Instructions For the
BONITRON SUPER SPORT TRANSMITTER

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The Bonitron Super Sport produces a pulse width, pulse rate modulated carrier suitable for operating both "Galloping Ghost" and fast pulse - double actuator systems for flying model aircraft. Both pulse rate (elevator) and pulse width (rudder) are controlled by a conventional stick assembly. The neutral rate for single actuators is approximately 6 pulses per second and for double actuators is approximately 14 pulses per second. The actual neutral rate is adjustable to compensate for various actuators.

The transmitter is pre-tuned* at the factory for maximum radio frequency power, so that no adjustments are necessary other than those related to control functions. Operation is accomplished by inserting a 9 volt (Burgess D-6, Eveready 276 or equivalent) battery and turning the power switch on. The operating frequency is indicated on the bottom of the case and is further identified by a color coded crystal on the circuit board.

The following instructions are given to assure maximum performance of the transmitter when used with various actuator systems.

* An F.C.C. license is required for tuning of the radio frequency section of the transmitter.

INSTRUCTIONS FOR THE SUPER SPORT

I. INTRODUCTION

The Super Sport transmitter has been designed to offer versatility to the radio control enthusiast while achieving optimum performance for each of three basic methods of flying model aircraft. To the beginner, this allows a method of achieving experience in flying with equipment that will allow a progressive means to achieve excellent control with a minimum investment in basic equipment. To the advanced flyer the system allows economical operation of aircraft capable of performing almost all maneuvers with lots of flying for fun.

The performance of the Super Sport can only be judged by the performance obtained in various airplanes that may be selected. Optimum performance can be achieved providing the proper aircraft, the proper actuator and the proper engine are chosen for a specific system. The advice of your hobby dealer or experienced flyers can be invaluable in selecting a compatible system to achieve good flying. The Super Sport transmitter provides the necessary signal which will allow the control to be achieved for three basic systems. Although the objective is to provide control of more complex systems, the more simple are also controlled without alteration to the transmitting equipment. The use of the transmitter will be described with typical systems with a description of the anticipated result so that optimum performance may be achieved. The three basic systems of flying involve:

1. An escapement for its control functions.
2. An actuator to provide rudder, elevator and Motor control, commonly referred to as the "Galloping Ghost."
3. The fast pulse double actuator systems which achieve smoother control of rudder and elevator and, In addition, provide motor control.

The following is a description of the procedures to be used with the Super Sport for these three types of flying:

1. Escapement Flying

Various types of escapements are available which may be cycled to provide control of a model airplane. These escapements require the presence of a signal to cause the escapement to cycle to a new position. Although simple transmitters are available for this type of flying, they are limited solely to this type of flying whereas the Super Sport incorporates provisions of using the basic transmitting capabilities to provide this function. On the front of the transmitter, the black handled lever type switch labeled motor control is used for escapement flying. It is necessary to remove the back of the transmitter case and disconnect the white with blue tracer wire which is soldered to the back of the circuit board near the outside edge and about one inch above the fast-slow pulse switch. The transmitter is now ready for escapement flying. When the transmitter is turned on a signal is produced to the airplane which is detected by its receiver whose output is fed to the escapement. Pushing the motor control lever away from the operation causes a tone to be produced which activates the escapement. It is only necessary to push this lever when changing control is desired. Release of the lever deactivates the tone. This particular mode of operation of the transmitting equipment uses no other features and requires no other adjustments.

2. Galloping Ghost

The Galloping Ghost mode of operation of the transmitter has been designed to be compatible with those actuators which are commercially available in addition to many of those variations which have been described in RC Publications. For this operation, all of the basic controls on the transmitter are used. On the front of the instrument (See Figure 1) the lever switch on the left side is used to provide motor control. Pushing the lever away from the operator should result in cycling of the actuator to increase motor speed and pulling the lever toward the operator should cause cycling to decrease motor

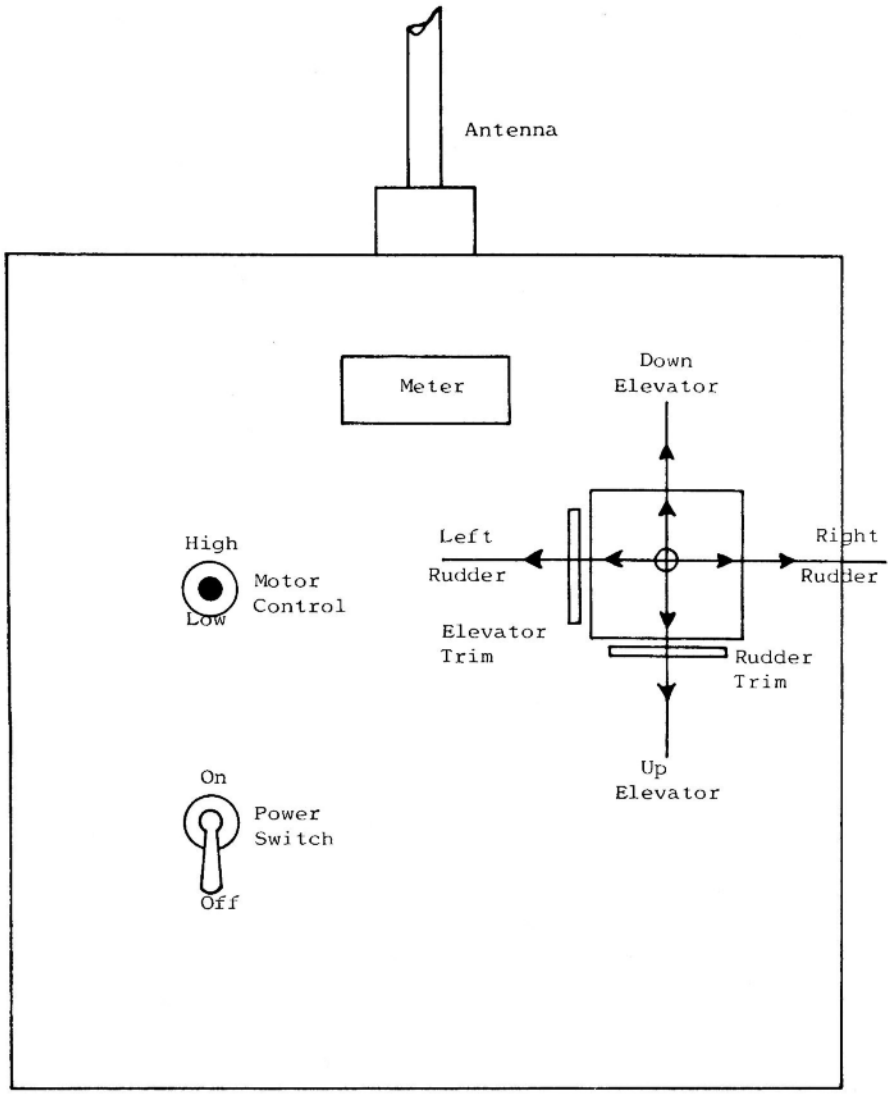

Figure 1. Front View of Super Sport Transmitter.

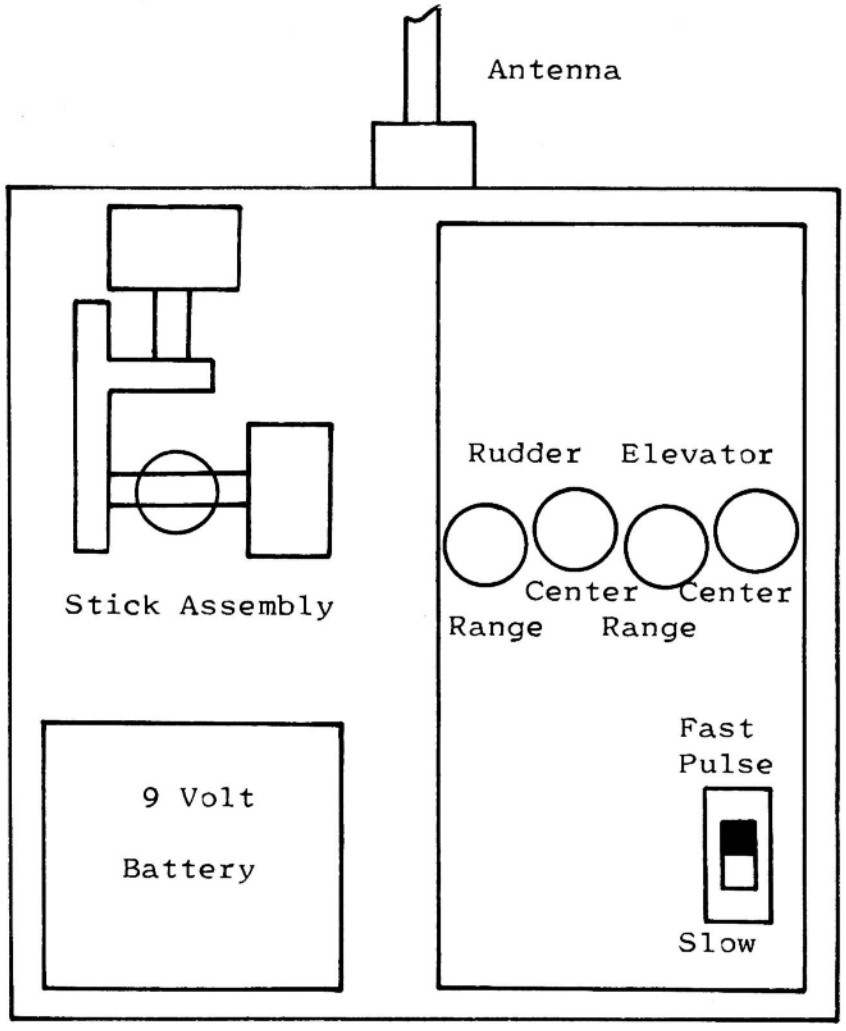

Figure 2. Back View of Super Sport Transmitter, Case Open.

speed. Although some actuators may reverse this function, it is recommended that the installation be such as to be consistent with the above so that in case of lost signal, the motor will return to low speed.

Control of rudder and elevator is achieved by the stick assembly on the right hand side of the transmitter. Pulling the stick directly toward the operator should cause the elevator to produce an upward movement whereas pushing the stick away from the operator should cause a downward movement. Pushing the stick to the right should cause right rudder and to the left, left rudder. The actual functioning of the actuator will be described in detail by instructions accompanying the actuator. In all commercial systems the actuator is so designed that when both the transmitter and receiver are off, the rudder will be in neutral position and the elevator will be in extreme down position. Upon turning the receiver and actuator on with the transmitter off, both rudder and elevator will cycle at a rate of two or three cycles per second. Since this operation is necessary to achieve motor control, it is necessary that all control surfaces with their associated push rods should be free enough that the motor of the actuator runs freely under this condition.

It is now necessary to remove the back of the transmitter case to determine that the function switch is in its proper position. The slow pulse versus fast pulse switch should be to the bottom in the slow pulse position. When you receive your transmitter it has previously been adjusted so that the pulse rate and width are set to achieve control of almost all actuators. To achieve optimum flying it is now necessary to adjust the transmitted signal to the particular actuator which has been selected. It should be emphasized that the first

adjustment is concerned with the motion of the actuator itself and not the motion of the airplane control surfaces. It is therefore recommended that all push rods be disconnected and that you familiarize yourself with the operation of the actuator with respect to the transmitter controls. In the middle of the circuit board in the transmitter are four controls which allow for adjusting the pulse rate and pulse width generated by the transmitter which provide control of the actuator. Two functions for each control surface are necessary. The first being centering of the control and the second being the range of control. It is recommended that, first, the rudder centering control should be adjusted so that the motion of the actuator is symmetrical about the position in which the actuator rests when the system is turned off. The second adjustment is that of centering of the elevator which is achieved at a pulse rate of approximately six pulses per second. For this condition the pivot pin in the actuator should continue to oscillate back and forth approximately 1/4" to each side of neutral. (See Figure 3.) To increase the oscillation the elevator centering control is rotated counterclockwise. Once these two adjustments have been made to provide centering of the actuator and achieving the proper rate for elevator control, it is now desirable to examine the motion of the actuator when the control stick on the transmitter is moved to its various positions.

A. Actuator Adjustment (Refer to Figure 3.)

Upon pushing the stick away from the operator the pulse rate in the transmitter increases and should cause the actuator motion to decrease to almost no vibration. On pulling the stick toward the operator, the pulse rate is lowered increasing the motion of the actuator so that it should complete almost a 1/2 cycle on the major pivot as illustrated in the picture. If the range of motion is too much, that is, you achieve these results before reaching the limit of the control stick, it is necessary to rotate this control in small amounts and reexamine the motion of the actuator after each small adjustment. To increase the range, the control is rotated counterclockwise.

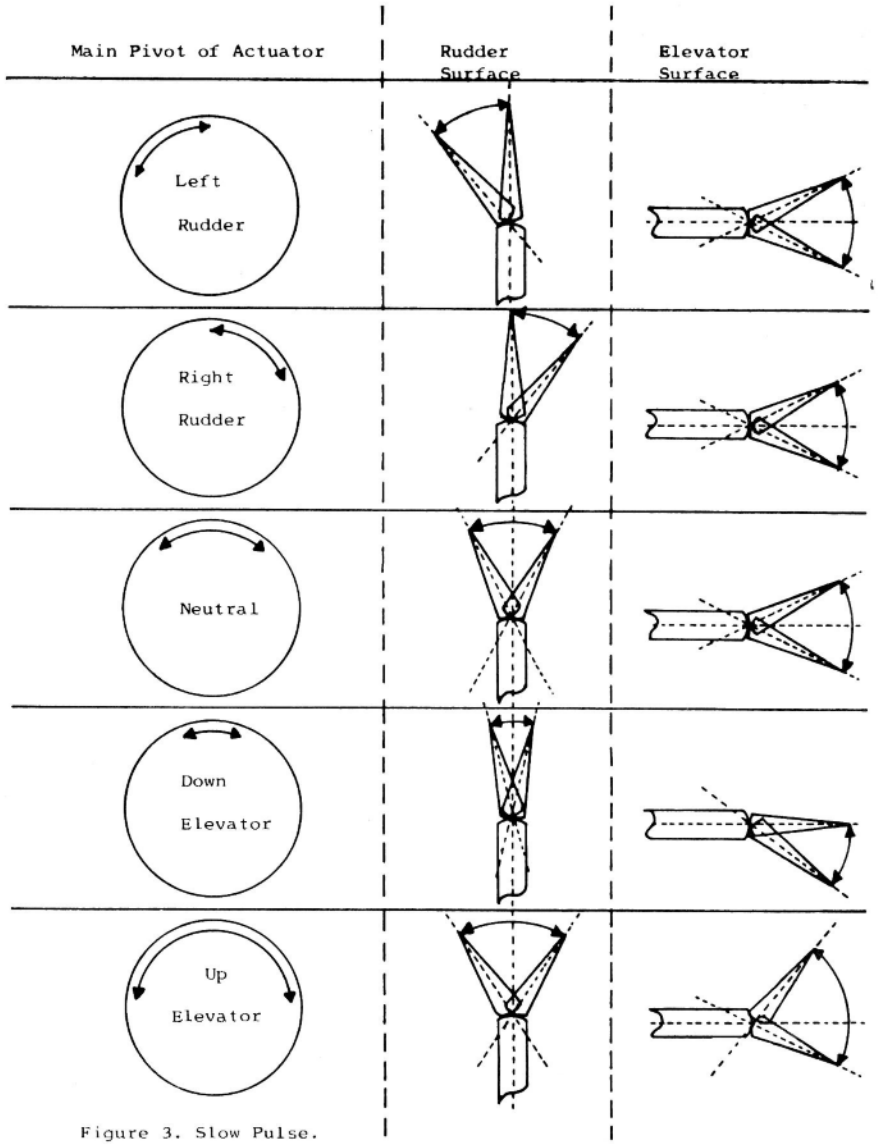

Figure 3. Slow Pulse.

It will be necessary after each range adjustment to re-center the elevator by the centering control. A similar procedure is followed in determining the range of the rudder control which is observed by displacing the motion of the pivot in the actuator either to the right or to the left. Again, the centering control should be adjusted after either increasing or decreasing the range control.

B. Control Surface Adjustment

After assuring satisfactory motion of the actuator, the push rods may be reconnected to the actuator and the motion of the control surfaces should be observed for various locations of the stick assembly. If the position of the rudder or elevator, when the stick is in neutral position, produces an average motion which deviates from neutral the push rod length should be adjusted to re-center the control surface. In no case should the re-centering be done by an adjustment of the transmitter.

3. Double Actuator System Adjustment

The double actuator systems utilize the same transmitted information as the single actuator systems, but with further electronic processing. These systems are capable of operating at a faster pulse rate of about 14 to 15 pulses per second for neutral. The control of the aircraft is more positive than with single actuators and results in greater maneuverability.

The slow pulse versus fast pulse switch should be to the top in the fast pulse position. When you receive your transmitter it has previously been adjusted so that the pulse rate and width are set to achieve control of almost all actuators. The Super Sport allows for further adjustments to assure

excellent performance from the specific actuator which you are using. In the middle of the circuit board of the transmitter are four controls which allow for adjusting the pulse rate and pulse width generated by the transmitter which provide control of the actuators. The centering and range for both rudder and elevator are provided by independent electrical controls.

It is recommended that, first, the rudder centering control be adjusted so that the motion of the actuator is symmetrical about the position in which the actuator rests when the system is turned off. The second adjustment is to adjust the elevator centering control so that the motion of the elevator actuator is symmetrical about the position in which the actuator rests when the system is turned off. The elevator adjustment is achieved when the pulse rate is approximately 14 pulses per second. Once these two adjustments have been made to provide centering of the actuators, it is desirable to examine the motion of the actuators when the control stick on the transmitter is moved to various positions.

A. Double Actuator Adjustment

It is recommended that all push rods be disconnected and that you familiarize yourself with the operation of the actuator with respect to the transmitter controls. Upon pushing the control stick away from the operator the pulse rate in the transmitter increases and the elevator actuator should move to the down position as indicated in Figure 4. A close examination of the pivot action will show a decrease in the amplitude of vibration. On pulling the stick toward the operator, the elevator actuator should move to the up position as indicated in Figure 4, and a slight increase in the amplitude of vibration should be observed. Both up and down elevator should cause the main actuator pivot to rotate almost ninety

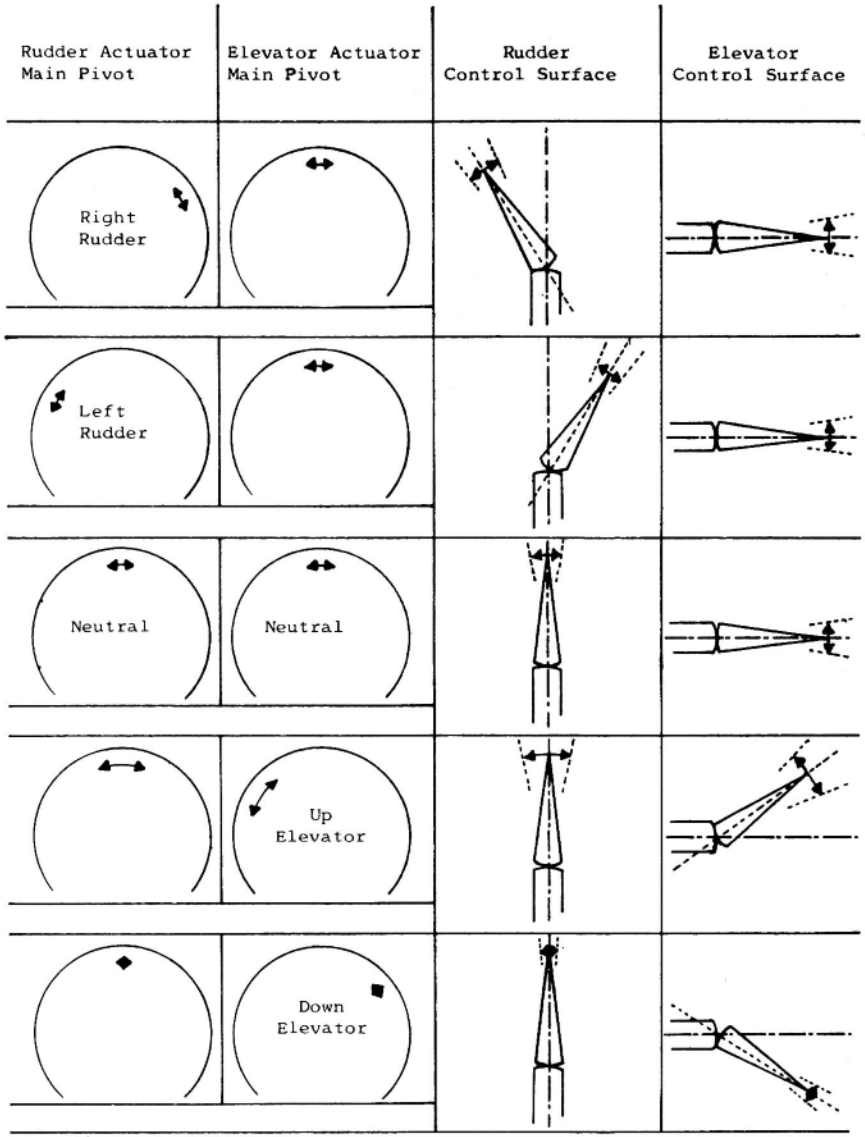

Figure 4. Fast Pulse.

degrees. If the movement is not sufficient, increase the range by rotating the elevator range control counterclockwise. If the movement is too much, decrease the range by rotating the elevator range control clockwise. In either case, change the control by small amounts and re-observe. It will be necessary to re-center the elevator control, if the range is changed greatly.

On moving the control stick to the right the rudder actuator should move to the right as illustrated in Figure 4. Movement to the left should cause rotation to the left. In a similar manner to elevator adjustment, adjust both range and centering to cause the actuator to function as illustrated.

Upon depressing the motor control, both actuators should cycle in one direction for high motor, and in the opposite direction for low motor.

Before proceeding, assure that the trim controls near the main control stick operate without causing the actuators to cycle. If cycling occurs, further reduce the range of the specific control. Become familiar with the operation of all of the controls before connecting the push rods. The push rods may then be connected and any further adjustment should be with the mechanical linkages, do not adjust the electrical system to achieve proper neutral position of the control surfaces.

THE BONITRON SUPER SPORT
TECHNICAL AND OPERATING DATA

The Super Sport transmitter operates on a predetermined frequency of approximately 27 megahertz. In order to achieve maximum radiated power the antenna should be fully extended and the transmitter case should be held firmly in the hands. The 9 volt battery should provide approximately 50 hours of operation and should be replaced if the voltage drops below 8 volts when the transmitter is turned on.

The modulation tone is approximately 1200 cycles per second which allows for selected reception and a maximum noise rejection. The tone may be keyed on for escapement flying, may be modulated at a variable rate with neutral at either 6 or 14 pulses per second and with variable width of tone versus carrier.

WARRANTY

The transmitter is guaranteed to be free of workmanship and parts defects for a period of 60 days from date of purchase. We reserve the right of inspection to determine abuse and if evident in our opinion, guarantee is void. When returning a transmitter for guarantee service, give full details as to why you think the unit is defective. Pack in original shipping carton if possible and return direct to the manufacturer.

SERVICE

In order to minimize cost of repair, describe the noted malfunctions and return with transmitter to BONITRON, Inc., 633 Thompson Lane, Nashville, Tennessee 37204. Minimum charge for inspection and repair is $5.00, which should be included with transmitter. Owner will be notified, if repairs are in excess of $25.00 . Allow two weeks for repair and return of all equipment.