

rfc 4-110

rfc 4-310

Owner's Manual

rfconcept



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a division of Kantronics Co., Inc.

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rfc 4-110 and rfc 4-310

Thank you for buying an rfconcepts amplifier. The amplifiers listed above (covered in this “combined” manual) represent the “fourth generation” of solid state power amplifiers built for radio amateurs. Features include “state of the art” GaAsFet preamp, variable SSB delay, “High SWR” protection, excessive temperature protection, and automatic or external keying. These amplifiers are designed to be used with FM transceivers; however, they can often be used in SSB and CW modes effectively.

Warning

High power output means high heat sink temperatures. Keep the heat sink clear of any obstructions to provide adequate ventilation.

If your radio puts out more than the maximum power listed below you should use an amplifier designed to accept that higher power.

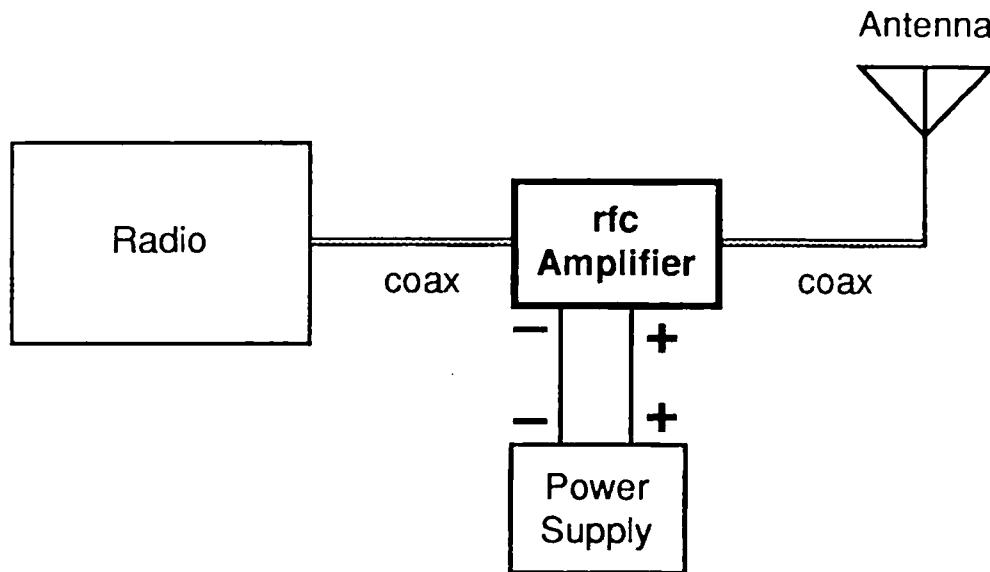
Unit	Maximum amplifier input power from your radio
4-110	15 watts
4-310	40 watts

Specifications

	4-110	4-310
Frequency Range	430-450 MHz	
Power		
Input Range	200 mW to 15 W	500 mW to 40 W
Output*	100 W (10 W in)	100 W (30 W in)
Maximum input	15 Watts	35-40 Watts
Duty Cycle	Less than 50%, not rated for repeater use	
Mode	FM	
GaAsFet Preamp		
Noise Figure	2 to 3 dB nominal	
Gain	12 dB nominal	
SWR Protection	Automatic shutdown with approximately 3:1 SWR	
Temperature Protection	175 degrees F (79.4 degrees C)	
Keying	1. Automatic – RF sensing 2. External – Ground or Plus 3-12 Vdc at J3 (user option) unit supplied with “plus voltage” keying	
Input-Output Impedance	50 Ohms	
Voltage Requirements	13.8 Vdc	
Current Requirement	22 Amps	20 Amps
Fuse	35 Amp	
Size	11.5" x 6" x 3" (29.2 cm x 15.25 cm x 7.6 cm)	
Weight	5 lbs. (2.27 kg)	

* output may vary by ± 0.75 dB

Installation



The power amplifier is connected between the radio and the antenna.

POWER: Heavy gauge wire should be used to connect the amplifier to the battery or power supply. For medium distances use #10 wire (American Wire Gauge (AWG)) and for longer distances use #8 wire.

ANTENNA: 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 2:1.

RADIO: To connect the amplifier to the radio, RG-8A/U or equivalent coax is recommended.

LOCATION: The amplifier should be placed to allow for maximum ventilation around the heat sink.

Operation

With the amplifier installed, power from your radio will be boosted as follows:

Unit	input from Radio	output of amplifier
4-110	10 Watts	100 Watts or more
4-310	30 Watts	100 Watts or more

With the amplifier turned on, power amplification is automatic. Adequate power from the radio will automatically key the amplifier. When keyed the "TX" LED will light. If the preamplifier is also turned on or operated without the power amplifier turned on, it too will be automatically switched into or out of the signal path. This automatic keying is best suited for FM operation. If SSB or CW operation is desired, it is highly recommended that external keying be used. See the External Keying section.

The GaAsFet receiver preamp will improve weak copy of marginal signals. With the preamp on and the station in receive mode, signals from the antenna are boosted by the preamplifier and then applied to the receiver input. As above the preamplifier is switched out of the circuit when the power amplifier is keyed.

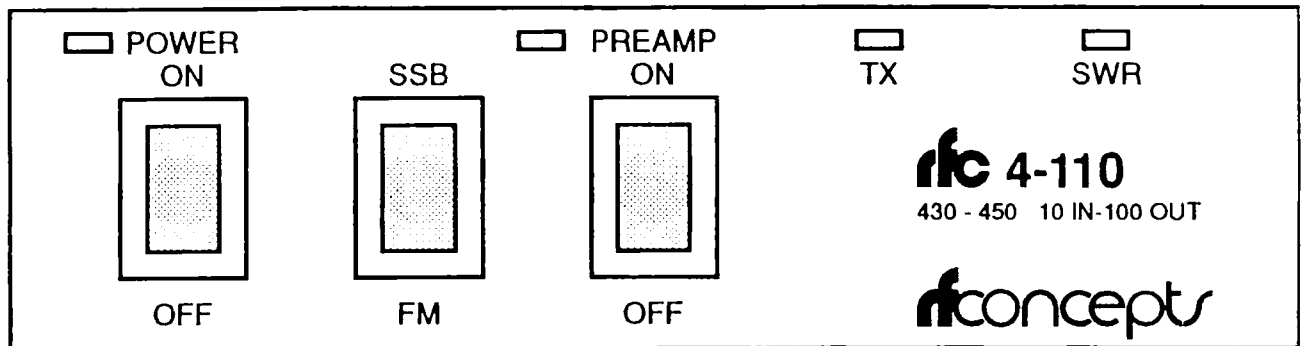
Fault Conditions

The amplifier has a special circuit that senses return power (SWR) from the antenna. If return power exceeds approximately 30 watts, the amplifier automatically shuts off. In this case the SWR LED turns on and the TX LED turns off. To reset the amplifier, turn the power on-off switch off for 5 seconds and then back on. **WARNING:** If this occurs be sure the antenna system is properly matched before operating the amplifier again.

If the heat sink temperature exceeds 175 degrees F (79.4 degrees C), the internal thermostat will open, shutting down the power amplifier. The "TX" LED will go out. The thermostat will automatically reset when the heat sink cools down.

Functions

The functions of the amplifier are controlled by the three front panel switches.

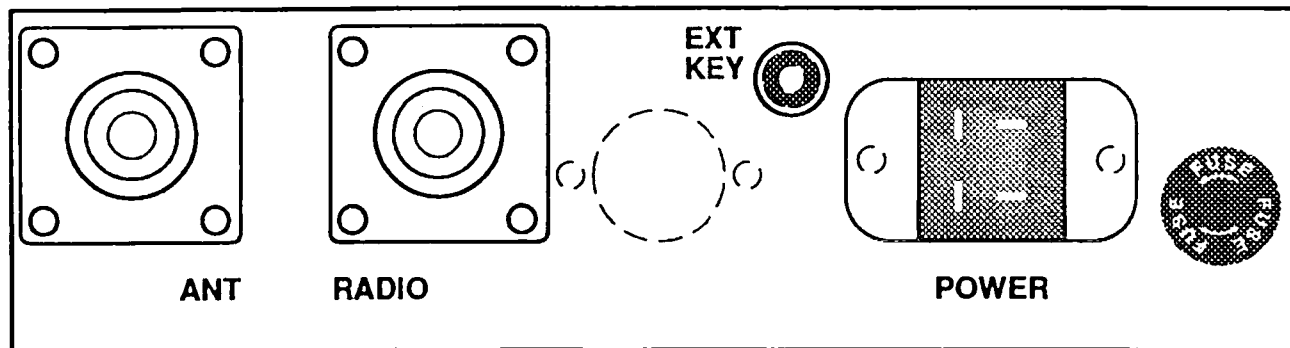


POWER: This switch activates the power amplifier section, and resets the SWR protection circuit.

FM-SSB: This switch changes the dropout delay. 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. See "Delay Adjust".

PREAMP: This switch turns the GaAsFet preamp on. It can be used even when the power amp section is off.

Rear Panel Connections



ANT: Antenna connection.

RADIO: Coax connector for input from the transmitter or transceiver.

CUTOUT: The dotted outline is a cutout for installation of a remote control jack. Contact your dealer or Kantronics to purchase the optional Remote Jack kit.

PHONO JACK: This jack (marked "EXT KEY" in diagram above) is the external keying input. By changing a jumper inside the amplifier, keying may be accomplished by either a ground or a positive voltage of +3 to +15 at 1 mA or less. See "External Keying". **NOTE:** the unit is factory set for "plus voltage" keying.

4 PIN "JONES": Power is supplied through this connector. Allows quick removal of the amplifier, if needed.

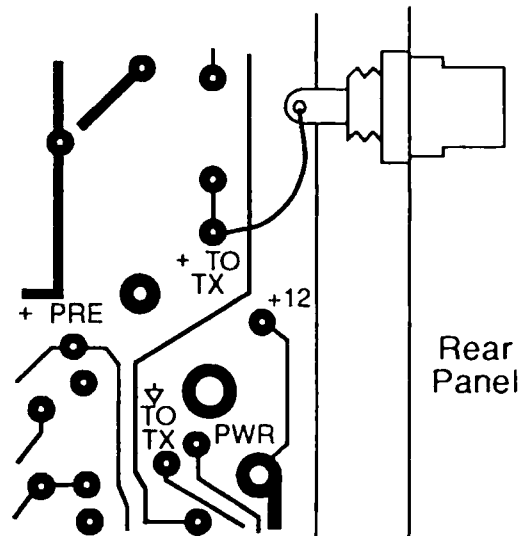
FUSE: A 35 Amp fuse provides protection in case of an internal short circuit.

Internal Connections and Adjustments

DELAY ADJUSTMENT: “SSB delay” can be varied by changing the potentiometer accessible through the hole in the cover on the left side of the unit.

EXTERNAL KEYING: The amplifier is designed to allow for either positive or negative (ground) keying. The amplifier is factory set for “plus voltage” keying. Most transmitters do not provide a “ground” during transmit, but do have a positive voltage available at their back panel. Consult your radio instruction manual to locate this voltage. Keying is applied to the phono jack on the back panel.

To change the amplifier from “plus” keying to “ground” keying you must remove the cover and move the wire connected to the phono jack from the “+” pad to the “∇ TO TX” pad.



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KANTRONICS CO., INC.
LIMITED WARRANTY

Effective December 1, 1992

To be sure you will receive notice of future updates, new product information and prompt warranty service, please take a moment to fill in the Kantronics/rfconcepts Warranty Registration card **COMPLETELY** and return it along with a copy of proof of purchase (to establish purchase date) to Kantronics Co., Inc., 1202 East 23rd Street, Lawrence, Kansas 66046 USA. **Return of the Warranty Registration card and proof of purchase is a pre-condition to warranty coverage.**

1. WARRANTY. Kantronics Co., Inc. ("Kantronics") warrants to the first consumer purchaser ("you"), for the Applicable Warranty Period (as described below), that the Applicable Product (as described below) will be free from defects in material and workmanship.

2. REMEDY. Kantronics agrees that, for any Applicable Product found by Kantronics to be in violation of the warranty of Section 1 hereof within the Applicable Warranty Period, it will, at its option, repair or replace the defective Applicable Product at no charge to you, excluding in-bound shipping charges.

3. EXCLUSIVE REMEDY. Repair or replacement of the Applicable Product, as provided herein, is the sole remedy available to you against Kantronics, and in no event will Kantronics be responsible for any other liability or damages or for incidental, special, or consequential damages, regardless of whether purported liability is predicated upon negligence, strict tort, contract, or other products liability theory and whether or not Kantronics is warned about the possibility of such liability or damages. **SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.**

4. DISCLAIMER. This Limited Warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume

for Kantronics any other liability in connection with the sale of its products. **KANTRONICS SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTY OF MERCHANTABILITY AND IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE FOR ANY APPLICABLE PRODUCT. IF, HOWEVER, YOU ARE A CONSUMER WITHIN THE MEANING OF 15 U.S.C. § 2301(3), THE ABOVE DISCLAIMER OF IMPLIED WARRANTIES IS EFFECTIVE ONLY FOR PERIODS OUTSIDE THE APPLICABLE WARRANTY PERIOD. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.**

5. APPLICABLE PRODUCTS AND PERIODS. Kantronics products are of two types – (1) hardware units and (2) firmware and software for operation of these units, whether incorporated into the units themselves or separate from the units as adjuncts or accessories to the units. Hardware units and the media containing firmware, software and documentation are sold to the consumer purchaser and become property of the purchaser. Firmware and software are licensed for use by the consumer purchaser in return for a fee included in the purchase price of the units and do not become the property of the consumer. (See separate License Agreement provided with these products). The products to which the warranty of Section 1 hereof applies (herein “Applicable Products”) and the periods during which the warranty shall apply to such products (herein, “Applicable Warranty Period”) are as follows:

Applicable Products:

UNITS:

KAM, KPC-2, KPC-3, KPC-4, Data Engine, DVR2-2, D4-10, KTU, rfc 2/70, rfc 2/70G, rfc 2/70H, rfc 2-23, rfc 2-217, rfc 2-117, rfc 2-317, rfc 2-417, rfc 4-32, rfc 4-110, rfc 4-310, rfc 3-22, rfc 3-211, rfc 3-112, rfc 3-312

Applicable Warranty Period:

One (1) year from date of purchase.

ACCESSORIES:

Anemometer, Rain Gauge, Temperature Sensor (for KTU units)

Applicable Warranty Period:

Sixty (60) days from date of purchase.

DE1200 modem, DE19K2/9K6 modem, DE Jumper Board,
MSK modem, Watchdog Timer

Applicable Warranty Period:

One (1) year from date of purchase.

MEDIA:

EPROMS, diskettes, video or audio cassettes, manuals (however bound), specification and other supplemental pages or any other media on which firmware, software or documentation are supplied

Applicable Warranty Period:

Thirty (30) days from date of purchase.

6. EXCLUSIONS. This Limited Warranty does not apply to the cosmetic appearance of the Applicable Product; to broken or cracked cabinets; to any accessory not supplied by Kantronics which is used with the Applicable Product; to any product that has been subject to misuse abuse or overvoltage; to any product that has been modified by non-Kantronics personnel unless specifically authorized in writing by Kantronics; or to any product damaged or impaired by shipping (whether or not caused by poor packaging), neglect, accident, wiring not installed by Kantronics, improper parameter settings which are cleared by performing a hard reset, or use in violation of instructions furnished by Kantronics or of generally accepted industry practice. Kantronics does not warrant that the functions contained in any software will meet your requirements or achieve your intended results; or that operation of any software will be uninterrupted or error-free or without effect upon other software used with it. Responsibility for the selection of the hardware and software program to achieve your intended results rests with you.

7. REMEDY PROCEDURE. Should you need to make a warranty claim, first contact the dealer from whom you purchased the product. If the dealer is unable to assist you, contact Kantronics Co., Inc., by mail at 1202 East 23rd Street, Lawrence, Kansas 66046 USA; by fax at 913-842-2021; or by phone at our Customer Support number 913-842-4476. Contact us prior to returning an Applicable Product to receive a Return Authorization Number. (As a practical matter, problems can often be solved in such a manner without the product having to be returned to Kantronics for repair or replacement.)

Return of any Applicable Product for the enforcement of rights under this Limited Warranty shall be at your expense. Any product returned for warranty service which Kantronics determines to be without defect or not covered by this Limited Warranty shall be subject to a minimum charge of one-half hour labor rate and the product will be returned to you at your sole expense. Please note, no warranty service will be provided until Kantronics has been furnished with your Warranty Registration card and copy of proof of purchase establishing purchase date.

8. NON-ASSIGNMENT. This Limited Warranty is not assignable by you. Any attempt to assign or transfer any of the rights, duties, or obligations hereof is void.

9. OTHER RIGHTS. This Limited Warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.

Return/Repair Procedures

Consult the limited warranty policy in this manual for the service provisions offered by Kantronics at no charge. This warranty is considered to be in force only when the customer has submitted a completed warranty registration within 10 days of purchase, and when the stipulations of the warranty have been met. Violations of warranty clauses will automatically void the warranty and service or repairs will be charged to the owner.

Service outside the warranty will be charged at the cost of parts, labor, and return shipping. Units returned for service without a Return Authorization number will be subject to a minimum charge of 1/2 hour labor plus shipping and handling. Contact the Service Department (913-842-4476) to obtain a Return Authorization number. Repaired units will be returned via UPS C.O.D. These C.O.D. charges can be avoided by including your VISA or MasterCard number with your unit to be repaired. Shipping and repair may then be charged.

When service or repairs appear necessary, it may be wise to call or write Kantronics to determine if the problem can be solved without returning the unit.

When calling, report the product name and ask for the Amateur Radio Service Department. Should you find it necessary to call for assistance, please have the unit name and serial number available. (The serial number is found on the rear panel.)

The Service Department telephone hours are 9 am - noon and 2 pm - 5 pm Central Time 913-842-4476, Monday through Friday.

Returns to the factory for refund or exchange are strictly regulated. Any return for refund or exchange must be approved by the service department.

Additional International Support

International Returns

In case of unit problems, first contact the dealer from whom you purchased the product. If you must return a Kantronics/rfconcepts product to us, please observe the steps outlined below. It will save both you, the customer, and Kantronics/rfconcepts unnecessary difficulties and expense.

1. All returns must be shipped to the factory at 1202 East 23rd Street, Lawrence, KS 66046 USA.
2. All expenses of returning item(s) to Kantronics/rfconcepts must be paid by you, including any duty/entry fees, whether the return is for warranty or non-warranty repair.
3. Usually, the best way to return item(s) to us is by mail. However, if you wish to use one of the courier services such as DHL, Federal Express, etc., be sure to use **DOOR-TO-DOOR** service. If you use one of these services, a commercial invoice may be required. Please check with your carrier before shipping.
4. Include in the description of the item(s) on the paperwork (whether postal or courier) the words:
 “U.S. GOODS RETURNED FOR REPAIR/REPLACEMENT.”
An *additional* description of “Amateur radio peripheral equipment”, or “Data communications equipment”, would be helpful. It would also be helpful (but not required) to include the code number 9801.00.1035 9 which tells U.S. Customs agents that the package contains “U.S. goods returned without improvement/enhancement”. However, if the words “U.S. goods returned for repair/replacement” are on the paperwork, the number is not really necessary.
5. Provide a value for customs purposes. This is usually the value of the item(s) in their current condition. A \$0 value is not acceptable for U.S. Customs.

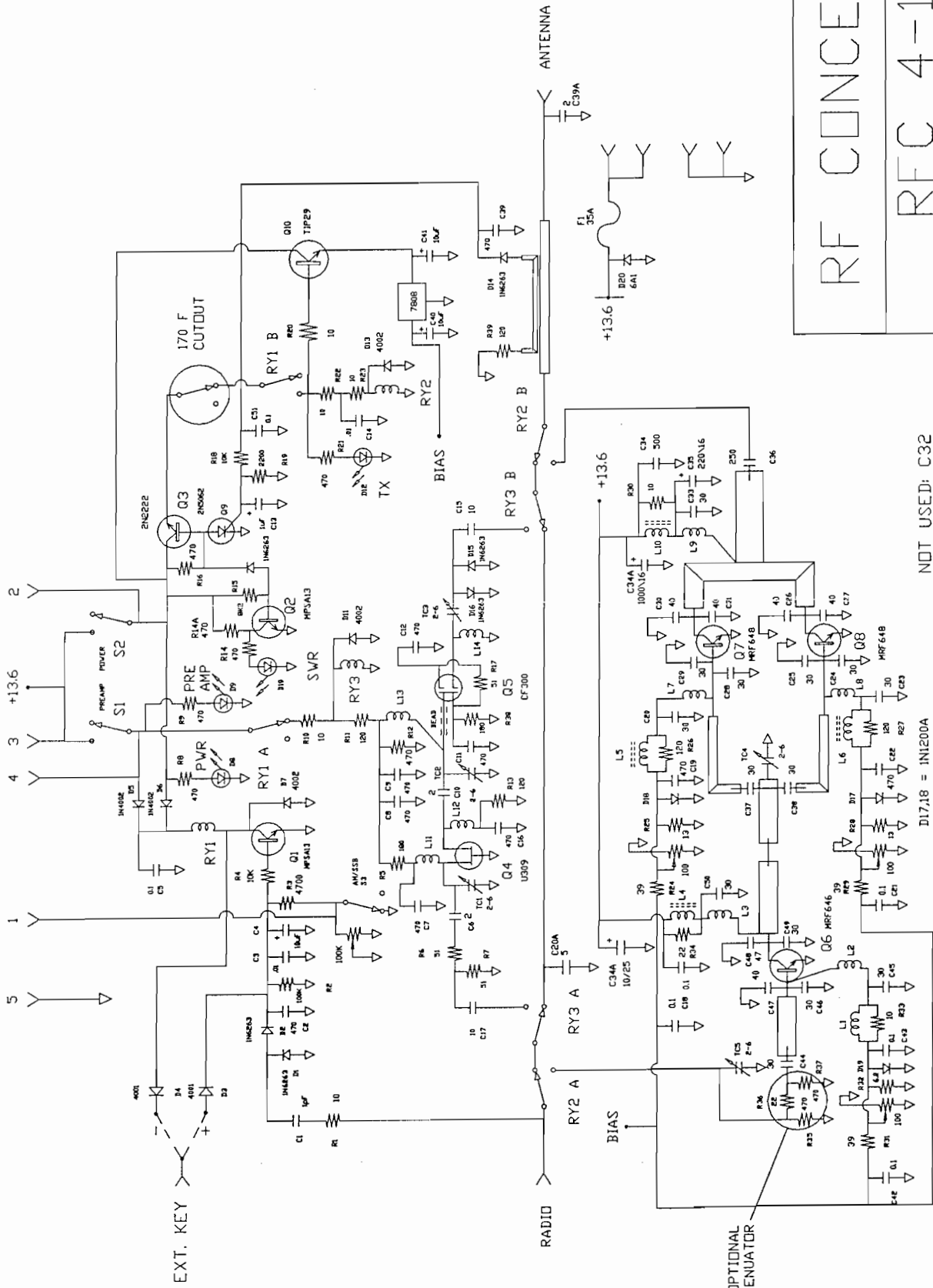
6. Inside the package, with the item(s), include:

- a fax number (if available) in case we need to contact you
- a correct and full address for return
- method of payment to be used for any charges (if MasterCard or VISA, include expiration date).
- a brief description of the problem
- a reference to any conversations with the technical/sales staff about the problem
- and the Return Authorization number assigned.

7. For warranty repairs, we will pay the shipping charges to return the item(s) to you via **air parcel post**. If you wish return by courier service, include your account number. To be eligible for repair under warranty, we must have a record that you sent your Warranty Registration card and proof of purchase to Kantronics/rfconcepts, and the item(s) must still be within the warranty period at the time the return is authorized.

8. For non-warranty repairs, you must pay the return shipping charges.

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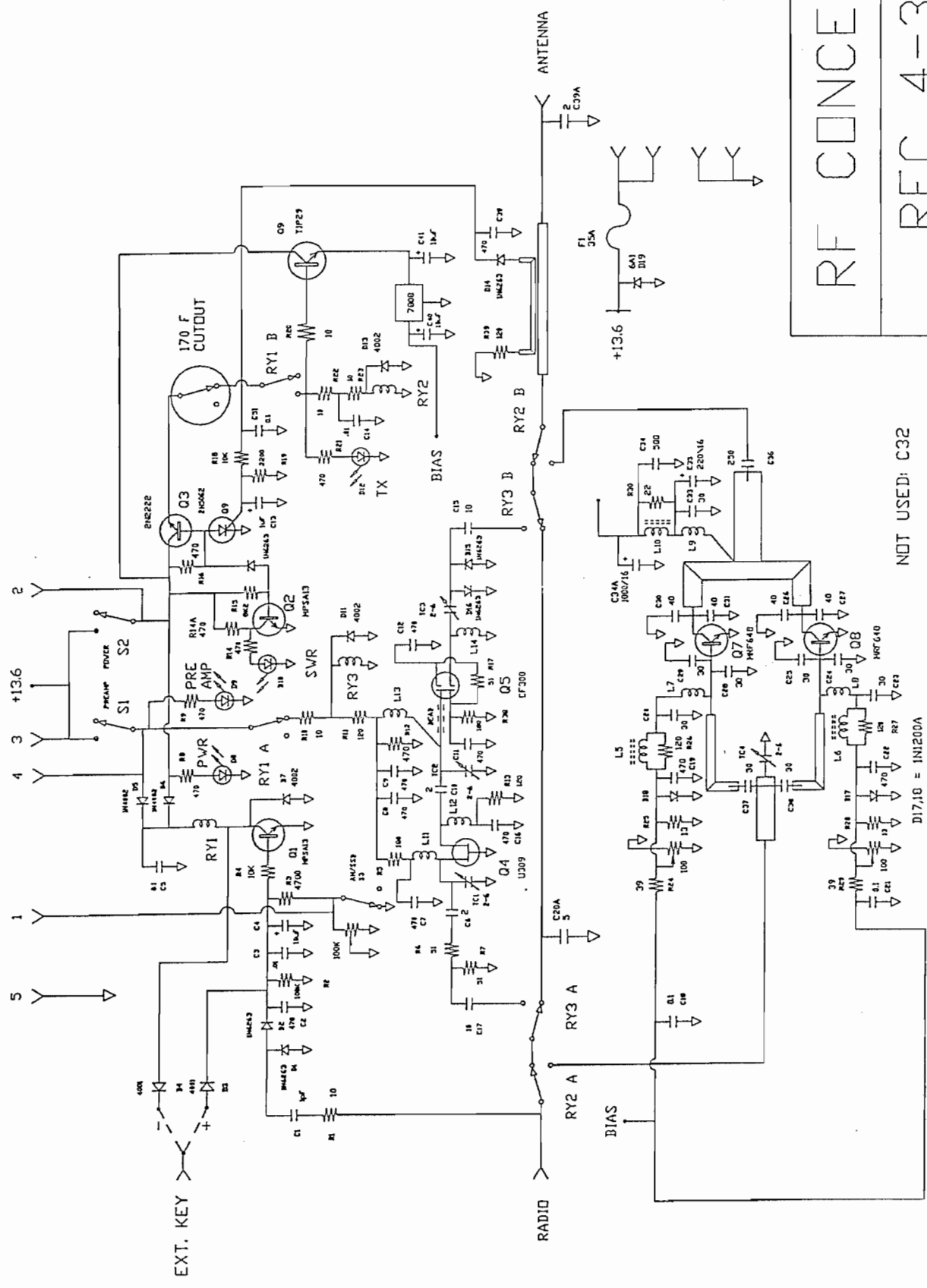
RFC 4-110

DRAWN BY J. QUINN DATE 1-25-89
 Rev. C 9-5-89

NOT USED: C32

COMPONENT VALUES MAY CHANGE WITHOUT NOTICE TO IMPROVE PRODUCT PERFORMANCE.

D117,18 = 1N1200A



RF CONCEPTS

RFC 4-310

DRAWN BY J. QUINN
 DATE 1-25-89
 Rev. C 9-5-89

NOT USED: C32

COMPONENT VALUES MAY CHANGE WITHOUT NOTICE TO IMPROVE PRODUCT PERFORMANCE.