ACOM International, Inc.

Exhibit 10: Operational Description

External Radio Frequency
Power Amplifier ACOM 1000
Model 1000

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OPERATIONAL DESCRIPTION

The ACOM1000 is a complete and self-contained linear amplifier that covers all amateur bands from 1.8 through 54MHz and provides over 1000W-output power with typically 60W-exciter drive.

Amplifier's tuning is simplified by a plate-load True Resistance Indicator (TRI) which helps the operator to quickly and precisely match antennas and eliminates probability of inadvertent mistune. The antenna impedance matching capability is up to VSWR 3:1 or higher. A broadband input matching circuit to the tube is employed which results in very good load to the driver over the entire frequency spectrum from 1.8MHz up to 54MHz, thus yielding a better linearity.

The 4CX800A (GU74B) Svetlana high-performance ceramic-metal tetrode with plate dissipation of 800W is grid-driven. The input signal is passed through a broadband input matching circuit, which comprises some L/C components and a 50 Ohm 100W RF swamping resistor. This circuit tunes out the input capacitance of the tube. The swamping resistor is a termination load for this circuit and could not be removed from the amplifier since a severe impedance mismatch to the driver would disable operating the amplifier at all.
A 12-Ohm composite cathode resistor creates DC and RF negative feedback, thus stabilizing the gain and equalizing the amplifier's frequency response (1dB typically).
A 390V varistor in the screen grid circuit protects the tube screen grid, and voltage regulator in the events of dynatron effect or a flashover.

Nominal voltages and currents at rated output are:
DC plate voltage: 2300 to 2500V (depends on mains voltage);
DC plate current: 0.6 to 0.5A (depends on mains voltage);
DC screen voltage: 340V (+/- 5% regulated);
DC screen current: 50mA;
DC grid bias: (-)52V (adjusted individually for minimum IMD).

A L-R combination in the plate circuit serves as a VHF/UHF parasitic generation suppressor. DC plate voltage is fed to the anode in parallel, through the plate choke. The output resonant circuit comprises a classical Pi-L network that transforms the antenna impedance to the tube optimum load impedance, and besides suppresses the harmonic frequency emissions. This tank is switched and tuned over the bands by a ceramic 7-band switch and two ceramic-supported air variable capacitors. Some bands have own positions, while three of the positions serve two bands each, as follows: 160m - 80m - 40&30m - 20m - 17&15m - 12&10m - 6m amateur bands.

The output signal is fed through an additional VHF low-pass filter for frequencies above 55MHz in order to improve harmonic suppression especially in the UHF band. Then it is passed through the vacuum antenna relay, wattmeter current transformer, and a high-pass filter for frequencies below 100kHz, to the antenna output connector. This last filter reduces the influence of eventual close-located powerful LF transmitters or 50/60Hz power lines.

An antenna choke improves operator's safety against HV reaching the antenna output. A discharge resistor is intended to protect the amplifier from accumulating static electricity fed by the antenna.

The amplifier is controlled by a microprocessor system, based on the 80C552 micro-controller from Philips. It uses a 16MHz clock, stabilized by a quartz crystal. An intended plate capacitive voltage divider and the integrated RF output directional wattmeter are the main sources of information for the control circuit during the antenna impedance matching process.

All supply voltages are delivered from conventional rectifiers and regulators and no switching supplies are used. The control grid, screen grid and plate currents, plate cooling airflow temperature, reflected power etc. are permanently monitored by the controller. Many software-derived protections are based on this information in order to insure normal tube regime and antenna tuning, thus drastically reducing the probability of any inadvertent operator's mistakes or apparatus irregularities that could arise during exploitation of the amplifier.