Installing and Operating the ECC TELECOMMANDER 951B Receiver

INTRODUCTION

The TELECOMMANDER 951B Radio Receiver is a precision electronic instrument specifically designed for the remote control of any mechanical device by means of radio signals from a suitable transmitter. The pick-up of such signals causes a variation in the current flowing through the receiver circuit, which in turn causes the integrally-installed relay to operate. Operation of the relay in turn controls an escapement or other type of actuator to produce the desired mechanical results.

Because of its compact and rugged design and extremely light weight (less than three ounces including relay) the 951B is ideally adapted for use in model aircraft and other small model vehicles. It is equally efficient in other applications, and has been used successfully to control remotely located doors, gates, pumps, floodlights, cameras, etc.

The range of operation depends upon the strength of the transmitter signal, and on atmospheric and terrain conditions which might affect this signal. The extreme sensitivity of the 951B assures the best possible results under any conditions prevailing.

Since various frequencies have been assigned for this type of radio signalling in various countries of the world, each 951B Receiver is set up for a single definite frequency band, which is indicated on the box in which it is packed. Sufficient tuning range is provided to assure maximum strength of the received signal on this frequency.

SETTING UP AND TESTING

Before installing the receiver permanently, it is advisable to build a simple test rig in order to become familiar with the operation of the unit and to check the correctness of the proposed installation. This is done by following the wiring diagram and instructions given below. If desired, an incandescent bulb may be substituted for an actuator in the test rig. A 3.5v bulb in series with a 4.5v flashlight battery is recommended.

MOUNTING

The 951B Receiver may be mounted in any position without affecting its operation, so long as easy access to the tuning controls is provided. When used in vehicles or where vibration is present, adequate shock-mounting is of course necessary. This is best provided by snug packing with sponge rubber or similar resilient material of sufficient thickness to absorb both vibration and impact loads. Precautions must also be taken to protect both the unit and all wiring from any water, oil, fuel, etc. The importance of this cannot be over-emphasized as a safeguard against failure.

INSTALLATION AND WIRING (both test and permanent installations)

Connect the wires from the six-pin socket to the batteries as shown on the wiring diagram, making certain that you locate the socket correctly by its coloured spot.

When wiring your Receiver make certain that you use flexible stranded wire of the order of 14/36 (i.e., each lead has 14 .0036 wires stranded) or equivalent. You will find it most helpful to use the accepted colour code in your wiring circuits. Thus you will use black coloured wire in your negative or common leads. Blue coloured wire for the L.T. positive circuit, and red coloured wire for your H.T. positive circuit.

Insert into the High Tension positive lead a two-pin non-reversible socket into which a 0-5 milliammeter will be plugged for testing and adjusting the receiver circuit. Since this meter will not be used during actual operation, a shorting plug, (i.e., a plug that matches the socket and has both pins connected by soldering a short length of wire across them) should be provided to close the circuit when the meter is removed. For convenience this shorting plug may be attached to the equipment by a short length of cord.

Attach a two-pin plug, as illustrated, directly to the 0-5 milliammeter, thus eliminating long leads which might give an erroneous reading. Note that the positive terminal of the meter goes to the battery side of the circuit.

For single control pins 2 and 3 (see wiring diagram) are connected to the actuator via the actuator battery and actuator switch. Pin 3 is the centre moving armature contact of the relay. Pin 2 is the outer relay contact; and pin 5 is the inner relay contact, which may be used to activate a supplementary control, such as a light. When using the inner relay contact for such a purpose, connect pins 3 and 5 to the light via battery and switch. The use of a light, in addition to giving your model added interest, will serve to tell you of the continued working of the Receiver, even at long range.

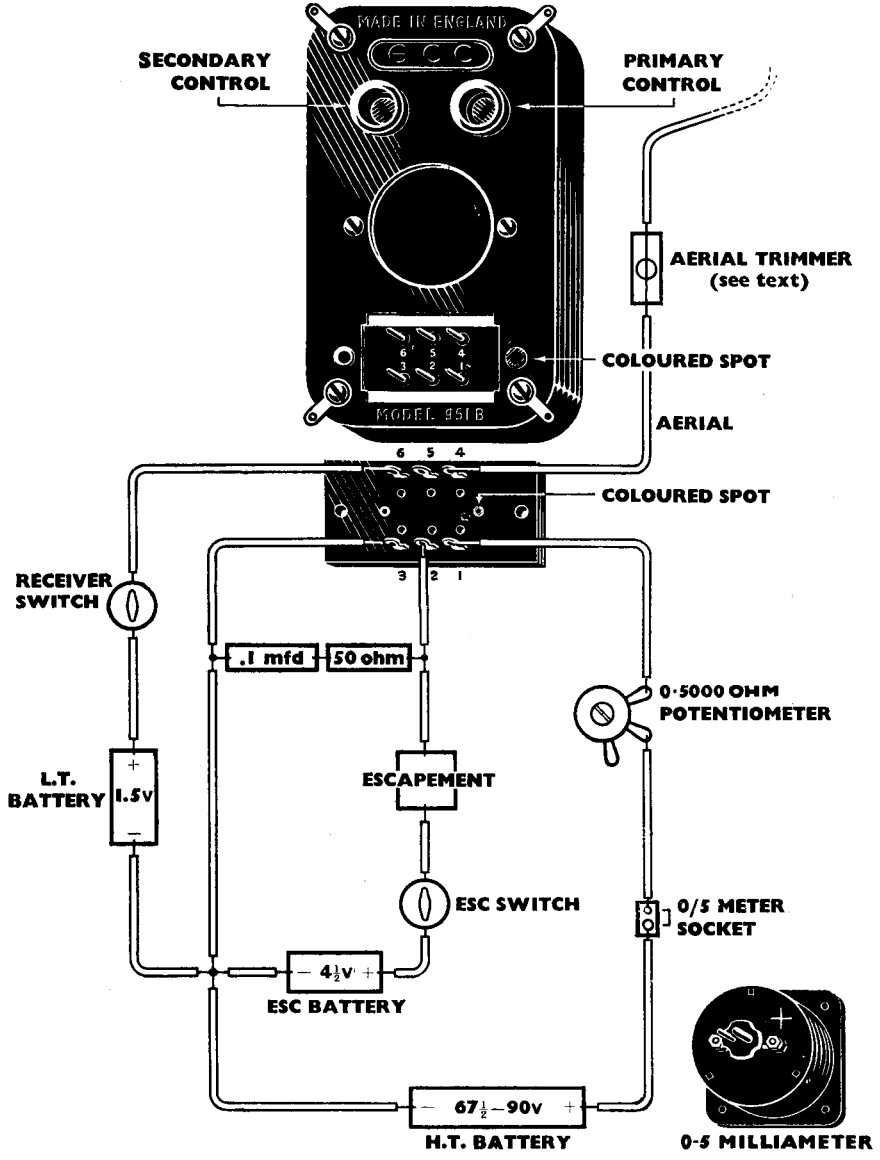
AERIAL

An aerial wire (black) is provided with the Receiver. Unwrap this and run between fingers to smooth out kinks Solder one end to pin 4, the aerial should be firmly attached to some rigid part of the equipment, allowing adequate slack between the Receiver and the attachment point; this will prevent damage to the Receiver if the aerial is accidentally pulled from outside. Use a rubber band to keep your aerial taut and "shipshape". Each Receiver is tested to give optimum results with an aerial length of approximately 36″. Particular installations, or the characteristics of a particular valve may require a slight increase or decrease in this length for best results.

TUNING

Two slotted-screw dust iron tuning controls are fitted—the primary or main control located under the letter "C" on the Receiver chassis; and the secondary control located under the letter "E" of the embossed E.C.C. trade mark. Adjustment is effected by screwing these controls in or out as described below. Be careful to use a properly fitting screwdriver for this, to avoid damaging the controls. If after use the threads become loose, remove the controls and coat the threads sparingly with beeswax, tallow or candle grease. Avoid a tight fit which again might result in damage to the controls.

When the Receiver is switched on a TOP Current (also sometimes called STANDING Current or IDLING Current) reading will be shown on the milliammeter. If the High Tension voltage used is 60 volts, the top current should be approximately 2.8 milliamperes; with 67½ volts High Tension, the top current should be between 3.0 ma and 3.2 ma. Should needle flutter be evident (which may cause relay "chatter") or the top current fall off sharply (usually to about .5 ma), unscrew the secondary tuning control until the current rises and remains steady.


MADE IN ENGLAND
SECONDARY CONTROL
PRIMARY CONTROL
AERIAL TRIMMER (see text)
COLOURED SPOT
AERIAL
MODEL 951B
6 5 4
COLOURED SPOT
3 2 1
RECEIVER SWITCH
.1 mfd
50 ohm
0·5000 OHM POTENTIOMETER
L.T. BATTERY
1.5v
ESCAPEMENT
ESC SWITCH
0/5 METER SOCKET
4½v
ESC BATTERY
67½–90v
H.T. BATTERY
0-5 MILLIAMETER

When these adjustments have been made, the Receiver is ready for final tuning with the transmitter. Set up Receiver and Transmitter about 15-20 yards apart with both Aerials fully extended and clear of the ground. Key the transmitter intermittently and rotate the primary receiver tuning control for greatest current dip on receipt of signal. The milliammeter reading should drop to a BOTTOM CURRENT of less than 1 ma. If it does not, then the secondary receiver tuning control requires screwing in until such a bottom current is obtained. Do not, however, screw it in so far as to prevent a steady top current when the transmitter is released.

A 0-5000 ohm potentiometer may be inserted as shown on the wiring diagram to bring the top current down to below the relay operating current of 2.2 ma., and thereby facilitate direct relay checking in the field without having to key the transmitter. For best operations the bottom current should be at least $\frac{1}{2}$ ma below the relay fall-out position when tested at approximately 150 yards range.

Should difficulty be experienced in obtaining a sufficiently large current drop when the transmitter is keyed, i.e., a drop to at least 1 ma at 150 yards, it is probable that the receiver is being too heavily loaded. The 951B Receiver uses a superregenerative circuit, one of the characteristics of which is that its receptivity is affected by the presence close-to of too much wire or other objects having electrical capacity—i.e., the Receiver becomes too heavily loaded. A variable trimmer may be inserted in the aerial as close as possible to the receiver to correct this condition. A value of roughly 5 to 30 pfd capacitance should be sufficient. This condition is most likely to occur in the case of model boats when the receiver is being tuned with the model in the water, as it should be. Because of the above characteristic do not cable leads from the six-pin socket with the Aerial, and also keep the other wiring in your boat as simple and direct as possible and as far away from the Receiver as is convenient.

RELAY

The 951B includes the Telecommander super-sensitive P100 subminiature polarised Relay which is the finest miniature built relay now available. The operating position of the relay has been adjusted at the factory to pull in at approximately 2.2 ma and to fall out at approximately 1.8 ma, the precise position depending on the top current and current drop of each individual receiver. The P100 relay, being polarised by permanent magnets, has the armature pulled against the outer contact screw when no current is switched on; this is sometimes called the fall-out position. When the current is switched on to the receiver the relay coil is energised and the armature is pulled over against the inner contact making a circuit through pins 3 and 5. This is called the fall-in position. When the transmitter is keyed, the current through the relay is reduced and the magnets pull the armature against the outer contact, thus making a circuit through pins 3 and 2. The relay contact screws are sealed at the factory, and normally will not need any further adjustment.

The relay has been tested, adjusted and sealed at the factory and no further adjustments should be required. If, notwithstanding the above *and* the terms of the guarantee below, you wish, for your own purposes, to alter the operating position of the relay contacts, this may be done provided you take great pains in carrying out the following instructions, and provided you turn the contacts very, very gently. The merest fraction of a turn will have considerable effect. The outer relay contact screw is the one which is visible adjacent to the bakelite cover when you open the set and look at the relay end of the chassis. The inner contact screw can be reached by passing a small long-shanked screwdriver

between the two coil formers after removing the valve from its socket. When replacing the valve, line up the pins with the holes in the valve socket and push valve firmly home, without twisting or turning.

Screwing the outer contact **in** and the inner contact **out** lowers both the fall-in and the fall-out position.

Screwing the inner contact **in** and the outer contact **out** raises both the fall-in and fall-out position.

Screwing both contacts **in** lowers the fall-in and **raises** the fall-out positions.

Screwing both contacts **out** raises the fall-in and **lowers** the fall-out positions.

RELAY OPERATING LIMITS

Correct wiring and operation of the 951B Receiver will assure that the relay is not overloaded electrically. In no case should a current of more than 8 milliamperes be passed through the relay coil. Maximum safe load for the contact points is .25 ampere at 250 volts A.C. (non-inductive load). In order to protect the relay points, lengthen their life, and eliminate the need for readjustment, it is strongly advised that you suppress sparking by connecting a .1 mfd. condenser in series with a 50 ohm resistor across the relay points which are in use, as shown on the diagram. Place these, if possible, directly across the tags.

CARE AND STORAGE

Your 951B Receiver is constructed with very fine components which require suitable protection from dampness not only when in use, but particularly when put away for any length of time. In operation full shielding from water or spray must be provided, as well as adequate ventilation to prevent condensation and collection of moisture. Storage should be in a very dry place where normal room temperatures will be maintained; in addition a small quantity of silica gel or other dehydrating agent may be placed in the box in which the unit is packed.

BE SURE THAT THE RECEIVER IS PROTECTED FROM FUEL, OIL, DUST, DIRT AND OTHER FOREIGN MATTER **AT ALL TIMES.**

THINGS TO WATCH FOR

No idling current — Check battery connections, milliammeter plug and socket, and battery voltage.

No current drop — Check transmitter by placing Receiver approximately 2 to 3 feet away and tuning it while keying the transmitter intermittently. If **any** drop is then obtained it may be safely assumed that the transmitter is all right. (If no drop is obtained this way, and the transmitter has been checked independently for output and frequency, and the batteries are O.K. and the aerial is **not** grounded to earth or other wiring, then there is an internal fault in the Receiver or valve). Move Receiver further away from transmitter, screwing in secondary control and rotating primary control back and forth. Repeat this process until the Receiver gives satisfactory current drop over a distance of approximately 150 yards. Check batteries on load for correct voltage. (An old High Tension battery may also have a high internal resistance which will affect performance).

Flutter—evident on meter when Receiver operating controls This may be caused by a spark ignition system in the power plant; by any secondary component such as selectors, electric motor escapement, buzzers, etc., which might cause sparking; or by any nearby and non-related source of spark interference. Sparking may be suppressed by connecting across the sparking points a .1 mfd. condenser in series with a 15-50 ohm fixed resistor. Unscrewing of the secondary control will lessen the effects of the interference, but will lessen sensitivity of Receiver.

Flutter—evident on meter when no signal is applied This indicates that the secondary control is screwed too far in, the aerial is too short, or the aerial trimmer too far open.

ESCAPEMENT

To check wiring of escapement circuit short tags 2 and 3 with screwdriver while set is switched on and top current is indicated—escapement should then operate.

RECOMMENDED BATTERIES

For airborne equipment or where weight is a prime factor:
High Tension (plate current), three B-122 22½v. in series; or equivalent.
Low Tension (filament current), one D-18 or D-19 1½v.; or equivalent.

For model boats and cars, or where weight is not prime factor:
High Tension, three B-110 22½v. in series; or one B-101 67½v.; or equivalent.
Low Tension, any suitable 1½v. battery.

For general operation a High Tension voltage of from 60v. to 72v. should be used.

VALVE

This set is constructed to operate only with the 3V4 valve.

GUARANTEE

This 951B Receiver is unconditionally guaranteed against defective parts or workmanship. If it does not function properly, return it at once, postage prepaid, with a detailed description of the fault, direct to the manufacturer, if the unit was purchased in Great Britain; or to the authorised Telecommander distributor in all other countries.

If the trouble is due to a fault in the Receiver—and provided that the Receiver has not been opened or tampered with in any way—a replacement will be sent by return mail free of charge.

In the case of misuse or damage, or if the Receiver has been opened or tampered with, a service charge will be made, depending on the nature and extent of the damage.

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