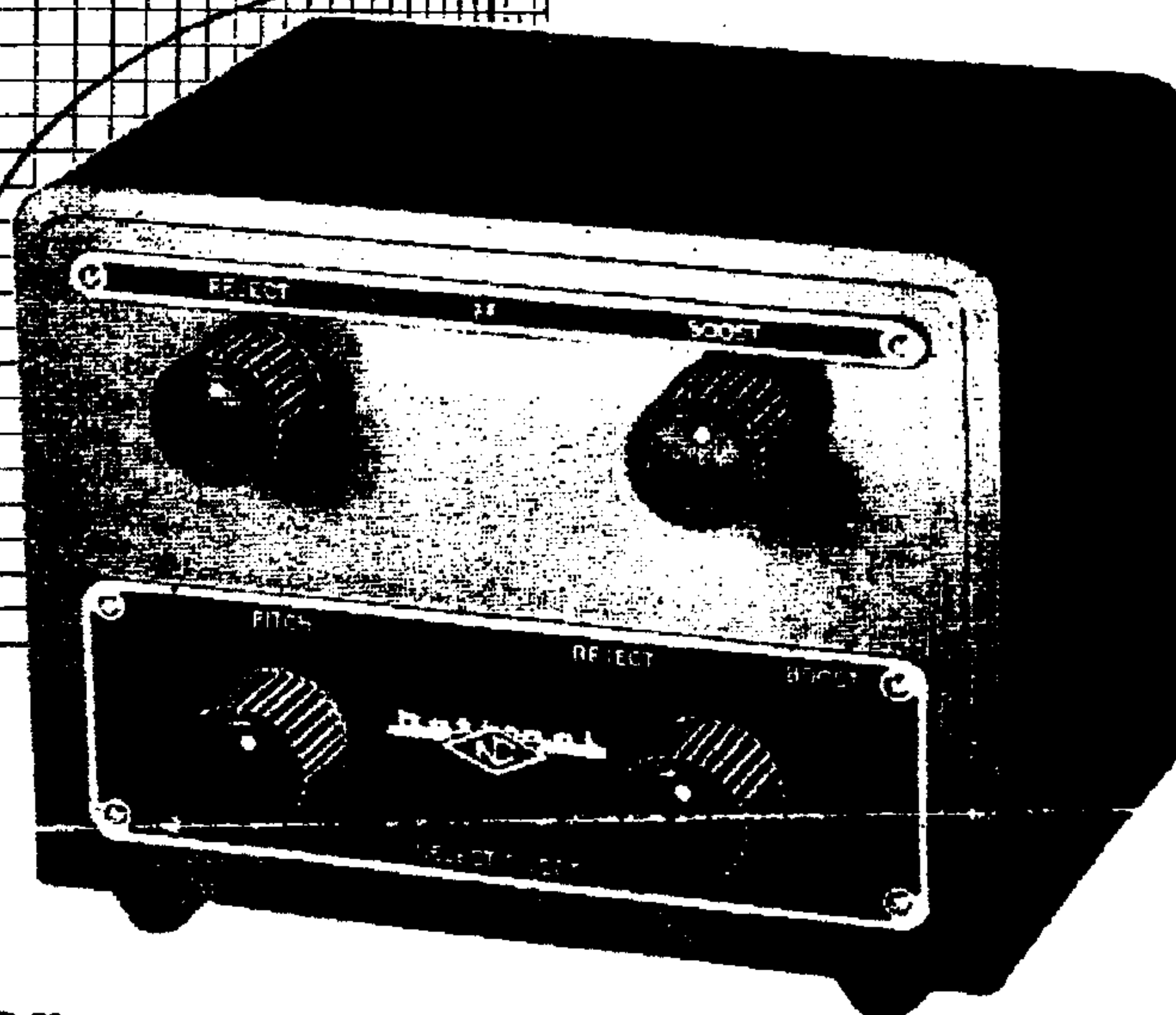


**SELECT-O-JECT\***

**amazingly  
versatile  
new audio filter**



**BOOSTS 38db! REJECTS 38db! ANY SELECTED FREQUENCY!**

Set SELECT-O-JECT for REJECT, tune by ear and — presto! — an annoying heterodyne or other unwanted signal practically disappears without materially affecting the wanted signal! Set SELECT-O-JECT for BOOST, tune — and — presto! — a selected signal rises above background noise and interfering signals! Can also be used as audio oscillator having over 100 to 1 frequency range with a single rotation of the tuning knob! Excellent as a code practice oscillator! Effective on any frequency from 80 c.p.s. to 9,000 c.p.s.! See your National dealer for details.

**\$24<sup>95</sup>**  
net



Patent applied for. Manufactured under exclusive agreement with Dr. O. G. Villard, Jr., Engineering Dept., Stanford University.

## S-O-J

What's in a name? Sometimes a name is truly descriptive of the object to which it is attached and sometimes not. Here at National, we have a habit of trying to make the name of our various devices as descriptive of that device as is feasible. Sometimes, as in the case of the HRO, this name may have

a touch of humor as those who are in the know can verify. In the case of the Select-O-Ject, a truly descriptive name was applied. "Select" describes the c.w. capability of the device to select any one of several c.w. signals with a twist of the wrist. "Ject" describes the ability of the device to reject a pitch such as a heterodyne when receiving a phone signal. The "O" was intended to indicate its use as an audio oscillator but could indicate the verbal reaction of those who have seen it work.

As in the case of the crystal filter when it was first introduced, it has been found that a certain amount of training and practice is necessary to get the excellent results that the device is capable of.

After the first half-hearted try, the operator may be tempted to alter the name to "Select-O-Junk" but after mastering the operation of the device, he may change this again to "Select-O-Jet" as more descriptive of its high-powered performance.

The adjustments of the controls are quite critical but at the same time are not as touchy as that of a crystal filter, especially in the sharper position. It has the advantage over the crystal filter of divorcing dial tuning and IF selectivity from the process of heterodyne elimination making this procedure more straightforward and easy to accomplish. The most critical adjustment to make is the setting of the Reject knob. This adjustment is very critical and the proper setting must be made coincident with the proper setting of the pitch control. If these settings were not critical, the selectivity of the device would be poor and the darn thing wouldn't be any good. One hint, so that you will start off "hot" instead of "cold" in your adjustment of the Reject control, the final adjustment will be around "2 o'clock" on the knob.

The Select-O-Ject works well with the various National Receivers and has been thoroughly checked with the NC-57, NC-173, NC-183, HRO-7, and HRO-50. We cannot, of course, guarantee that trouble may not be encountered with receivers built by other manufacturers. For example, a call from a local ham informed us that the new Select-O-Ject that he had just purchased was not working well. He was using it connected to a competitor's receiver. Out of curiosity, the writer payed this ham a visit. The unit was connected between the output of the limiter and the audio gain control as recommended. It worked well if the noise limiter was in the circuit but did not work at all well if the noise limiter was switched off in which case the signal was somehow bypassed around the Select-O-Ject. This was shown by shorting the input to the Select-O-Ject in which case considerable signal was still heard from the loud speaker. According to the circuit diagram, it shouldn't happen, but it does! The remedy is merely to leave the Noise Limiter in the circuit all the time.

Although all of the new National receivers are now wired for use with the Select-O-Ject, many hams having older receivers hesitate to buy a Select-O-Ject for fear that the wiring changes may be too difficult. These changes are actually very simple. They are described in detail in the instructions supplied with the unit. Actually, all necessary connections are already supplied at the accessory socket except one. This one missing connection is needed to bring the audio output of the unit back into the receiver. In order to do this, the pin which now supplies a regulated 150 volt supply to the accessory socket is rewired for the job. One merely clips off the lead connecting the voltage regulator to this pin and then this same pin is connected to the proper point in the audio system by a shielded lead. As my boss used to tell me, "Even you should be able to do that."

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P.S. If the owner of an NC-57 receiver already has an S meter plugged into the Accessory socket where the Select-O-Ject is supposed to go, the S meter can still be used along with the Select-O-Ject. This is done by removing the plug from the S meter cable and rewiring the S meter leads into the corresponding leads of the Select-O-Ject plug in addition to the leads that are already there.





**APPLICATION NOTES  
FOR THE  
NATIONAL MODELS  
SOJ-1, SOJ-2 AND SOJ-3  
SELECT-O-JECT**

**1. GENERAL**

The type SOJ Select-O-Ject is an audio frequency device designed to work into the audio circuits of an associated radio receiver. Properly adjusted, it will reject or boost any audio frequency selected at will between the limits of approximately 80 to 10,000 cycles. Its capabilities in this application are graphically illustrated on Figure Number 1. The unit will also serve as an audio oscillator and is excellent for code practice use. As an audio oscillator, it will deliver approximately two volts of audio output at any frequency in the 80 to 10,000 cycle range.

The many advantages to be realized by the use of this device are pointed out in an article entitled "The Selectoject" in the November 1949 issue of QST. This article also contains a very informative theoretical discussion.

**2. INSTALLATION**

The Select-O-Ject is supplied in three models, namely the SOJ-1, the SOJ-2 and the SOJ-3. Model SOJ-1 has the output leads unterminated and a separate octal plug is furnished. Reference to Figure No. 2, the schematic diagram, will identify the output leads. Model SOJ-2 has the output leads terminated in an octal plug for direct connection to the accessory socket of National receivers Models NC-173, NC-173A, HRO-7, HRO-7A and NC-183. Model SOJ-3 has the output leads terminated in an octal plug for direct connection to the accessory socket of National receivers Models HRO-50-1, HRO-60, HRO-50, NC-183D, NC-173B, NC-183B and NC-57B. Receiver models with suffix letters can be identified by noting the letter, if any, stamped on the receiver chassis after the serial number.

The input supply requirements of the Select-O-Ject are 6.3 volts at 0.6 ampere for the heaters and 200-250 volts at 4 milliamperes for the B plus circuits. In cases where the unit is connected to a National receiver with an accessory socket the required voltages can be conveniently obtained at the socket. Otherwise, the voltage supply may be obtained from any suitable source.

To install the Select-O-Ject proceed as follows:

- (1) Connect the brown lead to a 6.3 volt source.
- (2) Connect the red lead to a B plus 200-250 voltage supply.
- (3) Connect the black lead to the other side of the 6.3 volt source and the B minus or to the chassis of the associated receiver.
- (4) Connect the inner conductor of the shielded lead (brown covering) to the receiver at a point following the second detector (or noise limiter if the receiver has one).
- (5) Connect the inner conductor of the shielded lead (blue covering) to the receiver at a point ahead of the Audio Gain control.

The best place to connect the SOJ unit into the circuit is just ahead of the audio gain control between the control and the coupling capacitor connected to it. If the input lead is connected to a part of the circuit that has a D.C. potential on it at any time, the connection from the SOJ should be made through a 0.01 mfd. to 0.1 mfd. capacitor.

To adapt the Select-O-Ject for use as an audio oscillator simply remove the wire jumper on the "Key" terminal strip at the rear left of the unit and substitute a key in its place. The "Output" terminal strip allows audio output to be taken from the unit without disturbing the connections to the receiver. The terminal labeled G is the chassis connection.

The following instructions describe the method of installing the Select-O-Ject with National receivers fitted with accessory sockets. In some cases slight wiring changes are necessary in the receiver.

To use the Select-O-Ject with National receivers type NC-173, NC-183 and HRO-7 connect the output plug to the receiver's accessory socket and make the wiring changes outlined below.

The wiring changes in the NC-173 when used with the SOJ-2 are as follows:

- (1) Remove lead connecting pin no. 1 of accessory socket to the 150 volt regulated supply.
- (2) Connect a shielded lead between pin no. 1 of the accessory socket and the junction of C-41 and the Phono input jack terminal.

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To use the Select-O-Ject, plug an empty phone plug into the Phono input jack. When the Phono input jack is used for phono operation, disconnect the Select-O-Ject from the receiver to prevent signals from the radio circuits from interfering with phono operation and set the R.F. Gain control at 0.

The NC-173A can be used with the SOJ-2 without the necessity of making the wiring changes outlined above. The NC-173B requires no changes when used with the SOJ-3.

The NC-183 receivers require the following wiring changes when used with the SOJ-2.

- (1) Remove the lead connecting pin no. 1 of accessory socket to the 150 volt regulated supply.
- (2) Remove lead grounding the Radio-Phono switch.
- (3) Connect a shielded lead from pin no. 1 of the accessory socket to the contact of the Radio-Phono switch vacated by the lead removed in (2).
- (4) Connect the lead between pin no. 8 of the accessory socket and the Send-Receive switch to the opposite contact of the Send-Receive switch. This is done to render the Select-O-Ject inactive when the Send-Receive switch is in the Send position.

To use the Select-O-Ject set the Radio-Phono switch at Phono. When the phono input jack is used for Phono operation, disconnect the Select-O-Ject from the receiver and set the R.F. Gain control at 0. When it is desired to use the radio circuits without the Select-O-Ject set the Radio-Phono switch at Radio, the Select-O-Ject need not be disconnected.

The NC-183B and NC-183D receivers require no wiring changes when used with the SOJ-3.

The wiring changes in the HRO-7 when used with the SOJ-2 are as follows:

- (1) Remove lead connecting pin no. 1 of accessory socket to the 150 volt regulated supply.
- (2) Remove lead grounding the Radio-Phono switch.
- (3) Connect a shielded lead from pin no. 1 of the accessory socket to the contact of the Radio-Phono switch vacated by the lead removed in (2).

To use the SOJ-2 set the Radio-Phono switch at phono. When the Phono input is used for Phono operation, disconnect the Select-O-Ject from the receiver and set the R.F. Gain control at 0. When it is desired to use the Radio circuits without the Select-O-Ject set the Radio-Phono switch at Radio, the Select-O-Ject need not be disconnected.

The HRO-7A requires no wiring changes when used with the SOJ-2.

The HRO-50, HRO-50-1 and HRO-60 require no wiring changes when used with the SOJ-3.

To use the SOJ-1 with National receiver type NC-57, the plug is wired as follows:

- (1) Connect the brown lead to pin no. 2
- (2) Connect the red lead to pin no. 3
- (3) Connect the black lead to pin no. 4.
- (4) Connect the shielded lead (brown) to pin no. 6.
- (5) Connect the shielded lead (blue) to pin no. 8.

The wiring changes in the NC-57 consist of the following:

- (1) Remove capacitor C-42. This capacitor is located below the Control switch. It is connected between the switch and a terminal on the Audio Gain control.
- (2) Connect a shielded lead between the Audio Gain control terminal vacated in (1) and pin no. 8 of the accessory socket.

Later models of the NC-57 will be adapted for use with the Select-O-Ject by having incorporated in them the changes outlined in (1) and (2) above. To use the Select-O-Ject with these receivers, remove the bottom cover of the receiver and remove the jumper wired between pin no. 6 and no. 8 of the accessory socket.

To use the radio circuits without the Select-O-Ject disconnect the Select-O-Ject and connect a jumper between pin no. 6 and no. 8 of the accessory socket. Another octal plug with a jumper between pin no. 6 and no. 8 would serve conveniently as a means of installing the jumper quickly. To use the NC-57 phono input connection disconnect the Select-O-Ject and connect the phono lead to pin no. 8 instead of pin no. 6 as formerly.

The NC-57B receivers require no wiring changes when used with the SOJ-3. To use the Select-O-Ject with these receivers remove the jumper wired between pins no. 1 and no. 5 of the accessory connector socket. To use the radio circuits on the NC-57B disconnect the SOJ-3 and replace the jumper across pins no. 1 and no. 5. The phono input connection is made to pin no. 1

### 3. OPERATION

The following explanation of the function of each control on the Select-O-Ject will enable the operator to realize the full benefits of this accessory. Operation of this device is somewhat novel and some experimentation by the operator will be required to get the "feel" of using it.

The Reject-Boost switch adjusts the unit to reject or boost, respectively, a particular audio frequency. In the Reject position, the Reject control is operative and is adjusted to provide maximum attenuation of the unde-



sired audio frequency. It will be found that the correct setting of the Reject control will occur at approximately 2 o'clock on the control dial. Its adjustment is critical and it must be set carefully while at the same time the Pitch control is adjusted to the undesired frequency. The two controls must be adjusted simultaneously. After the initial adjustment of the Reject control is made, it need not be adjusted again over the entire frequency range. Adjustment of the Pitch control will then provide maximum attenuation of the desired audio frequency.

With the Reject-Boost switch in the Boost position, the Boost control is operative. It will be noted that the audio level of all signals and/or noise is greatly attenuated in the Boost position. The Audio Gain control on the receiver may be used to restore the previous audio level but this is not recommended since the boost of the selected frequency will be even more pronounced if the audio is left at a low level. As the Boost control is advanced in a clockwise direction the circuit becomes more regenerative, finally breaking into oscillation. Beyond this point the circuit operates as an audio oscillator. For maximum boost of an incoming audio frequency, the Boost control should be set as close as possible to the oscillation point without producing sustained oscillation. The Pitch control is then used to select the frequency to be boosted.

To use the receiver circuits without the boosting or rejecting effects on the signal, set the Reject-Boost switch at Reject and set the Pitch control at the extreme counterclockwise limit of its rotation.

#### **Standard Form Warranty**

**Adopted by the Radio Manufacturers Association, Inc.**

This equipment is warranted to be free from defective material and workmanship and repair or replacement will be made of any part which under normal installation, use and service discloses defect, provided the unit is delivered by the owner to the manufacturer or through the authorized radio dealer or wholesaler from whom purchased, intact, for examination, with all transportation charges prepaid to the factory, within ninety days from the date of original shipment from the factory, and provided that such examination discloses in the manufacturer's judgment that it is thus defective.

This warranty does not extend to any radio products which have been subjected to misuse, neglect, accident, incorrect wiring, improper installation, or to use in violation of instructions furnished by the manufacturer, nor extend to units which have been repaired or altered outside of the factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith of other manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for the manufacturer any other liability in connection with the sale of their radio products.

National Company, Inc. reserves the right to make any change in design or to make addition to, or improvements in, its products without imposing any obligations upon itself to install them in its products previously manufactured.

