

Fitting and Operating Instructions for

RECEIVER TYPE 394F & 394G

This receiver consists of two stages of high frequency amplification, a detector on which reaction is available, and one output stage.

The following two volt directly heated valves are specified:-

H.F. stages	V.S.2
Detector stage	Z.21 or Mazda SP.210
Output	P.2

The following supplies are required:-

L.T.	2 Volts.
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The H.T. voltage required depends upon whether auto-bias or separate grid bias battery is used. With a separate grid bias battery the H.T. is 120 V and grid bias 16.

With auto bias an H.T. voltage of at least 136 volts is required. The receiver will operate, under these conditions, successfully up to 190 volts.

When auto bias is used, the H.T. battery is connected between the terminals marked G.B. negative and H.T. positive and a resistance R_{14} is switched between G.B. negative and earth by a link. This is to be found beneath the chassis on the left-hand side of the receiver. The negative of the H.T. battery is thus depressed below earth by the value of the grid bias voltage (approximately 16 volts).

NOTE With separate grid bias battery the link is opened and resistance R_{14} switched from circuit.

The single tuning dial is illuminated by means of a small lamp, thus permitting the receiver to be installed, if necessary, where external illumination may be poor.

The three tuned stages are carefully ganged, and a single dial only is required for fine tuning within any given wave-range.

Five frequency ranges are available on this receiver, these being approximately:-

- (1) 4500 - 2000 kc/s.
- (2) 2250 - 1000 kc/s.
- (3) 1080 - 460 kc/s.
- (4) 510 - 215 kc/s.
- (5) 235 - 100 kc/s.

The particular frequency range which is required is selected by a switch, which is engraved with the appropriate figures.

Reaction is obtained by feed-back through the .003 μF variable condenser to a coil magnetically coupled to the tuning coil in use in the anode of the second screened grid valve.

In the anode of the detector valve an H.F. filter is included to reduce to a minimum the amount of high frequency voltage passed onto the grid of the output valve.

In the anode of the output valve is a transformer having a step-down ratio of 45.1 and 15.1. The 45.1 is taken to L.S. terminals, and the 15.1 ratio to the 'phone terminals.

One of each of the terminals marked "loud Speaker" and "Phones" is earthed, so that there is no danger of a shock occurring if any of these terminals are inadvertently touched.

Volume control is obtained by means of the grid bias potentiometer, which varies the negative voltage on the grids of the variable- μ screened grid valves.

A further aid to volume control is the local-distant switch on the left-hand side of the receiver. On "local" the aerial is connected via a 0.1 μF and a 0.00004 μF condenser in series. Upon changing to "distant" the smaller condenser is shorted.

A small lamp has been included in the front of the panel, which illuminates the dial when the receiver is switched on. This lamp, is controlled by the On/Off switch of the receiver, and serves to indicate when the receiver is switched on, as well as to illuminate the dial.

Mechanical Construction

All components are mounted on a baseplate which is firmly attached to the front panel, the latter carrying all controls with the exception of the "Local-Distant" switch, which is on the left-hand side of the case.

The case is constructed of sheet metal, forming a rigid structure. Both the lid of the case and the receiver itself are hinged so that by undoing four thumbscrews, not only may the lid be lifted, but also the whole receiver may be tipped forward out of its case, enabling any component in the interior of the receiver to be examined rapidly and to be accessible easily.

A stay on the inside of the lid enables the lid to be held open during examination of the receiver, and there are also two hinged hooks in the upper part of the receiver which fit into holes in the baseplate when the receiver is rotated forward 90° from its normal vertical position. These two hooks enable the receiver to be held open during any necessary examination of the interior.

It will be noticed that the hinges consist of two screws from which the thread is turned on the portion which actually forms the pivot of the hinge. By unscrewing these two screws out of the hinges, the receiver may be lifted completely out of its case.

The aerial connection is made internally by plugging a lead into a socket on the side of the case. In order to open the receiver, this plug must be withdrawn, and must be inserted in the insulated socket provided in the upper part of the left-hand portion of the receiver. It is important always to insert this plug in the insulated socket, as examination of the wiring diagram will show that this plug is at a definite potential below earth, and if it touches the case of the receiver, there is a possibility of the coupling coil in the aerial tuning unit being burned out, or of a failure in the bias system, which includes the volume control potentiometer and the fixed 1,000 ohm resistance.

The aerial terminal is situated at the top on the left-hand side of the case, and close to it is the local-distant switch.

Fitting and Operating Instructions

In choosing the position in which the receiver is to be placed it should be noted that the lid is held open by the stay about 9 inches, and therefore a head room of about 9 to 10 inches is required for this receiver. As the receiver opens forward, sufficient room should be left to enable it to be opened fully.

As the dial is normally illuminated, it is not important to place this receiver in a well lighted part of the cabin. It will be usual to place this receiver on the right hand side of the transmitter, so that the aerial lead between the transmitter and the receiver is as short as possible.

Where it is possible the receiver should be screwed to a table. Steel straps are provided on the bottom of the receiver by means of which the receiver is secured to the table. It will be noticed that there are holes in the back of the case, and if it is more satisfactory to mount the receiver on the bulkhead, the straps may be moved from the bottom and bolted to the back of the receiver. Should it be decided to fix the receiver to the bulkhead, it is essential to see that there is at least $\frac{1}{2}$ " of clearance between the receiver and any table or apparatus which may be underneath the receiver so that the latter may be opened completely.

If this clearance is not given, the terminal cover on the receiver will catch on the table and prevent the receiver opening fully.

The securing straps are kinked to give a clearance of about $\frac{1}{4}$ " between the bulkhead or table on which the receiver is mounted and the lower part of the strap. This kink in the straps is provided so that the wires which connect the receiver to the batteries, etc., may be run underneath the receiver, or behind it, without it being necessary to raise the receiver specially to accommodate such wires.

The lid of the receiver is provided with a skirting, and although reasonably splash-proof, care should be taken when fixing the receiver, that it is not placed near a port-hole, or in any position in which water is likely to drip on to the lid of the receiver.

Lead covered wire is to be used throughout in installing this receiver, including the lead from the receiver aerial terminal of the transmitter to the aerial terminal on the receiver, unless the length is greater than about 6 ft.

The lead should be stripped back at least 6 inches before making connection to the receiver terminals, and curls should be put in the wire, so that in opening the receiver continual flexure of the wire will not break the leads inside the wire.

In wiring the receiver it should be noted that wires will go underneath the receiver when this is clamped to the table, and thus allow a neat system of wiring.

The earth is actually connected to the case of the receiver, and the earth lead should be run direct from the earth terminals of the receiver to the earth bolt, without being connected to any intermediate point.

After installing the receiver and before switching on the H.T. the valves should be inserted.

The anodes of the screened grid valves should be connected to the flexible connections provided **and the H.T. must always be disconnected** before removing the screened grid valves. If this precaution is not taken, the flexible connection from

the tuning coils to the anode of the screened grid valve may inadvertently touch the side of the case and possibly burn out one of the tuning coils.

Having inserted the valves, the L.T. battery switch may be closed and the receiver switched on. The lamp which illuminates the dial should now light.

Next, switch on the H.T., select the appropriate wave range, and tune in a suitable station. The sensitivity of the receiver should then be checked, so that under conditions of maximum gain the receiver should be distinctly "lively".

Normal tests should then be carried out on the receiver, to see that the local-distant switch and the other controls are in proper working order.

Maintenance

The maintenance requirements are simple and straightforward.

A drop of fine machine oil should be placed on the condenser bearings and also on the wave-change switch, say once in every three or four months.

Occasionally it may be found that owing to long disuse of any particular wave band, the switch blades do not always make very good contact on the switch contacts. This is completely overcome by working the switch half a dozen times in its appropriate wave range, since as the switch blades and contacts are self-cleaning, by rubbing them together in this manner, the difficulty of bad contact will be overcome.

Should the illuminating lamp burn out, it may easily be replaced as follows:-

Slacken the screws around the reflector, lift reflector clear. Loosen the locking nut on the lamp holder, after which the lamp can be unscrewed. In replacing the lamp it should be remembered that the locking nut has a tapered thread and therefore will go on one way only.

In changing any valves it is essential to switch off the high tension supply first.

It is not anticipated that any other parts of the receiver are likely to give trouble, but if it is necessary to examine the internal part of the receiver while the latter is in operation, this may be done by opening the receiver in the manner described previously, and switching on.

It is not necessary in opening the receiver to disconnect the terminals, as the whole design of the case is arranged to give very rapid examination of the inside of the receiver while the latter is actually in use.

The receiver should **not** be used on batteries which are being charged.

NOTES ON RECEIVER TYPE 394 G

The Receiver Type 394G differs from the 394F described in the preceding pages only in having an additional wave-range of 8500-3500 kc/s.

This H.F. band is obtained by shunting the three Range 1 tuning inductances by coils of appropriate values. These additional coils are controlled by three wander plug-in connectors mounted on the end of the main tuning coils which may be placed in either the IN or OUT position.

It is essential that all three plugs be in the OUT position when reception is required on the normal frequency bands.

For reception of frequencies between 8500 and 3500 kc/s. the range switch must be set to Range 1 (4500-2000 kc/s) and the three wander plugs placed in the IN position. The receiver is then operated in the normal manner.

The receiver must always be switched off before altering the plugs, to avoid the risk of accidentally earthing them and the possibility of thereby burning out a coil.