RAND MANUFACTURING CO., INC.
8909 HUBBELL AVE., DETROIT, MICH. 48228

GG PAK

CATALOGUE NO. 6040

INSTRUCTION SHEET

The GG PAK is a completely matched and wired galloping ghost actuator, battery and harness ready for connection of three wires from the receiver and installation in the airplane.

The GG PAK will operate with any relay pulse receiver, superhet or super regen, with relay in use or disconnected.

The GG PAK works with relayless receivers. However, some have not been designed for use with pulse systems and require a reduction in capacity of the output filter capacitor for satisfactory operation. Note: Citizenship and Controlaire relayless superhet receivers have been found satisfactory. However, their performance can be improved by a decrease in value of the filter capacitor in the output.

RECOMMENDED UNITS: Min-X Pulsemite, Controlaire GG, Citizenship NPT, Jansson GG, F & M GG-1, or transmitter with add-on pulser like Phelps.

The GG PAK Actuator provides two proportional outputs for push rod operation of rudder and elevator and one trim output for throttle control.

SPECIFICATIONS:

System weight. 6½ oz. Actuator weight: 1¼-oz.
Actuator size: 1 x 1¾ x 2

Power Supply: Plus and minus 3.6 volt.

Signal Requirements: Elevator: 4–12 P.P.S. 6 P.P.S. Neutral
Rudder 70–30% Width Change

Unwanted motor control will occur if these signal requirements are exceeded.

UNDERSTANDING HOW GG WORKS:

The three variables transmitted by the pulse coder and received by the airplane receiver are decoded mechanically by the actuator. The actuator moves control surfaces to give effective proportional control to the rudder, elevator and motor.

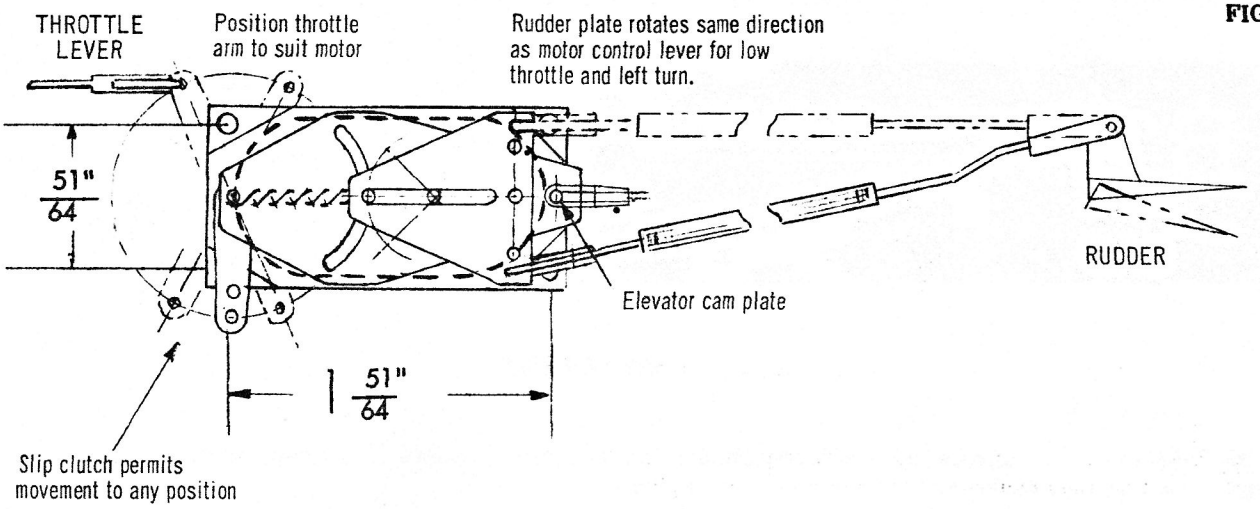
The rate information controls the position of the elevator cam plate in relation to how fast the actuator motor oscillates. At high pulse rates, the crank does not have time to move very far. Therefore, the effect is for full down elevator. At low pulse rates the crank has time to move about 270° with the effect of up elevator. At neutral pulse rates the crank swings back and forth approximately 100° (5/16") motion causing the elevator to move up and down for effective neutral elevator.

The width variable causes the motor to turn more in one direction than the other which means the crank (rudder) assumes an average position to the right or left.

Steady-on tone or steady-off tone causes the crank to turn 360°, five times for full throttle control. Signal off is used for low motor to provide fail-safe operation. The controls are moved rapidly through their extreme positions, for effective neutral control action.

The result is the control surfaces wiggle, which is necessary for the mechanical separation of the signals. But, because of the high rate, the effect on the airplane is minimal.

FIGURE 1.



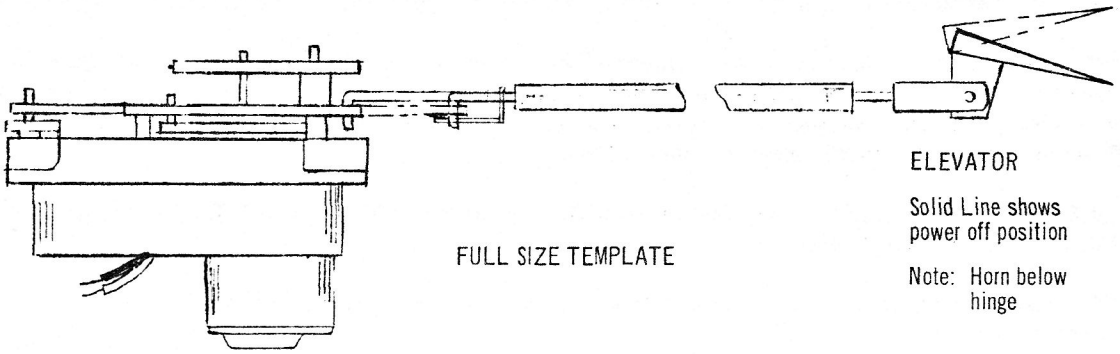
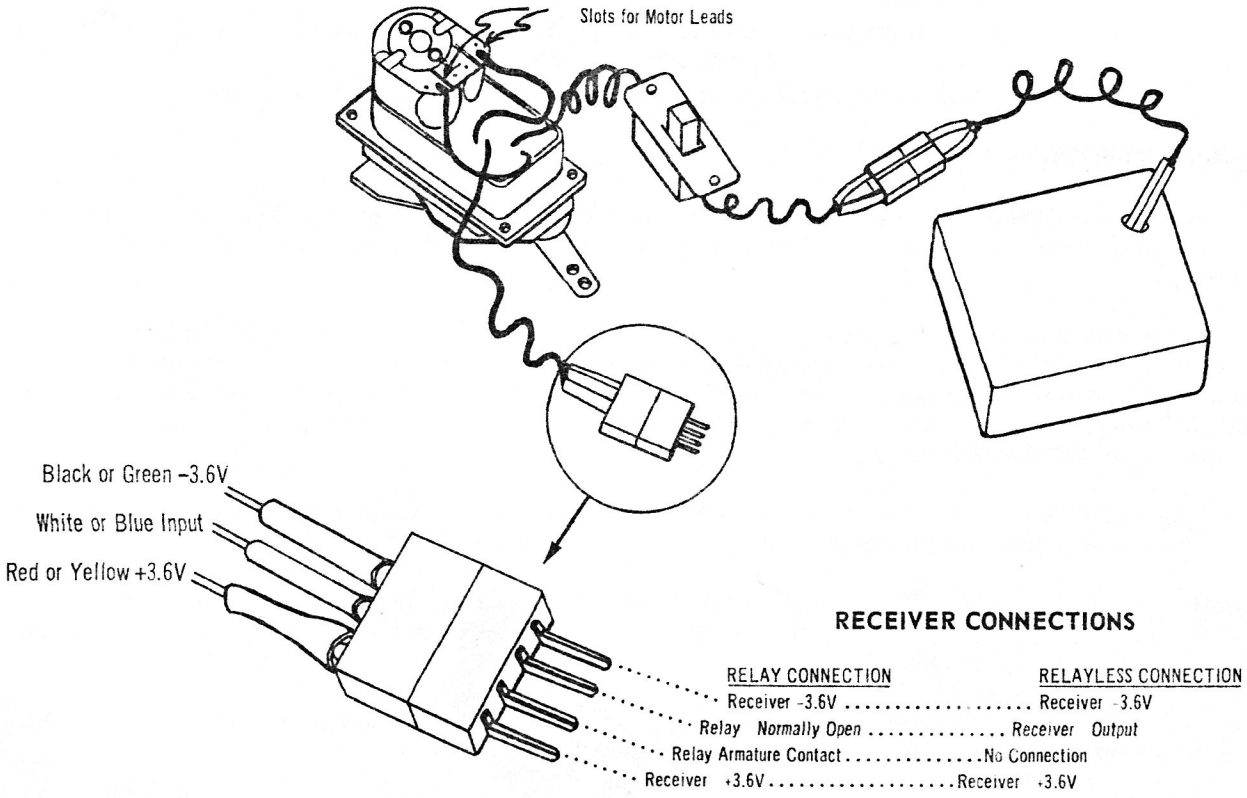


FIGURE 2.



RECEIVER CONNECTION INSTRUCTIONS

Technique of Soldering Wires To Plugs:

•Strip wire 1/8". Tin the wire and connector ends and place sleeves over the wires. Hold the plug in a vise or tape to the bench. Hold the wire in place and put the point of a freshly tinned iron along side the wire and prong, heating both simultaneously. Quickly remove the iron, holding the wire until the solder is set. The result should be a smooth filled joint.

Instructions for Use of Relay Receivers with Relay Disconnected:

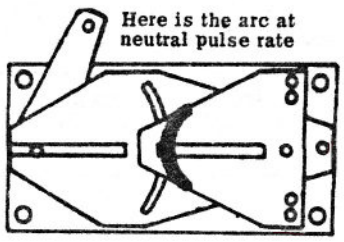
To avoid complications with receiver guarantees, it is recommended that the relay be left on the board but disconnected, so no soldering is required on the P.C. board. Inspection of the relay and receiver circuit board will reveal that one side of the relay coil is connected to the negative land and the other leg is connected to the output transistor.

- Unsolder the short wires connecting the relay to the P.C. board.
- Solder a blue or white wire to (or in place of) the short wire which had connected the relay to the output transistor.
- Remove the wires to the relay contacts.
- Twist the three receiver wires (red, black and white) together and connect to the receiver plug as shown in Figure 2.

INSTALLATION INSTRUCTIONS

Adjustments for Neutral Pulse Rate:

Prior to installation in the airplane, connect the battery and receiver to the harness and position the actuator on the bench in its relative position in the airplane. Turn on the transmitter and receiver and note the operation. Adjust the trim tabs to provide a neutral pulse rate and a neutral pulsing position as shown. In the event your transmitter will not allow sufficient trim for these neutral motions or if your transmitter uses a Bonner stick assembly, refer to the transmitter manufacturer instruction manual for the appropriate adjustments to be made to provide this pulse rate and width adjustment.



At this point the limitations of some relayless receivers may become apparent. If the control stick is moved to the full down position, it will be noticed that rudder will drift and the control stick will have to be moved to the left to neutralize it. Unless the amount is quite severe, this will not unduly limit your flying. A reduction in the capacity of the output filter capacitor will improve this condition.

Direction of Rotation of Actuator Motor:

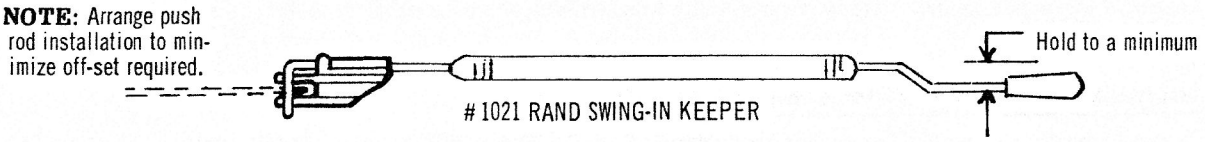
Signal for low motor on the transmitter and note the direction of rotation of motor control lever on the actuator. Note: The motor control arm on the actuator can be moved to either side to suit the throttle position. If the throttle arm does not move in the direction required to close the throttle, the direction of rotation of the actuator motor will have to be reversed. This is accomplished with reference to figure 2. The blue (or white) and green (or black) wires are soldered in slots in the P.C. board holding the suppression circuit to the actuator motor. Carefully unsolder them and reverse their position.

Connection for Rudder:

With transmitter signaling left turn, note position of rudder plate. Connect rudder push rod to appropriate side to give "left" rudder. Adjust push rod length for neutral.

Connection for elevator:

Connect as illustrated. Observe motion of elevator with stick and trim in neutral position, (6 P.P.S.). Adjust length of push rod so elevator is moving approximately same amount above and below center line. Connect push rod on furthest "out" position on elevator horn for initial flights. The trailing edge of elevator should move about 1/8" to 1/4" from neutral. Note: Elevator Horn must project below surface or add crank to convert the motion.



MOUNTING: Use RAND #7011 (includes mounting plate) or RAND #1014. Both these kits have the items needed for proper mounting. Otherwise, we recommend mounting the actuator on 3/32" plywood plate with #2-56 blind mounting nuts. Attach the plate with rubber grommets to rails glued to sides of fuselage. Must be mounted on rubber mounts for vibration protection.

FOR MOTOR CONTROL: Be sure all control linkages are free. Watch for binding of quick-links on control horns caused by too much tension, keepers that are too tight and misalignment. Be sure voltage under load is at least 3.6 V.

CARE OF BATTERY

Carefully measure your battery voltage prior to each day's flying. This can easily be accomplished by pulling the plug far enough apart to insert the probes from your meter. It should measure at least 3.6 V. with the system in operation. It is wise to make a battery check at least once each half hour of flying time. The G.E. cells have been tested for 1½ hours of constant pulsing on the bench. In normal operation with some rest time between flights, they will give this much time or more.

Charging should be at a rate of 50 to 60 mA for at least 16 hours prior to each day's flying. Note: These batteries may not be fully charged when received. No damage will result, if these batteries are left on the charger over 16 hours. However, it would be advisable to remove them after 24 hours. Batteries are considered to be discharged when they have reached 1.1 V. per cell or 3.3 V. for the battery.

Depending on the receiver used, this system will function below 3 V. The limiting voltage being that at which the receiver will no longer operate. Therefore, it is possible to discharge these cells because of prolonged use, below the recommended 3.3 V. The action of the actuator and its motor control will be noticeably affected at approximately 3 V. Serious damage to the batteries can result, if discharged completely. Sometimes a low battery will be indicated by a missed signal or glitch. For safe operation of your aircraft and protection of your equipment, it will be your responsibility to land your airplane and measure the battery voltage. Do not fly with voltage below 3.3 V. with the system in operation.

FLIGHT TRIM

Prior to flying this system, receiver range should be ground checked and receiver tuned in the manner prescribed by the receiver manufacturer.

The trim lever setting (on transmitters incorporating trim systems) selects the neutral pulse rate and therefore the amount of control surface motion. As in ordinary multi-airplanes, the push rod adjustment is used for flight trim. The trim lever is used for in-flight trim.

Note position of control stick or trim lever to maintain level flight.

If up trim is required, lengthen push rod. If down trim is required, shorten push rod. After trimming airplane, note whether center of neutral elevator motion is up or down. Trim model C.G. or incidence so neutral flight trim motion will be same amount above and below stabilizer center line. (Refer to Connection for Elevator Push Rod.)

Use of motor control may cause a pitching up of the airplane. The amount of pitching will vary with each airplane. We suggest obtaining sufficient altitude prior to signaling motor control for the first time. Short applications of motor control signal will help minimize this effect.