Solid-State VHF TV Transmitters NM500

New transmitters for TV band III

In the NM500 family, Rohde & Schwarz is introducing a new series of solid-state MOSFET transmitters for band III. Output power of 5 to 20 kW can be achieved simply and cost-effectively by cascading several units.

Characteristics

The transmitters have the following key features:
- clear-cut, modular design,
- continuously tunable frequency range from 170 to 230 MHz,
- PAL, PALplus, NTSC or SECAM colour system,
- lightweight amplifier module,
- high reliability thanks to dual high-power MOSFET transistors operated at low junction temperature,
- very high redundancy due to two-level modularity,
- microprocessorized transmitter control for operation, monitoring and remote control,
- integrated automatic switchover for passive exciter standby, active dual output stage and passive transmitter standby,
- split vision and sound amplification,
- self-engaging connectors for amplifiers,
- protection facilities in each amplifier and power-supply module,
- switch-mode power supplies of very high efficiency,
- high transmitter efficiency,
- Exciter SU200 with precorrection of linear and nonlinear output stages, regulated vision and sound output power, synthesizer tuning, SAW vestigial-sideband filter, sync-pulse regeneration as well as IRT or NICAM dual-sound method,
- serial and parallel remote-control interfaces, bitbus remote control (option),
- very simple cooling system [air] with low-pressure fans,
- extremely compact design.

Design and operation

A complete transmitter for 5 kW or 10 kW RF power is accommodated in just one rack (FIG 1), interconnection of several transmitters producing power of up to 20 kW. The systems can also be configured with passive exciter or passive transmitter standby.

The output power from Exciter SU200 for vision and sound is fed to separate preamplifiers, each integrated into the exciter monitoring section. A combination of two vision preamplifiers drives eight output vision amplifiers (FIG 2). These are provided with self-engaging connectors and allow replacement without interrupting transmitter operation. An interlock circuit blocks the RF power and the power supply of the plug-in to be removed. Output amplifiers are thus securely protected against damage. Cascaded 3 dB couplers split and combine the RF signals in the output stage. A colour-subcarrier trap prevents spurious emission in the lower vestigial sideband. The sound output stage of the 10 kW TV transmitter consists of two preamplifiers connected in parallel. The vision and sound power signals are combined by a diplexer. Checkpoints at the outputs of the exciter driver amplifiers of the vision and sound output stages and at the output of the vision/sound diplexer allow complete monitoring of quality and operational data.

Modular Exciter SU200 produces standard RF signals from the video and audio signals. Comprehensive control and monitoring facilities safeguard the entire transmitter in all phases of operation. Linear and nonlinear precorrection compensates for errors in the output stage. All exciter settings can be modified using the keys and rollkey and saved in nonvolatile memory.

The microprocessorized transmitter control unit, already tried and tested in NH500 transmitters, controls switch-on/off sequences but is also respon-
sible for monitoring, display and control. It displays the operating parameters of the output stages and the entire transmitter, inlet and outlet air temperature and reflections. An additional analog display is available to indicate transistor currents, supply voltages at the amplifier plug-in and heatsink temperature. A maximum of 40 faults are stored with time and date information. Variable thresholds can be set to generate additional warnings for output power and cooling-air temperature.

The standard, parallel remote-control interface (1864-1 relaying) provides remote-control messages and commands.

The single-stage driver amplifier following the exciter is configured for class A operation. The maximum output power is 10 W. The monitoring circuit of the driver amplifiers is linked to the exciter. The preamplifier and output amplifier plug-ins each consist of six identical 280 W power modules. These preamplifiers and output amplifiers only differ in terms of configuration and quiescent current adjustment of the power modules. In the case of a preamplifier, two modules (class A) are connected as drivers ahead of the four output modules (class AB). Power splitting and combining is implemented by means of Wilkinson circuits in stripline technique. Six of these class AB modules are combined in the output amplifiers, which are protected against reflection and overtemperature. LEDs on the amplifier front panel signal the most important operating states: supply voltage present, plug-in selected for measurement, amplifier blocked, RF output power too low (–2 dB), overtemperature or reflection. The preamplifier is used in both the vision and the sound section. In the sound section it is already the output stage. Maximum output power for the preamplifier is 800 W (sync) or 700 W (CW), and for the output amplifier 1.5 kW (sync).

The feed units are configured as single-phase switch-mode power supplies. To ensure maximum possible operating reliability, the power supplies include circuits to monitor overload, short circuits, overtemperature, blower failures and overvoltages at the AC supply end. These monitoring circuits are powered by their own supply. Faults are also signalled on the transmitter front panel. Efficiency of >87% makes a substantial contribution to the transmitter’s high efficiency.

The TV transmitter components are cooled by internal and external fans. An external fan is used for amplifiers and balancing resistors. The very slight pressure drop through the transmitter allows use of low-pressure fans. The high-power supply units have their own integrated fans. Cooling air can be fed in from the top or bottom of the transmitter.

Johannes Leitenstorfer

REFERENCES

Condensed data of Solid-State VHF TV Transmitters NM500
- Frequency range: 170 MHz to 230 MHz
- Output power, vision: 1 / 2 / 5 / 10 / 20 kW
- Output power, sound: 0.1 / 0.2 / 0.5 / 1 / 2 kW
- Output impedance: 50 Ω
- Output-stage technology: dual MOSFET
- Standard: B, D, M, I (others on request)
- AC supply: 3 x 230 V / 400 V ±15%, 50 Hz ±5%

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