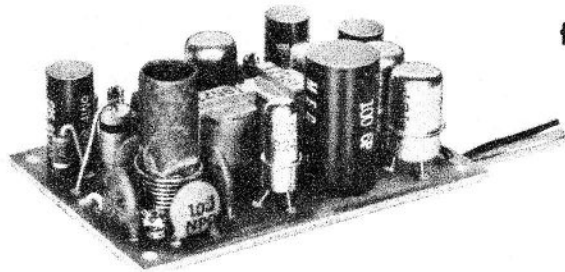


7377 BEVERLY BOULEVARD, LOS ANGELES 36, CALIFORNIA

# Operating Instructions

for the "Finch"



## RELAYLESS TONE RECEIVER

(MODEL CS - 505)

### DESCRIPTION

Your CS-505 Relayless Tone Receiver is the smallest, lightest radio control unit of its type presently available. Application of latest transistor circuitry techniques provides maximum sensitivity, minimum current drain and utmost reliability in the smallest possible package. The "Finch" receiver is unique in that it provides 3-way operation: first, it can be used as a conventional relayless receiver to operate an escapement directly, or it can be connected to provide relayless "quick blip" operation of a motor control escapement, or it will serve as a proportional pulse receiver to operate a magnetic actuator or small split-field motor. All 3 operations are possible with only two pencell batteries.

Elimination of the relay is an important step in the reduction of weight and vibration problems. The resulting simplified radio control system using this receiver, two pencell batteries, and a lightweight escapement or magnetic actuator, permits R/C operation, either

escapement or pulse, of the smallest model airplane you might desire.

The CS-505 Receiver is basically a five-transistor circuit utilizing transformer coupling for maximum efficiency. Switching transistor circuits are used to actuate a single escapement directly without the use of an intermediate relay. Any 5 to 8 ohm escapement will work well with this receiver, with no special escapement adjustments required. A fifth transistor, conducting alternately with the normal output transistor, provides a means of obtaining "quick blip" motor control or pulse operation. Power to operate both the receiver and related escapements or pulse actuator is obtained from a single 3-volt power supply, usually two alkaline pencells. This receiver is not designed to operate with cascaded escapements (parallel connected from the same output), and all guarantees are null and void when the equipment is used in this manner.

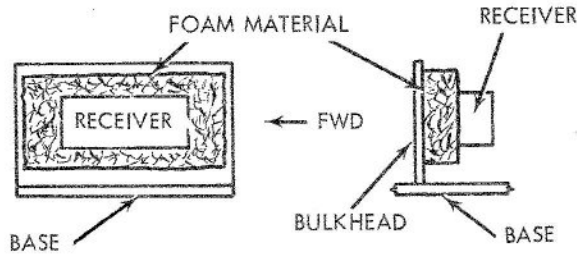
A fibreglass epoxy printed circuit board makes this unit virtually crash-proof when properly installed. A metal case is available as an accessory, if desired.

### SPECIFICATIONS

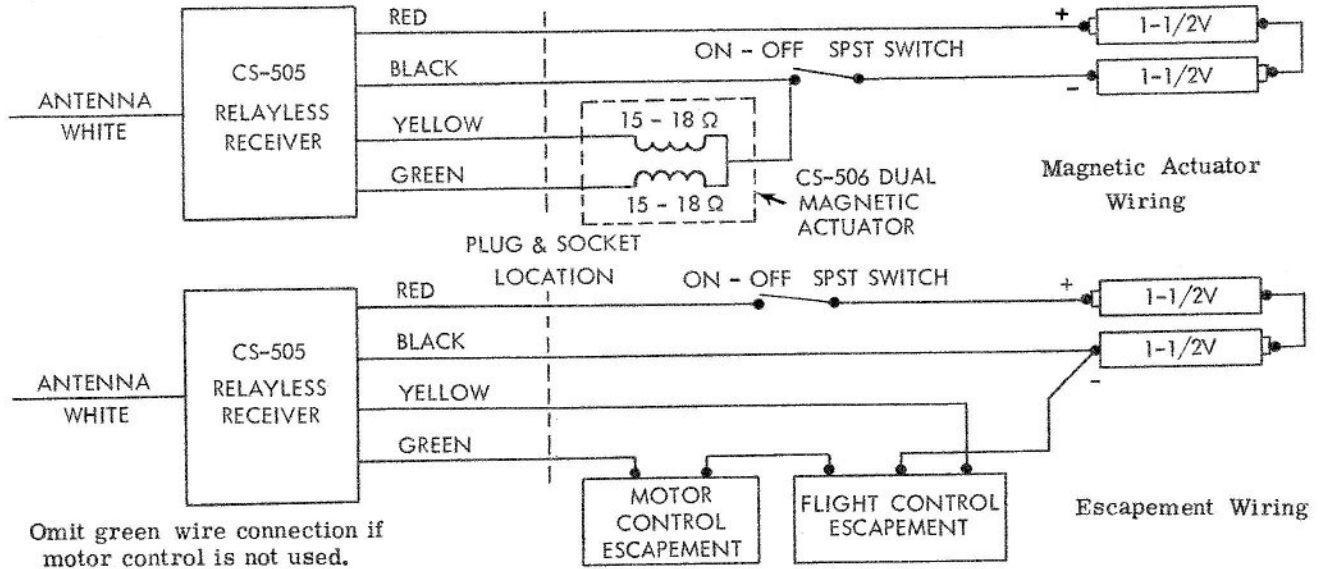
Sensitivity .....	Better than 1.5 microvolts for escapement operation
Operating Voltage .....	3.6 volts maximum 2.4 volts minimum
Recommended Batteries .....	Eveready E-91 Alkaline Energizers
Loss Across Switching Transistor .....	0.3 volt
Idle Current .....	14 ma nominal (carrier off)
	12 ma nominal (carrier on) at 70°F
Escapement Current .....	325 ma at 3 volts, with 8 ohm escapement
Magnetic Actuator Current .....	150 ma at 2.7 V (18 ohm winding)
Audio Modulation Required .....	400 - 1000 cps, 700 cps optimum
Modulation Percentage Required .....	80 - 100%
Recommended Transmitter .....	CS-502 Tone Transmitter
Recommended Pulser .....	CS-504 "Pulsi-Tran"
Recommended Escapement .....	Babcock Mark II, Citizenship SE-2
Tuning Range .....	26.995 to 27.255 mc band (will cover approximately 25 to 30 mc)
Operating Temperature Range .....	+0°F to +120°F
Dimensions .....	3/4 in. high x 1-3/8 in. wide x 2 in. long
Weight .....	1 ounce

## MOUNTING THE RECEIVER

Locate the receiver where it is least subject to crash damage and is still accessible for tuning. Foam plastic at least 1/2" thick provides good protection against impact shock. Either horizontal or vertical mounting (against a bulkhead) is satisfactory. Maximum crash protection can be obtained by completely surrounding the receiver with a thick layer of foam material. Always locate the receiver above and behind the batteries to reduce possible crash damage.



Alternate Mounting Arrangements



## ANTENNA

Sensitivity of the C & S receivers is extremely high and a long antenna wire is not necessary. We recommend a total antenna length of from 12 to 30 inches, depending on the size of the airplane or vehicle. A horizontal insulated antenna wire is satisfactory for aircraft use. A short vertical section of music wire will be adequate for boats or cars. Naturally, sensitivity will be somewhat greater with longer antenna lengths, and if extreme distance is anticipated, the longest antenna possible should be utilized.

### CAUTION

Antenna must not be close to other wires in the equipment installation.

## WIRING

Plastic-insulated multi-strand wire is recommended for your wiring installation. Use nothing smaller than No. 26 or 24 gauge wire or voltage drop may be excessive. For antennas, No. 26 or 28 gauge insulated wire is recommended. Make all wiring as neat as possible, making sure that it does not interfere with and cannot become entangled in the servo, actuator or escapement mechanisms or associated linkages.

Use only rosin core solder for all joints. Beware of cold solder joints which can result in operational failures.

### WIRING DIAGRAM

The illustrations below show proper wire connections for escapement and magnetic actuator usage. Leads can be soldered directly through, or a plug and socket arrangement may be used for quick removal of the receiver if desired. Battery leads may be soldered directly to the batteries, or a battery holder may be used if space and weight permit.

Sensitive receivers are somewhat prone to blocking when the transmitter is operated at too close a range. Consequently, keep the transmitter turned off until the separation distance is enough to prevent blocking. When hand launching an airplane, it may be necessary to keep the transmitter off, or the antenna down, until the airplane is in the air.

In many cases, sufficient control range may be obtained without extending the transmitter antenna to its full length. This feature makes operation of a hand-held transmitter less cumbersome.

## BATTERIES

A 3-volt battery supply is required for optimum sensitivity and correct receiver operation. Always use the

largest batteries your airplane can safely carry. If penicells are used, we recommend Eveready E-91 Alkaline energizers for maximum life. Small "C" or even "D" cells will provide more reliable operation and longer life.

If desired, 3 nickel-cadmium button cells (3.6V) may be used without harm to the equipment. Sensitivity will increase with higher voltages and occasionally may cause chatter until the transmitter is turned on.

A close check must be made on battery voltage with the receiver on and the escapement actuated. Always replace batteries when the voltage under load drops to approximately 2.4 volts. Receiver sensitivity drops rapidly as the supply voltage decreases, and if flown with weak batteries, loss of range or failure of actuator operation may occur while in flight. A safe practice is to replace batteries before each flying session.

If the airplane is large enough to carry the weight, battery holders can be used. For smaller aircraft, we recommend soldering the wire leads directly to the batteries. In such a case, extreme care must be observed to avoid overheating the batteries when soldering. (Use rosin core solder only.) Carefully sand the battery terminals first, then apply only as much heat as necessary to obtain a good connection. Be sure to check the voltage under load after new batteries are installed.

#### BATTERY CHARACTERISTICS

Batteries are the source of most equipment troubles and should receive the most attention. In case of malfunction always suspect and check batteries first. Replace immediately if weak or questionable.

Always use fresh batteries. Units which have been in storage or on the shelf for some time may check OK at first, but can deteriorate rapidly in use.

As batteries are used, their voltage drops and the internal resistance increases rapidly. A combination of weak batteries and high internal resistance can sometimes cause receiver malfunction evidenced by a "lock-in" condition, loss of range, or failure to operate entirely

When operating in cold weather, batteries lose their "zip" and often will not furnish sufficient voltage or current for proper operation. In this case, batteries providing 3.6 or even 4.5 volts may be required.

Certain makes of batteries are built with decorative end caps on the negative terminals. These caps are usually held in place only by the outer paper covering. Always remove these end caps and connect directly to the zinc end of the battery. Failure to do this will probably result in erratic or non-operation of equipment.

#### TUNING THE RECEIVER

Your receiver is factory-tuned to 26.995 megacycles. However, after installation in your airplane, car, or boat, it should be retuned. This is due to the fact that tuning is affected by antenna length and placement, and proximity to wiring and nearby metal objects. Check the tuning even though the receiver may appear to operate perfectly. It is important that tuning be checked before each flying session or after rough landings which may change the position of the coil tuning slug. Excessive vibration can also necessitate retuning.

Should the tuning slug become loose, unscrew it from the coil and coat the tuning slug threads very lightly with a thin layer of rubber cement. After it dries, re-install the slug in the coil and see that it fits securely.

To tune the receiver, we recommend that a transmitter without antenna be used for the initial adjustment. Starting with the transmitter near the receiver antenna, and audio signal held on, rotate the tuning coil slug with a plastic hex tuning wand obtainable at any radio supply house (General Cement #8282-7 or Walsco #2543) until the relay or escapement actuates. Tune for the middle of the actuation range. Then slowly move the transmitter farther away until the receiver does not respond. Retune receiver slightly until it actuates again. Continue this process until the transmitter no longer operates the receiver. This distance should be at least 6 to 10 feet or more, depending upon receiver antenna length and battery condition. Tuning should become sharper as the receiver-transmitter distance is increased.

**CAUTION**

Do not touch the receiver or antenna when tuning or a false tune may result.

For safety, a range check of approximately 1000 feet

should be made with the transmitter antenna installed. Minor retuning may be required to obtain peak receiver operation. Once this is done the equipment is ready for use. However, be sure that correct operation is obtained every time a signal is sent. If not, check batteries, escapement and wiring thoroughly to determine the cause of any malfunction.

**WARRANTY**

This equipment (except vacuum tubes) is warranted by C & S Electronics to be free of defects in material and workmanship for a period of ninety days. However, this guarantee is void should the manufacturer judge the defect to be caused by abuse, crashes, over-voltage, incorrect battery polarity or other misuse by the customer.

Repairs within warranty will be provided at no cost to the user. Other repairs will be performed at a nominal charge of \$3.00 plus cost of parts. When damage occurs which is too extensive for repairs, unit replacement will be made at a cost to user equivalent to 65% of original retail price of equipment.

In event of trouble do not hesitate to return equipment to the factory for service or checkup. The C & S service policy is to perform minor checkups and adjustments whenever possible without charge; in short, to see that our equipment continues to give maximum performance.

When sending equipment to the factory for service or repairs, package it carefully and be sure to include return address. For equipment in warranty, include return postage and insurance, or it will be returned postage C.O.D. Equipment sent to the factory for repairs will be returned repairs and postage C.O.D.

In event of trouble, return unit direct to the factory, not to the dealer. Include sufficient return postage with equipment. Equipment will be serviced and returned within 3 days.

Please fill in the following warranty form within 10 days and return it to the factory as a record of your equipment purchase. Warranty service will be performed only on equipment so covered.

Litho in U.S.A.

Cut along dotted line and mail warranty to C & S Electronics

**C & S Equipment Warranty**

Purchasers Name: \_\_\_\_\_

Address: \_\_\_\_\_

Equipment: \_\_\_\_\_

Purchased From: \_\_\_\_\_ Date of Purchase: \_\_\_\_\_

Address: \_\_\_\_\_