## Universal Relay Buffer and Bias Mod (rev2) URB SB200 relay buffer system (also 30L-1)

10" black, 20" green, 10" blue, 5" yellow URB board wired for 3-volt AC source installed Zener bias diode 3.9V 5W Heatshrink tubing and ty-wraps Extra 5W Zener diode 1N5335B 3M tape

The URB SB200 relay buffer "soft key" is configured for the Heathkit SB200 and similar 30L-1 bias and relay systems. The SB200 control grid bias/relay system is a direct copy or clone of the 30L-1. The SB200 has a few changes due to tube types and metering, but is basically just a copy of the 30L-1 system. As such these kits are common to both units.

Note: This kit is only the relay buffer. We also have a separate SB200/30L-1 tube-arc protection kit SB200KP. The SB200KP protection kit will result in slightly more gain, better stability, less IMD, and less damage from bad tubes. The SB200KP kit:

1.) Adds 230V GDTs from grids to ground. This reduces tube arc damage

2.) Adds central point grid arc protection parts, including a heavy positive voltage clamp diode

3.) Adds .001 disk caps in place of or in addition to the 200pF mica caps on the tube socket grid pins. This flattens gain across bands

4.) Adds two back-to-back 1N400x diodes across the meter. This protects the difficult to source panel meter

The URB-SB200 unit converts the -120Vdc grid bias system to a stable bias system with safe and



reliable low voltage and current relay "key" signals. The resulting relay keying line voltage will be V<5-volts positive open circuit, ~2.5 volts relay activation threshold, and ~2000 ohms keying

loop impedance. The closed-circuit relay loop current is about 5mA. These voltages and currents are almost perfect for reliable safe local relay control by any exciter.

We now pre-solder wires and the Zener to the URB solder pads.

This board is held down by a high-quality reliable 3M tape in these photos. If you wish to mount it with hardware, the transistor flange is at ground potential in the SB200 and other negative keying line amplifiers. Although good 3M tape is almost always adequate and has very long life, any of the mounting holes can be used. Just be careful to not accidentally short any hot traces to chassis ground.

## SB200 Installation

## URB-SB200 Installation

Note: The 2000-ohm resistor can be left in, but it is a pretty low value. While current is only around 60mA, this resistor dissipates 8-watts! If you remove it the relay will generate a back pulse spike. I recommend replacing it with a proper polarity diode, like a 1N4007 with the silver band end toward the relay buffer side of the SB200 relay.





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Wires connect to:



URB (2) Black wires to chassis ground

URB Yellow wire to the OEM yellow wire from relay to terminal strip URB Blue or violet wire to OEM relay jack center pin where resistor went URB Green wire to OEM terminal strip at one side of filament winding

The transistor collector or circuit board pads must not touch chassis ground Please double check your wiring. The OEM 33-ohm bias resistor should be removed when using Zener diodes. 572B normally are good with one Zener. Disregard the spare parts, such as the extra Zener. Some parts are used in other applications.

The idle current goal (no drive but keyed) in the SB200 is 50 mA to 150 mA. There will be very little change in IMD over this range but lower plate current will result in less heat. You can add the second Zener in series anywhere on the yellow lead if idle current is too high. The silver band end goes toward the URB and away from the SB200 relay.

## **Collins 30L-1 URB Installation**

Since the SB200 is a clone of the 30L-1 bias and relay system the URB-SB200 kit also directly fits the Collins 30L-1. The Collins hammers the more fragile 811A tubes very hard with almost 2kV anode voltage. Adding and extra Zener bias diode will up the bias voltage to almost 8 volts of stable negative bias. The extra bias adds noticeable tube life by reducing heat.

The URB-SB200 mounts under the chassis plate for connectors and jacks. All wiring is in that area except for the long green wire which must route to the filament winding at a feed through capacitor, but this is an easy route. Please follow the pictures.



Remove two screws holding this bracket. Snip the 22-ohm resistor between the two green standoffs out. The new wiring replaces it with two Zener bias diodes.



The URB mounts midway between the tube sockets on the chassis edge lip almost against the chassis base as shown. Be sure the board pads and transistor tap clear the chassis.



The additional Zener diode used with 811A tubes fits here on the green standoff that is wired to the antenna relay. The violet or blue wire connect to the standoff that is already wired to the relay jack.



Wiring attachment points 30L-1



The open key relay jack voltage is now about +3 Vdc and any resistance to ground less than 2K ohms that pulls voltage less than +1.5Vdc should solidly activate the relay. The keying current is just milliamperes and the bias is far more stable.