

OPERATING INSTRUCTIONS

GALLOPING GHOST PROPORTIONAL TRANSMITTER 9 VOLT OPERATION

INTRODUCTION

The Galloping Ghost transmitter represents the first offering in the Controlaire line designed specifically for the single channel proportional enthusiasts. It features a stable unijunction pulser coupled to the same type of high efficiency RF section and high modulation percentage associated with the Mark II Mule. Although designed as a companion proportional transmitter for the SH 100 superhet receiver, the Galloping Ghost will operate any other Controlaire single channel receiver equally well.

Average total power input to all stages is about 55 ma at 9 volts or about 495 milliwatts. Of this power about 275 milliwatts goes to the RF amplifier which in turn supplies the antenna. Average radiated power is approximately 175 milliwatts with a minimum of 150 milliwatts before a transmitter is approved. This means that Galloping Ghost will equal or surpass the output of the average tube type transmitter used in the past. Efficiency is due to several factors. One, the use of special graded silicon RF transistors, the employment of a series tuned center loaded antenna and last, the correct matching of this antenna to a special designed RF amplifier stage. Other features include the ability to pulse up to about 30 C.P.S., a tone modulation frequency of about 600 C.P.S. with a modulation percentage of approximately ninety-seven percent and a new sub-antenna system for precision receiver tuning. This latter feature eliminates the necessity of a distance check for positive transmitter-receiver tuning checks.

The unijunction pulser circuit contains all silicon semiconductor devices for stability and uniformity. The pulse symmetry ratio (rudder control) may be varied from 80/20 to 20/80 and a pulse rate (elevator control) change of approximately 4:1 may be affected simultaneously by the control stick. Auxiliary trim levers provide approximately 15 percent control surface movement on each side of neutral for flight trim on both elevator and rudder. Advanced design circuitry provides complete temperature stability and precludes the possibility of any transmitted interaction between the two proportional controls. A lever switch is provided to interrupt normal pulsing to transmit solid carrier or solid tone for actuation of a pulse-omission detection device for motor control.

A Class "C" citizens service station license is required to operate this transmitter.

PREPARING TRANSMITTER FOR USE

When removing rear case cover use a certain care so as not to bend sub-antenna or accidentally lose the case assembly screws that are packaged inside transmitter case. Remove the case assembly screws and prepare to install antenna and battery. In reference to antenna, notice the small "L" bracket with attaching screw near the lower section of the 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 the antenna is installed and collapsed, it only extends about four inches above the case so generally leave it installed as it should present no transportation or storage problem. The battery required is one (1) Eveready No. 276 or Burgess D6 or Novel 306. It is installed in lower case compartment connecting the red wire snap to plus and black wire snap to minus. Use scrap cardboard or balsa blocks to fill in unused space in battery compartment for a tight battery installation.

ANTENNA INFORMATION

Notice that the main 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% 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 a 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.

SUB-ANTENNA FOR RECEIVER TEST

As an added convenience the transmitter is equipped with a new sub-antenna system. This is the small bare wire that internally is soldered to the transmitter's antenna circuit which, in turn, protrudes flush in the small rubber grommet located on the rear case cover. One word of caution — when installing the rear cover use care to guide the wire into the grommet. Generally, it is to fit just flush through the grommet and not protrude over 1/32". The purpose of the sub-antenna is to allow a controlled amount of weak signal radiation from the transmitter when main antenna is removed. This controlled

amount of weak signal is used for receiver turning and sensitivity check purposes. As described in the Controlaire receiver instructions, a proper operating receiver should respond at a distance of 15" to 30" from the sub-antenna radiation hole. If the receiver will not respond at a minimum distance of 15" it should be considered insensitive or out of tune and should not be flown. Response at the 15" distance is equivalent to about 3/4 mile range in the air. Whenever you are in doubt about receiver sensitivity, check it with your sub-antenna system. Make this a before the first flight of the day preflight check.

TRANSMITTER OPERATION

After installing the rear case cover, the transmitter is ready for operation; checkout can best be accomplished using a monitor and/or matching receiver. Turn the transmitter on by placing the slide switch in the "on" position and notice that the meter on the front panel will indicate somewhere above mid-scale and quiver slightly, this indicates that a pulsed tone is being transmitted. With a monitor or receiver operating, notice that the pulse rate increases when the control stick is pushed up and decreases as it is pulled down; this action corresponds to elevator control. No noticeable change in pulse rate should occur when the stick is moved from side to side for rudder control. As the stick is moved from side to side, a change in the sound from the monitor or receiver relay will be noted, this is caused by the pulse symmetry ratio change used for rudder control; that is the percentage of time that a tone is transmitted within each pulse cycle. As the stick is moved to the left, tone is sent out a smaller percent of the cycle and at the extreme left position of the stick a monitor will issue a sound similar to a clock ticking indicating that tone is being trans-

mitted for approximately 20% of the pulse cycle and carrier the remaining 80%. The reverse is true as the stick is moved to the right and at the extreme right each pulse cycle is approximately 80% tone and 20% carrier.

Actuating the lever switch on the front panel interrupts the pulsing and allows the transmission of continuous tone or carrier; moving the lever downward causes continuous tone transmission and upward continuous carrier. While this device is primarily intended for use as a method of obtaining motor control it may be utilized for the more violent maneuvers in rudder-only flying by remembering that lever-down corresponds to hard right rudder etc.

The panel meter at the top of the case gives an indication of the battery current flowing in the R.F. amplifier circuit and is therefore a rough indication of the transmitter output if the antenna is installed. The meter reading should be noted with the lever switch depressed in either direction when the transmitter is first put into operation with a fresh battery as any significant deviation from this reading thereafter would indicate a weak battery or some malfunction.

PULSER ADJUSTMENT

The pulser is factory adjusted with the trim levers and control stick set at neutral to give 50/50 pulse width symmetry and 7 to 8 pulses per second rate. Normal rate limits at the extreme up and down control stick position are 3 and 12 P.P.S. which corresponds to the average requirements for Galloping Ghost.

If for any reason you wish to change the neutral stick pulser rate it is a matter of repositioning the control potentiometer shaft in reference to the neutral position of the stick. To do this notice the square opening in the P.C. board giving access to the potentiometer shaft lock screws located in the rear of the transmitter. Procedure is to move the stick toward the desired rate position, hold stick firm, then loosen lock screw. After screw is loose, release stick allowing it to return to neutral then retighten lock screw. It may be necessary to accomplish this operation more than

once to exactly position the pot shaft at your desired rate at neutral. Once properly set, it will not change.

Neutral pulse rate may be adjusted into the 20-30 P.P.S. range for use with the more exotic dual proportional schemes with retention of the 4:1 pulse rate change feature.

It is not recommended that any change be made to the neutral stick symmetry adjustment since most off-neutral rudder conditions are usually caused at the receiver end of the system by such things as poor relay adjustment, too much relay capacitance, unbalanced servo batteries, etc.

Every effort should be made to cure such trouble at the source and the transmitted neutral stick symmetry radio changed as a last resort. In the event that you find this a necessity, it may be accomplished in the same manner as outlined for the rate.

TUNING Only to be accomplished by persons having 1st or 2nd class commercial F.C.C. License.

Factory assembled transmitters have been 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 a 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 "on" position and the lever switch depressed upward (continuous carrier) notice the readings on the field strength meter and 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 45 to 60 ma. To check the tuning only one adjustment is involved. This is to the oscillator

tuning slug and is one of adjusting the oscillator for best efficiency. There is no adjustment to the RF power amplifier as this is fixed tuned. To adjust the oscillator first unscrew the tuning slug so it is about halfway out of the coil. At this point the oscillator should be inoperative and no indication should be noted on field strength meter. Current flow on meter should be less than 10 ma and fluctuating slightly due to pulser operation. Starting with the slug at the halfway point of the coil, slowly readjust it into the coil and notice the exact point of adjustment where the current suddenly jumps to the 45 to 60 ma level. The essence of proper oscillator adjustment is one of locating exact point where oscillator started or current suddenly increased, then pre-load the oscillator by turning slug one full turn more into the coil. This will allow current to rise about 4 ma above point of sudden increase and will insure oscillator starting every time it is keyed. At this point the oscillator should be operating properly and an indication should be noted on field strength meter. This completes adjustment of RF section of transmitter.

WARRANTY

Guarantee is extended that factory assembled transmitters, not kits, be free of workmanship and parts defect for a period of 60 days from date of purchase. This is valid only if transmitter is operated within scope of instructions presented and used with a companion Controilaire receiver. We reserve the right of inspection to determine abuse or improper operation and if evident in our opinion, guarantee is void. No responsibility is assumed for damage inflicted by shipping or handling organizations. When returning a transmitter for guarantee service, state this fact, along with full particulars of why you think unit is defective. Enclose particulars in carton, pack well, and send direct to Controilaire: Division, World Engines, Inc. Do not return to your dealer as in most cases details and particulars are omitted and mis-understandings result.

SERVICE

The minimum fee for inspection and repair is \$4.50. Include this amount with transmitter. If inspection reveals charges to be in excess of \$20.00 you will be notified for approval of intended repair. Include all symptoms of malfunction to lessen our troubleshooting time and costs to you. Parts are quoted net and no dealers discount is offered. In no case will repair exceed 50% of the original selling price. Print name and address, pack well, and attach or enclose letter of particulars in return carton. Allow two weeks for receipt, repair and return. Send repair work to Controilaire Division, World Engines, Inc., 8206 Blue Ash Road, Cincinnati, Ohio 45236. Do not return repair work to your dealer.