



Operating Instructions for the "Falcon II" TRANSISTORIZED TONE TRANSMITTER

(MODEL CS-509)

DESCRIPTION

Your CS-509 Hi-Power Transmitter is the most compact full power hand-held single channel tone transmitter presently available. It is designed to operate with any existing tone receiver responding to modulation within the 400 - 1000 cycle tone range. Tone frequency is approximately 600 cycles, providing maximum performance with the newest model C&S single channel receivers. Long range and extended battery life is obtained from a standard full size 9 volt battery.

Transmitter circuitry is basically a crystal-controlled transistor oscillator feeding a two-watt silicon planar power output transistor stage. 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-509 Transmitter meets all FCC "C" band requirements.

A two-transistor multivibrator oscillator provides the audio tone required. This circuit can be keyed very rapidly for pulse operation. In addition, if desired, audio tone frequency can be changed easily to match specific receiver requirements.

Although completely transistorized, the "Falcon II" Transmitter has a power output markedly superior to all competitive transistorized units. In fact, the power output from this equipment equals or exceeds 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. The extremely compact case is a pleasure to handle. Despite its size, this CS-509 Transmitter is a handful of pure "wallop".

BATTERIES

A single 9-volt battery is all that is required for the "Falcon II". 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 under load when installed. Replace when voltage under load falls to 7 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 power output. Equipment will not operate properly above 9 volts, and, if high voltages are used, all equipment guarantees are null and void.

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	600 cycles nominal
Modulation Percentage	95-100%
Tuning Range	26.995 to 27.255 MC
Frequency Tolerance005%
Operating Temperature Range	0° to +140°F
Dimensions	2 inches deep
	4 inches wide, 6 inches high
Antenna Length Retracted	15-1/4 inches
Antenna Length Extended	55 inches
Recommended Receivers	CS-503A "Lark II"
	CS-505A "Finch II", CS-507S "Oriole"
	CS-508S "Cardinal", CS-511 "Honey Bee"
	CS-514 "Queen Bee"

PREPARATION FOR USE

- Remove rear cover from transmitter case.
- If not installed, remove crystal from plastic bag and insert in crystal socket.
- Install 9-volt battery as shown in illustration. Attach battery connector to battery.
- Install antenna and extend to full length. Turn on transmitter slide switch and check battery voltage, using a low-voltage voltmeter. Battery voltage should be 8.4 volts or more, or battery is not fresh.

e. Replace rear cover and attach with the four sheet metal screws provided. Transmitter is now ready for use.

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.

TRANSMITTER OPERATION

Turning the transmitter switch "ON" applies voltage to the circuit and causes a continuous carrier wave to be emitted. Depressing the KEY causes audio tone modulation of the carrier to actuate a receiver tuned to this frequency. One tone pulse is transmitted each time the KEY is operated. With a compound type escapement, such as the Babcock Mark II, one pulse and hold provides a Right command, two pulses and hold a Left command, three pulses and hold an Up Elevator command. A quick blip can be used to provide engine control through a suitable receiver, relay or relayless, and an engine escapement hook-up. **CAUTION:** Transmitter antenna must be fully extended during operation or range will be greatly affected. **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

Unless otherwise specified, your transmitter is supplied with a crystal for 26.995 mc. The equipment is factory tuned (and sealed) with the crystal supplied and should require no further tuning except in event of equipment failure, parts replacement, or damage.

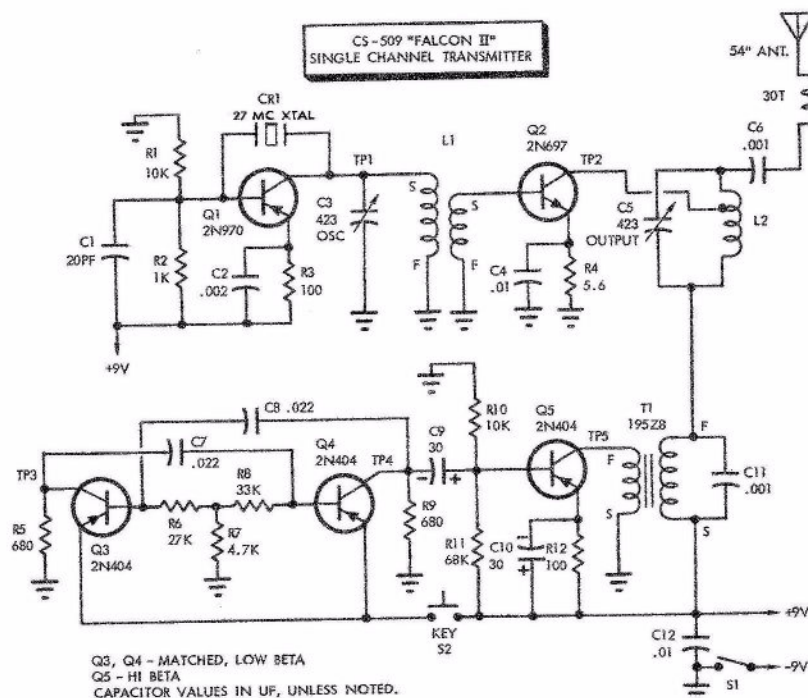
FCC Regulations require that tuning of class "C" transmitters be performed by a commercial operator holding a First or Second Class License. Basic tuning instructions are included for the licensed operator.

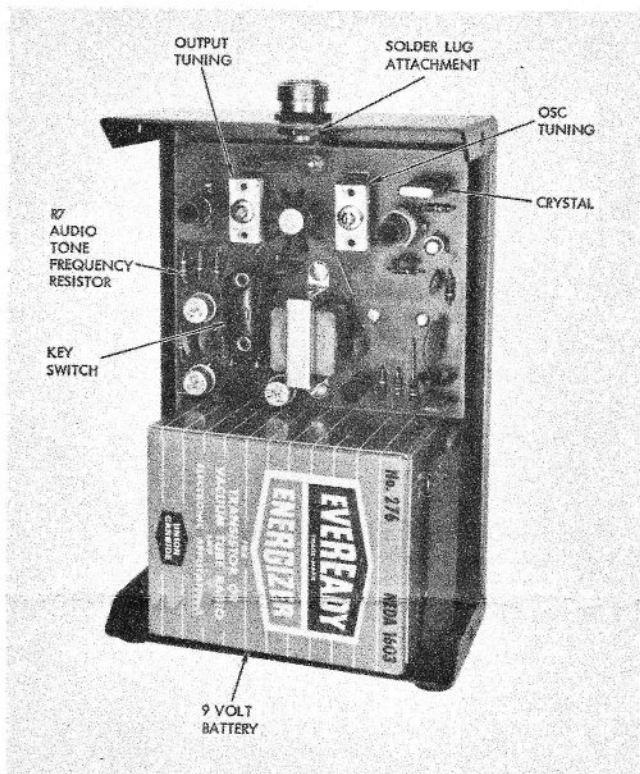
TUNE TRANSMITTER AS FOLLOWS:

- Be sure battery is fresh and antenna is fully extended.
- Using a field strength meter, tune the OSCILLATOR capacitor for maximum output. Then tune the OUTPUT capacitor for maximum also.
- Rock the OSCILLATOR tuning back and forth slightly to be certain peak output setting is obtained. Then rotate the tuning screw very slightly clockwise (less than 1/32 of a turn) from the peak position. This will insure oscillator stability.
- Retune the OUTPUT capacitor for maximum. Rotate screw slightly clockwise as above - so little that the output reduction is imperceptible as indicated on the field strength meter.
- Check transmitter output against an approved FCC signal standard. Be sure frequency is within the .005% tolerance allowed. Seal both tuning capacitors.

INSTALLING "PULSI-TRAN" PULSER

If a pulser is to be used with the "Falcon II" transmitter, install it as follows:





a. Remove rear cover from transmitter case. Take out battery.

b. Take out two screws holding slide switch. Remove lock ring holding KEY switch to case.

c. Unsolder lug at top of printed circuit board from antenna fitting, then lift circuit board assembly from case.

d. Unscrew remaining lock ring holding KEY switch to board. Two wires on back of board attach this switch electrically to the board. Unsolder these two wires from the board and remove switch entirely. Clean out these two holes in board for use later.

e. Detach case back from "Pulsi-Tran" Pulsar. Position pulser case back on the front of "Falcon II" case, so that the top and right hand sides of both cases align flush when pulser is assembled. If necessary, drill a 3/8" hole in the pulser case to match the KEY switch hole in the transmitter. NOTE: Later model pulsers have this hole drilled to match the "Falcon II".

f. Drill a 1/8" hole in the pulser case back about one inch above the 3/8" hole.

g. Attach the pulser case back to the front side of the transmitter, using the shaft bearing provided. Be sure bearing nut is located inside transmitter case. Tighten securely.

h. Be certain pulser fits squarely on transmitter, then drill a 3/32" hole through the front of transmitter case directly in the center of the 1/8" hole in pulser case. Use a No. 4 x 1/4" self tapping screw through these holes to secure the pulser in position.

i. Feed the two pulser lead wires through the shaft bearing into the transmitter case, then through the open 3/8" hole in transmitter printed circuit board. Cut off excess wire, leaving enough to permit easy removal of pulser front. Skin 1/4" insulation from each wire, slip wire ends through the open switch lead holes, and solder in place on printed circuit side. Be careful of excess solder.

j. Reinstall transmitter board assembly in case and attach with the two slide switch screws. Align board in case, then solder upper lug to antenna fitting.

k. Pull excess wire back into pulser. Position wires to avoid interference with relay operation, then slide pulser onto back.

l. Reinstall transmitter battery, install rear cover and all attaching screws. Transmitter and pulser are now ready for use.

MATCHING TO SUPERHET RECEIVERS

In the event this transmitter is used with a superhet receiver, it is absolutely imperative that the two units be completely matched in frequency. This may involve more than installing two "matched crystals". We recommend that units be purchased as a matched set. If not, both units should be returned to the factory where matching will be performed for a nominal charge. Evidence of mismatch will be indicated by loss of range or failure to operate correctly.

CHANGING TRANSMITTER AUDIO TONE FREQUENCY

If audio tone frequency change is desired for any reason, this can be accomplished as follows:

a. Remove transmitter board assembly from case.

b. Unsolder and remove the resistor indicated on the photograph.

c. To lower the tone frequency, install a higher value resistor (up to 10 K ohms).

d. To raise the frequency, reduce the resistor value (down to 1 K ohms).

e. After desired tone frequency is obtained, re-assemble transmitter.

Be careful during all disassembly operations to avoid changing position of any tuning controls, or transmitter realignment may become necessary!

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: _____