

# INSTRUCTIONS

for

MILLEN VARIARM E. CO

Cat. No. 90700 Serial No. 1139

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

MILLER VARIARM L.C.O.  
(90700 - 90701)

The commercial versions of the Variarm L.C.O. are as near like the one Mr. Henry B. Rice, Jr. W9YZH, described in his article in the January 1941 QST, as is commercially feasible. The main difference was made in the name of safety. Since the unit uses a vibrationless voltage-doubling power supply, a common ground cannot be used without raising the chassis potential above absolute ground. Therefore, the commercial Variarm chassis is grounded to the circuit ground through condensers. This allows the chassis to be grounded.

Instead of using plug-in coils for 80 and 40, and for 160 and 80, the Variarms use a tapped coil in the amplifier-doubler plate circuit, and a tapped coupling coil.

In some cases it may be necessary to rewire the crystal socket to use the Variarm coupling coil. The hot side of the coil is connected to prong #2 through a .002 mfd. condenser so that the coil will not short out the bias. The ground side of the coil, the ground side of the link coil, the shield on the cable, the coil shield are connected to prong #4. This should be grounded to the chassis and circuit ground of the transmitter, in most cases, the crystal socket is wired so that no change is necessary. Prongs #1, #3, and #5 are open.

In both the amplifier-doubler coil and the coupling coil, a flexible lead is connected to the stator of the negative-temperature coefficient tuning condenser. When the units are tested in the factory, the lead is soldered to the lug at the end of the coil. This is for 80 meter operation on the 90700 and for 160 meter operation on the 90701. The lead should be unsoldered from the end lug and soldered to the tap lug for 40 meter operation of the 90700, and for 80 meter operation of the 90701.

If the present crystal oscillator has no bias resistor, but merely an R-F choke across the crystal, it will be necessary to put a bias resistor in the oscillator.

In most cases the present oscillator should be used as a doubler when excited by the L.C.O. Straight-through operation without neutralization may result in oscillation.

The 90700 Variarm covers the same frequency range as Mr. Rice's unit (3500- 3650 kc. and 7000 - 7300 kc.). The 90701 Variarm was designed for use on the 160 meter bands. This unit covers 1750 - 2000 kc. and 3500 - 4000 kc. If it is desired to cover the 2000 - 2050 kc. range, the trimmer condenser in the grid circuit of the oscillator may be adjusted so that the unit will cover about 1800 - 2050 kc.

W2HKH

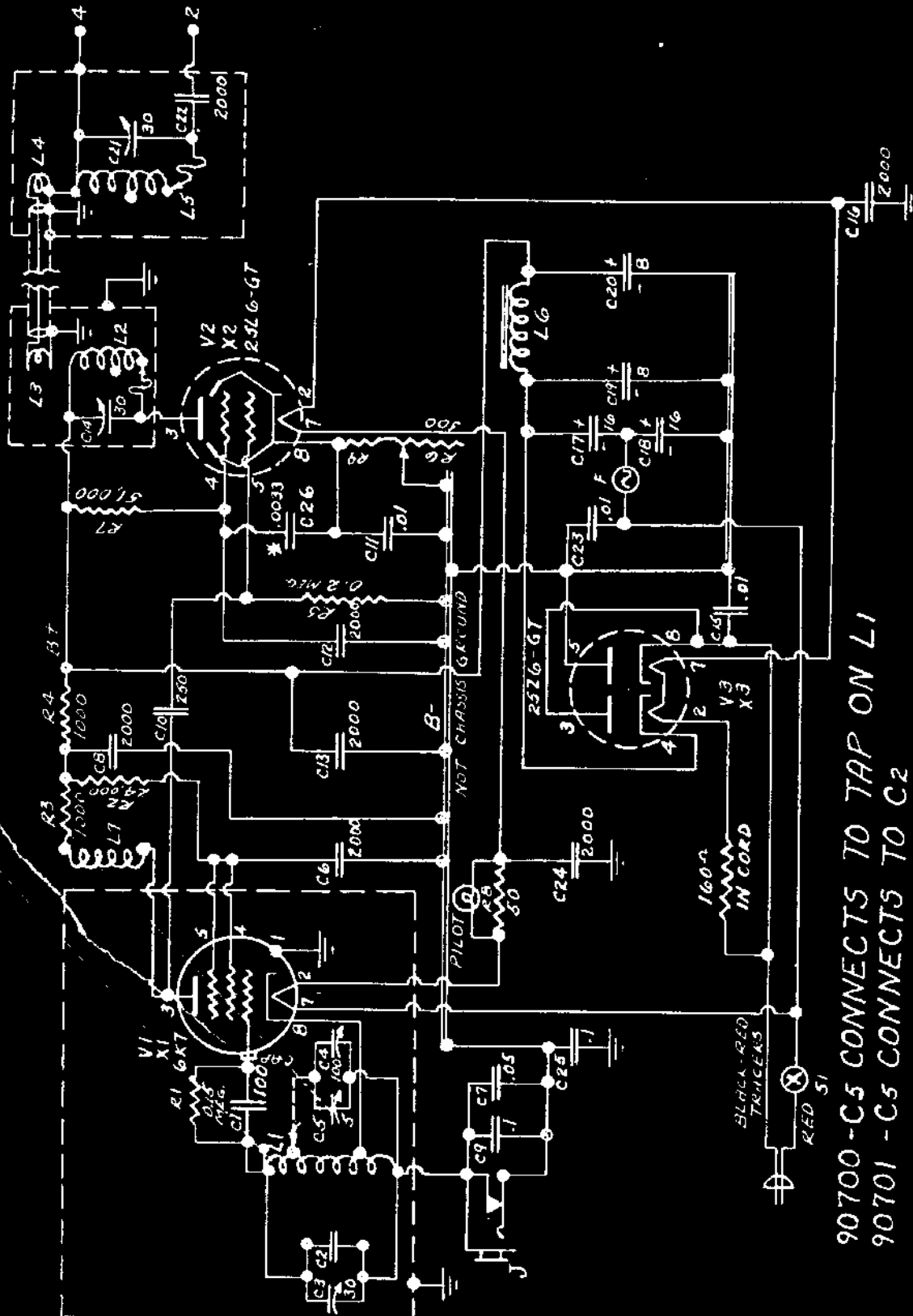
The trimmer condenser for recalibrating the Variarm is available for screw-driver adjustment by sliding back the oscillator cover. In recalibrating either the 90700 or the 90701, the oscillator cover should be closed when the frequency is measured. Each unit is individually calibrated at the factory.

The output from the coupling coil is enough to fully excite any low-power stage, (up to and including an 807). The grids of most crystal oscillator tubes will be over-driven by the n.c.o. It may be necessary to detune the coupling coil slightly to get maximum output from the transmitter. The amplifier-doubler tuning condenser and the output tank tuning condenser are available for screw-driver tuning through the top plates of their respective coil shields. The 90700 will drive any low power amplifier or frequency multiplier whose plate circuit tunes to 160, 80 or 40 meters.

The load-equalizing resistor for chirpless keying is adjusted and marked at the factory for each band. When changing coil taps, the load-equalizing resistor should be set to the other mark. If the note becomes chirpy, the resistor should be readjusted. The resistor is available for screw-driver adjustment at the back of the chassis.

The Variarm control, at the side of the oscillator, varies a small trimmer condenser in the grid circuit of the oscillator. This gives a small band-spread range for each setting of the main dial. In calibrating the main dial at the factory, the Variarm control is set to the front corner of the oscillator box. The plates of the band-spread condenser are then half-meshed.

THIRD ANGLE PROJECTION



90700 - C5 CONNECTS TO TAP ON L1  
 90701 - C5 CONNECTS TO C2  
 MICA CAPACITORS IN  $\mu$ fds - OTHERS IN  $\mu$ fds  
 ⊥ INDICATES CHASSIS GROUND

R9	MODEL	C2
700	90700	400 mmf
300 ohms	90701	270 mmf

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

8-3-46	③	C26 was shown to grid. Changed R9 to 100 ohms.
7-28-46	②	Added C26
12-26-46	①	Eliminated C2A Added 90701 notes: R9 $\mu$ fd

**SCHEMATIC CIRCUIT DIAGRAM**  
**VARIARM 90700 OR 90701**  
 FIRST MADE FOR 90700

DESIGNED BY H.R.  
 DRAWN BY [Signature]  
 CHECKED BY HJB  
 APPROVED R.W.C.

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

**K90700**

1139

DATE  
 10-31-45

\* USED ONLY IN 90701