EXHIBIT B

OPERATIONAL DESCRIPTION

NV7600E/V OFDM/DMQ-T (MEDIAFLO) 0.6-KILOWATT TRANSMITTER

SV7000 Transmitter Operational Description/Functional Overview

Following is a brief description of the SV7000 series transmitter. A much more detailed description of the transmitters' functionality, operation and mechanical layout can be found in Exhibit K, SV7600 Installation and Commissioning Manual; Exhibit L, and Exchbit N, VH620A2 Amplifier Instrument Manual.

The NV7000 series transmitter may be viewed in two parts. The exciter portion generates the desired carrier frequency and modulates it with the intelligent information of interest. The power amplifiers increase the exciter's output signal level to that desired for transmission.

SV700 Exciter:

The SV 700 processes the received MPEG transport stream in ASI or SMPTE 310 format. The utilized data packets are extracted from the data stream and coded and modulated in line with ETS 300744. The OFDM/ DMQ-T (MediaFLO) signal is then generated at the transmit frequency and fed to the output stage. Since the exciter is able to synchronize the output signal to an external reference (e.g. GPS = global positioning system) with a view to frequency and time, the transmitter can be used in MFNs (multi-frequency networks = single transmitters operating at different frequencies) and in SFNs (single frequency networks).

The exciter comprises the following modules: encoder, equalizer/pre-corrector, modulator and synthesizer. The modules are interconnected via the motherboard and are powered from their own switching power supply (one per exciter).

Encoder:

The encoder accepts up to two MPEG transport streams (TS). The selected input signal is first read into a buffer (FIFO) for clock decoupling and then coded and modulated according to the DVB standard. Baseband signals are thus obtained which are forwarded to the equalizer.

At the same time the encoder evaluates the MIP (megaframe initialization packet) and so synchronizes the transmission time of the data packets with the aid of a time reference like GPS (SFN automatic). The DVB / transmission parameters can also be read from the MIP and used to configure the encoder (TPS automatic).

The encoder also contains a microcontroller which drives the whole exciter and handles communication with the CCU (central control unit). A program memory is provided as a peripheral for the microcontroller. This means that all the exciter firmware and software is stored at one location and an update can be performed via the serial interface without replacing any hardware.

The coder extension board is an add-on encoder module. With this option proprietary modulation standards such as DMQ-T (MediaFLO) can easily be installed on the exciter by only transferring an FPGA configuration file to the unit.

Equalizer/Pre-Corrector:

The equalizer/pre-corrector consists of a linear equalizer and a non linear equalizer. Pre-correction is performed at digital baseband level. The linear pre-corrector corrects the phase and frequency response of any power filter that is used. The non linear equalizer separately corrects the amplitude and the phase of the time signal as a function of amplitude. A limiter can be added to linearity pre-correction to optimize the efficiency of the transmitter. An optional data recorder allows recording of the RF signal and thus automation of the pre-correction operation

The pre-emphasized digital baseband signals are subsequently converted into analog signals and applied to the modulator. The modulator generates the DVB/DMQ-T signal at the RF by direct quadrature modulation. The signal is filtered and amplified and then fed to the output stages.

Synthesizer:

The synthesizer generates the center carrier frequency required for modulation. A Global Positioning System receiver module may be fitted as an option. It acts as a reference for frequency generation and is used as a time reference for single frequency network operation.

Central Control Unit (CCU):

The CCU provides for control and monitoring of the transmitter and for operator interface. Internally it communicates with the exciter modules over and internal RS485 buss and to the amplifiers via a rack controller in the transmitter cabinet. External communications are via the front panel keyboard/display unit, via an optional parallel interface, via an RS232 connection using optional software on a local (or remote via dial-up modem) interface or via the optional NetCCU 700 linked into it via an RS485 connection.

Exciter Motherboard(s):

The motherboard(s) interconnect(s) the exciter modules and links the exciter to the CCU. The motherboards provide the mechanical and electrical interface to the transmitter rack (power supplies and amplifiers) for transmitter control. The modules are powered through the motherboard via a switching power supply; one supply for each exciter. The motherboard comes in several models:

Model 03: motherboard of main exciter (motherboard A)
Model 04: motherboard of standby exciter (motherboard B)

Power Amplifiers Section

The power amplifier system takes the low level modulated output of the exciter and amplifies it to the level desired for transmitting.

Power splitter:

Each transmitter has a power splitter network that divides the signal from the exciter into equal parts to feed the up to six power amplifiers contained within the cabinet. It also decouples the power amplifier inputs in order to avoid disturbing reflections from faulty units. And in transmitters with a second exciter there is an RF switch before all of the splitters to select which of the two exciters is utilized. In all multi-cabinet transmitters provisions are made to adjust the relative signal phasing between the cabinets.

Broadband Power Amplifier:

The VH620A2 air-cooled solid state UHF Power amplifier is utilized in the SV7000 series transmitter. Each amplifier provides an output power of up to 120 watts. The amplifiers are broadband, meaning that one amplifier can be used at any of the operating frequencies (470 – 860 MHz) without any modifications or tuning. The soft failure characteristic of the solid state transmitter is mainly provided by connecting the PAs in parallel. Failure of one PA reduces the output power in a predefined limit but doesn't cause interruption of the program transmission. Self protecting circuits have been implemented in the PAs against problematic situation (overheating, high VSWR, etc.)

Each power amplifier includes its own integral power supply. Each single-phase power supply module is designed for a maximum power load of 780-watts. The input voltage range to the power supply is 100 to 240 volts AC, 50/60/400 Hz and its DC output to the amplifier is 32-volts. The supplies are a “switching” design.

Each VH620A2 amplifier is air-cooled via fans contained within the amplifier chassis.

Output Power Combiner:

An passive output combiner network consisting of a series of 90° hybrids and associated power reject loads, combines the outputs of the various amplifiers in the transmitter into one output terminal. The signal from that single output terminal connects to the harmonic filter. The output of the harmonic filter is routed to the output sampling coupler located near the upper rear of the cabinet, and then to the transmitter output connector.

Output Directional Coupler:

A optional precision directional coupler assembly is utilized between the output of the transmitter’s harmonic filter and the transmitter’s output terminal. Sample ports on this coupler may be utilized for various functions such as forward and reflected power monitoring and to obtain sample signal(s) for the exciter(s) non-linear equalizer/pre-corrector functions. Multiple ports are available depending on the customer’s individual requirements.

RF Detector Module:

In the standard configuration forward power is monitored by summing the detected outputs of each VH620A2 amplifier’s internal coupler. Optionally a sample may be taken from the above described directional coupler and connected to the RF detector provided for that purpose on the transmitters rack controller unit. In either case the value is made available to the CCU module in the exciter chassis for display.

Channel “Mask” Filter:

A sharply tuned filter is utilized on the output of the transmitter to insure that the bandwidth occupied by the transmitted signal is in compliance with the requirements of Part 27 of the Rules and is considered to be part of the transmitter system. An optional directional coupler at the output of this filter is utilized to obtain an appropriate signal sample for the exciter'(s) linear equalizer/pre-corrector functions.

Mechanical Design

Transmitters in the SV7000 family are housed in a single cabinet measuring 59-centimeters (23-inches) wide, by 80 centimeters (31 ½ -inches) deep, by 199-centimeters (78 ⅜ -inches) high. The cabinet contains one or two exciter(s) in a single exciter cabinet frame, up to 6 power amplifier modules, each with an integral power supply, and all other components included as part of the transmitter.

Exciter:

The exciter is accommodated in the exciter cabinet frame which is part of the first transmitter rack. Up to two exciters can be fitted in the one cabinet frame. Exciter A is accommodated in the left half of the frame, exciter B in the right. The Central Control Unit (CCU), Synthesizer A, Modulator A, Equalizer/Precorrector A and Encoder A are the order of the modules from left to right. On the right hand side the CCU power supply always occupies the first module location. If the B exciter is present the module order (minus the CCU) repeats. The modules are inserted upright into the exciter cabinet frame and plugged into their respective motherboards which are screwed to the rear of the frame. Below the cabinet frame is a fan box for each exciter. The fan box has two fans for each exciter on the front side and the respective exciter's power supply to the rear.

Transmitter Cabinet:

Each transmitter cabinet holds up to six air-cooled power amplifiers. The amplifiers are "rack mounted" horizontally and slide in from the front.

Installed towards the rear of the cabinet is the passive power splitter network for dividing the exciter output among the various power amplifier inputs, the passive power combiner network(s) for combining the power outputs of the various amplifiers into a single terminal, the harmonic filter and the output sampling coupler. The channel "mask" filter is installed externally to the transmitter cabinet.

The last major system in the cabinet is the AC power distribution located at the bottom front. The cabinet is secured from the outside via the use of covers on the sides and the rear. The covers are secured in place by screws.