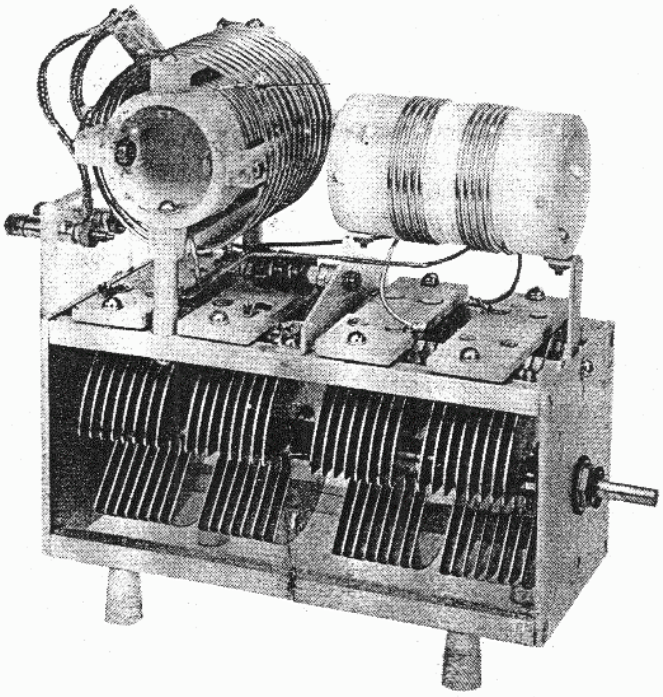
APPLICATION NOTES

for

THE NATIONAL TYPE MB-150

MULTI-BAND TANK



National Company, Inc. Malden, Mass.

MULTI-BAND TANK ASSEMBLY

Designed to meet amateur requirements for greater simplicity in multi-band transmitters, the unique MB-150 Multi-Band Tank illustrated below tunes all amateur bands from 80 through 10 meters with 180° rotation of the shaft; the coils are never changed. The unit is built around an essentially "multiple-tuned" circuit, i.e. a circuit which tunes to two harmonically unrelated frequencies at the same time. Thus, it becomes possible to cover a wide frequency range and yet maintain a reasonably constant L/C ratio. Three coils, four capacitors and an RF choke are combined to make up a compact tank 3" wide x 8¼" high (including the GS-10 standoffs) x 9" long overall including the ¼" dia. shaft and output terminals. Features of the MB-150 are as follows:

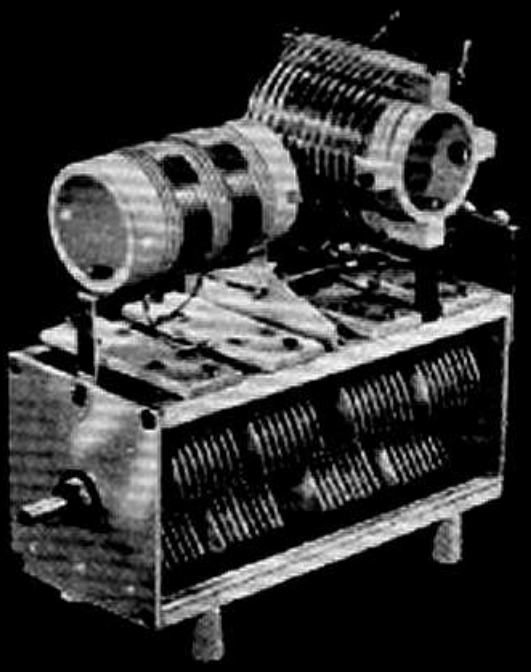
(1) For use as the all-band plate tank in push-pull or balanced single-ended stages running up to 150-watts input (1500 volts peak). It is ideal for a pair of 807s or 809s or a single 829B.

(2) Separate link coupling coil has special clips which adjust to match impedances up to 600 ohms directly. Output couples into a higher powered amplifier, an antenna or an antenna tuning network.

(3) Fast band changing is accomplished without handling coils, thus removing one of the danger points in the amateur station.

MB-150 Multi-Band Tank Assembly
Net $18.75

MB-150
MULTI-BAND
TANK CIRCUIT

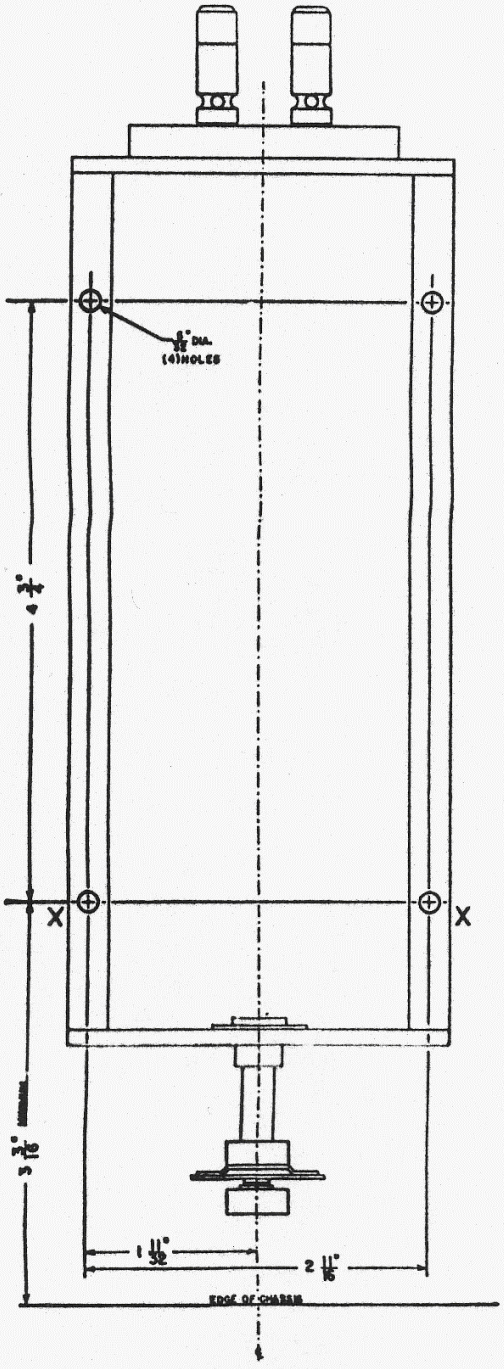


NATIONAL
TYPE MB 150 MULTI-BAND TANK

NATIONAL COMPANY, INC. MALDEN 48, MASS., U.S.A.

CENTER OF CONDENSER SHAFT IS 2¼ INCHES ABOVE TOP SURFACE OF CHASSIS WITH STAND-OFF INSULATORS PROVIDED.

HOLES MARKED "X" SHOULD BE AT LEAST 3 3/16 INCHES IN FROM EDGE OF CHASSIS TO ALLOW FOR INSULATED COUPLING, AND DRIVE MECHANISM, IF USED.



General

The MB150 is intended for use in transmitter stages where the plate input is approximately 150 watts or less (i.e. approximately 100 watts output). The tuning range is from 3.45 to 8.5 Mc. and from 12 to 30 Mc. Tuning any of these frequencies is obtained simply by turning the knob to the proper setting. No plug-in coils or band switching is required.

The MB150 tank is a coil and condenser combination suitable for push-pull or single ended applications from 80 through 10 meters. Output power can be taken from the link when coupling to an antenna or when link coupling to another tuned circuit. The link is designed to work into any load impedance from 50 to 600 ohms. Output can also be capacity coupled from the tank to another amplifier stage in the conventional manner. The tank impedance is relatively constant and as a result the fixed link will load the tank properly at any frequency in its range using a fixed load impedance.

The MB150 Tank is particularly well suited for use with low impedance tubes, but good results can also be obtained with the higher impedance tubes. The type 809 tube has the proper impedance and power ratings to make an ideal push-pull or parallel amplifier using the MB150 Tank. Popular types such as the 6L6, 807, 829, and 832 tubes work well with the MB150 as well as many other types.

Installation

The MB150 Tank must be insulated from the chassis (i.e. B minus) as B plus voltage is connected to the frame, and it is recommended than an insulated coupling be used between the condenser shaft and the panel knob shaft. The insulated coupling must be used when the tank is employed in any of the single tube or paralleled tube circuits to assure proper operation.

Four solder lugs are provided near the rear of the unit and are connected to the stator portions of the two rear tuning condensers. These lugs provide a convenient means for connection to the unit as required. The lug on the rear frame plate is provided for the connection of B plus to the unit.

A National type FWF banana plug can be permanently attached to each antenna feed line that is to be used with the MB150, as this type plug can be instantly attached to the link output terminals mounted at the rear of the MB150 tank.

Circuit

The circuit diagram for a typical push-pull amplifier is shown in Figure 1. The terminals for the amplifier plate connection should be observed carefully. The bypass capacitor C should have a value of roughly 0.001 microfarad.

The circuit for a single tube (or two tubes in parallel) used as an amplifier is shown in Figure No. 2. With this circuit the R.F. choke is not used and it may be necessary to use external decoupling circuits other than those shown. In this case a tube which does not require neutralization should be used as there is no provision for a neutralizing voltage from the tank, or the stage should be used as a multiplier stage.

A third application for the tank is that of a single tube (or two tubes in parallel) used as a neutralized amplifier or as a multiplier. See Figure No. 3. The balancing condenser C_B is necessary to assure good neutralization over a wide range of frequencies. C_B should have a maximum capacity value somewhat larger than the output capacity of the associated tube. This circuit permits the MB150 Tank to be used as a transition element from single ended to push-pull, if desired.

A fourth application is that of a grid tank for a high power final stage. If it is desired to transfer power from an exciter to a separate final it may be desirable to employ link coupling between units in which case an MB150 Tank in the plate of the driver and a second MB150 Tank in the grid of the final makes an ideal arrangement.

Operation

The operation of the MB150 is conventional in that the tank is tuned for minimum plate current and the link load adjusted until the tube plate current is the rated value for the tube (or tubes) used. Safety precautions such as turning off the transmitter before adjusting the link, etc. should be observed.

The tank is tuned to two frequencies at each setting of the tuning condenser. These two frequencies are not harmonically

related. The 3.45 to 8.5 Mc. range is tuned in the conventional manner with 3.45 Mc. near the maximum capacity setting of the condenser and 8.5 Mc. near the minimum capacity setting of the condenser. The 12 to 30 Mc. range is tuned in the same way with 12 Mc. near the maximum capacity setting of the condenser and 30 Mc. near the minimum capacity setting of the condenser. A simple rule to follow to prevent tuning the tank to a multiple (i.e. doubling, tripling, quadrupling, etc.) of the desired frequency is to tune to the point providing maximum plate current dip at resonance with no load on the tank.

The link load should first be set roughly when used on the highest frequency band and then checked on the other bands to assure relatively constant power input on all bands. A compromise setting should be made if necessary. It should be remembered that if different impedance feed lines are used on different bands that the link coupling must be adjusted each time a different line impedance is used. The clips supplied provide a convenient means of connecting to the various turns of the output link.

Neutralization of amplifiers using this tank is conventional and the usual procedure can be followed. When single-ended operation is employed the setting of the balancing condenser is important. See Figure No. 3. If the transmitter can be neutralized at frequencies corresponding to maximum capacity of the tuning capacitor and is not neutralized for frequencies corresponding to minimum capacity of the tuning condenser, the balancing condenser C_B must be readjusted. If near the minimum tuning capacity setting it is necessary to decrease the neutralizing capacitor C_N to obtain neutralization the capacity of the balancing condenser C_B must be increased or vice versa until neutralization is obtained at all frequencies. It is recommended that final setting of the neutralizing and balancing condensers be made at a frequency tuned near the minimum capacity tuning condenser setting and checked at other settings.

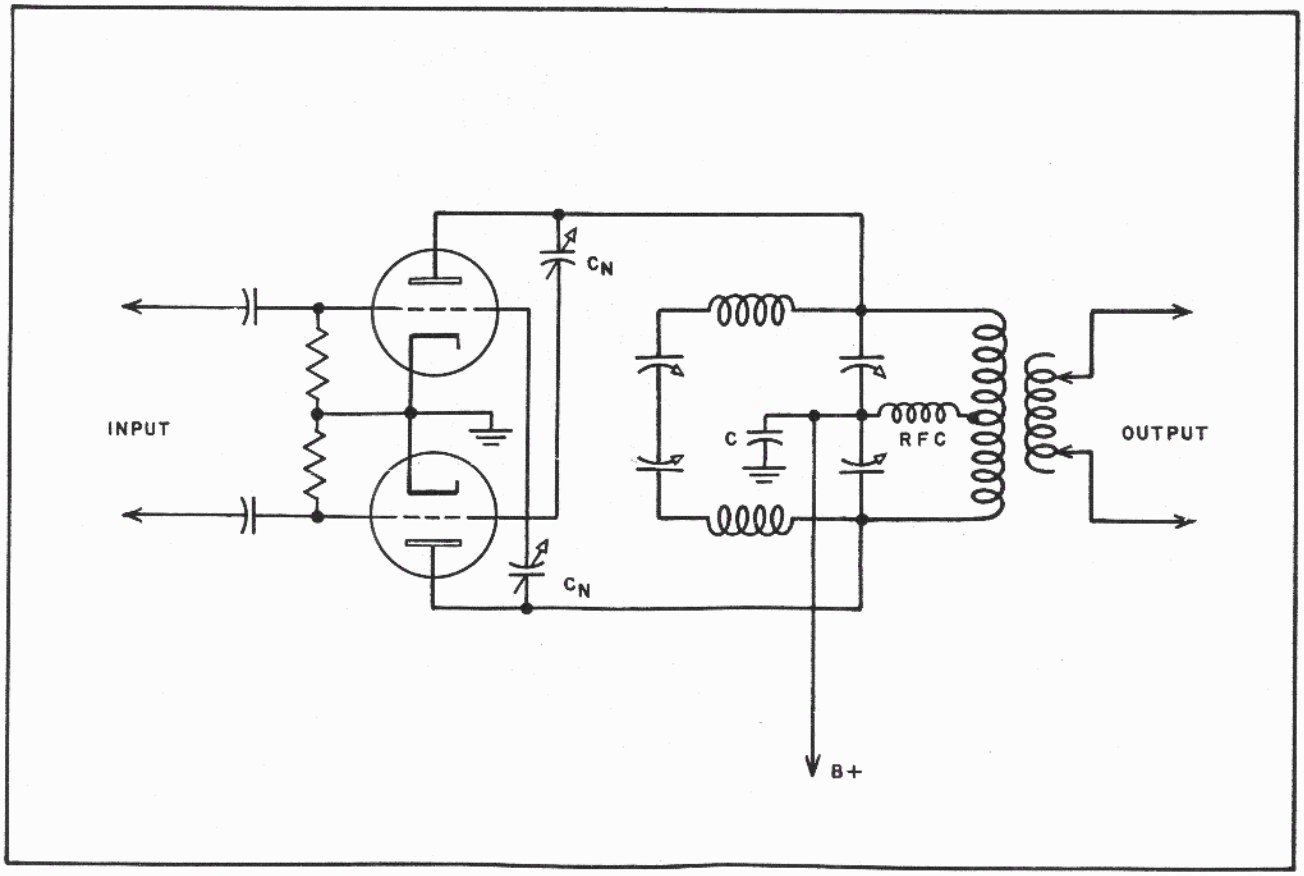


Figure No. 1. Typical Push-Pull Amplifier

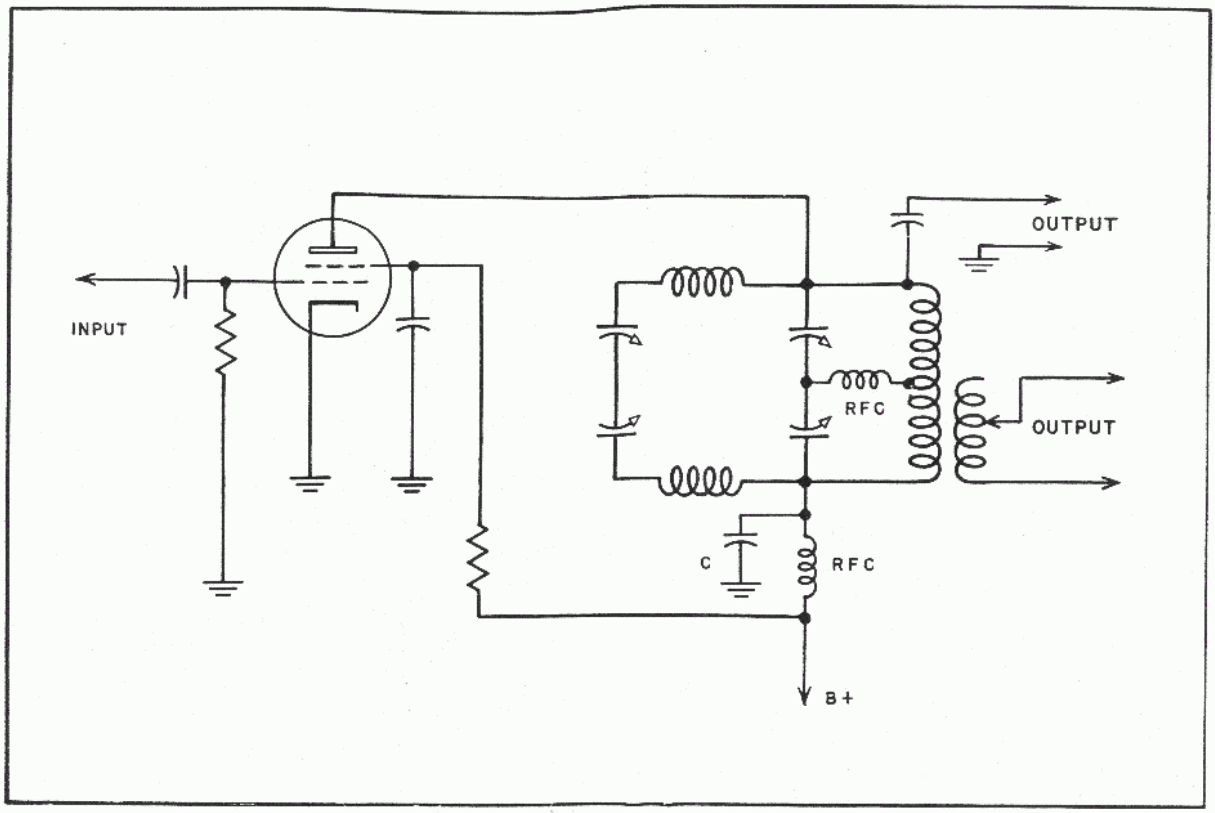


Figure No. 2. Typical Single Tube Amplifier or Multiplier

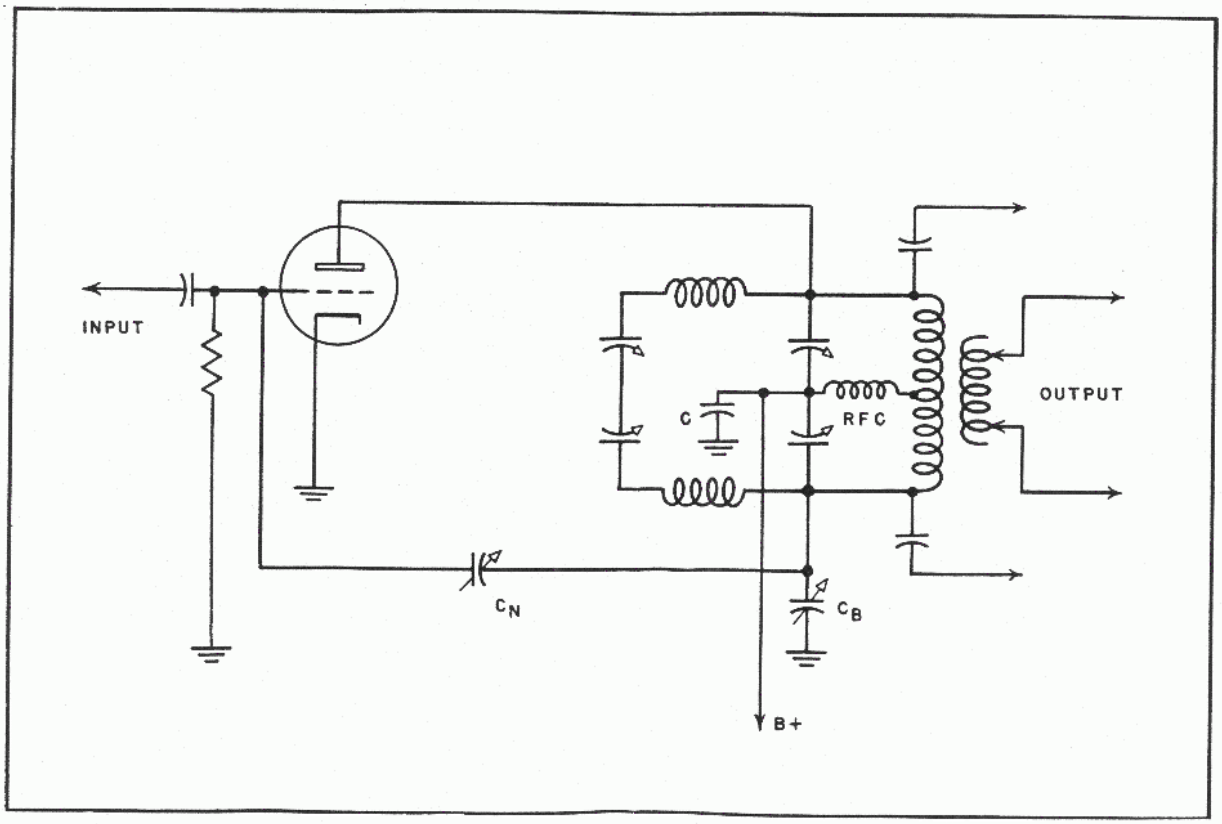


Figure No. 3. Typical Single Tube Balanced Amplifier or Multiplier