PAC 15-100-C
450 - 475 MHz UHF COMMERCIAL AMPLIFIER

This series of amplifiers is designed for 450 - 475 MHz band operation. The designs use the latest in micro-stripline techniques and highest quality state-of-the-art transistors. Relay switching is automatic RF sensing. These units do not require any tuning. The broadband design offers the ultimate in flat input VSWR 1.4:1 or less, and produces rated power output or better across the entire 25 MHz band.

BASIC OPERATION

The front panel switch puts the amplifier "in" or "out" of the transmission system. With the switch "out" the RF supplied bypasses the amplifier. With the switch "in" the power supply Voltage is applied to the RF sensing and relay circuitry inside the amplifier and the green "ready" LED on the front panel lights up. No current is drawn, however, until the transceiver or transmitter is keyed and RF is applied to the amplifier. Then an audible "click" from the relay can be heard, the red "RF on" LED will light, and the RF supplied will be amplified.

In over-temperature situations (circuit board temperature exceeds 160 °F) the amplifier is automatically switched "out" and the yellow "over temp" LED lights up. This can happen when the amp is run harder than the ICAS rating and/or air circulation is inadequate.

Where a remote switch is desired, +13 VDC can be applied through a switch to the "remote" phono jack on the rear panel. This provides remote "in-out" switching only when the front panel switch is "out."

SPECIFICATIONS

POWER OUTPUT	100 Watts, nominal with 15 Watts of drive
POWER INPUT	5-15 Watts
FREQUENCY RANGE	450-475 MHz, no tuning required
INPUT VSWR	Less than 1.5:1 from 450-475 MHz; less than 1.5:1 in the bypass mode
IMPEDANCE	50 Ohms, nominal
SUPPLY VOLTAGE	13.5 VDC, nominal (11-16 VDC)
SUPPLY CURRENT	20 amps, nominal
CONNECTORS	RF jacks - Type "N"; Remote control - RCA "phono"
PROTECTION CIRCUITRY	Over-temperature sensor - 160 °F (LED indicator and automatic shutdown) Over current breaker Reverse voltage - Shunt Diode

OPERATING CLASS..... AB1 Linear

KEYING..... COR keying provided automatically by applied drive. Amplifier can be controlled remotely by applying +14 Volts to the RCA jack center conductor. This places the amp in "ready" mode.

TYPE ACCEPTANCE..... This unit is type accepted under FCC part 90

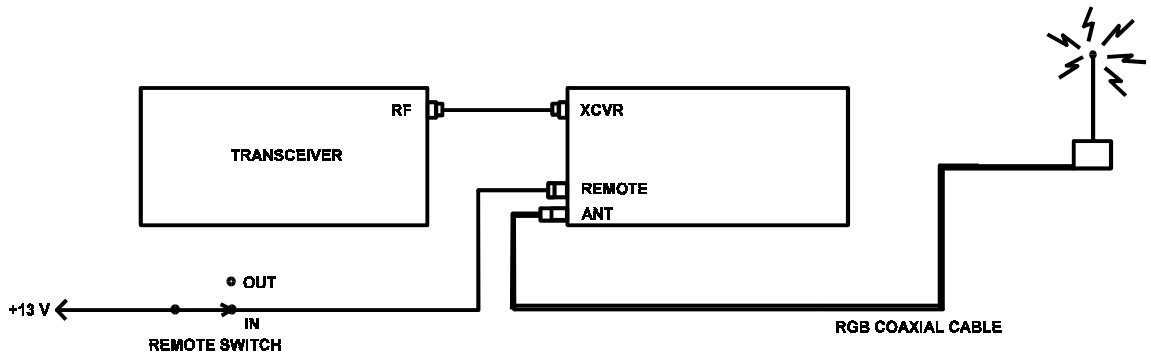
SIZE..... 2.375" H x 7" W x 10" D

INSTALLATION

Installation of the PAC 15-100-C amplifier is quite simple. The output of the driving transceiver is connected to the "XCVR" input via a short piece of coax (RG-8 preferred). The output of the amplifier is connected to the vehicle's UHF antenna. It should be noted that at this power level, RG-8 coax should be used for minimum losses and heating of the coax. RG-58 is too small to avoid losses and dielectric heating should the antenna develop VSWR problems.

The DC power to the amplifier should be provided from a source close to the battery through at least #12 wire (with #10 preferred). At 18 amps of current, losses through smaller wire and/or various pressure-type connectors may degrade power output performance by generating voltage drops.

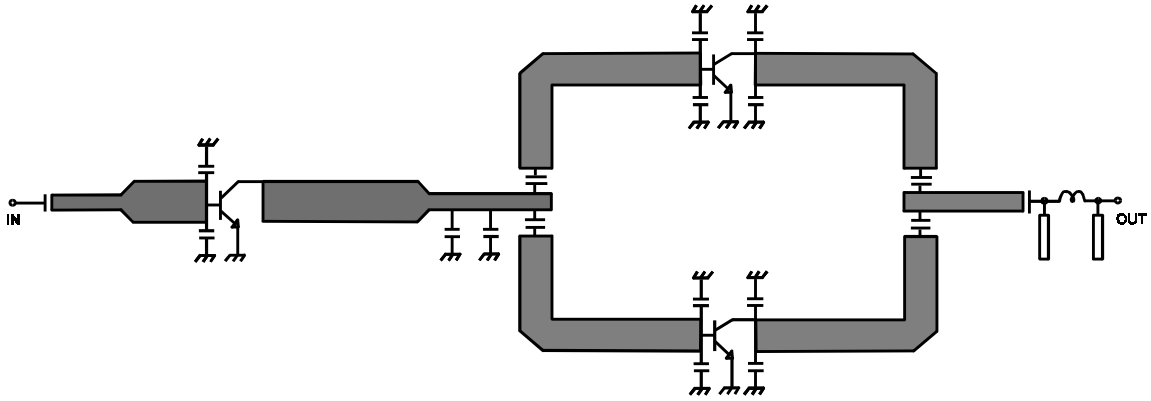
If remote switching is desired, another cable (preferably shielded) should be connected between a positive 14 Volts through a switch to the remote input on the PAC 15-100-C. The front panel switch must be "out" to use the remote jack.



No tune-up should be required as the circuit is broad-banded to cover the entire 450-475 MHz band. If tuning is required, refer to the factor for service. Only a qualified holder of an FCC second-class radiotelephone license (or higher) should tune or otherwise adjust this amplifier. Additionally, a spectrum analyzer should be used to monitor harmonic and spurious outputs to ensure that proper operation is obtained.

CIRCUIT THEORY AND DESCRIPTION

The PAC 15-100-C uses modern solid state devices and stripline techniques to achieve a broadband, high reliability power amplifier design.



The input signal from the driver transceiver is matched to the base of the PAC 15-100-C driver transistor via a microstripline matching network. The collector of this stage is impedance at this point where the signal is split for amplification by twin power amp stages.

The base of each power amplifier stage is matched using stripline techniques and their collectors are also matched to present the proper impedance for recombining at the output.

Various small capacitors are used to tune out reactances of the lines and multi-section matching networks to insure broad band tuning (450-475 MHz).

DC power is fed into the collector of each device via microstrip inductors and/or air wound inductors.

DC ground returns are provided by either air-wound or microstrip inductors.

A low pass filter consisting of 1/4-wavelength sections of coax (at 2Fo) and a 1 turn coil provides both a notch due to the characteristics of a 1/4-wavelength piece of coax, and a low pass filter using the capacitance of the coax and the inductance of the coil.

A DPDT relay provides straight through (bypass) operation. It can be keyed using the internal RF detector circuit. An MPSA-13 darlington transistor is used to key the DPDT relay.

INSTALLATION HINTS

Should you have trouble with your PAC 15-100-C installation, check the following:

1) Are all cables low loss (RG-8 or better), 50 Ohm coax free from shorts or open shielded?

2) Is your transceiver particularly sensitive to VSWR? Varying the length of coax between the amplifier and transceiver or the amplifier and the antenna may reduce interaction. An electrical 1/2-wavelength is generally the best choice (electrical 1/2-wavelength = 1/2-wavelength x velocity factor).

3) Is the amplifier keying (RF) intermittently or "buzzing"? Check the output from the driving transceiver to ensure that it has sufficient output. Check for high antenna VSWR. Try changing coax length. Check for RF feedback into your transceiver due to open mike cable shield, connecting cable shield, close antenna proximity, high VSWR on feedline, etc.

4) Is the amplifier producing low output? Confirm proper drive level by checking with a Wattmeter. Confirm proper supply voltage . . . 13.5 VDC <u>at the amplifier</u>. If it is not 13.5 V, power will be down in direct proportion. If high VSWR is present on the amplifier input but through (bypass) power is OK, one or more of the transistors may be blown. They can be checked using an ohmmeter from base to collector and base to emitter. Low resistance should be seen in one direction with high resistance in the opposite direction (all DC ground and power supply connections must be removed to check this, of course).

   Do not overlook the possibility that the wattmeter may not be very accurate at this frequency. Additionally, a wattmeter used at the lower end of its scale will not be as accurate as when used at the upper end of the scale. (Accuracy is listed as a percentage of full scale in most cases.)

TECHNICAL ASSISTANCE

If you have any problem with this unit first check the appropriate section of this manual. If the manual does not reference your problem or your problem is not solved by reading the manual you may call MIRAGE at 601-323-8287. You will be best helped if you have your unit, manual and all information on your station handy so you can answer any questions the technicians may ask.

You can also send questions by mail to MIRAGE, 921 HWY 25 South, Starkville, MS 39759 or by Fax to 601-323-6551. Send a complete description of your problem, an explanation of exactly how you are using your unit, and a complete description of your station.

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