HARRIS

Television Systems Products

# Sigma®

## 30-280kW UHF TV Transmitters with Inductive Output Tubes

*next level solutions*

HARRIS

# Sigma® UHF TV Transmitter

Harris, the world leader in broadcast transmission technology, proudly presents Sigma®, 30 through 280-kilowatt UHF television transmitters. Designed to provide maximum reliability, superb performance and unmatched efficiency, Sigma transmitters also have the linearity and headroom required for digital television (DTV/DVB).

## Sigma Systems are Built for Top Performance and Reliability

Featuring a flexible architecture, Sigma transmitters are available in parallel common amplification systems with your choice of high-efficiency power amplifier, including 30-, 40-, 50- or 70-kilowatt Inductive Output Tubes (IOTs). Externally diplexed systems are also available. Typical system efficiency[1] exceeds 70%.

Sigma is designed for superb analog or digital transmission. Harris has integrated the highly linear DiamondCD™ amplifier module into the Sigma for use as an intermediate power amplifier (IPA). LDMOS amplification produces a highly efficient Class AB IPA with linearity superior to a typical Class A amplifier. Excellent linearity permits easy conversion from NTSC analog service to ATSC 8-VSB digital service.

You will find that Sigma transmitters are exceptionally redundant. Each power amplifier has its own IPA driver stage, its own high-voltage power supply, and its own control and monitoring. The standard cooling system uses dual pumps and multiple fans. Separate cooling systems for each power amplifier are optionally available. Sigma transmitters are normally supplied in a common amplification configuration. In this mode, visual and aural signals are combined at a low level in the exciter, then amplified by a common tube. When two or more tubes operate in parallel, common amplification provides a level of confidence that the transmitter will continue to operate even if one power amplifier fails.

Each IOT has its own SD-1 correction assembly with linearization circuitry. In multiple tube systems, this allows each PA to be optimized for maximum linearity, allowing best performance if an amplifier is taken out of service for maintenance.

## Provides Peace of Mind

Sigma transmitters are designed to avoid conditions that compromise reliability and performance. Dedicated Automatic Gain Control (AGC) circuitry protects each power amplifier from overdrive when the transmitter is turned on. Quick and reliable Thyratron crowbar protection[2] safeguards each power amplifier from catastrophic grid arcs and other arcing conditions. Automatic VSWR foldback[3] ensures Sigma transmitters will continue to operate at the maximum safe power level during such conditions as antenna icing.

## Designed for Easy Operation, Control and Monitoring

Even technicians with relatively little RF experience can operate Sigma transmitters. Straightforward pushbutton control is provided on an eye-level front panel; interfaces for remote control and monitoring are conveniently located. Front-panel LEDs visually indicate operating status of the overall system and individual subassemblies. Most components are readily accessible when service is required. We invite you to examine Harris Sigma transmitters, your no-compromise choice for today and the future.

1 Including transmitter, cooling and associated equipment.

2 Sigma transmitters were the first to offer Thyratron crowbar protection.

3 Sigma transmitters are the first UHF transmitters to incorporate VSWR foldback protection.

## Sigma System

A typical Sigma transmitter system is comprised of a single cabinet and up to four power amplifier cabinets, depending on the configuration and power level. The control cabinet houses the system control logic, system control panel, single or dual exciters, remote control I/O board and RF system mode controller.

## Control Panel

An eye-level panel provides straightforward pushbutton control for the entire transmitter. LEDs associated with each control switch and system component provide at-a-glance status information. Power meters are also provided.

## Exciter

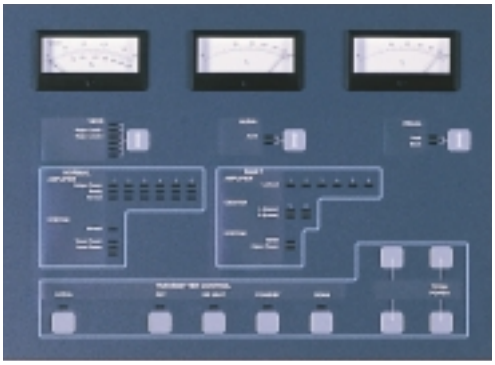
Housed in a single slide-out drawer, the solid-state exciter generates fully precorrected and filtered visual and aural IF signals then upconverts them to the channel frequency. Hinged IF modules provide ready access without extender cards or leads. Dual exciters with automatic changeover capacity are available.

## Bandpass Filter

All Sigma transmitters are provided with a constant-impedance, waveguide, bandpass filter, which removes unwanted out-of-band intermodulation products generated by common amplification operation. A passive device with no moving parts, the filter stays tuned, is stable under varying temperatures, and operates at very low insertion loss.

## Diamond Drive IPA

The Sigma *Diamond Drive* IPA is an LDMOS solid-state linear amplifier. The module, a hot-pluggable unit identical to a DiamondCD module, is rated for over 1000 watts peak-of-sync power. Parallel architecture and dual, diode-gated power supplies help maintain high reliability.



*SIGMA® SYSTEM CONTROL PANEL*

*SIGMA® EXCITER*

*REAR VIEW*

*REAR VIEW WITH DOORS OFF*

## Hot Power Amplifier

IOTs provide the highest levels of efficiency during program transmission in common amplification. IOTs are available from multiple sources.

## Power Amplifier (PA) Cabinet

Each PA cabinet contains one power amplifier assembly, a *Diamond Drive* IPA stage, SD-1 correction assembly with linearization, AGC, Thyratron crowbar assembly, power supply, cooling fans and amplifier control logic. For high on-air reliability, each PA cabinet operates independently. Harris' SD-1 correction assembly ensures superior performance and linearity.

## Thyratron Crowbar Protection

Thyratron crowbar circuitry for each power amplifier ensures fast and reliable protection from overcurrents, fully meeting tube manufacturers protection requirements. Sigma transmitters include, as an option, an exclusive test circuit to verify the Thyratron crowbar is functioning within the manufacturer's specifications.

## Magic Tee Combiner

The Magic Tee Combiner combines the output of multiple power amplifiers. If a fault occurs in a power amplifier, the Magic Tee transfers the affected amplifier to a test load for service or repair while the rest of the transmitter continues to operate at reduced power.

## Beam Power Supply

Each power amplifier has its own beam power supply which is rated for continuous black picture operation. Oil-filled, weatherproof outdoor beam supplies provide long-term reliability with minimal maintenance.

## Cooling

The IOTs are cooled by a water/glycol single-stage closed loop heat exchanger that transfers heat from the transmitter to the outside environment. The cooling system uses remotely selectable redundant main/alternate pumps that can be serviced during transmitter operation. The remainder of the transmitter is air-cooled with internal blowers and fans. Independent cooling/heat exchanger systems for each power amplifier are available as an option.

## Typical Sigma Configurations

| Configuration | 30kW Amplifier | 40kW Amplifier | 50kW Amplifier | 70kW Amplifier[4] |
|---|---|---|---|---|
| 1 PA Cabinet | 30kW | 40kW | 50kW | 70kW |
| 2 PA Cabinets | 60kW | 80kW | 100kW | 140kW |
| 3 PA Cabinets | 90kW | 120kW | 150kW | 210kW |
| 4 PA Cabinets | 120kW | 160kW | 200kW | 280kW |

[4] 70kW amplifier specifications are preliminary

## *Make These Sigma® Benefits Yours:*

- Diamond Drive LDMOS IPAs offer the ultimate in intermediate stage efficiency and linearity, ensuring the best system performance available. This amplifier, straight out of the DiamondCD transmitter, is easily swapped and extremely reliable.
- Ultra-redundant design provides unmatched reliability in a high-efficiency tube transmitter.
- Flexible Sigma architecture allows you to choose the best power amplifier type and system configuration for your operation.
- Independent, redundant design of power amplifier cabinets allows on-air maintenance in multiple-tube systems.
- Automatic Gain Control (AGC) circuitry and high-speed Thyratron crowbar circuitry provide superior protection for extended power amplifier life.
- Harris' patented correctors in the exciter and SD-1 ensure superior signal linearity and low levels of intermodulation between luminance, color, and sound signals.
- Sigma's linearity and headroom allow upgrading for superb digital television performance with worldwide digital standards.
- Straightforward logic control, front-panel LED status indicators, and accessible design simplify operation and maintenance.
- Manufactured under a registered ISO9001 Quality System; complies with IEC-215 safety standards and ANSI C62.41 transient testing requirements.

## *Harris Leading The Way With Next Level DTV Solutions*

### *1990*

Harris designs the RF Test Bed used by Advanced Television Test Center to evaluate all DTV systems proposed for the United States.

### *1993*

Harris installs first antenna intended for NTSC/ATSC broadcasting.

### *1995*

Harris demonstrates first commercial digital 8-VSB DTV exciter and DTV transmitter.

### *1996*

Harris provides transmitter for world's first commercial DTV station, WRAL in Raleigh, North Carolina.

### *1997*

Harris sponsors first live high-definition broadcast of a Major League Baseball game.

### *1998*

Harris sponsors first nationwide high-definition broadcast of a live news event, the John Glenn Space Shuttle Launch.

Harris Broadcast Communications Division Headquarters

## *Harris Broadcast Communications Serving Broadcasters In More Than 150 Countries With Next Level Solutions*

Since 1922, Harris has set the pace worldwide for the broadcast industry. Our more than 60 major "firsts" in RF technology have changed the way the world sees and hears itself and our innovations have extended to support for our customers as well. We pioneered around-the-clock technical service and parts, and we are the only transmitter manufacturer to sponsor a full-time Broadcast Technology Training Center.

Beyond the radio and television transmission products we manufacture, we are the world's leading supplier of studio equipment and a leader in the design and integration of custom systems.

You can count on Harris for any level of support you desire, from a single piece of equipment to a fully integrated broadcast system. We welcome the opportunity to be of service.

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