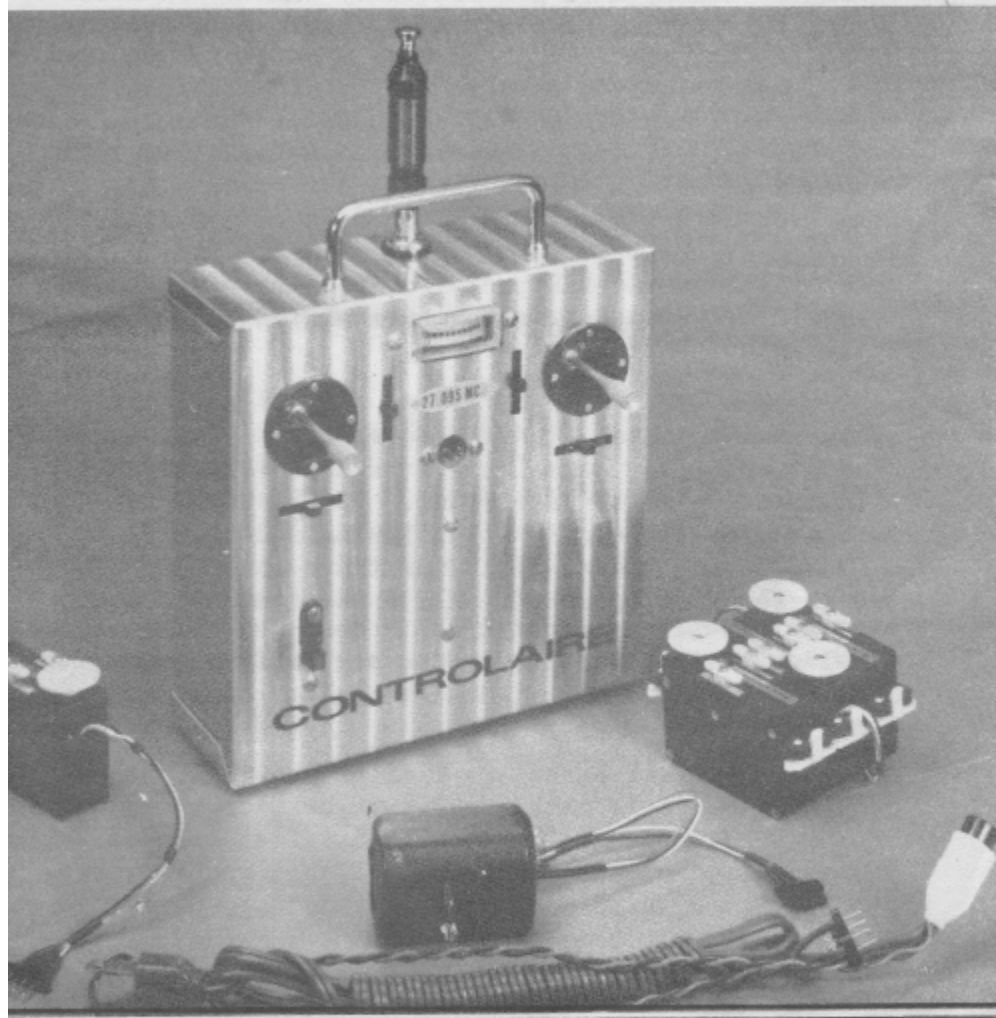


# CONTROLAIRE

## Digital Proportional Systems



Controlaire Electronics Division

**WORLD ENGINES**

I N C O R P O R A T E D

8860 ROSSASH AVE.

CINCINNATI, OHIO 45238

# Controlaire Digital Proportional System

## GENERAL NOTES:

The new Controlaire Digital Proportional Control Systems are offered in 2, 3, & 4 channel configurations, on the 27 & 72 MHz frequency bands. In order to facilitate this wide variety of models to suit all needs, a "Building Block" technique of design was employed which lends a certain amount of convertability to your equipment in adding channels or changing frequency bands. All the above models are available in standard or deluxe form. The standard models are fitted for 9 volt dry battery operation of the transmitter and no receiver power pack is furnished. The deluxe models include 600 MAH packs for both receiver and transmitter, with a transformer isolated dual charger built into the transmitter.

Transmitters on the 27 MHz band employ a "fixed-tuned" RF section; a very straight forward and stable unit with no adjustments to mistune. 72 MHz units feature a three stage circuit utilizing a double PI output; tuning instructions for these units are presented in separate booklets. All units feature a servo neutral adjustment inside the transmitters which also provides stick "sensitivity" control which governs the total travel of each of the servos.

Receivers for all bands are similar and interchangeable, requiring a 4 cell nickle cadmium pack for power. The 72 MHz band unit utilizes an RF amplifier to meet FCC radiation requirements while 27 MHz receivers employ a double tuned front end to obtain good image rejection.

## TRANSMITTER OUTPUT METER:

The meter circuit in your transmitter is essentially a built-in field strength meter. It is not directly connected to the RF circuitry but recives it's power through radiation from the portion of the antenna within the case. It's reading is entirely arbitrary and

should be used in a relative manner, that is, to indicate operation and battery condition. The reading will change when you grasp the case due to your body becoming a part of the antenna system (counterpoise.)

#### TRANSMITTER ANTENNAS:

Your transmitter has been factory adjusted for maximum radiation with the antenna fully extended. In the case of 27 MHz transmitters, a loading coil is employed to effectively double the length of the antenna. It is important that the antenna section directly above the loading coil be fully extended to prevent shorting the coil and thereby substantially reducing the radiated power.

#### RECEIVER ANTENNAS:

Your receiver is supplied with a 30" flexible wire antenna which is sufficient for normal operation. It is suggested that it be routed away from servos and noise sources and the end rubberbanded to a tail surface. If your manner of flying requires far away and low to the ground operation, you may wish to use a vertical whip type antenna fabricated of .040" wire from 18 to 24 inches long with the excess flexible antenna wire connected to it clipped off. In any case, retune the receiver front-end after installation to compensate for different antenna exposure lengths. See the receiver tuning section for this operation.

#### R.F. NOISE SUPPRESSION:

There are many possible sources of R.F. noise within your aircraft or boat installation and while your receiver features automatic gain control (A.G.C.) to aid you, it can only handle a reasonable amount. Here are a few hints to help you minimize trouble:

1. Bond metal control links, that is, connect with light flexible wire. (What you are trying to do is eliminate intermittent connections between metal parts.)
2. Use nylon connectors wherever possible.

3. Avoid telescoping receiver antennas, antenna connectors and plug in jacks.

### VIBRATION:

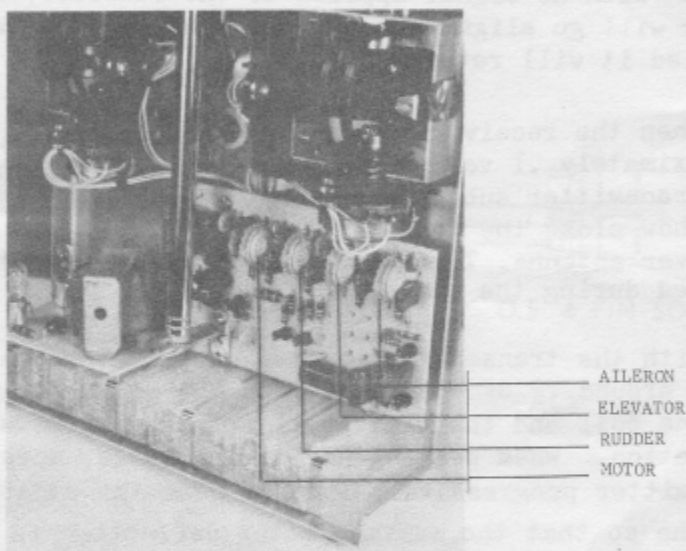
Not only can vibration cause intermittent operation, but it can virtually shake your equipment to pieces. Servos should be mounted securely, but with a bit of "float" to dampen out vibrations. The mounting grommets are designed to provide this feature but become useless if clamped too tightly. The newer method of glueing the servos in place with 1/8" neoprene tape and neoprene cement has shown very good results both from the standpoint of vibration immunity and ease of installation. Receivers should be wrapped in foam for crash protection aside from the effects of vibration on components and solder joints. There are contact springs in many types of nickel cadmium batteries which give intermittent contact and act as noise generators under vibration; for this reason it is a good idea to wrap the receiver pack in foam also. After installation try this simple test with your engine running and the receiver on: turn off the transmitter, in the absence of interference or close adjacent channel operation, all servos should retain their positions. General nervousness of all servos indicates a vibration excited electrical noise source. Movement of any one servo indicates the possibility of insufficient vibration damping in the mounting of that servo.

### SERVO CENTERING AND TOTAL TRAVEL ADJUSTMENT:

Note the adjustment pots pointed out in the accompanying photo. From left to right on the 4 channel models, they control the motor, rudder, elevator and aileron channels in that order. On 2 and 3 channel models, the order from left to right is motor (3 ch), elevator and rudder. These are dual purpose controls, that is, if moved only a small amount they act as servo neutral adjustments, but if their position is changed substantially and the servo recentered by adjusting the stick pot, the total servo travel may be adjusted. Notice the small ridge on the plastic wheel. If this is rotated toward the bottom of the case, the servo travel

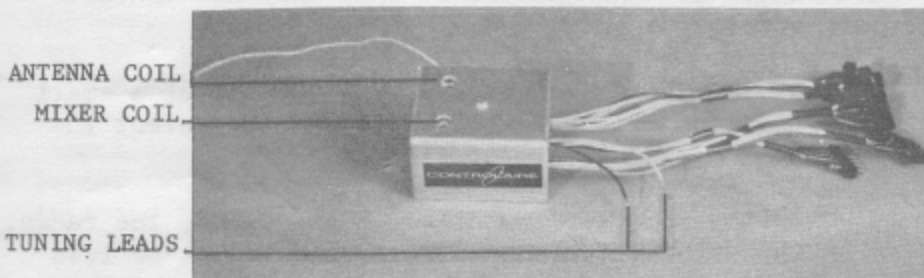
is decreased. Conversely, rotating the wheel toward the top of the case increases the servo travel.

NOTE: It is suggested that the stick adjustment Allen wrench be kept taped inside the transmitter when not in use. It is a metric size (1.5 MM) but a 1/16" wrench may be filed down to work in a pinch.



#### RECEIVER TUNING PROCEDURE:

Although your receiver has been factory adjusted and matched to your particular transmitter, it sometimes is necessary to retune the receiver after its' installation. Refer to the photograph and follow the steps indicated below.



1. With receiver, batteries, servos and antenna in final position, bare the ends of the short black and orange leads passing through the rubber grommet with the receiver power lead.

2. Set your VTVM or sensitive VOM on +1.5 volt D.C. scale and connect the negative lead of the meter to the black lead and the positive lead to the orange lead. With no signal applied to the receiver, the meter will go slightly below zero, but when signal is applied it will return on scale.

3. When the receiver is turned on, the meter will drop approximately .1 volt and upon receipt of a signal from the transmitter sub-antenna, will rise in accordance with how close the transmitter sub-antenna is to the receiver antenna. Transmitter main antenna should be removed during the tuning operation.

4. With the transmitter located such that the meter reads around .2 or .3 volts, tune the slugs of the antenna coil and the mixer coil for maximum meter deflection. When peaking any of the coils, move the transmitter progressively further from the receiver antenna so that the maximum meter deflection is .2 or .3 volts.

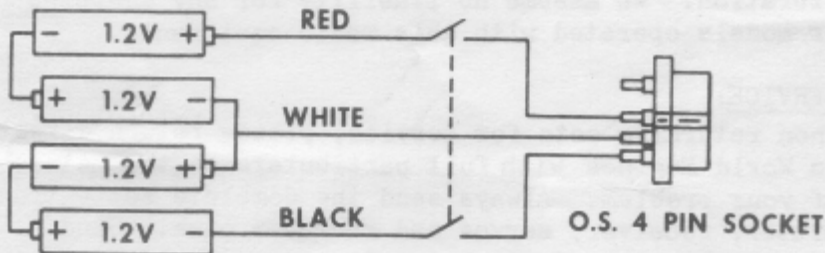
5. Normally, installation detuning will only affect the antenna and mixer coils due to antenna proximity with metal objects and different exposure lengths. However, you may have occasion to retune the I.F. cans at some time and, if so, it can be done in the same manner as outlined previously. It might be noted that tuning the I.F. cans is a more critical operation and care should be taken to insure that they are tuned to their absolute peak.

6. Touching the slugs quickly with the tip of a small soldering iron will reseal the beeswax to prevent the slugs from moving with vibration.

7. With the receiver installed in the plane, the range, using the transmitter sub-antenna, should not be less than 12".

### RECEIVER BATTERY PACK:

Since the standard models are supplied less the receiver pack, no responsibility will be assumed by World Engines for component damage or misoperation due to wiring mistakes or use of substandard cells. We recommend 600 MAH cells and you may expect 3 to 4 hours minimum operation time on a full charge. (Refer to the pictorial for wiring instructions.)



500 OR 600 MAH NICKLE CADMIUM PACK

### TRANSMITTER BATTERY:

Dry batteries in transmitters should be replaced when they check substantially less than 8 volts under load. Your transmitter will continue to operate down to about half this voltage but the power output will be down considerably. Deluxe models with the nickel cadmium pack and charger normally get a minimum of three hours operation on a full charge. If in doubt, monitor your output meter carefully. Remember, nickel cadmium cells drop in voltage rapidly at the end of their discharge cycle. To recharge, simply connect the charging cord to the plug in transmitter front and to a 110 V.A.C. source. The male O.S. plug on the charging cord connects the charger to the receiver batteries. The holes in the side of the transmitter case allow inspection of the two charge indication bulbs. When lit, the one nearest the front indicates that the transmitter pack is being charged; the other indicates the receiver pack is being charged. The charger will not operate with the transmitter switch

in the "on" position. A normal charge requires about 12 hours; however, most nickel cadmium manufacturers indicate that cells may be charged for 90 days continuously with no damage.

#### WARRANTY:

This Controlaire Digital equipment is guaranteed to be operational and free of defects when it leaves our factory and for 30 days after the date of sale. We will not service equipment at no charge as a result of tampering, crash damage or damage caused by excessive vibration. We assume no liability for any equipment or models operated with this radio equipment.

#### SERVICE:

When returning sets for service, please return directly to World Engines with full particulars on the nature of your problem. Always send the complete set - transmitter, receiver, servos and receiver pack. Send repair work to: Controlaire Division, World Engines Inc., 8960 Rossash Ave., Cincinnati, Ohio 45236

#### CHARGING HARNESS DETAIL

