

INSTRUCTIONS FOR OPERATING
CITIZEN-SHIP TWO CHANNEL
DIGITAL PROPORTIONAL SYSTEM

27 MHz

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INSTRUCTIONS FOR OPERATION OF CITIZEN-SHIP DIGITAL PROPORTIONAL SYSTEM 27 MHz

1.00 DESCRIPTION OF DP-2 SYSTEM

The Citizen-Ship DP System uses the digital position principle and gives two completely independent, fully proportional, simultaneous channels. Either servo may be removed and still operate the other perfectly. For instance, a rudder-only aircraft could be flown with or without motor control. Flying with rudder (or ailerons) and elevator, especially with smaller aircraft, can be very gratifying.

Two channels are also ideal for boat and car operation, steering and motor control being the usual functions.

1.10 DPR-2 Receiver

The DPR-2 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-2. An increase in reliability has been achieved since one integrated circuit replaces many conventional components. With use of integrated circuits, the size of the DPR-2 is exceptionally small and it is of single deck construction for simplicity.

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

A crystal filter is used which improves selectivity and noise rejection.

1.20 DPT-2 Transmitter.

The DPT-2 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.

As shipped from the factory the control stick on left side of transmitter is set up for motor control operation. If elevator control is desired centering spring must be properly positioned inside transmitter. See Para. 5.10 for further information.

1.30 DMS Servo.

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

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 DP series proportional transmitter. The output arms give six possible individual connections. Use of latest techniques in amplifier design has reduced component count and size. Servos are interchangeable and additional units are available for purchase.

2.00 FREQUENCY OF RECEIVER AND TRANSMITTER.

The DP-2 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 had a receiver tuned for 27.145 MHz, the receiver crystal should read 26.690 MHz (i.e. $27.145 - .455 = 26.690$).

The DPT-2 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.

CAUTION: a 72 MHz crystal cannot be used in the DPT-2 transmitter.

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

DPT-2 Transmitter crystal frequency	DPR-2 Receiver crystal frequency
26.995 MHz _z	26.540 MHz _z
27.045 MHz _z	26.590 MHz _z
27.095 MHz _z	26.640 MHz _z
27.145 MHz _z	26.690 MHz _z
27.195 MHz _z	26.740 MHz _z
27.255 MHz _z	26.800 MHz _z

3.00 BATTERY REQUIREMENTS

A four cell rechargeable battery for receiver and servos is supplied with the system. These cells are of high capacity 500 MA type and other kinds should not be used as performance may be affected.

An inexpensive 9 V dry cell battery is required for the transmitter. Use Eveready Type 276 or Burgess D 6. A snap type harness is provided for ease in connecting the battery. Replace the battery when the voltage measures less than 8 V with the set turned on. This will give several months of normal operation.

3.10 Charging Instructions

Charging rate for 500 MA cells should be 40-50 MA. A properly wired connector for matching battery to charger is furnished and must be connected with black wire to Negative of charger and Red wire to Positive of charger. Batteries should be charged a minimum of 24 hours before being used the first time or when completely discharged. Overnight charging is generally adequate for an afternoon flying session.

4.00 INSTALLATION OF UNITS.

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

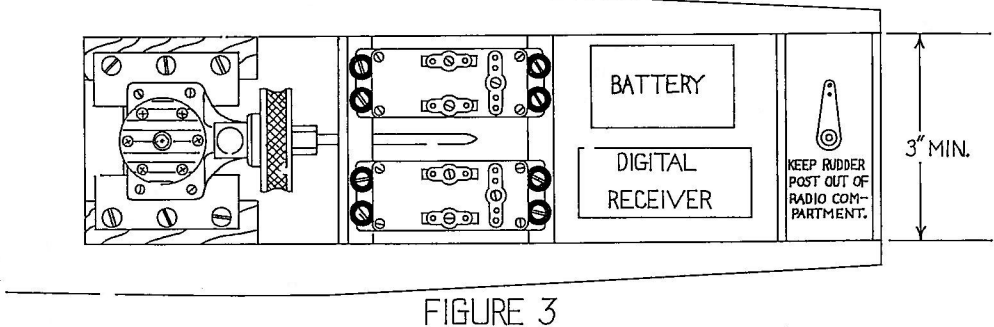
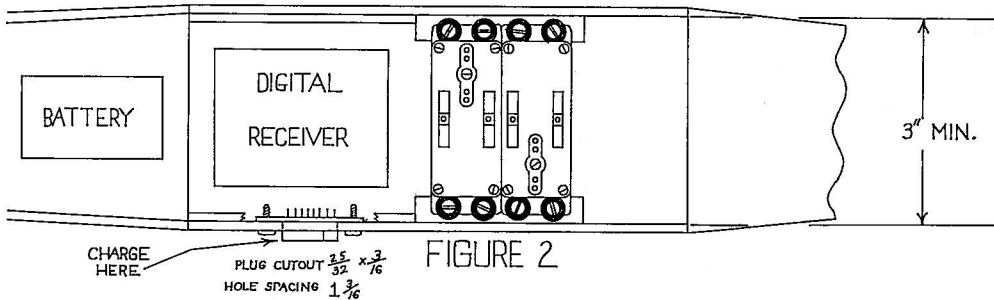
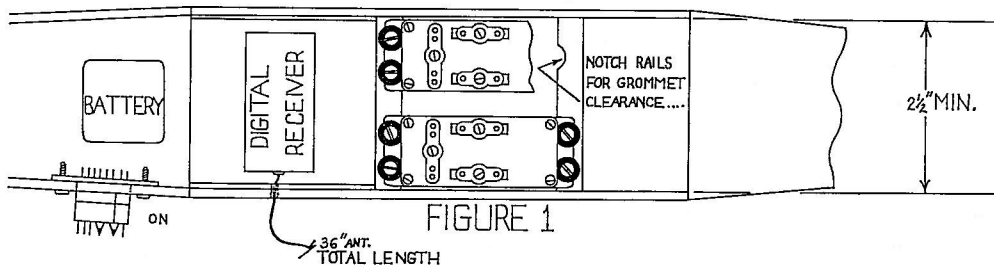
4.10 Receiver Mounting.

The receiver can be mounted in the position best suited to the model. Receiver must be surrounded by a minimum of ¼" 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 or boat (see Figures 1, 2 and 3). Mounting surfaces should consist of hardwood rails securely attached to the interior surface of the 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 Fig. 1, 2 & 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
Rudder or Aileron Plug.....	Red
Elevator or Motor Plug.....	Green
Battery Plug.....	Yellow

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 DPT-2 Transmitter is ready to operate after installations of the antenna and battery.

The antenna is inserted through the rubber grommet in the top of the case and is screwed to a mounting bracket inside the case by rotating the antenna in a clockwise direction. Antenna must be fully extended for maximum output and range.

If transmitter left stick is to be used for Elevator control with spring centering these steps should be followed:

1. Unscrew control stick and remove. (Do not loosen set screw, remove stick only.)
2. With transmitter back off push brass arm with small nylon roller up to disengage motor control gear segment.
3. Remove nylon roller and position wire spring exactly as is the spring on rudder stick.
4. Replace control stick and check operation.

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.

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.

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. Range over water is generally more than ground range.

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, water, 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 4 shows the normal direction of the servo travel.

When the rotary output is used, the linear output arms may 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 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-2 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. Warranty does not cover crash damage.

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.

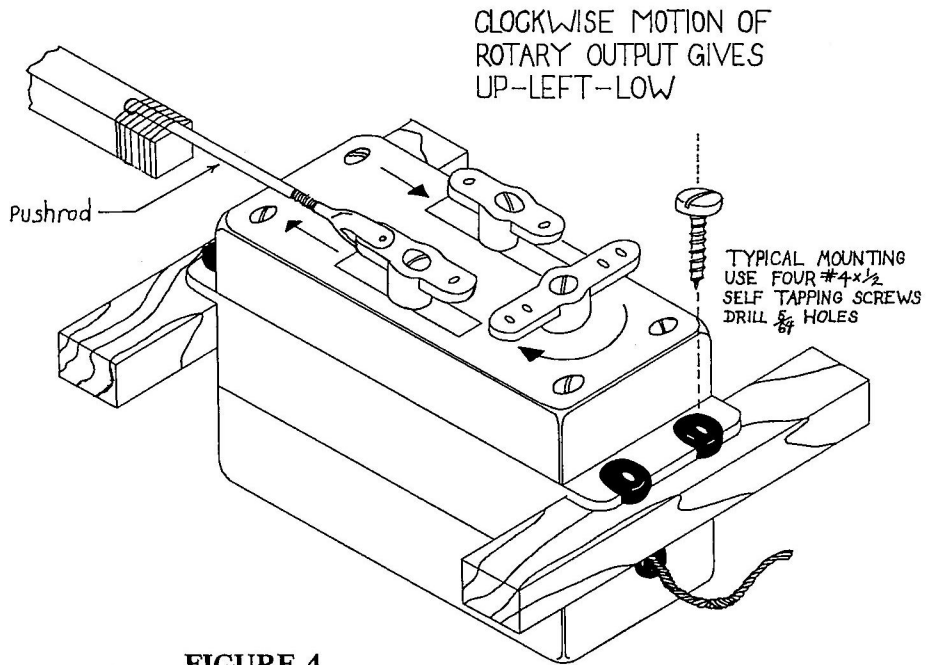
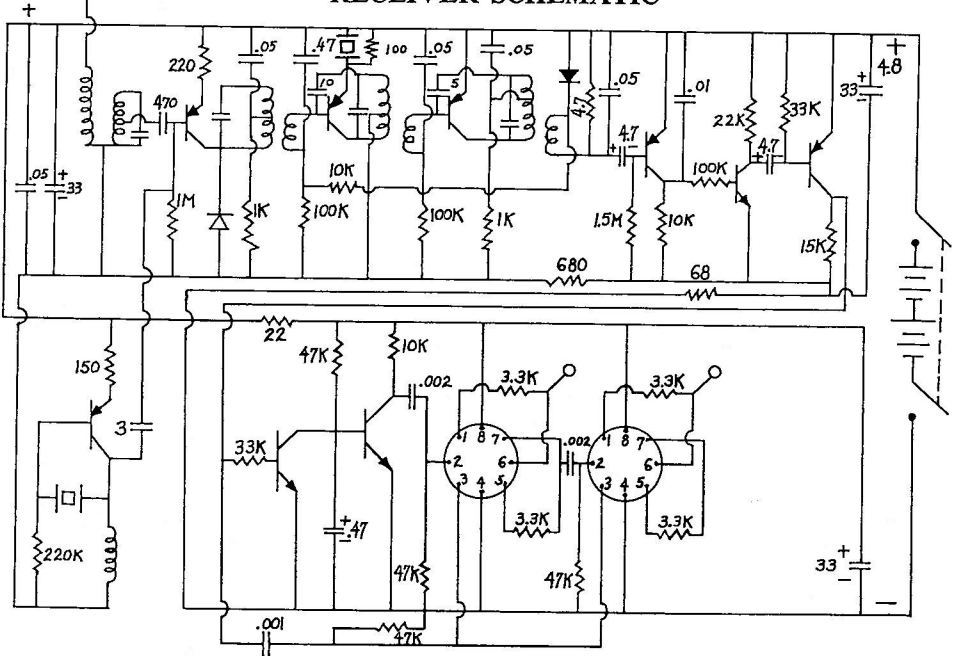


FIGURE 4

RECEIVER SCHEMATIC



TRANSMITTER SCHEMATIC

