No. 92101 ANTENNA MATCHING PREAMPLIFIER

1. General

The Millen 92101 Antenna Matching Preamplifier is a commercial version of the R9'er. It is the result of the combined engineering efforts of the General Electric Company and the James Millen Manufacturing Company, Inc. The 92101 preamplifier is an electronic impedence-matching device and a broad-band preamplifier, designed to work on the 10 and 6 meter amateur bands. Since some receivers do not match the antenna impedance too well at 20 meters, twenty meter coils are also available. Band-pass coils are available for the 6, 10 and 20 meter amateur bands. The 10 meter coils may be used on the 11 meter band. The amplifier is supplied with one set of plug-in band-pass coils, the No. 46910, covering the range of 27 to 32 mc. Additional coils may be purchased from Millen distributors:

No. 46920 for 13 to 15 mc.
No. 46906 for 48 to 55 mc.

2. Description

The shielded band-pass coils are plugged in through the front panel. A switch, for connecting the Antenna Matching Preamplifier in and out of the receiver antenna input circuit is on the front panel of the preamplifier. The PEAKING control on the panel of the preamplifier is for adjusting the screen voltage on the 6AK5 amplifier tube for maximum gain for the particular plate voltage used.

INPUT TUNING and OUTPUT TUNING controls are on the front panel. These are adjusted only when changing bands. A four-connection jack and plug for power input are on the rear panel.

RF INPUT and OUTPUT jacks and plugs are on the rear panel.

3. Installation

Remove the preamplifier from the housing by removing the four screws at the corners of the front panel. Insert a 6AK5 tube in the miniature tube socket and replace the tube shield. Use care in inserting the tube in the socket. Do not force, as this may bend the tube pins. Replace the unit in the housing.

The Antenna Matching Preamplifier is designed to operate from the receiver power supply. The plate voltage is not critical; any voltage from 150 volts to 275 volts may be used. The total current drain is 10 to 15 milliamperes. A power input plug is supplied to facilitate connecting the amplifier to the receiver power supply. Neither side of the 6AK5 heater is grounded directly so that the 6.3 volt heater voltage from the receiver may be connected to the 6 volt terminals on the amplifier, even though the receiver heater supply may be grounded at the center tap of the transformer. If it is known that one side of the 6.3 volt supply is grounded in the receiver, ground pin 4 on the amplifier power input plug.

Use the co-axial cable connectors supplied to connect the amplifier to the receiver antenna input and to connect the antenna to the 92101. Wire leads, rather than co-axial cable may be used if necessary, but they should be well insulated. Make the leads from the 92101 output to the receiver as short as practical.

4. Tuning

Plug the desired coil assembly in the front of the amplifier. Remove the two screws from the panel of the coil assembly. This will allow the coil panel to be removed so that the coils may be adjusted. The coil on the left is the grid coil; the coil on the right is the plate coil. Do not attempt to remove the coil assembly from the amplifier while the panel is off

the coil assembly, as the coil assembly might get turned around so that the grid coils are reversed.

Switch the preamplifier OUT and tune the receiver to a signal near the center of the band. A local signal is easier to use than a fading signal. Switch the preamplifier IN and turn the PEAKING control full clockwise.

Watching the S-meter on the receiver, tune the grid coil, L1, and the INPUT TUNING condenser, C2, for maximum receiver signal. The coils should be adjusted by an insulated screw driver, preferably all insulating material with no metal tip. The suggested procedure is to set L1 and tune the INPUT TUNING condenser for maximum receiver output, change L1 slightly and retune the INPUT TUNING condenser. Repeat this process until the maximum signal is obtained. The antenna impedance is now matched to the preamplifier grid. If the INPUT TUNING capacity is at full maximum or minimum capacity, 0 or 10 on the dial, the length of the antenna feeder should be changed. Add approximately a quarter-wave length of line; 16 feet on 20 meters, 8 feet on 10 meters and 5 feet on 6 meters. Prune the length of line until the INPUT TUNING control tunes near the center of the dial.

The output side of the amplifier is tuned in the same manner as the input side. Tune the plate coil, L2, and the OUTPUT TUNING condenser, C7, for maximum receiver signal. Set L2 and tune the OUTPUT TUNING condenser, change L2 slightly and retune the OUTPUT TUNING condenser. Repeat this process until the maximum signal is obtained. The preamplifier output impedance is now matched to the receiver input impedance; and through the Antenna Matching Preamplifier, the antenna impedance is matched to the receiver input impedance. If the OUTPUT TUNING capacity is at full maximum or minimum capacity, 0 or 10 on the dial, the length of the line between the preamplifier OUTPUT and the receiver antenna input must be altered. Add approximately a quarter-wave length of line and prune until the OUTPUT TUNING control tunes near the center of the dial. The output line should be as short as possible for 6-meter operation.

Replace the panel on the coil assembly and readjust INPUT TUNING and OUTPUT TUNING for maximum signal. Adjust the PEAKING control for maximum signal. Keep the PEAKING control as far counter-clockwise as is consistant with high gain.

Once all adjustments are made for both coils, it is only necessary to tune INPUT TUNING and OUTPUT TUNING when changing bands. The INPUT TUNING AND OUTPUT TUNING condensers need be adjusted **only** when changing bands.

5. Coils

The Antenna Matching Preamplifier is supplied with one band-pass coil assembly. Available coil assemblies are listed below.

Catalog Number	Band Meters	Tuning Range Megacycles	Band Pass Megacycles
46906	6	48-55 mc.	4 mc.
46910	10-11	27-32 mc.	2 mc.
46920	20	13-15 mc.	1 mc.

The 46910 coil assembly will tune either the 10 or 11 meter amateur bands but the band-pass is not sufficiently great to cover both bands completely. Those operators who use both the 10 and 11 meter bands may find it convenient to have two 46910 coils assemblies, one tuned for each band.

Since the input impedance of most receivers at 40 meters and 80 meters is approximately the antenna impedance, the Antenna Matching Preamplifier is generally not required for those bands. If, however, it is desired to operate the 92101 on 40 meters or 80 meters, coil assemblies can be made from standard catalog parts. The coil forms are Millen No. 69041 and the pins on the coils are Millen No. 10029.

6. Terminal Summary

Power Requirements:

6.3 volts at 175 milliamperes—A.C. or D.C.
150 to 275 volts dc. at 10 to 15 milliamperes.

Physical Dimensions:

Height—5¾ inches
Width—6⅜ inches
Depth—4¼ inches overall (including knobs)
Weight—2⅜ pounds

Tube Required:

1—6AK5 (General Electric)

7. Performance

The gain which can be realized by the use of the Antenna Matching Preamplifier depends on how well the antenna is matched to the receiver input impedance. The gain in the preamplifier itself is approximately 30 db and an additional gain of from 15 to 30 db is usually realized because of matching the impedance of the antenna feeder to the receiver input. Since the input impedance of most commercial receivers is considerably higher on ten meters than the rated input impedance, most receivers are poorly matched to the antenna feeder. The Antenna Match Preamplifier corrects this general difficulty.

Signal strengths will be increased from 30 to 60 db by the use of the 92101. This means that many signals will be heard which, without the 92101, cannot be heard at all.

8. Circuit

The Antenna Matching Preamplifier uses a 6AK5 miniature pentode tube. The extremely high transconductance of this tube allows good gain over a reasonably wide band of frequencies. The coils are loaded so that the pass-band will cover the entire amateur band. The gain drops only about two db at each end of the band when the coils are tuned for maximum gain at the center of the band.

The INPUT TUNING condenser, C2, in series with C1, forms an impedance matching network. The two condensers in series also form the tuning capacity across the grid coil.

The OUTPUT TUNING condenser, C7, in series with C6, forms an impedance matching network in the output of the preamplifier. The two condensers in series also form the tuning capacity across the plate coil. The plate coil is grounded through the plate blocking condenser, C5, so that the OUTPUT TUNING condenser may be grounded.

Resistors R1 and R5 are loading resistors which are plugged in with the coil assembly. This makes it possible to use different loading and achieve different band-pass on each type coil assembly.

R. W. C. 2/3/47

ANT. MATCHING PREAMPLIFIER

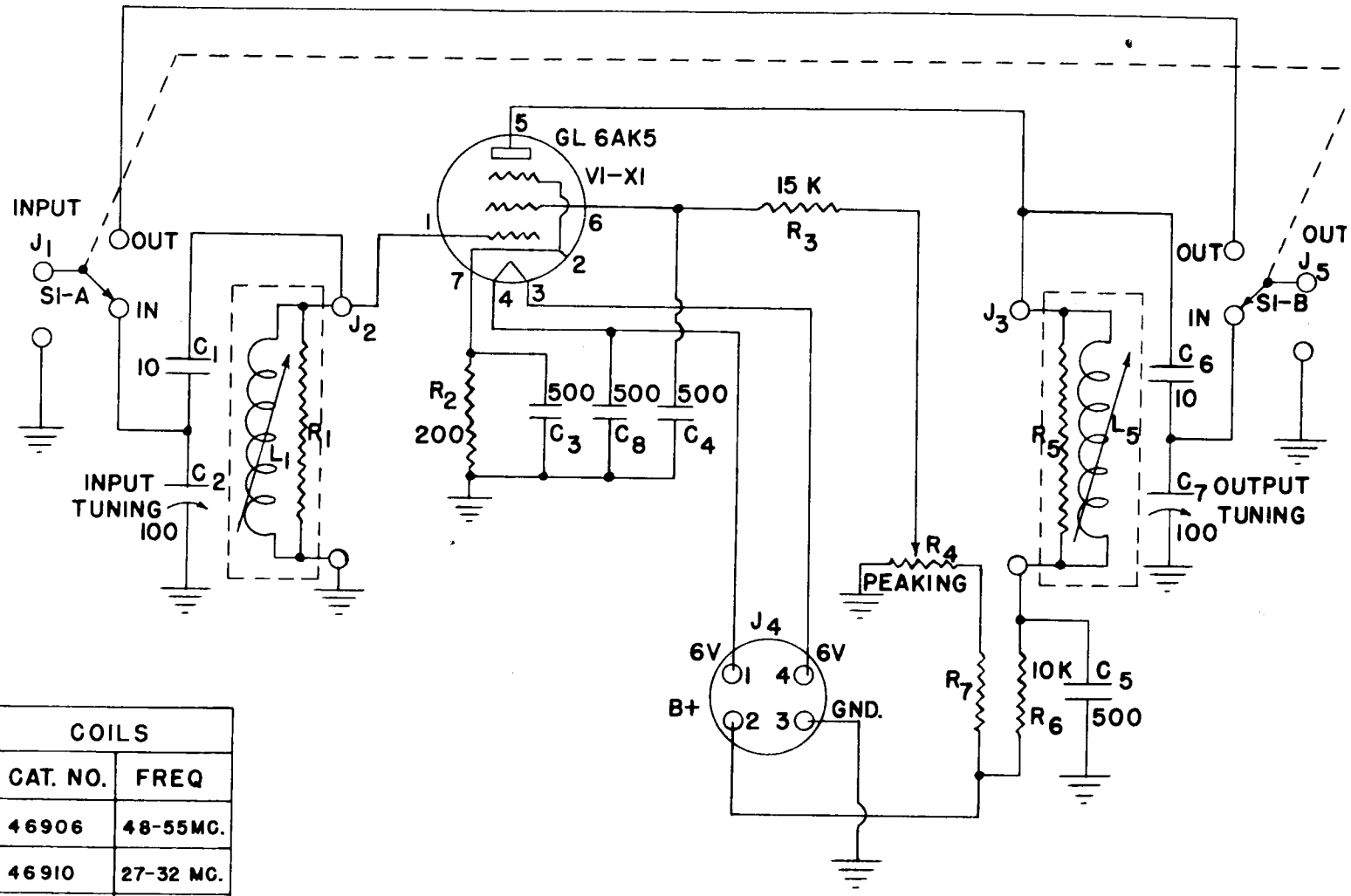
FIRST MADE FOR

JAMES MILLEN MFG. CO., INC.
MALDEN, MASS., U.S.A.

K92101

DESIGNED BY
DRAWN BY
CHECKED BY
APPROVED
DATE

ALL DIMENSIONS UNLESS OTHERWISE NOTED MUST BE HELD TO A TOLERANCE OF



COILS	
CAT. NO.	FREQ
46906	48-55MC.
46910	27-32 MC.
46920	13-15 MC.

K DENOTES 1000
RESISTORS IN OHMS
CAPACITORS IN MMFI