INSTRUCTIONS FOR OPERATING CITIZEN-SHIP DIGITAL PROPORTIONAL SYSTEM

CITIZEN-SHIP RADIO CORPORATION
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INDEX
FOR INSTRUCTIONS FOR

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1. DESCRIPTION OF D. P. SYSTEM

The Citizen-Ship D. P. System uses the digital pulse position principle and gives five completely independent, fully proportional, simultaneous channels. The system may be operated with any number (from 1 to 5) of servos connected. For instance, a rudder-only aircraft would use only 1 or 2 channels; an AMA Class II aircraft would use 3 channels; and a Class III installation would use 4 or possibly all 5 channels. The system is suitable for both sport and competition use in model planes, boats, or cars.

A. RECEIVER

The DPR Receiver is of the superheterodyne type and includes a crystal filter which improves rejection of unwanted frequency signals and a decoder which sorts out the information received and sends it to the proper servo. All receivers are completely interchangable except for crystal frequencies.

B. TRANSMITTER

The DPT Transmitter consists of the RF power section modulated by the digital type encoder signal which is varied by control sticks extending through the front of the case.

The two longest sticks control the four main channels (on an airplane, rudder, elevator, ailerons and motor) and a smaller lever marked "Aux" controls the 5th channel which can be used for any additional function such as brakes, flaps, or retracting wheels.

In addition there are four small levers located close to the main controls marked "trim." These enable the modeler to change the neutral position of the 4 main channel servos and therefore trim an airplane for straight and level flight.

Control sticks are spring loaded to neutral except for the motor control which has detents and stays where positioned. The auxiliary control lever may also be left in any position. Two arrangements of control sticks on the DPT Transmitter are available. One is aileron and elevator on the right control stick (Model AER) with motor and rudder on the left stick. Some modelers will have the transmitter with the elevator and motor controls interchanged (Model AMR).

Transmitter battery is installed in the transmitter along with a built-in charger for both transmitter battery and the furnished receiver and servo battery pack.

C. SERVOS

The Model DPC Servo is a feedback proportional actuator featuring small size, rugged construction, very low electrical noise, and linear output. Intended use is to move the control surfaces of a model aircraft, car, or boat upon command of the DPR proportional receiver. All servos are interchangable and additional units are available.

2. FREQUENCY OF RECEIVER AND TRANSMITTER

The DPR Receiver is shipped adjusted and tuned for reception on the frequency which is stamped on the box and on the side of the case. The frequency of the crystal in the receiver is not the frequency at which the set will operate, since the receiver crystal is always 0.455mc lower than the frequency of the transmitter and receiver. Example: If you have a receiver tuned for 27.145mc, the receiver crystal should read 26.690 (i.e.: 27.145 - .455 = 26.690).

The DPT Transmitter is crystal controlled and intended for use on all of the 27mc Citizens Band frequencies for radio control operation. It may be used on any of the 6 legal frequencies by plugging in the desired crystal without any retuning.

Crystals must be used in pairs as follows, and must be ground to a tolerance of .0025% to insure proper operation and allow replacement without making retuning necessary. Replacement crystals may be obtained directly from CITIZEN-SHIP for $4.50 plus postage.

TRANSMITTER CRYSTAL FREQUENCY	RECEIVER CRYSTAL FREQUENCY
26.995mc	26.540mc
27.045mc	26.590mc
27.095mc	26.640mc
27.145mc	26.690mc
27.195mc	26.740mc
27.255mc	26.800mc

3. BATTERY REQUIREMENTS

All batteries are supplied with the system and are rechargeable nickel cadmium cells of 500 MA hr. capacity. The transmitter operates from an 8 cell pack giving 9.6V. Only four cells supplying 4.8V are carried in the model to operate the receiver and all servos. Spare or replacement batteries are available from the factory. Other types should not be used.

4. CHARGING INSTRUCTIONS

Batteries should be charged a minimum of 14 hours before being used the first time and overnight before each full day's use.

The charger is built into the transmitter and must charge both transmitter and receiver batteries at the same time. A wiring harness is provided to make the necessary connections. Follow in listed order only:

1. Insert the round socket into the transmitter through the back.

2. Connect the flat plug into the airborne battery supply socket.

3. NOW -- and only after completing steps 1 & 2, connect the standard 2 prong plug into a 110V 60-cycle AC outlet. CAUTION: Do not charge batteries with the back off the transmitter. A light bulb is installed in the transmitter and

when the batteries are charging, the light from this bulb can be observed through the trim lever slots in the transmitter case front.

4. Transmitter on-off switch must be in the "off" position while charging or the bulb will not light and batteries will not charge.

5. USE OF WIRING BOARD

The DP System as supplied is completely wired. All interconnections are provided by the printed circuit wiring board which also carries the on-off switch and 7 Deans 2-8 connectors. Replacement Deans connectors can be purchased from your hobby shop or the CITIZEN-SHIP Factory.

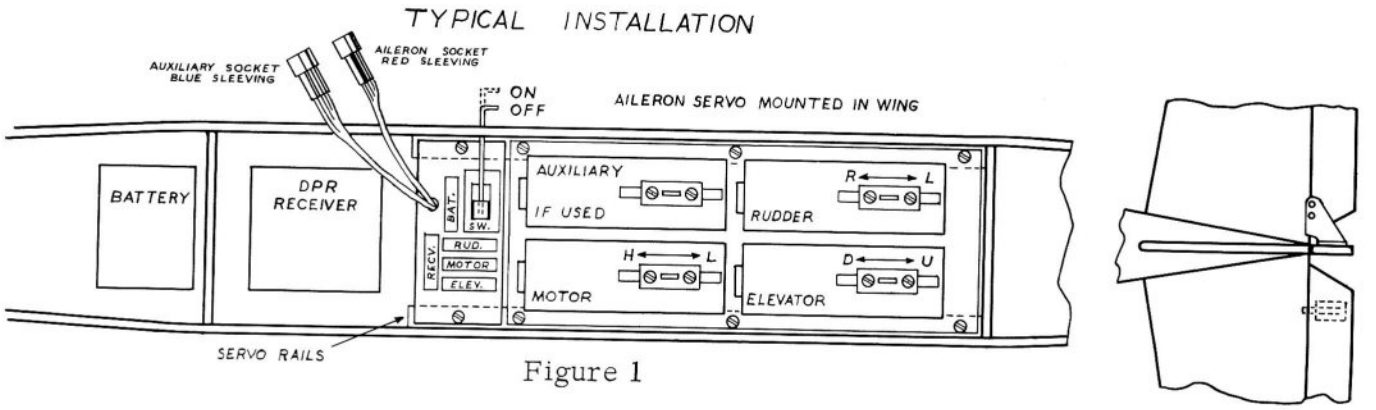

Figure 1

The sockets connected directly to the wiring board are identified in Figure 1. The aileron and auxiliary sockets are connected on extension cables and are identified by the sleeving color code in Figure 2.

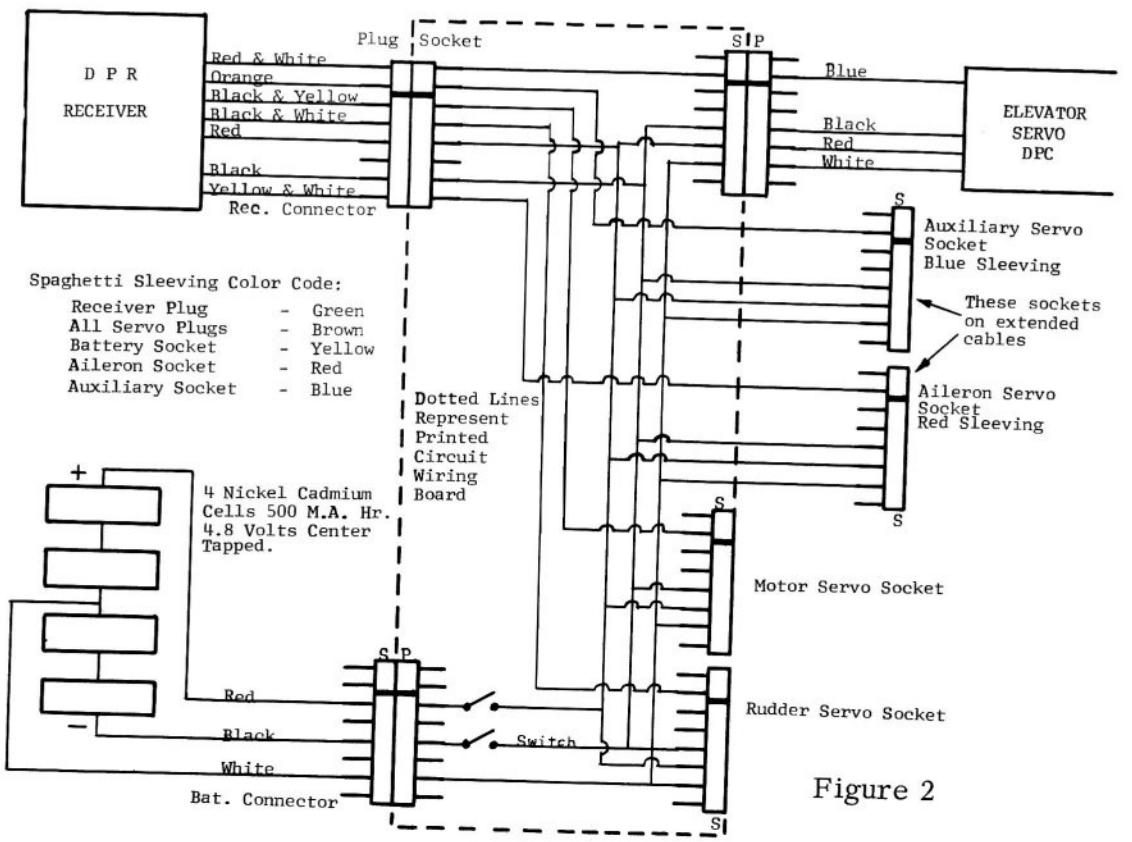

Figure 2

6. INSTALLATION OF UNITS

Figure 1 shows a typical installation. Your particular model may require some variation. Batteries should always be mounted ahead of or below the receiver.

A. WIRING BOARD

The wiring board is intended to be mounted on the servo rails just forward of the servos, but can be placed elsewhere if desired. One possibility is to mount it on the fuselage side with the switch rod extending out the top or bottom of the plane.

Before installation in plane, cut length of wiring board to match width of plane. Drill mounting hole in each end of board to match servo rails. (See Figure 1). Determine desired length for off-on switch rod. Cut, bend, and thread into 0-80 tapped hole in switch. (Follow Figure 1).

B. RECEIVER MOUNTING

The Receiver can be mounted in any position, as its operation is unaffected by vibration. However, for best crash protection it is recommended that the case be turned so that the printed circuit boards are in the same direction as the fuselage bottom. Also, Receiver must be surrounded by foam rubber to eliminate fatiguing components from vibration and to prevent crash damage. Receiver case must not touch servo cases as this may short circuit the battery supply.

C. SERVO MOUNTING AND OUTPUT ATTACHMENT

The servo direction of travel cannot be changed. Therefore, it is necessary to mount servos and control horns correctly to get the desired control direction from transmitter stick motion. Figure 1 and Figure 3 show the direction servos move for various control functions.

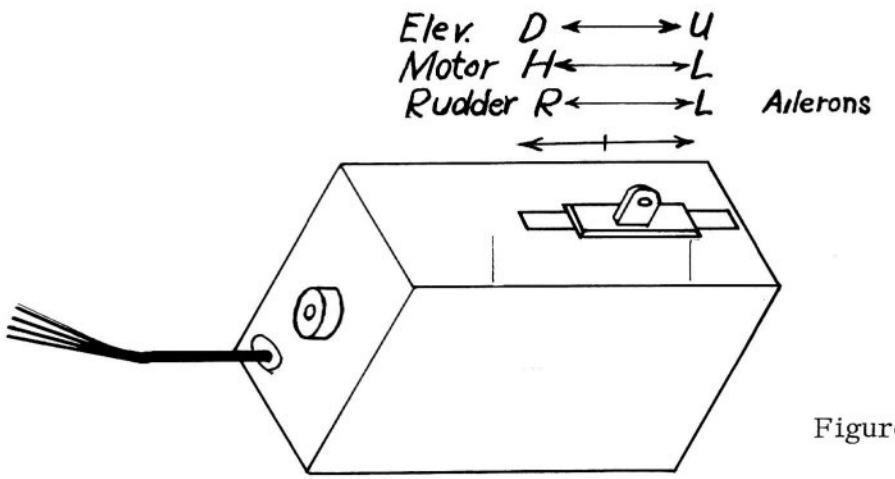

Figure 3

These servos can be mounted to a plywood board on either the large back surface or the narrow edge by moving the flat Tinnerman nuts to whichever surface is desired. The furnished 4-40 x 1/4'' Machine Screws are inserted through holes in the plywood and then into the Tinnerman nuts. (See Mounting Template). If the Servo is mounted on its large back surface, the plywood must be recessed or have holes drilled to clear the screw heads in the case bottom as shown on the Mounting Template. An alternate method is to use spacers between the Servo case and the plywood to raise the Servo above the surface of the plywood.

Attachment to the output arm can be accomplished by use of adjustable Clevis links sold at hobby shops, or by 1/16" wire as shown in Figure 4. Hobby shops stock a device which replaces the 1/32" wire in Figure 4 and eliminates soldering. Push rods should not be metal along their entire length. Wood or other insulating material should be used with wire ends.

Limit switches are incorporated which cut the power to the motor before the servo reaches its mechanical limit of travel. The linkage must not prevent the servo from running to these limits. This difficulty is most often encountered on the throttle control linkage as the throttle has definite stops. WARNING: If the above is not observed, batteries will be quickly exhausted due to the servo motor drawing a heavy current when the linkage prevents the servo from moving.

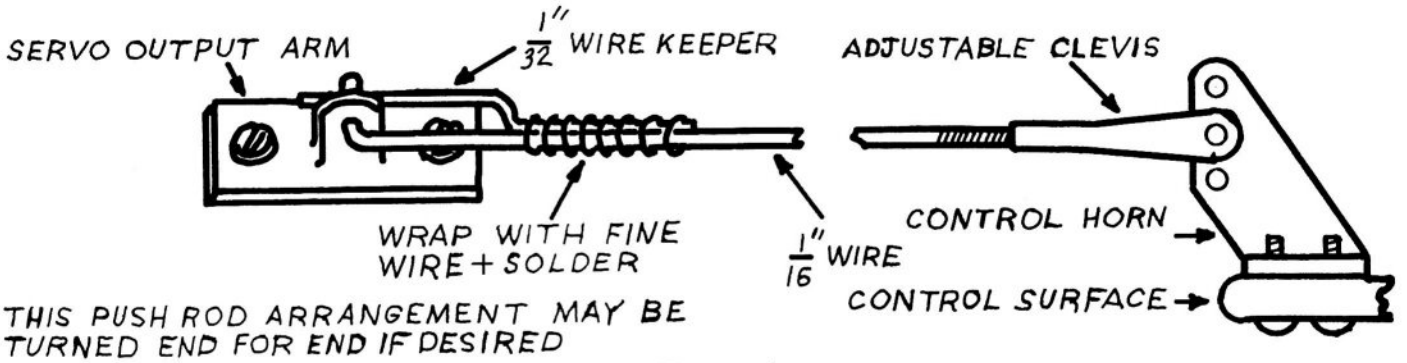

Figure 4

7. ADDITIONAL INFORMATION

A. PUTTING TRANSMITTER INTO OPERATION

The DPT Transmitter is ready to operate after the installation of the antenna.

The antenna is inserted through the rubber grommet in the top of the case and is screwed to a mounting bracket inside case by rotating the antenna in a clockwise direction. If difficulty is encountered the first time in lining up the antenna, remove the case back so that the screw can be seen. Antenna must be fully extended for maximum output and range.

Batteries should be charged before using the equipment for any length of time as explained under charging instructions.

CAUTION: REPLACE CASE BACK BEFORE CHARGING

Also be sure back is on and screws tight before use as a loose back generates noise which is transmitted to the receiver.

B. NOISE

Electrical noise can be generated by any two pieces of metal which are touching but not fastened securely and can cause trouble in any radio control system. If trouble is experienced only when the engine is running, suspect noise. It is good practice to use a nylon clevis on the motor control linkage (at the engine throttle) as this is the worst source of noise from metal-to-metal contact.

C. RECEIVER ANTENNA ARRANGEMENTS

Extensive flying with Proportional Systems has proven the superiority of two styles of antennas for the receiver over that which is in common use for reeds. The antenna wire run directly to the rear of the plane along the body, inside or out, or to the top of the rudder fin -- which, while easy to install, is very directional and not completely satisfactory for Proportional Systems, all of which require a continuous signal being received from the transmitter.

Recommended types of antenna in order of preference are:

1. A vertical steel wire 24-30" long mounted on fuselage.

2. A wire from receiver to one tip of stabilizer and continuing on to top of rudder, and then down to the other tip of stabilizer.

3. A wire from receiver to tip of rudder and continuing on to one tip of stabilizer.

Superheterodyne receivers require long antennas for best sensitivity. Use 36" minimum total antenna length, including lead-in.

Flying range of any equipment can be greatly reduced by modelers who have a bad habit of dragging the transmitter antenna on the ground (or close to it) and also by pointing the transmitter antenna directly at the airplane.

D. RANGE TESTING

If improper operation is suspected, a ground-range check would be in order. Ground range should be approximately 1/4 mile (2 - 3 blocks). Air range will be much greater than this.

Servo action will indicate when limit of range is reached. If all signal is lost (completely out of range) servos will remain in last position signaled. However, just before complete loss of signal, servos will become somewhat erratic.

E. SERVOS

Care should be taken to prevent dirt, grit, balsa dust, or any foreign substance from entering the servo case, as erratic operation may result due to bad contact between the switcher plate or feedback potentiometer and the contact fingers.

Servos are skillfully constructed and carefully tested. If difficulty should be encountered, it is suggested that they be serviced only at the factory. Do not return to the dealer.

The amplifier board, limit switches, and carbon feedback potentiometer are assembled into one unit. This eliminates all interconnecting wires inside the Servo, preventing failures from wire breakage. The Servo direction of travel cannot be changed, so it is necessary to mount the Servos and control horns correctly to get the desired control direction from transmitter stick motion. Figure 1 and Figure 3 show direction the servos move for various control functions.

The limit switch fingers and printed circuit tracks are factory lubricated with an electronic contact lubricant. The carbon feedback potentiometer is lubricated and should NOT be scraped, sanded or cleaned with any type solvent. Do NOT remove lubrication from any of these parts.

Care should be taken to keep the DPR Receiver case from contacting servo cases, as the receiver case is grounded to the +4.8 Volts and the servos are connected to Battery center tap. Touching of the two cases may short circuit the battery supply.

F. LICENSING

CAUTION: Before this transmitter may be operated, it must be licensed as a Class C Station in the Citizens Radio Service.

FCC Form #505 Application for Citizens Radio License is enclosed with the transmitter. Instructions on the front page are to be carefully followed in filling out the application.

In general, the only requirements for a Citizens Radio Station License with the CITIZEN-SHIP Transmitter are that the applicant be 12 years of age or older and a citizen of the United States. If some one under 12 wishes to purchase and use the transmitter, he may have his father or another adult file application for the license. After the Citizens Radio Station License has been obtained, anyone may operate the transmitter as long as the licensee assumes the responsibility for the proper operation of the station.

Do not operate your transmitter until you have received your Citizens Radio Station License.

WARRANTY AND SERVICE

Your CITIZEN-SHIP DP System is warranted by the manufacturer to be free from defects in material and workmanship. Any unit failing to operate within 30 days after date of purchase will be repaired or replaced free of charge upon being returned directly to the factory by the owner. DO NOT return the unit to the distributor or dealer for service. This warranty does not apply to failure of operation due to exhausted or improper batteries, or if in our judgement the equipment has been retuned, tampered with or received abusive treatment beyond that encountered in normal usage.

Any rewiring of equipment other than shortening of cables (do not cut them to less than 6'') can only cost the modeler money if equipment is ever returned for service. Our test equipment will take only wiring of units as originally furnished and other plug types, etc., will not be contended with. All modified units returned to the factory will be converted back to stock condition at the modeler's expense.

Minimum charges for units returned and not covered by Warranty will be $2.50 plus parts for each individual item. Only pieces of equipment known to be defective need to be returned to the factory for service. This can mean a great savings over the years to the owner of CITIZEN-SHIP Digital Proportional Equipment.

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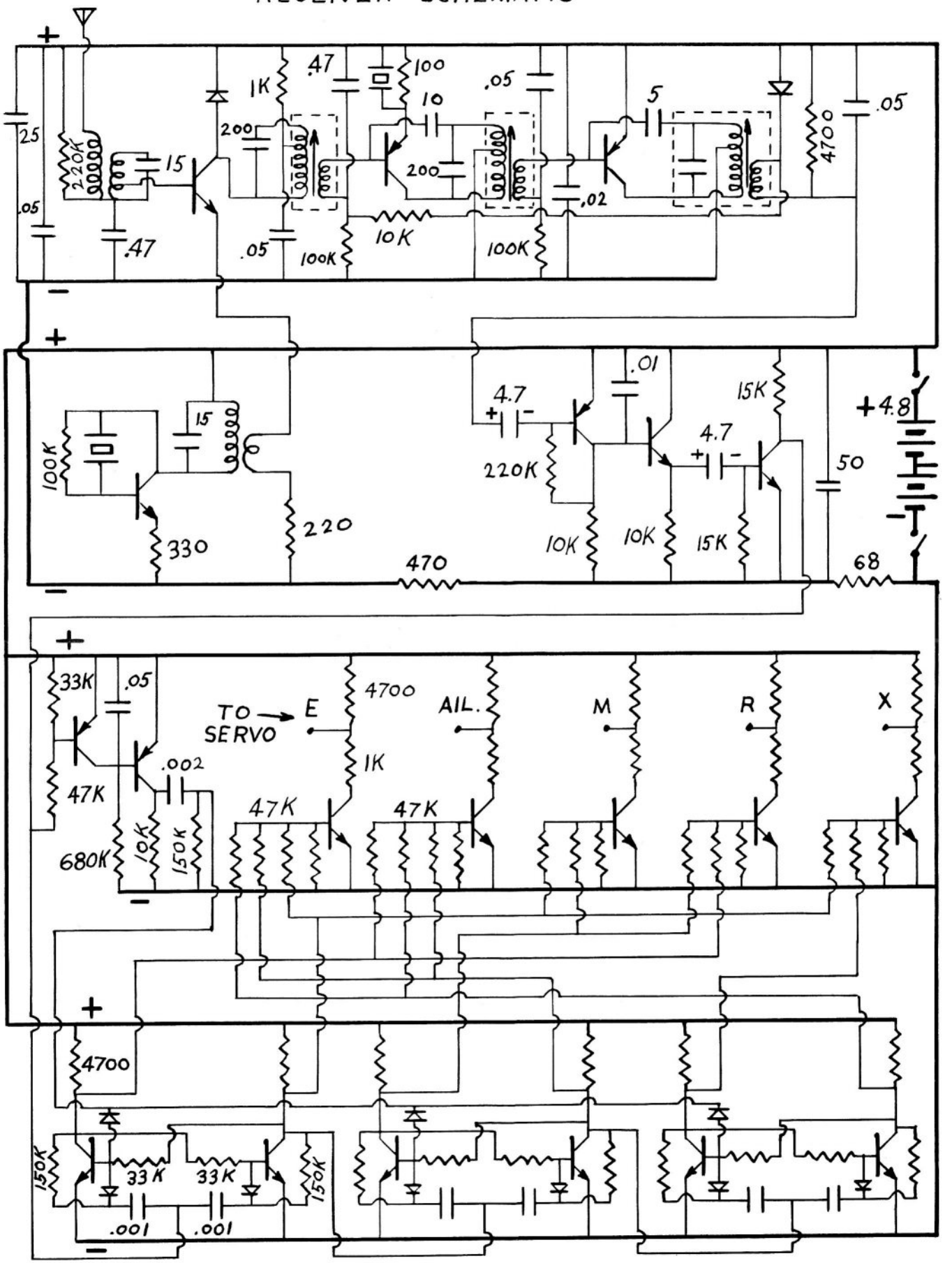
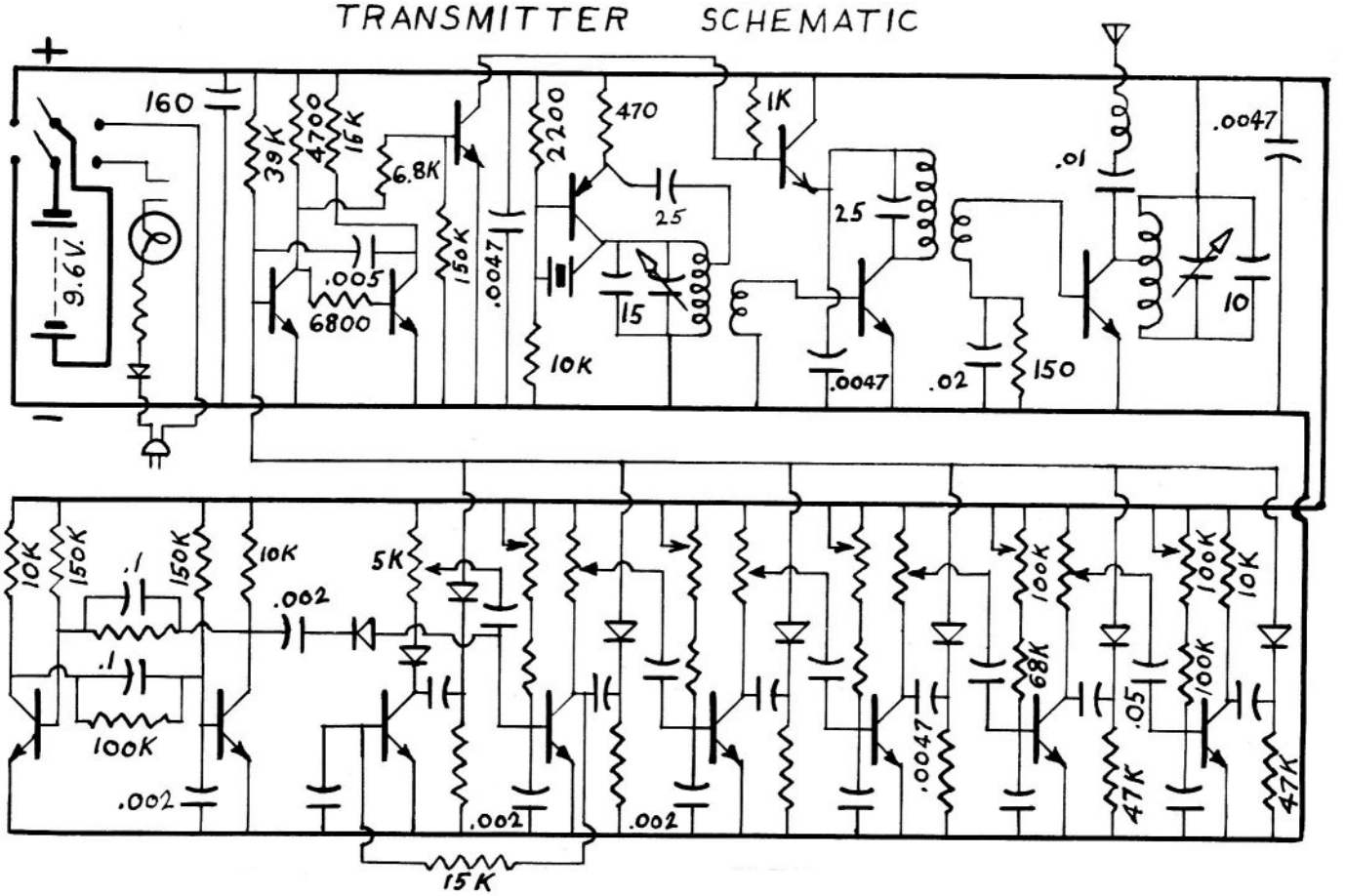
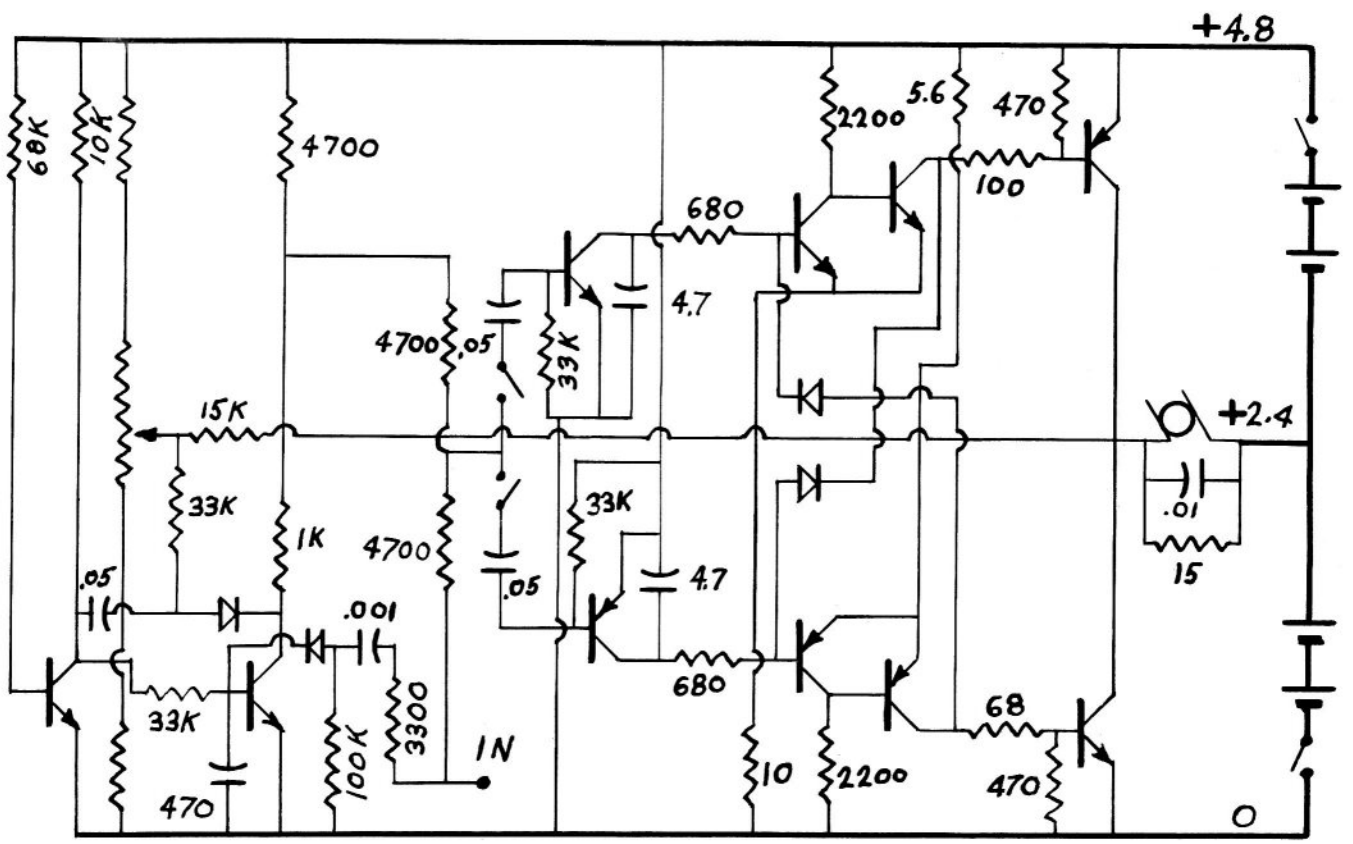
RECEIVER SCHEMATIC

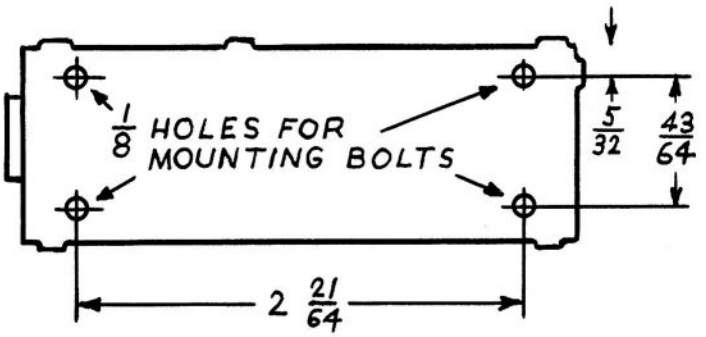


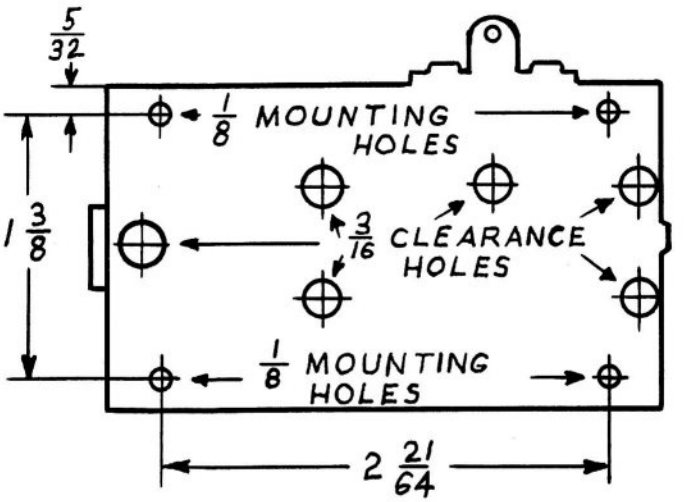
TRANSMITTER SCHEMATIC



SERVO SCHEMATIC







SERVO MOUNTING TEMPLATES