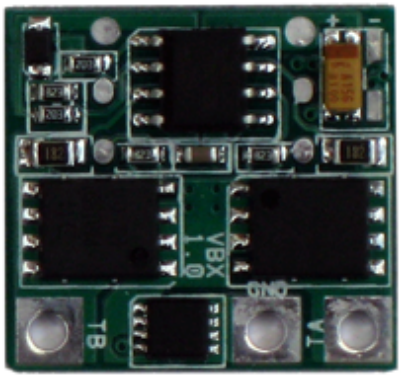
# Aurora Design VBx-1 Electronic Vibrator




The VBx-1 electronic vibrator represents a whole new paradigm in vibrator replacements. Microprocessor controlled for the highest accuracy and features available, nothing else even comes close!

Full protection against reverse battery, shorted outputs and over power, the VBx-1 is nearly indestructible. Because of this ruggedness, the VBx-1 can be hard wired into the circuit or wired to an original style vibrator base, even placed inside the can of an original vibrator! With this flexibility, hard to find 5, 6 and 7 pin vibrators are no longer an issue. Operating from 3.0 - 18V (12-36V for VBF-1), only one board is required for all positive ground installations and one for all negative ground installations.

Through the use of sophisticated algorithms, the microprocessor allows the VBx-1 to offer such unheard of features as deadband control, delayed start, soft start, delayed restart, short circuit protection and over power protection, all with astounding accuracy. The deadband control, delayed start and soft start features in particular greatly reduce the stresses on the transformer, rectifier and filters extending their lives.

Not only does the VBx-1 protect itself, but it also protects expensive parts in the radio like the transformer, rectifier and filters. Unlike simple “dumb” electronic vibrators that will burn a transformer up if something as simple as the buffer capacitor shorts, the VBx-1 immediately senses this condition, protecting itself and the radio components until the buffer capacitor can be replaced! No longer can a careless user destroy expensive parts in their radio simply by leaving it turned on after a failure.

Another great use for the VBx-1 is driving the synchronous seek motors as used in late 1950’s Ford-Benidx Town and Country® radios. By retaining the original motor and power transformer, no modifications to the mechanism are required saving time and money.

***Always replace the buffer capacitor!***

| | **VBN-1**<br>**(negative ground)** | **VBP-1**<br>**(positive ground)** | **VBF-1**<br>**(24V/32V)** |
|---|---|---|---|
| **Operating Voltage:** | **+**3.0V to +18V | -3.0V to -18V | +12V to +36V |
| **Trip Current:** | ~7A | ~7A | ~4A |
| **Frequency:** | 115Hz ±2% | 115Hz ±2% | 115Hz ±2% |
| **Deadband:** | 25% | 25% | 25% |
| **Dimensions:** | 0.70” X 0.75” x 0.14” (18mm X 19mm X 3.5mm) | | |
| **Operating Temp:** | -40°C to +65°C ambient (-40°F to +150°F) | | |

## *VBx-1 Connections:*

The three terminals, TA, TB and GND are the only required connections to the VBx-1. The TA and TB connections go to each leg of the transformer while the GND connects to chassis ground. The unit can be mounted in any fashion as it does not generate any substantial heat. No other circuit modifications are required in the radio.

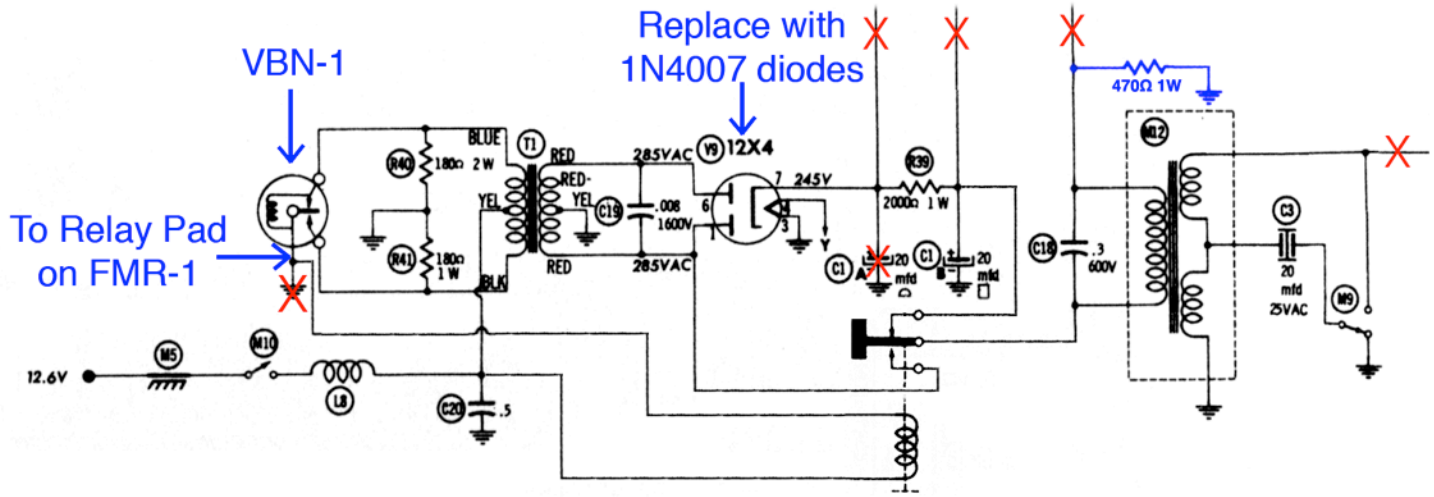
Since the VBx-1 uses such a revolutionary and robust design, there is no reason that it needs to be user serviceable. You would no more socket a modern capacitor or resistor than you would the VBx-1. The VBx-1 can be wired directly to the original vibrator socket.

If serviceability is desired, the VBx-1 can be mounted to an original base so that it can be plugged into the original socket. The metal can was originally required to reduce mechanical and electrical noise from the vibrator, so this is no longer needed but can be added for cosmetic reasons. The VBx-1 will wire to the base exactly the same as the original vibrator. On synchronous vibrators, two rectifying diodes will need to be added such as 1N4007's in place of the extra set of contacts on the original vibrator. Unlike with "dumb" electronic vibrators which will then create extremely high peak currents when starting up due to these diodes, the soft start feature of the "smart" VBx-1 controls the inrush current to the filter capacitors greatly reducing the stresses on them.

## *VBN-1 used with synchronous motors:*

The VBN-1 is an ideal solution for driving the synchronous motors used in 1950's Ford-Bendix Town & Country® radios. These motors used the AC signal from the vibrator power supply and are extremely difficult and time consuming to change out.

Below is a partial schematic for a typical Bendix synchronous motor signal seeking radio. By replacing the vibrator with a VBN-1, replacing the rectifier with two 1N4007 diodes and retaining the power transformer and associated components including the buffer capacitor, filter capacitor, seek relay, the motor with it's two capacitors and the reversing switch, and removing all unnecessary components, no mechanical changes are required to the radio. The FMR-1's Relay output will drive the VBN-1 and seek relay directly thereby controlling the motor. The 470Ω 1W resistor is added to limit current to the motor.



## *Replacing a rectifier with silicon diodes:*

When using silicon diodes, care must be taken so that the B+ voltage does not rise to high due to the efficiency of these diodes. Many times this voltage rise will be insignificant and can be ignored.

On radios using hard vacuum rectifiers like the 6X5, a resistor equivalent to the plate impedance should be used in series with the silicon diodes. For the 6X5 this would be 150 ohms. One common resistor or a resistor in each transformer leg can be used as long as they are of sufficient wattage.

On radios using gas rectifiers like the 0Z4 which typically have a fixed voltage drop, a zener diode or resistor should be chosen to provide this voltage drop. For instance the 0Z4 has a typical voltage drop of 24V. At a nominal current draw of 50ma, a resistance of about 470 ohms will achieve this voltage drop. Alternatively a 24V zener could be added in series with the diodes.

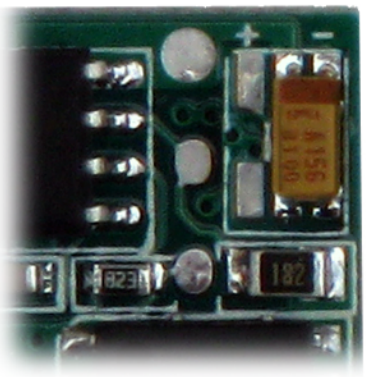
The B+ should be verified with the radio operating at normal input voltage after a warmup period.

## *Identifying model type:*

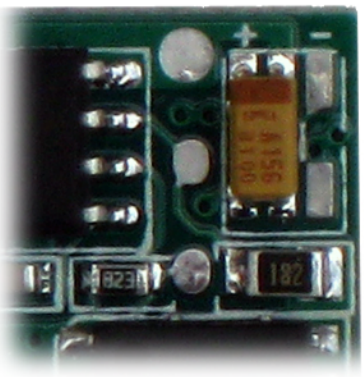
VBN models will have a GREEN dot on the backside of the module
VBP models will have a RED dot on the backside of the module
VBF models will have a YELLOW dot on the backside of the module

In the event the markings are lost on the module, the type can be determined by examining the position of the main capacitor as follows:

**VBN/VBF**



**VBP**



*All specifications @ 25°C and nominal voltage
Special order parameters/features available on request
All specifications subject to change