FOREWORD

Harris Corporation, Broadcast Group, presents a Short Form Catalog. Our latest all-products catalog features television and radio transmitting equipment, audio and video studio products, program and broadcast microwave equipment. The comprehensive product line represented on these pages meets virtually every requirement of the television and radio broadcaster.

The Harris sales network and service facilities are extensive. International market activities are coordinated by the International Sales Department in Quincy, Illinois with representatives located throughout the world.

Among the nation's 500 largest corporations, Harris is a world leader in the communications industry. Two separate operating arms of the Broadcast Group produce specialized products for the broadcaster. Harris Video Systems, located in Sunnyvale, California, manufactures an extensive line of digital video products. Harris Broadcast Microwave Operation, Mountain View, California, manufactures ENG receivers, miniature portable microwave receivers and transmitters.

Drawing on the considerable resources of research centers within Harris, the Broadcast Group has ready access to a large staff of professional scientists and engineers, in addition to maintaining an impressive engineering and service organization in Quincy.

Harris' reputation stands on the products in this catalog. Harris values your patronage, and will strive for continued excellence in product design and execution, in an innovative posture that fosters the advancement of the broadcast industry.
MEDIUM WAVE
BROADCAST TRANSMITTER

VP-100A
100,000 Watt Medium Wave Broadcast Transmitter

- Overall efficiency better than 65%
- Exclusive Pulse Duration Modulator (PDM)* for high level plate modulation
- Redundancy in solid state circuits
- Vapor phase cooling for quiet operation and extended tube life
- Only five tubes, with three tube types
- Designed for a wide climate range

Featuring Harris' exclusive high level Pulse Duration Modulator*, the VP-100A provides the finest performance of any medium wave broadcast transmitter in the same power range on the market today...at significantly lower operating costs.

EFFICIENCY EXCEEDS 65%. The VP-100A has an unusually high overall efficiency of more than 65%. This is made possible by the almost 90% efficiency of the Pulse Duration Modulator—and means about one-third less power consumption than other high level plate modulated 100 kilowatt transmitters.

HIGH AVERAGE MODULATION CAPABILITY. The transmitter is capable of sustained high average modulation such as that experienced with trapezoidal audio processing—which means greater loudness at the receiver without increased transmitter carrier power. This is a feature of the high efficiency, DC coupled PDM modulator that avoids the use of large, inefficient transformers in the modulation process. Another feature of this high efficiency series type modulator is convenient front panel carrier power adjustment over a wide range.

ONLY FIVE TUBES. The entire transmitter employs just five tubes—with a modern ceramic 4CV100,000C power tetrode in the modulator and final RF power amplifier sockets. All power supplies utilize long-life solid state silicon rectifiers. High quality components, conservatively rated, are used throughout the VP-100A to assure greatest reliability.

VAPOR PHASE COOLING. Cooling by the Vapor Phase method produces quiet operation by eliminating the need for large blowers—the heat exchanger is cooled by a two horsepower blower. This method of cooling also extends tube life by helping to eliminate "hot spots" and by maintaining tube anode temperatures far below those attained by other methods.

DESIGNED FOR WIDE RANGE OF CLIMATES. The transmitter will give top performance in a wide range of climates—from hot and humid, to dry and dusty. With Vapor Phase cooling, ducting outside air into the transmitter is not necessary. All transformers and similar components are hermetically sealed, encased, or vacuum impregnated. All high power radio frequency networks contain silver-plated inductors and vacuum capacitors.

GREATLY REDUCED FLOOR SPACE. Due to the high efficiency of the transmitter and the elimination of large iron core components (no modulation transformer and reactor), the VP-100A requires only 7.0 square meters (76 square feet) of floor space. Careful cabinet design provides easy accessibility to all components.

*U.S. Patent

VP-100A Specifications

POWER OUTPUT: 100,000 watts nominal unmodulated, capable 110,000 watts.
RF FREQUENCY RANGE: 535 kHz to 1620 kHz.
RF OUTPUT IMPEDANCE: 230 ohms, unbalanced.
RF FREQUENCY STABILITY: ±5 Hz.
SPURIOUS AND HARMONIC EMISSION: Less than 50 mW.
CARRIER SHIFT: Less than 5% at 100% modulation at 1,000 Hz.
AUDIO FREQUENCY RESPONSE: ± 1.5 dB from 40 to 10,000 Hz referenced to 1,000 Hz at 95% modulation.
AUDIO FREQUENCY DISTORTION: Less than 3% from 40 to 10,000 Hz at 95% modulation.
NOISE: 55 dB below 100% modulation at 1,000 Hz.
AUDIO INPUT LEVEL: 10 dBm ±2 dB for 100% modulation.
AUDIO INPUT IMPEDANCE: 600/150 ohms, balanced or unbalanced.
MODULATION LEVEL: 100% sinusoidal. 10 minutes, 50 to 5,000 Hz.
TRAPEZOIDAL MODULATION: Less than 5% tilt or overshoot. 100 Hz to 2,000 Hz.
POWER INPUT: Any specified voltage 380V to 480V. 3 phase. 50 or 60 Hz.
POWER CONSUMPTION: 155 kW—No modulation
150 kW—30% modulation
215 kW—100% modulation.
POWER FACTOR: 95%.
VOLTAGE REGULATOR: Electronic voltage regulation for all power supplies other than high voltage.
OVERALL EFFICIENCY: 65% at average modulation.
TUBES: Two 4CV100,000C; two 4CX1500A; one 2C10,000F.
TEMPERATURE RANGE: 0-50°C ambient temperature.
HUMIDITY: 95% relative humidity, maximum.
STORAGE TEMPERATURE: -35 °C to +60 °C (with no water in system).
ALTITUDE: Up to 1,829 meters (6,000 feet) above sea level.
CABINET DATA: Each of two cabinets measures 1.83 meters (6 feet) wide, 1.37 meters (4.5 feet) deep, and 1.98 meters (6.5 feet) high. The heat exchanger adds another 10.06 meters (3.5 feet) in height.

Ordering Information
VP-100A, 100,000 watt medium wave transmitter with one set of tubes, crystals and silicon rectifiers, for operation from 380 to 480 volts, 3 phase, 50 or 60 Hz..............................994-7651-001

Prices and Specifications Subject to Change Without Notice.
MW-50C
50,000 Watt Medium Wave Broadcast Transmitter

- Pulse Duration Modulation* (PDM) eliminates costly, inefficient modulation transformer and reactor
- Greater than 80% overall efficiency for reduced operating costs
- DC coupled modulator section provides unsurpassed low frequency square wave performance
- Automatic modulation tracking minimizes adjustments
- No slew induced distortion possible
- Only two tube types used...minimizes spares inventory
- Excellent cabinet accessibility for ease of service

The Harris MW-50C delivers overall performance superior to any other 50 kilowatt medium wave broadcast transmitter. The transmitter is high level plate modulated, using Harris’ patented, highly efficient Pulse Duration Modulator (PDM). This, in combination with a number of other outstanding features, makes the MW-50C the most advanced 50 kilowatt AM transmitter in the world.

Specifications

Power Output: 50,000 watts (rated), 60,000 watts (capable). Convenient power reduction through 10,000 watts.

RF Frequency Range: 535 kHz to 1620 kHz, supplied to frequency as ordered.

RF Output Impedance: 50 ohms unbalanced (higher on special order).

RF Output Terminal: 3-1/8" EIA 50 ohm flange.

RF Frequency Stability: ± 10 Hz.

RF Harmonics And Spurious Emissions: Exceeds FCC and CCIR specifications.

Carrier Amplitude Regulation: Less than 2% at 100% modulation (measured at 1000 Hz).

Audio Intermodulation Distortion: 3.0% or less, 60/7000 Hz 4:1, SMPTE standard at 55 kW operation at 50% modulation.

Audio Frequency Response: ± 1.0 dB, from 20 to 12,500 Hz referenced to 1,000 Hz at 95% modulation at 55 kW with Besel filter out.

Squarewave Overshoot: Less than 3.0% using 1000 Hz 6 dB clipped sinewave at 90% modulation.

Total Harmonic Distortion (Unenhanced) : Less than 2.5%, 20 to 10,000 Hz at 95% modulation at 55 kW. 3% at 25 to 10 kW.

Squarewave Tilt: Less than 8% at 20 Hz 60% modulation.

Compression Ratio: 4/1 dB at 3 dB of enhancement; -95%, +125% modulation.

Positive Peak Capability: +125% with program modulation at 55 kW.

Noise (Unweighted): -80dB or better below 100% modulation. Typical -62 dB.

AM Stereo Operation: Incidental Quadrature Modulation (IQM) is down 25 dB or better at 95% modulation.

Audio Input: 600 ohms at 0 to +10 dBm for 100% modulation, unenhanced; +16 dBm with enhancement activated.

Power Input: 480V ± 5%, 3 phase, 60 Hz. Available for 380V ± 5%, 3 phase, 50 Hz.

Power Consumption : 80 kW at 0% modulation; 87 kW at 30% modulation; 110 kW at 100% modulation.

*Patented

Overall Efficiency: Better than 60% at average modulation.
Power Factor: 95%.

Tubes Used: (2) 4CX35, 000C; (2) 4CX1500A.

Monitor Provision: An unmodulated sample is provided for freq monitor and a modulated sample for modulation monitoring.

Remote Control: Self-contained interface for extended or remote control.

Air Flow: 5200 CFM total by internal blowers.

Operating Acoustical Noise: Better than 70 dB acoustic rating 3 ft. from front of transmitter.

Temperature Range : -20°C to +50°C.
Humidity: 95%.

Altitude: Up to 3,048 meters (10,000 feet) above sea level. Higher on special order.

Size : 78"H x 144"W x 48"D (2.0 x 3.7 x 1.2m) (transmitter cabinet). External components include high voltage power supply and wall mounted circuit breaker assembly.

Floor Space: Main transmitter assembly 48 square feet (4.5 square meters). Power supply 15 square feet (1.4 square meters).

Weight (Approx.): Main Transmitter Assembly: Net unpacked 5,000 lbs. (2268 kg). Domestic packed 6,000 lbs. (2722 kg).
Export packed 7,200 lbs. (3268 kg).

Power Supply: Net unpacked 1,370 lbs. (622 kg). Domestic packed 1,500 lbs. (681 kg). Export packed 1,800 lbs. (817 kg).

1. If transmitter is operated into a bandwidth limited antenna system, distortion at the higher modulation frequencies may degrade.
2. Noise measured over the band 20 Hz to 20 kHz, with line to line voltages of the supply line balanced. Noise may degrade with line voltage unbalance.
3. Typical power consumption figures are for 50 kilowatt output and for optimum transmitter adjustment. For higher output powers and/or transmitter misadjustments, power consumption may be higher.
4. Maximum operating temperature derates linearly to +29°C (84.2°F) at 10,000 feet AMSL (3048 meters).
5. Does not include height of output connector, which may be removed for transport.

Ordering Information

MW-50C, with one set of tubes and 2 crystals, 60 Hz ... 994-8832-001
MW-50C, with one set of tubes and 2 crystals, 50 Hz ... 994-8833-002
Recommended spare parts kit for MW-50C transmitter ... 994-8909-001

Prices and Specifications Subject to Change Without Notice.
MEDIUM WAVE
BROADCAST TRANSMITTER

MW-10B
10,000 Watt Medium Wave
Broadcast Transmitter

• Pulse Duration Modulation* (PDM) eliminates costly, inefficient
  modulation transformer and reactor
• Unsurpassed low frequency square wave performance
• Automatic modulation tracking minimizes adjustments
• No significant overshoot...yielding maximum modulation capability
• No Slew Induced Distortion possible
• High modulator and PA efficiency yields low power consumption
• Only two tube types
• Produces faithful transmission of today's demanding formats in a
cost effective manner

The Harris MW-10B delivers overall performance superior to any other
10 kilowatt medium wave broadcast transmitter. The transmitter is a
high level plate modulated, using Harris' patented, highly efficient
Pulse Duration Modulator (PDM). This, in combination with a number of
other outstanding features, makes the MW-10B the most advanced
10 kilowatt AM transmitter in the world.

Specifications

Power Output: (Rated) 10,000 watts. (Capable) 11,000
  watts. FCC type accepted at 10,000,
  5000, 2500 and 1000 watts.

Modulation Method: Pulse Duration Modulation.

Carrier Shift: (At 95% modulation with 400 Hz tone)
  2% or less.

Audio Input: (For 95% modulation) + 10 dBm,
  ± 2 dB.

Audio Input Impedance: 600 ohms balanced.

Audio Frequency Response: ± 1 dB, 20 to 10,000 Hz. (Response
  referred to 1 kHz, 95% modulation, with
  modulations at other frequencies held to
  same percentage. Response may de-
  grade at higher modulating frequencies
  if transmitter is operated into a band-
  width limited antenna system.)

THD Distortion : 2% or less at 95% modulation, 20 to
  10,000 Hz unenhanced.

RF Harmonics: Meets or exceeds FCC and CCIR
  requirements.

Spurious Output: 80 dB or better.

RF Frequency Range: 535 to 1605 kHz. Supplied to one
  frequency as ordered.

RF Output Impedance: 50 ohms, unbalanced. Other output
  impedances available on special order.

RF Output Connector: 1-5/8” male EIA flange. Other types of
  output connectors available on special order.

Maximum VSWR: 1.3 to 1.

Noise : Unweighted, 60 dB below 100% mod-
  ulation. Weighted (CCIR Rec. 488-1),
  70 dB below 100% modulation.

Positive Peak Capability: 125% at 11 kW output, when modulated
  with processed program material.

Negative Peak Capability: 95%.

Frequency Stability: ± 20 Hz or less over operating tempera-
  ture range.

Supply Voltage: 200/500 volts, 3 phase, 60 Hz, closed
  delta/wye or 350/430 volts, 3 phase, 50 Hz operation.

Line Voltage Regulation
  And Variation: 5% maximum.

Line Voltage Unbalance : 4% maximum.

Power Consumption

(Typical) 20.5 kW, 0% modulation; 22.1 kW, 50% tone modulation; 28.0
  kW, 100% tone modulation. (Maxi-
  mum) 22.1 kW, 0% modulation; 24.3
  kW, 50% tone modulation; 30.8 kW,
  100% tone modulation.

Power Factor: 95% or better.

Ambient Temperature Range*: -20° to +50°C (-4° to +122°F) at sea
  level. Decreases 3.5° per 1,000 feet of
  altitude (84°F at 10,000 feet).

Maximum Relative Humidity : 95%.

Maximum Altitude For
  Full Power Rating: 10,000 feet AMSL (3048 meters). Trans-
  mitters for operation above 10,000 feet
  AMSL require special order.

Size*: 78”H x 72”W x 32”D
  (198 x 183 x 81.3cm)

Weight: Unpacked, 1500 lbs. (680.4 kg) approx.
  Domestic packed, 1900 lbs. (861.8 kg)
  approx. Export packed, 2150 lbs.
  (975.2 kg) approx.

Cubage: 120 cu. ft. (3.4 cu. meters) packed,
  approx.

Finish: Blue, white and black.

Tubes Used: (1) 3CX15,000H3 and (1) 4CX15,000A.

Remote Control: Normal terminal board interface.

1. Distortion measured at 95% modulation, or less, down to 25% . If transmitter is
  operated into a bandwidth limited antenna system, distortion at the higher
  modulating frequencies may degrade.

2. Noise measured over the band 20 Hz to 20 kHz, with line to line voltages of 11's
  supply line balanced. Noise may degrade below 16 dB below 100% modulation
  with line voltage unbalance not exceeding 4%.

3. Typical power consumption figures are for 10 kilowatts output and for optimum
  transmitter adjustment. For higher output powers and/or transmitter misadjust-
  ments, power consumption may be higher.

4. Maximum operating temperature derates linearly to +23°C (84.2°F) at 10,000 feet
  AMSL (3048 meters).

5. Does not include height of output connector, which may be removed for transport.

Ordering Information

MW-10B Transmitter with one set of operating tubes and two crystals,
for 200-250 Volts or 350-430 Volts, 3 phase, 60 Hz operation

MW-10B Transmitter with one set of operating tubes and two crystals,
for 200-250 Volts or 350-430 Volts, 3 phase, 50 Hz operation

Recommended spare semiconductor kit

Low voltage and filament voltage regulator, and line voltage regulator
for MW-10B available.

*Patented

Prices and Specifications Subject to Change Without Notice.
HARRIS
P.O. Box 4290
Quincy, IL 62306-4290
(217) 222-8200

MEDIUM WAVE BROADCAST TRANSMITTER

SX-1 1000 Watt
SX-2.5 2500 Watt
SX-5 5000 Watt
All Solid-State Medium Wave Broadcast Transmitters

FEATURES
• 100% solid-state for highest reliability
• Exceptionally high operating efficiency offers direct power cost savings over other designs
• New concept dual microprocessor control and status monitoring simplifies operation and service
• Flat-Pass output network for exceptional phase and amplitude linearity
• Designed for stereo operation (optional)
• Unique air handling system lowers maintenance time

The entire SX Series of solid-state AM transmitters are based on a rigid design philosophy. Central to this concept are the commitments to achieve:
• The highest possible audio performance
• The highest possible overall efficiency
• Maximum reliability
• Optimum stereo performance

The SX Series broadcast transmitters are in a class by themselves. They are computer designed and computer tested, with their own self-contained dual status and control computers. The SX Series are 100% solid-state and not affected by loss of emission, shorted elements or other problems found in tube type transmitters.

EASE OF INSTALLATION AND SERVICE
The SX Series arrive ready for installation. Included is a wall mounted AC disconnect panel designed to interface with the station’s electrical distribution system. Installation is essentially positioning the SX Series transmitter and making final AC, RF and audio connections. No special air handling systems are required.

TODAY’S TRANSMITTER FOR TODAY’S BROADCASTER
Exceptionally high overall efficiency; maximum reliability; improved audio performance; full service microprocessor control and status monitoring; readiness for AM Stereo, these are just a few of the features in the SX broadcast transmitter. Never before has Harris incorporated as many benefits in today’s transmitter for today’s broadcaster, with an advanced design to ensure years of reliable operation.

ORDERING INFORMATION
SX-1 TRANSMITTER, complete with all solid-state devices, crystal oscillator, technical manual.
Specify frequency .......................................................... 994-8581-001
SX-1 Transmitter, complete with all solid-state devices, frequency synthesizer, technical manual.
Specify frequency .......................................................... 994-8581-003
Recommended spare semiconductor kit .................................. 444-XXXX-000
Spare crystal ................................................................. 990-1012-001
Ancillary Equipment
AM 90 modulation monitor ............................................. 994-8424-001
Potomac AT-51 test set ................................................. 700-0499-000

SX-2.5 TRANSMITTER, complete with all solid-state devices, crystal oscillator, technical manual.
Specify frequency .......................................................... 994-8582-001
SX-2.5 Transmitter, complete with all solid-state devices, frequency synthesizer, technical manual.
Specify frequency .......................................................... 994-8582-003
Recommended spare semiconductor kit .................................. 444-XXXX-000
Spare crystal ................................................................. 990-1013-001
Ancillary Equipment
AM 90 modulation monitor ............................................. 994-8424-001
Potomac AT-51 test set ................................................. 700-0499-000

SX 5 TRANSMITTER, complete with all solid-state devices, crystal oscillator, technical manual.
Specify frequency .......................................................... 994-8583-001
SX-5 Transmitter, complete with all solid-state devices, frequency synthesizer, technical manual.
Specify frequency .......................................................... 994-8583-003
Recommended spare semiconductor kit .................................. 444-XXXX-000
Spare crystal ................................................................. 990-1014-001
Ancillary Equipment
AM 90 modulation monitor ............................................. 994-8424-001
Potomac AT-51 test set ................................................. 700-0499-000

Prices and Specifications Subject to Change Without Notice.
SX-1 SPECIFICATIONS

Power Output: (Rated) 1000 watts. (Capable) 1100 watts. Power reduction through 100 watts.

RF Frequency Range: 535 kHz through 1620 kHz. Supplied to one frequency as ordered.

Carrier Frequency Stability: A) Crystal Oscillator: ± 20 Hz over temperature range.
B) Frequency Synthesizer (optional): ± 10 Hz over temperature range.

RF Output Impedance: 50 ohms unbalanced. Will match into a VSWR of 1.5:1 at carrier.

RF Output Terminal: Female N connector.

Carrier Amplitude Variation: (Carrier Shift): Less than 2% at 100% modulation at 1000 Hz.

RF Harmonics: Exceeds FCC and CCIR specifications.

Type Of Modulator: Patented Polyphase PDM.

Audio Frequency Response: +0.5 dB, -1.5 dB from 20 to 12,500 Hz at 95% modulation with Bessel filter out. (Ref. 1000 Hz)

Audio Harmonic Distortion: 95% modulation, 20 Hz to 12.5 kHz: 1% or less at 1 kHz; 1.5% or less at 500W; 2.0% or less at 250W; 3.0% or less at 100W.

Audio Intermodulation Distortion: 95% modulation, 60/7000 Hz; 1:1 or 4:1 ratio; 1.5% or less at 1 kHz; 1.5% or less at 500W; 2% or less at 250W; 3% or less at 100W.

Squarewave Overshoot: 5% or less at 400 Hz and 90% modulation with Bessel filter. (Unweighted): Better than 60 dB below 100% modulation.

Noise: Better than 60 dB below 100% modulation.

Positive Peak Capability: 125% positive peak program modulation capability at 1.1 kW

AM Stereo Specifications: Incidental phase: 0.2 radian average IPM at 95% envelope modulation at 1 kHz. 0.5 peak radians.

Audio Input: 10 to +10 dBm (unattenuated) transformerless, 600 ohms balanced.

AC Voltage Input: 197-251 VAC, 48 to 63 Hz, single phase. ±5% from nominal line voltage to maintain full performance.

PA Efficiency: 85% or better.

Overall Efficiency: 535 kHz to 1200 Hz, 65% ± 2%; 1200-1620 kHz, 70% ± 2%.

Power Consumption: 1.5 kW at 90% modulation at 1000 watts. 2.2 kW at 100% tone modulation at 100 watts carrier. 1.9 kW under average programming conditions.

Spurious Output: Exceeds FCC and CCIR requirements.

Monitor Provisions: 10 volts RF (RMS) modulated output sample at 50 ohms. (High/Medium/Low) power.

Remote Control: Self-contained interface for most remote control or facility control systems.

Ambient Temperature Range: -20°C to +50°C AMSL (Irate upper limit 2°C per 1000 feet altitude).

Ambient Humidity Range: To 95% non condensing.

Air Flow: 250 CFM fan.

Attitude: Sea Level to 13,000 feet (4000 meters).

Operating Acoustical Noise: Better than 64 dB A rating, 3 feet from transmitter.

Size: “27” H x “28” W x “30” D (1830 x 712 x 762 mm).

Weight: (Unpacked), 450 lbs. (204 kg) — approximate. Domestic packed, 650 lbs. (298 kg) — approximate. Export packed, 750 lbs. (343 kg) — approximate.

Cubeage: 58.7 cubic feet (2 cubic meters) packed.

Colors: Black and white.

Type Of Active Components: 100% solid-state.

Power Supply: Self-contained, dry.

Overall Efficiency: 65% or better at 2500 W.

Power Consumption: 3.85 kW at 90% modulation at 2500 watts. 5.8 kW at 100% tone modulation at 2500 watts carrier. 5.4 kW under average programming conditions.

Monitor Provisions: 10 volts RF (RMS) modulated output sample at 50 ohms. (High/Medium/Low) power.

Remote Control: Self-contained interface for most remote control or facility control systems.

Ambient Temperature Range: -20°C to +50°C AMSL (Irate upper limit 2°C per 1000 feet altitude).

Ambient Humidity Range: To 95% non condensing.

Air Flow: 250 CFM fan.

Attitude: Sea Level to 13,000 feet (4000 meters).

Operating Acoustical Noise: Better than 64 dB A rating, 3 feet from transmitter.

Size: “27” H x “28” W x “30” D (1830 x 712 x 762 mm).

Weight: (Unpacked), 450 lbs. (204 kg) — approximate. Domestic packed, 650 lbs. (298 kg) — approximate. Export packed, 750 lbs. (343 kg) — approximate.

Cubeage: 58.7 cubic feet (2 cubic meters) packed.

Colors: Black and white.

Type Of Active Components: 100% solid-state.

Power Supply: Self-contained, dry.

For AC service connection, please provide 14 KVA with a minimum of 5% voltage demand regulation.

Note: The above audio performance may be degraded should the transmitter be operated into a broadband, restricted antenna system. Also, all specifications are referenced to operation at 2500 watts except when noted.

SX-5 SPECIFICATIONS

Power Output: (Rated) 5000 watts. (Capable) 5600 watts. Power reduction through 500 watts.

RF Frequency Range: 531 kHz through 1620 kHz. Supplied to one frequency as ordered.

Carrier Frequency Stability: A) Crystal Oscillator: ± 20 Hz over temperature range.
B) Frequency Synthesizer (optional): ± 10 Hz over temperature range.

RF Output Impedance: 50 ohms unbalanced. Will match into a VSWR of 1.5:1 at carrier.

RF Output Terminal: 7/8” EIA male flange connector.

Carrier Amplitude Variation: (Carrier Shift): Less than 2% at 100% modulation at 1000 Hz.

RF Harmonics And Spurious Emissions: Exceeds FCC and CCIR specifications.

Type Of Modulator: Patented Polyphase PDM.

Audio Frequency Response: +0.5 dB, -1.5 dB from 20 to 12,500 Hz. Reference 1000 Hz with Bessel filter out.

Audio Harmonic Distortion: 1.5% or less at 5 kW; 20 to 12,500 Hz at 95% modulation.

Audio Intermodulation Distortion: 1.0% or less, 60/7000 Hz: 1:1, 2% or less, 60/7000 Hz: 4:1, SMPTE standards at 5 kW operation.

Squarewave Overshoot: Less than 5% at 400 Hz

Squarewave Tilt: Less than 5% at 20 Hz and 90% modulation.

Noise: (Unweighted): Better than 60 dB below 100% modulation.

Positive Peak Capability: 125% positive peak program modulation capability at 5600 watts.

AM Stereo Specifications: Incidental Phase: 0.2 Average (Radiains) at 95% Envelope Modulation at 1 kHz. 0.5 Peak (Radiains).

Audio Input: 10 to +10 dBm, transformerless 600 ohms balanced, continuously adjustable.

AC Voltage Input: 197-251 VAC, 48 to 63 Hz, three phase, 3 wire or 341 to 343 VAC, three phase, 4 wire, 48 to 63 Hz, ±5% from nominal line voltage to maintain full performance.

Overall Efficiency: Better than 65%.

Power Consumption: 1.7 kW at 90% modulation at 5000 watts. 11.6 kW at 100% tone modulation at 5000 watts carrier. 10.4 kW under average programming conditions.

Monitor Provisions: 10 volts RF (RMS) modulated output sample at 50 ohms. (High/Medium/Low) power.

Remote Control: Self-contained interface for most remote control or facility control systems.

Ambient Temperature Range: -20°C to +50°C AMSL (Irate upper limit 2°C per 1000 feet altitude).

Ambient Humidity Range: To 95% non condensing.

Air Flow: 500 CFM fan.

Attitude: Sea Level to 13,000 feet (4000 meters).

Operating Acoustical Noise: Better than 64 dB A rating, 3 feet from transmitter.

Size: “27” H x “28” W x “30” D (1830 x 712 x 762 mm).

Weight: (Unpacked), 500 lbs. (226 kg) — approximate. Domestic packed, 650 lbs. (298 kg) — approximate. Export packed, 750 lbs. (343 kg) — approximate.

Cubeage: 68.7 cubic feet (2 cubic meters) packed.

Colors: Black and white.

Type Of Active Components: 100% solid-state.

Power Supply: Self-contained, dry.

For AC service connection, please provide 14 KVA with a minimum of 5% voltage demand regulation.

Note: The above audio performance may be degraded should the transmitter be operated into a broadband, restricted antenna system. Also, all specifications are referenced to operation at 2500 watts except when noted.
The new Harris AM-90 Modulation Monitor is designed for continuous monitoring of the amplitude modulation envelope in the 450 kHz to 30 MHz frequency range. This sensitive instrument assures strict compliance with FCC rules and regulations.

The AM-90 Modulation Monitor is an all solid-state self-contained rack mounted unit consisting of compact mainframe and two printed circuit cards. All controls are front panel mounted. Connections to a remote unit, primary power and RF inputs are mounted on the rear of the chassis.

Specifications

Frequency Range: 450 kHz to 30 MHz
RF Input: 1.0 V RMS to 10.0 V RMS
Power Input: 115 VAC ± 15%, 50-60 Hz (230 VAC ± 15% available)

MODULATION INDICATION
Display Meter: 0% to 100% on negative peaks. 0% to 140% on positive peaks.

Flasher Frequency Response: +0%, -5%; 20 Hz to 20 kHz
Flasher Accuracy: ±1% at 1 kHz

AUDIO TEST OUTPUTS
Frequency Response: +0 dB, -0.5 dB; 20 Hz to 20 kHz
Distortion: 0.15% maximum at 99% modulation, 1 kHz audio, 450 kHz to 1.8 MHz carrier; 0.50% maximum, 1.8 MHz to 30 MHz carrier
Signal-To-Noise: 75 dB minimum referenced to 100% sine wave modulation

ELECTRONICALLY BALANCED OUTPUT
Output Impedance: 75 ohms balanced
Output Level: +10 dBm into 600 ohms at 100% sine wave modulation

INSTRUMENT OUTPUT
Output Impedance: 100 ohms (unbalanced)
Output Level: 5 volts RMS into 10K ohms at 100% sine wave modulation

Modulation Calibration: Built-in calibration, digitally synthesized RF source, +125% and -100% modulation, RMS value 111% ± 0.1%
Remote Output: For meter and flasher indications at another location, use Harris' remote meter panel 994-8487-001

GENERAL
Size: 19" long x 3.5" high x 13.5" deep (48cm x 9cm x 34cm). Mounts in standard relay rack
Weight: 15 lbs. (6.82 kg). Export Packed: approx. 20 lbs. (9 kg)
Ambient Temperature Range: -20°C to +55°C (-4°F to 131°F)
Humidity: 95% maximum (non-condensing)
Altitude: 10,000 feet maximum (3048 meters)

Ordering Information
AM-90 Solid-State AM Modulation Monitor .............. 994-8424-001
AM-90 Remote Meter Panel .......................... 994-8487-001

It's Harris who has it all!

- Most advanced and complete line of radio and television broadcast equipment. - 24-hour-per-day, 365-days-per-year emergency service and parts. - 24-hour-per-day technical and engineering consulting assistance. - More than 30,000 different items in inventory, from 2,000 manufacturers. - One responsible point of contact. - Proven reputation for product quality and service responsiveness.

FOR A COMPLETE LINE OF RADIO AND TELEVISION BROADCAST EQUIPMENT NEEDS AND SERVICE CALL HARRIS

Prices and Specifications Subject to Change Without Notice.
Tower Light Isolation Chokes

(20 AMP AC RATING)
Most popular of all tower light isolation chokes. Available in 2 or 3 wire models and in open type, or weatherproof as illustrated. Wound on heavy triple X tubing with mica by-pass condensers on each circuit end. Inductance approximately 350 uH. 3' stand-off insulators are part of coil. (Weatherproof type), 24" high, 17¾" wide, 10¼" deep. Illustration on left shows weatherproof unit with front cover removed.

ORDERING INFORMATION
Tower Choke, 2 wire, weatherproof, Fig. A ..............................994-3937-001
Tower Choke, 3 wire, weatherproof, Fig. A ..............................994-3938-001
Tower Choke, 2 wire, open type, Fig. B ..............................994-3935-001
Tower Choke, 3 wire, open type, Fig. B ..............................994-3936-001

RF Contactors
Harris offers a complete line of RF contactors of both the mechanical and vacuum variety.

The popular mechanical contactors, that handle a wide range of medium wave antenna applications, are available from stock.

DIODE TYPE
REMOTE METER EQUIPMENT

For remote indication of RF current. Consists of a carefully constructed pickup loop attached through a short coaxial cable to a solid-state rectifier assembly. RF current is measured without breaking the main lead. No AC power is required. May be used with any good 1 MA DC meter. Power range: 250 watts to 50,000 watts. Frequency range: 540 kHz to 1600 kHz.

ORDERING INFORMATION
Diode remote meter unit, less meter ........................................994-6112-001
0-1 MA METERS
Meter 3" sq. case, scale 0-3 R.F. amperes .................................632-0416-000
Meter 3" sq. case, scale 0-6 R.F. amperes .................................632-0405-000
Meter 3" sq. case, scale 0-8 R.F. amperes .................................632-0420-000
Meter 3" sq. case, scale 0-10 R.F. amperes ...............................632-0421-000
Meter 4" sq. case, scale 0-8 R.F. amperes .................................632-0426-000
Meter 4" sq. case, scale 0-10 R.F. amperes ...............................632-0428-000
NOTE: Other meter scale ranges available at extra cost. Above for use with diode remote unit, not thermocouple.

Heavy Duty Sampling Loop

This is a very rugged fixed non-shielded RF sampling loop. It is heavily galvanized after welding, and is fitted with large steatite insulators and heavy duty tower leg clamps for easy and positive mounting. Complete with type female "N" jack. For 50 to 70 ohm sampling line.

ORDERING INFORMATION
Heavy duty sampling loop ........................................994-6126-001

ISOLATION COILS
Harris manufactures several types of sampling loop isolation coils to meet the needs of the directional array and associated monitoring system.

Standard units available use either ½ inch or ¾ inch phase stabilized foam transmission line. The isolation coils are available with an optional resonating capacitor. The unit can be mounted on a flat aluminum wall panel or housed in a weatherproof enclosure.

Prices and Specifications Subject to Change Without Notice.
Weatherproof 5-10 KW Antenna Coupling Units

Housed in aluminum cabinet with double front doors. Large coils combined with capacitors of generous voltage and current ratings to assure a lifetime of service under extreme heat or cold. A large antenna lead in bowl is provided. Mounting is with metal flanges on the back of the tuning unit for attachment to wooden poles set in ground or for mounting on wall.

SPECIFICATIONS
CARRIER POWER: 5,000 watts or 10,000 watts AM, as ordered.
FREQUENCY: 525-1,700 KHz as ordered.
LINE IMPEDANCE: 50 ohms
TO MATCH: Series fed tower of from 70° to 100° electrical length.
CIRCUIT: Full Tee Network.
WEIGHT: Approximately 200 lbs.
SIZE: 38" high, 37" wide, 21½" deep.

ORDERING INFORMATION
Antenna Coupling Unit, 5 kW ..........994-5309-001
Antenna Coupling Unit, 10 kW ..........994-5309-002
NOTE: When ordering, state carrier frequency, transmission line impedance, power, tower height and tower measurements, if known. Couplers to match unusual loads such as short or tall towers, shunt feed, etc., are available on special order, at extra cost.

RF ANTENNA METERS
Internal thermocouple standard scale. Weston Model 308, three-inch square case. Other ranges not listed below are available with many carried in stock. Also expanded scale meters in inventory.

ORDERING INFORMATION
Meter, 0-3 R.F. amperes ..........634-0206-000
Meter, 0-6 R.F. amperes ..........634-0238-000
Meter, 0-8 R.F. amperes ..........634-0209-000
Meter, 0-10 R.F. amperes ..........634-0210-000

Test Jacks

Harris manufactures both a medium power and high power RF test jack for use in several medium wave antenna network applications. The medium power test jack (shown at left) is rated for 35 amperes while the high power version (shown at right) is rated for 100 amperes. These units are constructed to assure maintenance free operation.

ORDERING INFORMATION
Medium Power Test Jack ..........994-3280-002
High Power Test Jack ..........994-3280-003

METER SHORTING SWITCH

A heavy duty, make-before-break meter shorting switch of the plunger or push type. Heavy bronze tempered spring grips on both sides assure accuracy and durability.

ORDERING INFORMATION
Meter Shorting Switch, rating 15 amperes ..........994-3493-001
Meter Shorting Switch, rating 40 amperes (shown above) ..........994-6527-001

Weatherproof Series – FED Antenna Coupler, 1250 Watts

Recommended for broadcast transmitter powers of 1,000, 500 and 250 watts, 100% modulated. Heavy edgewound coil has generous inductance for a Tee network along with fixed mica capacitors supplied. Extra room is provided to install either diode or thermocouple remote metering equipment. Heavy duty meter shorting switch eliminates antenna meter from the circuit when not in use for lightning protection. Meter is observed through plexiglass porthole. Front door of cabinet has been removed for illustrative purposes.

SPECIFICATIONS
CARRIER POWER: Up to 1250 watts AM.
FREQUENCY: 525-1700 KHz as ordered.
LINE IMPEDANCE: 50 ohms.
TO MATCH: Series-fed tower of from 70° to 100° electrical length.
CIRCUIT: Full Tee Network.
WEIGHT: 98 lbs.
SIZE: 20" high, 20½" wide, 18½" deep.

ORDERING INFORMATION
Antenna Coupler with antenna meter ..........994-3494-001
NOTE: When ordering, state transmission line impedance, frequency, tower height, and tower measurements, if known. Couplers to match unusual loads such as short or tall towers, shunt feed, etc., are available on special order at extra cost.

Prices and Specifications Subject to Change Without Notice.
SHORT WAVE
BROADCAST TRANSMITTER

SW-50A
50,000 Watt Short Wave Broadcast Transmitter

- High level Pulse Duration Modulation
- Exceeds 57% overall efficiency
- 10-Channel pre-set tuning, crystals included
- Low power consumption
- Only five tubes for 50 kW
- Vapor phase cooling
- Designed for trapezoidal programming
- Minimum floor space
- Full front and rear accessibility

Harris' SW-50A is a high-level, plate modulated short wave broadcast transmitter, featuring automatic 10-channel pre-set tuning. Utilizing the exclusive Pulse Duration Modulator, the SW-50A provides higher efficiency, lower operating costs and overall performance superior to that of any other short wave transmitter in the 50 kilowatt power range. The transmitter is capable of operating at any frequency between 3.2 and 22 MHz.

Specifications
POWER OUTPUT: 50,000 watts nominal unmodulated.
RF FREQUENCY RANGE: 3.2 to 22.0 MHz.
METHOD OF TUNING: Manual, or selection of 10 pre-set channels.
RF OUTPUT IMPEDANCE: 300 ohms balanced, 2.0 to 1 maximum VSWR.
RF FREQUENCY STABILITY: \( \pm 1 \times 10^{-6} \) (\( \pm 22 \text{ Hz at 22 MHz} \)).
SPURIOUS AND HARMONIC EMISSION: Less than 50 mW.
CARRIER SHIFT: Less than 2% at 95% modulation at 1000 Hz.
AUDIO FREQUENCY RESPONSE: \( \pm 1.5 \text{ dB from 50 to 10,000 Hz referenced to 1000 Hz at 95\% modulation.} \)
AUDIO FREQUENCY DISTORTION: Less than 3% from 50 to 10,000 Hz at 95% modulation.
NOISE: 55 dB below 1000 Hz, 100% modulated level.
AUDIO INPUT LEVEL: 0 dBm \( \pm 2 \text{ dB for 100\% modulation.} \)
AUDIO INPUT IMPEDANCE: 600/150 ohms, balanced or unbalanced.
MODULATION LEVEL: 100% sinusoidal, 60 minutes, 500-5000 Hz.
TRAPEZOIDAL MODULATION: Less than 5% tilt or overshoot, 100 Hz to 2000 Hz measured using 12 dB clipped sine wave.
POWER INPUT: Any specified voltage 380V to 480V, 3 phase, 50 or 60 Hz. Phase unbalance 5%, Regulation 5%.
POWER CONSUMPTION:
- No modulation 89 kW
- 30% modulation 92 kW
- 100% modulation 130 kW
POWER FACTOR: Greater than 95%.
VOLTAGE REGULATOR: Electronic voltage regulation for all power supplies other than high voltage.
OVERALL EFFICIENCY: 57% or greater @ average modulation.
TUBES: Two 4CV50,000E, two 4CX1500A, one F-1089.

SW-50A with front doors removed.

TEMPERATURE RANGE: 0 to +50°C ambient air temperature. Sea level decrease 2°C/1000 ft. altitude (38°C @ 6000 ft.)
HUMIDITY: 95% relative humidity, maximum.
STORAGE TEMPERATURE: -35°C to +60°C.
ALTITUDE: Up to 1829 meters (6000 feet) above sea level.
CABINET DATA: The two cabinets measure 366 cm (12 feet) wide, 137 cm (4.5 feet) deep, and 304 cm (10 feet) high.

Ordering Information
SW-50A, 50,000 watt short wave broadcast transmitter, with remote heat exchanger ........................................... 954-8630-001
HARRIS
P.O. Box 4290
Quincy, IL 62305-4290
(217) 222-8200

SW-100A
100,000 Watt Short Wave
Broadcast Transmitter

- High level Pulse Duration Modulation for exceptional audio performance
- Overall efficiency exceeds 55% - for reduced operating costs
- Only three tube types used - reduces spare stocking costs
- Pre-set channel tuning in 20 seconds or less, minimizes programming disruption
- Vapor phase cooling provides constant anode temperature resulting in extended tube life
- Front and rear cabinet accessibility eases maintenance

Harris’ SW-100A is a high-level, plate modulated short wave broadcast transmitter, featuring automatic 10-channel pre-set tuning. Utilizing the exclusive Pulse Duration Modulator, the SW-100A provides higher efficiency, lower operating costs and overall performance superior to that of any other short wave transmitter in the 100 kilowatt power range. The transmitter is capable of operating at any frequency between 3.2 and 22 MHz.

SW-100A Specifications

POWER OUTPUT: 100,000 watts nominal unmodulated.
RF FREQUENCY RANGE: 3.2 to 22.0 MHz.
METHOD OF TUNING: Manual, or selection of 10 pre-set channels.
RF OUTPUT IMPEDANCE: 300 ohms balanced, 2.0 to 1 maximum VSWR.
RF FREQUENCY STABILITY: $\pm 1 \times 10^{-6}$ ($\pm 22$ Hz at 22 MHz).
SPURIOUS AND HARMONIC EMISSION: Less than 50 mW.
CARRIER SHIFT: Less than 2% at 95% modulation at 1000 Hz.
AUDIO FREQUENCY RESPONSE: $\pm 1.5$ dB from 50 to 10,000 Hz referenced to 1,000 Hz at 95% modulation.
AUDIO FREQUENCY DISTORTION: Less than 3% from 50 to 10,000 Hz at 95% modulation.
NOISE: 55 dB below 1,000 Hz, 100% modulated level.
AUDIO INPUT LEVEL: 0 dBm ± 2 dB for 100% modulation.
AUDIO INPUT IMPEDANCE: 600/150 ohms, balanced or unbalanced.
MODULATION LEVEL: 100% sinusoidal, 10 minutes, 500-5000 Hz.
TRAPEZOIDAL MODULATION: Less than 5% tilt or overshoot, 100 Hz to 2000 Hz measured using 12 dB clipped sine wave.
POWER INPUT: Any specified voltage 380V to 480V, 3 phase, 50 or 60 Hz. Phase unbalance 5%, Regulation 5%.
POWER CONSUMPTION:
- No modulation 180 kW
- 30% modulation 190 kW
- 100% modulation 250 kW

ORDERING INFORMATION
SW-100A, 100,000 watt short wave broadcast transmitter, with remote heat exchanger ........................................ 994-8629-001

Prices and Specifications Subject to Change Without Notice.
**FM EXCITER**

**FM**

- **Maximum** reduces the
- **excellence** provides the broadcaster

**Continuing**

- **AC**

**REMOTE METERING PROVISIONS:**

- **TOTAL MODULATION**
- **AUDIO/CONTROL CONNECTIONS:** Two

**OVERALL CABINET SIZE:** 17.7" Wide

**AMBIENT TEMPERATURE RANGE:**

- **ALTITUDE RANGE:** 15,000 feet.

**FM EXCITER**

- **MAXIMUM**
- **mono option** (for use with externally mounted SCA Generator)

**Specifications**

**GENERAL**

- **POWER OUTPUT:** 3 watts to 15 watts continuously variable.
- **FREQUENCY RANGE:** 8.5 MHz to 108 MHz (reduced to one specified frequency), (selectable programmable to 50 MHz channel spacing)
- **INPUT IMPEDANCE:** 50 ohms, open and short circuit safe.
- **FREQUENCY STABILITY:** +0.005 % to 50° C temperature compensated reference oscillator.
- **TYPE OF MODULATION:** Direct carrier, frequency modulation (DCFM)
- **MODULATION CAPACITY:** +100 kHz
- **AC INPUT POWER:** 100 to 120 VAC or 200 to 260 VAC, 60 Hz or 50 Hz, 150 watts.
- **RF HARMONICS:** Radiated meets all FCC requirements for 10 watt and 15 watt educational transmitter requirements.
- **ALTITUDE RANGE:** 15,000 feet.
- **AMBIENT TEMPERATURE RANGE:** 0° to 50° C (operational) –25° C.
- **OVERALL CABINET SIZE:** 17.7" W x 14" H x 13.5" D 4.125"D (2030) 18" 1/8" rack mounting standard.

**CONSTRUCTION:**

- **FINISH:** Brushed metal.

**AUDIO/CONTROL CONNECTIONS:**

- **Two 18-terminal barrier strips parallel by 36 pin and socket connectors.**
- **Passing push-in input/output solderless or finger tip.

**METERING:**

- **MULTIMETER:** 0-10 position, DC metering.

**ORDERING INFORMATION**

- **MX-15 Exciter for wideband composite operation, 19-inch rack mounted**
- **DSM Stereo Generator with DTR Filter**
- **SCA Generator**
- **External SCA Generator Jumper Card**
MX-15
Multi-Purpose SCA Generator

- Designed for operation on 67 kHz or 92 kHz (with other frequencies available) to meet the new applications of SCA service
- Improved carrier mute decay circuit considerably reduces annoying SCA receiver squelch pops
- Transformerless audio input stage improves SCA aural performance
- DC coupled data input port provides accurate transmission of digital information
- Automatic MX-15 SCA/composite level control maintains maximum main channel modulation

The MX-15 multipurpose SCA generator is designed to meet the expanded needs of today's SCA service requirements, and is ideal for high quality aural service or for accurate transmission of digital data.

Expanded Range
Of Operation
The MX-15 multipurpose SCA generator can be user programmed to operate on 67 kHz or 92 kHz by simply positioning a jumper plug. Other operating frequencies can be easily accommodated upon request. Two SCA generators, one on 67 kHz and the other on 92 kHz, can simultaneously operate with stereo. The MX-15 exciter accommodates additional SCA channels through the composite input.

Improved Aural Performance
The transformerless audio input stage improves aural performance in comparison with other designs. Stations will note lower harmonic distortion for improved SCA fidelity.

The transformerless input stage is low pass filtered to meet the technical needs of the SCA information transmitted. A 4.5 kHz low pass response is provided as standard. This can be easily changed for 3 kHz, 5 kHz or 7.5 kHz response, or may be defeated if desired.

The MX-15 multipurpose SCA generator meets the precise transmission requirements of stations transmitting digital information. A rear mounted BNC input connector DC couples the digital data to the SCA generator's FM modulator for precise transmission quality.

Improved Mute
Decay Circuit
SCA operators recognize that abrupt muting of the SCA carrier may cause an annoying "pop" in the SCA receivers. Harris has incorporated a carrier mute decay circuit to eliminate this objectionable noise.

In addition to the mute decay circuit, stations may select the mute delay time constant they desire—anywhere between 0.5 seconds and 20 seconds. Automatic mute threshold level can also be adjusted between 0 and −30 dBm in order to meet varying input levels.

Automatic Composite
Level Adjustment
The MX-15 exciter and multipurpose SCA generator work as an effective system to automatically maintain maximum main channel modulation at all times. Here's how: When the SCA generator is activated, the composite level is automatically lowered to allow for insertion of the SCA channel. The converse is also true. Stations need not compromise 10% to 30% of modulation when SCA is not used continuously.

Expanded Applications
Whether you are planning to use your SCA channel for conventional aural services (such as background music), or are looking at some of the new expanded applications possible today, the Harris MX-15 multipurpose SCA generator meets your needs.

Specifications
MODULATION: Direct FM
FREQUENCY OF OPERATION: Selectable 67 kHz or 92 kHz. Any frequency between 25 kHz and 92 kHz available on special order.
FREQUENCY STABILITY: ±500 Hz.
MODULATION CAPABILITY: ±7.5 kHz.
AUDIO FREQUENCY RESPONSE: 67 kHz and 92 kHz AC coupled input, 150 microsecond pre-emphasis, ±1 dB, standard. Selectable flat, 50 or 75 microsecond pre-emphasis. DC coupled input: No pre-emphasis: DC to 4 kHz ±0.5 dB.
AUDIO INPUT IMPEDANCE: 600 ohms balanced transformerless (AC coupled). Also 2000 ohms DC coupled unbalanced input through rear BNC connector.
AC INPUT LEVEL: +10 dBm, ±1 dB for 100% modulation at 400 Hz @ 600 ohms.
DC INPUT LEVEL: 1.0 volt peak for 5 kHz deviation.
INPUT FILTERING: Programmable LPF, 4.5 kHz standard. 3 kHz, 5 kHz, 7.5 kHz selectable. Low pass filter defeatable.
HARMONIC DISTORTION: 0.5%, 30-4500 Hz, ±5 kHz deviation.
INTERMODULATION DISTORTION: 1%, 60 Hz/7 kHz, 1:1 ratio (audio low pass filter and pre-emphasis bypassed).
FM NOISE: (Main channel not modulated) −63 dB (reference: 100% modulation = ±5 kHz deviation at 400 Hz).
CROSSTALK: (SCA to main or stereo sub-channel) −60 dB or better.
CROSSTALK: (Main or stereo sub-channel to SCA) 57 dB below ±5 kHz deviation of SCA with mono or stereo channels modulated by frequencies 30 Hz-15 kHz, SCA demodulated with 150 microsecond de-emphasis).
CROSSTALK: SCA to SCA (41 kHz/67 kHz) 50 dB demodulated with 150 microsecond de-emphasis.

AUTOMATIC MUTE LEVEL: Variable from 0 to −30 dBm.
MUTE DELAY: Adjustable 0.5 to 20 seconds.
CARRIER MUTE DECAY: Greater than 30 milliseconds.
INJECTION LEVEL: 1% to 30% of composite level (adjustable).

Ordering Information
Multi-Purpose SCA Generator (specify 67 or 92 kHz) 994-7952-002

HARRIS
P.O. Box 4290
Quincy, IL 62305-4290
(217) 222-8200

Prices and Specifications Subject to Change Without Notice.
FM BROADCAST TRANSMITTERS

FM-300K  300 Watt
FM-1K    1 Kilowatt
FM-3.5K  3.5 Kilowatt
FM-5K    5 Kilowatt
FM-10K   10 Kilowatt
FM-20K   20 Kilowatt
FM-25K   25 Kilowatt
FM-40K   40 Kilowatt
FM-50K   50 Kilowatt (Dual)

FM BROADCAST TRANSMITTERS
STANDARD FEATURES
- MX-15 Exciter with ultra linear modulated oscillator for minimum distortion, maximum signal clarity
- Digitally Synthesized Modulation stereo generator provides excellent midband separation for increased stereo realism
- Dynamic Transient Response (DTR*) stereo generator filter maximizes modulation level without overshoot

*Patented

FM-300K
Solid-State 300 Watt FM Transmitter

FM-300KD
Solid-State Main/Alternate 300 Watt FM Transmitter

Harris' 300 watt FM transmitter is available in two configurations; the standard model (FM-300K) or the dual FM-300KD which can be equipped for one of three configurations.

1. Separate 300 watt transmitters operating on different frequencies for two program channels.
2. Main/alternate main configuration where one transmitter acts as a full backup to the other permitting uninterrupted program service should one fail.
3. Combined operation yielding 600 watts of power for program services requiring increased coverage area.

Both the FM-300K and the FM-300KD are housed in a single 24 inch wide cabinet. Since the FM-300K only contains one transmitter, the extra cabinet space may be used for monitoring and test equipment.

Both transmitters are 100% solid-state for top reliability and represent one of the first all-solid state 300 watt broadband transmitters ever developed. Harris was the first equipment manufacturer to introduce an all solid-state radio broadcast transmitter; the MW-1, one kilowatt AM transmitter. The same solid-state transmitter engineering experience that has given the MW-1 an excellent reliability and performance track record brings you the Harris FM-300K/KD.

FM-1K
1 Kilowatt FM Broadcast Transmitter

The FM-1K employs Harris' advanced-design MX-15 solid-state exciter to provide the cleanest and loudest FM signal of any one-kilowatt FM transmitter available today. The DSM (Digitally Synthesized Modulation) stereo generator allows the transmitter to provide stereo separation of 50 dB minimum, 30-15,000 Hz, while the DTR (Dynamic Transient Response) filter permits a 2 to 6 dB increase in loudness, with no degradation of audio quality, by limiting overshoot to 2% or less.

FM-5K 10K/20K
5/10/20 Kilowatt FM Broadcast Transmitters

The Series features the advanced-design MX-15 exciter. The Harris 5 kW, 10 kW or the 20 kW. FM series provides the cleanest and loudest stereo signal of any FM transmitter in their power range. The DSM (Digitally Synthesized Modulation) stereo generator allows the transmitter to provide stereo separation of 48 dB minimum, 30-15,000 Hz, while the DTR (Dynamic Transient Response) filter permits a 2 to 6 dB increase in loudness, with no degradation of audio quality, by limiting overshoot of 2% or less. Add to this high efficiency plus conservatively rated components and you have truly exceptional FM transmitters.

Prices and Specifications Subject to Change Without Notice.
FM-25K
25-Kilowatt FM
Broadcast Transmitter

Harris' technology has combined advances in both tube and transistor designs, to bring you a major step forward in high-power FM transmitters. Transistors are now available which provide 50 watts of RF power at reasonable gain and low junction temperatures. By combining several of these transistors in wideband RF circuits, enough power can be generated to drive an advanced high-gain Eimac tetrode tube, the 8990. This tube, when grid driven in a grounded cathode, quarter-wave cavity, can produce 25 kilowatts with 350 watts of drive at nearly 80% plate efficiency.

The FM-25K, 25 kilowatt FM transmitter reflects Harris' design philosophy that FM transmitters should deliver RF power efficiently, should not limit exciter performance, and should integrate dependable solid-state control logic. In the FM-25K, these features are teamed with efficient, single-tube design, and with the high performance MX-15 exciter.

The FM-25K was designed for applications with tower limitations or specific coverage requirements. The higher RF power output reduces the number of antenna bays required for a given ERP; and fewer bays mean a reduction in windloading and mounting area, so that tower size and/or height may be reduced. Also, fewer antenna bays, with less gain, can mean improved close-in coverage and the elimination of null fills.

FM-40K
40-Kilowatt FM
Broadcast Transmitter

Reliability through redundancy, that's the story on Harris' FM-40K, 40 kilowatt transmitter.

The basic FM-40K transmitter system consists of two 20 kilowatt amplifiers, and a center control cabinet containing the MX-15 exciter, and provides redundancy in all areas except the exciter and isolation amplifier. In case emergency operation is required, you stay on the air at one-quarter normal power output.

The complete 40 kilowatt FM transmitter system includes an optional Automatic Exciter Switching Kit and RF Output Switching Kit, and provides total redundancy. Should a malfunction occur anywhere in the system, you are still on the air at one-half normal power.

In the basic system, outputs of each amplifier are coupled through harmonic filters to the output combining network. This hybrid network summing the two 20 kilowatt signals to produce a 40 kilowatt output to the transmission line. However, the two amplifiers remain isolated from each other.

With the addition of the Automatic Exciter Switching Kit, automatic backup exciter protection is provided. And with the further addition of the RF Output Switching System, power output becomes one-half the normal output during emergency operation. Either or both of these options may be included in the FM-40K at the time you order, or added later in the field.

FMD-50K
50-Kilowatt Dual FM
Broadcast Transmitter

The FMD-50K dual 50 kilowatt transmitter offers real protection against off-air time through redundancy, and through extensive use of solid-state circuitry. Only two tubes are employed in the entire FMD-50K high-gain, highly efficient 8990 tetrodes used as the final power amplifiers. The 8990 uses a wavy fin radiator which provides exceptional cooling at reduced air requirements, for quiet operation. The quarter-wave PA cavity design eliminates troublesome sliding contacts for tuning, and assures wide RF bandwidth. This results in a signal path that is transparent to the MX-15 exciter.

The basic FMD-50K transmitter consists of two 25 kilowatt amplifiers, and a center control cabinet. It provides redundancy in all areas except the excitors. In case emergency operation is required, you stay on the air at one-quarter normal power output. An even higher level of redundancy is achieved in the complete FMD-50K through an optional arrangement of switches, sensors and circuits that make the FMD-50K totally redundant from audio input to RF output.

The FMD-50K with the RF output switching option provides the capability of automatically switching either transmitter directly to the antenna, thus providing one-half normal operating power in the event of a transmitter malfunction.

With the addition of the automatic exciter switching option, automatic backup exciter protection is provided. Also, an optional RF input patch panel is available to connect either exciter directly to either transmitter by bypassing all of the automatic exciter switching equipment.

Prices and Specifications Subject to Change Without Notice.
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<tbody>
<tr>
<td>GENERAL</td>
<td>POWER OUTPUT: 300 watts</td>
<td>1 kW</td>
<td>800 to 2800 watts</td>
<td>5.1 kW</td>
<td>10 kW</td>
<td>10 kW</td>
<td>20 kW</td>
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<tr>
<td>FREQUENCY RANGE: 87.5 to 108 MHz, tuned to specified operating frequency.</td>
<td>RF OUTPUT IMPEDANCE: 50 ohms.</td>
<td>OUTPUT TERMINATION: Type: 1-5/8&quot; EIA flange.</td>
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<tr>
<td>FREQUENCY STABILITY: ± 300 Hz 0° to 45° TCXO.</td>
<td>TYPE OF MODULATION: Direct Carrier Frequency Modulation (DCF).</td>
<td>MODULATION CAPABILITY: ± 100 kHz.</td>
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<td>AC INPUT POWER: 208 to 245 VAC, 50 to 60 Hz. Single phase, ± 5% variation.</td>
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**FM Broadcasting Transmitters**

**Specifications**

**Prices and Specifications Subject to Change Without Notice.**

**Price:**

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<th>Item</th>
<th>Price</th>
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<td>Item 1</td>
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<td>Item 2</td>
<td>$1235.00</td>
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<tr>
<td>Item 3</td>
<td>$1235.00</td>
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</tbody>
</table>

**Contact Information:**

P.O. Box 4290
Quincy, IL 62305-4290
(217) 222-8200

**General Information:**

- Size: 29" W x 78" H x 33" D
- Finish: White, blue and black

**Variations:**

- Overall cabinet size: 29" W x 78" H x 33" D
- Finish: White, blue and black

**Safety:**

- Suppression meets all FCC requirements.

**RF Harmonics:**

- Suppression meets all FCC requirements.

**Altitude:**

- 12,000 ft.
- 10,000 ft.
- 10,000 ft / 60 Hz
- 7500 ft.
- 10,000 ft.
- 7500 ft.
- 10,000 ft.
- 7500 ft.
- 10,000 ft.

**Ambient Temperature Range:**

- 0°C to +50°C.
- +45°C.

**Maximum VSWR:**

- 1.2:1
- 1.7:1
- 2:1
- 1.7:1

**OVERALL CABINET SIZE:**

Approx. 23.3/4"W x 71.3/4"H x 26.3/4"D

(70.5cm x 182.3cm x 75.6cm)

**OVERALL CABINET SIZE:**

29" W x 78" H x 33" D

(74cm x 198cm x 84cm)

**OVERALL CABINET SIZE:**

33" W x 72" H x 34" D

(84cm x 182.3cm x 84cm)

**Size:** Transmitter cabinet, 42" W x 78" H x 33" D

(107cm x 198cm x 84cm)

**Size:** Transmitter cabinet, 42" W x 78" H x 33" D

(107cm x 198cm x 84cm)

**Size:** Transmitter cabinet, 42" W x 78" H x 33" D

(107cm x 198cm x 84cm)

**Size:** Transmitter cabinet, 34.6" W x 71.7" H x 31.0" D

(87.8cm x 182.1cm x 78.7cm)

**Size:** Transmitter cabinet, 48.6" W x 60.2" H x 24.2" D (123.8cm x 152.4cm x 61.5cm)

**Size:** Transmitter: 113" W x 78" H x 33" D

(287cm x 198cm x 84cm)

**Size:** Transmitter cabinet (2):

each 30" W, 49" H, x 30" D (76cm x 125cm x 76cm)

**Size:** Transmitter: 90.2" W x 72" H x 30.5" D

(229cm x 183cm x 77.5cm)

**Size:** HV power supply cabinet:

leach 48" W, 60.2" H, x 24.2" D (122cm x 153cm x 61.5cm)
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<tbody>
<tr>
<td>PILOT OSCILLATOR:</td>
<td>Crystal controlled.</td>
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<td>PILOT PHASE:</td>
<td>Harris patented automatic pilot phasing circuit.</td>
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<td>PILOT STABILITY:</td>
<td>19 kHz ± 1 Hz 0°C to 50°C.</td>
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<td>OPERATIONAL MODES:</td>
<td>Stereo, mono (left and right), mono (left), mono (right)—remoteable.</td>
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<tr>
<td>SCA OPERATION</td>
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<td>MODULATION:</td>
<td>Direct FM.</td>
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<td>FREQUENCY OF OPERATION:</td>
<td>67 or 92 kHz programmable, any frequency between 25 and 92 kHz on special order.</td>
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<tr>
<td>FREQUENCY STABILITY:</td>
<td>± 500 Hz.</td>
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<td>MODULATION CAPABILITY:</td>
<td>± 7.5 kHz.</td>
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<td>AUDIO FREQUENCY RESPONSE:</td>
<td>67 kHz and 92 kHz AC coupled input, 150 Microsecond pre-emphasis ± 1 dB, standard. Selectable flat, 50 or 75 microsecond pre-emphasis. DC coupled input: No pre-emphasis: DC to 4 kHz ± 0.5 dB.</td>
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<td>AUDIO INPUT IMPEDANCE:</td>
<td>600 ohms balanced (AC coupled). Also 2000 ohms DC coupled unbalanced input through rear BNC connector.</td>
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<td>AC INPUT LEVEL:</td>
<td>+10 dBm, ± 1 dB for 100% modulation at 400 Hz @ 600 ohms.</td>
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<td>DC INPUT LEVEL:</td>
<td>1.0 volt peak for 5 kHz deviation.</td>
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<td>INPUT FILTERING:</td>
<td>Programmable LPF, 4.5 kHz standard, 3 kHz, 5 kHz, 7.5 kHz selectable. Low pass filter defeatable.</td>
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<td>HARMONIC DISTORTION:</td>
<td>0.5%, 30-4,500 Hz ± 5 kHz deviation.</td>
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<td>INTERMODULATION DISTORTION:</td>
<td>1%, 60 Hz/7 kHz, 1:1 ratio (audio low pass filter and pre-emphasis bypassed).</td>
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<td>FM NOISE:</td>
<td>(Main channel not modulated) — 63 dB (reference: 100% modulation = ± 5 kHz deviation at 400 Hz).</td>
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<td>CROSSTALK:</td>
<td>(SCA to main or stereo sub-channel) -60 dB or better.</td>
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<tr>
<td>CROSSTALK:</td>
<td>*57 dB</td>
<td>*57 dB</td>
<td>*55 dB</td>
<td>*55 dB</td>
<td>*55 dB</td>
<td>*55 dB</td>
<td>*57 dB</td>
<td>*52 dB</td>
<td>*57 dB</td>
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<tr>
<td>CROSSTALK:</td>
<td>SCA to SCA (67 kHz/92 kHz) — 50 dB demodulated with 150 microsecond de-emphasis.</td>
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<td>AUTOMATIC MUTE LEVEL:</td>
<td>Variable from 0 to −30 dBm.</td>
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<td>MUTE DELAY:</td>
<td>Adjustable 0.5 to 20 seconds.</td>
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<td>INJECTION LEVEL:</td>
<td>1% to 30% of composite level (adjustable).</td>
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<td><strong>MONOURAL OPERATION</strong></td>
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<td><strong>AUDIO INPUT IMPEDANCE:</strong></td>
<td>600 ohms, balanced, resistive, transformerless, adaptable to other impedances.</td>
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<tr>
<td><strong>INPUT FILTER:</strong></td>
<td>Controlled response low pass filter, defeatable.</td>
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<td><strong>AUDIO INPUT LEVEL:</strong></td>
<td>+10 dBm ± 1 dB for 100% modulation at 400 Hz</td>
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<tr>
<td><strong>AUDIO FREQUENCY RESPONSE:</strong></td>
<td>Standard 75 microsecond FCC pre-emphasis curve ± 0.5 dB, 30 Hz-15 kHz. Microsecond pre-emphasis. Selectable: flat, 25 or 50</td>
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<td><strong>HARMONIC DISTORTION:</strong></td>
<td>0.15%, 30 Hz to 15 kHz de-emphasized.</td>
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<tr>
<td><strong>INTERMODULATION DISTORTION:</strong></td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.46%</td>
<td>0.15%</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.15%</td>
<td>0.45%</td>
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<tr>
<td><strong>CCIF INTERMODULATION DISTORTION:</strong></td>
<td>All distortion products down 70 dB (reference 14 kHz/15 kHz test tone pair).</td>
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<td><strong>FM SIGNAL TO NOISE RATIO:</strong></td>
<td>80 dB below 100% modulation (reference 400 Hz @ ±75 kHz deviation, measured 20 Hz to 200 kHz bandwidth, 75 microsecond de-emphasis).</td>
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<tr>
<td><strong>STEREO OPERATION</strong></td>
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<td><strong>TYPE OF MODULATION:</strong></td>
<td>Digitally Synthesized Modulation (DSM).</td>
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<td><strong>AUDIO INPUT IMPEDANCE:</strong></td>
<td>Left and right channels: 600 ohms, balanced, resistive, transformerless, adaptable to other impedances.</td>
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<td><strong>AUDIO INPUT LEVEL:</strong></td>
<td>+10 dBm ± 1 dB for 100% modulation.</td>
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<tr>
<td><strong>AUDIO FREQUENCY RESPONSE:</strong></td>
<td>(Left and right) standard 75 microsecond FCC pre-emphasis curve ± 0.5 dB, 30 Hz-15 kHz. Selectable: flat, 25 or 50 microsecond pre-emphasis.</td>
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<td><strong>INPUT FILTERING:</strong></td>
<td>15 kHz low pass filter, 45 dB rejection at 19 kHz.</td>
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<td><strong>OVERSHOOT PROTECTION:</strong></td>
<td>Harris patented Dynamic Transient Response (DTR) filter. Defeatable for test purposes.</td>
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<td><strong>AUDIO TRANSIENT RESPONSE:</strong></td>
<td>2% maximum overshoot beyond steady state.</td>
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<td><strong>HARMONIC DISTORTION:</strong></td>
<td>(Left or right) 0.2% or less, 30-15,000 Hz.</td>
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<td><strong>CCIF INTERMODULATION DISTORTION:</strong></td>
<td>(Left or right) 0.1% 60 Hz/7 kHz test tone pair, 4:1 ratio.</td>
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<tr>
<td><strong>CCIF INTERMODULATION DISTORTION:</strong></td>
<td>*80 dB</td>
<td>*80 dB</td>
<td>*75 dB</td>
<td>*80 dB</td>
<td>*80 dB</td>
<td>*75 dB</td>
<td>*75 dB</td>
<td>*70 dB</td>
<td>*80 dB</td>
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<tr>
<td><strong>(Left or right) all distortion products down * (reference 14 kHz/15 kHz test tone pair).</strong></td>
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<tr>
<td><strong>STEREO SEPARATION:</strong></td>
<td>*50 dB</td>
<td>*50 dB</td>
<td>*50 dB</td>
<td>*48 dB</td>
<td>*50 dB</td>
<td>*48 dB</td>
<td>*50 dB</td>
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<td><strong>(30 Hz-15 kHz; typically 60 db at midband frequencies.</strong></td>
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<td><strong>DYNAMIC STEREO SEPARATION:</strong></td>
<td>48 dB under normal programming conditions.</td>
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<tr>
<td><strong>LINEAR CROSSTALK:</strong></td>
<td>-52 dB</td>
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<td>-50 dB</td>
<td>-50 dB</td>
<td>-48 dB</td>
<td>-50 dB</td>
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<tr>
<td><strong>NON-LINEAR CROSSTALK:</strong></td>
<td>-60 dB</td>
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<tr>
<td><strong>76 kHz SUPPRESSION:</strong></td>
<td>-68 dB</td>
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<tr>
<td><strong>38 kHz SUPPRESSION:</strong></td>
<td>-73 dB</td>
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<td>-73 dB</td>
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<tr>
<td><strong>FM NOISE:</strong></td>
<td>*-74 dB</td>
<td>*-70 dB</td>
<td>*-72 dB</td>
<td>*-74 dB</td>
<td>*-70 dB</td>
<td>*-72 dB</td>
<td>*-72 dB</td>
<td>*-74 dB</td>
<td>*-74 dB</td>
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<tr>
<td><strong>(Left or right) * dB minimum below 100% modulation. Reference: 400 Hz, 75 microsecond de-emphasis, ±75 kHz deviation, measured 30 Hz to 15 kHz bandwidth.</strong></td>
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<td></td>
<td>WEIGHT &amp; CUBAGE: Export: 900 lbs. (405kg). Cubage—Export: 46.7cu. ft. (1.32 cu. m).</td>
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<td></td>
<td>Domestic: 880 lbs. (400kg). Cubage—Export: 46.7cu. ft. (1.32 cu. m).</td>
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<td></td>
<td>WEIGHT AND CUBAGE: Export: 2100 lbs. (953kg).</td>
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<td></td>
<td>Domestic: 1700 lbs. (771kg). 120 cubic feet.</td>
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<td></td>
<td>WEIGHT &amp; CUBAGE: Export: 2300 lbs. (1040kg).</td>
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<td>Domestic: 1800 lbs. (817kg). 120 cu. ft.</td>
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<td></td>
<td>WEIGHT &amp; CUBAGE: Export: 2600 lbs. (1175kg).</td>
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<td></td>
<td>Domestic: 2300 lbs. (1040kg). 141 cu. ft.</td>
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<td></td>
<td>WEIGHT &amp; CUBAGE: (Estimated) Export: 3000 lbs. (1361kg).</td>
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<td></td>
<td>WEIGHT &amp; CUBAGE: Export: 6800 lbs. (3037kg).</td>
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<td></td>
<td>Domestic: 6000 lbs. (2272kg). 270 cu. ft. (7.5 cu. m).</td>
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<td></td>
<td>WEIGHT &amp; CUBAGE (Approximate): Export: 7000 lbs. (3178kg).</td>
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<tr>
<td></td>
<td>Domestic: 6800 lbs. (3037kg). Cubage: 400 cu. ft. (111.3 cu. m).</td>
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</table>

**WIDEBAND COMPOSITE OPERATION**

<table>
<thead>
<tr>
<th>COMPOSITE INPUT:</th>
<th>One balanced floating input.</th>
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<tbody>
<tr>
<td>COMPOSITE INPUT IMPEDANCE:</td>
<td>2000 ohms resistive.</td>
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<tr>
<td>COMPOSITE INPUT CONNECTOR:</td>
<td>Female BNC.</td>
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<tr>
<td>COMPOSITE INPUT LEVEL:</td>
<td>1.0 volt RMS nominal for ± 75 kHz deviation.</td>
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<tr>
<td>EXTERNAL SCA GENERATOR INPUTS:</td>
<td>Up to two unbalanced inputs (optional).</td>
</tr>
<tr>
<td>COMPOSITE FM SIGNAL TO NOISE:</td>
<td>80 db below 100% modulation (reference 400 Hz @ + 75 kHz deviation with 75 microsecond de-emphasis, 20 Hz to 200 kHz bandwidth).</td>
</tr>
<tr>
<td>COMPOSITE HARMONIC DISTORTION:</td>
<td>0% 0.15% 0.8%</td>
</tr>
<tr>
<td>COMPOSITE INTERMODULATION DISTORTION:</td>
<td>0.02% 0.1% 0.02% 0.02% 0.1% 0.02% 0.1% 0.02%</td>
</tr>
<tr>
<td>COMPOSITE CCAF INTERMODULATION DISTORTION:</td>
<td>80 dB 77 dB 80 dB 75 dB 80 dB 75 dB 80 dB</td>
</tr>
<tr>
<td>COMPOSITE AMPLITUDE RESPONSE:</td>
<td>± 0.1 dB, 30 Hz-53 kHz.</td>
</tr>
</tbody>
</table>

**ASYNCHRONOUS AM SIGNAL TO NOISE:** 85 db below reference carrier AM modulation 100% output power (300 watts).
### FM BROADCAST TRANSMITTERS

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM-300K</td>
<td>300 Watt All Solid-State Transmitter, mounted in a 24&quot; cabinet, for 50/60 Hz operation.</td>
<td>994-8238-001</td>
</tr>
<tr>
<td>FM-300KD</td>
<td>Basic, Two Identical 300 Watt All Solid-State Transmitters, mounted in a single 24&quot; cabinet, for 50/60 Hz operation, 50 ohm type N female output connectors. Equipped for wide band operation.</td>
<td>994-8257-001</td>
</tr>
<tr>
<td>FM-1,1K</td>
<td>1 kW FM transmitter with MX-15 exciter, for wideband operation, 50/60 Hz.</td>
<td>994-8046-001</td>
</tr>
<tr>
<td>FM-3.5K</td>
<td>3.5 kW FM transmitter with MX-15 Exciter for wideband operation.</td>
<td>994-7950-004</td>
</tr>
<tr>
<td>FM-5K</td>
<td>5 kW FM transmitter with MX-15 exciter, for wideband operation, 50 Hz.</td>
<td>994-8049-003</td>
</tr>
<tr>
<td>FM-5K</td>
<td>5 kW FM transmitter with MX-15 exciter, for wideband operation, 60 Hz.</td>
<td>994-8049-006</td>
</tr>
<tr>
<td>FM-5K</td>
<td>5 kW FM transmitter with MX-15 exciter, for wideband operation, 60 Hz.</td>
<td>994-7952-002</td>
</tr>
<tr>
<td>FM-20K</td>
<td>20,000 watt FM broadcast transmitter with MX-15 exciter.</td>
<td>994-8062-002</td>
</tr>
<tr>
<td>FM-25K</td>
<td>25,000 watt FM broadcast transmitter with MX-15 exciter, for wideband operation, 50/60 Hz.</td>
<td>994-8258-001</td>
</tr>
<tr>
<td>FM-40K</td>
<td>40 kilowatt FM transmitter, basic system, for wideband operation, 60 Hz.</td>
<td>994-8053-002</td>
</tr>
<tr>
<td>FM-50K</td>
<td>Dual 50 kilowatt FM transmitter, with automatic RF output switching, for wideband operation.</td>
<td>994-8455-001</td>
</tr>
</tbody>
</table>

**Options**

- Constant Voltage Filament Regulator Transformer: 472-0586-000 for 60 Hz, 472-1244-000 for 50 Hz
- Spare 4CX350A PA Tube: 374-0189-000
- Mono Generator (Add For Mono Operation): 994-8051-001
- Harris DSM Stereo Generator (For Stereo Operation): 994-8020-001
- Harris SCA Generator (67 or 92 kHz Operation): 994-7952-002
- Mono generator (add for mono operation): 994-8019-001
- DSM stereo generator with DTR (add for stereo operation): 994-8020-001
- SCA generator (add for SCA operation, specify 41 or 67 kHz): 994-7952-002

**Prices and Specifications Subject to Change Without Notice.**
FMXH High Power, High Performance
Circularly Polarized FM Antenna

- Horizontal circularity is typically ± 2 dB when pole mounted or face mounted on a 24" tower for uniform signal coverage
- Excellent bandwidth minimizes degradation to stereo and SCA channels
- High power handling capability provides flexibility in transmission system design
- Rugged brass construction and silver-plated inner-conductor connectors insure long, trouble-free service
- Standard corrosion-resistant steel support brackets and hardware
- Antenna pattern optimization available to meet exact requirements

Specifications And Ordering Information

<table>
<thead>
<tr>
<th>&quot;A&quot; MODEL, 3 1/4&quot; INTERBAY LINE, 3 1/4&quot; ELEMENT STEM</th>
<th>&quot;B&quot; MODEL, 4 1/2&quot; INTERBAY LINE, 4 1/4&quot; ELEMENT STEM</th>
<th>&quot;C&quot; MODEL, 6 1/2&quot; INTERBAY LINE, 4 1/4&quot; ELEMENT STEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harris Part No.</td>
<td>No. of Bays</td>
<td>Power Gain</td>
</tr>
<tr>
<td>710-0473-000</td>
<td>FMXH-1AE</td>
<td>0.4611</td>
</tr>
<tr>
<td>710-0474-000</td>
<td>FMXH-2AC</td>
<td>0.9971</td>
</tr>
<tr>
<td>710-0475-000</td>
<td>FMXH-2AC</td>
<td>0.9971</td>
</tr>
<tr>
<td>710-0476-000</td>
<td>FMXH-2AC6</td>
<td>0.9971</td>
</tr>
<tr>
<td>710-0477-000</td>
<td>FMXH-3AE</td>
<td>1.5588</td>
</tr>
<tr>
<td>710-0478-000</td>
<td>FMXH-4AE</td>
<td>2.1332</td>
</tr>
<tr>
<td>710-0479-000</td>
<td>FMXH-4BC</td>
<td>2.1332</td>
</tr>
<tr>
<td>710-0480-000</td>
<td>FMXH-4AC6</td>
<td>2.1332</td>
</tr>
<tr>
<td>710-0481-000</td>
<td>FMXH-5AE</td>
<td>2.7154</td>
</tr>
<tr>
<td>710-0482-000</td>
<td>FMXH-6AE</td>
<td>3.3028</td>
</tr>
<tr>
<td>710-0483-000</td>
<td>FMXH-6AC</td>
<td>3.3028</td>
</tr>
<tr>
<td>710-0484-000</td>
<td>FMXH-6AC6</td>
<td>3.3028</td>
</tr>
<tr>
<td>710-0485-000</td>
<td>FMXH-7AE</td>
<td>3.8935</td>
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<tr>
<td>710-0486-000</td>
<td>FMXH-8AE</td>
<td>4.4872</td>
</tr>
<tr>
<td>710-0487-000</td>
<td>FMXH-8AC</td>
<td>4.4872</td>
</tr>
<tr>
<td>710-0488-000</td>
<td>FMXH-8AC6</td>
<td>4.4872</td>
</tr>
<tr>
<td>710-0489-000</td>
<td>FMXH-10AC</td>
<td>5.6800</td>
</tr>
<tr>
<td>710-0490-000</td>
<td>FMXH-10AC6</td>
<td>5.6800</td>
</tr>
<tr>
<td>710-0491-000</td>
<td>FMXH-12AC</td>
<td>6.8781</td>
</tr>
<tr>
<td>710-0492-000</td>
<td>FMXH-12AC6</td>
<td>6.8781</td>
</tr>
</tbody>
</table>

FOOTNOTES: (Apply to all models) 1. Horizontal and vertical power gain and db gain are the same. 2. Power input capability up to 2,000 ft above mean sea level. Derating required above 2,000 ft. 3. Windload based on 50-33 PFS. 112 m.p.h. actual wind velocity. NOTE: Brackets included in weight and windload calculations. 4. Heaters add 4 lbs. to each half of a single bay. Heater box, hardware, interbay connecting A.C. cable, and copper conduit add a total of 7 lbs. to each bay. The total effect of adding heaters is 15 lbs. per bay level.

FMXH Options

<table>
<thead>
<tr>
<th>FMXH Radomes</th>
<th>710-0530-000</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMXH Electrical Deicers (less control sensor)</td>
<td>710-0532-000</td>
</tr>
</tbody>
</table>

Mounting Brackets for Special Tower Configurations

FMXH Custom Pattern Measurement and Optimization for other structures

Prices and Specifications Subject to Change Without Notice.
FMXl
Low Power, High Performance
Circularly Polarized FM Antenna

- Horizontal circularity is typically ±2 dB when pole mounted or face mounted on a 24” tower for uniform signal coverage
- Excellent bandwidth provides excellent performance for stereo and SCA channels
- Power handling capability provides flexibility in transmission system design
- Rugged brass construction and silver-plated inner-conductor connectors insure long, trouble-free service
- Standard corrosion-resistant steel support brackets and hardware
- Antenna pattern optimization available to meet exact requirements

Specifications And Ordering Information

<table>
<thead>
<tr>
<th>Harris Part No</th>
<th>No of Bays</th>
<th>Power Gain</th>
<th>DB Gain</th>
<th>Type Feed</th>
<th>50 OHM Input</th>
<th>Input Rating</th>
<th>Lbs. Weight</th>
<th>Lbs. Wind Load</th>
<th>Calculated Weight with Radome and Brackets</th>
<th>Calculated Wind Load with Radome and Brackets</th>
</tr>
</thead>
<tbody>
<tr>
<td>710-0513-000</td>
<td>FMXl-1E</td>
<td>0.4611</td>
<td>3.3632</td>
<td>END</td>
<td>1/2&quot;</td>
<td>9kW</td>
<td>57</td>
<td>102</td>
<td>88</td>
<td>228</td>
</tr>
<tr>
<td>710-0514-000</td>
<td>FMXl-2E</td>
<td>0.9971</td>
<td>0.0128</td>
<td>END</td>
<td>1/2&quot;</td>
<td>9kW</td>
<td>114</td>
<td>212</td>
<td>171</td>
<td>461</td>
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<tr>
<td>710-0515-000</td>
<td>FMXl-3E</td>
<td>1.5588</td>
<td>1.9278</td>
<td>END</td>
<td>1/2&quot;</td>
<td>9kW</td>
<td>170</td>
<td>323</td>
<td>253</td>
<td>693</td>
</tr>
<tr>
<td>710-0516-000</td>
<td>FMXl-4E</td>
<td>2.1332</td>
<td>3.2903</td>
<td>END</td>
<td>1/2&quot;</td>
<td>9kW</td>
<td>227</td>
<td>433</td>
<td>336</td>
<td>926</td>
</tr>
<tr>
<td>710-0517-000</td>
<td>FMXl-5E</td>
<td>2.7154</td>
<td>4.3384</td>
<td>END</td>
<td>1/2&quot;</td>
<td>9kW</td>
<td>283</td>
<td>543</td>
<td>418</td>
<td>1,158</td>
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<tr>
<td>710-0518-000</td>
<td>FMXl-6E</td>
<td>3.3028</td>
<td>5.1888</td>
<td>END</td>
<td>1/2&quot;</td>
<td>9kW</td>
<td>340</td>
<td>654</td>
<td>501</td>
<td>1,391</td>
</tr>
</tbody>
</table>

CENTER FED

<table>
<thead>
<tr>
<th>Harris Part No</th>
<th>No of Bays</th>
<th>Power Gain</th>
<th>DB Gain</th>
<th>Type Feed</th>
<th>50 OHM Input</th>
<th>Input Rating</th>
<th>Lbs. Weight</th>
<th>Lbs. Wind Load</th>
<th>Calculated Weight with Radome and Brackets</th>
<th>Calculated Wind Load with Radome and Brackets</th>
</tr>
</thead>
<tbody>
<tr>
<td>710-0519-000</td>
<td>FMXl-2C</td>
<td>0.9971</td>
<td>0.0128</td>
<td>CENTER</td>
<td>3/4&quot;</td>
<td>12kW</td>
<td>152</td>
<td>302</td>
<td>204</td>
<td>538</td>
</tr>
<tr>
<td>710-0520-000</td>
<td>FMXl-3C</td>
<td>1.9276</td>
<td>1.5588</td>
<td>OFF CENTER</td>
<td>3/4&quot;</td>
<td>12kW</td>
<td>207</td>
<td>412</td>
<td>287</td>
<td>770</td>
</tr>
<tr>
<td>710-0521-000</td>
<td>FMXl-4C</td>
<td>2.1332</td>
<td>3.2903</td>
<td>CENTER</td>
<td>3/4&quot;</td>
<td>12kW</td>
<td>260</td>
<td>509</td>
<td>371</td>
<td>1,002</td>
</tr>
<tr>
<td>710-0522-000</td>
<td>FMXl-5C</td>
<td>2.7154</td>
<td>4.3384</td>
<td>OFF CENTER</td>
<td>3/4&quot;</td>
<td>12kW</td>
<td>317</td>
<td>620</td>
<td>452</td>
<td>1,235</td>
</tr>
<tr>
<td>710-0523-000</td>
<td>FMXl-6C</td>
<td>3.3028</td>
<td>5.1888</td>
<td>CENTER</td>
<td>3/4&quot;</td>
<td>12kW</td>
<td>373</td>
<td>730</td>
<td>534</td>
<td>1,467</td>
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<tr>
<td>710-0524-000</td>
<td>FMXl-7C</td>
<td>3.8935</td>
<td>5.9034</td>
<td>OFF CENTER</td>
<td>3/4&quot;</td>
<td>12kW</td>
<td>430</td>
<td>840</td>
<td>617</td>
<td>1,700</td>
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<tr>
<td>710-0525-000</td>
<td>FMXl-8C</td>
<td>4.4872</td>
<td>6.5197</td>
<td>CENTER</td>
<td>3/4&quot;</td>
<td>12kW</td>
<td>486</td>
<td>950</td>
<td>699</td>
<td>1,932</td>
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<tr>
<td>710-0526-000</td>
<td>FMXl-9C</td>
<td>5.0826</td>
<td>7.0608</td>
<td>OFF CENTER</td>
<td>3/4&quot;</td>
<td>12kW</td>
<td>543</td>
<td>1,060</td>
<td>782</td>
<td>2,164</td>
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<tr>
<td>710-0527-000</td>
<td>FMXl-10C</td>
<td>5.6800</td>
<td>7.5435</td>
<td>CENTER</td>
<td>3/4&quot;</td>
<td>12kW</td>
<td>599</td>
<td>1,171</td>
<td>864</td>
<td>2,397</td>
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<tr>
<td>710-0528-000</td>
<td>FMXl-11C</td>
<td>6.2783</td>
<td>7.9785</td>
<td>OFF CENTER</td>
<td>3/4&quot;</td>
<td>12kW</td>
<td>656</td>
<td>1,281</td>
<td>947</td>
<td>2,630</td>
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<tr>
<td>710-0529-000</td>
<td>FMXl-12C</td>
<td>6.8781</td>
<td>8.3847</td>
<td>CENTER</td>
<td>3/4&quot;</td>
<td>12kW</td>
<td>713</td>
<td>1,391</td>
<td>1,029</td>
<td>2,862</td>
</tr>
</tbody>
</table>

FOOTNOTES:
1. Horizontal and vertical power gain and dB gain are the same.
2. Power input capability up to 2,000 ft. above mean sea level. Derating required above 2,000 ft. The wind load based on 112 mph wind velocity (50-33 psf) and the wind blowing normal to the side of the antenna. Weight and wind load calculations include brackets, interbay line and the transformer section. Calculations based on the frequency of 95 MHz. The total effect of adding heaters is 15 lbs. per bay level.

FMXl Options

The following options are available for the FMXl antenna in order to meet special requirements. Your Harris representative can provide you with additional information.

- FMXl Radomes
- FMXl Electrical Deicers (less control sensor)
- Mounting Brackets for Special Tower Configurations
- FMXl Pattern Optimization for a 24 inch uniform cross sectional tower
- FMXl Custom Pattern Measurement and Optimization for other structures

Prices and Specifications Subject to Change Without Notice.
FMH Super-Power Circularly Polarized FM Antenna

- High input power rating permits flexibility in transmitting system design
- Capable of multi-station operation
- Excellent bandwidth characteristics minimize VSWR and related signal degradation
- Internal element feed point minimizes weather related VSWR problems
- Rugged brass element construction, along with stainless steel support brackets and hardware, impedes corrosion

ANTENNA MODELS. The Harris FMH super-power FM antenna is available in three versions. The “A” version uses a 3-¾” element feed stem, and 3-¾” rigid interbay line. It is available in 3-¾” end fed, 3-¾” center fed and 6-¾” center fed models, in arrays of up to 15 bays.

The FMH “B” version uses a 4-¼” element feed stem, and a 4-¼” rigid interbay line. It is available in either 6-¼” end fed or 6-¼” center fed models in arrays of up to 12 bays.

The FMH “C” version uses a 4-¼” element feed stem, and a 6-¼” end fed. It is available in arrays of up to 6 bays.

Each antenna is supplied with a 6-foot input transformer. The input is 50 ohm EIA with either a 3-¾” flare or a 6-¼” flare, depending on the model type. All antennas are completely assembled and tuned to the customer’s factory. Also, pressure testing is done at that time to assure the customer of a leak-free antenna, provided the antenna is properly installed by a qualified erector and is free of damage.

MOUNTING. Stainless steel mounting brackets and hardware are supplied for standard constant cross section towers having less than 4 ft. face or steel poles at no additional cost. Brackets for mounting on tapered towers are available at additional cost.

DIMENSIONS. Each FMH element is approximately 47-½ inches long, and 30 inches high. Weight is approximately 57 pounds per element with line block.

<table>
<thead>
<tr>
<th>TYPE NO.</th>
<th>POWER GAIN1</th>
<th>FEMALE 50 OHM INPUT</th>
<th>POWER2</th>
<th>CALULATED WIND-LOAD [LBS]</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMH-1AE</td>
<td>0.4611</td>
<td>-3.3623</td>
<td>3/8&quot;</td>
<td>32kW 114 137</td>
</tr>
<tr>
<td>FMH-2AE</td>
<td>0.9971</td>
<td>-0.0128</td>
<td>3/8&quot;</td>
<td>32kW 225 304</td>
</tr>
<tr>
<td>FMH-2AC</td>
<td>0.9971</td>
<td>-0.0128</td>
<td>3/8&quot;</td>
<td>39kW 301 421</td>
</tr>
<tr>
<td>FMH-3AE</td>
<td>1.5588</td>
<td>1.9278</td>
<td>3/8&quot;</td>
<td>32kW 336 470</td>
</tr>
<tr>
<td>FMH-4AE</td>
<td>2.1332</td>
<td>3.2903</td>
<td>3/8&quot;</td>
<td>32kW 447 637</td>
</tr>
<tr>
<td>FMH-4AC</td>
<td>2.1332</td>
<td>3.2903</td>
<td>6/8&quot;</td>
<td>64kW 523 758</td>
</tr>
<tr>
<td>FMH-5AE</td>
<td>2.7154</td>
<td>4.3384</td>
<td>3/8&quot;</td>
<td>32kW 558 804</td>
</tr>
<tr>
<td>FMH-6AE</td>
<td>3.3028</td>
<td>5.1888</td>
<td>3/8&quot;</td>
<td>39kW 559 971</td>
</tr>
<tr>
<td>FMH-6AC</td>
<td>3.3028</td>
<td>5.1888</td>
<td>6/8&quot;</td>
<td>64kW 745 1096</td>
</tr>
<tr>
<td>FMH-7AE</td>
<td>3.8935</td>
<td>5.9034</td>
<td>6/8&quot;</td>
<td>32kW 780 1138</td>
</tr>
<tr>
<td>FMH-8AE</td>
<td>4.4872</td>
<td>6.5197</td>
<td>3/8&quot;</td>
<td>32kW 891 1305</td>
</tr>
<tr>
<td>FMH-8AC</td>
<td>4.4872</td>
<td>6.5197</td>
<td>6/8&quot;</td>
<td>64kW 916 1320</td>
</tr>
<tr>
<td>FMH-9AC</td>
<td>4.4872</td>
<td>6.5197</td>
<td>6/8&quot;</td>
<td>64kW 957 1433</td>
</tr>
<tr>
<td>FMH-10AC</td>
<td>5.6800</td>
<td>7.5435</td>
<td>3/8&quot;</td>
<td>39kW 1138 1653</td>
</tr>
<tr>
<td>FMH-10AC</td>
<td>5.6800</td>
<td>7.5435</td>
<td>6/8&quot;</td>
<td>64kW 1180 1770</td>
</tr>
<tr>
<td>FMH-12AC</td>
<td>6.6781</td>
<td>8.3747</td>
<td>3/8&quot;</td>
<td>39kW 1360 1987</td>
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<tr>
<td>FMH-12AC</td>
<td>6.6781</td>
<td>8.3747</td>
<td>6/8&quot;</td>
<td>64kW 1411 2108</td>
</tr>
</tbody>
</table>

FMH OPTIONS. The following options are available for the FMH antenna in order to meet special requirements. Your Harris representative can provide you with additional option information for your consideration.

- DC shorting stub for lightning protection.
- FMH radomes or electrical deciers.
- Mounting brackets for special tower configurations.
- FMH custom pattern measurements and optimization.

**“B” Model, 4½” Interbay Line, 4-¼” Element Stem**

<table>
<thead>
<tr>
<th>TYPE NO.</th>
<th>POWER GAIN1</th>
<th>FEMALE 50 OHM INPUT</th>
<th>POWER2</th>
<th>CALULATED WIND-LOAD [LBS]</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMH-1BE</td>
<td>0.4611</td>
<td>-3.3623</td>
<td>6/8&quot;</td>
<td>40kW 159 201</td>
</tr>
<tr>
<td>FMH-2BE</td>
<td>0.9971</td>
<td>-0.0128</td>
<td>6/8&quot;</td>
<td>56kW 297 407</td>
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<tr>
<td>FMH-3BE</td>
<td>1.5888</td>
<td>1.9278</td>
<td>6/8&quot;</td>
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<tr>
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<td>6/8&quot;</td>
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<td>4.3384</td>
<td>6/8&quot;</td>
<td>56kW 711 1024</td>
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<tr>
<td>FMH-6BC</td>
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<td>5.1888</td>
<td>6/8&quot;</td>
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**“C” Model, 6½” Interbay Line, 4-¼” Element Stem**

<table>
<thead>
<tr>
<th>TYPE NO.</th>
<th>POWER GAIN1</th>
<th>FEMALE 50 OHM INPUT</th>
<th>POWER2</th>
<th>CALULATED WIND-LOAD [LBS]</th>
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<tbody>
<tr>
<td>FMH-1CE</td>
<td>0.4611</td>
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<td>FMH-2CE</td>
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<td>1.9278</td>
<td>6/8&quot;</td>
<td>120kW 615 780</td>
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<tr>
<td>FMH-4CE</td>
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<td>3.2903</td>
<td>6/8&quot;</td>
<td>120kW 820 1040</td>
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<tr>
<td>FMH-5CE</td>
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<td>4.3384</td>
<td>6/8&quot;</td>
<td>120kW 1025 1300</td>
</tr>
<tr>
<td>FMH-6CE</td>
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<td>5.1888</td>
<td>6/8&quot;</td>
<td>120kW 1230 1560</td>
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</table>

FOOTNOTES-(Apply to all models)
1. Horizontal and vertical power gain and dB gain are the same. 2. Power input capability up to 2,000 ft. above mean sea level. Derating required above 2,000 ft. 3. Windload based on 50/33 PSF. 112 m.p.h. actual wind velocity. NOTE: Brackets included in weight and windload calculations.

Prices and Specifications Subject to Change Without Notice.
FML LOW POWER CIRCULARLY POLARIZED FM ANTENNA

- High input power rating permits flexibility in transmitting system design
- Rugged brass element construction with stainless steel support brackets impedes corrosion to insure long, trouble-free life
- Excellent bandwidth minimizes VSWR and related signal degradation
- Custom pattern optimization service available to meet special requirements

The Harris low power FML circularly polarized FM antenna features excellent bandwidth characteristics and the same rugged construction as Harris' higher-power FM antennas to insure top service and long life.

ANTENNA MODELS. Two versions of the FML are available. The "E" version is an end fed model mounted on 1-5/8", 50 ohm rigid line. The "C" version is center fed, and uses 3-1/8", 50 ohm rigid line.

FML LOW POWER CIRCULARLY POLARIZED FM ANTENNAS

<table>
<thead>
<tr>
<th>TYPE NO.</th>
<th>POWER GAIN</th>
<th>TYPE</th>
<th>FEMALE 50 OHM INPUT</th>
<th>POWER INPUT CAPABILITY</th>
<th>CALCULATED WEIGHT [LBS.]</th>
<th>CALCULATED WIND LOAD [LBS.]</th>
</tr>
</thead>
<tbody>
<tr>
<td>FML-1E</td>
<td>0.4611</td>
<td>END</td>
<td>1-1/4'</td>
<td>9 kW</td>
<td>57</td>
<td>102</td>
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<tr>
<td>FML-2E</td>
<td>0.9971</td>
<td>END</td>
<td>1-1/4'</td>
<td>9 kW</td>
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<td>212</td>
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<tr>
<td>FML-3E</td>
<td>1.5586</td>
<td>END</td>
<td>1-1/4'</td>
<td>9 kW</td>
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<td>323</td>
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<td>FML-4E</td>
<td>2.1322</td>
<td>CENTER</td>
<td>3-1/4'</td>
<td>12 kW</td>
<td>227</td>
<td>433</td>
</tr>
<tr>
<td>FML-4C</td>
<td>2.1322</td>
<td>CENTER</td>
<td>3-1/4'</td>
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<tr>
<td>FML-5E</td>
<td>2.7154</td>
<td>END</td>
<td>1-1/4'</td>
<td>9 kW</td>
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<tr>
<td>FML-5C</td>
<td>2.7154</td>
<td>OFF CENTER</td>
<td>3-1/4'</td>
<td>12 kW</td>
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<td>620</td>
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<td>FML-6E</td>
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<tr>
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<td>CENTER</td>
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<tr>
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<td>1-1/4'</td>
<td>9 kW</td>
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<td>764</td>
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<tr>
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<td>3.8935</td>
<td>OFF CENTER</td>
<td>3-1/4'</td>
<td>12 kW</td>
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<td>840</td>
</tr>
<tr>
<td>FML-8E</td>
<td>4.4872</td>
<td>END</td>
<td>1-1/4'</td>
<td>9 kW</td>
<td>453</td>
<td>874</td>
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<tr>
<td>FML-8C</td>
<td>4.4872</td>
<td>CENTER</td>
<td>3-1/4'</td>
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<td>486</td>
<td>950</td>
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<tr>
<td>FML-9C</td>
<td>5.0826</td>
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<td>543</td>
<td>1060</td>
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<tr>
<td>FML-10C</td>
<td>5.6800</td>
<td>CENTER</td>
<td>3-1/4'</td>
<td>12 kW</td>
<td>599</td>
<td>1171</td>
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<tr>
<td>FML-11C</td>
<td>6.2783</td>
<td>OFF CENTER</td>
<td>3-1/4'</td>
<td>12 kW</td>
<td>656</td>
<td>1281</td>
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<tr>
<td>FML-12C</td>
<td>6.8781</td>
<td>CENTER</td>
<td>3-1/4'</td>
<td>12 kW</td>
<td>712</td>
<td>1391</td>
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<tr>
<td>FML-13C</td>
<td>7.4785</td>
<td>OFF CENTER</td>
<td>3-1/4'</td>
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<td>769</td>
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<tr>
<td>FML-14C</td>
<td>8.0800</td>
<td>CENTER</td>
<td>3-1/4'</td>
<td>12 kW</td>
<td>825</td>
<td>1612</td>
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</tbody>
</table>

FOOTNOTES.  1. Horizontal and vertical power gain and dB gain are the same.  2. Power input capability up to 2,000 ft. above mean sea level. Derating required above 2,000 ft.  3. Wind load based on 112 mph wind velocity (50/30 psf) and the wind blowing normal to the side of the antenna. Weight and wind load calculations include brackets, interbay line and the transformer section. Calculations based on the frequency of 95 MHz.

FML OPTIONS. The following options are available for the FML antenna in order to meet special requirements. Your Harris representative can provide you with additional information for your consideration.

- DC shorting stub for lightning protection.
- FML radomes or electrical deicers.
- Mounting brackets for special tower configurations.
- FML custom pattern measurements and optimization.

Prices and Specifications Subject to Change Without Notice.
DIRECTIONAL DUAL POLARIZED FM ANTENNA

- Pattern factory tested for proven results
- Deicers not needed in most environments, eliminating associated maintenance and operating costs
- Excellent bandwidth characteristics minimize VSWR problems
- Rugged brass element construction, with stainless steel support brackets, impedes corrosion

Harris’ FMD-(X) is a directional dual polarized FM antenna designed for pole mounting. It is available with up to eight bays and with either 1-3/8 inch or 3-3/8 inch EIA 50 ohm female input. The “X” in the type number indicates the number of bays. The suffix “A” following the complete type number signifies 1-3/8" input and the suffix “B” indicates 3-3/8" input. (Example—FMD-4A is a 4-bay antenna with 1-3/8" input).

UP TO 40 KW INPUT POWER. The maximum power input capability for the “A” series is 12 kilowatts. The maximum power input capability for the “B” series is 20 kilowatts for a single bay, and 40 kilowatts for two (2) through eight (8) bays.

The interbay lines use 3-3/8 inch rigid, with three such lines used between bays, two for the horizontal element feeds and one for the vertical element feeds. A combiner, for combining the three transmission line feeds, is used below the bottom bay. A six foot transformer section is used immediately below this combiner.

ORDERING INFORMATION. Orders for the Harris Dual Polarized Directional FM Antenna should specify the desired true azimuth orientation, maximum ERP permitted, radiated power limitations and their true orientation, transmission line efficiency (or specify the type of transmission line and its length), and the transmitter power output capability. Such antenna pattern requirements are normally specified by the stations’s consultant. Ideally, a copy of the FCC construction permit should be supplied so that the manufacturer can assure full compliance with the requirements of such authorization relative to the antenna.

### Electrical And Mechanical Data

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<thead>
<tr>
<th>HARRIS TYPE NO.</th>
<th>INPUT POWER RATING KW</th>
<th>FEMALE INPUT FLANGE</th>
<th>POLE LENGTH FT</th>
<th>WEIGHT POLE AND ANTENNA LBS</th>
<th>TOTAL WIND LOAD [BASED ON 50/33 PSF] FT LBS</th>
<th>OVER-TURNING MOMENT BT LBS</th>
<th>HEIGHT ELECTRICAL CENTER ABOVE TOWER TOP FT</th>
<th>BOLT CIRCLE DIAMETER INCHES</th>
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<td>9595</td>
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<td>3 3/8&quot;</td>
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<td>826</td>
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<td>10000</td>
<td>16</td>
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<td>FMD-2A</td>
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<td>11325</td>
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<td>344847</td>
<td>53</td>
<td>17</td>
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FM ANTENNAS

CBR
Circularly Polarized FM Antenna
- The ideal antenna for multistation FM operations
- Wide bandwidth provides low VSWR across the FM band
- Superb horizontal circularity and excellent vertical pattern control insure uniform coverage
- High power handling capabilities provide wide latitude in transmission system design
- Wire-grid cavity design minimizes windloading and the associated cost impact on the support structure
- Available in one, two, three or four around configuration to meet the required coverage contour
- Fully assembled and tested at Harris’ full capability antenna test range to insure top performance

The Harris Cavity Backed Radiator (CBR) antenna offers ideal characteristics to FM stations desiring the advantages of combined station operation or to stations requiring special directional coverage. Extensive field experience has proven the CBR to be the best approach to circularly polarized FM transmission.

The Harris Cavity Backed Radiator consists of a crossed dipole radiator fed in phase quadrature and mounted within a circular cavity. Rotating RF energy is produced when the cavity is excited by the dipole elements. The signal emanating from the cavity is right-hand circular. The field rotates clockwise as viewed in the direction of propagation. Cavity size is principally determined by beamwidth requirements. A beamwidth of 90 degrees is required for a 4-around array and 120 degrees is required for a 3-around array, (measured at the half-voltage coordinates).

GRID CAVITY
The cavity used in the Harris circularly polarized FM antenna is a welded steel galvanized grid. The cavity grid is supported from a center mounting plate, which also serves as a mounting for the dipole assembly and for attachment of the unit to the supporting structure.

The use of grid cavities and aerodynamic design significantly reduce weight and windload requirements on the supporting structure. This often represents substantial savings in support structure cost compared with other panel style antenna designs.

MULTISTATION OPERATION
Multistation FM operation where two or more stations share the same antenna has increased in popularity due to the inherent cost savings which can be realized. Multistation operation can be achieved only with the wide bandwidth characteristics the Harris CBR antenna offers.

These characteristics are achieved through the use of a broadband radiating element in conjunction with high power hybrid junctions. A VSWR plot of a Harris CBR antenna is shown on the facing page.

Harris also offers the associated combining equipment necessary for multistation operation. Harris’ experience with multiplexer installations insures proper combiner operation to optimize the operation of stereo and SCA services.

AZIMUTH CIRCULARITY
For omnidirectional operation, the shape of the standard azimuth pattern will vary from omni by less than ±2.0 dB for three-sided tower configurations. With a four-around antenna array, the typical circularity will be comparable.

Stations employing directional arrays will find one of the several patterns available to be ideally suited to their specific needs.

ELEVATION PATTERN
The unique design of the CBR antenna offers precision control of the elevation pattern which is critical in auto receiver reception. Vertical pattern contouring to introduce beam tilt and null fill may be provided by means of standard phase and power distribution techniques.

HIGH POWER CAPABILITIES
The Harris CBR antenna is designed for high power operation enabling station flexibility in transmission system design. Harris’ conservative power rating insures adequate design headroom for long term reliability.

The Harris CBR antenna can be configured with one or two input ports. This feature allows the top and bottom six bays of a typical twelve bay antenna to be fed by two independent transmission lines. Should standby operation become necessary, one half of the system may be used at reduced power.

Prices and Specifications Subject to Change Without Notice.
TV-20L 22.5 Kilowatt
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

Harris' TV-20L, 22.5 kilowatt and TV-30L, 30 kilowatt low band VHF television transmitters are the most cost-effective TV transmitters available in their power range. Their 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.

These compact transmitters require only three tubes, visual PA, visual driver and aural PA, to provide a 22.5 kilowatt visual and a 4.5 kilowatt aural output and 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-20L and TV-30L incorporate 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.
### VHF Low Band Color Television Transmitters

**Specifications**

<table>
<thead>
<tr>
<th></th>
<th>TV-20L</th>
<th>TV-30L</th>
<th>TV-20L</th>
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<tr>
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<td></td>
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<tr>
<td>Power Output</td>
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<td>25 kW peak</td>
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<td>Load Impedance</td>
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<td>3% or less relative to sync peak</td>
<td>50 ohms</td>
<td>3% or less relative to sync peak</td>
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<tr>
<td>CARRIER FREQUENCY STABILITY:</td>
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<td>±0.5 MHz to ±5.0 MHz</td>
<td>±0.75 dB</td>
<td>±0.75 dB</td>
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<tr>
<td>AM BUZZ ATTENUATION</td>
<td>3% or less relative to sync peak</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td>±250 kHz (maximum variation over 30 days)</td>
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<tr>
<td>AM BUZZ FREQ.</td>
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<td>5.6 MHz</td>
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<tr>
<td>FM BUZZ ATTENUATION</td>
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<td>±20° or ±25° or better</td>
<td>±20° or ±25° or better</td>
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<tr>
<td>FM BUZZ FREQ.</td>
<td>3% or less relative to sync peak</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td></td>
</tr>
<tr>
<td>TV BUZZ ATTENUATION</td>
<td>3% or less relative to sync peak</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td></td>
</tr>
<tr>
<td>VIDEO BUZZ ATTENUATION</td>
<td>3% or less relative to sync peak</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td></td>
</tr>
<tr>
<td>VIDEO BUZZ FREQ.</td>
<td>3% or less relative to sync peak</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td></td>
</tr>
<tr>
<td><strong>Audio Input Level</strong></td>
<td>4.5 kW</td>
<td>6kW</td>
<td>4.5 kW</td>
<td>6kW</td>
</tr>
<tr>
<td><strong>Audio Impedance</strong></td>
<td>+1 dBm, ±2 dB</td>
<td>150 kHz</td>
<td>+1 dBm, ±2 dB</td>
<td>150 kHz</td>
</tr>
<tr>
<td><strong>Input Impedance</strong></td>
<td>50 ohms, balanced</td>
<td>75 microseconds</td>
<td>50 ohms, balanced</td>
<td>75 microseconds</td>
</tr>
<tr>
<td><strong>Frequency Response</strong></td>
<td>±0.5 dB rel to o pre-emphasis curve (30 kHz)</td>
<td>±4.5 kHz</td>
<td>±0.5 dB rel to o pre-emphasis curve (30 kHz)</td>
<td>±4.5 kHz</td>
</tr>
<tr>
<td><strong>Distortion</strong></td>
<td>0.5% THD or less with ±25 kHz deviation from</td>
<td>±10%</td>
<td>0.5% THD or less with ±25 kHz deviation from</td>
<td>±10%</td>
</tr>
<tr>
<td><strong>SNR</strong></td>
<td>80 dB RMS or better</td>
<td>±25 kHz</td>
<td>30 kHz</td>
<td>±25 kHz</td>
</tr>
<tr>
<td><strong>Synchronizing AM Noise</strong></td>
<td>±0.2° or better</td>
<td>±25 kHz</td>
<td>±0.2° or better</td>
<td>±25 kHz</td>
</tr>
<tr>
<td><strong>System 1/2 System</strong></td>
<td>±2°</td>
<td>±25 kHz</td>
<td>±2°</td>
<td>±25 kHz</td>
</tr>
<tr>
<td><strong>Video Modulation</strong></td>
<td>3% or less relative to sync peak</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td></td>
</tr>
<tr>
<td><strong>Video Freq.</strong></td>
<td>3% or less relative to sync peak</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td></td>
</tr>
<tr>
<td><strong>Video BuZZ Freq.</strong></td>
<td>3% or less relative to sync peak</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td></td>
</tr>
<tr>
<td><strong>Video BuZZ Attenuation</strong></td>
<td>3% or less relative to sync peak</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td></td>
</tr>
<tr>
<td><strong>Video BuZZ Response</strong></td>
<td>3% or less relative to sync peak</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td>±250 kHz (maximum variation over 30 days)</td>
<td></td>
</tr>
</tbody>
</table>

**Noise Specifications**

- **TV-20L**
  - 22.5 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.
  - Prices and Specifications Subject to Change Without Notice.

- **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.
  - Prices and Specifications Subject to Change Without Notice.

**Ordering Information**

- TV-20L, 22.5 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.
- 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.

- Prices and Specifications Subject to Change Without Notice.

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1. After initial aging of 60 days.
2. Response for transmitter operating into a resistive load of 1.05 VSWR or better.
3. Measured using 20° p. p. amplitude sweep video modulation with pedestal set at black 10%, white 90% with reference to gray level 50%. All percentages relative to blacking to white excursions.
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 5-step riser signal. Test signal No. 3 C CIR 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 slight loss.
8. After demodulation.
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. Deviation: 0° to 1000 feet (305 meters) altitude above sea level.
DUAL VHF LOW BAND COLOR TELEVISION TRANSMITTERS

TVD-40L 45 Kilowatt
TVD-60L 60 Kilowatt
Dual VHF Low Band Color Television Transmitters

- Ultra-linear drivers with solid-state IPAs for maximum reliability and signal transparency
- Two independent, complete 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

The Harris TVD-40L, 45 kilowatt and the TVD-60L, 60 kilowatt dual low band VHF TV transmitters are 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-40L consists of two completely independent 22.5 kilowatt transmitters operating in parallel, and the TVD-60L consists of two completely independent 30 kilowatt transmitters operating in parallel, both 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-40L and 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 assure long-term "hands-off" operation.

In the event of a malfunction of one-half of the parallel combination, the Harris TVD-40L and TVD-60L offer 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.

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.

Prices and Specifications Subject to Change Without Notice.
TELEVISION

DUAL VHF LOW BAND COLOR
TELEVISION TRANSMITTERS

SPECIFICATIONS

VISUAL PERFORMANCE

POWER OUTPUT:
Load Impedance: 208/240 volts, 72" cabinet (without output switchers).
Frequency Range: Chan-1, 54-88 MHz (Channels 2-6).
Carri er Frequency Stability: ± 5 Hz with optional precise frequency control.
Reg. of RF Output Power: 3% or less relative to sync peak.
Variation of Output (over one frame): Less than 2%.
Visual Sideband Response: Less than 2%.
Audio Input Level: +10 dBm, ± 25 kHz.
Power Input: +10 dBm, ± 25 kHz.
Input Impedance: 600 ohms, balanced.
Pre-emphasis: 20 microvolts.
Frequency Response: ± 0.5 dB rel. to pre-emphasis curve, 30-15,000 Hz.
Distortion: 0.5% THD or less with ± 25 kHz deviation from 30-15,000 Hz.
Signal-to-Noise: 60 dB RMS or better relative to sync peak.
K-factors: 20.2 ± 0.10 less than 5% baseline disturbance.
Equivalent Envelope Delay: 0.2 to 0.31 MHz ± 0.05 ns.
Video Input Level: 75.0 dB ± 0.75 dB.
Harmonic Radiation: 80 dB relative to peak of sync.

AURAL PERFORMANCE

Power Output: 9 kW.
Audio Input Level: +10 dBm, ± 25 kHz.
Frequency Deviation: ± 25 kHz.
Input Impedance: 600 ohms, balanced.
Pre-emphasis: 20 microvolts.
Frequency Response: ± 0.5 dB rel. to pre-emphasis curve, 30-15,000 Hz.
Distortion: 0.5% THD or less with ± 25 kHz deviation from 30-15,000 Hz.
Signal-to-Noise: 60 dB RMS or better relative to sync peak.
K-factors: 20.2 ± 0.10 less than 5% baseline disturbance.
Equivalent Envelope Delay: 0.2 to 0.31 MHz ± 0.05 ns.
Video Input Level: 75.0 dB ± 0.75 dB.
Harmonic Radiation: 80 dB relative to peak of sync.

SERVICE CONDITIONS

Ambient Temperature: 0 to 95% relative humidity.
Ambient Humidity Range: 0 to 95% relative humidity.
Altitude: Sea level to 10,000 feet.
Physical and Mechanical Dimensions: 19.3" W x 32" D x 72" H. Weight: 208 lbs. Switcher cabinet (without side panels): 22.5" W x 24.5" 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 5" W x 34" D x 34.25" H. Weight: 1,500 lbs.

Electrical Requirements:
Power input: 208/240 volts, ±11 volts, 3 phase, 50/60 Hz. Power consumption: 112 kW, black picture; 96 kW, average picture.

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 Relative 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-40L, 45 kW dual VHF-TV transmitter for System M standards service, Channels 2-6, with operating tubes, semiconductors, crystals, VS B filter, harmonic and color notch filters, output combiner, input and output switchers

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

Prices and Specifications Subject to Change Without Notice.
**TV-35H 35 Kilowatt**  
**TV-50H 50 Kilowatt**  
**VHF High Band Color Television Transmitter**

- Straightforward design for high reliability and stability
- Advanced new SAW filter, built-in receiver equalizer eliminates separate correction modules
- New 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

Harris' TV-35H, 35 kilowatt and the TV-50H, 50 kilowatt high band VHF television transmitters, are the most cost-effective TV transmitters available in their power range. Their 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 new Quadrature Corrector to insure the highest level of picture quality.

These compact transmitters require only three tubes: visual PA, visual driver and aural PA, to provide a 35 kilowatt visual and a 4.5 kilowatt aural output or a 50 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 emergency conditions. 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, the transmitters incorporate 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 (6964 tetrode), and DC filaments in every visual stage for an excellent signal-to-noise ratio.

*Visual IF Delay Equalized Output*
## Specifications

### Visual Performance

<table>
<thead>
<tr>
<th>Parameter</th>
<th>TV-35H</th>
<th>TV-50H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Output</td>
<td>4.5 kW</td>
<td>50 kW peak</td>
</tr>
<tr>
<td>Load Impedance</td>
<td>50 ohms, Output connector: 3½&quot; EIA standard, unflanged</td>
<td></td>
</tr>
<tr>
<td>Audio Input Level</td>
<td>+10 dB, +2 dB</td>
<td></td>
</tr>
<tr>
<td>Input Impedance</td>
<td>+50 kHz</td>
<td></td>
</tr>
<tr>
<td>Pre-Emphasis</td>
<td>600 ohms, balanced</td>
<td></td>
</tr>
<tr>
<td>Frequency Response</td>
<td>75 microseconds</td>
<td></td>
</tr>
<tr>
<td>Distortion</td>
<td>0.5% THD or less with ±25 kHz deviation from 30-15,000 Hz</td>
<td></td>
</tr>
<tr>
<td>FM Noise</td>
<td>-60 dB RMS or better rel: to ±25 kHz dev</td>
<td></td>
</tr>
<tr>
<td>Intercarrier Phase Modulation (noise)</td>
<td>-46 dB RMS or better rel: to ±25 kHz dev</td>
<td></td>
</tr>
<tr>
<td>AM Noise</td>
<td>-55 dB RMS rel: to 100% amplitude modulation of aural carrier</td>
<td></td>
</tr>
<tr>
<td>Synchronous AM Noise</td>
<td>-40 dB RMS or better</td>
<td></td>
</tr>
<tr>
<td>Frequency Stability</td>
<td>-0.5 dB (maximum variation over 30 days)</td>
<td></td>
</tr>
</tbody>
</table>

### Service Conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>TV-35H</th>
<th>TV-50H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient Temperature</td>
<td>0° to +50℃ (33° to 122°F)</td>
<td>0° to +50℃ (14° to 122°F)</td>
</tr>
<tr>
<td>Humidity</td>
<td>2% to 95% relative humidity</td>
<td></td>
</tr>
<tr>
<td>Altitude</td>
<td>Sea level to 7,500 feet</td>
<td></td>
</tr>
<tr>
<td>Physical and Mechanical Dimensions</td>
<td>Trans.-106” W x 32.2” D x 72” H. Weight: 2,365 lbs. Power supply: 69.9” W x 33.9” D x 54” H. Weight: 3,000 lbs.</td>
<td>Power input: 455/480/505 volts, ±11 volts, 3 phase, 60 Hz Power consumption: Average picture (50% APL): 85 kW. Black picture: 107 kW.</td>
</tr>
</tbody>
</table>

### Electrical Requirements

<table>
<thead>
<tr>
<th>Parameter</th>
<th>TV-35H</th>
<th>TV-50H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Input</td>
<td>208/240 volts, ±11 V/ohm</td>
<td></td>
</tr>
<tr>
<td>Phase</td>
<td>3 phase, 60 Hz</td>
<td></td>
</tr>
</tbody>
</table>

### Ordering Information

- TV-35H, 35 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, 208/240 volts, 60 Hz

- TV-70H, 70 kW dual 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, output combiner, input and output switchers, 208/240 volts, 60 Hz

- TV-50H, 50 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, 480 volts, 60 Hz

- TV-50H, 42 kW VHF-TV transmitter for System B service, 174-230 MHz (Channels 5-12, Band III), complete with operating tubes, semiconductors, crystals, required pre-correction circuitry, low-level vestigial sideband filter, harmonic filter, 384/415 volts, 50 Hz

Prices and Specifications Subject to Change Without Notice.
**DUAL VHF HIGH BAND COLOR TELEVISION TRANSMITTERS**

**TVD-70H (70kW)**
**TVD-100H (100kW)**

Dual VHF High Band Color Television Transmitters

- Ultra-linear drivers with solid-state IPAs for maximum reliability and signal transparency
- Two independent, complete transmitter for total redundancy and on-the-air reliability
- "Hot" standby exciters, modulators and sideband filters for maximum redundancy
- Harris' Dualtran output switching system allows parallel or single transmitter operation
- Ideal for circularly polarized applications
- Advanced new SAW filter — built-in receiver equalizer eliminates separate correction modules
- New Quadrature Corrector cancels tube distortions
- Notch diplexer included

The TVD-100H and TVD-70H television transmitters are designed for Channels 7-13 and Channels 56-61. These transmitters are made up of two separate and independent 50kW or 35kW transmitters whose visual and aural outputs are combined to provide the high power required for maximum ERP with circularly polarized antennas. The TVD-70H and TVD-100H transmitters are identical except for the high voltage power supplies.

In addition to the two complete transmitters, these high power dual transmitters are equipped with a control cabinet located between the transmitters and a Dualtran RF System that is normally located behind the transmitters.

"A + B Air": This is the normal operating mode in which the two visual and aural transmitters are combined and fed to the antenna line through the diplexer.

"A + B Test": In this mode the combined visual and combined visual signals are connected to dummy loads for testing.

"A Air": In this mode the "A" transmitter is connected to the antenna line through the diplexer while the "B" transmitter is connected to the test loads.

"B Air": This mode is identical to the "A Air" mode except that the "B" transmitter is connected to the antenna line while the "A" transmitter is connected to the test loads.

The "A Air" and "B Air" modes may also be used to operate the two transmitters in a main/alternate main configuration. In this configuration the full output power capability of each transmitter is available to feed the antenna line while the second transmitter is kept in a hot or cold reserve status.

The Dualtran concept that Harris has used for many years in lower power transmitters is now applied to high power transmitters. The 100kW Dualtran RF System is a factory assembled, tested and optimized coaxial system that contains all of the components necessary for operating the dual transmitters in the modes described above. A 100kW notch diplexer is also supplied as part of this system for combining the aural and visual signals together for feeding the antenna line.

All of these components are mounted in an open frame cabinet for ease of handling and simple installation.

Parallel operation of the two identical transmitters provides the redundancy needed to prevent any loss of air time. If one of the two transmitters should malfunction, the transmitter output power automatically decreases 6dB with no interruption in service. If desired, the Dualtran RF System may be switched to a single transmitter mode that will provide the full power output capability of that single transmitter.

The dual transmitters may be completely controlled and monitored from a remote location by a Harris Facilities Control System or by any standard remote control hardware. The Dualtran RF System mode switching may also be accomplished by remote control.

The Dualtran RF System is equipped with three water cooled test loads. Each test load is equipped with a calibrated in-line wattmeter. In addition, the water lines for each load are equipped with thermometer wells for precise calorimetric power measurements.

The Dualtran RF System also contains all directional couplers and voltage probes necessary for internal metering and monitoring of the transmitter operation. Extra couplers and probes are included for connection to monitoring and test equipment. A 4 port 6-1/8" manual patch panel (optional) permits use of the visual load for diplexer output testing.

Every Harris dual transmitter contains two MCP-2 visual and aural exciters. The RF output of one set of exciters is split into two signal paths and fed to both transmitters through the splitting and phasing networks. An exciter switcher automatically switches to the reserve exciters in the event of a malfunction. The exciter outputs are on-carrier, providing maximum redundancy of the important exciter circuitry. All low level circuits are 100% redundant, including video processors, modulators, VSB filters, IF correctors, oscillators and up-converters.

The RF Input Patch Panel provides the capability of driving any transmitter from any exciter for test purposes or in the event of malfunction in the exciter switcher or phasing and control panel.

Prices and Specifications Subject to Change Without Notice.
### DUAL VHF HIGH BAND COLOR TELEVISION TRANSMITTERS

#### TVD-100H And TVD-70H SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>TVD-100H</th>
<th>TVD-70H</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual Power Output:</strong></td>
<td>100 kW peak (System M).</td>
<td>70 kW peak (System M).</td>
</tr>
<tr>
<td><strong>Aural Power Output:</strong></td>
<td>84 kW peak (System B).</td>
<td>60 kW peak (System B).</td>
</tr>
<tr>
<td><strong>Power Consumption</strong> (Typical at 10% aural)</td>
<td>Up to 14 kW (20 kW optional).</td>
<td>Up to 12 kW.</td>
</tr>
<tr>
<td><strong>Average Picture (50% APL):</strong></td>
<td>480 volts, ±5%, Phase, 60 Hz or 380/415 volts,</td>
<td>208/240 volts, ±5%, Phase, 60 Hz or 380/415</td>
</tr>
<tr>
<td><strong>Black Picture</strong></td>
<td>172 kW.</td>
<td>216 kW.</td>
</tr>
<tr>
<td><strong>Physical and Mechanical Dimensions:</strong></td>
<td></td>
<td>134 kW.</td>
</tr>
<tr>
<td><strong>Visual Performance</strong></td>
<td></td>
<td>158 kW.</td>
</tr>
<tr>
<td><strong>Type Emission</strong></td>
<td></td>
<td><strong>Specifications below apply to both the TVD-70H and TVD-100H:</strong></td>
</tr>
<tr>
<td><strong>Frequency Range:</strong></td>
<td></td>
<td><strong>Transmitter cabinets:</strong></td>
</tr>
<tr>
<td><strong>Video Input Impedance:</strong></td>
<td></td>
<td>(2) each: 106&quot; W x 32&quot; D x 72&quot; H. (269 cm x 82 cm x 183 cm). Weight: (each): 2385 lbs. (1082 kg). <strong>Power supplies:</strong> (2) each: 70&quot; W x 35&quot; H x 52&quot; D. (178 cm x 89 cm x 132 cm). Weight: (each): 2600 lbs. (1179 kg). <strong>Central control cabinet:</strong> 22&quot; W x 25&quot; D x 72&quot; H. (56 cm x 62 cm x 183 cm). Weight: 300 lbs. (136 kg). <strong>RF output switcher system:</strong> 122&quot; W x 48&quot; D x 80&quot; H. (310 cm x 122 cm x 203 cm). Weight: 1800 lbs. (816 kg).</td>
</tr>
<tr>
<td><strong>Video Input Level:</strong></td>
<td></td>
<td><strong>Video Input Impedance:</strong></td>
</tr>
<tr>
<td><strong>RF Load Impedance:</strong></td>
<td></td>
<td><strong>Audio Input Type:</strong></td>
</tr>
<tr>
<td><strong>AM Noise:</strong></td>
<td>Total random and periodic noise unweighted.</td>
<td><strong>Visual Input Impedance:</strong></td>
</tr>
<tr>
<td><strong>Regulation of Output Power:</strong></td>
<td>Hum and low frequency.</td>
<td><strong>Power Supplies:</strong></td>
</tr>
<tr>
<td><strong>Variation of Output over One Field:</strong></td>
<td>Periodic noise 10 kHz to 6.2 MHz.</td>
<td><strong>Audio Input Type:</strong></td>
</tr>
<tr>
<td><strong>Frequency Response Variation:</strong></td>
<td><strong>Luminance Nonlinearity:</strong></td>
<td><strong>Video Input Type:</strong></td>
</tr>
<tr>
<td><strong>Visual Sideband Response:</strong></td>
<td><strong>Differential Gain:</strong></td>
<td><strong>Luminance Nonlinearity:</strong></td>
</tr>
<tr>
<td><strong>Differential Phase:</strong></td>
<td><strong>Differential Phase:</strong></td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>20 kHz Gain and Delay Response:</strong></td>
<td>±2° or better.</td>
<td><strong>Response:</strong></td>
</tr>
<tr>
<td><strong>Chrominance Intermodulation:</strong></td>
<td>5% or less total baseline disturbance.</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>Field Frequency Square Wave Tilt:</strong></td>
<td>Less than 2% total distortion.</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>Incidental Phase Modulation:</strong></td>
<td>Less than 2% total variation.</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>Envelope Delay:</strong></td>
<td>±1.5° or less relative to blanking.</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>Carrier Stability:</strong></td>
<td>0.5 to 2.1 MHz ±40 ns</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>Harmonic Radiation:</strong></td>
<td>± 3.58 MHz to ± 60 ns</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>Aural Performance</strong></td>
<td>± 4.18 MHz to ± 600 ns</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>Type Emission:</strong></td>
<td>± 250 kHz (maximum variation over 30 days).</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>Frequency Stability:</strong></td>
<td>-80 dB or better below point of sync.</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>RF Load Impedance:</strong></td>
<td><strong>F3:</strong></td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>Audio Input Impedance:</strong></td>
<td>±20 Hz (for 30 days relative to frequency offset) of 4.5 MHz from visual carrier).</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>Audio Input Level:</strong></td>
<td>50 Ohms.</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>Frequency Deviation:</strong></td>
<td>600 Ohms. balanced.</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>Frequency Response:</strong></td>
<td>+10 dBm. ±2 dB.</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>Audio Distortion:</strong></td>
<td>±25 kHz.</td>
<td><strong>Phase Response:</strong></td>
</tr>
<tr>
<td><strong>AM Noise:</strong></td>
<td>±5.5 dB relative to 75 microsecond pre-emphasis.</td>
<td>±5 dB relative to 50 microsecond pre-emphasis.</td>
</tr>
<tr>
<td><strong>FM Noise:</strong></td>
<td>Less than 0.6% from 30 to 15,000 Hz with ±25 kHz deviation.</td>
<td>Less than 1% from 30 to 15,000 Hz with ±50 kHz deviation.</td>
</tr>
<tr>
<td><strong>Intercarrier Noise:</strong></td>
<td>-55 dB or better relative to ±25 kHz deviation.</td>
<td>-55 dB or better relative to ±20 kHz deviation.</td>
</tr>
<tr>
<td><strong>Service Conditions:</strong></td>
<td>Less than 1% relative to ±20 kHz deviation.</td>
<td>Less than 1% relative to ±20 kHz deviation.</td>
</tr>
<tr>
<td><strong>Ambient Temperature:</strong></td>
<td>-46 dB or better relative to ±25 kHz deviation.</td>
<td>-46 dB or better relative to ±20 kHz deviation.</td>
</tr>
<tr>
<td><strong>Ambient Humidity Range:</strong></td>
<td>-10° to +50° C (14° to 122° F).</td>
<td>-10° to +50° C (14° to 122° F).</td>
</tr>
<tr>
<td><strong>Relative Humidity:</strong></td>
<td>0 to 85% relative humidity.</td>
<td>0 to 95% relative humidity.</td>
</tr>
<tr>
<td><strong>Sea level to 7500 feet (2286 meters).</strong></td>
<td>(Derate 2° C per 1000 feet above sea level).</td>
<td>(Derate 2° C per 300 meters above sea level).</td>
</tr>
</tbody>
</table>

#### Ordering Information

- TVD-100H, 100 kW VHF-TV transmitter for CCIR System M service, 174-216 MHz, Channels 7-13, 480 volts, ±5%, 60 Hz, with operating tubes, transistors, IC’s, solid-state rectifiers, crystals, required precorrection circuitry, low level sideband filter, harmonic filters, input and output switchers, power combiners, dual exciter sets, high power notch diplexer, and stepdown transformers. Phone: (217) 222-8200, Ext. 994-8457.
- TVD-100H, 84 kW VHF-TV transmitter for CCIR System B service, 174-230 MHz (Band III), 380/415 volts, ±5%, 50 Hz, includes same as above, with line frequency inverters added. Phone: (217) 222-8200, Ext. 994-8457.
- TVD-70H, 70 kW VHF-TV transmitter for CCIR System M service, 174-216 MHz, Channels 7-13, 208/240 volts, ±5%, 60 Hz, with operating tubes, transistors, IC’s, solid-state rectifiers, crystals, required precorrection circuitry, low level sideband filter, harmonic filters, input and output switchers, power combiners, dual exciter sets, high power notch diplexer. Phone: (217) 222-8200, Ext. 994-8467.
- TVD-70H, 60 kW VHF-TV transmitter for CCIR System M service, 174-230 MHz (Band III), 380/415 volts, ±5%, 50 Hz, includes same as above, with stepdown transformers and line frequency inverters added. Phone: (217) 222-8200, Ext. 994-8467.
UHF Color Television Transmitters

- Variable Visual Coupler for higher klystron efficiency
- Advanced new SAW filter, built-in receiver equalizer eliminates separate correction modules
- New Quadrature Corrector cancels klystron distortions
- High efficiency 5-cavity klystrons
- Highly linear IF Modulation of the visual and aural carriers for superior color and sound reproduction
- Mod Anode Pulser for increased transmitter efficiency
- Straightforward design for high stability, reliability
- Low-loss waveguide diplexer
- Emergency multiplex operation minimizes off-air time

TVE-30 30 Kilowatt UHF Color Television Transmitter

The Harris TVE-30 is designed to meet the critical performance standards demanded by today's discriminating broadcaster. State-of-the-art technology, such as Harris' VIDEO* SAW receiver equalized filter and the Quadrature Corrector, is used to provide the highest levels of performance, reliability and stability. This performance level assures standard and subscription television broadcasters the best quality picture and sound, now and in the future.

The TVE-30 transmitter includes a newly developed device that significantly reduces power consumption. This is the Variable Visual Coupler (VVC), which greatly increases the visual klystron's operating efficiency over previously used fixed couplers.

Several other energy-saving devices are also standard in the TVE-30, including "H" type high-efficiency klystrons, the Mod Anode Pulser, and a high-efficiency aural klystron coupler.

For maximum efficiency, high power RF losses are kept to a minimum by using a 100% waveguide diplexer and color notch filter.

The Harris TVE-60S, 60 kilowatt UHF-TV transmitter, incorporates all of the latest efficiency-improving technologies to help keep power costs down. At 60 kilowatts peak visual power with 10% aural, total power consumption is only 130 kilowatts.

The TVE-60S visual amplifier uses a single Varian 5-cavity VKP-7550 "S" Series klystron for a full 60 kilowatt visual power output. This super-high-efficiency, high-power integral cavity klystron utilizes a new modified-cavity Q-tuning technique for maximum beam efficiency.

TVE-60S 60 Kilowatt UHF Color Television Transmitter

The VKP-7550 "S" Series klystron is an improved version of the popular Varian VA-950 "H" Series klystron currently in use in hundreds of UHF transmitters worldwide. For redundancy, the aural amplifier uses an identical klystron.

To further increase beam efficiency of the VKP-7550S, the TVE-60S includes as standard a variable visual coupler (VVC). This device, installed on the output of the klystron, is tuned to optimize coupling to the output transmission line for 60 kilowatt power output at reduced klystron beam current. For maximum aural efficiency, a high-efficiency aural klystron coupler is also included as standard. Another energy saving device included as standard with the TVE-60S is a mod anode pulser.

TVE-120S 120 Kilowatt UHF Color Television Transmitter

The Harris TVE-120S is designed to meet the critical performance standards demanded by today's discriminating broadcaster; State-of-the-art technology, VIDEO* SAW receiver equalized filter and the Quadrature Corrector.

The TVE-120 transmitter includes the Variable Visual Coupler (VVC), which greatly increases the visual klystron's operating efficiency.

Standard in the TVE-120, are "S" type high-efficiency klystrons, the Mod Anode Pulser, and a high-efficiency aural klystron coupler.

High power RF losses are kept to a minimum by using a waveguide visual combiner, a 100% waveguide diplexer and color notch filter.

*Visual IF Delay Equalized Output

Prices and Specifications Subject to Change Without Notice.
UHF COLOR TELEVISION TRANSMITTERS

SPECIFICATIONS

VISUAL PERFORMANCE

POWER OUTPUT: * 4
LOAD IMPEDANCE:

FREQUENCY RANGE:

FREQUENCY STABILITY:

REG. OF RF OUTPUT POWER (black to white pic.):

VARIATION OF OUTPUT (over one frame):

VISUAL SIDEBAND RESPONSE:

SPECIFICATIONS

SYSTEM M/NTSC
30 kW peak.
50 ohms. Cabinet output connector: 3-1/8" EIA
flanged. (Channels 14-51). 6-1/8'' EIA flanged.
(Channels 52-69). Diplexer output connector: 6-1/8''
EIA flanged.

FREQUENCY RANGE:

FREQUENCY STABILITY:

REG. OF RF OUTPUT POWER (black to white pic.):

VARIATION OF OUTPUT (over one frame):

VISUAL SIDEBAND RESPONSE:

TVE-30
TVE-60S
TVE-120

60 kW peak.
120 kW peak.

- 500 Hz (maximum variation over 30 days).
- 2%.
- 2%.
- 2%.
- 2%.
- 2%.
- 2%.

60 Hz or better.
- 1.0 dB or better.
- 3 dB.
- 2% or better relative to blanking or trailing edge.

-50 dB (RMS) or better below sync level.
-27.2°, 207° less than 5% baseline disturbance.

0.5% to 2.1 MHz ± 40
at 3.58 MHz ± 25
at 4.18 MHz ± 60
at 4.75 MHz and higher

NOISE:

-55 dB
-50 dB

ENVELOPE DELAY:

±20 kHz
±20 kHz

SYNC OVERSHOOT:

5% or less of sync peak within ±300 ns of leading/
trailing edge.

-55 dB or better relative to blanking.
±0.05° better than ±25 kHz deviation.

-55 dB or better rel. to 2.5 kHz dev.
-46 dB RMS or better rel. to ±25 kHz dev.

±20 Hz.

SERVICE CONDITIONS

AMBIENT TEMPERATURE:

±2°C to +50°C (36°F to 122°F).

0 to 95% relative humidity.

ALTITUDE:

Sea level to 7,500 feet (2286 meters).

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 sweep video
modulation with pedestal set at black 10%, white
90% with reference to gray level 50%. All percen-
tages 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.
7. After de-emphasis.
8. Relative to frequency offset of 4.5 MHz.

TVE-30

Physical & Mechanical Dimensions/
Electrical Requirements
94"W x 63"D x 72"H (240 x 160 x 183 cm).
Weight: 4100 lbs. (1864kg). Power supply:
60-600 lbs. (272.5kg). Power supply:
75 V x 511/2D x 761/2H (191 x
121 x 177 cm). Weight: 600 lbs. (272.5kg). Heat
exchanger: 9081 x 647 x 761/2 (444
x 242 x 198 cm). Weight: 400 lbs. (181.6kg).
Power input: 440/480/480 volts, 3 phase,
60 Hz. Power consumption (typical): 900w
(10% aural), 990w (20% aural). Power
factor: better than 90%.

TVE-60S

Physical & Mechanical Dimensions/
Electrical Requirements
125W x 63"D x 72"H (320 x 160 x 183 cm).
Weight: 4100 lbs. (1864kg). Power supply:
75 V x 511/2D x 761/2H (191 x
121 x 177 cm). Weight: 600 lbs. (272.5kg). Heat
exchanger: 9081 x 647 x 761/2 (444
x 242 x 198 cm). Weight: 400 lbs. (181.6kg).
Power input: 440/480/480 volts, 3 phase,
60 Hz. Power consumption (typical): 1300w
(10% aural), 1400w (20% aural). Power
factor: better than 90%.

TVE-110

Physical & Mechanical Dimensions/
Electrical Requirements
157"W x 63"D x 72"H (400 x 160 x 183 cm).
Weight: 11760 lbs. (5327kg). Power supply:
55 V x 761/2D x 761/2H (191 x
121 x 177 cm). Weight: 600 lbs. (272.5kg). Heat
exchanger: 9081 x 647 x 761/2 (444
x 242 x 198 cm). Weight: 400 lbs. (181.6kg).
Power input: 440/480/480 volts, 3 phase,
60 Hz. Power consumption (typical): 2450w
(10% aural). Power factor: better than 90%.

Ordering Information

TVE-30, 30 kW UHF-TV transmitter for FCC standards service,
Channels 14-69, with semiconductors, crystals, VSB filter, harmonic
and color notch filters, Mod Anode Pulser, Variable Visual Coupler,
notch-diplexer, 994-8721-001.

TVE-60S, 60 kW UHF-TV transmitter, for FCC standards service,
Channels 14-69, with semiconductors, crystals, VSB filter, harmonic
and color notch filters, Mod Anode Pulser, Variable Visual Coupler,                        994-8868-001

Ordering information for CCIR systems other than "M" available on
request.

TVE-120S, 120 kW UHF-TV transmitter for FCC standards service,
Channels 14-69, with semiconductors, crystals, VSB filter, harmonic
and color notch filters, Mod Anode Pulser, Variable Visual Coupler, 994-8916-001.

Prices and Specifications Subject to Change Without Notice. 35
UHF-TV EXCITER RETROFIT PACKAGE

- MCP-2U visual exciter for highly superior color performance
- Wideband, linear aural exciter for high fidelity audio transmission
- Stable, drift-free operation reduces tuning and maintenance
- Fully assembled and tested for easy installation at transmitter site
- Excellent performance for subscription television stations (STV)

The Harris UHF-TV Exciter Retrofit Package (E.R.P.) is designed specifically for use as an exciter/driver for non-Harris klystron transmitters...permitting users of older non-Harris transmitters to enjoy state-of-the-art performance.

STANDARD EXCITER RETROFIT PACKAGE

The standard Exciter Retrofit Package consists of a Harris MCP visual exciter, a Harris MCP aural exciter, and a solid-state visual/aural amplifier. A notch diplexer phase equalizer is also included. All equipment is mounted in a 24-inch rack cabinet and is interconnected. Special configurations, such as dual exciters, can also be supplied. Drawer slides are used so that exciters may be easily pulled out for adjustment purposes.

VISUAL EXCITER

The Harris MCP-2U visual exciter incorporates Harris’ new VIDEO* SAW filter (CCIR M only), which provides vestigial sideband shaping, plus the required FCC group delay pre-correction. This new filter eliminates conventional receiver equalizers that require periodic maintenance with special test equipment. The visual exciter also uses a unique Quadrature Corrector that compensates for several types of klystron non-linearities, such as differential gain, incidental phase and intermodulation distortions.

POWER RATING

The Exciter Retrofit Package output power is 10 watts visual and 5 watts aural, which is adequate power for most klystrons currently being used in television transmitters.

ASSEMBLY AND TESTING

The Exciter Retrofit Package is fully assembled and tested at the Harris factory before shipment. Factory test data sheets and complete technical manuals are shipped with each Package.

INSTALLATION SERVICES

The services of a Harris field engineer are included with each E.R.P. (48 contiguous states only) to assist the station engineers in the installation and check-out of the Package with the transmitter. The Harris proof of performance (included) will be in a form sufficient to aid the customer in obtaining FCC type acceptance of the hybrid exciter/transmitter.

*Visual IF Delay Equalized Output

Ordering Information

UHF Exciter Retrofit Package for use as klystron driver in non-Harris transmitters. 10 watts visual, 5 watts aural. Please specify transmitter type, channel and offset. 790-XXXX-XXX Options available include: (1) dual exciters with automatic exciter switcher, and (2) emergency multiplex.
QUADRAPOWER
UHF Television Antenna

- Unlimited range of patterns
- Omnidirectional gains up to 45
- High power handling capability
- Radomes for reduced windloading
- High reliability, low maintenance
- Factory assembled and tested, no field tuning required

Harris' Quadrupower antennas are panel type antennas specifically designed for high power UHF transmission with omnidirectional patterns. The antenna consists of four panels per bay mounted on a square mast section. The antenna may be top mounted on a tower or the panels may be supplied without the mast for side mounting on a tower or other structure. Starting with the original Harris Zig-Zag antenna design, Harris re-engineered the antenna to provide the Quadrupower's improved performance and mechanical specifications. Smooth vertical patterns are the result of computer-aided optimization of the feed system and panel pattern shape. Lower windloading is achieved by the addition of radome covers that give the antenna a nearly cylindrical profile. The mast is constructed of structural quality steel, the panels are of structural grade aluminum to minimize weight, and the radiating elements are sturdy "Copperweld" steel supported by low-loss insulators. The RF transparent radomes are of fiberglass construction, and are color impregnated so that they never require painting. All materials used in the antenna are corrosion resistant to insure long life, low maintenance and optimum performance.

CUSTOM PATTERNS
Because of its multiple panel construction, the Quadrupower antenna can easily provide an unlimited number of directional patterns in the horizontal plane. This high degree of pattern flexibility enables the Harris antenna engineers to custom design a pattern to meet the specific requirements of each station. This pattern shaping permits the most efficient use of available transmitter power to cover a geographic area. Computer-aided design is used extensively to rapidly and accurately calculate nearly any desired pattern.

RADOMES
Quadrupower antennas may be equipped with radome covers that significantly reduce windloading and eliminate the need for electrical deicing. The radome covers effectively protect the antenna elements from precipitation, and are constructed so that they can be easily removed for inspection or maintenance of one antenna panel at a time. Electrical deicing is available on non-radomed Quadrupower antennas.

INPUT CONNECTIONS AND POWER RATINGS
The standard input connector is 6-1/8", 75 ohm coax line to permit power levels up to 75 kilowatts. Since the antenna feed system is conservatively designed for safe high power operation, 8-3/16" coax, 9-3/16" coax, waveguide or dual 6-1/8" coax input connectors can be supplied for input power levels of 110 kilowatts or greater.

ASSEMBLY AND TESTING
To insure the best possible performance, every Quadrupower antenna is completely assembled and tested at the Harris antenna facility in Palmyra, Missouri. In addition to the testing of each panel and bay, the entire antenna is tested for correct azimuth pattern, elevation pattern and VSWR.

Length permitting, Quadrupower antennas are shipped fully assembled. The factory assembly and testing, along with one-piece shipping, minimize installation time required after delivery to the antenna site.

FILING INFORMATION AVAILABLE
Complete specifications and filing information are available on request. Harris antenna engineers are also available by telephone to discuss your specific antenna requirements.

Ordering Information
When ordering UHF Quadrupower antennas, please specify channel number, pattern, beam tilt and null fill. Antennas supplied with lightning protector, beacon cable and prime coating on mast. Assistance with antenna assembly and ground test also supplied. Beacon, painting and ground support structures are not included.

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAZ-24U 3 bay</td>
<td>Quadrupower antenna with deicing</td>
<td>$994-7623-001</td>
</tr>
<tr>
<td>TAZ-24U 3</td>
<td>Quadrupower antenna with radomes</td>
<td>$994-7623-002</td>
</tr>
<tr>
<td>TAZ-31U 4</td>
<td>Quadrupower antenna with deicing</td>
<td>$994-7624-001</td>
</tr>
<tr>
<td>TAZ-31U 4</td>
<td>Quadrupower antenna with radomes</td>
<td>$994-7624-002</td>
</tr>
<tr>
<td>TAZ-38U 5</td>
<td>Quadrupower antenna with deicing</td>
<td>$994-7625-001</td>
</tr>
<tr>
<td>TAZ-38U 5</td>
<td>Quadrupower antenna with radomes</td>
<td>$994-7625-002</td>
</tr>
<tr>
<td>TAZ-45U 6</td>
<td>Quadrupower antenna with deicing</td>
<td>$994-7626-001</td>
</tr>
<tr>
<td>TAZ-45U 6</td>
<td>Quadrupower antenna with radomes</td>
<td>$994-7626-002</td>
</tr>
<tr>
<td>TAZ-45U 6</td>
<td>Quadrupower antenna with radomes</td>
<td>$994-7626-003</td>
</tr>
</tbody>
</table>

Note: One bay and two bay UHF Quadrupower antennas and VHF Quadrupower antennas are available on request. All antennas are F.O.B. Harris' antenna facility, Palmyra, Missouri.

Options And Accessories
Input Connectors: Dual 6-1/8", 8-3/16", 9-3/16" or waveguide.
Input Power: Up to 150 kilowatts.
Rosemount Ice Warning System: Consists of Model 871CB1 Ice Detector and Model 524B1 Controller.
The Harris Wavestar antenna is the first television broadcast antenna to employ waveguide technology. For many years, waveguide has been recognized as having many advantages over coaxial transmission line, now these advantages are also available in UHF-TV antennas. They include: simpler construction; higher power handling capability; and higher reliability. Although the Wavestar is of a unique waveguide construction, it performs in the same manner as coaxial antenna designs.

This new slotted waveguide antenna is the ultimate in design simplicity. Unlike coaxial antennas, it has no center conductor, bullets or insulators, fewer components mean higher reliability and longer life.

POWER RATING
Because of its waveguide design, the Wavestar antenna is inherently capable of handling in excess of 240 kilowatts. The overall power handling capacity is limited only by the size of the input feed system coaxial line.

Power is transferred from the tower transmission line by an input feed adaptor at the base of the antenna, just below the tower top. The Wavestar can be supplied with an input connection to match nearly any coaxial or waveguide transmission line. The operating channel and the desired power rating of the antenna input will determine the optimum input connection.

For power ratings up to 80kW, the Wavestar is supplied with a 6-1/8" 75 ohm coaxial input. For higher power ratings, the Wavestar can also be supplied with 8-3/16" or 9-3/16" coaxial input connections. The Wavestar can also be fed directly from rectangular or circular waveguide, thus eliminating the power handling and high frequency limitations of coaxial line.

PATTERNS
The WVS-30 is designed for a highly circular azimuth pattern for uniform radiation in all directions. The power gain of 30 can provide over 1600kW of radiated power from 55-60kW transmitters, 3000kW from 110-120 kW transmitters, and the maximum 5000kW of radiated power from 220-240kW transmitters.

Elevation pattern shapes approximate the ideal cosecant-squared shape required for uniform field strength versus distance from the transmitting location.

The Wavestar design minimizes variations in beam tilt, or "beam rocking", over the channel width, thereby preventing large variations in radiated power at different frequencies within the channel.

CONSTRUCTION
The Wavestar is a hollow galvanized steel cylinder with six rows of slots around the circumference of the antenna. Depending on the channel, two or three sections are stacked vertically to achieve the required gain. Fiberglass climbing steps are used to prevent pattern distortions that might be caused by metal steps.

The WVS-30 is designed for top mounting. It is constructed of structural steel that provides the high strength needed to prevent wind swaying (which causes reception problems such as color flutter in receivers). The standard Wavestar is engineered for wind up to 125 miles per hour (65/43 PSF) to provide excellent mechanical safety margins. The antenna is designed in accordance with the American Institute of Steel Construction Code and EIA Standard RS-222C.

The Wavestar slots are covered by Teflon radomes to protect the slots from ice buildup and subsequent performance degradation. Electrical de-icing is normally not required, which means substantial savings in installation and operating costs. For extremely severe icing environments, radome heaters can be provided.

The antenna is galvanized after fabrication, insuring that all surfaces inside and outside are protected from corrosion. In addition, the Wavestar is primed and finish painted before shipment.

HARRIS ANTENNA FACILITY
The Wavestar is assembled and tested at the Harris antenna test range... the largest, most comprehensive facility of its kind. Situated atop a 230-foot bluff, with test transmitters located up to 3 miles away on flat, unobstructed Mississippi River bottom lands, the uncluttered range offers ideal conditions for testing, approaching the "free space" situation of an installed antenna. The test range, with its sophisticated test equipment, is ideal for testing broadcast antennas, and provides accurate comparisons between theoretical predictions and actual antenna performance.
The Wavestar design minimizes variations in beam tilt, or "beam rocking", over the channel width, thereby preventing large variations in radiated power at different frequencies within the channel.

**CONSTRUCTION**
The Wavestar is a hollow galvanized steel cylinder with a single row of slots on one side of the antenna. Depending on the channel, two or three sections are stacked vertically to achieve the required gain. Fiberglass climbing steps are used to prevent pattern distortions that might be caused by metal steps.

The antenna is designed for low tip deflection to minimize wind swaying that causes reception problems such as color flutter in receivers. The standard Wavestar is engineered for wind up to 125 miles per hour (65/43 PSF), which results in excellent mechanical safety margins.

The Wavestar slots are covered by Teflon® radomes to protect the slots from ice buildup and subsequent performance degradation. Electrical deicing is not required, which means substantial savings in installation and operating costs. The antenna is galvanized after fabrication, insuring that all surfaces inside and outside are protected from corrosion. In addition, the Wavestar is primed and finish painted before shipment.

**Electrical Specifications**

**Table:**

<table>
<thead>
<tr>
<th>Channel</th>
<th>Antenna Height (ft.)</th>
<th>Radiation Center (ft.)</th>
<th>Moment (a) (ft.-lbs.)</th>
<th>Shear (a) (lbs.)</th>
<th>Weight (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>76.7</td>
<td>36.0</td>
<td>115,500</td>
<td>3,080</td>
<td>10,300</td>
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<tr>
<td>20</td>
<td>71.6</td>
<td>33.5</td>
<td>94,100</td>
<td>2,690</td>
<td>8,900</td>
</tr>
<tr>
<td>25</td>
<td>67.9</td>
<td>31.6</td>
<td>84,400</td>
<td>2,550</td>
<td>8,500</td>
</tr>
<tr>
<td>30</td>
<td>64.6</td>
<td>29.9</td>
<td>71,100</td>
<td>2,250</td>
<td>7,500</td>
</tr>
<tr>
<td>35</td>
<td>61.6</td>
<td>28.4</td>
<td>60,000</td>
<td>1,990</td>
<td>6,500</td>
</tr>
<tr>
<td>40</td>
<td>58.9</td>
<td>27.1</td>
<td>54,800</td>
<td>1,900</td>
<td>6,300</td>
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<tr>
<td>45</td>
<td>56.4</td>
<td>25.9</td>
<td>46,500</td>
<td>1,670</td>
<td>5,500</td>
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<tr>
<td>50</td>
<td>54.2</td>
<td>24.7</td>
<td>40,300</td>
<td>1,500</td>
<td>4,900</td>
</tr>
<tr>
<td>55</td>
<td>52.1</td>
<td>23.9</td>
<td>37,200</td>
<td>1,450</td>
<td>4,700</td>
</tr>
<tr>
<td>60</td>
<td>50.2</td>
<td>22.7</td>
<td>32,800</td>
<td>1,310</td>
<td>4,200</td>
</tr>
<tr>
<td>65</td>
<td>48.4</td>
<td>21.9</td>
<td>30,500</td>
<td>1,270</td>
<td>4,000</td>
</tr>
<tr>
<td>69</td>
<td>47.1</td>
<td>21.2</td>
<td>28,900</td>
<td>1,230</td>
<td>3,900</td>
</tr>
</tbody>
</table>

Specifications for other UHF channels available on request. Specifications subject to change without notice. 

(a) Windload data for 50.33 PSF including effect of beacon.

**Ordering Information**

TWS-30C Wavestar antenna, cardioid pattern. Includes: assistance with antenna reassembly and ground check at customer's site; beacon cable; and finish painting. Beacon and support structure not included. Please specify channel number, beam tilt and null fill.

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**Prices and Specifications Subject to Change Without Notice.**
VHF TELEVISION ANTENNAS

The Harris VHF Batwing antenna is normally fed by two 3-1/8", 50-ohm transmission lines. The 90° phasing between lines is normally provided by a hybrid diplexer that is available as an accessory.

As an option, the antenna can be equipped to accept a signal from a single transmission line. In this case, a notch diplexer is required for combining the aural and visual transmitter signals.

DEICERS

Batwing antennas are not severely affected by moderate amounts of icing because of the inherently low feed point impedance. Deicers are recommended, however, in areas where severe icing may be expected.

ASSEMBLY AND TESTING

Each Batwing antenna is completely assembled and tested at the Harris antenna facility in Palmyra, Missouri. After assembly and test, the antenna may be partially disassembled to facilitate shipping; however, shorter antennas may be shipped in one piece. The factory assembly and testing minimize installation time required after delivery to the antenna site.

FILING INFORMATION

Complete specifications and filing information are available on request. Harris antenna engineers are also available by telephone to discuss your specific antenna requirements.

Electrical Specifications

<table>
<thead>
<tr>
<th>Channel Range</th>
<th>Power Gain: 1 to 6, Ch. 2-6; 1 to 12, Ch. 7-13.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Gain</td>
<td>Input Connector: Dual 3-1/8&quot;, 50 ohm.</td>
</tr>
<tr>
<td>Input Power Rating</td>
<td>102 to 120 kW, TAB-L.</td>
</tr>
<tr>
<td>Input VSWR</td>
<td>70 to 77 kW, TAB-12H.</td>
</tr>
<tr>
<td>Visual Carrier</td>
<td>1.05 to 1.</td>
</tr>
<tr>
<td>Color Subcarrier</td>
<td>1.08 to 1.</td>
</tr>
<tr>
<td>Rest of Channel</td>
<td>1.10 to 1.</td>
</tr>
<tr>
<td>Circularity</td>
<td>± 2dB.</td>
</tr>
<tr>
<td>Deicer Power</td>
<td>3 kW per bay, Ch. 2, 3; 2 kW per bay, Ch. 4-6; 1 kW per bay, Ch. 7-13; 208/240 VAC, 60 Hz.</td>
</tr>
</tbody>
</table>

Ordering Information

When ordering Harris Batwing antennas, please specify channel number, pattern, beam tilt and null fill. Antennas supplied with lightning protector, beacon cable and finish painting in international orange. Assistance with antenna assembly and ground test also supplied. Beacon and ground support structures are not included.

Options And Accessories

Rosemount Ice Warning System: Consists of Model 871CB1 Ice Detector and Model 425B1 Controller.

Input Connector:

Pattern:

Hybrid Diplexer:

26 kW, Ch. 2-6.
66 kW, Ch. 2-6.
15 kW, Ch. 7-13.
55 kW, Ch. 7-13.

Test Range Pattern Measurements

Single Bay Rental Antennas Available on Request

Prices and Specifications Subject to Change Without Notice.
LOW BAND VHF-TV TRANSMITTING ANTENNAS

TAV-5L AND TAV-5LE
Circularly Polarized
Low Band VHF-TV Transmitting Antennas

- Low windload design for lower tower and installation cost
- TAV-5LE directly replaces Batwing antenna
- Excellent axial ratio — reduces ghosting effects
- Upper-lower feed system for maximum redundancy
- Radomed feed points and baluns-maximum protection from ice and corrosives
- Requires no electrical deicing

TAV-5L
The TAV-5L is a five-bay CPV antenna designed for excellent circularly polarized performance and for low windload. Each bay of the antenna consists of three crossed vee dipoles mounted at 120° intervals around a vertical mast. As a direct result of the precise tailoring of the radiator pattern of the vee dipoles, the TAV-5L has super axial ratio characteristics.

The antenna is designed for maximum ERP (Effective Radiated Power) using today's 60-kilowatt low band television transmitters.

TAV-5LE
The TAV-5LE antenna is designed specifically as a replacement for the commonly used six-bay Batwing horizontally polarized antenna. The 5LE's radiation center, mechanical characteristics and lower bury section are engineered so that a Batwing antenna may be easily replaced on an existing tower. The 5LE's "extended radiation center" is slightly higher than the 5L to place it within two meters of existing Batwing antennas.

PATTERNS
Elevation pattern contouring to introduce beam tilt and null fill may be provided by means of standard phase distribution techniques. Control of the elevation pattern is accomplished with no degradation of the axial ratio. For omnidirectional stations, the shape of the azimuth pattern will vary from circular less than ±2 dB.

RADOMES
Fiberglass radome covers are standard, and protect the feed point and balun from exposure to moisture, ice and atmosphere corrosives. Consequently, the antennas are not subject to performance degradations caused by the environment.

INPUT CONNECTIONS
The standard 5L antennas are supplied with dual 3/4", 50 ohm input connections. The upper two bays and lower three bays of the antenna are each fed by a separate, independent transmission line. This feature permits using one-half of the antenna in an emergency situation (with appropriate patching) with only a minor reduction in signal strength. The TAV-5L may also be supplied with a single input connection.

All 5L antenna masts are hot dip galvanized and all hardware is stainless steel for excellent corrosion protection. In addition, all antennas are primed and finish painted before assembly.

TAV-5L/5LE
Electrical Specifications

<table>
<thead>
<tr>
<th>CHANNEL</th>
<th>ANTENNA (d) HEIGHT-(FT)</th>
<th>RAD. CENTER (FEET)</th>
<th>MOMENT (FT-LBS)</th>
<th>SHEAR (LBS)</th>
<th>WEIGHT (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>81.5</td>
<td>41.4</td>
<td>230,000</td>
<td>7,500</td>
<td>13,300</td>
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<tr>
<td>3</td>
<td>75.5</td>
<td>38.0</td>
<td>197,000</td>
<td>7,050</td>
<td>11,500</td>
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<tr>
<td>4</td>
<td>69.0</td>
<td>34.7</td>
<td>161,000</td>
<td>6,050</td>
<td>9,500</td>
</tr>
<tr>
<td>5</td>
<td>62.25</td>
<td>30.9</td>
<td>126,000</td>
<td>5,350</td>
<td>8,200</td>
</tr>
<tr>
<td>6</td>
<td>59.0</td>
<td>29.1</td>
<td>111,000</td>
<td>5,050</td>
<td>7,700</td>
</tr>
</tbody>
</table>

NOTE: a) Height includes 4 foot lightning protector.
b) Windloads for 50/33 PSF EIA wind.

c) Bury section same as 6 bay Batwing.
d) Windloads for 50/33 PSF EIA wind.

Ordering Information
When ordering, please specify channel number, pattern, beam tilt, and null fill. Antennas supplied with lightning protector, beacon cable and finish painting in international orange. Assistance with antenna assembly and ground test also supplied. Beacon and ground support structures not included. Standard antenna is bury mounted.

TAV-5L five-bay CPV antenna .............................................. 994-8798-001
TAV-5LE five-bay CPV antenna ......................................... 994-8799-001

NOTE: Four and six bay CPV antennas for Channels 2-6 are available. All antennas are F.O.B. Harris' antenna facility, Palmyra, Missouri.

Options And Accessories
Input Connector: Dual 4½" or single line.
Pattern: Directional.
Notch Diplexer: TD-60L, 66 KW rating, Channels 2-6.
Antenna Mounting: Flange mounted.

Prices and Specifications Subject to Change Without Notice.
CPV
Circularly Polarized
Television Antenna

- Top mount design
- Excellent axial ratio — reduces ghosting effects
- High power handling capabilities
- Requires no electrical deicing
- Superb horizontal circularity
- Excellent control of vertical pattern
- Directional pattern capability
- Antenna elements are at DC ground potential for lightning protection
- Dual or single line input

In addition to its outstanding mechanical specifications, the Harris CPV antenna also features excellent circularity: standard omnidirectional pattern varies less than ±2 dB; low axial ratio (less than 2 dB); VSWR less than 1.05:1 at visual carrier and below 1.1:1 over each channel; directional horizontal pattern capability; and a variety of vertical patterns that may be tailored to specific coverage requirements. Harris has spent years in research and development of the CP concept for TV broadcasting, so that the current design now combines optimum circularly polarized performance with all of the regular features of the Harris line of television antennas.

With the Harris CPV, picture quality may be improved through ghost reduction. Also, increased signal-to-noise ratios may be achieved whether the viewer uses a CP receiving antenna, conventional rabbit ears or an ordinary outside receiving antenna.

DESIGN
Each bay of the CPV consists of three crossed vee dipoles mounted at 120° intervals around a vertical mast. These dipoles are separated by three vertical grids which isolate the vee dipoles and provide horizontal beam shaping. Each set of crossed dipoles is fed in phase quadrature to produce rotating RF energy. The signal emanating from each set of dipoles is considered right hand circular since the field rotation is clockwise as viewed in the direction of propagation.

The Harris CPV is available with power ratings up to 100 kilowatts, and a special wideband flat dipole is used to safely handle the required power levels. Each dipole is mechanically supported and fed from special baluns for both vertical and horizontal polarization.

RADOMES
Fiberglass radome covers are standard, and protect the radiating elements from exposure to moisture, ice and atmospheric corrosives. Consequently, the CPV antenna is very insensitive to performance degradations caused by the environment. As the need for electrical deicing is eliminated, substantial annual savings in power costs can result—in addition to the initial savings in not having to purchase deicer elements, transformers and wiring.

AXIAL RATIO
The CPV has superb axial ratio characteristics as a direct result of the precise tailoring of the radiated pattern of the vee dipoles. Axial ratio, the ratio of the major and minor axes of the polarization ellipse, critically defines the quality of a radiating element. When circularly polarized receiving antennas are used by the viewer, reflected signals may be attenuated, thereby reducing ghosting effects.

Prices and Specifications Subject to Change Without Notice.
VHF TELEVISION ANTENNAS

TAV-6L Electrical Specifications
Channel Range: FCC Channels 2-6 (54-88 MHz).
Power Gain (10% Null Fill): 2.92 (4.85 dB) per polarization.
Input Connector: Dual 3-1/8", 50 ohm.
Input Power Rating: 70 kW visual with 20% aural.
Input VSWR: 1.10.
Visual Carrier: 1.08 to 1.
Color Sub-carrier: 1.05 to 1.
Rest of Channel: 1.10 to 1.05.
Axial Ratio: 2 dB.
Circularity: ± 2 dB.

TAV-6L Mechanical Specifications

<table>
<thead>
<tr>
<th>Channel</th>
<th>Antenna Height (ft.)</th>
<th>Rad. Center (feet)</th>
<th>Moment (ft.-lbs.)</th>
<th>Shear (lbs.)</th>
<th>Weight (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>95.5</td>
<td>46.25</td>
<td>337,000</td>
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<td>3</td>
<td>88.0</td>
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<td>291,000</td>
<td>8,900</td>
<td>15,000</td>
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<tr>
<td>4</td>
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<td>7,650</td>
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<tr>
<td>5</td>
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<tr>
<td>6</td>
<td>70.0</td>
<td>32.60</td>
<td>164,000</td>
<td>6,450</td>
<td>10,100</td>
</tr>
</tbody>
</table>

Note: Antennas are designed in accordance with the American Institute of Steel Construction Code. The loading data shown in the table is based on a wind pressure of 50 lbs. per sq. ft. acting normal to flat surfaces. Loading data includes windload effects for beacon (not provided by Harris), and also bury sections if not flange mounted.

TAV-12H Electrical Specifications
Channel Range: FCC Channels 7-13 (174-216 MHz).
Power Gain (15% Null Fill): 5.81 (7.54 dB) per polarization.
Input Connector: Single 6-1/8", 50 ohm.
Input Power Rating: 75 kW visual with 20% aural.
Input VSWR: 1.05 to 1.
Visual Carrier: 1.08 to 1.
Color Sub-carrier: 1.10 to 1.
Rest of Channel: 2 dB.
Circularity: ± 1.5 dB.

TAV-12H Mechanical Specifications

<table>
<thead>
<tr>
<th>Channel</th>
<th>Antenna Height (ft.)</th>
<th>Rad. Center (feet)</th>
<th>Moment (ft.-lbs.)</th>
<th>Shear (lbs.)</th>
<th>Weight (lbs.)</th>
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</thead>
<tbody>
<tr>
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<td>8</td>
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</tr>
<tr>
<td>9</td>
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<td>155,550</td>
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<tr>
<td>10</td>
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</tr>
<tr>
<td>11</td>
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<tr>
<td>12</td>
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<td>28.6</td>
<td>136,550</td>
<td>4,725</td>
<td>8,000</td>
</tr>
<tr>
<td>13</td>
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<td>130,700</td>
<td>4,650</td>
<td>7,600</td>
</tr>
</tbody>
</table>

Note: Antennas are designed in accordance with the American Institute of Steel Construction Code. The loading data shown in the table is based on a wind pressure of 50 lbs. per sq. ft. acting normal to flat surfaces. Loading data includes windload effects for beacon (not provided by Harris), and also bury sections if not flange mounted.

Low Band CPV Ordering Information
When ordering Harris low band CPV antennas, please specify channel number, pattern, beam tilt and null fill. Antennas supplied with lightning protector, beacon cable and primer coating. Assistance with antenna assembly and ground test also supplied. Beacon, painting and ground support structures not included. Standard antenna is bury mounted.

TAV-6L six bay CPV antenna, Channels 2, 3 994-8602-00X
TAV-6L six bay CPV antenna, Channels 4, 5 and 6 994-8602-00X

Note: Four and five bay CPV antennas for Channels 2-6 are available on request. All antennas are F.O.B. Harris’ antenna facility, Palmyra, Missouri.

Options And Accessories
Input Connector: Dual 4-1/16" or single line.
Pattern: Directional.
Test Range Pattern Measurements: TD-50L, 66 kW rating, Ch. 2-6.
Notch Diplexer: Flange mounted.
Antenna Mounting: Flange mounted.

High Band CPV Ordering Information
When ordering Harris high band CPV antennas, please specify channel number, pattern, beam tilt and null fill. Antennas supplied with lightning protector, beacon cable and finish painting in internal orange. Assistance with antenna assembly and ground test also supplied. Beacon and ground support structures not included. Standard antenna is flange mounted.

TAV-12H twelve bay CPV antenna, Channels 7-13 994-8707-001
TAV-12H twelve bay CPV antenna, Channels 7-13, as above, except with dual 3-1/8", 50 ohm input 994-8707-002

Note: 8, 10, 14, 16 and 18 bay CPV antennas for Channels 7-13 are available on request. All antennas are F.O.B. Harris’ antenna facility, Palmyra, Missouri.

Options And Accessories
Input Connector: Dual 3-1/8" or dual 4-1/16", 50 ohm.
Pattern: Directional.
Test Range Pattern Measurements: TD-100H, 100 kW rating, Ch. 7-13.
Notch Diplexer: 6-1/8" 50 ohm to 5-1/8" 75 ohm.
Impedance Transformer: Bury mounted.
Antenna Mounting: Bury mounted.

Prices and Specifications Subject to Change Without Notice.
MEDALIST 8, 10 or 12 Channel Dual Stereo Audio Consoles

- Plug-in, interchangeable attenuator modules provide quick replacement, even with unskilled personnel
- Choice of rotary or linear attenuators for the best performance by your operating staff
- Mic input available on any channel to provide individual station configuration of console channel assignments
- Up to 3 sources into each input channel to eliminate patch panels and external switching panels
- Virtually transparent performance assures the best possible signal quality and listener satisfaction
- 25 dB minimum headroom in all circuits provides excellent station sound, even with the VU meters pinned
- Excellent RFI/EMI immunity assures noise-free signal of your programming, without interference from nearby stations
- Ideal for stereo on-air and production applications where you want the cleanest signal in the area

MEDALIST-8 has the capability for 24 sources into 8 input channels. Microphone capability on all input channels makes the Medalist audio console an attractive choice for small TV operations. Other applications include Cable TV, post-production facilities and sound distribution systems. Features typically found only in more expensive modular audio consoles are standard in the Harris Medalist. Multiple input selectors are provided for headphone and monitor circuits. And the best in human engineering is evident in the choice and location of front panel components.

RELIABILITY

A heavy duty power supply with plenty of reserve capacity is included in the Medalist console. The components in the supply have power and voltage ratings well above nominal requirements to assure optimum reliability and long life. Burned-in ICs, selected and screened for important operating parameters, are used for high reliability and stability in the various signal paths.

Top line components such as the DBX® VCAs, Penny and Giles attenuators and Schadow switches provide unquestioned reliability and performance in their respective areas of the console. Even the quick connect AMP BarreI Terminals for the input and output connections are gas tight and were selected for reliability as well as for convenience.

YOU SPECIFY THE STYLE OF PLUG-IN ATTENUATORS

You may select either rotary or linear Penny and Giles or alternate, lower cost attenuators with 100 millimeter (four inch) throw in your Harris Medalist audio console. In either configuration, the plug-in, interchangeable attenuator modules offer operating ease and new dimensions of service convenience.

TRANSPARENT PERFORMANCE

Active transformerless balanced input and output circuits give the Medalist virtually transparent performance rarely matched in competitive consoles of any size. The frequency response is very flat, with no transformers to cause rolloff or sharp rise in distortion within the audio passband.

AMPLIFIER COMPLEMENT

Two microphone preamps with plug-in connections are provided as standard equipment. A pan pot on the output of the preamps sets the desired left/right stereo mix. Additionally, two stereo program amplifiers are included for the Program and Audition line outputs. Other amplifiers provided are: A stereo headphone amplifier capable of driving either low or high impedance phones; a line level stereo amplifier to drive the optional external monitor speaker amplifier; and a powerful cue amplifier with built-in speaker.

SWITCHING PHILOSOPHY

All front panel switching on the Harris Medalist audio console is effected through high quality pushbutton switches. Large, rectangular buttons aid comfortable, positive operation.

MEETING IMPORTANT CRITERIA

In the tradition of all Harris audio consoles, the Medalist is a skilful blend of engineering advances, no-compromise performance, and user-friendly design—all wrapped in a functional, cost competitive package. This innovative audio console merits serious consideration in present or future plans to update your facility.

The Harris Medalist Series of dual stereo audio consoles is ideal for AM and FM on-air and production applications. The Harris Medalist-12 offers facilities for up to 36 sources into 12 input channels. It provides full visibility of all output signal levels via five dedicated meters for Program, Audition, and Mono/Sum. It also has mounting provisions for one or two up/down counters, synchronous clock or master clock readouts. The Medalist-10 allows facilities for up to 30 sources into 10 input channels. The

Prices and Specifications Subject to Change Without Notice.
OUTPUT CHANNELS:
Stereo PROGRAM and AUDITION, plus optional mono SUM channel with +8 VU output level (+4 VU and 0 VU field adjustable).

INPUT CHANNELS:
12 total on the Medalist-12, 10 on the Medalist-10 and 8 on the Medalist-8. Stereo line level, or mono mic level with pan-pot for left/right imaging.

INPUT CIRCUITS:
Medalist-12, 36 total; Medalist-10, 30 total; Medalist-8, 24 total. Has three-position source selector in each input channel with the first position of each group capable of mic input for up to 8 mics in the Medalist-8, 10 in the Medalist-10 and 12 in the Medalist-12. The second and third positions on the last two input channels of each console are capable of remote line operation, with program cue feed down the line before being switched into the console. All others are for line level sources such as cart machines, reel-reel and turntables.

STANDARD AMPLIFIER COMPLEMENT:
2 microphone preamps, 2 stereo program line amplifiers, stereo headphone amplifier, stereo monitor driver (to optional external speaker power amplifier), and mono/sum cue amplifier with built in speaker.

OUTPUT CIRCUITS:
2 stereo plus optional mono/sum program line level outputs, stereo driver @ .25 volt nominal output (10V maximum, external power amplifier required), stereo headphone feed for external power amplifier (if more than 2 watts/channel internal headphone amplifier is desired).

INPUT IMPEDANCES:
MICROPHONE: 5K ohms or better, balanced CART MACHINES, ETC.: 8K ohms or better, balanced EXT 1, EXT 2: 8K ohms or better, balanced NETWORK: 620 ohms terminated, balanced

SOURCE IMPEDANCES:
MICROPHONE: 150/250 ohms CART MACHINES, ETC.: 150/600 ohms EXT 1, EXT 2: 150/600 ohms NETWORK: 600 ohms

OUTPUT IMPEDANCES:
PGM, AUD, MONO: 20 ohms, resistive MONITOR FEED: 50 ohms maximum, resistive PROGRAM CUE TO REMOTE LINES: Approx. 2K ohms, resistive EXTERNAL PHONE FEED: 50 ohms maximum, resistive

LOAD IMPEDANCES:
PGM, AUD, MONO: 150/600 ohms MONITOR FEED: 1K ohms or greater PROGRAM CUE TO REMOTE LINES: Approx. 2K ohms, resistive EXTERNAL PHONE FEED: 1K ohms or greater

GAIN:
MIC TO LINE: 94 dB ±2 dB* with controls @ minimum attenuation TAPE TO LINE: 30 dB ±2 dB* with controls @ minimum attenuation *May be changed with circuit value changes

FREQUENCY RESPONSE:
MIC TO LINE: +0, -0.5 dB, 20 Hz to 20 kHz TAPE TO LINE: +0, -0.25 dB, 20 Hz to 20 kHz BANDPASS: -3 dB @ 3 Hz and 100 kHz

TOTAL HARMONIC & IM DISTORTION:
PGM, AUD, MONO: 0.05% maximum, 20 Hz to 20 kHz output 0.1% maximum, 20 Hz to 20 kHz @ +18 dBm output Clipping Level: +28 dBm/600 ohms, or higher

SIGNAL TO NOISE:
MIC TO LINE: 77 dB (or better) below +18 dBm output with -50 dBv input level, for typical proof measurements; -127 dBv (or better) equivalent input noise with 20 Hz to 20 kHz bandpass and normal control settings TAPE TO LINE: 95 dB (or better) below +18 dBm output with +14 dBv input level and normal control settings MONITOR & PHONE FEED: Approx. same as TAPE TO LINE

CUE AMPLIFIER OUTPUT:
5 watts with complex wave into 8 ohm speaker

HEADPHONE AMPLIFIER:
2 watts per channel with complex wave into 8 ohm phones, 7 volts RMS into phones of 600 ohms or greater.

POWER REQUIREMENTS:
125 watts max. for Medalist-12; 100 watts max. for Medalist-10; 80 watts max. for Medalist-8.

SIZE:
MAINFRAME: 513 mm (20 in.) deep x 278 mm (11 in.) high Width: Medalist-12 — 1241 mm (49 in.) Medalist-10 — 1038 mm (41 in.) Medalist-8 — 835 mm (33 in.)

POWER TRANSFORMER/FUSE ASSEMBLY: 152 mm (6 in.) deep x 133 mm (5 1/4 in.) high (with 25 ft. interconnecting cable, plugs on each end).

WEIGHT:
Medalist-12 — 36 kg (80 lbs) Medalist-10 — 31 kg (69 lbs) Medalist-8 — 27 kg (60 lbs)

ORDERING INFORMATION
Medalist-12 console, with two stereo program amplifiers, two mic preamplifiers, less input channel attenuators 994-865-001
Medalist-12 4-digit, 100-minute up/down timer with .3' LED display and 3 controls 436-0244-000
Medalist-12 6-digit, 12 hour line synch. clock with .3' LED display and 3 controls 436-0249-000
Medalist-12 6-digit, remote display for ESE master clocks with serial time code 436-0250-000
Medalist-10 console, with two stereo program amplifiers, two mic preamplifiers, less input channel attenuators 994-8758-000
Medalist-8 console, with two stereo program amplifiers, two mic preamplifiers, less input channel attenuators 994-8759-001
Medalist-12 console, with two stereo program amplifiers, two mic preamplifiers, less input channel attenuators 994-8776-001
Stereo program amplifier for Mono/Sum and remote program cue 994-8812-001
Additional microphone preamps 994-8775-001
Penny & Giles linear attenuators* 994-8762-001
Penny & Giles rotary attenuators* 994-8763-001
Alternate linear attenuator* 994-8812-001
Alternate rotary attenuator* 994-8811-001
Blank attenuator module (use when less than full complement of attenuator modules specified) 994-8826-001
Remote start switch, momentary action 992-6281-001
Remote start switch, alternate action 992-6382-001
BGW-75 dual monitor power amplifier 740-0696-000

*May be intermixed; order up to 10 total

 Prices and Specifications Subject to Change Without Notice. 45
PHONO PREAMPLIFIER

PX-91
Mastering Quality Phono Preamplifier

- Dual mono or stereo operation
- Extremely low transient intermod and dynamic distortion, assures faithful reproduction of even the most demanding disc cuts
- High accuracy equalization and excellent response, +0.25 dB maximum from ideal RIAA curve
- Polypropylene equalization components insure excellent transient response
- All integrated circuits burned in and factory tested for high reliability
- Low noise design for dead quiet mastering operation
- High input overload immunity, 630 mV at 1 kHz insures adequate headroom and extraordinary quality

Excellent audio fidelity in the broadcast chain is of vital concern to broadcasters. The phono preamplifier is a critical component in this chain. The advent of inexpensive integrated circuit technology has produced an array of low cost phono preamplifiers which advertise excellent steady-state performance. However, static measurements do not adequately describe dynamic listening criteria.

The new Harris PX-91 Mastering Quality Phono Preamplifier is the result of a careful evaluation of the performance requirements of broadcast phono preamplifiers.

SPLIT EQUALIZATION
Broadcast phono preamps generally employ only a single stage for equalization and amplification. These designs suffer from inadequate feedback loop gain due to the stringent requirements imposed by RIAA equalization and the gain required for a usable output level.

The Harris PX-91 Mastering Quality Phono Preamplifier splits the equalization and amplification requirements into two separate stages. This allows considerably more conservative operation of each amplifier stage to insure excellent transient performance. The first stage buffers the phono cartridge, provides equalization time constants of 3180 and 318 microseconds, and supplies a small amount of overall gain. Unlike composite amplifier preamps, this first stage is DC coupled to the cartridge, eliminating a coupling capacitor that can easily degrade the small signal level present.

The 7950 microsec and the 75 microsec time constants are provided by a passive interstage network. This output is directly coupled to the second stage which provides the additional gain necessary to bring the cartridge level up to line level. It is electronically balanced, provides 20 dB of variable gain range and an output capability in excess of +20 dBv into a 600 ohm load.

NOISE
The Harris PX-91 Phono Preamplifier design effort has been supplemented by an equally extensive measurement program. The unit is subjected to a battery of tests which completely and unambiguously define its actual performance. Typical noise is 85 dB below 10 mV input level, 600 ohm termination, which approaches the theoretical limit of performance. In addition, 1/3 octave analysis reveals a smooth noise vs. frequency curve, indicating hum- and pop-free performance.

FREQUENCY RESPONSE
The 2-stage design of the Harris PX-91 allows for theoretically perfect equalization. Use of the finest 1% film and foil polypropylene capacitors and 1% metal film resistors insure compliance with the ideal IEC-RIAA curve within 0.25 dB.

DISTORTION
The static and transient distortions of the Harris PX-91 Phono Preamplifier are so low that they are difficult or impossible to measure. Over one year of solid research into low noise amplifier design and transient distortion culminated in the production of this preamplifier.

Distortion in the Harris Phono Preamp was measured with classical and modern techniques that more closely approximate auditory perception. Swept two-tone Intermodulation Distortion and Transient Intermodulation Distortion test results were limited by modern state-of-the-art test equipment performance, not by the performance of the preamp.

OTHER FEATURES
Amplifier slew rates are better than 15V/ usec, more than adequate for the small signal levels involved. Adjustable gain and capacitive cartridge loading assure optimum performance with any moving magnetic cartridge. The power supply is regulated and doubly filtered to eliminate power line transients from the preamp output. Conservative operation of all components provides trouble-free operation, even in brownout or surge conditions. Professional XLR output connectors eliminate RFI prone barrier strips. RCA type phono input connectors assure RF immunity and compatibility with quality tone arms.

Specifications
Input Impedance: 47K ohms in parallel with 100pf to 300pf, adjustable in 50pf steps.
Input Stage Overload: 630 mV RMS (1.78 VpP) at 1 kHz.
Maximum Input Sensitivity: 3.2mV RMS for +4 dBv output.
Output Impedance: 100 ohm, electronically balanced, resistive.
Maximum Output Level: +20 dBv.
Frequency Response: Within ±0.25 dB of standard IEC-RIAA curve, 20 Hz to 20 kHz.
Harmonic Distortion: Less than 0.02%, 20 Hz to 20 kHz, +10 dBv output. Typically less than 0.005%.
Intermodulation Distortion: Less than 0.02%, 60 Hz/7 kHz, 4:1 ratio, +10 dBv output. Typically less than 0.008%.
Transient Intermodulation Distortion: Less than 0.01%, CCIF two tone method, 20 Hz difference frequency. Typically less than 0.002%, DIM-100 sine/square (Otalpa) method below 0.05% measurement limit.
Signal To Noise: Greater than 80 dB below 10 mV RMS input reference, 20 Hz to 20 kHz, 600 ohm input termination. Typically: 85 dB below 10 mV input, 600 ohm terminated, non-weighted, 90 dB below 10 mV input, 600 ohm terminated, A weighted.
Equivalent Input Noise: -122 dBv, 20 Hz to 20 kHz, 600 ohm terminated.
Audio Slew Rate: ±15 V/usec.
Gain: 32-52 dB, continuously variable.
Channel Separation: Greater than 70 dB.
AC Power: 117 VAC/234 VAC, 50/60 Hz, 4 watts.
Audio Input Connectors: RCA phono jacks.
Audio Output Connectors: Male XLR type.
Size: 10.5"L x 2.25"W x 4"H (267mm x 57mm x 102mm).
Weight: Domestic packed, 3.25 lbs. (1.5 kg).
Cubage: 2 cubic feet.

Ordering Information
Harris PX-91 Mastering Quality Phonograph Preamp for dual mono or stereo operation ........................................... 994-8915-001

Prices and Specifications Subject to Change Without Notice.
HARRIS 9000 PROGRAM CONTROL SERIES

- Video editing and display
- MULTI-FILE™ Program Memory
- Jock-assist countdown clock with 10-second warning
- Automatic power failure restart
- Built-in time announce control
- Interfaces to all popular random access machines
- Ready sensing to prevent dead air
- Crystal-controlled 7-day clock
- Simple one-time bulletin insertion
- Operator "error sensing"
- Automatic voice track control
- Programmable fade-under for talk-over
- Software logic — your safeguard against future obsolescence
- Front panel access to test points and adjustments
- Full function monitoring and audition
- Optional logging, which provides discrepancy diagnostics
- 25 Hz detection included for all real-to-reel sources
- Ready for most syndicated programming services
- Four "coffee pot" function relays included
- Micro-computer versatility
- Complete system remote control
- Dual silence sensors
- Stereo and sum-channel mono outputs
- Emergency back-up operation panel

The purpose of radio program control equipment is to maximize station profits through greater operating efficiency and through the presentation of a more saleable program product. That's pretty basic, but that's what it's all about...saving time...improving your product...increasing your profits.

That's what the Harris 9000 Program Control is all about, too. It has been designed to give you the best tool available to increase the efficiency and effectiveness of your staff, while providing the opportunity to improve your sound—whatever your format may be. As the originator of micro-computer program automation, Harris has drawn on its years of experience, and taken the next step forward to give you more flexible, more convenient, more reliable, and easier to operate systems than any available before. Harris 9000 systems will handle any format flawlessly, yet are so easy to understand, and so easy to program that even the most non-technical person in your station will readily see how they work and appreciate their help.

With many exclusives, from live-assist features to the truly advanced MULTI-FILE™ Program Memory, the Harris 9000 Series is definitely the most advanced concept in program automation, and the best there is at its job—helping you improve your results, on the air and on the bottom line.

UNLIMITED FLEXIBILITY TO HANDLE ANY FORMAT...

With the wide variety of program formats that are on the air today, a system must have great versatility if it is to be able to handle any one of them. Harris' 9000 systems have that versatility.

As three distinct systems available, offering the broadcaster a complete selection to meet his particular requirements • MULTI-FILE™ Program Memory saves you time...and money • Easy-to-understand video display of current system status • Conversational messages • No special skills required to operate system • Live-assist features and ease of operation meet the needs of today's fast-paced combo operator • Advanced micro-computer design • Operationally and environmentally proven...hundreds of Harris' systems in field use.

No programming is too complicated—or too simple. They will faultlessly handle everything from fast-paced "lots-of-musics, lots-of-talk" programming to a more simple sequence of reel-to-reel events integrated with commercials at the proper times. In addition, the Harris 9000 enables management to achieve its goal of minimizing the time and errors associated with entering commercials and other schedule changes.

EFFICIENCY AT EVERY STAGE...

The Harris 9000 aggressively pursues maximum efficiency at every stage of station operation. The video terminal provides necessary information—very complete yet very simple—for schedule entry and review. Even during editing, a status display informs the operator of the on-air situation, alerting him to possible problems. Conversational messages provide easy-to-understand prompting regarding the nature of errors. The keyboard layout, developed from Harris' experience in hundreds of installations, is aimed at fast and reliable scheduling.

48 Prices and Specifications Subject to Change Without Notice.
SIMPLIFIED SCHEDULE ENTRY WITH MULTI-FILE PROGRAM MEMORY...

The need to separate commercials from repetitive format elements was partially satisfied with the use of sub-routines, a concept developed by Harris and now widely copied throughout the industry. With the MULTI-FILE Program Memory, Harris' 9000 has vastly improved on a good idea, providing a real solution to an error-prone, time-consuming problem.

Commercial schedules, music rotations, repetitive format elements and special programs are all independent schedules which must be integrated to create the broadcast day. MULTI-FILE Program Memory provides independent files for these schedules, eliminating the need to refer to unrelated material. Traffic, for instance, no longer needs to know where to go after a commercial cluster. Traffic keeps the commercial file, the music director keeps the playlist file, etc. This is a real time-saver.

The Harris 9000 with MULTI-FILE Program Memory keeps things simple by integrating these various schedule files, according to plan and always on time. The operator can highlight on the video screen the look-ahead display of entries from any particular file; in addition, a bar graph can be displayed, distinctly illustrating the integration of upcoming schedule files. The innovative use of graphics in the Harris 9000 is not only of great assistance to the operator, but minimizes effort in the area of operator training.

IMPECCABLE EXECUTION...

Today's competitive operation can't afford to waste time deciding whether or not a format change is possible. The Harris 9000 Program Control knows that any format is possible, and concentrates on impeccable execution.

"Tighter playlist control...more consistent air sound...increased ratings" are broadcaster comments that are frequently made about Harris' program control equipment.

Live or automated operation is no longer the issue when the end result is a significant advantage in ratings and revenues. The Harris 9000 provides multiple overlaps, dependable voice-track synchronization, plus solid support for the fast-paced live announcer.

Live-assist means never having to keep a program log, stack cards or cue records. A countdown timer, complete with a ten-second warning, helps maintain a tight sound. Insertion of unscheduled material is easy. This is live-assist that really aids your on-air talent and encourages more creative performance.

YOUR CHOICE OF SYSTEMS TO MEET YOUR PARTICULAR REQUIREMENTS. The Harris 9000 Series is composed of three distinct systems, each showing a progressive increase in programming capability. The 9001 is a basic program control system which can be used for any automation requirement. It uses a single video terminal, and has a 1,999-event memory, which is expandable up to 9,999 events. The 9002 fills all program control requirements, plus has the ability to interface with an external business system, and can be programmed from totally independent terminals. It has a 1,999-event memory, expandable up to 9,999 events. The 9003 handles even the most sophisticated format faultlessly.

The Harris 9000 Series has been designed to expand as your needs expand. All 9000 Series models can easily be upgraded in the field to a higher numbered model.

THE HARRIS 9001. The 9001 has the full mainframe, audio switcher and heavy-duty power supply already in use in hundreds of installations worldwide. The 1,999-event memory (expandable to 9,999 events) and the 7-day clock allow you to program for a weekend or an entire week ahead. The simple keyboard and plain-text programming assure mastery of system operation by most station personnel in less than a day. Dual-intensity video allows highlighting of the schedule items chosen by the operator. The types of highlighted entries could be commercial clusters, music sets, contest/promos—any file from the MULTI-FILE Program Memory.

Among the many other important 9001 features are: automatic power failure restart, time announce control, network join, ready sensing to prevent dead air, remote control and countdown clock for live-assist, bulletin insertion, "coffee pot" function relays, and MULTI-FILE Program Memory.

THE HARRIS 9002. In addition to the many features of the 9001, the 9002 includes dual flexible-disk drives to increase the memory capability and to provide a permanent memory storage medium.

Another key innovation is the ability of the 9002 to support totally independent terminals. Using MULTI-FILE Program Memory, the traffic director and program director can have their own files in the program memory. Now they can both edit their respective areas of event memory simultaneously! And, while this is happening, data can be received or transmitted to an external business system using the port provided for this purpose.

In the 9003, up to 3 lines may be used for bulletins or other copy for live insertions. For instance, this copy may be typed on the newsroom terminal and will appear on the studio terminal video display.

The Mode Control Keys are used to determine what data is to be entered. (scheduling, set clock, log recording, etc.) Manual operation keys are used for remote control. (START, STOP, FADE, etc.)

The Data Entry Keyboard is used for entering instructions. It includes dedicated function keys to eliminate typing frequently used instructions (PLAY, INTRO, LINK, etc.).

Upper area shows on-air status, real time, and the next scheduled event.

Lower area shows, in the various operational displays, a list of upcoming schedule entries. In the editing modes, this serves as a "work area."

A full typewriter keyboard is provided for entering log messages for encoding in the 9003. The keyboard is also used for titles and for live copy insertions.

9000 Series Control Terminal

Programming and operating instructions are communicated to the system from a terminal that may be located up to 150 feet from the system electronics. The terminal provides continuous video display of various operational functions, and is also used for editing purposes.

Prices and Specifications Subject to Change Without Notice.

HARRIS
P.O. Box 4200
Quincy, IL 62305-4290
(217) 222-8200
9000 SERIES
CONTROL ELECTRONICS

THE HARRIS 9003. The Harris 9003 has revolutionized the role of program control in radio broadcasting by integrating the program system into the planning process—extending the benefits of program control beyond the operations level to everyone concerned with the on-air product.

The Traffic Director can enter on the CRT display a new commercial order. He selects an account number, enters time, anticipated running time and the desired description, which will also appear on the display (and optionally on the log). The Traffic Director may also specify one of several live copy tags to be associated with the announcement, and that tag will also appear on the control room terminal. All further references can then be made using the account number.

With the plain-text title display feature, the music director no longer has to wonder if the system will air the recurrent record he wants following a commercial break. With Harris 9003 in charge of a random access music library, it is now possible to specify the names of the music selections. Instead of a "Play 05-27" indication, an operator will see that the scheduled selection is "Sara by Fleetwood Mac", along with other information, on the same line, such as intro/running time and chart position.

As more stations seek to better localize their syndicated programming, there is a need for periods of live programming; this may be for drive time or news blocks. In any case, the Harris 9003 is ideal for the live operator. The display shows the name of a song or commercial that is on the air, plus the names and starting times of upcoming scheduled events.

The system software is contained on the disk. In the unlikely event of disk failure, the system defaults to programmed Read-Only Memory (EPROM) chips located on the single 8080 CPU board; it would then operate similarly to the Harris 9002.

Going beyond the traditional role of the program system, the Harris 9003 brings significant benefits to the broadcaster—cost reduction due to reduced workload at the planning stage; improved on-air performance from scheduling flexibility; reduction in lost revenue due to scheduling errors; and improved operator performance due to easier system operation.

Major System Capabilities

<table>
<thead>
<tr>
<th>Harris Card Size</th>
<th>Standard No.</th>
<th>Optional No.</th>
<th>Memory Size</th>
<th>Interfaces</th>
<th>Automation</th>
<th>Countdown Clock</th>
<th>Independent Editing/Program Terminals</th>
<th>Logging</th>
<th>Plain Text Programming</th>
<th>Plain Text Display</th>
<th>List Copy Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>9001</td>
<td>3*</td>
<td>15*</td>
<td>Optional</td>
<td>Programmable</td>
<td>Yes</td>
<td>Optional</td>
<td>Yes (Optional)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>9002</td>
<td>3-15*</td>
<td>15-31*</td>
<td>Yes</td>
<td>Programmable</td>
<td>Yes</td>
<td>Optional</td>
<td>Included</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>9003</td>
<td>31**</td>
<td>Not Applicable</td>
<td>Yes</td>
<td>Automatic</td>
<td>Yes</td>
<td>Included</td>
<td>Included</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Based on average of 50 events per hour
**Based on average of 110 events per hour.
FACILITIES CONTROL

HARRIS 9100 FACILITIES CONTROL
For TV Or Radio

- Building block concept allows a wide variety of applications, from complete automatic facilities control (including ATSI), to simple remote or local control
- Reduces operating expenses
- Improves transmission quality
- Improves transmission system reliability
- Offers automatic security measures to protect your capital investment
- Allows automatic control of building environment
- Handles time-related functions automatically, tower lights on/off, etc.

The Harris 9100 is a facilities control system designed to improve your performance, protect your investment and cut your operating costs. The Harris 9100 in its various configurations can provide intelligent remote control, automatic transmitter control, automatic logging, plant protection through intrusion and fire alarms, automatic control of such items as tower lights and building temperature, and automatic exercising of standby equipment.

In short, the Harris 9100 Facilities Control provides surveillance over your transmission system and your physical plant, and offers protection from costly failures wherever they may occur.

The system is composed of a family of microcomputer controlled "building blocks" which determine the configuration, based on a specific application. Whether your need is to monitor and control a single co-located site or to operate up to three remote sites from a single location, the Harris 9100 Facilities Control has the flexibility to meet your requirements. No matter what the size of your operation—whether you're AM, FM or TV—you will find many beneficial applications for the Harris 9100 Facilities Control to help improve your profitability.

WHAT HARRIS 9100 CAN DO FOR YOU
There are three major areas where Harris 9100 Facilities Control can provide significant savings and/or improvements in a station’s operation—1) manpower allocation, 2) protection, and 3) equipment performance. Let’s take a closer look at each of these for specific examples.

Improved Manpower Allocation. The FCC requires monitoring and adjusting the broadcast transmission to assure compliance with technical standards. In addition, it is imperative that optimum use be made of the equipment while simultaneously protecting it from catastrophic failure. These requirements have been complicated by the increasing use of remote transmitter sites which, while ideal for transmission, are not conducive to manned operation.

The trend in both radio and television has been toward delegation of the transmission system to operations personnel. Remote control equipment has been used increasingly as the only acceptable alternative to a full-time staff at the remote site. This has been a cost-effective approach for management, consistent with the increased stability and reliability of transmitting equipment. However, this approach does not provide the continuous monitoring which can spot trouble about to happen, which can provide trend analysis through careful parameter logging and which can allow operation at peak performance without rule violation.

The first responsibility of operations personnel is usually to the program chain. Even in those stations with a full-time transmitter engineering staff, monitoring the transmitter system may give way to higher priorities of equipment maintenance and repair.

The Harris 9100 Facilities Control meets all existing and currently proposed FCC regulations governing the monitoring, adjustment and remote control of radio and television transmitters. It can offer very valuable assistance to your operators for flawless transmission monitoring, adjustment and logging—freeing them for more effective work elsewhere.

Operation, Equipment and Plant Protection. The broadcaster is faced with potentially costly mishaps on a daily basis. One such area is violation of FCC rules and the resulting fines, particularly since Congress has dramatically raised the amount of maximum fines. This potential for higher fines has also increased as more stations operate their equipment at the legal maximum power and modulation levels, and operate with lower skilled, often untrained operators.

The transmission system also must meet its own rules in terms of what constitutes safe operation. Careful monitoring together with the proper action and associated alarms, as provided by the Harris 9100 Facilities Control, can help prevent operation outside the legal limits, or costly equipment failures with resulting lost air time. Additional protection can be provided for the entire physical plant with monitoring and alarms for intrusion or fire which may lead to reduced insurance premiums for these sites.

Improved Performance. Maximizing equipment life and minimizing FCC violations are not the only advantages of Harris 9100 Facilities Control. In an increasing number of markets, large and small, operating equipment at the maximum levels is a key to the successful competition for higher ratings and increased revenues. Even the most stable transmission system needs the attention of the Harris 9100 to operate at peak performance over extended periods of time with minimum equipment problems, and without FCC rule violations.

Another area for improved performance with the Harris 9100 is in trend analysis. Long-range tracking of very accurate readings helps locate problem areas in the transmission system and pinpoint areas for improvement.
How Harris 9100 Facilities Control Is Used

Remote Control. The Harris 9100 Facilities Control opens a new dimension in remote control, providing intelligent surveillance and decision-making. Channels are automatically scanned and compared with pre-programmed limits; and alarms are initiated or corrective action taken, as appropriate. Power can be computed using the indirect method of power determination and the Harris 9100 can serve either as an efficiency monitor or as the primary means of power control. Automatic logging of all parameters can be performed on a regular basis, eliminating periodic interruptions of station personnel. Also, the logger fully records out-of-limits conditions when they occur.

Time-initiated switching may be employed for power levels, changing control limits, checking tower lights, and other time-oriented functions.

Automated Transmission System (ATS). The Harris 9160 and 9161 Automatic Control Unit (ACU) provides for ATS operation with its power and modulation control, yielding additional benefits to management. Relaxed operator restrictions will give greater flexibility in the selection of staff and duties; the FCC requirement for a person to be present for monitoring can now easily be met by utilizing a receptionist, switchboard operator or guard. Under existing and currently proposed ATS rules, there will be a reduction in requirements for routine inspections, meter readings and logging requirements. And there will be much less anxiety concerning the reliability of switching power modes in AM stations, very often a problem where “combo” operators are employed.

To sum it up, the Harris 9100, operating under ATS rules, will provide cost savings considerably beyond those provided by remote control, through more efficient use of manpower.

Facilities Control. The Harris 9100 Facilities Control is a true systems approach to the transmission system and related physical plant. Up to three remote sites can be controlled from a single common control unit at the studio. In addition to control of the transmission system, related functions can be surveyed and controlled. Heating, air conditioning and ventilation equipment can be monitored. Backup equipment can be exercised and performance logged, all on an automatic basis. And temperature sensors and intrusion alarms can be constantly on guard for plant protection. By combining the monitoring and control of all functions, the Harris 9100 Facilities Control will profitably produce greater consistency, precision and reliability of operation than is obtainable with existing manually operated equipment. In addition, the Harris 9100 will allow maximum operation of the transmission system to provide the most competitive broadcast signal in your market.

The Harris 9100 Facilities Control design is based on over half-a-century of experience by Harris in the broadcast equipment field—and the quality is backed by the most experienced service organization in the industry.

Harris 9100 Facilities Control Components

FACILITIES CONTROL

Automatic Control Unit (9160). Location: transmitter or studio site. Function: provides automatic facility control—i.e., intelligent remote or automatic control of transmitter (ATS), building environment, security measures, etc.

CRT Terminal Models

Studio Unit (9120). Location: studio facility. Function: communicates with the Transmitter Unit (9130) or the Automatic Control Unit (9160) to provide monitoring and control of the transmitter facility.

Transmitter Unit (9130). Location: transmitter site. Function: provides remote control of the transmission facility when used with a Studio Unit (9120) or an Automatic Control Unit (9160). Allows remote control from a studio facility or from another transmitter facility. Alternate function: provides local control of the transmission facility.

Automatic Control Unit (9161). Location: transmitter or studio site. Function: provides automatic facility control—i.e., intelligent remote or automatic control of transmitter (ATS), building environment, security measures, etc.

Prices and Specifications Subject to Change Without Notice.
FACILITIES CONTROL

Options

Monitor and Alarm Panel. Used in conjunction with the Automatic Control Unit (9160), provides minimal monitoring and control in compliance with FCC ATS rules for monitor and alarm points.

Channel Expansion Panel. Offers additional channels for the Transmitter Unit (9130) and Automatic Control Units (9160 and 9161). Each panel adds 8 telemetry, 16 status and 16 command functions. Up to 7 Channel Expansion Panels may be added to each 9130, 9160 and 9161 unit.

Multi-Site Module (not shown). Allows a Studio, Transmitter or Automatic Control Unit to communicate with up to three remote sites.

9100 FACILITIES CONTROL INFORMATION

<table>
<thead>
<tr>
<th>9120</th>
<th>9130</th>
<th>9160</th>
<th>9121</th>
<th>9161</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keyboard or CRT Terminal I/O</td>
<td>KBD</td>
<td>KBD</td>
<td>KBD</td>
<td>CRT</td>
</tr>
<tr>
<td>Communicates with remote sites, display and control identical to unit at remote site</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td>User-assignable time functions</td>
<td>—</td>
<td>5</td>
<td>64</td>
<td>—</td>
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<tr>
<td>Limits monitoring and executive action, number of analog channels</td>
<td>—</td>
<td>5</td>
<td>all</td>
<td>—</td>
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<tr>
<td>Status monitoring and alarm</td>
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<td>all</td>
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<td>—</td>
</tr>
<tr>
<td>Status monitoring/alarm and executive action channels</td>
<td>—</td>
<td>—</td>
<td>all</td>
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<tr>
<td>15-step series functions</td>
<td>—</td>
<td>4</td>
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<td>5-step mini-series functions</td>
<td>—</td>
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<td>—</td>
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<tr>
<td>Modulation level control</td>
<td>—</td>
<td>3</td>
<td>3</td>
<td>6</td>
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<tr>
<td>Separate data bases</td>
<td>—</td>
<td>4</td>
<td>—</td>
<td>6</td>
</tr>
<tr>
<td>Separate partitions</td>
<td>—</td>
<td>—</td>
<td>XX</td>
<td>—</td>
</tr>
<tr>
<td>Logging capability</td>
<td>opt.</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td>Real-time clock—hrs/min/sec</td>
<td>1 day</td>
<td>1 day</td>
<td>1 day</td>
<td>7 day</td>
</tr>
<tr>
<td>CRT entry of scaling factors</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Momentary or latching relay action at mode entry</td>
<td>—</td>
<td>XX</td>
<td>XX</td>
<td>—</td>
</tr>
<tr>
<td>Assignable momentary or latching relay action via CRT terminal</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Maximum status input display per display group</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>128</td>
</tr>
<tr>
<td>User-defined CRT displays, messages, logs and log headings</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>DCA type channel squaring</td>
<td>—</td>
<td>XX</td>
<td>XX</td>
<td>—</td>
</tr>
<tr>
<td>Calculation channels</td>
<td>—</td>
<td>—</td>
<td>3</td>
<td>—</td>
</tr>
<tr>
<td>Can interface with MONITOR and ALARM PANEL (used for ATS only)</td>
<td>no</td>
<td>no</td>
<td>opt.</td>
<td>no</td>
</tr>
<tr>
<td>Multi-site module</td>
<td>opt.</td>
<td>opt.</td>
<td>opt.</td>
<td>opt.</td>
</tr>
<tr>
<td>Log printer (opt.) minimum CPS</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>150</td>
</tr>
<tr>
<td>CHANNEL EXPANSION PANELS units included + maximum (opt.) add-on</td>
<td>—</td>
<td>1+7</td>
<td>1+7</td>
<td>—</td>
</tr>
<tr>
<td>Analog input channels per CHANNEL EXPANSION PANEL (CEP)</td>
<td>—</td>
<td>8</td>
<td>8</td>
<td>—</td>
</tr>
<tr>
<td>Number of control relays with 5A-120VAC contacts per CEP</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Number of (opto-isolated) status input channels per CEP</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Automatic system restoration after power failure and return</td>
<td>—</td>
<td>—</td>
<td>XX</td>
<td>—</td>
</tr>
<tr>
<td>Auto link switching capability</td>
<td>—</td>
<td>XX</td>
<td>XX</td>
<td>—</td>
</tr>
<tr>
<td>Battery backup for user program</td>
<td>opt.</td>
<td>opt.</td>
<td>opt.</td>
<td>opt.</td>
</tr>
</tbody>
</table>

TYPICAL 9100 FACILITIES CONTROL SYSTEMS

For ATS OPERATION

A. 9160 Automatic Control Unit + (N) Channel Expansion Panels
9100 Battery Backup for 9160
9100 Monitor and Alarm Panel

B. 9161 Automatic Control Unit/CRT + (N) Channel Expansion Panels
9121 Studio Control Unit/CRT I/O Terminal
9100 Battery Backup for 9161 and 9121 (2)

For INTELLIGENT REMOTE CONTROL

A. 9130 Transmitter Control Unit + (N) Channel Expansion Panels
9120 Studio Control Unit (Keyboard I/O)
9100 Logging Electronics Package

Ordering Information

9161 Automatic Control Unit ........................................... 994-8494-001
9121 Studio Control Unit ............................................. 994-8493-001
9160 Automatic Control Unit ........................................... 994-8222-001
9120 Studio Control Unit ............................................. 994-8233-001
9130 Remote Control Unit ........................................... 994-8234-001

Channel Expansion panel for 9130, 9160 and 9161 Control Units ........................................... 994-8240-001
9100 Monitor and Alarm Panel for 9160 Automatic Control Unit ........................................... 994-8244-001
Exel Log Printer (9120, 9130, 9160) ........................................... 749-0051-000
Texas Instruments TI-820 Log Printer ........................................... 749-0072-000
9100 Multi-Site Module ........................................... 994-8241-001

Prices and Specifications Subject to Change Without Notice.

53
9100 Facilities Controller

Disk Memory Option

- Reduces operational display time
- Changeable diskettes provide non-volatile memory for user flexibility and file security
- Dual disk drives increase system reliability and provide user with file copy capability

The addition of the Floppy Disk Drive Memory Option provides some unique system enhancements. Greater software security results from having a non-volatile memory in the form of diskettes which can be reproduced for storage. The time required to receive operational displays is significant for large information displays.

TIMELY CONTROL AND MONITORING

The Harris 9100 CRT based Facilities Control System engages in a continual data exchange between sites to provide up-to-the-minute monitoring and control. This surveillance may include control of the transmitter facility, building environment, security measurers, etc.

The 9100 Disk Memory Option is available to enhance the standard CRT based facilities controller with large-scale non-volatile memory. This protects all user entered programming, including multiple site information. In addition, the operation speed of the 9100 System is improved via accelerated display time of user entered programming.

The 9100 Disk memory operates as an option to all Harris CRT based Facilities Control systems.

Specifications

DUAL FLOPPY DISK DRIVE SYSTEM

Height: 10 inches (25.4 cm)
Width: 19 inches (48.5 cm) rack mount
Depth: 13.5 inches (34.3 cm)
Weight: 18.5 lbs. (8 kg)
Spindle Speed: 300 RPM (±3%)
Sectoring, GCR Encoding: 5¼ inch soft sectored
Density (inner track): 6,380 bits/inch

ENVIRONMENTAL

- Temperature Range: 32°F to 131°F—0°C to 55°C (operating)
- Relative Humidity: 5% to 95% non-condensing (operating)
- Altitude: To 10,000 feet (3048 meters)

* Typically located in a controlled studio environment, which is dust and contaminant free.

Ordering Information

9100 Disk Memory Option ........................................... 994-8675-001

Prices and Specifications Subject to Change Without Notice.
ANTENNA CONTROL SYSTEM

9135 ANTENNA CONTROL SYSTEM

- Pre-stored antenna positions
- Position/Receiver changes on a time-corrected basis
- Full-computer control of antenna position
- Control of up to 16 output relays (Manual or time)
- Monitoring of 8 analog channels and 16 status inputs

The 9135 computer-based antenna control system gives the Harris receive-only satellite earth station operator complete control through pre-programmed time corrections or manual operation. A CRT terminal provides monitoring capability of the antenna. The CRT displays the current antenna position (azimuth, elevation and polarization), the transponder and format for each of the four receivers in use, plus additional status fields. As many as 50 user-programmed antenna positions may be defined in the computer for immediate reference. A 365-day program-ahead feature allows memory storage of changes in antenna position or receiver channels.

Status Checks
The CRT will display the values of eight analog channels, and the decimal position may be individually set for each channel. The system will also monitor 16 status inputs, and display the status of each on the CRT. If desired, each input can be programmed for alarms. One of these inputs can be programmed to cause a site-specific message to appear on the CRT screen. The next time correction is displayed at the bottom of the CRT display. An optional color CRT will highlight alarms and other important messages in red. Other values and messages will be shown in appropriate colors.

Manual Control
The CRT can be used to manually control any aspect of the antenna, or changes can be programmed to make time-based antenna adjustments. Up to four receivers can be controlled by the computer. Both the antenna position and the transponder setting of any receiver can be changed automatically by the computer. Changes to receivers and antenna position can be made independently.

ANTENNA CONTROL SYSTEM SPECIFICATIONS

OPERATING ENVIRONMENT

- RELATIVE HUMIDITY: 5% to 95% non-conducting
- ALTITUDE: 0 to 10,000 feet
- TEMPERATURE: 0 to 50 degrees C
- SIZE: 19" wide x 18.5" deep x 12.12" high
- WEIGHT: 36 lbs.

REAL TIME CLOCK

- Day: Seconds, minutes, hours
- Calendar: Days, months, years
- Accuracy: ± 10 seconds per month

ELECTRICAL SPECIFICATIONS

- STANDARD: Three RS232C, async, 300 to 19.2K baud
- DISPLAY: 12" video monitor
- KEYBOARD: Standard ASCII, with keypad
- POWER: 115/230 volts AC, 50/60 Hz, ± 10%, 260W max.
- ANALOG INPUT: 8
- INPUT RANGE: ±2.000V
- COMMON MODE: ± Signal ±4V
- ACCURACY: ±10 mV over input range
- DIFFERENTIAL INPUT CONNECTOR: 37 Pin D
- STATUS GENERAL PURPOSE: 16, optional signal fan-out barrier strip
- SYSTEM CONTROL: Direct drive 30V hold-off sync mA
- CONNECTOR: 37 Pin D
- SYSTEM STATUS: Direct TTL inputs with pull up resistors to +5V, or opto isolation couplers

ANTENNA CONTROL I/O

- Accommodates Harris 91350U Outside Electronics Box located on antenna pad. Includes command outputs, position and status inputs for AZIMUTH, ELEVATION, and POLARIZATION control of antenna. Requires one each 25 conductor cable, two each 3 conductor shielded, and one each 5 conductor shielded. Connectors are one each 25 PIN female, and one each 15 PIN male.

RECEIVER INTERFACE: TTL compatible current sink control

- CAPACITY: Up to 4 receivers (Harris 6521 or 6522). Two receiver interfaces included as standard. Eight signals; 6 BCD frequency select; 1 polarity select; 1 frequency spacing select

RATING: TTL levels

CONNECTOR: 20 pin ribbon cable at board end, 9 pin D male connector when appropriate interface cable is used.

ORDERING INFORMATION

Harris 9135 computer-based antenna control system
(with 12-inch green-on-black CRT control terminal) 994-8833-001
Optional 12-inch color CRT control terminal 749-0178-000

Prices and Specifications Subject to Change Without Notice.
9100 HIGH SPEED
COMMUNICATIONS OPTION

- 400% improvement in communications speed for the Harris 9100 Facility Controllers
- Easy to install
- Reliable transmission of control information
- Choice of conditioned or unconditioned telephone lines, 2- or 4-wire circuits
- RS-232C Industry standard communication interface

With the installation of the High Speed Communications Option, your Harris 9100 Facility Control Units can communicate four times faster between the studio and remote sites. This 9100 option replaces the clock modem, which runs at 30 characters per second (300 BAUD), with a new clock board and RS-232 board which connects to industry standard modems.

MODEMS: The appropriate 9100 High Speed Communications Option should be ordered for each end of the communications link. The option contains a clock board and a board with three RS-232 ports and appropriate cables. These cables connect an RS-232 port from the 9100 at the remote site to a 202T or 212A (or equivalent) modem. The modem at the remote site is connected via telephone line to a similar modem at the studio control site. This is connected to one of the ports on the High Speed Option in the 9100 studio control system.

Telephone lines may be C2 conditioned or unconditioned, depending on the transmission rate desired. Over unconditioned lines, a transmission rate of 300, 600 or 1200 BAUD (approximately 120 cps) can be supported. C2 conditioned lines can support transmission rates of 300, 600, 1200 or 1800 BAUD (180 cps). The 202T modem requires a 4-wire circuit. The 212A modem requires a 2-wire circuit.

With these connections, information on monitored alarms and inputs is communicated almost instantaneously to the studio control site for display. Commands are returned with equal speed and accuracy.

The High Speed Communications Option can be ordered with the 9100 Facility Control, or may be added at any time in the future when system configuration requirements change.

SPECIFICATIONS
(212A MODEM)

HIGH SPEED MODE: 1200 bps + 1.0% to 2.5%, character-asynchronous format; 1200 bps, synchronous format.

ORDERING INFORMATION
In order to utilize the new Harris 9100 High-Speed Communications option you will need:
One High-Speed Package located at the studio.
Order No. 994-8828-02—Studio Package includes (1) RS-232 board; (1) clock/interface board; (3) RS-232 Cables; (1) ribbon cable.
One High-Speed Package of each remote site.
Order No. 994-8828-001—Remote Site Package includes (1) RS-232 board; (1) clock/interface board; (1) RS-232 cable; (1) ribbon cable
Two 202T modems for each remote site.
Order No. 746-0057-000—202T modem (order two) or
Two 212A modems for each remote site.
Order No. 746-0043-000—212A modem (order two)

Prices and Specifications Subject to Change Without Notice.
ENG/EJ/EFP (Portable) System Equipment

An FV13MP miniature-portable, frequency-agile video and sound transmission system replacing existing cable or bulky equipment.

**FV-MP “Mini-Link” Series:** Lightweight, compact, fully self-contained one-way microwave-radio system that offers both terminal and repeater-station service. Capacity is a single color-video channel (either 525-Line NTSC or 625-Line PAL, PAL-M or SECAM) and one or two full-quality program-audio subcarrier channels. AC, -24 VDC or portable-battery powered; with a multi-purpose charger.

May be tripod or, optionally, rack mounted. Accessories include antennas, transport cases, narrow-band pre-select filters, power cables, diplexers, etc.

Available for following RF bands (GHz) up to 12 channels in the selected band:

- **FV2MP** 1.700-1.915 and 1.990-2.110
- **FV2.5MP** 2.300-2.650
- **FV6MP** 6.425-6.525
- **FV7MP** 6.875-7.125
- **FV8MP** 7.125-8.500
- **FV11MP** 10.550-11.700
- **FV12MP** 11.700-12.200 and 12.200-12.700
- **FV13MP** 12.700-13.250

Transmitter RF Power Output:

- **FV2/2.5MP** 1 watt, min (+30 dBm)
- **FV6/7MP** 1 watt (+30 dBm)
- **FV8MP** 0.8 watt (+29 dBm)
- **FV11/12/13MP** 63 mW (+18 dBm)

Receiver Noise Figure:

- **FV2/2.5MP** 6.0 dB (w/o pre-select filter)
- **FV7/8MP** 6.0 dB
- **FV11/12/13MP** 10.5 dB (with pre-select filter) 8.5 dB (w/o pre-select filter)

**FCC type accepted for Parts 21, 74, 76 and 94.**

**Reference**

Form 7604 (FV2/2.5MP)
Form 7610 (FV7 thru 13MP)

**Type 60732:** Transmitting RF Power Amplifier for 1.990 to 2.110 GHz. Provides 12 watts of RF output power with an input drive range of 0.1 to 2.0 watts. The unit is designed for installation directly at the transmitter antenna. The amplifier is contained in a weather-resistant, pressurizable housing. Coordinates with the transmitter of the FV2MP Miniature Portable Microwave-Radio system.

RF Input/Output connectors are Type N (female).

Operates from an external source of -24 VDC.

**Reference**

Form 7905 (Type 60732 RF Power Amplifier)

**GLOBAL IX™ Transmitter shown with Optional Parabolic Quick-Disconnect Antenna.**

**FV2/2.5G “Global IX™”:** Portable Microwave-Radio Transmitter for the frequency band 1.990 to 2.700 GHz (uses up to 16 separate frequency plans, with each plan having up to 60 RF channels). The transmitter is lightweight, compact, self-sufficient, weather resistant, and adaptable to both indoor and outdoor use. RF power output is +34.5 dBm (2.8 W) typical and +33.5 dBm (2.2 W) minimum.

Applications include ENG/EJ/EFP services and other services requiring a mobile ground or airborne link. Capacity is one 525- or 625-Line color-video signal and two high-quality program audio subcarriers. Baseband interface with camera and audio-initiating equipment is standard. Accessories include a selection of antennas, tripod, battery pack, etc.

Programmable FM-subcarrier line frequencies. AC or Battery powered. Transmitter Frequency Stability ±0.005%. Standard Video or 70 MHz IF input; can be used in repeater applications. Remote or Local Control — Local or remote monitor and control features available. In addition to remote monitoring of transmitter status, the following functions can be controlled: On/Standby and Frequency Selection. Construction — Mechanically constructed for operation in extreme environmental conditions and helicopter applications. Multi-level shielding is provided for RFI environments.

Input operating voltage to the transmitter can be either +10.5 to +16 VDC (car battery or camera-belt power pack) or 115/230 VAC, 50/60 Hz (selectable by a switch in the power supply.)

**FCC type accepted for Part 74.**

**Reference**

Form 8175 (FV2/2.5G Transmitter)

Prices and Specifications Subject to Change Without Notice.
BROADCAST MICROWAVE

**FV-MF Series**: Miniaturized baseband, self-contained microwave transmitter terminals that require only three vertical spaces on a 19” equipment rack. RF Power Output is typically 1 watt (+30 dBm). May be optionally configured for up to two FM audio/program subcarrier channels. The 2/2.5 GHz transmitter may be factory-arranged for 525-Line NTSC or 625-Line PAL, PAL-M or SECAM service. The 8 GHz version is limited, on a standard basis, to NTSC-type operation.

Applications include ENG/EJ/EFP service in mobile vans, aircraft or helicopters, fixed-plant utilization for surveillance and security systems, and repeater-station functions. Readily adaptable to Government and specialized military observation and training functions.

For operation from a power source of:

- **FV2/2.5MF**: +28, -24, -48 VDC or 117/220 VAC, 50/60 Hz.
- **FV8MF**: -22 to -28 VDC or 117/220 VAC, 50/60 Hz.

**Type 60828**: Transmitting RF power Amplifier for the 2 and 2.5 GHz bands. A built-in AGC circuit assures a constant output power level with input drive variations. Typically, 12 or 15 watts RF output power depending on frequency band. Drive level requirement as low as 0.1 watt.

For frequency bands 1.990-2.110 GHz or 2.301-2.690 GHz.

Requires two vertical mounting spaces on a 19” equipment rack. RF input/Output connectors are Type N (Jack).

Operates from a source of 115/230 VAC, 50/60 Hz, or from positive or negative 21 to 30 VDC.

Coordinates with the FV2/2.5 Miniature Fixed Transmitter and the Transmitters of the FV2MP and FV2.5MP Miniature Portable systems.

**Reference**

Form 8181 (Type 60828 Power Amplifier)

**FV8FA**: Miniature Fixed, Frequency-Agile Baseband Microwave Receiver for low-noise receiving applications. Coordinates with the FV8MF Transmitter. Instantaneously phase locks to any manually-selected frequency (0.1 MHz steps) in the receiver’s RF band of operation.

For operation in the microwave bands: 7.125-7.800 or 7.800-8.500 GHz.

Capacity is one NTSC color video signal and up to two optional program-audio subcarriers.

Requires only three vertical mounting spaces in a 19” equipment rack. Operates from a power source of either 115/230 VAC, 50/60 Hz or from positive or negative 22 to 29 VDC. Noise figure is a 9 dB, maximum.

**Reference**

Form 8076 (FV8FA Receiver)

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Prices and Specifications Subject to Change Without Notice.
BROADCAST MICROWAVE

Fixed Wideband Microwave-Radio Transmission Systems

FV-CR Series: Microwave-radio Central Receivers for Electronic News Gathering (ENG) applications. Miniaturized, frequency-agile, low-noise, narrow-band, and designed specifically for video and program-audio pick up from "at-the-scene" news crews. Coordinates with FV-MP, FV-MF and FV-G portable ENG transmitter equipment within the total "five news collection network.

Frequency Bands:
FV2CR 1.990-2.110 GHz (for 525-Line NTSC service)
FV2.5C 2.300-2.690 GHz (for either 525-Line NTSC or 625-Line PAL, PAL-M or SECAM service)
FV7CR 6.425-6.525 and 6.875-7.125 GHz (for either 525-Line NTSC or 625-Line PAL, PAL-M or SECAM service)
FV8CR 7.125-7.425 GHz (for either 525-Line NTSC or 625-Line PAL, PAL-M or SECAM service)

Operates from 115/220 VAC, 50/60 Hz, or from -24 or +28 VDC. Capacity is one color video signal and up to two FM program-audio subcarrier channels.

21 Synthesized RF Channels for FV2CR (up to 60 channels in the other bands), Instantaneous Phase Lock — locally or remotely selected. Noise Figure 3 dB at 2 GHz, 4 dB at 2.5 GHz and only 6 dB at 7 or 8 GHz. Narrow-band IF SAW Filter — for "state-of-the-art" split-channel operation. 78 to 81 dB (depending on band) Dynamic Input Signal Level

Range — crews operate from maximum range to within the shadow of the receiver's antenna. Auxiliary IF Output — for heterodyne interconnection where desired. RFI Shielding — for operation in an interfering environment. Fully Alarmed — with dry contacts for remote indication.

Reference
Form 7703 (FV2CR Central Receiver)
Form 8006 (FV2.5CR Central Receiver)
Form 8007 (FV7CR and FV8CR Central Receivers)

Low-Noise Receiving Preamplifier

Type 60576: Low-Noise Receiving Preamplifier — General-purpose device used with 2/2.5 GHz receiving antenna systems requiring long transmission lines. Suitable for numerous ENG/EJ/EFP applications. Is "out-of-band" protected by a combline input filter. Amplifier is isolator coupled.

Equipped for remotely-controlled amplifier bypassing when a strong input signal is present or should an amplifier failure occur. Mounted in a weather-resistant box; RF Input/Output connectors are Type N (Jack).

Amplifier operates from an external source of -21 VDC, regulated. The optional bypass relay operation requires a source of -21 to -24 VDC or a ground indication.

Frequency Range Options Noise Figure Gain (GHz) (dB, max.) (dB, min.)
1.990-2.110 3.0 20
2.300-2.500 3.5 19
2.450-2.690 3.5 19

Reference
Form 7729 (Type 60576 Low-Noise Preamplifier)

Program Audio Subsystem

FV43-02: FM Transmission Channel System is a high-quality baseband subcarrier facility designed to allow up to five broadcast-quality program audio channels to be transmitted over a microwave-radio or video-cable system simultaneously with a composite NTSC or CCIR television signal. The FV43 equipment provides transmit-only and receive-only terminals for coordinated subcarrier transmission in the range 5.8 through 8.59 MHz. The equipment is Bell-System compatible and operates, end-to-end, with the FV43-01 Diplexer.

Operates from 115/220 VAC, 50/60 Hz, or from -24 or -48 VDC. Has no front-panel controls; requires no operating adjustments after initial performance check. Requires 2 (with up to 2 channels) or 4 (up to a total of 5 channels) vertical mounting spaces on a 19" equipment rack.

Interfaces with standard video and audio line levels and impedances. Normally arranged for 75-ohm video or diplexed video and subcarrier input and output impedances. Option-

ally, is available with user-selectable 75 and 124-ohm impedances.

Available Channel Subcarrier Frequencies (MHz):
Bell System Network: 5.8, 6.4
Std US FM Subcxrs: 6.2, 6.7, 7.5, 8.2
Std. Canadian wide-band FM Subcxrs: 5.6, 6.17, 6.8, 7.67, 8.3
Std. Canadian narrow-band FM Subcxrs: 5.35, 5.8, 6.17, 6.7, 7.7
CCIR FM Subcarriers: 7.12, 7.5, 8.065, 8.59
EIA-quality NTSC 525-line or CCIR 625-line television service over microwave-radio, video cable, CATV/CARS head-end, or satellite transmission media. 5 MHz passband for NTSC or 6 MHz passband for PAL, PAL-M or SECAM.

Optionally equipped for low-noise, low-distortion, flat response 15 kHz audio subcarrier channels in the 5.8 through 8.59 MHz range. Utilizing two specific frequency plans, here referred to as the Standard Canadian plans, frequencies in a wideband or narrow-band spectrum can be optionally equipped. Audio Pre-emphasis/De-emphasis — 75 µs for North American Standard or 5 µs for CCIR.

Reference
Form 7725 (FV43-02 FM Trans. Chan. System)

Prices and Specifications Subject to Change Without Notice.
Fixed Wideband Microwave-Radio Transmission Systems

Features

- Non-protected or Monitored Hot-Standby Protected service. May be configured for frequency diversity operation or space/hybrid diversity receiving.
- TV version for 525-Line NTSC or 625-Line PAL, PAL-M or SECAM color systems.
- Radio-System noise and continuity-pilot monitors.
- 70-MHz Modulation and Demodulation (IF) interface.
- May be equipped for engineering order wire and for radio and station-keeping alarm and supervisory facilities, or multiplexed voice and data VF channels on baseband subcarriers.
- Up to five FM or AM Subcarrier Channels.
- Optional video clamper/amplifier.
- FCC type accepted for Parts 21, 74, 78 and 94.

Reference

Form 7411 (FV-F Radio)  
Form 7430 (FV40 Vid. Transm. Equip)  
Form 7621 (FV44 Radar-Remote Equip)

FV-F series: One-way microwave terminals and heterodyne repeaters. Combined with FV40 Video Transmission Equipment for STL, Inter-city and Satellite Backhaul video/audio program transmission— and used with FV44 Video Transmission Equipment for Vessel Traffic Management System (VTMS) or Air Traffic Control (ATC) Radar-Remote services.

Available mounted on 19-inch Equipment Rack or Rack Cabinet, or on shipping bars for field installation on existing rack facilities. For operation from a power source of 117 or 220 Vac, 50/60 Hz, or from -24 or -48 Vdc.

For operation in any one of the following frequency bands (GHz):

<table>
<thead>
<tr>
<th>FV2F</th>
<th>1.390-2.110, 1.700-1.850, 1.850-1.990, 1.700-2.100, 1.900-2.300</th>
</tr>
</thead>
<tbody>
<tr>
<td>FV2.5F</td>
<td>2.300-2.500, 2.500-2.700</td>
</tr>
<tr>
<td>FV6/7F</td>
<td>5.925-6.425, 6.425-7.125, 6.875-7.125</td>
</tr>
<tr>
<td>FV8F</td>
<td>7.100-7.800</td>
</tr>
<tr>
<td>FV11/12/13F</td>
<td>10.7-11.7, 11.7-12.2, 12.2-12.7, 12.7-13.25</td>
</tr>
</tbody>
</table>

Features

- Standard video and audio equipment levels and impedances.
- Video clamper is standard.
- Non-protected and protected assemblies are available.
- 7-dB noise figure at 7 GHz and only 9 dB at 13 GHz.
- A number of 7 or 13-GHz systems can be placed on the same equipment rack, or cross-band configurations.
- All modules plug in. Radio is easy to maintain.
- Radio-System noise and continuity-pilot monitors.
- May be equipped for engineering order wire and for radio and station-keeping alarm and supervisory facilities.
- FCC type accepted for Parts 21, 74, 78 and 94.

FV-FB series: One-way Baseband microwave terminals and insert remodulating repeaters—for TV Broadcast STL and many economical multi-hop services. The FV13FB radio also offers superior performance as the CARS head-end system in the Cable Television Relay Service. May also be used with FV-F Heterodyne Repeaters for medium-haul inter-city service.

Available mounted on 19-inch Equipment Rack or Rack Cabinet, or on shipping bars for field installation on existing rack facilities. For operation from a power source of 117 or 220 Vac, 50/60 Hz, or from -24 or -48 Vdc.

Operating Frequency Bands:

<table>
<thead>
<tr>
<th>FV7FB</th>
<th>6.875-7.125 GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>FV13FB</td>
<td>12.700-13.250 GHz</td>
</tr>
</tbody>
</table>

Capacity: One 525-Line NTSC color TV channel plus a maximum of four FM audio (program) subcarriers.

Reference

Form 8375 (FV7FB)  
Form 8377 (FV13FB)
Satellite Microwave-Radio
Up-Link Equipment

TYPE 60950 Ku Band Video Exciter: Consists of two interrelated shelf assemblies; the 60945 Video Exciter Modulator and the 60945 Video Exciter Upconverter. The Modulator assembly accepts an NTSC composite color signal and up to three diplexed 15-kHz audio program channels. Two standard subcarrier line frequencies are used; 6.2 MHz (Chan. 1) and 6.8 MHz (Chan. 2). When required, Channel 3 line frequency is selected from a compatible plan. The resulting frequency-modulated video/audio signal is centered at 70 MHz and drives the Upconverter assembly. The triple-conversion upconverter RF output signal is channelized within the band 14 to 14.5 GHz. Nine hundred and ninety nine-channel selection is available by front-panel thumb-wheel manipulation or from remote location. Video/audio baseband inputs and RF output levels and impedances are designed to current industry standards for this form of equipment.

A spreading waveform generator is incorporated in the video path, ahead of the modulator, for producing a 1-MHz p-p spectral energy spreading, at a 30-Hz rate, of the FM modulator's unmodulated and modulated, combined carrier output signal. Total installation space for the Exciter is six vertical mounting spaces on a 19-inch equipment rack. (A four-space version is planned for early 1984.) The exciter operates from a source of 117/220 Vac, 50/60 Hz.

System Accessories

TYPE 60367: PORTABLE TEST UNIT, while suitable for numerous high-quality fixed and portable microwave-radio test application, is primarily intended as a temporary modem for drop and/or insert transmission service, or testing, at an IF repeater of a fixed, heterodyne microwave system. Composite video and program audio appear as separate line interfaces, at standard input and output levels and impedances. Radio interconnection is at the conventional 70-MHz IF point.


Video Service: 525-line or 625-line composite monochrome or color, with or without sound subcarrier, sync negative transmission mode, emphasis is standard CCIR/Bell System weighting.

Features

- Self-contained Deviation Test Unit for setting modulation deviation of the FM radio carrier.
- Plug-in circuit modules of the portable tester are interchangeable with those of the FV40 video transmission/modem equipment that usually is used with PV-series microwave—provides spares backup for emergencies.

Reference

Form 7801 (60367 Port. Test Unit)

TYPE 60888-series Portable Microwave-Radio Parabolic (reflector/feed) and Rod Type Antennas: For Harris Broadcast Microwave's family of portable radio systems.

Features

- 1.99 to 13.25-GHz range, with Reflector Diameters of 14, 25, 50, and 72 inches. Also 2 and 4-foot Rods and for the low-frequency bands.
- Quick Mounting and Disconnect fittings.
- Interchangeable Feeds: Circular polarization; some feeds can also be operated in a linear-polarization mode.
- Rugged Design, Reliable Operation in most outdoor Environments.

Reference

Form 8275 (Portable Microwave Antennas)

TYPE GTS-04C Ultra-lightweight, Low-cost Tracking Antenna System for ENG Central Receiving. Manufactured for Harris Broadcast Microwave by EMP, inc. (Electro-Magnetic Processes, Inc.). A single-axis tracking system using a multi-mode (dual-beam) antenna may be directed (steered) locally (manual) or on a programmed unattended basis, as a master, slave or stand-alone unit; uses the associated ACU-6 Series Microprocessor-Based Antenna Control Unit.

Reference

Please see your local Harris Sales Engineer.

Prices and Specifications Subject to Change Without Notice.
TC-90 ENG/EFP CAMERA

The Harris TC-90 brings out the best in your cameraperson...and your pictures. The just-right camera balance makes sure-footed shooting from even the most difficult angles a snap. And the super lightweight adds to the ease of handling and eliminates fatigue as a factor on long days in the field.

Better yet, the TC-90 provides excellent pictures, like a studio camera. It uses three LOC, mixed field 1/2" (13mm) diode gun Plumbicon® tubes, an extremely stable f/1.4 prism and exclusive FET preamps for outstanding picture performance. The TC-90 reproduces colors the way you actually see colors, and the pictures have a sharpness and clarity you rarely get from a portable camera. Even the reds are clearly defined. With most cameras, anything red tends to become a little fuzzy; with the TC-90, an exclusive contours-from-red* circuit maintains sharp detail on all red objects.

A terrific balancing act

The TC-90 could be smaller, but we deliberately designed it just a little longer than it had to be, making it slightly tail-heavy to counterbalance the weight of the lens. It also has a low center of gravity that makes the TC-90 practically cling to a cameraperson’s shoulder. Then there’s the weight, only 8.2 pounds without viewfinder, lens and battery.

It may be the most rugged camera there is.

Lightweight as it is, the TC-90 may be the toughest camera you can buy. Every part was selected or designed to take a beating. The case is built of a graphite composite that needs no maintenance and should never need repair.

FCC radiation certification

The TC-90 has passed the FCC radiation test with flying colors, and is suitably labelled to conform to Part 15 Subpart J FCC Rules and Regulations for Type A equipment.

Tubes — smaller is better.

The LOC (low output capacitance), mixed field 1/2" diode gun Plumbicon tubes used in the TC-90 provide registration performance so much better than 2/3" magnetic tubes that the additional complication of computer-controlled geometry correction is not required.

Pictures with “snap”.

From its exclusive f/1.4 prism to its sophisticated use of Large Scale Integrated (LSI) circuits, the TC-90 is designed to deliver outstanding picture clarity as well as perfect colorimetry, under all lighting conditions.

Auto white balance in 0.3 second.

When the auto white balance switch is activated, with the TC-90's test signal inserted, you will get a perfect white balance for 3200°K scene color temperature. Or, when the auto white switch is activated with scene content, a perfect white balance is achieved for that scene content in 0.3 second. This is stored in memory until reset.

Auto black balance assures perfect colorimetry.

When the TC-90’s black balance switch is momentarily activated, the lens iris closes automatically, the blacks are balanced in 0.3 second, and the lens opens to its previous iris setting. This ensures perfectly balanced individual black levels for red, green and blue channels, which are stored in memory until reset.

Comet tail suppression.

The TC-90 employs comet tail suppression circuits to minimize the effects of bright scene highlights.

The TC-90 delivers a S/N of at least — 60dB.

An outstanding S/N ratio of 60dB is achieved at light levels as low as 56 foot-candles at f/1.4.

Simultaneous contours from red and green.

Other cameras offer contouring on only one color at a time. The TC-90 provides contours out of green and red simultaneously to enhance image sharpness over a wide color spectrum.

Genlock with precise SC/H phasing.

With three LSIs in the RS-170A sync generator system, timing is quick, accurate and at the proper relationship between horizontal sync and color subcarrier. The TC-90 genlocks to either a composite color or black-burst signal.

Built-in color bar and stairstep test signals.

The TC-90 has built-in full field or split field color bars that meet or exceed all NTSC specifications.

High-fidelity microphone amplifier.

The TC-90 includes a built-in microphone preamplifier to supply line level audio to all VTRs.

Built-in RTS-compatible intercom amplifier.

The TC-90 camera head has a built-in RTS-compatible intercom amplifier.

Runs on very little power from a big array of sources.

You can power the TC-90 on DC voltage from +10.5 to +15 volts, from any of six sources: 1) two-ampere/hour on-board battery pack; 2) four-ampere/hour on-board battery pack; 3) VTR/VCR battery; 4) an AC-to-DC converter power pack which attaches like a battery pack; 5) a battery belt; 6) any automotive 12-volt DC power supply with negative ground.

You get more than a good view on the 1-1/2” diagonal CRT in the TC-90 viewfinder.

An oscilloscope-type display provides an actual video waveform, which, with a 100% exposure cursor, lets you make precise manual iris adjustments. You can turn it off when you don’t want it. Four LEDs in the viewfinder give you four different warnings: 1) the VTR/VCR is in record mode; 2) end-of-tape of VTR/VCR not connected to camera; 3) VTR/VCR battery low; 4) on-board camera battery low.

A filter for any type of shot.

The TC-90 has a built-in 5-position filter wheel to allow the camera operator great flexibility for color temperature compensation and scene illumination correction.

With the “Smart Package“™ option, the TC-90 may just be the smartest ENG/EFP camera available anywhere.

Add the exclusive Smart Package™ option to the TC-90, and you get microprocessor time code generation that lets you record SMPTE and VITC time codes as you shoot. The Smart Package also adds diagnostics, auto centering and encoder balance. No diascop lenses or special test charts are needed for the automatic adjustment of these parameters, only normal scene content is required.
C SERIES COLOR STUDIO TELEVISION CAMERAS

The Harris C Series offers a wide range of choices to give you the exact camera configuration that best fits your production needs. Now you can have a camera that is essentially custom designed for your operation. You make the choices...and you get exactly what you want.

The basic C Series model is a manual setup camera with automatics. The C Series also offers a full computer-controlled automatic setup version that features a separate computer in each camera for simultaneous setup and greater flexibility. The basic model may be upgraded in the field to full computer setup capability as your requirements change.

The C Series operates with TV-81 multicore cable, Triax cable or TV-81 mini multicore cable. This gives you the flexibility of utilizing camera cable that may already be in place in your facility or at remote sites. All types of pickup tubes designed for the 25mm format can be accommodated. These include standard Plumbicons®, Diode Gun Plumbicons, ACT Plumbicons and Saticons. Choose the tube that best fits your operating environment. From your local news-cast to a remote sports event, the C Series offers a lens to "bring it home". 10:1 to more than 42:1 zoom ranges are available from all major lens manufacturers.

- Color fidelity and picture integrity of the Harris C Series cameras are unsurpassed. High resolution with low lag, high sensitivity, low noise, unique contouring from red and green simultaneously, highlight handling that virtually eliminates comet-tailing, and variable contrast give you color as you really see it, and clean sharp video even under the most severe lighting conditions.

- Harris C Series cameras are designed for easy operation from the control panel on through to the camera head.

- The Harris C Series cameras are reliable, rugged and ready to operate over long periods of time with minimal engineering attention.

- In the C Series computer setup model, 48 operator functions are controlled by the computer and adjusted according to preset parameters. Each camera has a built-in independent computer to eliminate camera interdependence in multi-camera installations.

**TC-80C** Manual Studio Camera without Tubes and Lens

**TC-85C** Computer Studio Camera without Tubes and Lens

Prices and Specifications Subject to Change Without Notice.
IRIS II DIGITAL STILL STORE SYSTEM

SYSTEM LEVEL 1
One user station with 260 stills available.
Digital noise reduction included.
You can store stills from video tape recorders, video cameras, character generators, network feeds, and reflective art, virtually any video input, from a free-standing keyboard. The space-saving 80 Mbyte removable disk drive (RSD) will store up to 260 images on a small, removable disk pack. This allows you to remove the disk pack for security, or use it at another location. You, or a computer, can access images as quickly as they are stored. The System Controller (SCU) coordinates the system via an Intel Multibus™-based 28000 microcomputer. The Floppy Disk Drive allows easily updated software control, while the Disk Controller (DCU) gives you the freedom to add up to 8 disk drives as your image storage requirements increase.

SYSTEM LEVEL 2
Two user stations with 780 stills available, plus digital keying, picture compression/positioning, digital noise reduction and remote keypad. IRIS II, in this configuration, allows two keys to store stills and build/retrieve lists simultaneously. A Remote Keypad has also been added which can be slaved to the master keyboard, or used independently for limited space applications. This level 2 system is completed with the addition of: 1) a 160 Mbyte fixed disk drive (FSD) to give you 520 more stills. 2) Another 632 Frame Synchronizer to provide preview and line capability, plus montage effects.

SYSTEM LEVEL 3
Four user stations with 1776 stills available. Also equipped with production graphics/effects, high resolution titling, digital keying, DNRs, picture compression/positioning, and a remote keypad.
This level system has Harris’ new four-frame synchronizer, the 650, and the Iris Composition Station (ICS) for exciting production graphics. ICS gives you:
- Variable compression and 2X expansion
- Joystick positioning and cropping
- Variable aspect ratio
- Infinite border and background color
- Soft border capability
- H & V inversion
- Cut and paste
- Digital keyer with 17ns resolution
- Removable memory modules
- Frame-to-field interpolation

Digifont, a 35ns resolution character generator, has also been added. With Digifont, you can preformat any titling sequence, and then key the titles over Iris II stills. Digifont, in combination with Digikey, lets you retile background slides hundreds of times with no perceptible degradation.

SYSTEM LEVEL 4
Six user stations and 3 remote keypads, with over 17,000 stills. A full complement of production graphics/effects, high resolution titling, digital keying, DNRs, picture compression/positioning, and a library management system.
Here it is. The ultimate Iris. The Library Management System we’ve added has the most powerful routines of any in existence. Over 80,000 stills can be cataloged, either on or off-line. Retrieval is simple, because you can catalog stills under five categories, and search each category with an unlimited number of keywords. Library entry information is stored on a Winchester-type drive which can be instantly accessed via any of the six user stations.
Who now offers exciting effects for graphics production on your IRIS Still Store?
Harris' IRIS Composition System — ICS — is the newest component in the IRIS family of still store systems. The ICS gives you a wide range of effects.

- Compression
- Expansion
- Variable aspect ratio
- Hard and soft borders
- Continuously variable border width/color
- Internal matte generator
- Opaque and transparent overlay
- Cut and paste
- Joystick positioning and cropping
- Luminance keyer with adjustable polarity and key level

The ICS can store up to 9 sets of effects in removable, erasable Archive Modules. So you can recall your best effects — at the touch of a button.

Who gives you the freedom to build graphics with unlimited layers?

With the ICS, an unlimited number of images can be manipulated and overlayed. And because it's all done digitally, there is no generation loss in image quality, from the first layer to the last.

Who gives you the ability to digitally key characters and irregular shapes without tying up your switcher?

With the ICS keyer, any video source (character generator, camera, internal color generator, or another IRIS still) can be keyed into a background still under control of an external key signal. In the ICS dynamic keying mode, key signals corresponding to irregular shapes can be created to allow cutting and pasting of one piece of a still into another — all while maintaining first generation quality. For more information, or to arrange for a demonstration, contact:

Harris Studio Division, Video Systems Operation,
1255 East Arques Ave., Sunnyvale, CA 94086
(408) 737-2100 Telex: 4992172

For your information, our name is Harris.
IRIS, DIGITAL STILL STORE SYSTEM

Several years ago an ambitious engineering program began that resulted in the world's most flexible and powerful digital still store system, Harris' IRIS II. Built with component-coded framestores and designed to evolve as the needs of the industry changed, it offered six simultaneous users, each with preview/program output, library management, production graphics, and on-line storage for over 17,000 stills. It also interfaced to many types of fixed and removable media disk drives.

Now, the evolution continues with IRIS C, a new version that maintains the broadcast quality signal performance and rigorous system design standards of IRIS II, yet offers a compact still store at significantly lower cost to the facility that does not need large storage capacity or six-user flexibility.

Two simultaneous users and a compact package

IRIS C will support two simultaneous users with dual channel capability for both. This means that each user has both preview and program capability. And, installation in cramped spaces like mobile vans is easy because IRIS C occupies less than 24 inches of rack space.

A new quad framestore synchronizer with optional transition effects for increased flexibility

IRIS C incorporates the Model 654 framestore which contains four frames of component-coded memory and up to four NTSC encoders to produce four separate outputs. (The 654 is available as either a 2 or 4 output unit, and the 654-2, two output unit can be expanded to the 654-4, four output unit by field retrofit.) The 654 transitions option provides dissolves and left/right, up/down wipes with programmable transition frame rates between pairs of outputs. When two users are operating IRIS C, transitions can be utilized by each user independently, and transitions can also be programmed into sequence lists. This advanced framestore synchronizer also provides time base correction and optional RGB input/output.

Control Flexibility

IRIS C can be operated by the new Mini-Controller or the IRIS II keyboard. The interactive menu screen of the Mini-Controller allows for a first time user to be instantly effective with the system. IRIS C also provides an RS232 control port for full remote control from a host computer or editing system. A parallel printer port is also provided, allowing all the on-line library information as well as sequence lists, IDs and descriptions, to be printed.

Built-in, on-line Library Management

No index cards or hand written lists. The on-line library system catalogs stills using a six character numeric or alpha numeric ID, in addition to a description of up to 20 characters. Alpha numeric ID provides much more flexibility than other systems. For example, "News" stills may have ID's that start with "N", or "Basketball" stills with "B". Users may store their stills by their initials or other mnemonic identification.
The IRIS Composition System (ICS) provides a full range of production graphics and effects for both IRIS C and IRIS II. Two ICSs may be used simultaneously on the IRIS C. The removable, erasable Archive Module (right) can store up to nine sets of effects.

**IRIS COMPOSITION SYSTEM (ICS)**

Compatible with IRIS II
IRIS C stored picture data is compatible with IRIS II, so the pictures stored by the IRIS C in your van are perfectly interchangeable with the pictures stored by the IRIS II in your studio.

**Exciting effects available**
The IRIS Composition System (ICS) option, available on both IRIS II and IRIS C, provides a wide range of effects:

- Compression
- Expansion
- Variable aspect ratio
- Hard and soft borders
- Continuously variable border width/color
- Internal matte generator
- Opaque and transparent overlay
- Cut and paste
- Joystick positioning and cropping
- Luminance keyer with adjustable polarity and key level (keyed signals may be colorized)
- Dynamic key mode — continuous keying for creative camera copy-stand techniques
- Field-to-frame interpolation

The ICS can store up to 9 sets of effects in removable, erasable Archive Modules. You can recall your best effects at the touch of a button or have them automatically recalled by a sequence list. The Archive Module is also compatible with IRIS II.

With the ICS, an unlimited number of images can be manipulated and overlayed. And because it's all done digitally, there is no generation loss in image quality, from the first layer to the last.

With the ICS keyer, any video source (character generator, camera, internal color generator, or another IRIS still) can be keyed into a background still under control of an external key signal. In the ICS dynamic keying mode, key signals corresponding to irregular shapes can be created to allow cutting and pasting of one piece of still into another — without tying up your switcher.

**Media Flexibility**
The constantly changing demands of the video industry's customers make storage media flexibility a necessity. IRIS C is compatible with many media storage drives from CDC. *Any two drives (below) may be used.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 MB</td>
<td>RSD (cartridge)</td>
</tr>
<tr>
<td>160 MB</td>
<td>FSD</td>
</tr>
<tr>
<td>300 MB</td>
<td>SMD</td>
</tr>
<tr>
<td>340 MB</td>
<td>FSD</td>
</tr>
<tr>
<td>675 MB</td>
<td>FMD</td>
</tr>
</tbody>
</table>

The IRIS Series Still Stores; evolving to keep you in the lead as your needs change.

HVS manufactures digital electronic equipment for television broadcast and post-production. Our products range from hardworking Time Base Correctors used throughout the video industry, to the sophisticated digital still store and image manipulation systems described here. So if you're looking for the newest in special effects to enhance your programming, or for a cost-effective solution to almost any signal processing problem, look to a company that is famous for its innovative products and high-level product support.

For more information or a demonstration, contact:

Harris Studio Division, Video Systems Operation, 1255 East Arques Avenue, Sunnyvale, CA 94086 (408) 737-2100 Telex: 4952172.

*Control Data Corporation*
IRIS II SPECIFICATIONS

Physical and Electrical

<table>
<thead>
<tr>
<th>Unit</th>
<th>Power</th>
<th>Size</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk drive (RSD &amp; FSD)</td>
<td>250 watts</td>
<td>10.2&quot;h x 8.5&quot;w x 23.1&quot;d</td>
<td>60 lb</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(25.9 cm x 21.6 cm x 58.4 cm)</td>
<td>21.27 kg</td>
</tr>
<tr>
<td>Disk drive (SMD &amp; FMD)</td>
<td>1000 watts</td>
<td>36.1&quot;h x 23.9&quot;w x 36.4&quot;d</td>
<td>550 lb</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(91.4 cm x 59.7 cm x 91.4 cm)</td>
<td>249.47 kg</td>
</tr>
<tr>
<td>Systems controller</td>
<td>180 watts</td>
<td>12.25&quot;h x 19.1&quot;w x 25.5&quot;d</td>
<td>51 lb</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(31.1 cm x 48.9 cm x 65.5 cm)</td>
<td>23.18 kg</td>
</tr>
<tr>
<td>Quad Framestore (654)</td>
<td>550 watts</td>
<td>10.5&quot;h x 9.8&quot;w x 22.7&quot;d</td>
<td>50 lb</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(26.7 cm x 48.2 cm x 57.2 cm)</td>
<td>22.68 kg</td>
</tr>
<tr>
<td>Keyboard</td>
<td>5 watts</td>
<td>4&quot;h x 9.8&quot;w x 10.0&quot;d</td>
<td>10 lb</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(10.1 cm x 48.2 cm x 25.4 cm)</td>
<td>4.54 kg</td>
</tr>
<tr>
<td>Mini-controller</td>
<td>5 watts</td>
<td>5.25&quot;h x 6.3&quot;w x 4.1&quot;d</td>
<td>2.3 lb</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(13.3 cm x 15.2 cm x 10.1 cm)</td>
<td>1.04 kg</td>
</tr>
<tr>
<td>ICS Panel</td>
<td>50 watts</td>
<td>5.25&quot;h x 11.5&quot;w x 13.7&quot;d</td>
<td>5 lb</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(13.3 cm x 29.2 cm x 33.7 cm)</td>
<td>2.27 kg</td>
</tr>
</tbody>
</table>

Model 654-2 Two Output Framestore Synchronizer
Model 654-4 Four Output Framestore Synchronizer

GENERAL
Signal Inputs
Video
1 V p-p stable direct or unstable heterodyne, composite
0.7 V p-p into 75 ohms
RGB (Optional)
Genlock
1 V p-p composite video or composite sync and subcarrier
High impedance looping

SIGNAL OUTPUTS

<table>
<thead>
<tr>
<th>654-2</th>
<th>654-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video Outputs</td>
<td>2</td>
</tr>
<tr>
<td>Key Outputs</td>
<td>2</td>
</tr>
<tr>
<td>RGB</td>
<td>2</td>
</tr>
</tbody>
</table>

Sync and Blanking Outputs
4 V p-p

STABILITY
Residual Luma TBE
± 10 ns with 50 dB S/N input
± 20 ns with 40 dB S/N input
Residual Chroma TBE
± 2° with 50 dB S/N input
± 4° with 40 dB S/N input

PERFORMANCE
Video Bandwidth
Luma ±0.2 dB to 4.2 MHz
Chroma 1.25 MHz

S/N ratio (p-p signal to RMS noise)
(95% noise meter with bandpass filter
5 C. Trap and 10 kHz LPF)
57 dB (avg)

Differential phase
1.0°

Differential gain
1%

2T K factor
1%

C/L delay
17 ns max

ELECTRICAL AND ENVIRONMENTAL
Ambient temperature
10°-40°C
Humidity
10%-90% non-condensing
A.C. voltage
115 V ± 10%, 50/60 Hz
A.C. power
550 W

All specifications subject to change without notice

System
On-line storage capacity
4264 Max. NTSC

Number of users: up to two maximum; additional user stations may be allocated to an RS232 computer interface. Up to 2 disk drives in any combination.

Storage/recall format: field or frame storage with field 1, field 2, or frame recall

Number of fields per drive:
80 MB RSD 280
160 MB FSD 520
300 MB SMD/FSD 996
340 MB FSD 1100
675 MB FMD 2132

Library
(Provided as standard)
On-board library system capable of cataloging and recalling Still by identification number (six characters numeric or alpha numeric), or by description (up to 20 characters)

Parallel Printer Port
Centronix and TI compatible

For your information
our name is Harris.
HDE 100/150/200 DIGITAL VIDEO EFFECTS SYSTEM
Harris introduces the HDE 200. This easy-to-use production tool features a 150 event bubble memory and easily upgradeable multi-channel capability. It is also available in two expandable versions, the HDE 100 and HDE 150. So now your effects capability can expand with your needs, and you can stay within your budget.

HDE 100 Features
- Variable Squeeze and Compression
- Slide/Path
- Split and Compression Split
- H & V Invert
- Freeze/Stop Action
- Programmable Multi-Pix Freeze
- Post-join
- Mirror/Reflect
- Montage
- Separate Border/Background
- Variable Aspect Ratio
- Fader Limiter
- Preset Effect Registers

HDE 150
All the effects of the HDE 100, plus:
- Variable Expansion/Zoom
- Programmable Trajectory
- Multi Move
- Mosaic (Tile)
- Flip/Tumble
- Wipe Follow
- Chroma Key Tracking
- Auto Operation of up to 150 Programmed Events
- On-Board Event Memory with Battery Back-up
- Removable Event Bubble Memory
- Editor Interface

HDE 200
All the effects of the HDE 150, plus:
- Automatic Input Switching
- Strobe Caption
- Decay
- Prewired for Dual Channel Option

Specifications

GENERAL
Signal processing system: PDM binary-coded signal processing
No. of bits per word: 8 bits
Sampling frequency: 14.3 MHz
Input signals: NTSC composite sync or monochrome signal. 1 V p-p, 75 ohms
Input key signal: 0.7 V p-p or TTL
Output signals: NTSC composite sync, 1 V p-p, 75 ohms, 4 outputs
Output key signal: 0.7 V p-p, 75 ohms, 3 outputs
External Reference:
- Black Burst: 0.3 V p-p
- Composite Video: 0.3 V p-p, high impedance
- SYNC: 4 V p-p
- SC: 2 V p-p

SIGNAL PERFORMANCE
Video input return loss: >30 dB at 3.58 MHz
Reference input return loss: >30 dB at 3.58 MHz
Video output return loss: >28 dB at 3.58 MHz
Frequency response:
- NTSC: 1 kHz to 5.0 MHz: ±0.2 dB
- Composite sync: >7.5 MHz: < -40 dB
K factor:
- Composite sync or monochrome signal: -1
diff gain: 2%
diff phase: 2°
Signal-to-noise ratio:
- 50 dB (quantizing noise included)
- Periodic noise: <30 mV p-p
- Periodic noise: < -50 dB
Adjustable ranges:
- Video level: Adjustable to 0.7 V p-p with input of 0.56 to 0.84 V p-p
- Chroma level: ±10%
- Set-up: 0 to 17.5 IRE
- Burst phase: 360°
- HUE: ±20°
- SYNC level: 0.3 V ±0.1 V
- Burst level: 0.3 V ±0.1 V

MECHANICAL & ENVIRONMENTAL
Dimensions:
- Video Processor: 11.7" (30 cm) H x 19" (48 cm) W x 17.6" (45 cm) D
- System Controller: 5.9" (15 cm) H x 19" (48 cm) W x 17.6" (45 cm) D
- Control Panel: 17.2" (44 cm) H x 7.8" (20 cm) W x 5.9" (15 cm) D

EMI: Conducted & Radiated:
- Meets FCC Class A specifications

Operating temperature:
- 0°C to 40°C

Spec temperature:
- 10°C to 30°C

Power requirements:
- 110 V ±10%, 220 V ±10%, 50/60 Hz

HDE 100: $47,000.00
HDE 150: $55,250.00
HDE 200 Single Channel: $79,000.00
HDE 200 Dual Channel: $135,000.00

Prices and Specifications Subject to Change Without Notice.
HVS 632/DNR NTSC

Frame Synchronizer and Time Base Corrector

Frame Synchronizer and Time Base Corrector which offers superb performance with outstanding flexibility. It operates with time base stable direct color, and monochrome signals and also time base unstable heterodyne or monochrome signals. The unit is shipped as a stand-alone unit with manuals and rack slides.

- Stable or unstable input
- "Dual Mode" hot switching
- Smooth handling of odd field edits
- Compensation for lost video
- Picture freeze
- High noise immunity
- Exceptional write clock range
- RGB mode
- Digital interface
- Convenient front panel operation
- Easy maintenance

<table>
<thead>
<tr>
<th>Part #</th>
<th>Product</th>
<th>Price</th>
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<tr>
<td>7-18482-01</td>
<td>HVS 632/DNR</td>
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<tr>
<td>7-13106-03</td>
<td>Compress/Positioner</td>
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<td>TBA</td>
<td>Spare Parts Kit</td>
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<td>5-16356-01</td>
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<td>5-16357-01</td>
<td>Operators Manual</td>
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<td>7-16212-01</td>
<td>Remote Control</td>
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<td>7-16391-01</td>
<td>Digikay</td>
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<td>1-14745-01</td>
<td>Rackmount for C/P and/or Remote Control Panel</td>
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<td>HVS 632C (RGB)</td>
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<tr>
<td>HVS 632/DNR Package (includes C/P, Digikay and Remote Control)</td>
<td>27,990.00</td>
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HVS 516WB Digital Time Base Corrector (Wide Band)

The HVS 516WB is a broadcast quality, NTSC digital time base corrector. This wide-band TBC gives the user any non-segmented, heterodyne VTR all the proven advantages of modern digital video processing, plus the bandwidth to handle the extended frequency response of the new generation VTRs.

ENG/EFP, CATV, Production and Post-production applications benefit from the HVS 516WB's component-coded processing techniques and 4 x Fsc sampling in terms of excellent time base error handling characteristics and reduced video noise levels. The 516WB, based on HVS's experience with over 8000 digital TBCs, is our most advanced and reliable 516 yet.

The HVS 516WB accepts an input video signal, separates it into component form, digitizes and stores it. The signal is then encoded, clocked out at a corrected rate and referenced to either an external or an internal sync generator. The result is a time base corrected video signal.

<table>
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<th>Part #</th>
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<tr>
<td>7-11852-03</td>
<td>HVS 516WB</td>
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<td>1-13093-01</td>
<td>H &amp; V Blanking (option)</td>
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<td>7-13591-01</td>
<td>H &amp; V Blanking (kit)</td>
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<td>7-11245-01</td>
<td>Fiberglass Shipping Case</td>
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<td>1-11413-01</td>
<td>Operators Manual</td>
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<td>TBA*</td>
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<td>1-11203-00</td>
<td>FM Sampler for D. O.C. (kit)</td>
<td>95.00</td>
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*To Be Announced

Prices and Specifications Subject to Change Without Notice.
**TIME BASE CORRECTOR**

**HVS 550 Digital Time Base Corrector**
The Harris 550 operates with all capstan servo heterodyne video recorders, from the older, non-subcarrier feedback machines to the new highband VCRs. 3.58 feedback and process modes are both available to offer superb performance over a wide range of VTRs.

For easy editing, the 550 will handle 10X shuttle speeds. And its full remote panel is small enough so that two can fit side-by-side in a 1 1/4” rack space.

The 550’s 8-bit, 4fsc architecture provides virtually-transparent signal performance, while its 16-line memory and Automatic Vertical Advance handles large gyro errors with ease. A built-in proc amp, plus RS-170A sync output circuitry, allow complete operator control of video signals and gen-lock of external equipment.

This new TBC is also FCC certified for radiated and conducted EMI.

To keep down-time to a minimum the 550 is designed with features that make it ultra reliable and, at the same time, quick and easy to repair.

- Printed circuit signal paths, versus wire harnesses
- Redundant circuit board contacts
- Front-removable, three-board architecture
- Shields integral with the chassis, not the PCBs
- Sturdy, two-piece package

**HVS 540 Time Base Corrector**
The 540 is a low cost TBC similar to the HVS 550 except it operates in the 3.58 MHz (subcarrier) feedback mode only.

**SPECIFICATIONS**

- **Signal Inputs**
  - Video: 0.5 to 1.5 V p-p into 75 ohms, 525 lines, 60 fields/sec
  - Video input return loss: greater than 43 dB at 3.58 MHz
  - DOC: 1 V p-p RF, 75 ohm terminating

- **Signal Outputs**
  - Video out 1: 1 V p-p into 75 ohm comp. video by-passable
  - Video out 2: 1 V p-p into 75 ohm comp. video not by-passable
  - ADV VTR Sync Out: 0.3 V or 4 V p-p into 75 ohm
  - VTR 3.58 feedback: 1 V p-p into 75 ohms

- **Memory Architecture**
  - Sampling rate: 4X subcarrier
  - Quantizing: 8 bit
  - Memory capacity: 89K bits
  - Time base correction window: 16 H lines

**Signal Performance**

- **Frequency response**
  - 3.58 feedback mode: + / - 0.5 dB from 10 Hz to 4.2 MHz less than 3 dB down at 5 MHz
  - Process mode: luminance 2.5 MHz (550 only)

- **Differential gain:** 2%
- **Differential phase:** ± 2°
- **Low frequency linearity:** 0.2 dB
- **Tilt**
  - Field rate: 1%
  - Line rate: 1%
- **K factor**
  - 3.58 feedback mode: 2T 1%/20T 1% baseline error
  - Process mode: 2T 5%/20T 3% baseline error (550 only)
- **Signal-to-noise ratio (p-p signal to RMS noise):** 59 dB (ave.)
- **Residual time base error**
  - 3.58 feedback mode: Luma + / - 20 ns, Chroma + / - 2 ns
  - Process mode: + / - 3 ns relative to burst (550 only)

**Mechanical, Environmental and Power**

- **Dimensions:** 19" x 3.5" x 16.75" (48.3 x 8.8 x 42.55 cm)
- **Weight:** 27 lbs. (62.3 kg)
- **Operating temperature:** 32°F to 104°F (0°C to 40°C)
- **Spec temperature:** 50°F to 104°F (10°C to 40°C)
- **Storage temperature:** 14°F to 140°F (-10°C to 60°C)
- **Altitude:** sea level to 12,000 feet (3,700 M)
- **Max humidity:** 95% relative non-condensing
- **Power requirements:** 100, 120, or 240 V + / - 5%, -10% 50-60 Hz 175 watts

**VARIABLE TRACKING OPTION FOR 540/550 TBCs**
The new Variable Tracking (VT) option allows either TBC to be used with slow-motion heterodyne VTRs such as the Sony BVU 820 with its Dynamic Tracking mode. The 540VT and 550VT will dynamically track from 1x reverse play speed to 3x forward play speed and hold color lock to +/ - 5x shuttle speed. In addition, the 540VT and 550VT will enable the VTR to present a stable picture in “pause” as well as present a viewable picture in fast forward and rewind modes (± 40X normal speed). Included with the option, an interconnect harness compatible with the Sony BVU 820.

<table>
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<tr>
<th>Part #</th>
<th>Product</th>
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<tr>
<td>7-18000-02</td>
<td>HVS 540 (16L)</td>
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<td>HVS 540VT (16L)</td>
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<td>7-18478-01</td>
<td>HVS 550VT (16L)</td>
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<td>7-18043-01</td>
<td>Operators/Maintenance Manual (540/550)</td>
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Prices and Specifications Subject to Change Without Notice.

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HARRIS

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Shawnee Mission, KS 66201

CATALOG NO. 85
HARRIS CORPORATION
BROADCAST GROUP

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