JRC

HF LINEAR AMPLIFIER

JRL-2000F

48MOSFETs SEPP system

Fully Automatic MOSFET HF Linear Amplifier

JRL-2000F

Are DX'ers satisfied with today's linear amplifiers? This question has been a key to the design of the JRL-2000F solid-state HF amplifier. The JRL-2000F has solved the problems that conventional linear amplifiers have had: troublesome manual operation and fan noise found in tube type amplifiers, and a low margin of output power and high IMD in transistor amplifiers. The JRL-2000F is the world's first MOSFET HF linear amplifier, designed using the same high technology found in JRC's professional high-power radio transmitters.
The JRL-2000F features a heavy-duty power amp (PA) that incorporates 48 RF power MOSFETs to ensure low distortion and clean output, plus a high-speed automatic antenna tuner with a memory capacity of 1820 channels. In addition, a high efficiency switching power supply with a PFC to suppress AC line currents, an automatic antenna selector and a wireless remote control unit are among the JRL-2000F's many user-friendly features.

A SUPERIOR MOSFET PA TO S

48 RF POWER MOSFETS

The PA unit is equipped with 4 wide-band amplifier circuits, each incorporating 12 power MOSFETs (2SK408/2SK409) that are driven on a drain voltage of 80 VDC. The outputs of the 4 amplifiers are combined at a hybrid power combining circuit, ensuring sufficient dynamic range and high quality output power.

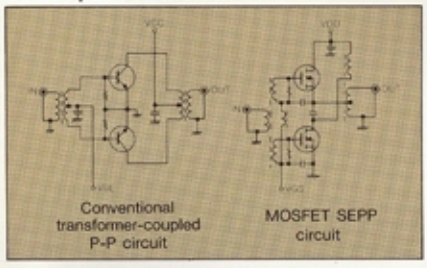
The MOSFETs have excellent linearity, low high-order IMD, high gain on all HF bands, and a negative thermal coefficient to cause no thermal runaway. The power devices, connected in parallel, operate in good balance and are insensitive to excessive current, output and thermal stress.

LOW DISTORTION SEPP PA

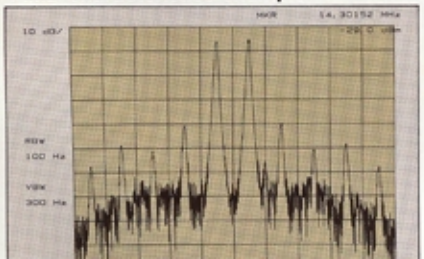
Conventional solid-state wide-band amplifier circuits have serious problems with high IMD and harmonic distortion. These problems are caused by incomplete impedance matching due to the low input impedance and NFB (negative feedback) of bipolar transistors, and by output waveform distortion due to phase delay in waveform combining in the push-pull circuit with transformer coupling.

The JRL-2000F's PA circuits feature low IMD (−35dB or less at 1kW PEP) and low harmonic distortion, made possible by matching input capacitances of the insulated gate MOSFETs using a LPF (low pass filter) network, and by using single-ended push-pull (SEPP) circuits that are current-combined and use no phase coupling transformers.

● Push-pull PA circiut



● IMD characteristics example

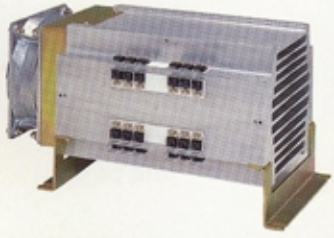


SLOW SENSING COOLING SYSTEM

In a power amplifier generating high output power with few power transistors, the heat is concentrated on a small part of the heat sink. Therefore, forced air cooling has to be made using a heat sink with rapid thermal response.

In the JRL-2000F, 48 MOSFETs are mounted to a high-capacity heat sink with a high thermal time constant, so that efficient thermal distribution and effective cooling is achieved.

The heat sink features a slow temperature rise, so that cooling fan operation can be delayed by temperature detection. During typical intermittent SSB or CW operation, the cooling fan starts rotating slowly and the time of rotation is short. Maximum cooling is achieved during heavy-duty operation such as RTTY or SSTV. This cooling system is designed to maximize forced air cooling and minimize fan noise.



AUTOMATIC BAND SETTING

By detecting the frequency of the input signal from the exciter and measuring it with its built-in frequency counter, the JRL-2000F automatically selects the proper frequency band, eliminating the conventional manual band switching found on other amps.

The JRL-2000F can be connected to any type of exciter without special interfacing. When used with the JRC JST-135 HF transceiver, the JRL-2000F can automatically read the frequency data directly from the trans-

AUTOMATIC ANTENNA SELECTION

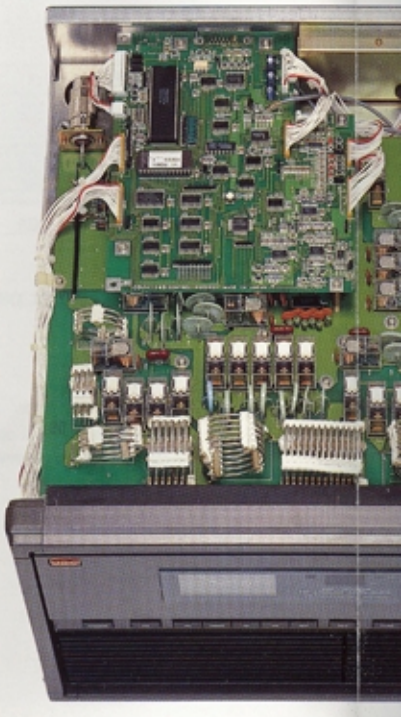
Up to 4 antennas can be connected to the JRL-2000F. Automatic switching between antennas eliminates the need for manual antenna switching for every QSY, and prevents faulty accidental connection to an unmatched antenna.

AUTOMATIC ANTENNA TUNING

The JRL-2000F is equipped with a fully automatic, instantaneous switching antenna tuner, in which the elements of the tuning circuit are variably adjusted in binary sequence by CPU control. The antenna matching data returned from the tuner is stored in one of 1,820 memory channels (4 antennas×455 HF band divisions). The stored data can be instantly recalled without the need for retuning, enabling easy QSY and offering a powerful feature for DX contesters.

FULL BREAK-IN CAPABILITY

The full break-in circuit is designed for reliability, good RF characteristics and low noise by housing the relay circuit,



SPECIFICATIONS

Operating frequency bands: 1.8, 3.5, 3.8, 7, 10, 14, 18, 21 and 24MHz bands — amateur bands
28MHz band — only for antenna tuner

Rated output power: SSB 1kW PEP* 100% duty cycle, 24-hour
CW 1kW* 100% duty cycle, 24-hour
FSK/FM 1kW* 100% duty cycle, 1/4-hour

Output impedance: 50 ohms unbalanced, VSWR 3.0 (16.7—150 ohms)

Harmonics: —60dB or less

Intermodulation distortion (IMD): —35dB or less below PEP (at 1kW output)

Input impedance: 50 ohms unbalanced

Exciting power: 100W max.

Frequency switching time: Less than 0.1 sec.

Power supply voltage: 85 to 264VAC, single-phase

Power consumption: 2.5kVA or less (at 1kW output)

Input power factor: 95% or more (at 1kW output)

Temperature range: —10 to +40°C

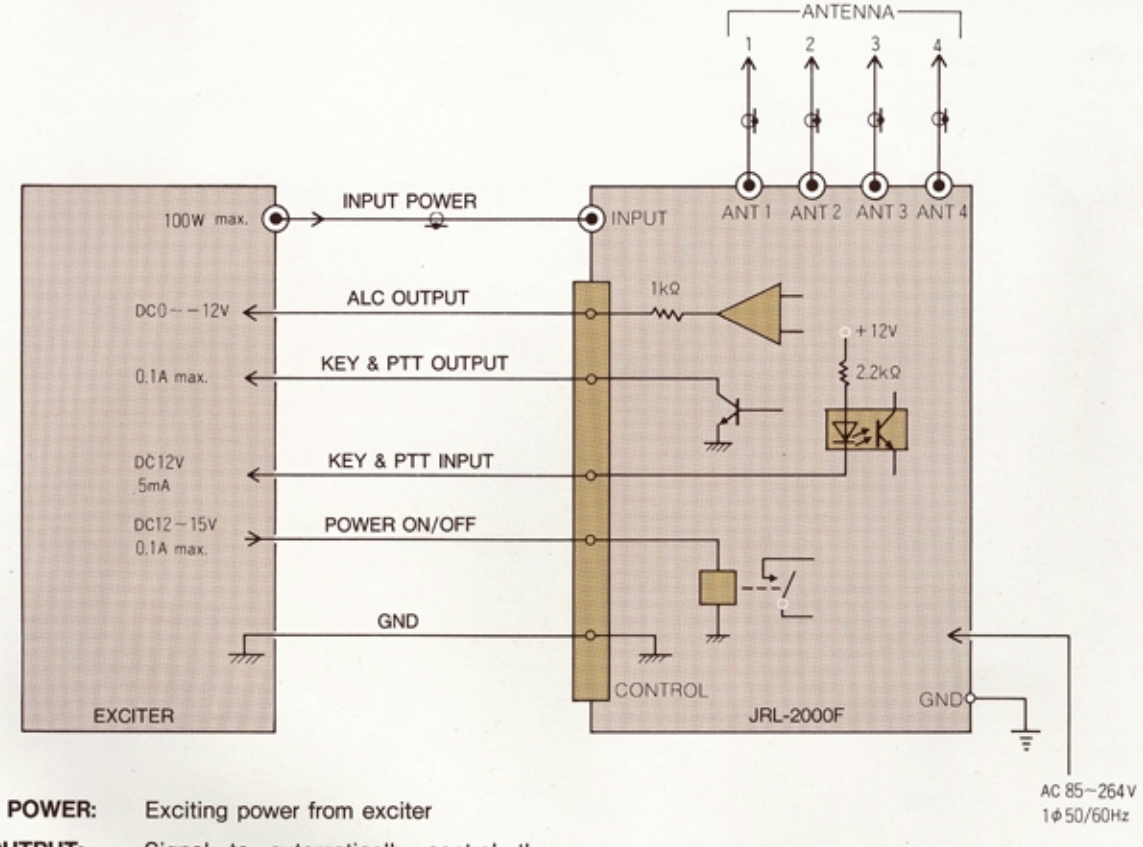
Protection items: PA excess current, PA over-heat, PA abnormal load, AC power supply excess voltage, power supply over-heat, PA failure, antenna VSWR excess, exciting power excess, antenna matching anomaly

Dimensions: 430(W)×300(H)×402(D)mm

Weight: Approx. 28 kg

Note* : Rated output on 200-240 VAC. The rated output on 100-120 VAC is 750 W.

INTERFACE BETWEEN JRL-2000F AND EXCITER



INPUT POWER: Exciting power from exciter

ALC OUTPUT: Signal to automatically control the exciting power from exciter

KEY & PTT OUTPUT: Signal to set exciter to transmit state

KEY & PTT INPUT: Signal to indicate that the exciter is in its transmit state.

POWER ON/OFF: Exciter's power on/off to set the JRL-

Options for interface between JRL-2000F and exciter