INSTRUCTION MANUAL

FOR

Kraft CUSTOM

10 and 12 CHANNEL

SUPERHETERODYNE RECEIVER

BEFORE ATTEMPTING HOOK-UP

PLEASE READ CAREFULLY

INSTRUCTION MANUAL

for

KRAFT CUSTOM-10 CHANNEL SUPERHETERODYNE RECEIVER

INTRODUCTION

The Kraft Superheterodyne Receiver is unquestionably the finest and most reliable unit available for Radio Control enthusiasts. Its sensitivity (operating range) and stability is unequalled. Its selectivity and excellent AGC (automatic gain control) system makes reliable control possible in our tremendously crowded radio control frequencies.

The receiver will reject signals 5000 cycles per second or less away from its operating frequency. However, with your transmitter off you may notice that your receiver can be operated by nearby transmitters which are 50 KC or more away from your receiver's frequency. This has nothing to do with the receiver's selectivity. It is caused by the square wave modulation used in most radio control transmitters. This type of modulation causes a "dirty" transmitted signal that may splatter over as much as plus or minus 100 KC from the actual frequency of the transmitter. Fortunately this splatter is not a problem at the low power levels used in radio control. The carrier wave signal from your transmitter will turn on the AGC system of your Kraft Superheterodyne Receiver which greatly reduces its gain. Thus, with your transmitter on, your receiver will not be bothered by the splatter from other R/C transmitters on adjacent R/C frequencies.

Properly installed, your receiver will require no maintenance or retuning for years to come. It will function with absolute reliability at any temperature from 0^{o} to over 140^{o} Fahrenheit.

Batteries:

The receiver has been designed to operate on the batteries supplying power to the models servo actuators. Thus, no additional battery supply is required for the receiver. All of today's practical relayless servo systems require five 1.2 volt batteries wired in series for power. Dry batteries have become obsolete for multi-channel radio control use. Therefore, the receiver is designed to operate on five

500 or 250 milliamp hour scintered plate type nickel cadmium cells. These are available from your dealer either singly or in potted packs of five cells. If he cannot supply you, it is suggested that you contact Ace Radio Control, Higginsville, Missouri, who can supply batteries as well as a kit to make your own holder. These cells have a fully charged voltage of 1.3 volts per cell under moderate loads. This means that the total voltage across the battery pack will be 6.5 volts initially. After a bit of use the batteries will drop to 6 volts under load (by "load" we mean the drain of the servos as the receiver itself draws very little current). Always charge your battery pack the day before use as it will gradually lose its charge in storage.

You may expect over two hours of actual flying time from the average ten channel five servo installation when using 500 milliamp hour cells. Over one hour's use may be expected from 250 milliamp cells. These times are based on the use of servos such as the Bonner.

Wiring

Careful neat wiring is a must for reliable operation of the radio control system. Always use a high quality 60-40 resin core (not acid core) solder.

There are twelve wires coming from the receiver. The red wire is connected to the positive (plus 6 volts) side of the battery pack. The white striped green wire is connected to the negative (minus 6 volts) side. The other ten wires are from the reed bank and are divided into 5 color pairs, each pair corresponding to a suggested control function as follows: Brown pair, rudder. Orange pair, aileron. Yellow pair, motor. Green pair, elevator. Blue pair, trim. This reed selection matches the tone selection of the Kraft transistor transmitter. Other combinations could be used with other make transmitters, but it must be remembered that this reed bank is of a new high frequency type and other make transmitters may not only be difficult to match to it, but may not have the necessary tone frequency stability to insure reliable operation.

The only difference between the 10 and 12 channel units is in the reed bank. The 12 channel reed bank has two more reeds added and its tone frequency spread is approximately 20 cps higher. The gray pair of wires from the 12 channel reed bank are for auxiliary use. (i.e. flaps, spoilers, twin engine control, etc.). The other colors of wire pairs are for the same functions as the 10 channel reed bank.

The receiver should be installed in its compartment with all connections made to servos, switches, batteries, etc. (including aileron servo connection if any). Slide the receiver out of its compartment just far enough to expose the tuning hole in the cover. A hex type plastic tuning wand is used to match the hex hole in the tuning slug. Remove the transmitter antenna. If a helper is available have him hold down the trim or motor switches to drive the associated servo to the end of its travel. Tuning will be easier using the trim or motor tones because the servos will not be running back and forth during tuning. Have your helper walk out a few feet until you cannot hear the reed vibrating. Insert the tuning wand into the slug and keep your body away from the wiring and receiver can as much as possible. Do not hold the receiver while tuning. Rotate the slug in or out until the reed starts vibrating again then have your helper move slowly away with the transmitter tone held on while you tune the slug to keep the reed vibrating. When your helper has reached the range limit, the slug tuning will be very sharp and in most cases you will be able to faintly hear the tone humming in the reed coil beyond the point of range where the reed stopped vibrating. Merely tune the slug for maximum tone volume.

A range of about 15 feet with the transmitter antenna removed is adequate. Occasional range checks may be made right in your shop. Establish a fixed point to place the airplane and another point of maximum range to use as checks. Do not vary these positions in your shop or proximity to various objects will greatly change the range to be expected. For example, with the airplane sitting on a dry asphalt runway, a range of 8 to 10 feet may be all that can be attained. With the airplane propped on a stool over a lawn a range of 50 feet or more may be obtained. We point this out to illustrate that range will vary considerably with the transmitter's antenna removed depending on the test location.

If you desire a real range test, prop the airplane upon a stool off the ground and have your helper start walking out with the transmitter (antenna on, of course). Pull up a chair and relax as he will have a mighty long walk.

Reed Tuning

The transmitter and receiver have been very carefully matched at the factory and should never require retuning unless damaged. However, in manufacture slight stresses are sometimes set up in the metal reeds. The vibration of the reeds will relieve these stresses causing a very slight frequency shift after a bit of use. This could cause simultaneous reed action to become less than perfect. Therefore, you should be familiar with the procedure of tuning the transmitter tones to the receiver.

The transmitter instruction sheet identifies the tuning pots associated with these various control functions. Turn on your transmitter with antenna removed. It is well at this point to make sure that servos are not hooked up to the receiver. This is because it is possible to get a pair of reeds driving together which could harm the servo amplifier. Rotating the tone control pot on the transmitter to the right increases the frequency of the transmitter tone. Rotating to the left decreases the frequency. Press one of the control switches and observe reed action. Rotate the control pot associated with this switch position to the right increasing the audio tone frequency. Continue to rotate the pot to the right until the reed stops vibrating or until the reed next up from it (i.e. the next shortest reed), starts to vibrate. Release the switch and actuate it again. Then rotate the pot to the left slowly until the reed starts vibrating. Rotate the pot to the left slightly beyond the point and this will be the correct tone settings to match the reed. This should be repeated for each control function.

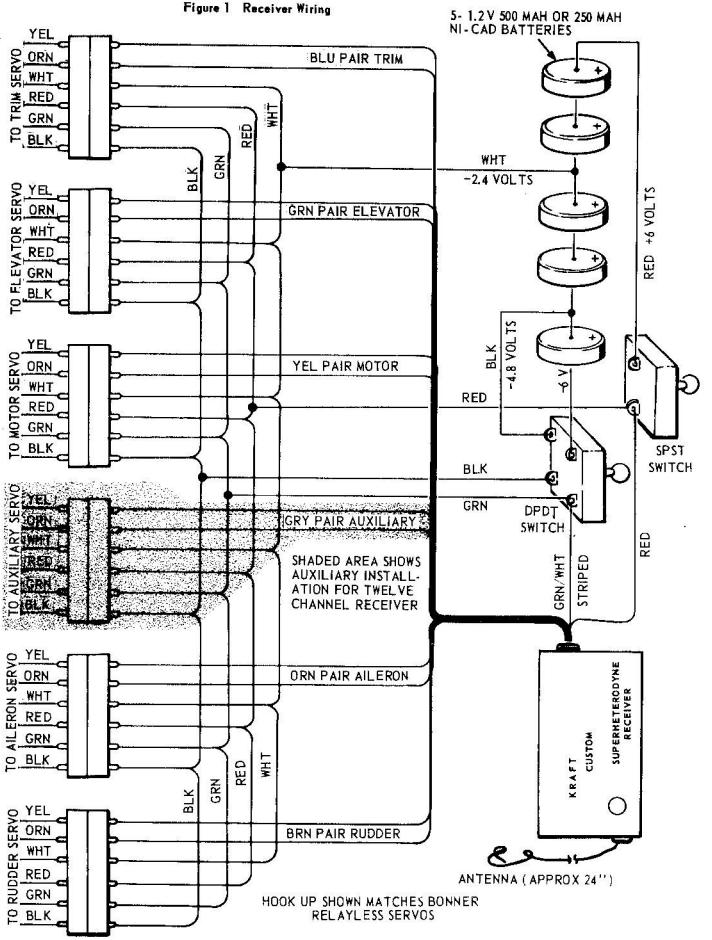
The same procedure should also be followed now for adjustment of the simultaneous combinations. Two of the simultaneous control functions are for example, down elevator and left rudder. Hold these two switch positions on and rotate the pot association with down elevator to the right until it stops vibrating, then rotate it back again to the left until the reed starts again and go just slightly beyond this starting point. Then repeat this procedure with the left rudder pot. Each simultaneous combination should be adjusted in a like manner.

It is very unlikely that the reed bank as a whole will ever be out of adjustment. Therefore, should adjustment be required, retuning should only be done on the control functions which are not performing satisfactorily. Do not attempt in any manner to tamper with the reed adjustment screws or the reed plate itself.

Despite very careful testing at the factory, it is possible that a small piece of dirt or other matter might become imbedded under one of the reed contacts. If one of the reeds appears to be driving well but does not actuate the associated servo, the reed may be cleaned as follows: cut a small length of .040 piano wire and file or grind it across the width of the wire to roughen it. Very carefully rub this roughened surface of the wire across the reed contact. Do not in any way distrub or excessively bend the reed itself. After the reeds have been operated for a short period of time it is most unlikely that they will ever require further cleaning or attention. To reiterate, it is most important that unnecessary tampering or attempted adjustment of the reed bank be absolutely avoided.

In case of trouble, inspect all wiring carefully for properly soldered joints. Most radio troubles can be traced to poor soldering.

Figure 1 Receiver Wiring



The receiver is designed to be used with relayless servos such as the Bonner. The wire pairs (brown, blue, yellow, green, orange and gray) from the reed bank are connected one color pair to the orange and yellow wires from each servo. To change direction of servo movement, reverse the connections of the orange and yellow wires from the servo to the color pair of wires from the receiver.

Figure I. shows the suggested wiring diagram. Use #26 19 strand wire and strip back only long enough to make connections. Always use tight fitting sleeving over connections to protect against vibration.

INSTALLATION

The receiver should be mounted with a minimum of 1/2" of foam rubber surrounding it on the sides, top and back. 3/4" minimum is desirable on the front and bottom for greatest protection. Do not pack the receiver in tightly. It should slide loosely into its foam rubber lined compartment without compressing the foam.

Mounting position is not important except that it is desirable to mount the unit vertically with the bottom of the can facing forward where practical.

The antenna installation should be kept clear of all wiring, servos, etc. We prefer to glue a length of number 26 stranded wire from the tail forward to the receiver compartment inside the fuselage during construction. The end at the receiver compartment should be left long enough for easy attachment. The antenna wires from the receiver is supplied 24" long but if the suggested installation is used it may be cut off about 3" from the can. We prefer to solder the antenna connection permanently from the receiver to the model, covering the splice with a length of sleeving. However, a small tight fitting plug may also be used.

Total antenna length should be about 24", but it can be anything from 18" to 30". If the antenna is installed inside the airplane, do not use a metallic finish as this could materially reduce range.

Tuning

A hole is provided in the receiver can to allow for final RF tuning. NO OTHER TUNING ADJUSTMENTS ARE NECESSARY AND THE WARRANTY IS VOID IF THE I. F. CAN TUNING SEALS ARE TAMPERED WITH.

Be sure no wiring is accidentally shorted. Check your switches and plugs to be sure that they are making good contact. Both can be a source of trouble that is sometimes difficult to isolate. Check your battery voltages and inspect the battery pack. Be sure wire color coding matches with Fig. I. If after a careful inspection, the trouble seems to be insolated to the receiver, return it to the factory with a letter outlining your difficulty. DO NOT TAMPER WITH OR ATTEMPT ANY RECEIVER ADJUSTMENT OTHER THAN SPECIFIED IN THIS INSTRUCTION MANUAL. IF YOU DO TAMPER WITH THE RECEIVER, YOUR WARRANTY IS AUTOMATICALLY VOID AND EXPENSIVE REPAIRS MAY BE NECESSARY.

Changing Frequencies

The operating frequency of your receiver is fixed by the crystal installed in it. Should you desire to have your receiver changed to another radio control frequency, return it to the factory along with your transmitter. Do not attampt to change the frequency by changing crystals yourself. The transmitter and receiver crystal are ground within specific tolerances. While these tolerances are extremely close, it is entirely possible that they could be far enough off to substantially degrade the performance of the receiver. Therefore, realignment is desirable when changing the receiver from one frequency to another. When returning your transmitter and receiver to the factory for frequency change, include your check or money order for $10.00. This will cover the cost of exchanging crystals, realignment, and a thorough check of your receiver and transmitter together.

GUARANTEE

The Kraft Custom Superhetrodyne Receiver is guaranteed against defects in workmanship and material for 90 days from the date of purchase. In case of trouble, return the unit to the factory. Enclose $3.00 to cover the cost of return postage, insurance, and handling. If the unit is judged to be defective, we will immediately repair or replace it and return it to you at no charge. If our inspection indicates that it has been tampered with or physically damaged, we will send you a repair estimate. No COD shipments will be made.

CONCLUSION

We take great pride in our electronic design and workmanship and in the careful thorough testing of every unit we manufacture. Our standard of manufacture is that we would personally use any unit which leaves our plant in our most prized model under any conditions.

If you have any comments or criticisms regarding our equipment, we would appreciate hearing from you.

Very truly yours,

Phil Kraft

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