

## INSTRUCTIONS

### CONTROLAIRE "MULE" TONE TRANSMITTER

#### ALL TRANSISTORIZED

The MULE, although small, has a man-size wallop in reference to power output. Average radiated power is approximately 135 milliwatts with a minimum specification of 100 milliwatts before a transmitter is approved. This means the MULE will equal and in most cases surpass the output of the average tube type transmitter used in the past. Efficiency is due to several factors. One, the use of specially graded Silicon, RF transistors, the employment of a series tuned center loaded antenna and, last, the use of collector modulation. Collector modulation is quite important as average power will increase during modulation and not reduce as experienced with grid modulation of older tube type units. Modulation or tone frequency is approximately 600 C.P.S. The total power input for all stages is approximately 42 ma at 18v or about 750 milliwatts. Of this power approximately 360 milliwatts goes to the RF power amplifier which in turn supplies the antenna. A Class "C" citizens service station license is required to operate this transmitter.

#### PREPARING TRANSMITTER FOR USE

Use care when removing rear case cover as the case assembly screws, battery jumper cable and cardboard spacers are packed inside the case. Remove these items and prepare to install the antenna. Notice the small "L" bracket with attaching screw near the lower section of etched circuit board. This is the antenna attaching point. Insert the antenna carefully through the rubber grommet so as not to damage any of the internal parts then thread it firmly onto the antenna attachment screw. Notice that when fully collapsed your antenna only extends about seven inches above the case so generally leave it installed as it should present no transportation or storage problem.

Batteries required are two Eveready No. 266, Burgess M6 or Novel S206. These are 9v batteries and two must be connected in series to provide the 18v required. Batteries are installed with snap contacts running parallel along the bottom edge of etched circuit board. Use the jumper snap cable to provide the series connection between the batteries then connect the transmitter power input cables. Red to 18 volts plus and black to 18 volts minus. The snaps normally will only fit the proper connections but one word of caution- be sure the snaps or leads do not short out against one another and are faced to the rear of the transmitter case. Dressing the battery snap leads in this manner will prevent shorts to one another and also prevent shorts to the bottom edge of the circuit board. After batteries are in place insert a cardboard spacer on each side of the battery installation then install rear cover. Do not over-tighten case assembly screws.

#### OPERATING INSTRUCTIONS

Notice that the antenna is a center loaded unit and includes a coil assembly as part of the antenna. It is of primary importance when the antenna is extended that all slide elements are fully extended and especially that element just above the coil. This particular element, if not fully extended, can short out the coil and power output from transmitter will be reduced 90%. Sometimes on new antennas this one element may not slide

freely through coil until it has been extended a few times. If yours appears to stick as it goes through the coil, rotate it slightly and this will free it. When fully extended this element will extend about  $4\frac{5}{8}$ " above coil.

For maximum radiation of signal power the operator should grasp the transmitter case firmly with his bare hands. By doing this the operator becomes part of the antenna system (counterpoise) and maximum efficiency is achieved. Grasping the case loosely or the wearing of thick gloves reduces your body connections as part of the antenna system and power will be reduced. For maximum range to your receiver the antenna should be held vertical with respect to ground. When flying at an extreme distance do not point antenna at aircraft. This is brought to your attention for maximum efficiency - let it guide your operation.

### SWITCH

There are two switches on the front of the transmitter. One of these is a push button and the other is a slide switch. First about the operation of the slide switch. This is fundamentally a steady "carrier on" or "carrier off" switch. When in the down position the transmitter is basically off (no carrier), however, when the push button switch is actuated and instantaneous carrier and tone is produced. When the slide switch is in the "up" position, this turns on a steady or continuous carrier and upon actuation of push button the steady carrier is again modulated with a tone. Normally when the transmitter is not in use the slide switch should be placed in the "down" position so there is no drain on the batteries. Now let's stop to consider this a minute. For the safest flying possible it is best to fly with a carrier on, however, this uses up batteries a little faster than to fly without a carrier on all the time. Flying without a carrier subjects your model airplane to a greater interference gamble than you would be taking by leaving the carrier on so if you feel you are flying in an interference free area you might try flying with the carrier off or with the switch in the lower position. Now, there is another advantage to flying without a carrier with some receivers. There are some receivers that have swamp-tendencies so if you are flying up close to an airplane containing one of these receivers you should at least fly with your carrier off until your model airplane is far enough away so that it will not swamp and then you can turn the carrier "on" switch on.

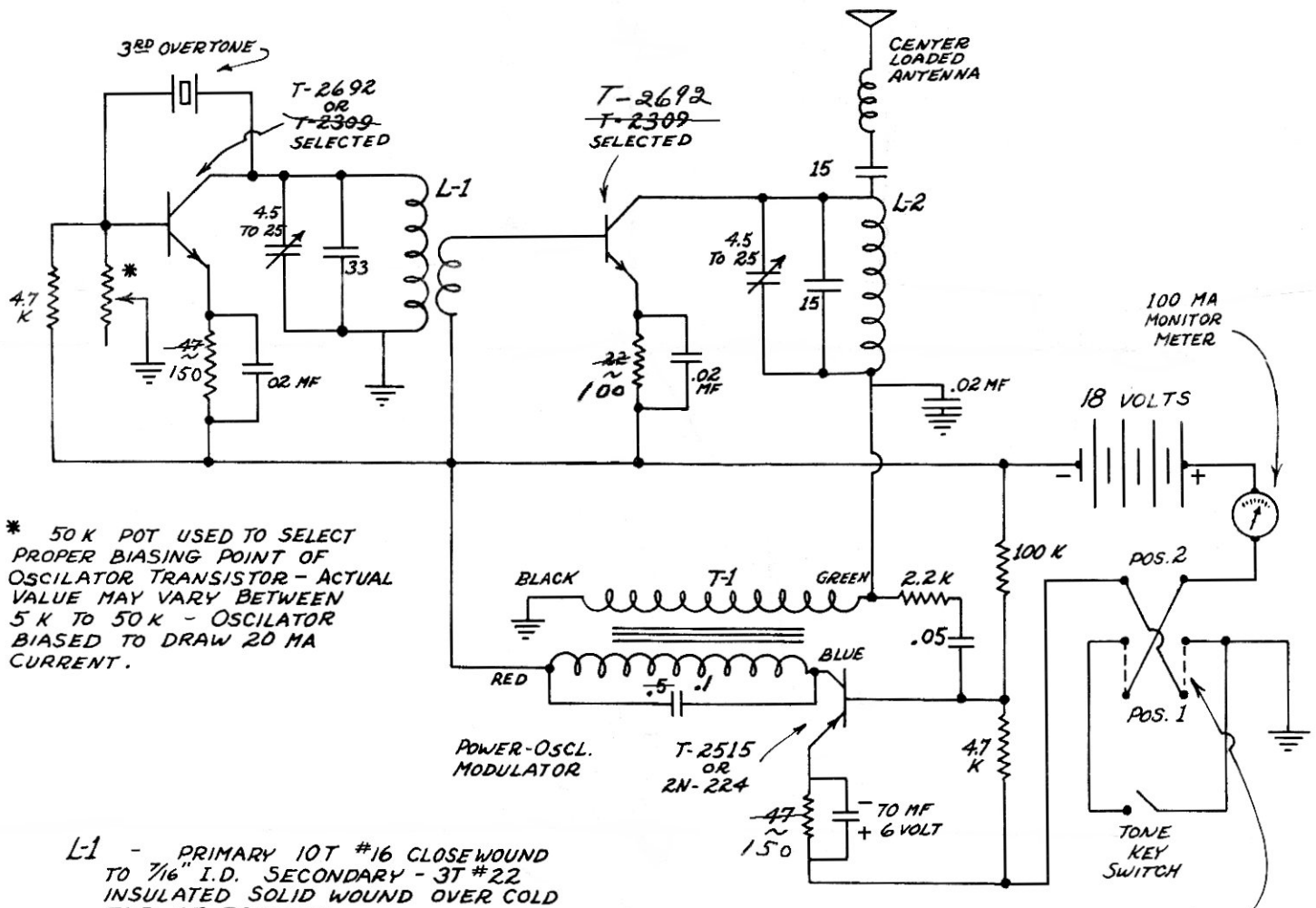
### TUNING

Your transmitter has been factory tuned for maximum output and barring any physical damage should remain in tune indefinitely. Do not attempt to retune unless you are positive the tuning is at fault then be sure you understand the procedure. Equipment involved is a sensitive field strength meter, insulated tuning tool and 0-100 ma meter to measure the current drain from the batteries. Procedure is to place field strength meter at a point from the transmitter where a reading can be obtained actual distance will depend on sensitivity of meter. Install the 0-100 ma meter in the (+) lead from the batteries. Grasp transmitter case firmly and fully extend antenna - remember you are the counterpoise antenna. With slide switch in down position (carrier off) depress the push button switch and notice the readings on the field strength meter also the reading on the 0-100 ma meter. The field strength meter should indicate, however its reading will be arbitrary. Current flow

on the 0-100 ma meter should be approximately 40 to 55 ma. To repeak the tuning adjust the oscillator trimmer capacitor for a condition of a maximum field strength meter reading together with a maximum condition of current flow on the 0-100 ma meter. Notice that although the tuning is broad only one point of adjustment gives both maximum field strength and current flow readings. After this point has been determined slightly readjust oscillator trimmer toward an increased capacitance position about 5° of trimmer adjustment. (The trimmer is at maximum capacitance or value when solder spot on movable disk is aligned with solder spot on body of trimmer.) The purpose of the 5° adjustment is to insure instantaneous starting of the oscillator when the push button is keyed rapidly. If a delay is experienced on your particular transmitter increase the oscillator trimmer capacitance until instantaneous starting or keying is obtained.

Adjust the amplifier trimmer for a combined condition of maximum field strength reading and minimum current flow on 0-100 ma meter.

## CONTROLAIRE ALL TRANSISTOR "MULE"



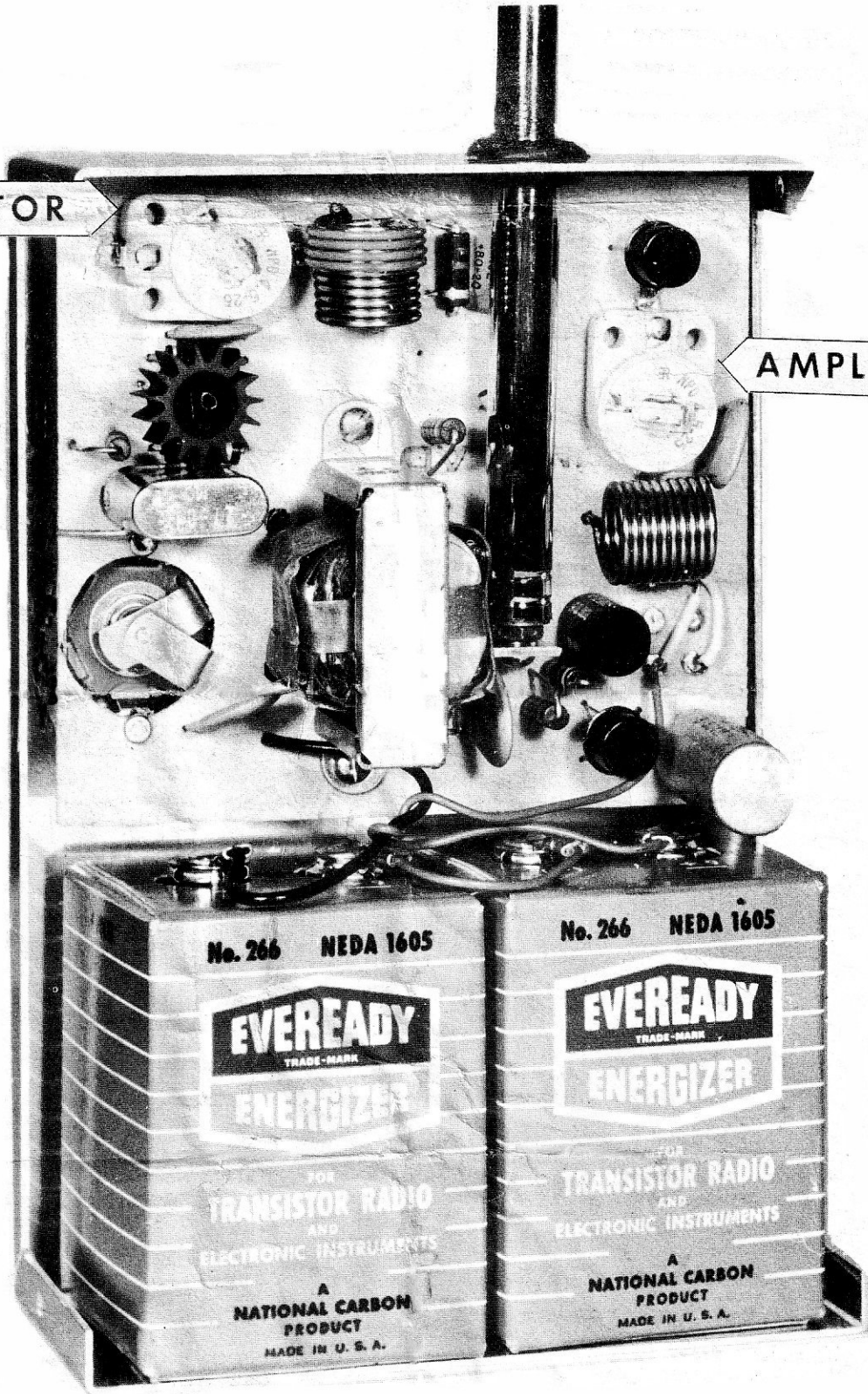
CONTROLAIRE ELECTRONICS DIV. OF WORLD ENGINES, INC.

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OSCILLATOR

AMPLIFIER



No. 266 NEDA 1605

**EVEREADY**  
TRADE-MARK  
**ENERGIZER**

FOR  
**TRANSISTOR RADIO**  
AND  
ELECTRONIC INSTRUMENTS

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