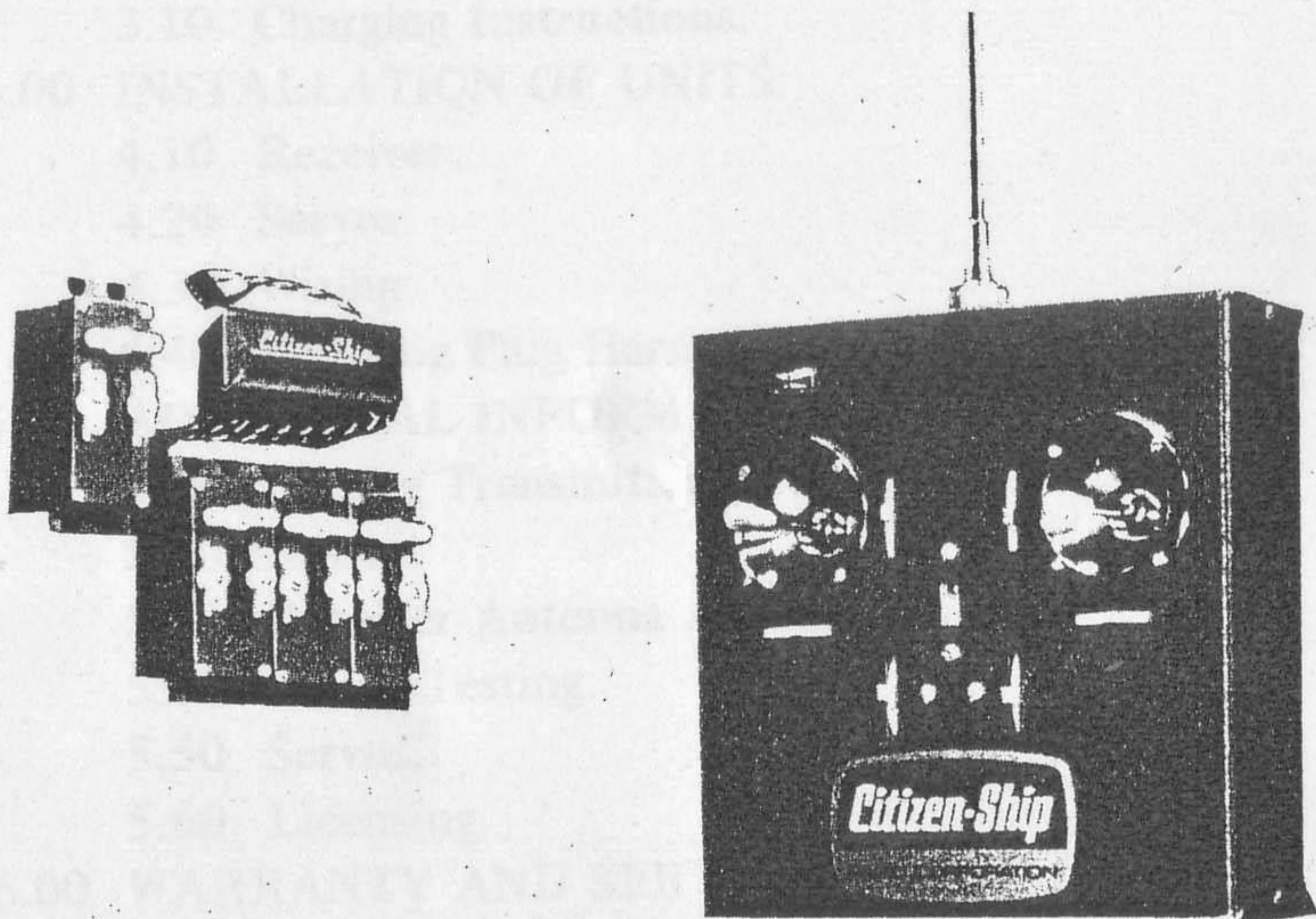


INSTRUCTIONS FOR OPERATING  
CITIZEN-SHIP DV-6  
DIGITAL PROPORTIONAL SYSTEM

72 MHz



CITIZEN-SHIP RADIO CORPORATION

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# INSTRUCTIONS FOR OPERATION OF CITIZEN-SHIP DIGITAL PROPORTIONAL SYSTEM 72 MHz

## 1.00 DESCRIPTION OF DV-672 SYSTEM.

The Citizen-Ship DV System uses the digital pulse position principle and gives six completely independent, fully proportional, simultaneous channels. The system may be operated with any number (from 1 to 6) of servos connected. For instance, a rudder-only aircraft would use only 1 or 2 servos. The system is suitable for both sport and competition use with model aircraft.

### 1.10 DPR-672 Receiver

The DPR-672 Receiver is of the superheterodyne type and includes a decoder which sorts out the information received and sends it to the proper servo. In keeping with new technological developments, integrated circuits have been incorporated into the DPR-672. An increase in reliability has been achieved since one integrated circuit replaces many discrete components. With the use of integrated circuits, the size of the DPR-672 is exceptionally small.

A sturdy case is used to enclose the receiver and give maximum protection.

A narrow band filter is used to preselect the signal giving high selectivity and noise rejection.

### 1.20 DVT-672 Transmitter.

The DVT-672 Transmitter consists of an RF power amplifier modulated by a digital type encoder signal which is varied by control sticks extending through the front of the case. The motor control stick has detents to keep motor speed in position desired. All controls have trim levers for trim changes while the plane is in flight. Auxiliary controls are centered below elevator and motor trim levers. Auxiliary # 1 is on the left side of transmitter, # 2 is on the right.

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. A zero center meter is included in transmitter to indicate battery current (right of center) and also charging current (left of center).



### 1.30 DMS Servo.

The Citizen-Ship DMS Servo was designed exclusively for use with the Citizen-Ship proportional control system.

The Model DMS Servo is a feedback proportional actuator of digital type featuring small size, lightweight nylon construction, very low electrical noise, convenient mounting, and a combination of linear and rotational outputs. Intended use is to position control surfaces of a model aircraft upon the command of a multi-channel DV series proportional transmitter. The output arms give six possible individual connections. Use of latest techniques in amplifier design has reduced component count and size. All servos are interchangeable and additional units are available for purchase.

## 2.00 FREQUENCY OF RECEIVER AND TRANSMITTER.

The DPR-672 is shipped adjusted and tuned for reception on the frequency which is stamped on the packing box and on the top 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 0.455 MHz lower than the frequency of the transmitter and receiver. Example: If you have a receiver tuned for 72.400 MHz, the receiver crystal should read 71.945 MHz (ie.  $72.400 - .455 = 71.945$ ).

The DVT-672 Transmitter is crystal controlled and intended for use on all of the 72-75 MHz frequencies for control of model aircraft only. Due to the strict regulations on frequency tolerances, crystal frequencies can only be changed at the factory.

CAUTION: A 27 MHz crystal cannot be used in the DVT-672 transmitter, and a 72-75 MHz crystal cannot be used in the DVT-627 transmitter.

Crystals must be used in pairs as follows and must be ground to a tolerance of 0.0025% to insure proper operation:

DVT-672 Transmitter crystal frequency	DPR-672 Receiver crystal frequency
72.080 MHz	71.625 MHz
72.240 MHz	71.785 MHz
72.400 MHz	71.945 MHz
72.960 MHz	72.505 MHz
75.640 MHz	75.185 MHz



## 3.00 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 9.6 volts. Only four cells supplying 4.8 volts 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 as performance may be affected.

### 3.10 Charging Instructions.

Batteries should be charged a minimum of 24 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 charging harness is provided to make the necessary connections. Follow the listed order only:

3.11 Insert the round socket into the transmitter back.

3.12 Connect the flat plug into the shorting plug socket or directly to the airborne battery supply socket. Charging batteries through shorting plug socket is most advantageous as wiring in model need not be disturbed.

3.13 Now, and only after completing steps 1 & 2, connect the standard 2 prong plug into a 110 volt, 60-cycle AC outlet. CAUTION: Do not charge batteries with the back off the transmitter. When the batteries are charging meter will read approximately one half of full scale to left of center.

3.14 Transmitter on-off switch must be in the "off" position while charging or the batteries will not charge.

## 4.00 INSTALLATION OF UNITS.

Figures 1, 2 and 3 show two typical installations. Your particular model may require some combination or variation of these arrangements. Batteries should always be mounted ahead of or below the receiver.

### 4.10 Receiver Mounting.

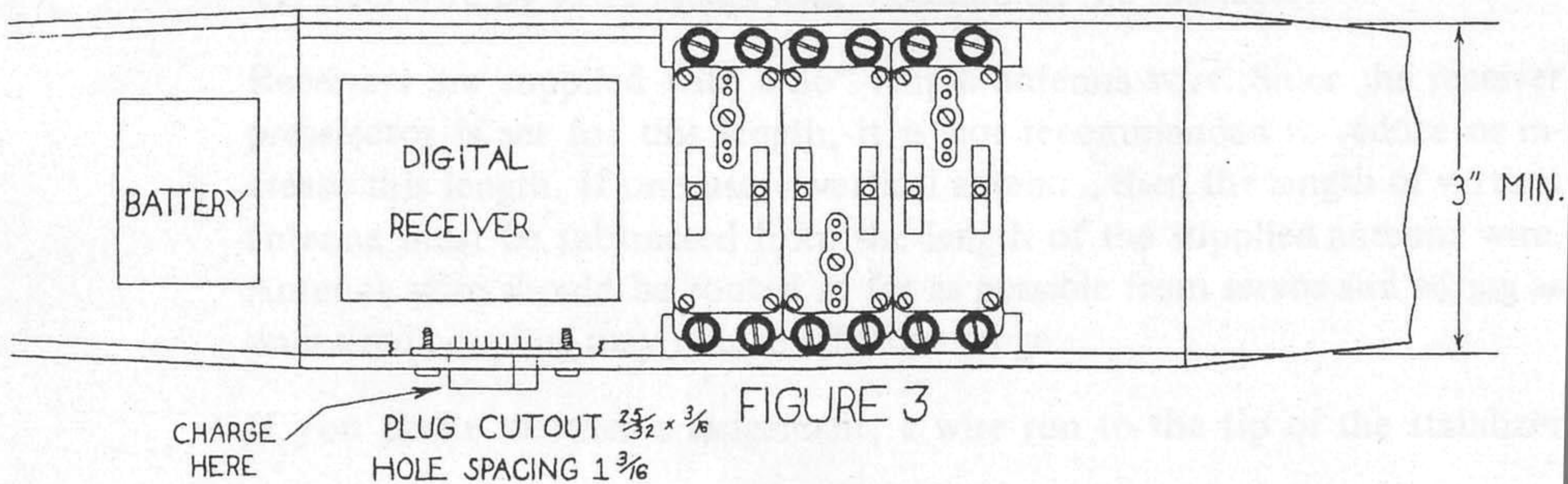
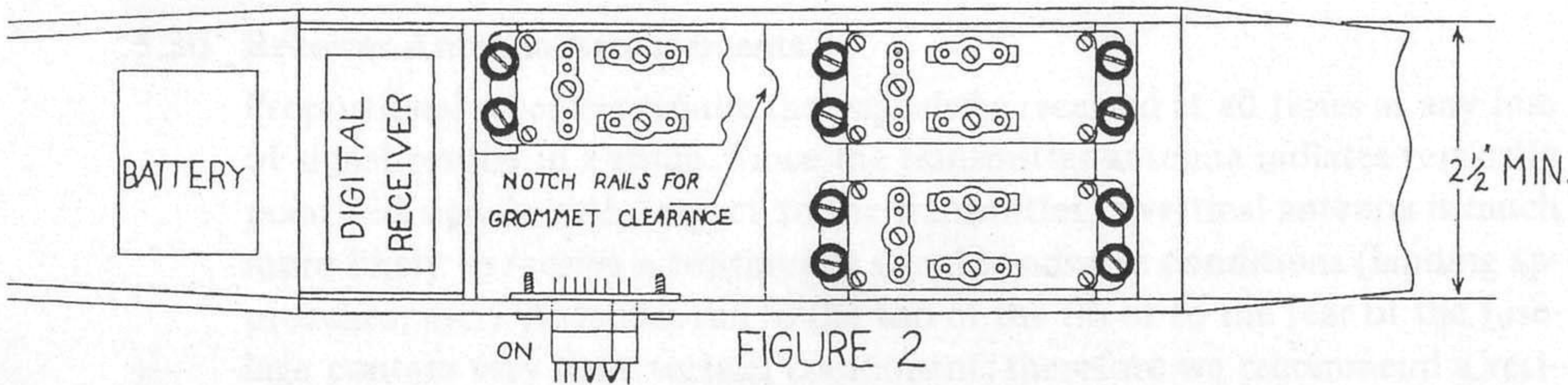
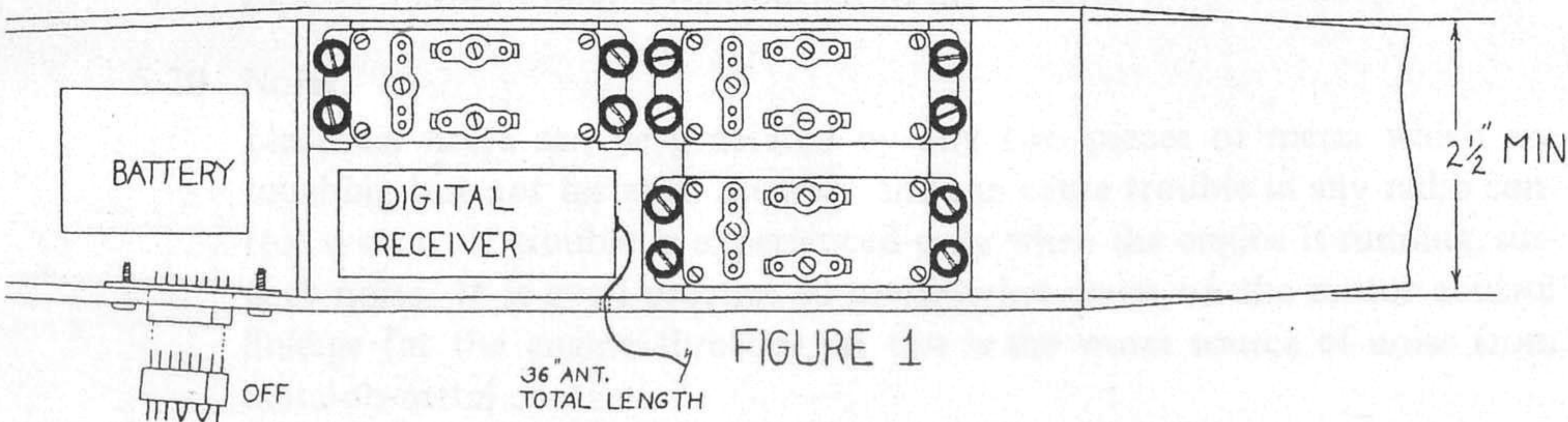
The receiver can be mounted in the position best suited to the model. Receiver must be surrounded by a minimum of 1/4" thick foam rubber to eliminate fatiguing components from vibration and to prevent crash damage.



## 4.20 Servo Mounting and Output Attachment.

These servos can be mounted in positions parallel or perpendicular to the longitudinal axis of the aircraft (see Figures 1, 2, and 3). Mounting surfaces should consist of hardwood rails securely attached to the interior surface of the aircraft servo compartment.

Sheet metal screws are inserted through the rubber grommets and screwed into hardwood rails. This method is shown in Figures 1, 2, and 3. An alternate method may be used which consists of a plywood plate in which rectangular cut-outs are made for the insertion of the servo body (see mounting template, Section 8.00). Mounting of the plywood plate to airplane is made by longitudinal rails.





Attachment to the output arm can be accomplished by use of adjustable clevis links sold at hobby shops or make a 90° bend in 1/16" wire 3/8" from end, remove output arm, insert wire and replace arm. Push rods should not be metal along their entire length. Wood or other insulating material should be used with wire ends to avoid mechanical coupling of noise.

Avoid control linkages which bind or restrict the servo from running to its signaled position. Under no circumstances should a servo be allowed to jam at end of case for extended periods of time.

#### 4.30 Shorting Plug Harness.

Shorting Plug Harness should be mounted through fuselage side opposite engine exhaust. See Figures 1, 2 and 3. It is held in place with No. 4 screws. To put system in operation, insert shorting plug into harness socket. Plug may be secured to model with short length of nylon line to prevent loss.

#### 4.40 Wiring.

All units in the system have prewired connecting plugs. Receiver plugs are color coded as follows:

##### Spaghetti Sleeving Color Code

Receiver Power Plug.....	Yellow
Aileron Plug .....	Red
Rudder Plug .....	Orange
Elevator Plug.....	Green
Motor Plug.....	White
Battery Plug .....	Yellow
Auxiliary 1.....	Blue
Auxiliary 2.....	Violet

Servos are interchangeable and all have brown spaghetti. Switch harness is color coded yellow on both ends and battery may be plugged directly into receiver power plug for test purposes.

## 5.00 ADDITIONAL INFORMATION

### 5.10 Putting Transmitter into operation.

The DVT-672 Transmitter is ready to operate after installation of the



antenna. The antenna is inserted into the antenna socket on top of the case and is rotated in a clockwise direction until screwed in tightly. Antenna must be fully extended for maximum output and range.

Federal Communications Commission regulations prohibit tuning of the transmitter by unauthorized personnel. If any difficulty is experienced, the unit should be returned to the factory for adjustment.

Batteries should be charged before using the equipment for any length of time as explained under 3.10 charging instructions.

**CAUTION: DO NOT CHARGE BATTERIES WITH THE BACK OFF OF TRANSMITTER CASE.**

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

#### **5.20 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.

#### **5.30 Receiver Antenna Arrangements.**

Proportional receivers require that signals be received at all times as any loss of signal results in a glitch. Since the transmitter antenna radiates vertically polarized signals with respect to the transmitter, a vertical antenna is much more likely to receive a continuous signal in adverse conditions (landing approaches, etc.). Antennas run to the top of the fin or to the rear of the fuselage contain very little vertical component; therefore we recommend a vertical steel wire 24 to 30 inches long mounted on the fuselage.

Receivers are supplied with a 36" length antenna wire. Since the receiver preselector is set for this length, it is not recommended to reduce or increase this length. If one uses a vertical antenna, then the length of vertical antenna must be subtracted from the length of the supplied antenna wire. Antenna wire should be routed as far as possible from servos and wiring as undesired coupling may reduce effective range.

If you desire another arrangement, a wire run to the tip of the stabilizer



over the top of the fin to the other stabilizer tip, or a wire to the top of the fin and down to one of the stabilizer tips may be used.

Do not exceed 36 inches antenna length including lead-in as set was qualified for Federal Communications Commission Certification with this length antenna.

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 at the airplane.

#### 5.40 Range Testing.

If improper operation is suspected, a ground-range check should be in order. Ground range should be approximately  $\frac{1}{4}$  mile (2 - 3 city 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 may become somewhat erratic.

#### 5.50 Servos.

Although potentiometer and motor are sealed in the DMS, care should be taken to prevent dirt, grit, balsa dust, or any foreign substance from entering servo case.

Servos are skillfully constructed and carefully tested. If difficulty should be encountered, it is recommended that they be serviced at the factory. Do not return to dealer. Part replacements are available from the factory.

The direction of servo travel may be changed; however, it is recommended that it be done by factory technicians since the neutral position of the servo must be reset in addition to reversing potentiometer and motor wires. Changing of servo direction should not be necessary, since the servo has dual and opposite linear outputs plus the rotary output. Figure 3 shows the normal direction of the servo travel.

When the rotary output is used, the linear output arms must be removed. This is accomplished by simply loosening the retaining screws and pulling the arm off the output post. Do not remove rack gears from servo as they act as limits.



## LICENSING

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

FCC Form No. 505 Application for Citizens Radio License must be obtained from the Federal Communications Commission, Washington, D. C., 20554. Instructions on the front page are to be carefully followed in filling out the applications.

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 DV-6 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 judgment the equipment has been retuned tampered with or received abusive treatment beyond that encountered in normal usage. Warranty does not cover crash damage.

Any rewiring of equipment other than shortening of cables 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.



CLOCKWISE MOTION OF  
ROTARY OUTPUT GIVES  
UP-LEFT-LOW

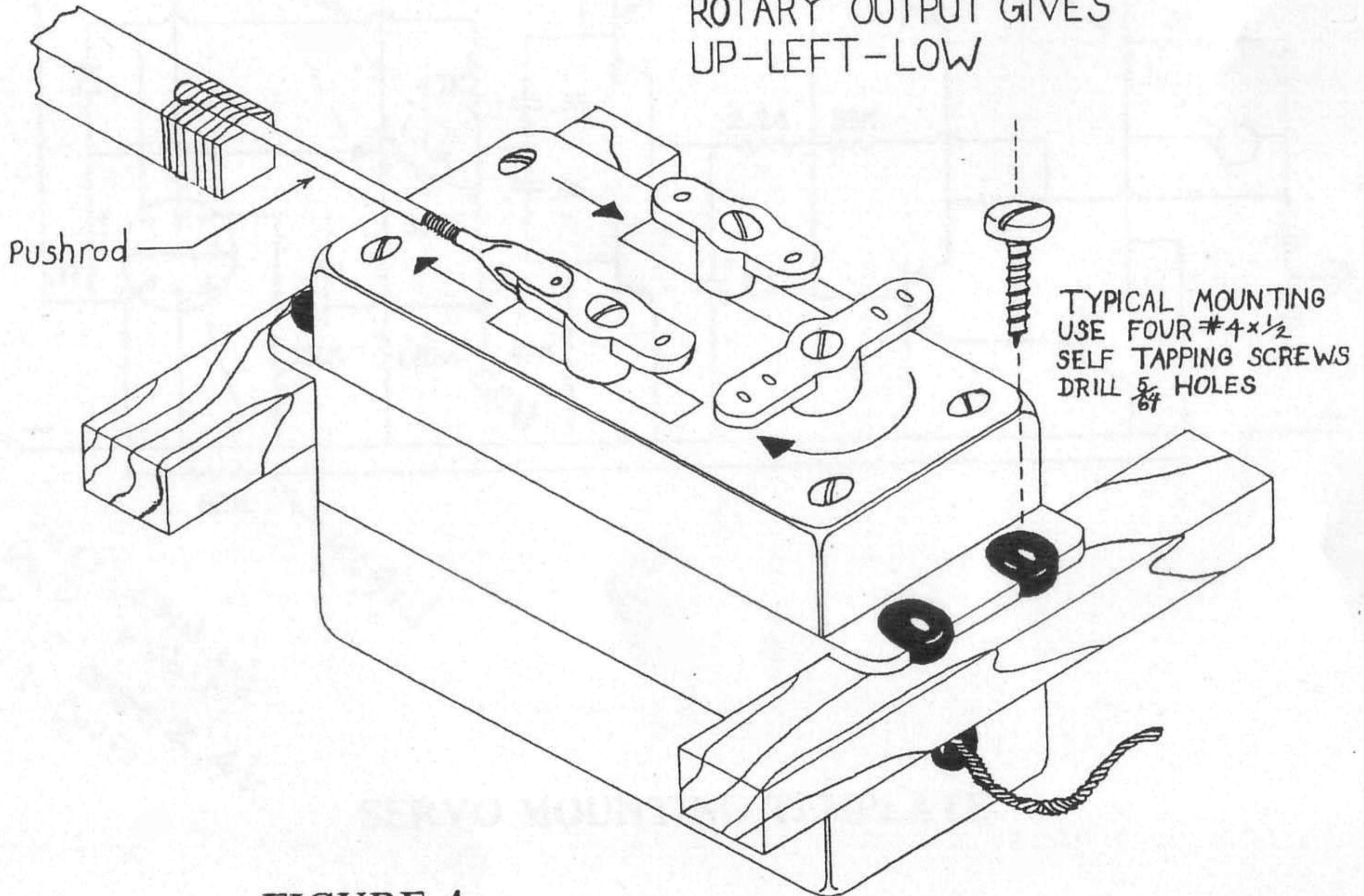


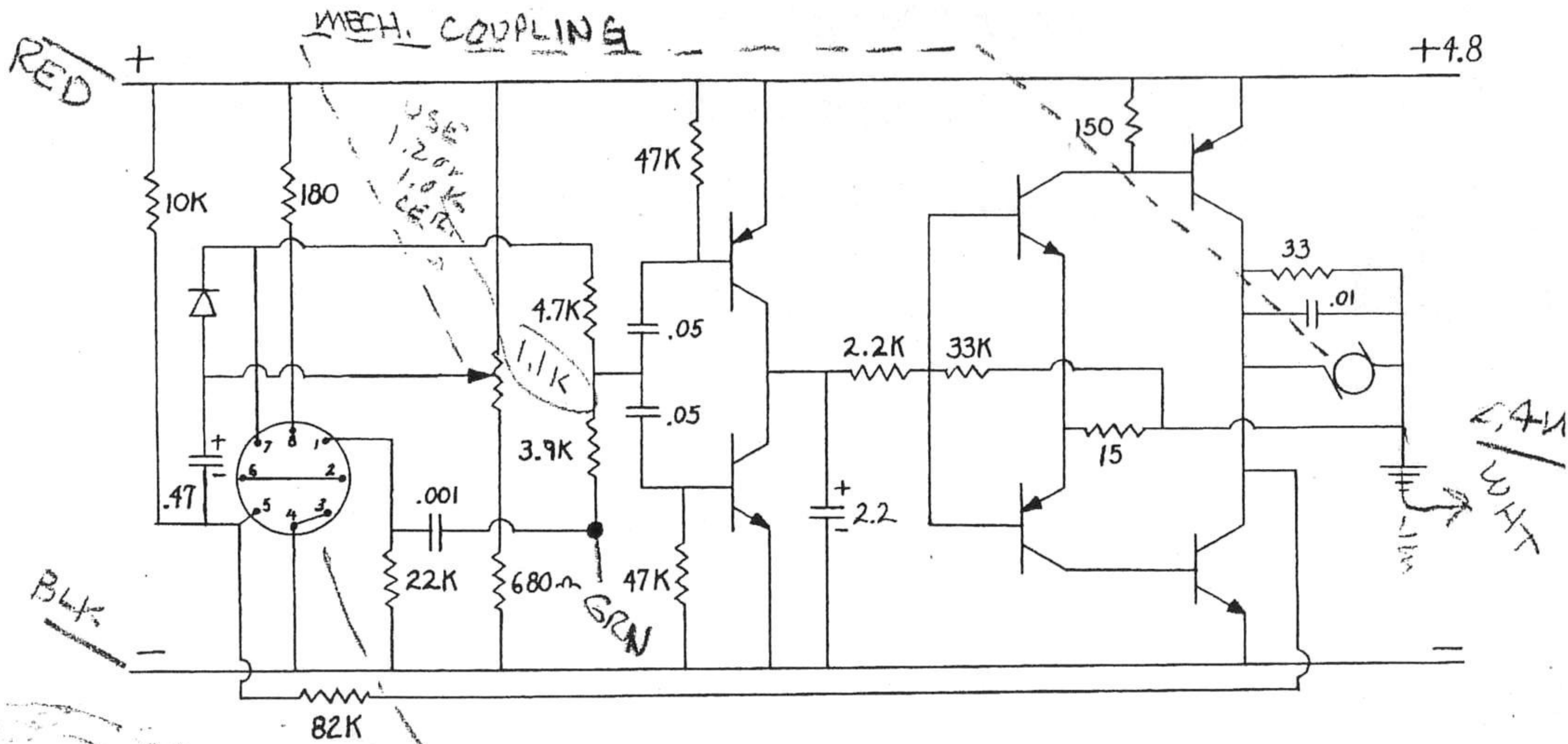
FIGURE 4







# DMS SERVO



RED cont. sig.  
 RED + VOLT.  
 WHT 2.4V  
 BLK GND

## SERVO MOUNTING TEMPLATE

