Multi INSTALLATIONS

The Key to Maximum Performance and Reliability

Virtually every construction article, manufacturers instruction manual, and general discussion of multi channel flying will stress the fact that a very large percentage of equipment malfunctions are due in great part to faulty, or careless, wiring and installation. Every model publication has, at one time or another, published a number of articles on methods of wiring and installation, and no great and startling revelations will be made here to add to this fund of knowledge. Due to the number of requests received daily for this type of article, we have selected a six channel and ten channel rig of popular manufacture, and will use it to illustrate a straightforward, practical hook-up, sans gimmicks.

To begin with, buying cheap equipment is false economy. Purchase the best multi-channel gear you can afford, based on what you see flying week after week, with reliability and consistency, at your local flying site. In other parts of the country, other makes of multi equipment may be predominant, but selecting your own equipment on the basis of what the experienced multi fliers use in your area will, for one thing, assure you of experienced help if difficulties should arise. Following this advice, we have selected the Kraft Custom 6 and 10 channel for illustration purposes.

Before commencing your wiring and general installation, stop and reflect for a moment on the time you have spent in building your model, whether it be a sport, scale, or contest ship. You can't put a dollar value per hour on the time spent on building your newest creation, but if you were to mentally pay yourself a minimum wage of $1.25 per hour, the total sum for labor could well be staggering! So take a little time, an extra hour or so, to carefully wire and install the equipment in that expensive beast, and you'll be rewarded with many hours of troublefree flying.

First, decide what type of installation you want to achieve. A contest flier, flying one of the many similar low-wing, monoplane designs with fairly uniform equipment installations, may use a servo mounting printed-circuit board such as the RGA Servo Solver. In this case, your servo mounting requirements are predicated by the board itself, and the versatility of your installation is limited. The Servo Solver is excellent for this type of installation, but is limited in its flexibility. The Justin Micro-Tie printed circuit board is also available, allowing you to select your own servo installation, but eliminating the necessity for the numerous plugs and corresponding solder joints. The third alternative, and the one described here, is the common method of wiring from unit to unit with standard plug connectors. Whichever method you choose, do it carefully!

The Kraft 4 and 6 channel receivers illustrated have the servo and battery wiring pre-cabled. Here, it is only necessary to match the wire colors of the servo cables to the color coding of the wires from the servos. Follow the wir-

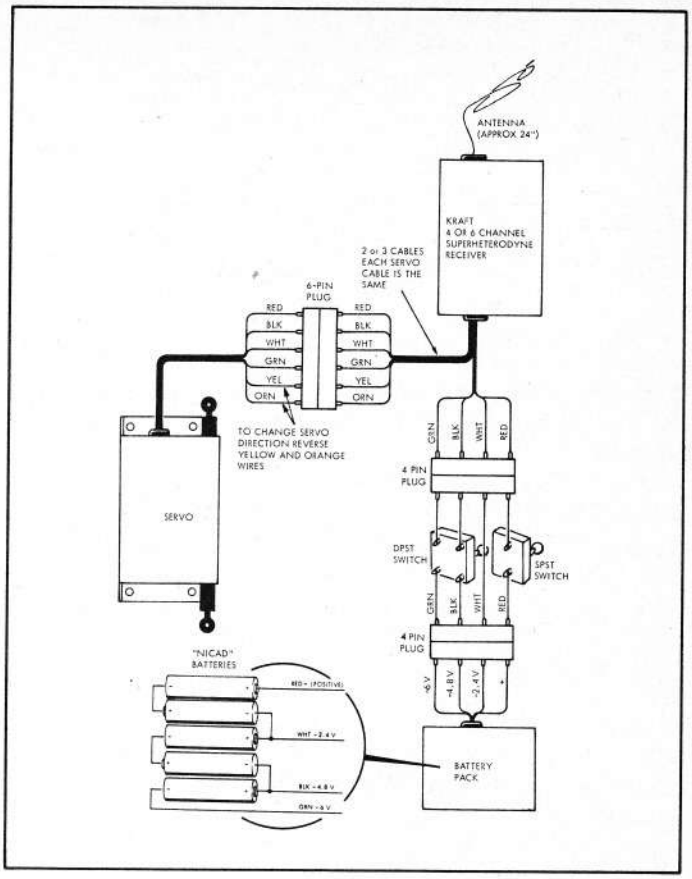
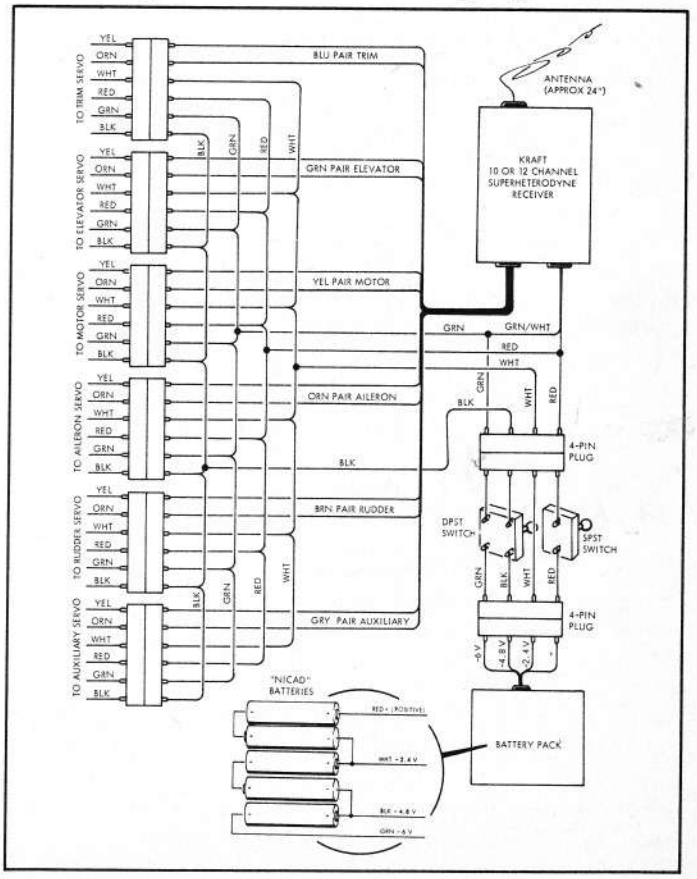


Fig. 1. 4 and 6 channel wiring diagram.

Fig. 2. 10 and 12 channel wiring diagram.



ing diagram carefully and be sure the four-wire power cable is correctly wired to the battery pack. We use 8-pin Orbit-Brunner polarized connectors for the receiver-servo connections, and a Medco 6-pin plug and socket connector for the receiver-power supply connection. Careful, neat soldering is absolutely essential for reliable operation. Always use a high quality 60-40 resin core solder and small-tipped soldering iron of 25-40 watt capacity. Never, under any circumstances, use acid-core solder! When soldering the wire leads to the connectors, first strip approximately 3/16" insulation from the leads. Slip one of the color coded insulation sleeves on the wire, then tin both the wire and the plug pin. Touch the hot iron to the exposed wire tip, remove the iron and solder. Do the same with the pin to be used. Never apply solder directly to the tip of your iron (except when tinning a brand new tip) and carefully wipe the tip on a piece of wet sponge rubber after each soldering application. This will keep your iron clean and assure good solder joints without an excess of solder. When both the pin and the wire are tinned, hold the two together and touch with the hot iron, causing the solder to flow. Be sure the connection is bright and shiny — a dull gray, or flaky condition indicates a cold solder joint that will break or vibrate loose. Slide the insulating sleeve down over the joint and repeat this procedure with each connection to the plug. It is recommended that #26 nineteen-strand wire be used, stripped back only far enough to make a connection, and that tight fitting sleeving or thermoshrink be used to protect against vibration at the soldered joints. After you have completed the wiring of each plug, make sure your servos run in the proper direction to the transmitted command. If not, simply reverse the yellow and orange wires at the servo plug. Once this is accomplished, and assuming all your connections are satisfactory, you can "pot" the wires to the plug with General Electric Clear Seal, or its equivalent, available at most hardware and building supply stores. The latter is a translucent silicone rubber that is completely flexible, yet prevents the solder joints from breaking by removing the strain at the plugs. Its one disadvantage is that you no longer have access to the soldered connections, so if you choose to use this material, make absolutely certain your connections are as you want them to be in the final installation.

The ten and twelve channel Kraft receivers illustrated in the drawings do not have the servo wiring precabled due to the fact that the resulting large bundle of wires to the light superhet receiver would tend to transmit vibration, possibly causing reed problems. There are twelve or fourteen wires coming from the receiver. The red wire is connected to the plus six volt side of the battery pack. The green and white striped wire is connected to the minus six volt side. The other ten wires are from the reed bank and are divided into five color pairs, each pair corresponding to a suggested control function. For example, brown pair: rudder; orange pair: aileron; yellow pair: motor; green pair: elevator; blue pair: trim. This reed selection matches the tone selection of this *manufacturers* transmitter. Be certain to check the manufacturers color coding for the units you plan to use. You will note that the drawing illustrates a pair of auxiliary gray wires — these are for use with the Kraft twelve channel unit, and employed for flaps, spoilers, aileron trim, twin engine control, etc.

Before progressing to the actual installation, a note about servos. There are three popular makes of multi channel servos for use with modern relayless equipment — the Bonner Transmite, Annco, and Kraft. The Bonner unit is by far the most widely used to date, and the largest in physical size. Travel is non-linear. Both the Annco and Kraft servos feature linear travel, with the Annco the smallest of the two. The newer Kraft unit features lower battery drain with a higher powered industrial type motor and resultant higher thrust to the flying surfaces. All are good servos and have standardized color coding. If you must experiment with one of the less popular, or foreign servos, make sure you check the color coding and recommended method of wiring. Again, look to see what the local fliers are using — it's a good guide.

When installing the receiver in your ship, use a minimum of one-half inch of foam rubber surrounding it on the sides, top, and back. Three-fourths inch minimum is desirable on the front and bottom for maximum protection. *Do not* pack the receiver tightly in the foam — it should be able to slide loosely into its foam-lined compartment without compressing the foam around it. The position of the reed receiver is not important except that, whenever possible, it is desirable to mount the can vertically with the base of the receiver facing forward. When installing the antenna, be sure to keep the wire clear of other wiring, servos, pushrods, and the like. Unless you use a metallic finish on your ship, an 18" to 30" length of #22 wire can be glued inside the length of the fuselage during construction. You can cut off the antenna wire at the receiver to a length of about 3" if you desire, soldering the internal antenna to this lead, or using a tight antenna plug connector. If you solder the two wires together, be sure to cover the splice with a length of tight sleeving or thermoshrink.

Servos may be mounted to the sides or bottom of the ship, or to a plywood mounting board installed on servo rails. Use whatever method is recommended in your construction kit and following the servo manufacturers suggestions for actual mounting. Be sure to use the rubber servo mounting grommets for proper shock absorption. Don't tighten the servos down so tightly that the grommets are completely compressed, defeating their intended purpose.

Make certain that all pushrods are free to travel with no binding whatsoever. Wire ends of pushrods should be bound securely with hinge thread and then cemented with Duco cement or equivalent. Spring wire keepers and Dubro links should be held together with plastic tape to prevent them from coming loose from the control horns during flight. Check to be sure that your pushrod ends do not bind against non-linear servos such as the Transmite.

Before tuning the receiver, connect all servos, switches, batteries, etc. Due to many faulty switches appearing on the market, a popular trend is to eliminate switches altogether, simply connecting the power supply plugs when ready to fly. If you do use switches, be sure to bend the wires back, then tie them against the switch body with tape or hinge thread to

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afford stress relief. GE's Clear Seal can be used to "pot" the switch, if you so desire. Slide the receiver out of its compartment far enough to expose the tuning hole. Remove the transmiter antenna completely. If you have an assistant available, have him depress and hold down the motor or trim lever switch in order 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, self-neutralizing, during tuning. Have your helper walk out a few feet until you cannot hear the reed vibrating. Insert the proper end of a plastic tuning wand into the slug, keeping your body away from the wiring and receiver can as much as possible. Do not hold the receiver while tuning, but allow it to remain in its compartment with only the tuning slug hole exposed. Rotate the slug in or out until the reed starts vibrating again, then have your assistant move slowly away with the transmitter tone held on while you tune to keep the reed vibrating. When your helper has reached the range limit, the slug tuning will be very critical, 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. Simply tune the slug for maximum tone volume. A range of about 15 feet with the transmitter antenna removed is adequate for the Kraft units. Although simple range checks can be made in your shop, many variables exist, and final tuning should be done at the flying site. For a final check, the plane can be propped on a stool, while your helper walks across the field with the transmitter antenna in place. With today's modern transmitter-receiver combinations, he may well expect a long walk!

Once the installation and tuning procedures are completed, you are ready for preliminary flight testing. In case of intermittent operation, or other difficulties, inspect all wiring carefully for properly soldered joints. Most radio troubles can be traced to improper soldering techniques. Be certain that no wiring is accidentally shorted and that all soldered connec-

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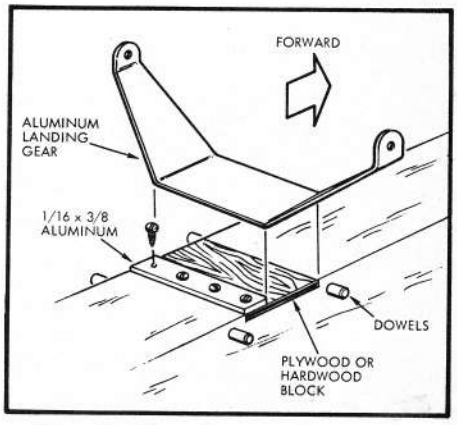
tions are properly sleeved. Check switches and plugs to be sure they are making good contact. Many cases of hard-to-isolate difficulties can be traced to the switches and plugs. Check the battery voltages and inspect the battery pack. Be sure wire color coding matches the manufactures hook-up instructions. Do not forget to fully charge your nicad pack at the recommended rate for the specified length of time. *Do not* reverse charge as you will ruin the pack. If, after trouble-shooting all wiring, connections, and general installation, the trouble seems to lie in the receiver, send it back to the manufacturer or his service center for repair. Don't attempt to make any adjustments or changes in the receiver not specifically mentioned in the instruction manual. This is a hobby whose end goal is *flying*, not tinkering or unneeded expense in costly RC equipment replacements.

Knock-Away Mount For Dural Gear



Frank Garcher, Hobart, Indiana, suggests a tried and proven method of mounting dural main gear so that it will knock-off in hard landings, but without tearing along the bottom of the fuselage. The gear is mounted in the normal fashion, with rubber bands and dowels, but is backed up by a 1/16" x 3/8" aluminum strip from an old gear blank. On impact, the main gear is thrown clear, and to the side of the ship, instead of rolling back the length of the fuselage, often causing extensive damage.