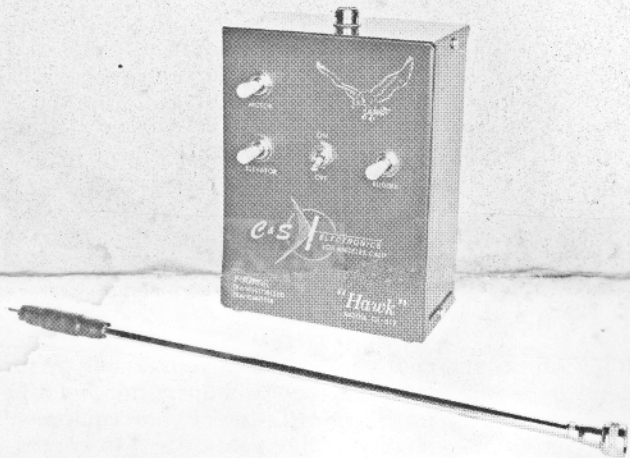


13400-12 SATICOY STREET, NORTH HOLLYWOOD, CALIFORNIA

Operating Instructions for the "Hawk"

TRANSISTORIZED MULTI TRANSMITTER

(MODEL CS-512)



DESCRIPTION

Your CS-512 6-channel Multi Transmitter is the most powerful yet compact hand-held transistorized unit presently available. It is specifically designed to operate with the latest types of receivers, such as the C & S "Oriole", and "Wren", employing the new high-frequency reed banks.

Transmitter circuitry is basically a crystal-controlled transistor oscillator feeding a one-watt silicon planar power output transistor stage. Connection to the antenna circuit is made through a "pi" filter network to eliminate harmonics and provide correct antenna matching. Output frequency from the transmitter is in the 27 mc "C" band, exact frequency being determined by the crystal employed. Use of carefully selected components, together with the MOPA circuit, provides minimum drift with maximum output and frequency stability. Placing your hand on the antenna does not affect frequency but merely reduces transmitter output by absorption. The CS-512 Transmitter meets all FCC "C" band requirements.

A Hartley audio oscillator is employed to provide the selective audio tones. Frequency stability under all conditions of temperature, humidity, and battery voltage is assured by the use of a high quality toroid transformer and Mylar capacitors. As delivered from the factory, audio output frequencies match those of the new high-frequency reed banks. However, if desired, these tones can be changed by "padding" to match any desired reed bank. Sine wave audio tones reduce possibility of interaction in the reed bank.

Although completely transistorized, the "Hawk" transmitter has a power output equal to or exceeding that of most tube transmitters currently available. Efficient

circuit and antenna design take full advantage of the power available from the 9 volt supply battery. Use of collector modulation further increases the transmitter output when the audio is keyed.

A new lightweight center-loaded antenna gives a balanced "feel" to your transmitter. A compact case with minimum depth makes the unit a pleasure to handle.

SPECIFICATIONS

Operating Voltage	9 volts
Power Amplifier Input	
Current	40-45 milliamperes
Power	400 milliwatts
Current Drain (total)	70-75 milliamperes
Power Output (nominal)	250 milliwatts
Audio Modulation Range	350 to 600 CPS
Modulation Percentage	80-85%
Tuning Range	26.995 to 27.255
Frequency Tolerance005%
Operating Temperature Range	0° to +130°F
Dimensions	2-7/8 inches deep
	5 inches wide
	7 inches high
Antenna Length	
Retracted	15-1/4 inches
Extended	55 inches
Recommended Receivers	CS-507M "Oriole"
	CS-513 "Wren"

CONTROL LEVERS

Each lever switch on the front of the transmitter has two possible directions of movement; choice of direction determines which aircraft control you move. Markings under these levers indicate the controls they were designed to operate.

For standardization, C & S has adopted the following control lever positions as related to the aircraft controls.

Control Lever	Position	Aircraft Control	Direction
Rudder	Right Left	Rudder	Right Left
Motor	Forward Back	Motor	Hi Speed Lo Speed
Elevator	Forward Back	Elevator	Down Up

BATTERIES

A single 9 volt battery is all that is required for the "Hawk" transmitter. Batteries are not supplied with the equipment. We recommend the Eveready 276, Burgess D6, or equivalent. Perfectly satisfactory operation and long life can be expected from these batteries. NOTE: Batteries should not read below 8.4 volts when installed. Replace when voltage falls to 7.5 volts or less.

If desired, a rechargeable nickel-cadmium battery pack comprised of seven 1.25 volt, 500 mah cells can be used. This will provide an operating voltage of approximately 8.75 volts. Do not use a higher voltage than specified in an attempt to increase output power, or all equipment guarantees are void.

PREPARATION FOR USE

- Unscrew the four self-tapping screws and slide rear cover from transmitter case.
- Attach connector to 9 volt battery. Install antenna and extend to full length. Turn on transmitter switch and check battery voltage (use an external voltmeter) while keying one audio tone. Battery voltage should be 8.4 volts or more, or battery is not fresh.
- Slide battery into position in case, then install one layer of corrugated cardboard on open side of and behind battery to prevent movement in case.
- Tune transmitter audio tones to your receiver (see paragraph following), then install rear cover permanently.

TUNING TRANSMITTER AUDIO TONES

Although C & S Transmitters and Receivers are carefully matched at the factory, there will be occasions when you will wish to tune the transmitter tones to the receiver reeds. Proceed as follows: NOTE: Tuning of audio pots can be done using a small screwdriver or the hex end of a standard tuning wand. Audio pots are located beneath the circuit board on both sides of the transmitter. Each pot is identified by function on the back side of the printed circuit board .

- Operate transmitter with antenna removed and receiver with servos disconnected, if possible. This

will avoid possible servo damage which could occur if the two reeds to the same servo were accidentally driven at the same time.

- Actuate one control lever on transmitter and observe action of corresponding reed in receiver. Rotate related audio tone pot in transmitter clockwise (increase audio frequency). Reed vibration will start, increase in amplitude, then stop.

- Release control lever, then operate it again. Slowly turn potentiometer counterclockwise (reduce frequency) until reed just starts to vibrate. Turn pot very slightly counterclockwise beyond this point - reed should now be tuned properly.

- Repeat same procedure for each control function.

- Install antenna and check operation of all controls with servos connected.

TUNING THE RECEIVER

Refer to the instruction sheet with your receiver for detailed tuning instructions. This operation must be performed after initial installation of your equipment in the airplane, boat or other vehicle. It is recommended that a range check be performed before each flying session to insure that all equipment components are working properly.

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 absolutely sure that correct operation is obtained every time a signal is sent. If not, check batteries and complete equipment installation to determine the cause of any malfunction.

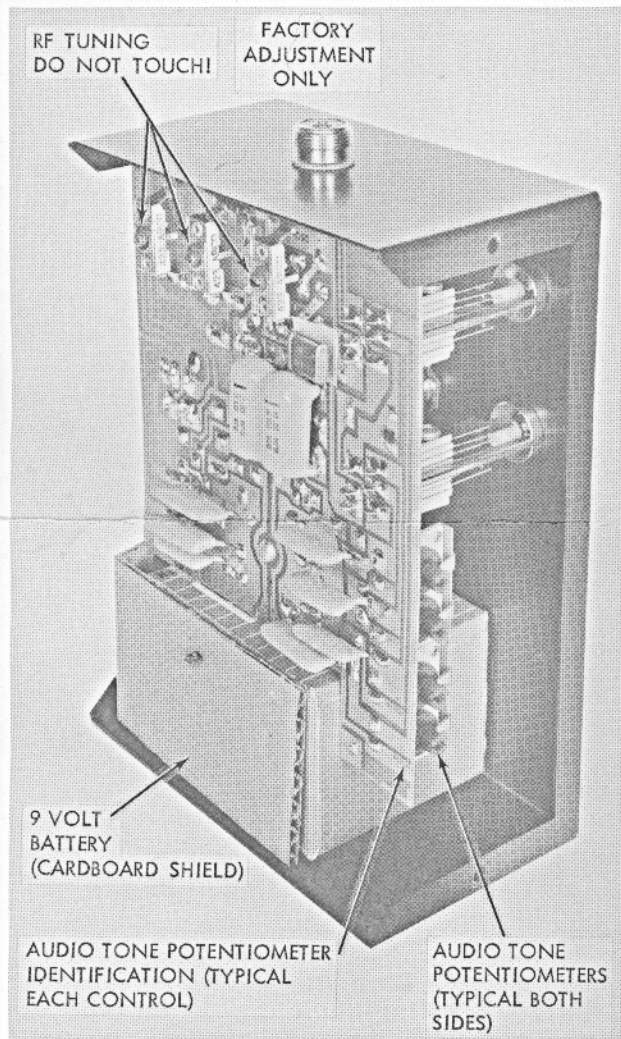
OPERATION

Turning the transmitter switch "ON" applies voltage to the circuit and causes a continuous carrier wave to be emitted. Full movement of a lever switch in one direction causes audio tone modulation of the carrier to actuate one reed of a receiver tuned to the basic transmitter frequency. This in turn operates a servo to provide desired movement of the control. With this transmitter, only one tone can be transmitted at a time. If dual simultaneous operation is required, we recommend the "Eagle" transmitter. NOTE: Output of this transmitter is in excess of 100 milliwatts; it is illegal to operate without a Citizens' Band license. Form 505 for securing this license is available from your dealer or the nearest Federal Communications Commission office.

TUNING

FCC Regulations require that tuning of Class "C" transmitters be performed by a commercial operator holding a First or Second Class License, so no tuning instructions are provided herein.

All C & S transmitters are factory-tuned, and adjustments sealed. This equipment is extremely difficult,



if not impossible, to tune correctly without proper test equipment. Under no circumstances should these tuning adjustments be touched. If needed, Service Data is available for use by a Commercial Operator. Otherwise, we recommend that equipment be returned to the factory for required checks and adjustment.

MATCHING TRANSMITTER-RECEIVER FREQUENCIES

Crystals in your transmitter and superhet receiver determine the RF operating frequency. Should you desire to change frequencies, we recommend that you return both units to the factory where frequency change will be performed for \$10.00 (transmitter only - \$5.00). This includes unit check-out and tune up, but does not cover repairs.

Although crystals are very close tolerance (.005%) it is possible that transmitter and superhet receiver crystals can be far enough off to degrade performance and reduce range. This is extremely critical and, for proper operation, both units must be matched very closely. Mismatch is most likely to occur when transmitters are used with receivers without crystal matching (in C & S matched sets, both crystals and audio tones are matched). Should mismatch be suspected, as evidenced by poor range, regardless of equipment make C & S will verify crystal matching for \$5.00. Of course, when this transmitter is used with a superregen receiver, no RF crystal matching is required.

Transmitter audio tone matching (padding) to C & S Multi Receivers will be performed at a charge of \$5.00, plus parts. This does not cover conversion of transmitter from high to low frequency reed banks, or vice versa.

Send all transmitters (and matching receivers) for service directly to C & S Electronics Repair Station, 13400-19 Saticoy St., North Hollywood, California, NOT TO THE DEALER. No discounts are allowed on service. Pack units carefully, enclose estimated service cost, postage and insurance, and allow about two weeks for service. Failure to include return postage and insurance may result in delay in return of your equipment.

SERVICE DATA

A separate 4-page manual, "Service Data for the 'Hawk Transmitter'", is available for \$2.00. This includes a schematic, information on crystal matching, tuning procedures and instructions for audio padding. Available only from C & S.

WARRANTY

This equipment (except vacuum tubes and transistors) 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 except for transportation and insurance. 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 retail price of equipment.

In event of trouble return unit direct to the factory, NOT TO THE DEALER. Repairs are not priced for dealer discounts. Equipment will be serviced and returned within a few days.

When sending equipment to the factory for service or repairs, package it carefully, include name and address and be sure to enclose cost of return postage and insurance. Equipment will not be serviced or returned without this remittance. When repairs are chargeable to customer, he will be notified as to cost so remittance can be made. No C.O.D.'s or credit on service.

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.

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.

SEND ALL REPAIRS AND SERVICE TO;
C & S ELECTRONICS REPAIR STATION
13400-12 SATICOY STREET
NORTH HOLLYWOOD, CALIFORNIA

Litho in U. S. A.

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

C & S ELECTRONICS EQUIPMENT WARRANTY

Purchasers Name: _____

Address: _____

Equipment: _____

Purchased From: _____ Date of Purchase: _____

Address: _____