

ELECRAFT Application Note

Power Output Modification for the KX1

Revision B, April 2006
Elecraft Part Number: KX1PWRMODKT
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Background

Some KX1s have slightly lower transmitter output than others due to slightly lower gain in the transmit circuits. When using a 14V supply the output may be as low as 2.5 to 3 watts instead of the expected 3 to 4 watts. When using the internal battery the output may be as low as 0.75 to 1 watt instead of the expected 1 to 1.5 watts. The difference between these output levels is rarely a factor in communication, but some operators prefer a higher output level. The modification described here will increase the output power.

Changes Needed

This modification requires changing only two resistors on the KX1 printed circuit board (PCB). Both resistors are easily accessible even if the KX1 is equipped with the KXB30 or KXB3080 modules. The following parts will replace those already in your KX1:

Ref.	Description	Qty	Part No.
R11	Resistor, 1/4 watt, 4.7 ohms	1	E500062
R30	Resistor, 1/4 watt, 33 ohms	1	E500036

Procedure

Open the KX1 and set the bottom cover aside.



Observe ESD precautions when handling the KX1 PCBs. Wear an ESD wrist strap or touch an unpainted, metal ground frequently while working. See your KX1 Owner's Manual for more information.

If present, remove the KXAT1 ATU PCB. Put it in a safe place. Use an ESD-safe bag if one is available.

Remove the knob and three flat-head screws and free the main KX1 PCB from the top cover.



Do not touch relays or other components with a hot soldering iron or desoldering tool! Relays are especially vulnerable to heat damage.

Locate resistor R30, 22 ohms (red-red-blk) on the bottom of the KX1 PCB, between trimmer pot R4 and diode D7. Replace it as follows:

- Remove existing resistor R30, 22 ohms (red-red-blk), 1/4 watt and clear the solder pads.
- Install the new resistor R30, 33 ohms (org-org-blk) 1/4 watt. Solder both leads and trim them flush with the PCB.

Locate resistor R11, 10 ohms (brn-blk-blk) on the top of the KX1 PCB as shown in Figure 1 (on next page). Replace it as follows:

- Remove existing resistor R11, 10 ohms (brn-blk-blk), 1/4 watt and clear the solder pads.
- Install the new resistor R11, 4.7 ohms (yel-vio-gld) 1/4 watt. Solder both leads and trim them flush with the PCB.



Figure 1. Replacing R11.

- Ensure trimmer potentiometer R4 is fully clockwise.
- Reassemble your KX1.
- Apply power and verify that the display lights as expected. If it does not, immediately turn off the KX1 and look for a short circuit. The most likely place will be in the mounting of the final amplifier transistor to the front of the case.

Your modification is now complete. You should notice a significant increase in the transmitter power output.

Technical Details

A partial schematic diagram of the circuits in your KX1 affected by these modifications is shown in Figure 2. (See your KX1 Owner's Manual for a complete schematic diagram.) Decreasing the value of R11 in the emitter of Q5 from 10 to 4.7 ohms increases the output of that stage and the RF drive available to power amplifier Q6. Increasing the value of R30 in the base circuit of Q6 increases the RF voltage swing at the base of that stage, further increasing the output.

R30 is also important to limit the total gain of Q6 to a safe value. Increasing the value of R30 above 33 ohms is not recommended. It may allow Q6 to become unstable, producing spurious emissions and possibly even destroying the transistor.

We don't recommend you try to get more than 4 watts, maximum, from your KX1. The heat sink for Q6 is not designed to dissipate the heat produced by higher power levels. Also, the output filter is designed to properly match the output impedance of Q6 at power levels up to 3 or 4 watts. Higher power levels will result in a substantial impedance mismatch and increasingly inefficient operation which could destroy Q6.

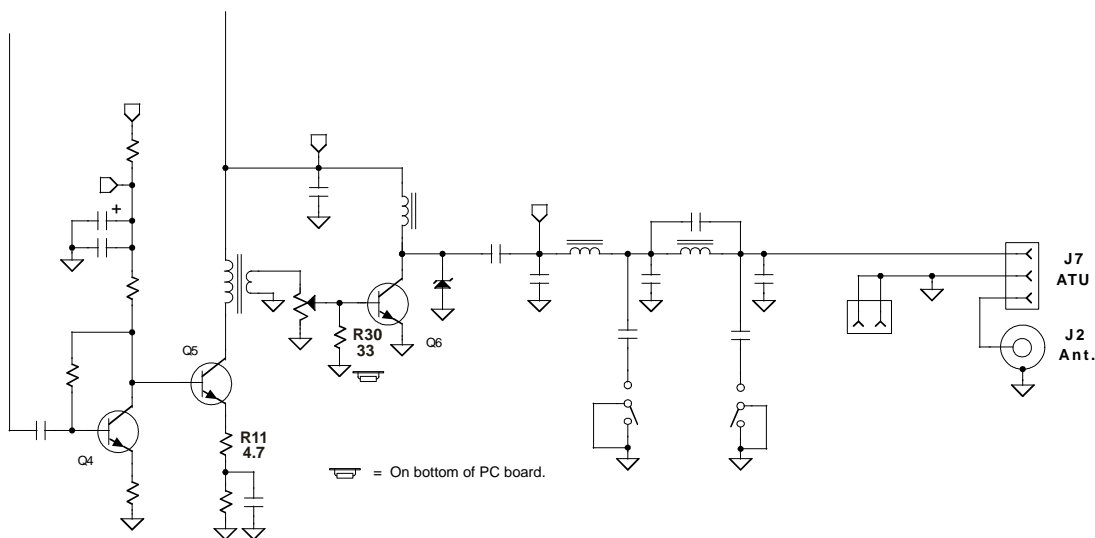


Figure 2. KX1 Partial Schematic Diagram.