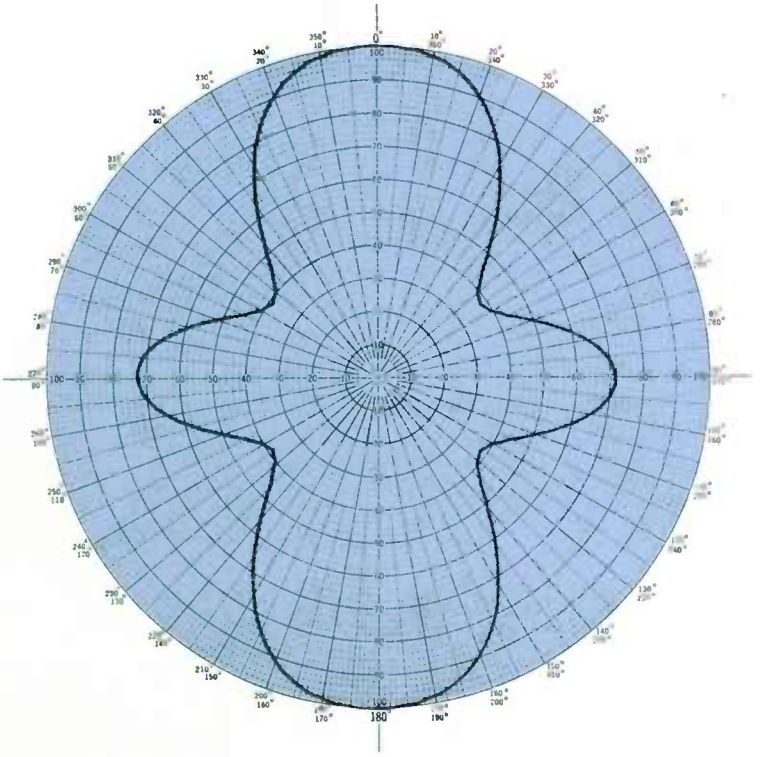


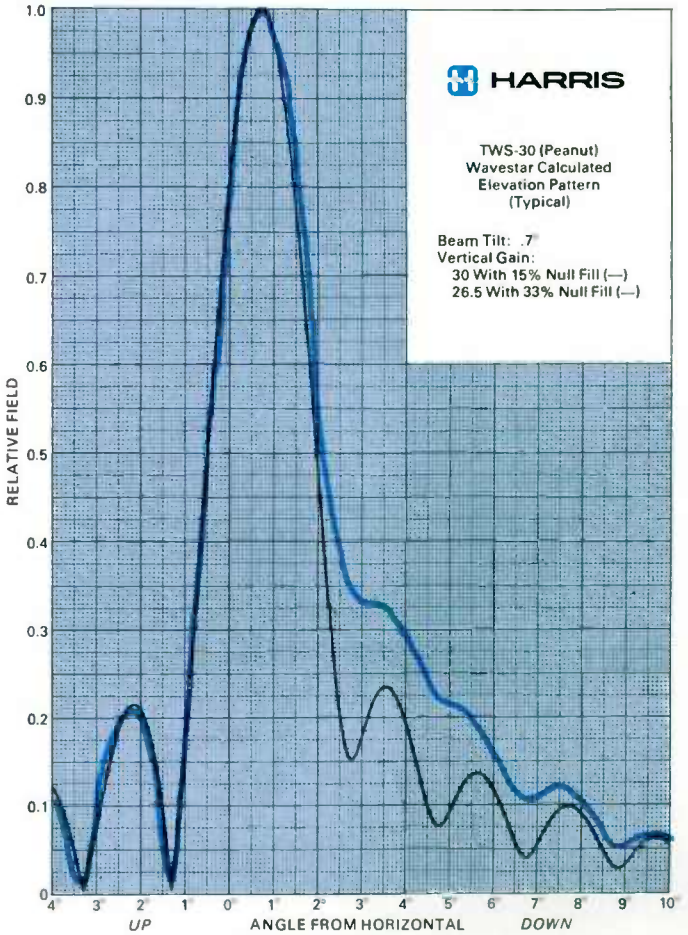
TWS-30 (Omnidirectional) Wavestar Calculated Patterns





TWS-30P (Peanut) Wavestar Calculated Patterns





Wavestar™ Antenna Mechanical Specifications

Total Height (ft.)			Rad. Ctr. (ft.)		Weight (lbs.)		Shear (lb.)		Moment (ft.-lbs.)	
Ch.	O, P, T*	C*	O, P, T*	C*	O, P, T*	C*	O, P, T*	C*	O, P, T*	C*
14	66.1	74.8	31.3	35.3	8800	11300	5460	3240	172,000	117,500
15	65.3	74.0	31.0	34.9	8700	11200	5390	3200	167,700	114,700
16	64.6	73.1	30.6	34.4	8600	11000	5330	3160	164,000	112,000
17	63.8	72.3	30.2	34.0	8300	10900	5260	3130	159,800	109,500
18	63.1	71.5	29.9	33.6	8300	10800	5200	3090	156,100	107,000
19	62.4	70.7	29.6	33.3	8200	10700	5140	3060	152,500	104,600
20	61.9	69.9	29.3	32.9	7500	9800	4780	2840	140,700	96,200
21	61.2	69.2	28.9	32.5	7400	9700	4720	2810	137,300	94,100
22	60.5	68.4	28.6	32.2	7400	9600	4660	2780	134,100	92,100
23	59.9	67.7	28.3	31.8	7300	9500	4620	2750	131,300	90,100
24	59.3	67.0	28.0	31.5	7200	9400	4570	2720	128,600	88,200
25	58.7	66.3	27.7	31.1	7200	9300	4520	2690	125,900	86,400
26	58.1	65.6	27.4	30.8	7100	8500	4470	2490	123,200	79,300
27	57.5	65.0	27.2	30.5	7000	8400	4420	2470	120,500	77,700
28	57.1	64.3	26.9	30.2	5800	8300	4100	2440	110,900	76,100
29	56.5	63.7	26.6	29.9	5700	8200	4050	2420	108,500	74,600
30	56.0	63.1	26.4	29.6	5700	8100	4010	2390	106,500	73,100
31	55.4	62.5	26.1	29.3	5600	8000	3970	2370	104,100	71,700
32	54.9	61.9	25.8	29.0	5600	8000	3930	2350	102,200	70,300
33	54.4	61.3	25.6	28.7	5500	7200	3890	2170	100,200	64,400
34	53.9	60.8	25.4	28.4	5500	7200	3860	2150	98,300	63,200
35	53.4	60.2	25.1	28.2	5400	7100	3820	2130	96,400	62,100
36	52.9	59.7	24.9	27.9	5400	7000	3780	2110	94,500	60,900
37	52.4	59.1	24.6	27.6	5400	7000	3740	2090	92,600	59,800
38	52.0	58.6	24.4	27.4	5300	6900	3710	2070	91,100	58,700
39	51.6	58.1	24.2	27.1	4800	6900	3420	2050	83,400	57,700
40	51.2	57.6	24.0	26.9	4800	6800	3390	2030	82,000	56,700
41	50.7	57.1	23.8	26.6	4800	6700	3360	2020	80,400	55,700
42	50.3	56.6	23.6	26.4	4700	6100	3330	1850	79,000	50,900
43	49.9	56.1	23.4	26.2	4700	6000	3300	1840	77,700	50,000
44	49.5	55.7	23.2	25.9	4700	6000	3270	1820	76,400	49,200
45	49.1	55.2	23.0	25.7	4600	5900	3250	1810	75,100	48,400
46	48.7	54.8	22.8	25.5	4600	5900	3220	1790	73,800	47,600
47	48.3	54.3	22.6	25.3	4600	5800	3190	1780	72,600	46,800
48	47.9	53.9	22.4	25.1	4600	5800	3160	1760	71,300	46,000
49	47.5	53.5	22.2	24.9	4500	5300	3140	1650	70,000	42,800
50	47.1	53.0	22.0	24.7	4500	5300	3110	1630	68,800	42,100
51	46.8	52.6	21.9	24.5	4500	5200	3090	1620	67,900	41,400
52	46.5	52.2	21.7	24.3	4000	5200	2830	1610	62,000	40,800
53	46.2	51.8	21.5	24.1	4000	5200	2810	1600	61,100	40,200
54	45.8	51.4	21.3	23.9	4000	5100	2790	1580	60,000	39,500
55	45.5	51.1	21.2	23.7	4000	5100	2770	1570	59,200	38,900
56	45.2	50.7	21.1	23.5	3900	5100	2750	1560	58,400	38,400
57	44.8	50.3	20.9	23.3	3900	5000	2720	1550	57,300	37,800
58	44.5	49.9	20.7	23.1	3900	4500	2700	1460	56,500	35,400
59	44.2	49.6	20.6	23.0	3900	4500	2680	1450	55,700	34,900
60	43.9	49.2	20.4	22.8	3900	4500	2670	1440	54,900	34,400
61	43.6	48.9	20.3	22.6	3900	4500	2650	1430	54,100	33,900
62	43.3	48.5	20.1	22.5	3900	4400	2610	1420	53,300	33,400
63	43.0	48.2	20.0	22.3	3900	4400	2610	1410	52,500	33,000
64	42.7	47.9	19.8	22.1	3900	4400	2590	1400	51,800	32,500
65	42.5	47.5	19.7	22.0	3900	4300	2580	1390	51,200	32,100
66	42.2	47.2	19.6	21.8	3800	4300	2560	1380	50,500	31,600
67	41.9	46.9	19.4	21.7	3800	4300	2540	1370	49,700	31,200
68	41.6	46.6	19.3	21.5	3800	4300	2520	1360	49,000	30,800
69	41.3	46.3	19.2	21.4	3800	4200	2500	1350	48,200	30,400

*O=Omni, P=Peanut, T=Trilobe, C=Cardioid

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

1. Mechanical specifications and patterns for the trilobe antenna are approximate. Exact patterns and mechanical specifications must be quoted on an individual basis.
2. Windloads calculated for 50/33 PSF.
3. Windloads include beacon (not supplied).
4. Masts are designed in accordance with AISC code for 65/43 PSF wind conditions.
5. Antennas include disposable support horses.
6. Windloads calculated for antennas for 15% null fill and .7° beam tilt. Windloads will vary slightly at different null fills and beam tilts.
7. Antennas include beacon cable installed.
8. Total heights include 4 ft. lightning protectors (included).
9. Specifications and other information subject to change without notice.

HARRIS CORPORATION BROADCAST TRANSMISSION DIVISION
P. O. BOX 4290, QUINCY, ILLINOIS 62305-4290 U.S.A. 217/222-8200

HARRIS, the leader in VHF television transmitter technology since it introduced I.F. modulation to the U.S. in 1969, proudly presents the ***Platinum Series*** of all solid state VHF TV transmitters. Engineered with input from a cross-section of broadcasters, consultants and key Harris vendors, the solid state family offers technology so advanced that it will change your expectations of VHF TV transmitters.

Offering unsurpassed performance specifications, Harris solid state TV transmitters are ultra-reliable yet ultra-simple. Reliability is maximized by conservatively-rated, identical and interchangeable 1 kilowatt solid state visual and aural power amplifier modules with individual MTBFs of 280,000 hours, parallel operation of multiple power supplies and Harris' patented distributed cooling system. For total redundancy, Harris solid state VHF transmitters are available with dual exciters.

PA Modules

The advanced design of Harris solid state transmitters makes operation very user-friendly. An easy-to-read display provides immediate and comprehensive system status, with bar graph and digital information on a central panel. The vast majority of components, including hot-pluggable pull-out power amplifier modules, visual/aural exciter and power supplies, are easily accessible from the front of the transmitter, and the highly stable transmitter requires less adjustment time at less frequent intervals. This level of simplicity means that even studio personnel can operate the transmitter with a minimum of training.

Status lights on the control panel illuminate automatically to indicate fault conditions.

THE BEST VALUE FOR YOUR INVESTMENT. Value shines through the solid state family. No tubes mean longer life, less maintenance and lower spares costs. The architecture of this transmitter, with modular, redundant components, questions the need for a standby transmitter. And the simplicity of the design requires fewer personnel to maintain and supervise transmitter operation.

Harris solid state VHF TV transmitters feature a functional yet ruggedly elegant design. They look different from other transmitters because they *are* different. We invite you to open this page for a full view of the features and benefits which will be yours with a Harris solid state TV transmitter.

Visual/Aural Exciter

On The Air with Harris

Since its founding in 1922, Harris Corporation's Broadcast Division has set the pace for the broadcast equipment industry worldwide.

From the company's introduction of the transcription turntable in 1926 to its introduction of a digital, solid-state AM transmitter in 1987, Harris has pioneered over 50 technology and service innovations. A rich tradition of providing cutting-edge products and services to broadcasters distinguishes Harris from its competitors.

The Harris difference begins with commitment. Harris Broadcast Division has the largest investment in plants and equipment of any U.S. broadcast equipment manufacturer. But the Harris investment goes far beyond its facilities.

Committed to keeping broadcasters on the air, Harris has the largest domestic field sales force of problem-solving radio and television specialists. Harris provides twenty-four hour technical service and parts assistance — an innovation it introduced in 1975. Harris also sponsors the industry's only Broadcast Technology Training Center at its Quincy, Illinois, Headquarters. Offering regularly scheduled programs on major Harris broadcast equipment, a two year degreed college program in broadcast technology, and annual training for foreign broadcasters through the U.S. Telecommunications Training Institute, the Harris Broadcast Technology Training Center attracts broadcasters from around the world. Harris training is also available at the site of a customer's choosing.

With installations in more than 100 countries worldwide, Harris Broadcast Division is a leading supplier of radio and television transmission equipment, including transmitters, antennas, and audio and video production systems. The Broadcast Division is part of Harris Corporation, a $2.1 billion producer of state-of-the-art information processing, communication and microelectronic products for the worldwide information technology market.

HARRIS

Harris Corporation, Broadcast Division
P.O. Box 4290, Quincy, Illinois 62305-4290 U.S.A.
217/222-8200

ADV 750 Printed in U.S.A.

HARRIS

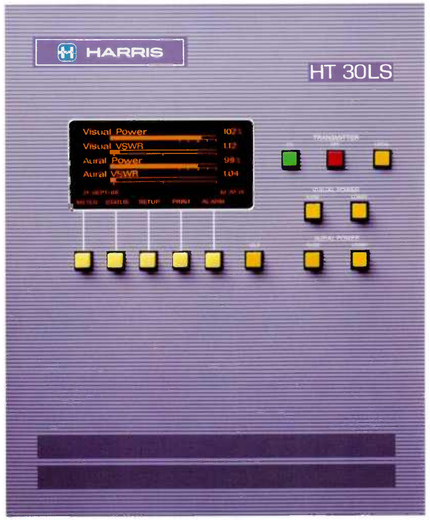
Platinum Series™

1 - 60 kW Solid-State VHF TV Transmitters

Solid-State

VHF-TV

Revolutionizing VHF TV technology



TECHNOLOGY SO ADVANCED
...it will change your expectations of VHF TV transmitters

MAKE THESE EXCITING *PLATINUM SERIES* BENEFITS YOURS:

1. Solid state design provides unsurpassed on-air reliability.*
2. New levels of redundancy and parallel operation with soft-failure design eliminate the need for a standby transmitter.*
3. FET solid state design totally replaces tubes with conservatively-rated power amplifier modules with large silicon areas. Each has an MTBF in excess of 280,000 hours.
4. Clean and simple user-friendly design makes transmitters easy to operate and maintain with minimal training.
5. Visual/aural exciter provides unsurpassed visual performance and audio performance equal to a top FM stereo exciter.*
6. Harris solid state VHF transmitters are available in powers to 60 kilowatts with aural power to 20% (optional).
7. Family architectural design approach permits cabinets to be added should power requirements change.
8. From the world leader in VHF television transmitter technology.

*Patents applied for.

Main Control
The main control circuit provides a central point for control and monitoring of the entire transmitter. VSWR overload, VSWR foldback and automatic power control are just a few of the many functions performed by the control system. Connection to any standard remote control system is simplified by the use of standard "D" connectors.

Transmitter Control
Simple, straightforward control of transmitter on/off, remote/local and power raise/lower functions is provided by front panel pushbuttons.

Cabinet Control
Individual cabinet circuitry provides control and monitoring of each cabinet. The design is simple for the highest MTBF.

User Display
A high resolution flat screen display provides both bar-graph and accurate digital readouts of power, VSWR, voltage and other operational parameters for the entire transmitter. Screens can be viewed at the touch of a button, allowing all information to be displayed quickly and clearly. An added bonus is logging of date, time and type of transmitter fault type, which is kept in storage for future reference.

Status Indicators
Status indicators provide a simple means to observe the condition of all overload and interlock circuits.

Visual/Aural Exciter
Harris' new visual and aural exciter features a patented* design developed specifically for solid state transmitters. Improved performance, pre-corrector adjustments, frequency synthesis and digital power raise and lower controls are just a few of the many useful features provided. In addition to top visual performance, the exciter offers audio performance comparable to a top FM stereo exciter.

The model shown is the HT 30LS, 30 kilowatt low band solid state VHF transmitter configured with dual exciters and the 20 percent aural option.

*Patent applied for.

Power Amplifier Modules
Designed for on-air removal and insertion, all visual and aural PA modules are identical and interchangeable. Each module has an MTBF of over 280,000 hours. The broadband design requires no tuning, and each module is self-protecting against VSWR, overvoltage, undervoltage, overtemperature and RF input overdrive.

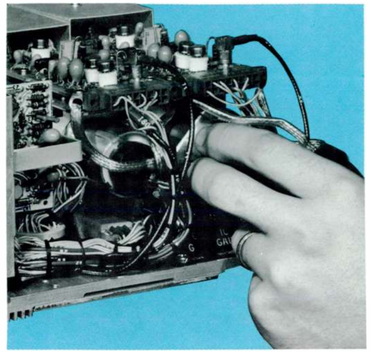
RF Module Power Supplies
Parallel operation of multiple power supplies ensures the highest on-air reliability. The regulated, non-switching design provides a constant voltage to modules even under varying AC line voltages or load currents. Over 90% efficiency means less heat to manage and lower operating costs. The compact, roll-out design provides accessibility for servicing.

Dual Exciter Option
For ultimate on-air reliability, a fully redundant exciter and exciter switching system is available.

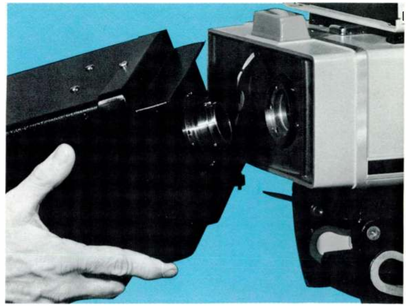
Aural PA/Visual Driver Cabinet
Interchangeable visual and aural pre-amp modules offer user convenience. Space is provided for an optional 20 percent aural configuration.

Cooling System
Separate fans provide cooling for each PA and driver cabinet. Ducting within the cabinet ensures equal cooling for all modules, even if one or more is removed for servicing. Positive cabinet air pressure prevents unwanted dirt and dust buildup, reducing cleaning requirements. Low pressure/high volume fans significantly reduce audible cooling system noise.

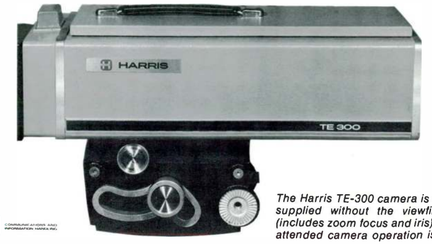
Visual PA Cabinets
Parallel power amplifier cabinets further enhance reliability. Separate AC feeds for each cabinet provide a degree of serviceability never possible with conventional tube amplifiers.



Pick-up tubes may be removed quickly and easily from the rear of the camera head, without disturbing other components.



Lenses are attached with a quick-disconnect bayonet mount for easy removal for camera transport or storage. Optional range extenders snap into place quickly.



The Harris TE-300 camera is the same as the TE-301, except it is supplied without the viewfinder, and has a motorized lens (includes zoom focus and iris). The TE-300 is employed where unattended camera operation is desirable.

HARRIS COMMUNICATIONS AND INFORMATION HANDLING, INC.

TE-301 Specifications

Electrical Scan Standards

EIA 525/60
CCIR 625/50

Power Requirements

Voltage . . 90 to 130V or 180 to 260V, 60 Hz (50 Hz on request)
Power Load-Camera . . . . . 160 Watts
Viewfinder . . . . . 35 Watts

Inputs (Loop-Through, Bridging)

Sync . . . . . 2 to 8Vpp, negative
H Drive . . . . . 2 to 8Vpp, negative
V Drive . . . . . 2 to 8Vpp, negative
Sub Carrier . . . . . 1.5 to 4Vpp

Outputs

Program Video . . . . . Two Composite, 1Vpp across 75 ohm
Chroma Key (R,B,G) non-composite . . . . 0.7Vpp across 75 ohm
Monitor Video non-composite . . . . . 0.7Vpp across 75 ohm

Monitor Switching Facilities

Picture and Waveform . . . . . R,B, & G separately or combined with -G or -B
Viewfinder . . . . . G,R +G, B + G

Sensitivity (Typical Tubes)

Minimum Incident Light for full output with f2.0 lens . . . . . 10 fc
Incident Light for rated Signal/Noise . . . . 85 fc at f2.8
Signal/Noise Ratio . . . . . 48 dB (300na, green signal current; 1.0 Gamma; 4.2 MHz bandwidth; masking, aperture, and chroma-off)
Resolution (no aperture correction) . . . . . 500 TV lines

Optical System

Color Separation . . Sealed relay optics
Correction Filters . . . . Lens accessory
Depolarization . . . . . Retardation plate at optical input

Recommended Pick-up Tubes (Supplied Separately)

Red . . Amperex XQ1074 extended red
Blue . . . . . Amperex XQ1071B
Green . . . . . Amperex XQ1070G

Registration Accuracy

Zone 1 (Circle=.8V) 0.15%
Zone 2 (Circle =1.0H) 0.3%

Picture Geometry

All Zones 1.0%

Camera Cable Length

Without Optional Module . . . . . to 400 ft. (122 m)
With Optional Module . . . . . to 1500 ft. (457 m)

Operating Environment

Temperature . . . . . —20°C to +40°C (—4°F to +104°F)
Humidity . . . . . 0 to 95% RH
Altitude . . . . . 0 to 10,000 ft. (3048 m)

Shading Provisions

H&V sawtooth and parabola modulation.

Aperture Correction

With the integral horizontal aperture corrector a boost of 10 dB at 3 MHz (240 TV lines) is attainable. Noise clipping included. Optional contours from green image enhancer module available.

Gamma Correction

Continuously variable from linear to 0.35, each channel.

Intercom

Party Line . . . . . 6000 ohm balanced to ground
Camera Head . . . . . One headset amplifier and controls
Local Control Panel . . . . One headset, amp & controls
Program Audio . . . . . Bridging input, unbalanced

Viewfinder

Screen Diagonal . . . . 8.0 in. (203 mm)
Picture Brightness . . . . . 0 to 150 ft. lamberts
Resolution . . . . . 600 TV lines
Picture Timing . . . . . AFC
Controls . . . . . Contrast, Brightness, and Input Select

Mechanical

Camera Head (Less Lens)
Height . . . . . 5.5 in. (140 mm)
Width . . . . . 9.0 in. (228 mm)
Depth . . . . . 18.0 in. (457 mm)
Weight . . . . Approx. 22 lbs. (10 kg)
Viewfinder (removable)
Height . . . . . 8.0 in. (203 mm)
Width . . . . . 9.0 in. (228 mm)
Depth . . . . . 16.0 in. (406 mm)
Weight . . . . . 15 lbs. (7kg)
Control Drawer
Height . . . . . 5.25 in. (133 mm)
Width . . . . . 19 in. (483 mm)
Depth . . . . . 22 in. (559 mm)
Weight . . . . . 20 lbs. (9 kg)
Local Control Panel
Height . . . . . 1.75 in. (45 mm)
Width . . . . . 19.0 in. (483 mm)
Depth . . . . . 4.5 in. (114 mm)
Weight . . . . . 2.0 lbs. (.9 kg)
Main Power Supply
Height . . . . . 7 in. (178 mm)
Width . . . . . 19 in. (483 mm)
Depth . . . . . 18 in. (457 mm)
Weight . . . . . 38 lbs. (17 kg)

Accessories

Image Enhancer Module (H&V contours from green)
Cable Compensation Module (extends maximum cable to 1500 ft.)
Sync generator module (genlock/color lock)
Broadcast Grade Tube Set XQ1070B, XQ1070G, XQ1073ER
Camera Cable, std. lengths 50 ft., 100 ft., 150 ft., 200 ft., 250 ft.
Headset, Single or dual
Conrac, 9 in. Monochrome Picture Monitor SNA9
Tektronix 528 (146B) Waveform Monitor
Quick-Set Cam Head; Quick-Set Hercules Elevator Tripod; Quick-Set Hercules Folding Dolly.

HARRIS CORPORATION Broadcast Products Division
123 Hampshire Street, Quincy, Illinois 62301

JK-4M-1275

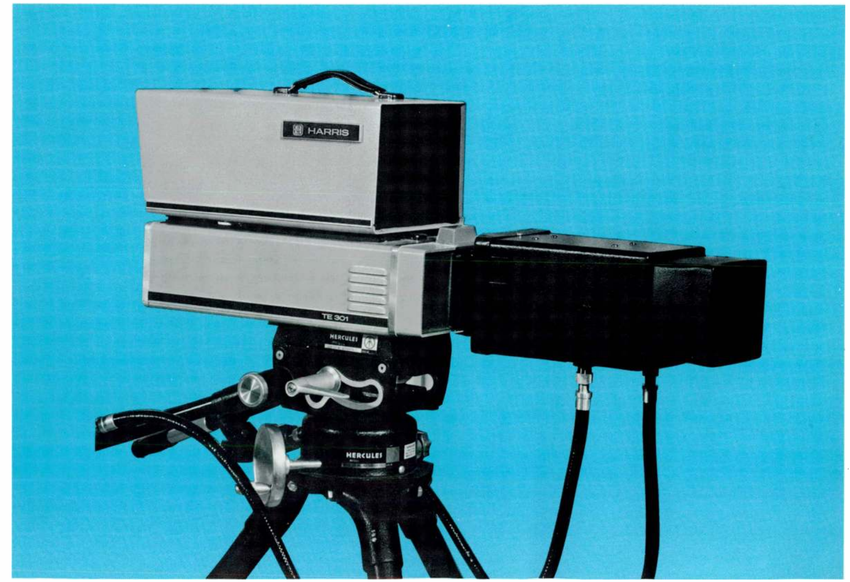
ADV. 448 PTD. IN U.S.A.

HARRIS
COMMUNICATIONS AND INFORMATION HANDLING

TE-301

Live Color TV Camera

- "Big Camera" picture quality in a compact, lightweight unit (40 lbs., including viewfinder).
- Outstanding low-light level capability—unequaled signal-to-lag performance.
- Long-term stability and reliability—low operating costs.
- Simple set up and operation—all electrical controls at camera control unit.
- Fast, economical maintenance from neat circuit layout, plug-in modules serviceable in place, rear-load pickup tubes.
- Portable viewfinder unlocks and detaches in seconds—lightweight camera cable.
- Integral electronics—all modules drawer mounted — no external units.



HARRIS COMMUNICATIONS AND INFORMATION HANDLING

TE-301... Uncomplicated, Economical, Lightweight — With Excellent Colorimetry

TE-301 live color camera

The Harris TE-301 live color television camera offers a unique combination of complete broadcast quality performance, ease of operation, lifetime economy, and great versatility, all in a lightweight, compact unit. The camera head, including lens and viewfinder, weighs only 40 pounds. All electrical operating controls are at the camera control position.

BROAD APPLICATIONS: The TE-301's excellent color fidelity, color matching capability, and all-around low-light-level performance fit it admirably to broadcast applications. Wherever optimum picture quality is required, with moderate investment and long-term economy, the TE-301 can serve broadcasters, remote producers, production firms, CATV originators, and educational, medical, and industrial users.

The TE-301 meets all EIA and FCC broadcast standards with a built in NTSC encoder and color bar generator. The camera is operable on 625/50 PAL and SECAM Standards with the appropriate encoder.

For totally self contained operation an optional plug in sync generator module supplies all drives for one or more cameras. It genlocks/colorlocks for easy system integration.

COLOR FIDELITY: The outstanding colorimetry of the TE-301 results from many design features. Among these are a white pulse AGC system to maintain color balance; color masking; adjustable gamma tracking; separate mesh lead oxide pickup tubes in all three channels; extended-red tube in the red channel; dust-sealed, relay type, optical package and tight quality control of optical elements. These features also contribute to consistent colorimetry between cameras for fast, easy color matching.

ADVANCED PREAMPLIFIERS: Extremely "clean" pictures result from the use of state-of-the-art preamplifiers comparable to those used in the most deluxe cameras. System signal-to-noise ratio is 48 dB, and modern first stage design eliminates high peaker controls. The preamplifiers will accommodate 500% of normal level, to eliminate overload streaking.

CRISP, SHARP PICTURES: Horizontal aperture correction with noise clipping, is built in. For added crispness an optional plug-in contours-from-green image enhancer, with comb filter and noise coring, is available.

EXCELLENT REGISTRATION: Printed circuit yokes, and all-around circuit stability provide the TE-301 with precise, stable registration. The subtractive registration technique, thoroughly proven in hundreds of live and film broadcast color cameras, is employed for simple, fast, and accurate registration.

FLARE COMPENSATION: These circuits maintain the TE-301's blacks even under extremes of contrast and average picture level changes.

GRAY SCALE TRACKING: The TE-301's excellent gray scale tracking is simplified by the use of a null meter at the camera control unit, which sets black and white balance on each channel to within 0.5%.

PLUMBICON® PICKUP TUBES: Three 1-inch separate mesh type tubes yield flatter field and improved resolution. The use of lead oxide tubes in all 3 channels prevents high light blooming that can happen with other types.

LIGHTWEIGHT CAMERA CABLE: At 4 ounces per foot this cable is rugged but easy to handle. For extended lengths an optional plug-in cable compensator module is available.

OUTSTANDING LOW-LIGHT-LEVEL CAPABILITY: The TE-301 offers incomparable all-around low-light-level capability. The camera's excellent sensitivity is supported by its industry-leading signal-to-lag ratio and its color balance at all gain settings. The TE-301 provides full video for usable pictures at less than 10 foot candles, in the maximum sensitivity mode, with an f/2.0 lens.

A single switch selects 1X, 2X, or 4X sensitivity modes, and automatically maintains correct color balance.

*Reg. Trademark N. V. Philips

With all TE-301 electrical operating controls at the camera control unit, the cameraman has only to focus and frame the picture.

The TE-301's industry-leading lag performance makes a 10-foot-candle picture usable even on fast sports action. In the 4X gain mode, the green channel signal-to-lag ratio is 32 dB. Image reduction on the red and blue tubes closely matches this figure, for minimal, balanced lag performance.

LONG-TERM STABILITY: The TE-301's long-term stability assures both consistent performance and operating economy extending over the life of the camera.

Stability of color balance is ensured by an AGC system operating from a reference white pulse inserted at the head end of the video system. Any level variations are eliminated since the AGC automatically adjusts the gain to maintain the reference pulse at the correct amplitude.

NOISE IMMUNIZATION: Noise occuring during horizontal blanking is restricted from shifting black level reference. This feature immunizes the system to noise by a factor of 20 to 1 or more.

VOLTAGE REGULATION: Most DC voltages in the camera are regulated three times. Pickup tube filament voltage is regulated for stable tube performance and longer tube life. Further assurance of stable operation results from regulation of focus current to within one-tenth of one percent. Linear integrated circuits used throughout the system, employ negative feedback to render circuit groups more stable and linear. Class A/B amplifiers with stabilizing feedbacks are used for all sweep circuitry.

OPERATING ECONOMY: The TE-301's unusual operating simplicity releases technical manpower for other assignments, and over the camera's life can add up to major savings. Non-technical personnel can easily operate the TE-301. At the camera head the only controls are lens zoom and focus and viewfinder brightness and contrast. All electrical operating controls, such as iris, master blanking, and sensitivity, are at the camera control unit.

Viewfinder detaches from the camera head for easy portability.

All of the TE-301's electrical operating controls are located at the camera control position. At top is the local control panel, with master blanking and iris (servo) controls. The camera control unit is below, with the null meter for simple daily checkout of black and white levels on each channel.