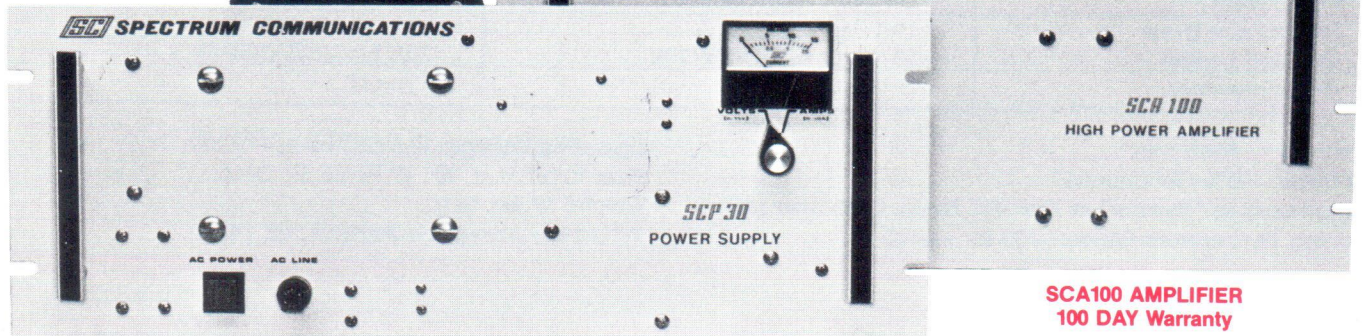


150W VHF & 100W UHF POWER AMPLIFIERS

Includes many **standard** features that are optional on competitive units

SCA100

SCP30 POWER SUPPLY

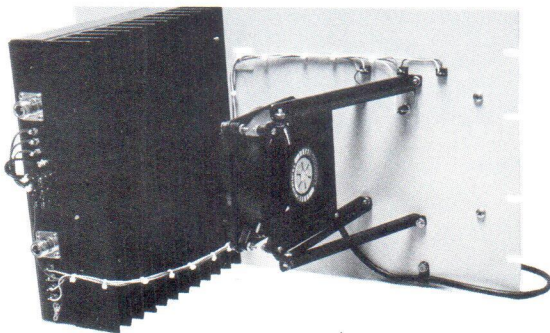


SCA100 AMPLIFIER
100 DAY Warranty

The Spectrum SCA100 High Power Amplifiers are the final amp stages for 100-150W Spectrum Transmitters, Repeaters and Base Stations, but they can be used with any 10-40W Transmitter, Repeater or Base Station. They were specifically designed for **absolutely 100% continuous duty**—i.e., “key-down” for hours, or even months at a time. They are **definitely not** just another “mobile amp” bolted to a rack panel or a larger heat sink!

Actual tests of competitors’ units which use a rack-mount “small-fin” heat sink reveal very poor heat dispersion. They run “super-hot” at the center of the heat sink near the critical power transistors, and very cool at the edges, (due to the high thermal

resistance over the length of a large heat sink). This leads to an early failure. The fins away from the center dissipate very little heat and are of little use. This problem does not occur with the SCA100 since a massive “deep fin” heat sink is used along with a high efficiency forced air cooling system—**which is far more effective than convection cooling!** Even after hours of key-down operation, the heat sink is only slightly warm at the hottest spot! This ensures years of trouble-free operation, even in high ambient temperature areas. Excellent cooling is the key to success for any high power amp, and an area where competitive units are sadly lacking.



Rear View of SCA100
Fins are vertical for greatest cooling efficiency

FEATURES

- **State of the Art Broadband Design** using the highest quality high power components available, along with the finest workmanship and very heavy duty mechanical construction. Rugged emitter balasted RF transistors rated for 20:1 VSWR @ all phase angles. Mil Spec G-10 glass-epoxy PC board.

FULLY PROTECTED

- **VSWR Protection.** In the event of high output VSWR, the amp will shutdown and go into “bypass” mode. Then an automatic logic circuit will “reset” up to 4 times at 15 second intervals. If the VSWR is still high after the fourth try, the amp will latch off until manually reset. This unique feature prevents transmitting full power into a damaged cable or antenna, but if there should be a momentary fault, the amp will automatically return to normal operation—*thus preventing needless trips to a remote site.*

- **Automatic Amplifier “Bypass” if power supply should fail,** (standard)—permits ‘straight through’ exciter operation on emergency battery power if exciter is so equipped. High quality encapsulated RF changeover relay is triggered by RF input, and also functions as an antenna T/R relay for base station transceiver applications.
- **Overtemperature Protection.** In the unlikely case that the amp should begin to run extremely hot, it will automatically go to “bypass” mode until it cools down—thus protecting the expensive power transistors. It will automatically “reset” when cool.
- **Reverse Voltage Protection** on DC input.
- **Convenient Front Panel LED Status Indicators** show RF output, VSWR Fault Shutdown & Overtemperature Shutdown to facilitate rapid fault location. Front Panel VSWR Reset button.
- **Behind the panel heat sink arrangement** permits use in cabinet with locking front door (for security from tampering)—**without loss of cooling effectiveness.**
- **Cooling System** uses a quiet, high quality fan rated for 80,000 hrs. continuous operation.
- **Unusually Tight RF Shielding & Filtering** eliminates “stray RF” leakage problems common to almost all other rack-mount amps on the market.
- **Linear Mode Option**—for SSB or ACSB operation. Custom.
- **115 VAC, 50-60Hz fan normally supplied. Optional 220VAC & 12VDC fans available.**

ORDERING INFORMATION

Specify Frequency, Power Input, & Primary Supply Voltage.



SPECTRUM COMMUNICATIONS CORP.

1055 W. GERMANTOWN PIKE NORRISTOWN, PA. 19403-9616 U.S.A.
(215) 631-1710 TELEX: 846-211 SPECTRUM NTW

PERFORMANCE SPECIFICATIONS FOR SCA100 SERIES POWER AMPLIFIERS

	VHF	UHF
Model No.	SCA100V and SCA100V-10	SCA100 and SCA100-10
Frequency Range	136-174MHz	406-512MHz
RF Output Power	150W nom.	100W nom. (80-90W typ. above 475MHz)
RF Input Power for Full Output	30W nom. (SCA100V) 6W nom. (SCA100V-10)	40W Nom. (SCA100) 10W nom. (SCA100-10)
DC Current Draw @ Rated Output	19A typ. (SCA100V) 23A typ. (SCA100V-10)	15A typ. (SCA100) 20A typ. (SCA100-10)
RF Connectors	UHF S0239	Type N

Harmonics: -65dB min.

Duty Cycle: 100% Continuous

Insertion Loss in "Bypass" or Xcvr. RX Mode: Less than 1dB

Operating Temperature Range: -30 to +60°C

Operating Voltage: 13.6VDC nom. 11V min. 14.5V max.

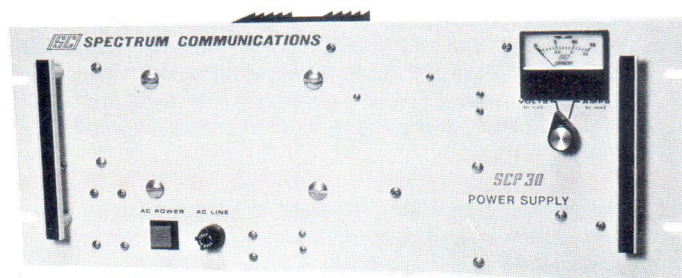
Size: 10½" H x 19" W Panel. 9" Deep.

Weight: 13 lbs. net.

FCC Type Accepted—Parts 21, 22, 74, 90

SCP30 HEAVY DUTY 30A POWER SUPPLY

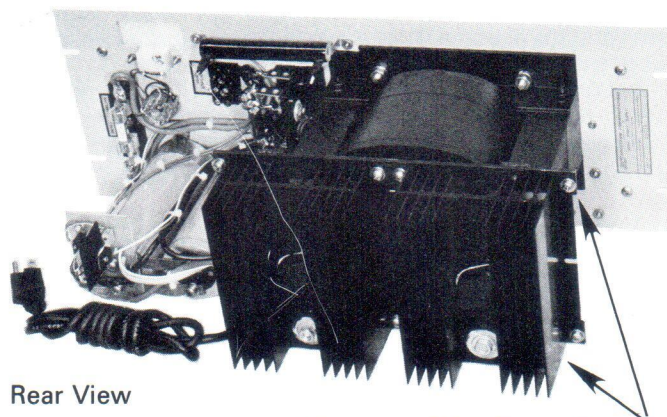
For use with SCA 100, or any application requiring an Extremely Heavy Duty High Current Supply



Made in U.S.A.

Applications

- High Power RF Amps, Transmitters, etc.
- Service Bench
- Industrial & Commercial



Rear View

Massive 30# Transformer and Heat Sinks

Metal Case Available

Input Voltage: 115 or 230 VAC nom., 50-60Hz. Other Primary Taps at 105, 125 and 210, 250VAC for high or low AC line areas.

Output Voltage: 13.8VDC nom. Adjustable 9.5-16VDC typ.

Max. Output Current: 25A (100% Continuous Duty). 30A (70% Intermittent Duty Cycle: 10 min. max On, 4 min. Off.)

FEATURES

- **Solid State Electronic Regulation**
- **Designed specifically to operate 100% continuously**, at 25A min. load current (for many years) without running "super hot" and burning-out, as with most competitive units.
- **Unusually Heavy Duty Power Transformer** combined with a unique design very low dissipation regulator provides excellent regulation and ripple rejection without the usual high heat dissipation series regulator, or the complex circuitry and potential problems of a switching regulator. (RFI, etc.) Immune to stray RF.
- **Over-current Protection Circuit** shuts down the supply if there is a short or excessive current draw on the output.

Ripple: 30 mVpp typ. @ 25A load

No Load to Full Load Regulation: 0.1V typ.

Line Regulation: <0.1% change in V_o with $\pm 5\%$ change in V_{in} .

Operating Temperature Range: -30 to +60°C

Metering: Built-in front panel meter for output voltage & current.

- **MOV Transient/Spike Protection** on line input. AC line fuse.
- **Optional Automatic Switchover to External Battery Backup** in the event of AC power failure. All solid state switching—no relays. Includes Trickle Charger to maintain full battery capacity. Battery input fused & reverse polarity protected.
- **Straight forward design, plus extremely heavy duty construction and very conservatively rated components assure years of reliable operation.**
- **Standard 19" rack mount, 7" panel height, 9½" deep. Net weight: 38 lbs. Shipping wt.: 44 lbs.**
- **6 Month Warranty—covers parts & labor.**



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SPECTRUM NTW

SCA100 POWER AMPLIFIER MANUAL

SECTION 1 INTRODUCTION

We would like to take this opportunity to thank you for becoming one of the discerning individuals or organizations to own the Spectrum Communications' SCA100 Amplifier. Our company is dedicated to the development of very high quality products, manufactured in limited quantities, and we anticipate that they will always be in short supply. Only the finest quality components and workmanship are used throughout the SCA100. The components are carefully selected and derated for many years of trouble-free operation. The unit is 100% solid-state and is designed for continuous duty, unattended service.

SECTION 2 UNPACKING AND INSTALLATION

Unpack the amplifier and all accessories carefully. Save the box and packing materials for use if the unit should ever have to be shipped. This amplifier is designed for mounting in a 19" standard rack or cabinet.

The amplifier should be connected to the exciter, duplexer (if used) or antenna with proper cables. Keep all cables, including DC Input, as short as possible.

SECTION 3 OPERATION

Operation of this amplifier is automatic, controlled by the presence of an input drive signal. With no DC Input, or in the event of detected failures, the exciter is automatically connected to the output connector of the amplifier.

SECTION 4 SPECIFICATIONS

RF Output Power: 100 Watts nom. (80-90W typ. above 475 MHz.)
Frequency Range: 406-512 MHz
RF Input Power for full output: 35-40 W nom. (SCA100); or 10W
nom. (SCA100-10) 406-470 MHz.
Harmonics: -65dB min.
Duty Cycle: 100% Continuous
Insertion Loss in "Bypass" or Xcvr. RX Mode: less than 1dB
Operating Temperature Range: -30 to +60°C
RF Connectors: Type N
DC Current Draw: 15A typ. (SCA100), 20A typ. (SCA100-10)
Operating Voltage: 13.6VDC nom. 11V min. 14.5V max.
Size: 10½" H x 19" W Panel. 9" Deep.
Weight: 13 lbs. net.

SECTION 5 SETUP AND ADJUSTMENT

5.1 ADJUSTMENT PROCEDURE

The three internal adjustments on the SCA100 are factory set and will not usually require attention. Normally the only setup required will be to connect the RF input, RF output, +13.6VDC and ground cables to their terminals and the blower cord to a source of 115VAC. *A few precautions should be observed to assure best operation and reliability.

- 1) Use at least #12 wire for the +13.6V and ground cables. (#10 is supplied)
- 2) Be sure that nothing is placed in a position that could interfere with air circulation around the heat sink.
- 3) If repeated fault indications occur, find and correct the problem before resuming operation.
- 4) Do not apply more than 40 Watts of input drive power. (10-12 Watts for 10W input units.)
- 5) Use only good quality double shielded coaxial cable to connect the exciter to the amplifier and from the amplifier to the duplexer. The very good shielding of this amplifier can be made useless by leakage from cables. (Short lengths of RG-214 are recommended for repeater or full duplex applications - RG-213 or 8 otherwise.)

5.2 TUNING PROCEDURE

In the event that it does become necessary to readjust the internal controls, the following steps should be used:

- 5.2.1. Input tuning (C701) and output tuning (C716) should be adjusted for best output power (as measured with a Bird ThruLine Wattmeter or equivalent) consistent with good efficiency - i.e., minimum current draw.
- 5.2.2. The VSWR Trip Point must be set using a Bird Wattmeter or equivalent and a triple stub tuner or other means to vary the reflected power. Connect the Wattmeter input to the amplifier output with stub tuner between the Wattmeter output and a 50ohm dummy load. Key the transmitter and adjust the stub tuner for 18-20 Watts reflected power. Using a Simpson or similar voltmeter, read the DC Voltage at the ungrounded end of R708.

Note: Be certain that the voltmeter used is not sensitive to strong RF fields. Many VTVM's, FET VOM's, Digital Voltmeters etc. will give inaccurate readings when the transmitter is keyed.

Unkey the transmitter and adjust R710 (the trip point set) for a voltage on pin 2 of U701 exactly equal to the voltage measured above.

*NOTE: 12VDC and 220VAC Fans are also available.

SECTION 6 THEORY OF OPERATION

6.1 RF AMPLIFIER

The input signal is applied to an input signal sensor consisting of C738, CR710 and associated components. The resulting DC signal is applied as an input to the fault detection logic circuitry. If normal conditions exist, relay RY701 is operated, connecting the input RF signal to the input matching circuitry. This input circuit matches the 50 Ohm nominal input impedance directly to the bases of Q701 and Q702 by means of stripline transformers Z701 and Z702 in the 40 watt input version, and to Q703 in the 10 watt input unit. For the 10 watt input unit, the input signal is matched to the base of Q703 by an LC network and amplified to 40 watts. This output is then applied to the input circuit of Q701 and Q702. Q701 and Q702 amplify the signal to the 100 watt level. Their output signals are combined and matched to a 50 Ohm load by stripline transformers Z703 and Z704. The signal is then filtered by a 3 section low pass circuit (C717, C718 and C719 with L707, L708 and L709) and connected to the output connector via contacts on relay RY701.

6.2 RF SWITCHING RELAY

The Transmit/Receive and Fault Detection Logic Section consists of U701, U702 and U703 with their associated circuitry. When an input signal is applied to the amplifier, it is sensed by C733 and detected by CR710. The resulting DC is amplified to logic level and inverted by Q706, producing a 'low' on input pin 12 of V703D. If pin 13 is low (as will be the case if no faults have been detected), output pin 11 will go 'high'. This high is applied to the base of relay driver transistor Q705, operating relay RY701. The contacts on this relay connect the input jack to the base circuit of the RF Amplifier and the collector circuit to the RF output connector.

6.3 HIGH VSWR PROTECTION CIRCUIT

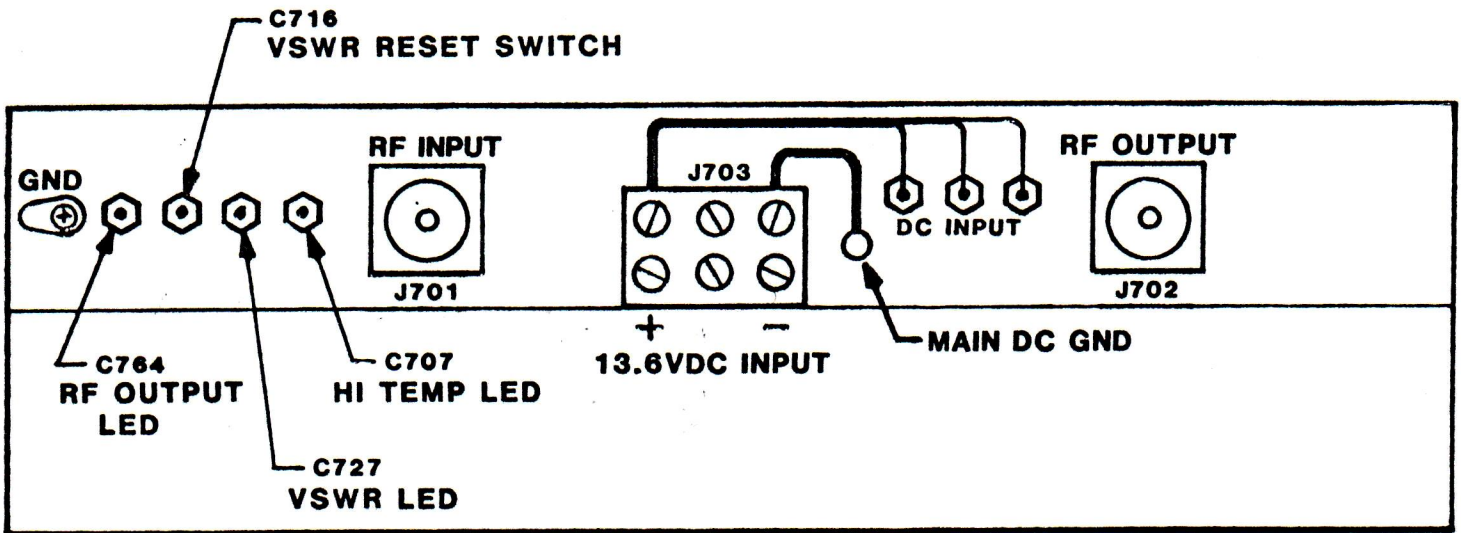
Reflected Power on the output line is sampled by a stripline directional coupler. The sampled RF is rectified by CR705, yielding a DC voltage proportional to reflected power. This voltage is applied to the noninverting input of comparator U701 through an R-C time constant circuit consisting of R709 and C727. The voltage on the inverting input of U701 is set by potentiometer R710.

When capacitor C727 has charged to a voltage equal to that on the inverting input of U701, the comparator output goes from a logic low level to a logic high level. This signal is applied to pin 14, the clock input, of counter U702 which

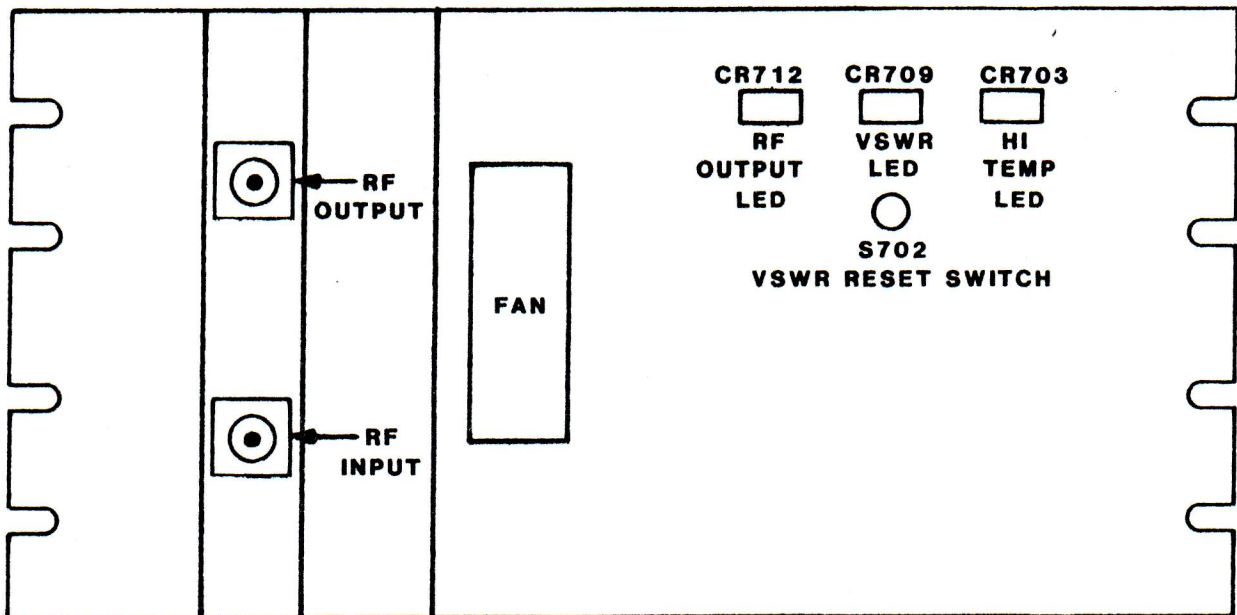
advances one count for each positive transition. The output of U701 is also applied to the base of Q704 through R712. Q704 is turned on by a high from U701 and discharges C732, pulling input pins 1 & 2 of U703A low. U703A inverts this input to a high on output pin 3, which is connected to input pin 6 of U703B. A high on this input causes output pin 4 to go low. This low is inverted by U703C and the resulting high is connected to pin 13 of U703D, causing output pin 11 to go low which turns off Q705. The relay drops, connecting the RF input directly to the RF output, thus disconnecting the RF Amplifier. The sampled reflected power is then zero and the output of U701 goes low. C732 charges through R719. When the voltage on C732 reaches approximately 2/3 of the supply voltage, pin 3 of U703A goes low and RY701 is again activated. If high reflected power is again sensed, the sequence is repeated. This will continue, at approximately 15 second intervals, until counter U702 reaches a count of 5. The "5" count from U702 is applied to input pin 5 of U703B and to the inhibit input of the counter. The high on pin 5 of U703B prevents further cycling of the relay until the counter is manually reset with the front panel VSWR RESET switch S702. This condition is indicated by CR708, the "VSWR" LED.

6.4 HIGH TEMPERATURE PROTECTION

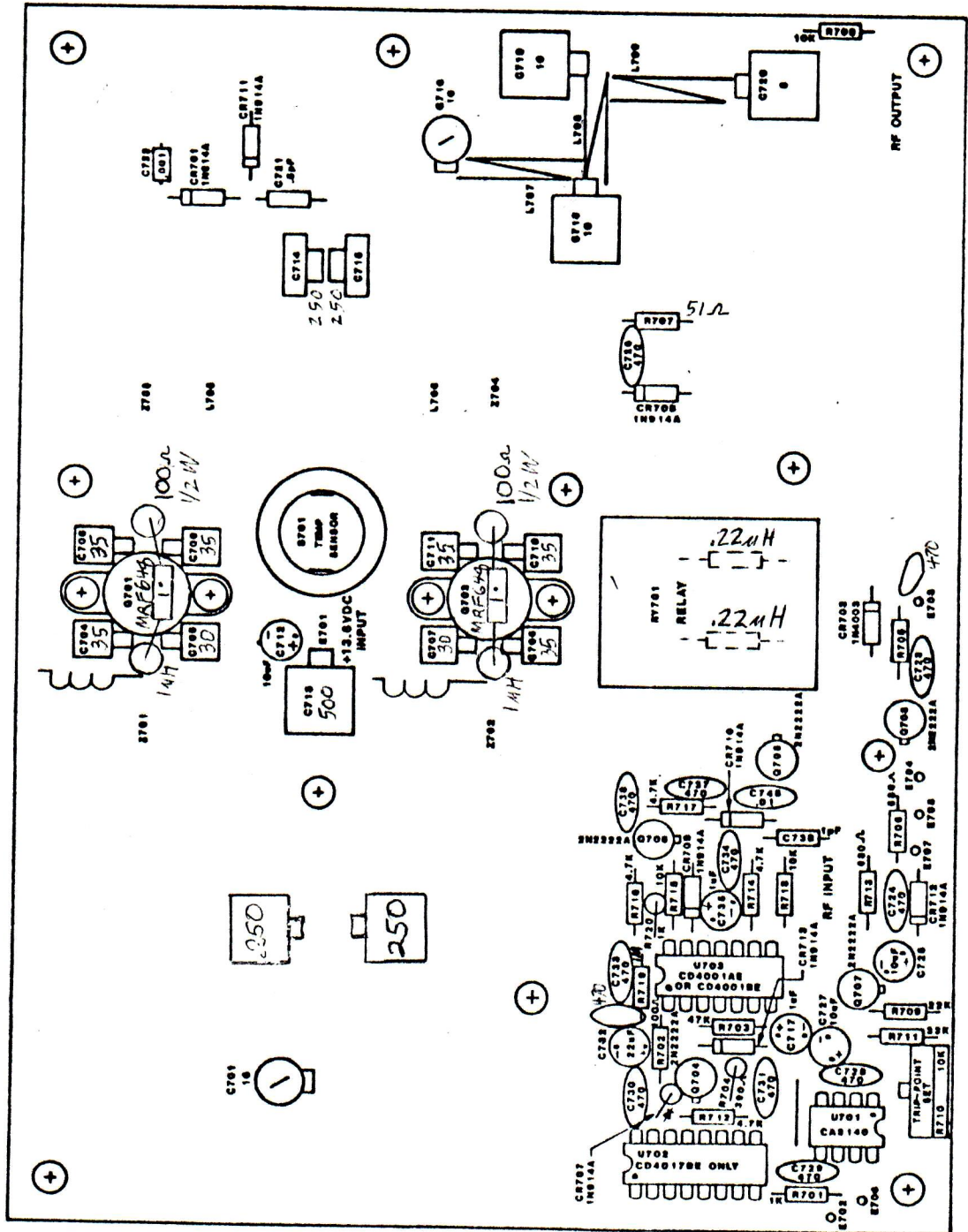
The heat sink temperature is sensed by thermal switch S701. If this temperature exceeds 200°F, the switch contacts open, interrupting the current to the coil of RY701. This condition is indicated by CR704, the "temp" LED. When the temperature of the heat sink falls to about 150°F, S701 closes automatically, restoring normal condition.



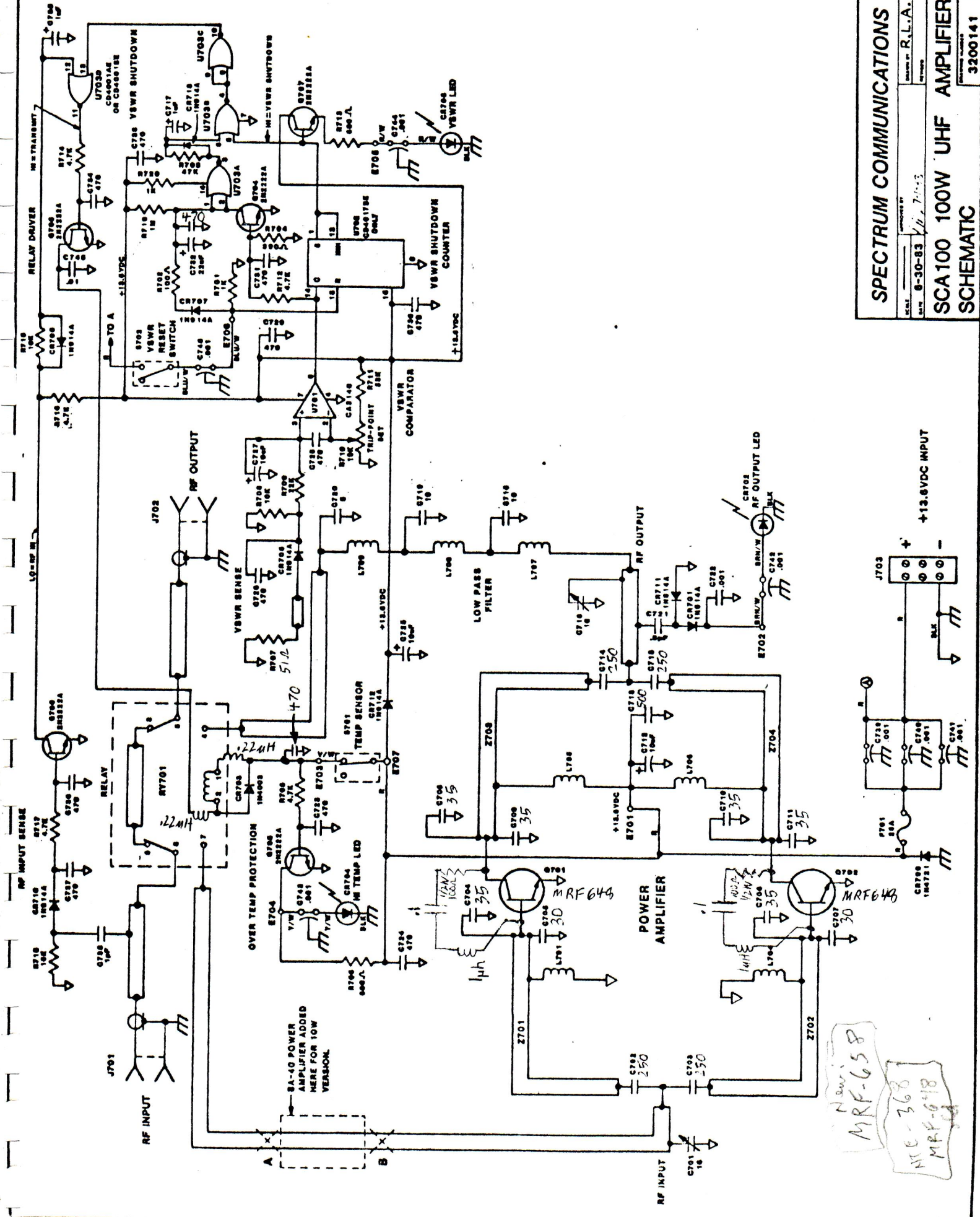
SCA100 HEATSINK/HOUSING ASSEMBLY



**SCA100 FRONT PANAL ASSEMBLY
(REAR VIEW)**



DATE	REV	DESIGNED BY
8-30-83	1	R.L.L.A.
		REVIEWED BY



New
MRF-658
MRF-648