Instructions for Installation and Operation of

Babcock Three Channel R-C Boat Equipment

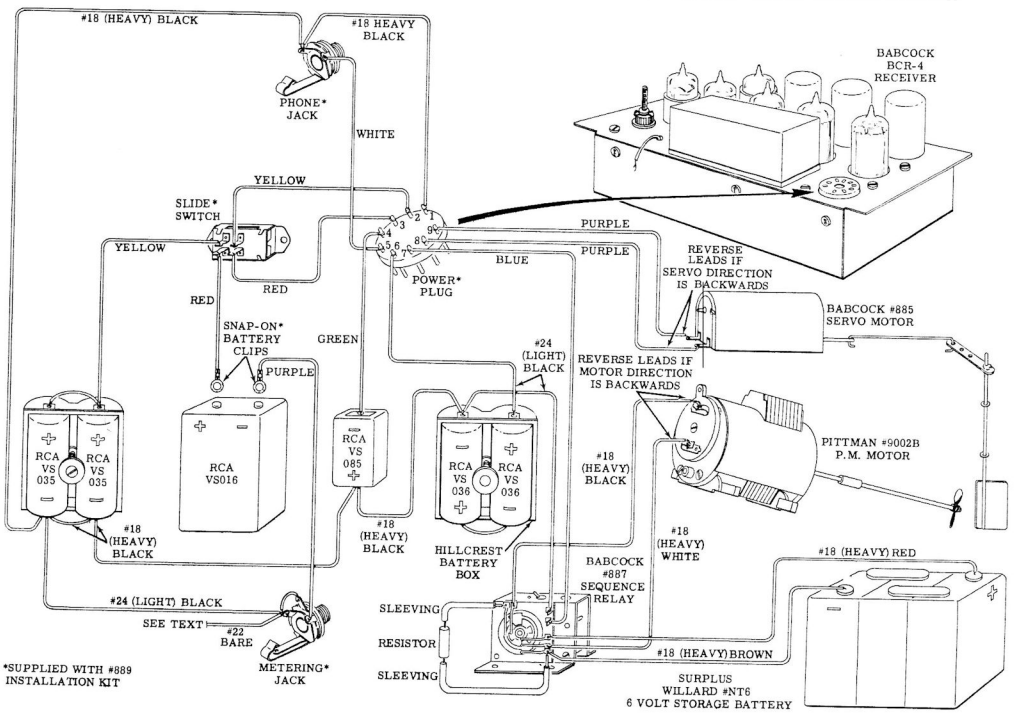
With the growing interest in model boats, the need for comprehensive instructions for installing R/C has been increasing. BABCOCK MODELS, therefore, has prepared this information to assist you, the model boat builder and operator, in getting your boat operating in the water as rapidly as possible. It is usually the custom to complete the boat kit before buying the radio equipment and accessories for installation. Sometimes, this procedure results in added installation difficulty. Had the modeler been fully aware of component requirements and the size of each component, he might have been able to make minor changes in the hull and deck structure to accommodate them before the finish paint job was applied. We suggest that you fully acquaint yourself with what will be required to install radio control in your boat and preferably that you obtain and install all components before you apply the finish paint job. This, we are sure, will save you considerable work.

This instruction sheet describes the installation of Babcock three channel equipment that will provide complete control of rudder position, motor direction and speed. The following is a complete list of the various components that will be required for this installation:

1	BABCOCK	BCR-4A Receiver	$86.00
1	BABCOCK	BCR-4A Installation Kit	3.50
1	BABCOCK	#885 Servo Motor	12.50
1	BABCOCK	#887 Motor Speed Control and Sequence Reversing Relay	12.95
1	Pittman	9001B or 9002B motor (depending on size of boat)	
2	Hillcrest	Battery Boxes	
1	Willard	NT6 Surplus Storage Battery—(6 volt motor power battery)	
4	RCA	VS-035 Flashlight Cells—(1½ volt "C" cells for filaments and servo power)	
1	RCA	VS-085 Hearing Aid Battery—(30 volt bias battery)	
1	RCA	VS-016 "B" Battery—(67½ volt plate circuit supply)	

Of course, you will have to have a BABCOCK BCT-4 Transmitter to operate the equipment after it is installed in the boat. The BCT-4 sells for $69.00.

Interconnecting Wiring Diagram - BABCOCK BCR-4A (Three Channel) Radio Control Receiver



The BCR-4A Installation Kit will have a quantity of multi-colored wire, a power switch, two jacks for headphones and metering, also a 9 pin power plug to connect the equipment to the receiver. An instruction book is packed with each receiver and transmitter and should be reviewed before the actual installation is started. Be sure you fill out the registration card at once and mail it to the factory and also send a license card to the F.C.C. Read the following installation instructions at least once before proceeding.

Figure 1 is a pictorial diagram of all the equipment as installed in a boat. It is not necessary to maintain a physical relationship as shown. The location of the servo and motor will be dictated pretty well by the construction of the boat and most certainly will have to be in the aft section. The balance of the equipment should be arranged in the hull in the most convenient manner considering that the radio receiver and the batteries will have to be removed from time to time. Don't forget that the #887 Sequence Reversing Relay will operate properly only when it is mounted on a horizontal surface. The normal pitch and rolling of a boat will not affect this operation.

After you have decided on what you believe the most practical arrangement in the hull, the components should be placed as closely as possible in the positions they will later occupy and the hull floated in the water to insure that the trim will be maintained. If the hull lists or pitches off the water line, the components should be shifted around until the hull is properly trimmed. If you are building a plastic hull, there should be enough waste material left over to fashion brackets for the servo and motor, receiver, etc. A ⅛" strip of sponge rubber between the receiver and the mounting surfaces may well eliminate future vibration troubles.

Now that we have all the positions of the components determined and the mounting brackets constructed and installed, let us proceed with the installation and rigging of the equipment. It is presumed that you have the boat rudder installed and have constructed an arm such as is shown in Figure 1. Bear in mind that the servo has a total travel of ¾" and should be mounted in such a way that you will get balanced deflection of the rudder from center. This can be checked out after the servo is installed by connecting a 3V battery to the servo and allowing the servo to run against the stop, removing the battery and checking the rudder deflection. Reverse the leads on the battery which will cause the servo to run in the opposite direction until it is against the opposite stop. The deflection from neutral should be approximately the same, also the deflection from neutral should not be more than 30°

Most manufacturers show how the motor should be installed. Don't forget that you will have to have a flexible coupling between the motor shaft and the propeller shaft in order to avoid binding. These flexible couplings are available in hobby shops and your hobby dealer will be glad to show you the various types.

Since the installation kit is designed for aircraft, extra lengths of red and brown #18 wire will be required for the drive motor busses. You will notice on pages 13 and 15 of the BCT-4—BCR-4 instruction book the method of constructing a wire harness. This type of harness is well worth the trouble it takes to construct it. It will make you very proud when you remove the deck to show the fellows your installation. Follow closely the color coding indicated in Figure 1 of **this** instruction sheet as it will help you keep track of the wires and will assist you in trouble-shooting at some later date. The best place to start with the harness is to attach the 9 wires of the proper colors to the receiver plug. Be sure to use about ½" of the transparent sleeving over each wire. Push it against the connector and tie the cable as shown in the radio instruction book.

Use the bare tinned wire to connect the metal frames of all components together. This "bonding" eliminates static and subsequent misoperation of the receiver. The bare tinned wire should connect to the metering jack as shown in the pictorial diagram.

Now that all units are installed and properly wired install batteries in the boat and in the transmitter and check out the system. It might be well to re-read the radio instruction book at this point to refresh our memory on its operation. (You may want to rewire the stick control, which is factory wired for airplane operation, so it is more convenient for boats. This is accomplished by moving the wires at the back of the stick control switch clockwise one position. Be sure to move the jumper wire clockwise also. Now the motor control will be accomplished when the stick is moved up or down and rudder direction changed when the stick is moved right or left.)

Turn the equipment on by actuating the switch on the transmitter front panel and the switch on your boat. Move the control stick on the front panel to the right. The rudder should move to the right. Move the stick left and the rudder should move left. When the stick is released the servo will stop and maintain its position. If the rudder direction is wrong reverse the two leads to the rudder servo.

Pull the stick toward you to pulse the sequence reversing relay. The motor should start (or stop if it has been running). Each time the stick is pulsed toward you the sequence reversing relay will move one step. The proper sequence (1) is slow speed forward, (2) stop, (3) slow speed reverse, (4) stop, (5) high speed forward, (6) stop, (7) slow speed reverse, (8) stop. Check the rotation of the propeller in the high speed range to be sure it drives the boat forward. If the propeller is in reverse in the high speed range reverse the leads to the propeller motor. **Do not** change the wiring of the sequence relay.

Well that does it. Let's finish the paint job and go sailing.

"The Ultimate in Radio Control"

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