

# **RF CONCEPTS**

**RFC 2-23**

**2 METER  
POWER AMPLIFIER**

## RFC 2-23

Thank you for buying the RF CONCEPTS RFC 2-23. This amplifier represents the "fourth generation" of solid state power amplifiers built for amateurs. The RFC 2-23 features a "state of the art" GaAs-Fet preamp, "High SWR" protection and automatic keying. The RFC 2-23 is designed to work with all modes of transmissions, including FM, CW, and SSB.

### SPECIFICATIONS

Frequency Range .....	143-149 MHz
Power .....	Input range: 200 MW to 5 W Output*: 30 W with 2 W in
Maximum Input .....	5 Watts
Duty Cycle .....	Intermittent
Modes .....	FM, SSB, and CW
GaAs-Fet Preamp .....	Noise Figure: .75 to 1.5 db Gain : 20 db Nominal
SWR Protection .....	Automatic shut down at approximately 3:1 SWR
Keying .....	Automatic - RF sensing
Input-Output Impedance .....	50 Ohms
Voltage Requirement .....	13.8 VDC
Current Requirement .....	4 Amps
Fuse .....	7 Amp
Size .....	6.5 x 3.5 x 2 inches
Weight .....	2 lbs

\*output may vary by .75 db.

### INSTALLATION

The RFC 2-23 can be mounted with the bracket, supplied. It should be placed to provide maximum ventilation, around the heat sink.

Heavy gauge wire should be used to connect the RFC 2-23 to the battery or power supply. For medium distances use #12 wire and for longer distances use #10 wire. To connect the amplifier to the antenna, RG-8A/U or equivalent coax is recommended. For best performance, the antenna should be adjusted for an SWR of less than 1.5:1.

## OPERATION

The power amplifier is connected between the radio and the antenna. The RFC 2-23 will boost the power of a 2 Watt radio to 30 Watts or more.

The preamp utilizes the latest GaAs-Fet technology. It has a low noise figure and 20 db gain. The preamp should be used to improve the "copy" of weak and marginal signals. However, in areas that have strong 2 Meter signals the added gain may overload your receiver. In this case, the preamp should not be used.

When either the power amplifier or the preamp are "on" they automatically switch in and out of the circuit by sensing the RF from the radio. The "TX" LED will light during transmit.

## FAULT CONDITIONS

During normal operation the "TX" LED will light when the power amplifier is activated.

The RFC 2-23 has a special circuit that senses return power (SWR) from the antenna. If this returned power exceeds approximately 8 Watts, the amplifier automatically shuts off, turning off the "TX" LED. In order to reset the amplifier, the power and preamp on-off switches must be switched off for 5 seconds then turned back on. **WARNING! CHECK OUT THE ANTENNA SYSTEM BEFORE OPERATING THE AMPLIFIER AGAIN.**

## FUNCTIONS

The functions of the RFC 2-23 are controlled by the three front panel switches.

- POWER ..... This switch activates the power amplifier section, as well as resetting the SWR protection circuit.
- FM-SSB ..... In FM, the amplifier has a fast dropout, when the carrier is removed. In SSB, this dropout is delayed, so the relays do not "chatter" while on SSB.
- PREAMP ..... This switch turns on the GaAs-Fet preamp. It can be used even when the power amp section is off.

## REAR PANEL CONNECTIONS

- 2 PIN MOLEX ... Power is supplied thru this connector. This allows quick removal of the amplifier, if needed.
- FUSE ..... A 7 Amp fuse provides protection in case of an internal short circuit.

RADIO ..... This coax connector is the input from the transmitter or transceiver.  
ANTENNA ..... This is connected to the antenna.

## CIRCUIT DESCRIPTION

### KEYING CIRCUIT

When the power switch, S2, is "off", the signal passes straight thru, without amplification. When S2 is "on", a small amount of RF is detected by D2 and D3, causing Q1 to activate Ry1. This switches the amplifier into operation.

In order to keep the relay from "chattering" when using SSB, the FM-SSB switch, S1, increases the dropout delay time by switching in C5. The combination of C5 and R2 sets the dropout delay time of Ry1.

The receive preamp is controlled by Q2 and Ry2. When S3 is "on", Q2 is turned on through R6 + R7, actuating Ry2. This connects the preamp into the signal path.

When a keying voltage is applied to Q1, its collector switches the junction of R6 + R7 to ground. This turns off Q2, switching the preamp off.

### PROTECTION CIRCUITRY

#### SWR DETECTOR

The output trace passes by a "strip line" coupler which senses if the SWR is too high. If the antenna SWR is greater than 3:1, D15 provides a voltage to the gate of the SCR, Q4. Q4 then conducts, grounding the bases of Q1 and Q2 through D4 and D7, unkeying the amplifier and/or the preamp. S2 and S3 must be switched off to reset the circuit.

#### PREAMP

When S3 actuates Ry2, the incoming signal is routed to the preamp.

Diode D11 and D12 prevent large input signals from damaging Q3. C13 and L102 are tuned to 2 meters and provide matching to Q3. Q3 is a Gallium arsenide field-effect transistor (GaAs-Fet). It amplifies the signal with a minimal addition of its own noise. L101, C11, and C10 tune to 2 meters and match Q3 to R9. R9 + R10 provide a constant matching impedance for Q3, as well as for the station receiver. D9 and D10 protect the output of Q3 from large signals. IC1 is a 5 volt regulator that provides the proper voltage to Q3.

No adjustment of the preamp should be tried, without the use of proper noise figure equipment.

#### POWER AMPLIFIER

The signal from the radio passes through C1, Ryl and C16 to Q5, where it is amplified to 30 Watts. The signal then goes to Rylb and the filter, C105, L103, FL1, L104, and C106 to remove any harmonics, before it is connected to the antenna.

Q5 has a resistor, capacitor and coil connected from collector to base, which provides stability at low frequencies.

Bias is applied thru L3 and is adjusted by R14. The bias voltage is switched on when Ryl is activated.

The input tuning, for Q5, is adjusted by C18. It is set for minimum input SWR.

Output tuning is set by C21. C21 is adjusted for maximum power output.

#### WARRANTY

RF CONCEPTS warrants its products to be free from defects in material and workmanship for 5 years from date of purchase, with the exception of the RF power transistors, which are warranted for 6 months.

The unit must be returned to the factory, freight prepaid. The warranty card must have been submitted within the 15 days after purchase. Any unauthorized repair or changing of the internal adjustments may void this warranty.

RF CONCEPTS will provide, free of charge, both parts and labor, as necessary, to correct any defect occurring within the warranty period.

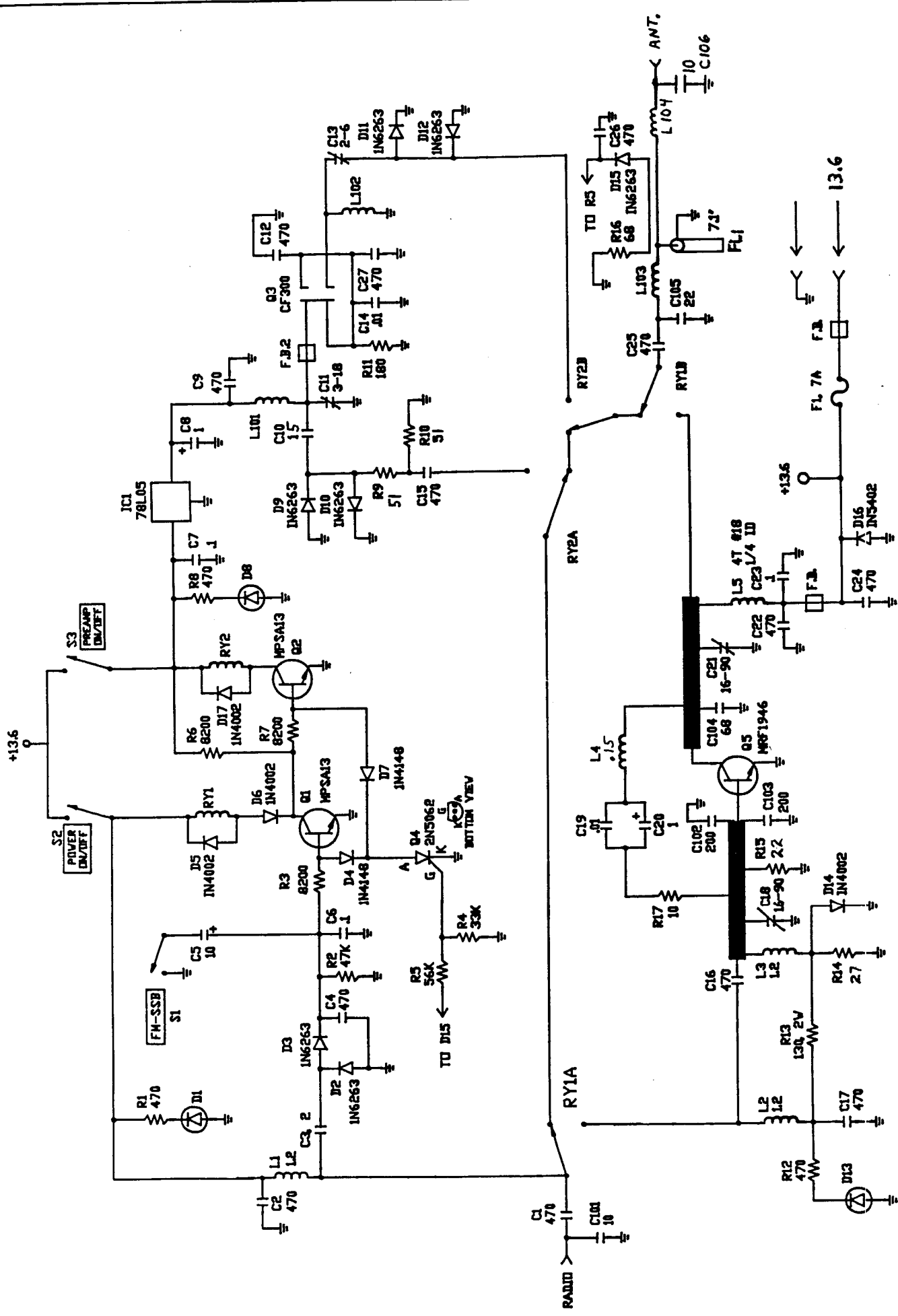
This warranty applies to the original owner only.

This warranty applies only to those units that fail during normal operation. Any units that have been overdriven, overvoltaged, modified, accidentally damaged or misused will not be covered.

USE OF THIS UNIT IN REPEATER SERVICE WILL VOID THE WARRANTY.

RF CONCEPTS will not assume any responsibility for damage to any antenna, radio, or accessory connected to this product.

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RF CONCEPTS

RFC 2-23

DATE 12/2/86

DESIGNED BY C. MALDONEY

COMPONENT VALUES MAY CHANGE, WITHOUT NOTICE, TO IMPROVE PRODUCT PERFORMANCE.