EDDYSTONE

AM/FM RECEIVER MODEL EB35

INSTRUCTION MANUAL

The EDDYSTONE Model EB35 is a fully transistorised AM/FM broadcast receiver designed to meet the requirements of the enthusiastic listener who demands somewhat superior performance to that given by the conventional domestic type of set. Advanced techniques and components of the type normally found only in professional communication equipment are used in the EB35 receiver and largely account for its unusually good performance.

Sensitivity is high and in addition to reception of the usual long- and medium-wave broadcasts, provision is made for receiving the high quality FM transmissions in the VHF range and the long-distance programmes transmitted on the short-wave bands. The versatility of the receiver is enhanced by providing facilities for feeding any received signal to a tape recorder or alternatively to a hi-fi system when greater volume is required than is available from the internal loudspeaker. Another useful feature is the ability to use the audio frequency section independently of the other stages for amplifying the output from a record-player or microphone.

Power for the receiver is normally derived from a self-contained battery pack but provision is made to fit a power unit for direct operation from any standard AC mains supply thus dispensing with the inconvenience of batteries in a permanent installation. A socket is provided to permit connection of telephones for personal listening and this same output is available to feed an external loudspeaker if so desired.

Construction follows much the same pattern as that found on other receivers in the EDDYSTONE range. Styling and appearance are in keeping with current trends and the finish is to the highest standard with attractive two-tone colouring.

The complete frequency coverage is divided into six ranges as follows:

FM Band	88·0 — 108·0 Mc/s.
Range 1	8·5 — 22·0 Mc/s.
Range 2	3·5 — 8·5 Mc/s.
Range 3	1·5 — 3·5 Mc/s.
Range 4	550 — 1500 kc/s.
Range 5	150 — 350 kc/s.

EB35 (MkI)

N.B. See extra note on Page 8 re IF modification.

INSTALLATION

Batteries

Six standard 1·5 volt dry cells need to be fitted in the internal battery box before the receiver can be put into use. Any of the following batteries may be used, leak-proof types being preferred where available.

EVER READY	U2	OLDHAM	K532
VIDOR	V0002	PERTRIX	601
DRYDEX	T20/T21	SIEMENS	T1
G.E.C.	BA6103	RAYOVAC	3LP

To fit the batteries, first unscrew the two knurled screws which retain the battery box at the rear of the receiver. Carefully remove the box and free it from the receiver proper by disengaging the battery connector. Lay the box on a flat surface and take off the inner cover. Arrange the batteries in two groups of three and then slide them into the battery troughs.

Use the diagram printed on the container as a guide when fitting the batteries and make certain that they are in the correct positions before replacing the box. Switching on with the batteries connected the wrong way round could damage the transistors. Replace the inner cover, re-connect the battery plug (yellow dots adjacent to each other) and then re-fit the box at the rear of the set.

Mains Operation

The receiver can be operated directly from all standard AC mains supplies by fitting a Power Unit Type 924 in place of the battery container. The P.U. gives an output of 9V and has the same physical size and fixing arrangements as the normal battery box. An instruction sheet is supplied with the power unit which can be ordered through your local stockist. Specify for use with EB35 receiver when ordering.

Aerial Connections

Three aerial sockets are provided, together with a coaxial socket which is used only for FM aerials. The other sockets are marked "A1," "A2" and "AE." "A1" is for AM reception only and "A2" for AM or FM reception when using short indoor aerials. "AE" is normally linked to the "EARTH" terminal except as indicated below.

Aerials for use on Ranges 1—5

The type of aerial used with the EB35 receiver will depend to a large extent on the permanency of the installation. Reasonable results may be obtained in a temporary installation with a relatively short length of wire located indoors. Some 15—20 feet of insulated wire run round the picture rail will provide reception from all long and medium wave stations serving the area; many of the high-powered short wave stations should also be audible at good strength. Such an aerial is of course relatively inefficient and it should be realised that signals are received only because of the high receiver sensitivity.

An outside aerial is strongly recommended for a permanent installation, permitting reception from a greater number of stations with a lower level of background noise. A suitable aerial could take the form of some 30—60 feet of insulated wire strung between two insulators and located as high as conveniently possible. It should be kept well away from local obstructions (especially those of metallic construction). The down-lead can be taken from either end or from any point along the length of the horizontal top and should be run well clear of house guttering etc. to avoid any loss in the available signal voltage. Soldered joints should be used where connections are needed.

Aerials of the types so far described are known broadly as "single-wire" or unbalanced aerials and are connected to socket "A1." The socket marked "AE" should be linked to the "EARTH" terminal using the special shorting plug supplied.

Improved results may be obtained when the wire length is less than 15 feet if the "A2" socket is used for the aerial connection. "A2" should also be used for connecting short rod aerials when a longer aerial is not available as for example when using the receiver in a vehicle.

For serious short-wave reception a further improvement can be obtained if a balanced aerial is employed. One type which falls in this category and involves no difficult constructional problems is the dipole aerial. This takes the form of a letter "T" in appearance, the horizontal portion being the aerial proper and the vertical section the downlead or feeder. Any wire of adequate strength (either insulated or bare) can be used for the top while the feeder can be any good quality twisted flex suitable for outside use (*e.g.* plastic covered). Special feeder cables are manufactured for this specific application but these are more expensive and offer little in the way of advantage for a normal domestic installation. They can of course be employed if the user so wishes.

For general short-wave reception the overall length of the horizontal portion should be of the order 50—60 feet, the wire being broken at the centre with each lead connected separately to the feeder cable. An insulator is used at this point to facilitate connection and provide mechanical support for the feeder. The length of the feeder is of minor importance and little attention need be paid to its actual positioning. The aerial proper should be erected as high as conveniently possible using insulators for supporting the two ends of the wire.

If attention is centred in one specific short-wave broadcast band, performance can be optimised at this frequency by cutting the aerial to a predetermined length. Overall lengths for the main broadcast bands are as follows — 49m : 76ft, 31m : 48ft, 25m : 39ft, 19m : 30ft, 16m : 26ft, 13m : 21ft. Overall lengths (in feet) for other bands can be calculated by dividing 468 by the frequency in megacycles. (If wavelength only is known, refer to the following section for instructions on converting to frequency).

When using a twisted flex feeder of the type described above one feeder wire is connected to the "A1" socket and the other to the "AE" socket. The special shorting plug is removed and can be stored in the "A2" socket to avoid loss. The same connections are employed when using a standard flat twin transmission line. Coaxial feeders are unbalanced and are connected as follows. Braid to "EARTH" terminal, inner wire to "A1," shorting plug in position between "AE" and "EARTH" terminal. On the lower frequencies the dipole can be operated as a single-wire aerial by strapping together both the feeder wires and connecting to the "A1" socket. This will give greater signal pick-up and increase the versatility of the aerial.

In some cases it will be found that reception can be improved if an earth connection is made to the "EARTH" terminal. One benefit is a reduction of locally generated electrical interference especially when listening on the lower frequencies in the tuning range. The earth lead should be as short and direct as possible connected to a water pipe or an external earth rod.

Aerials for FM reception

In the case of a permanent installation it will usually be found best to employ an outside aerial except when the receiver is situated very close to the transmitting station. A wide variety of commercial designs are available at moderate cost and can be installed by your local supplier who will be in a position to advise on the type of aerial most suited to local conditions. Such an aerial will have a coaxial feeder which should be terminated with the plug supplied and connected to the "FM" aerial socket.

For FM reception in regions of high signal strength an indoor aerial will usually suffice. The simplest type of indoor aerial takes the form of a short piece of insulated wire some 4—6 feet in length connected to the "A2" socket. Its position will have quite a marked effect on reception and some experimentation is called for if optimum results are to be achieved.

Greater signal pick-up and reduced background noise are features of the dipole aerial already referred to in connection with AM reception on the short wave bands. A dipole suitable for receiving FM signals in the VHF band is relatively small and can be conveniently made from a length of ordinary twisted flex. Unravel some 30 inches at one end and straighten the two wires to form a horizontal top with an overall length of approximately 60 inches, Tape the flex to prevent further unravelling. The remainder of the lead will serve as the feeder; one wire being connected to the "A2" socket and the other to the "EARTH" terminal.

As with the single-wire aerial, various positions should be tried for best results and it may be found convenient to tape the aerial proper to a short length of bamboo cane to facilitate handling the wire which should be kept in a horizontal plane. Once the best position has been determined, the wire can be removed from the cane and tacked to a picture rail or otherwise retained in an unobtrusive location.

Use of the FM Attenuator

In some installations it may be found that too strong a signal is picked up by the aerial, especially when this is an outdoor type located only a few miles from the broadcast station. Excessive signal input to the receiver will be indicated by distorted output and a tendency for the station to remain in tune when the tuning is off-set from the correct tuning point. If this effect is noticed, it can be eliminated by removing the aerial plug from the set, plugging it instead into the attenuator and connecting this to the "FM" aerial socket.

Connecting telephones or an external loudspeaker

The "PHONES" socket on the panel of the receiver can be used either for connection of telephones for personal listening or an external loudspeaker which can if required be located some distance from the receiver.

Telephones should preferably be of low impedance and the "high-quality" type are recommended. The external loudspeaker should have an impedance in the range 8—15 ohms and can be any size or type. An external transformer is not required. Twisted flex can be used for connection with a standard jack plug to mate with the telephone socket. Bulgin Type P38 plug will be found suitable. Inserting the plug in the socket automatically switches off the internal loudspeaker.

Connecting to a tape recorder or hi-fi amplifier

The socket labelled "TAPE" at the rear of the set can be used to extract a low-level signal for connection to a tape recorder or hi-fi system. A suitable plug is supplied with the receiver and this should be used to terminate a screened cable to feed the external unit. The braid of the cable should be soldered to the neck of the plug shell and the inner wire to the pin.

When using the receiver in this way, it will be found that the normal volume control has no effect on the output level at the "TAPE" socket and the volume control on the tape recorder should be used to control the recording level in the usual manner. The receiver speaker (and telephone output) function as before so that when feeding into a hi-fi installation the receiver volume control should be set to give minimum output. The output from the hi-fi speaker(s) will be controlled by the amplifier volume control in the normal way.

Using the receiver as an audio amplifier

A second plug is supplied with the receiver for use when it is required to use the audio stages as an amplifier in conjunction with a microphone, gramophone pick-up or tape replay head. The socket for this facility is marked "AF INPUT" and is arranged to cut out normal signals when the plug is inserted.

The input has a low impedance and it will be necessary to obtain a suitable matching transformer from your local dealer if a crystal microphone or other high impedance device is to be used.

OPERATION

The EB35 will be found just as easy to operate as any other domestic type receiver. Controls have been kept to a minimum in the interest of simplicity and the user will quickly become familiar with their functions.

Assuming that batteries have been fitted and a suitable aerial connected as described earlier, the receiver is brought into use by moving the SUPPLY SWITCH at the left-hand end of the panel to the "ON" position. The VOLUME and TONE controls should be set initially to their midway position and can be re-adjusted to suit reception conditions once the desired signal has been selected.

To tune to a specific frequency, first determine the appropriate range by reference to the figures printed at the left-hand end of the calibrated scales. Set the WAVECHANGE SWITCH to the range indicated and then move the tuning pointer to the correct setting by means of the TUNING CONTROL. This has a larger knob than the other controls and requires over fifty revolutions to give a complete traverse of the pointer. Flywheel-loading is employed and the control can be "spun" for rapid movement of the pointer across the dial. The very high reduction ratio makes for ease of tuning on the short wave bands and helps considerably in obtaining the precise setting required for FM reception. In this connection it should be noted that whereas a small degree of mistuning is acceptable on the other frequency bands, this is not the case when listening on FM. Mistuning of an FM signal will introduce distortion and so make the signal unpleasant to listen to. It is best therefore to always make a point of tuning *across* the signal so that the correct tuning point can be readily determined. The tuning must be set to the exact centre of the transmission.

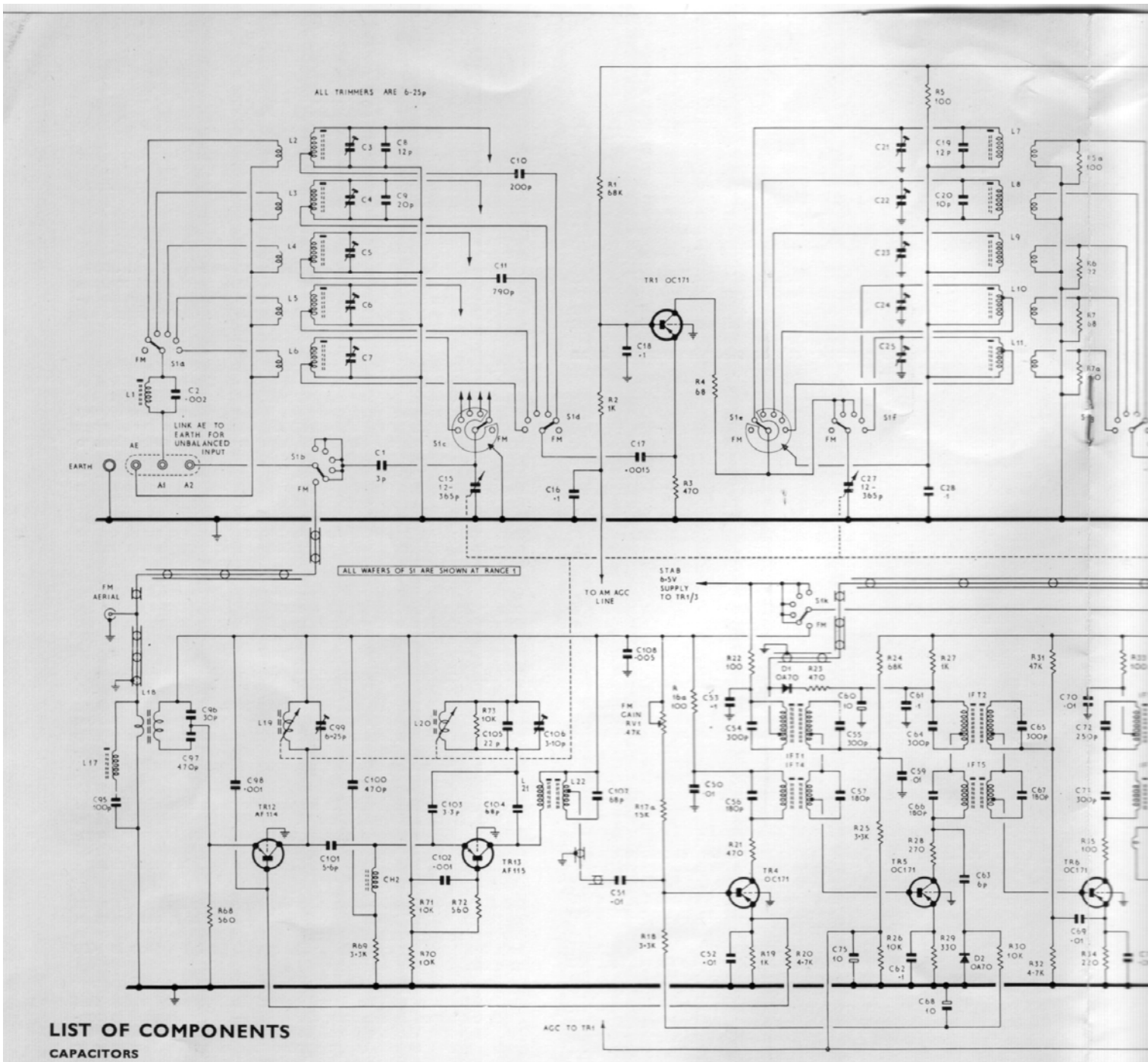
Dial calibration is in terms of frequency rather than wavelength, a feature which will be found advantageous especially when tuning on the short wave ranges. Published frequencies for stations using these bands are precise whereas the wavelengths quoted are often approximate. These stations can therefore be selected more rapidly than would otherwise be the case. All broadcast bands are underlined on the scales to assist the user in locating their position.

If the wavelength but not the frequency of a station is known, the latter can be determined quite easily by making a simple calculation. Dividing 300 by the wavelength will give the frequency in megacycles. For example, a station on 100 metres would appear on a frequency of 3 Mc/s, one on 50 metres at 6 Mc/s and so on.

On the long and medium wavebands, frequencies are usually given in kilocycles (kc/s) and since 1 Mc/s = 1000 kc/s, the figure in Mc/s is simply multiplied by 1000 to obtain the frequency in kc/s. 0·5 Mc/s for example would be 500 kc/s, 1·4 Mc/s is 1400 kc/s, etc.

A further scale will be found below the frequency scales, this being calibrated in arbitrary divisions 0—500. It is used in conjunction with the small calibrated vernier (located above the tuning knob) to obtain very accurate dial settings for specific stations. The readings on the horizontal and vernier scales are combined to give a one, two or three figure number which corresponds to the actual frequency setting in use. A list of dial settings can be compiled for preferred stations which can then be tuned more rapidly than would otherwise be the case.

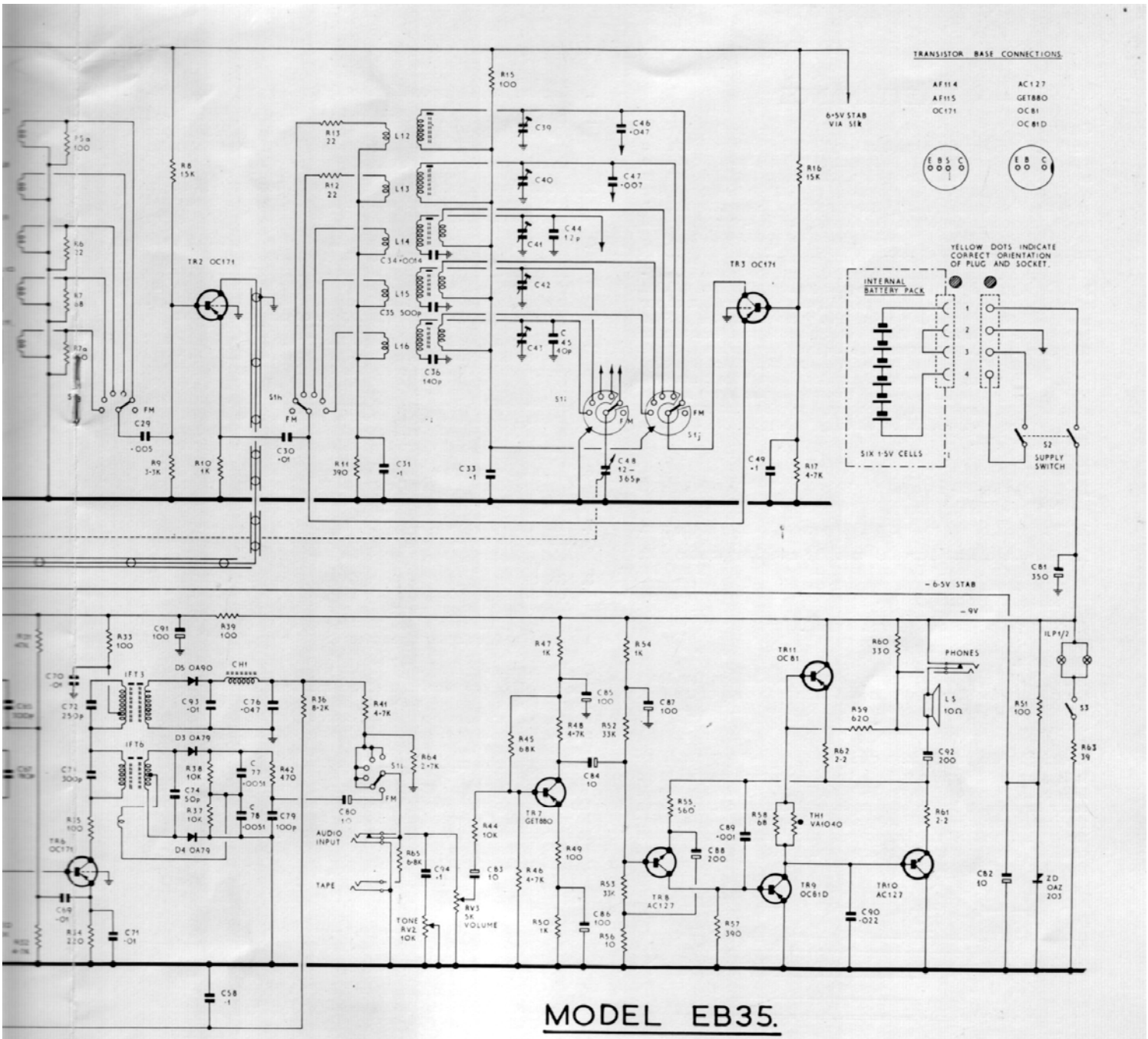
The small slide switch at the lower left-hand corner of the panel controls the dial illumination, a facility which will be required only on rare occasions. The switch must be held down to illuminate the scale (two dial lamps, one at each end), and will automatically return to the "off" position on being released. This simple precaution avoids undue drain on the batteries since the dial light consumption doubles the average current taken from the supply.



LIST OF COMPONENTS

CAPACITORS

C1 : .. .. 3pF Tubular Ceramic±0·5pF 750V DC wkg.
C2 : .. .. 0·002uF Polystyrene±5% 125V DC wkg.
C3—7, C21—25, C39—43, C99 : 6—25pF Ceramic Trimmers.
C8, 19, 44 : .. .. .. 12pF Tubular Ceramic±10% 750V DC wkg.
C9 : .. .. 20pF Tubular Ceramic±10% 750V DC wkg.
C10 : .. .. 200pF Polystyrene±5% 125V DC wkg.
C11 : .. .. 790pF Polystyrene±5% 125V DC wkg.
C12, 13, 14, 26, 32, 37, 38 : .. References not allocated.
C15, 27, 48 : .. .. .. 3-gang air-spaced variable 12-365pF per section.
C16, 18, 28, 31, 33, 49, 53, 58, 61, 62, 94 : .. .. 0·1uF Polyester±20% 250V DC wkg.
C17 : .. .. 0·0015uF Tubular Ceramic +50% —25% 750V DC wkg.
C20 : .. .. 10pF Tubular Ceramic±10% 750V DC wkg.
C29, 108 : .. .. 0·005uF Tubular Ceramic±10% 750V DC wkg.
C30 : .. .. 0·01uF Metallised Paper±20% 200V DC wkg.
C34 : .. .. 0·0014uF Polystyrene±5% 125V DC wkg.
C35 : .. .. 500pF Silvered Mica±2% 350V DC wkg.
C36 : .. .. 140pF Polystyrene±5% 125V DC wkg.
C45 : .. .. 40pF Tubular Ceramic±10% 750V DC wkg.
C46, 76 : .. .. 0·047uF Polyester±20% 250V DC wkg.
C47 : .. .. 0·007uF Polystyrene±5% 125V DC wkg.
C50, 51, 52, 59, 69, 70, 71 : .. 0·01uF Polyester±20% 250V DC wkg.
C54, 55, 64, 65, 73 : .. .. 300pF Polystyrene±5% 60V DC wkg.
C56, 57, 66, 67 : .. .. .. 180pF Polystyrene±5% 60V DC wkg.
C60, 75, 80, 82, 83, 84 : .. .. 10uF Tubular Electrolytic +50% —10% 16V DC wkg.
C63 : .. .. 6pF Tubular Ceramic±10% 750V DC wkg.
C68 : .. .. 1uF Tubular Electrolytic +100% —10% 40V DC wkg.
C72 : .. .. 250pF Polystyrene±5% 125V DC wkg.
C74 : .. .. 50pF Polystyrene±5% 125V DC wkg.
C77, 78 : .. .. 0·0051uF Polystyrene±5% 125V DC wkg.
C79, 95 : .. .. 100pF Polystyrene±5% 125V DC wkg.
C81 : .. .. 350uF Tubular Electrolytic +100% —20% 12V DC wkg.
C85, 86, 87, 91 : .. .. .. 100uF Tubular Electrolytic +100% —20% 15V DC wkg.
C88, 92 : .. .. 200uF Tubular Electrolytic +100% —20% 6V DC wkg.
C89 : .. .. 0·001uF Polystyrene±5% 125V DC wkg.
C90 : .. .. 0·022uF Polyester±20% 250V DC wkg.



MODEL EB35.

C93	0·01uF Metallised Paper ±20% 150V DC wkg.
C96	30pF Tubular Ceramic ±5% 500V DC wkg.
C97, 100	470pF Disc Ceramic +80% —20% 500V DC wkg.
C98, 102	0·001uF Disc Ceramic +80% —20% 500V DC wkg.
C101	5·6pF Tubular Ceramic ±0·1pF 500V DC wkg.
C103	3·3pF Tubular Ceramic ±0·1pF 500V DC wkg.
C104, 107	68pF Tubular Ceramic ±10% 500V DC wkg.
C105	22pF Tubular Ceramic ±1pF 500V DC wkg.
C106	3 – 10pF Ceramic Trimmer.

RESISTORS

R1, 24, 45	68,000Ω
R2, 10, 19, 27, 47, 50, 54	1,000Ω
R3, 21, 23, 42	470Ω
R4, 7, 58	68Ω
R5, 5a, 7a, 15, 16a, 22, 33, 35, 39, 49, 51	100Ω
R6, 12, 13	22Ω
R8, 16, 17a	15,000Ω
R9, 18, 25, 69	3,300Ω
R11, 57	390Ω
R14, 40, 43, 66, 67	References not allocated

R17, 20, 32, 41, 46, 48	4,700Ω
R26, 30, 37, 38, 44, 70, 71, 73	10,000Ω
R28	270Ω
R29, 60	330Ω
R31	47,000Ω
R34	220Ω
R36	8,200Ω
R52, 53	33,000Ω
R55, 68, 72	560Ω
R56	10Ω
R59	620Ω
R61, 62	2·2Ω
R63	39Ω
R64	2,700Ω
R65	6,800Ω
RV1	47,000Ω
RV2	10,000Ω
RV3	5,000Ω
TH1	VA1040

All resistors are 10% ¼ watt except R61/62 : 5% 3 watt and R63 : 5% ¼ watt.

MAINTENANCE

General

The EB35 receiver should require very little in the way of routine maintenance apart from replacement of the batteries from time to time. If a fault should develop, check first that it is not an obvious one such as poor contact in the battery connector due to this not being pushed fully into the socket. Other simple faults which may occur are broken or shorting aerial connections and in the case of a receiver operating from the mains with a power unit Type 924 — a blown fuse.

If the fault cannot be traced, take the receiver to the nearest EDDYSTONE Agent who will rectify the trouble at reasonable cost. A list of Agents can be obtained from the Sales and Service Dept. at our usual address. If there is no Agent in your district the set can be taken to any reputable dealer but you are then advised to take this sheet with the set because the engineer in question may not be familiar with Eddystone equipment. The sheet contains information which will assist him in locating the fault and will help to ensure that the receiver is returned to you in the shortest possible time. Receivers can be returned to the manufacturer but prior arrangements should be made by writing first to the Sales and Service Dept.

Removing the cabinet

1. Remove the battery container by unscrewing the two knurled retaining screws and disengaging the battery connector.
2. Remove the four cabinet retaining screws located at the rear.
3. Free the cabinet from the panel by applying pressure with the fingers between the rear inner edge of the cabinet and the ends of the strip which supports the IF printed board near the top of the cabinet.
4. Slide the cabinet away from the panel.

Dial Bulbs.

Faulty bulbs can be changed by levering the holders free from the rubber mounting grommets at the extreme ends of the dial. Replacements should be of the L.E.S. type with a rating of 6V at 50mA.

Re-stringing the pointer drive cord

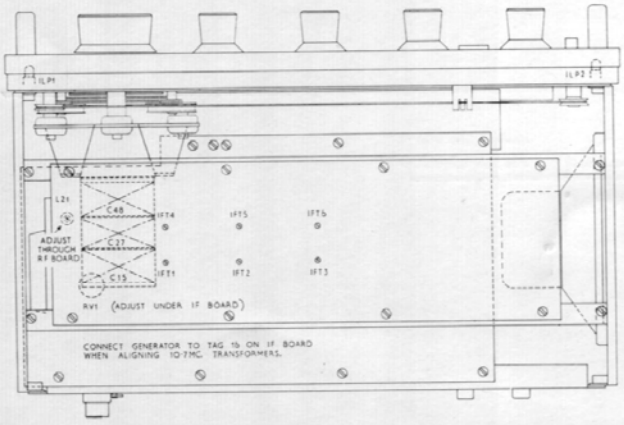
It is most unlikely that trouble would be experienced with the high quality cord used on the EB35 receiver. If a breakage should occur however, a length of suitable cord can be obtained from the manufacturer. No difficulty should be experienced in fitting the replacement if the instructions given below are followed carefully step by step. Right-hand and left-hand are as viewed from the rear of the set.

1. Remove the existing cord and set the tuning gang to full mesh.
2. Tie a double knot in one end of the replacement cord and feed the cord through the hole provided in the left-hand drive pulley with the knot on the inside of the rim. The hole should lie at approximately "4 o'clock."
3. Wind approximately one-quarter of a turn anti-clockwise round the drive pulley and then pass the cord under and over the left-hand guide pulley.
4. Pass the cord across the dial from left to right and then, while holding the free end of the cord in tension, rotate the tuning control to fully unmesh the tuning gang. This operation will wind just over three complete turns of cord onto the left-hand drive pulley and tension must now be maintained to prevent the cord from slipping out of the pulley groove.
5. Pass the cord clockwise round the jockey pulley (right-hand side of the receiver) and then back across to the right-hand drive pulley. Feed the cord into the pulley groove and then through the hole in the rim (hole lies at about "10 o'clock"). Increase the tension on the cord until the outer rim of the jockey pulley takes up a position level with the nearest edge of the panel handle retaining screw. Mark the cord with a pencil at the point where the retaining knot must be tied.
6. Free the cord from the jockey pulley and while maintaining tension, draw the cord through the hole in the right-hand drive pulley until it tightens on the left-hand guide pulley.
7. Tie a double knot at the position marked in (5) above and then cut off the surplus cord. Feed the cord back through the hole and replace in position round the jockey pulley.
8. Set the tuning gang to full mesh and slide the pointer to "0" on the logging scale. Attach the pointer to the cord (when viewed from above the cord should pass under the two outer prongs at the rear of the pointer carrier) and then check the drive for free normal operation.

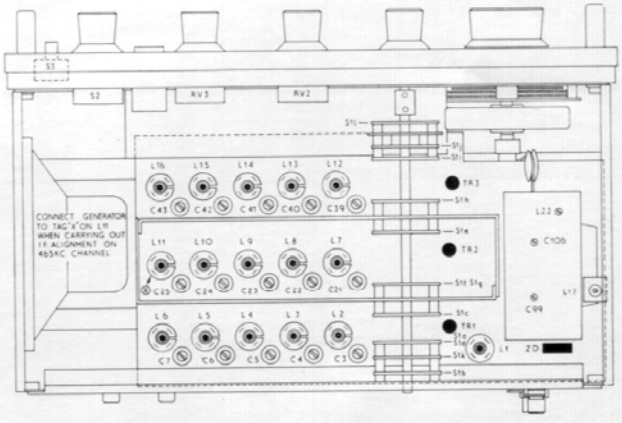
Re-alignment

The initial factory alignment of the receiver should hold for a long period and re-alignment should not be carried out unless there is a clear indication that this course of action is necessary. It should be noted that any figures quoted for sensitivity etc., in the instructions which follow are based on the assumption that a new set of batteries is in use.

When aligning either IF channel, the four screws which retain the two angle strips on which the IF board is mounted should be removed. The board can then be re-mounted at right-angles to its normal position using two screws only. All dust cores will then be accessible and there is no need to unsolder connections to the board.



Plan view of Model EB35 Receiver



Underside view of Model EB35 Receiver

The following test equipment is required for satisfactory re-alignment of the EB35 receiver:

Signal generator(s) covering the two intermediate frequencies (465 kc/s and 10·7 Mc/s), the AM range (150 kc/s — 22 Mc/s) and the FM band 88—108 Mc/s.
Output meter matched to 10Ω with plug to mate with telephone socket.

Trimming tools: Miniature insulated screwdriver with $\frac{1}{16}$" blade (length 2" maximum), small metal-tipped insulated screwdriver and a Neosid HS1 hexagonal core adjuster.

465 kc/s Stages

Stand the receiver on one end to allow connection of the generator output lead to the Range 5 Mixer coil L11 (see underside view of receiver). The generator should be arranged to provide a 50Ω source and the earth lead can be clipped to the screen adjacent to the coil. Disable the Local Oscillator by shorting out the forward section of the tuning gang (C48) and then plug the output meter into the telephone socket. The speaker is automatically disconnected on insertion of the plug and the meter if matched to 10Ω will read the true output power. Switch on the generator, allow it adequate time to stabilise against drift and then set the receiver controls as follows:

Range Switch .. Range 5. Volume .. .. Maximum.
Tuning .. .. 350 kc/s. Tone .. Fully clockwise.

Tune the generator to 465 kc/s (with modulation 30% at 400 c/s) and then set the attenuator to give a reading of approximately 50mW on the output meter. Peak the cores in IFT1, IFT2 and IFT3 for maximum output, setting all cores to the "outer" peak. Re-check each adjustment several times to ensure accurate alignment and then set the attenuator for an output reading of 50mW. Input should be of the order 4uV. If the IF sensitivity is lower than this figure, check the AF sensitivity by introducing an audio generator across RV3. At 1,000 c/s an input of 5mV should give an output of 50mW.

Disconnect the generator(s) and remove the shorting link from C48 on completion of the alignment.

10·7 Mc/s Stages

N.B. The 10·7 Mc/s IF Transformer L21/L22 is not aligned with the other 10·7 Mc/s circuits. It forms part of the FM Tuner Unit and is adjusted when aligning this unit later in the alignment procedure.

Switch on the generator, allow adequate time to stabilise against drift and set all receiver controls as for 465 kc/s alignment except the Range Switch which should be at FM. Short out the one discriminator diode D4 and connect the output meter to the telephone socket as before. Tune the generator to 10·7 Mc/s, adjust for 30% modulation at 400 c/s and then connect its output lead to tag 16 at the right-hand end of the IF board. The adjacent tag 17 can be used as an earthing point.

Peak the cores in the 10·7 Mc/s transformers IFT4, IFT5 and IFT6 on their "outer" peak for maximum reading on the output meter. Remove the short from D4 and adjust the secondary (top) core of IFT6 for minimum signal.

IF sensitivity using an AM signal and with D4 shorted should be of the order 30uV for 50mW output. RV1 can be adjusted if necessary to achieve this figure.

RF Alignment (Ranges 1—5)

The first step in this part of the procedure is a check on the overall calibration accuracy. Proceed as follows:
Standardise the generator calibration against a reliable frequency standard and connect its output lead to the "A1" socket and "EARTH." The shorting plug should be in position between "AE" and "EARTH."

Select Range 1 and tune the generator and receiver to each mega-cycle point in turn noting the degree of error present. Errors should not exceed 1% (*i.e.* 180 kc/s at 18 Mc/s, 90 kc/s at 9 Mc/s etc.). Repeat on Range 2 and then select Range 3. Checks should be made at 500 kc/s intervals on this range followed by checks at 100 kc/s intervals on Ranges 4 and 5.

Oscillator adjustments should not be touched unless errors of greater than 1% are detected. If re-alignment is found to be necessary, carry out normal tracking procedure using trimmers at the high frequency end of the band and cores at the low frequency end. Each adjustment must be repeated several times to ensure accurate alignment. Alignment frequencies and adjustments are listed in the Table which follows:

Range	Frequency	Trimmer	Frequency	Core
1	20·0 Mc/s	C39	8·6 Mc/s	L12
2	8·0 Mc/s	C40	3·6 Mc/s	L13
3	3·5 Mc/s	C41	1·5 Mc/s	L14
4	1400 kc/s	C42	550 kc/s	L15
5	330 kc/s	C43	160 kc/s	L16

Alignment of the RF (Aerial) and Mixer circuits can now be commenced. The generator is connected to "A1" and "EARTH" as before but must now be adjusted to match the receiver input impedance (75Ω for Ranges 1/3 and 400Ω for Ranges 4/5). The output meter is connected as for IF alignment. Adjustments are made at the same frequencies used for oscillator alignment but using the adjustments listed in the second Table. Care should be taken to ensure that the aerial circuits are set for best s/n ratio.

Range	Trimmer			Core		
	Frequency	Aerial	Mixer	Frequency	Aerial	Mixer
1	20·0 Mc/s	C3	C21	8·6 Mc/s	L2	L7
2	8·0 Mc/s	C4	C22	3·6 Mc/s	L3	L8
3	3·5 Mc/s	C5	C23	1·5 Mc/s	L4	L9
4	1400 kc/s	C6	C24	550 kc/s	L5	L10
5	330 kc/s	C7	C25	160 kc/s	L6	L11

On completion of these adjustments, select 550 kc/s on Range 4, tune the generator to 465 kc/s and increase its level until an indication is obtained on the output meter. Adjust the IF rejector coil L1 for *minimum* signal.

FM Alignment

Alignment of the FM tuner unit is most conveniently carried out by using an AM signal and with D4 shorted out as in alignment of the 10·7 Mc/s stages. The generator is required only to establish the accuracy of the dial calibration, all other adjustments being made on noise to avoid the need for continual re-tuning of the generator to cope with pulling of the receiver oscillator which occurs when either the input or output circuits of the mixer transistor are re-tuned.

The calibration check should be carried out at 100 Mc/s with the generator connected either to the FM coaxial socket or to "A2" and "EARTH." Oscillator trimmer C106 should be adjusted to nullify any error which may be present. Now switch off the generator and adjust C99, L21 and L22 for maximum noise output. Re-check C106 setting at 100 Mc/s and then carry out a sensitivity check at this frequency. A figure of the order 10uV should be obtained for 50mW output.

Finally, tune the generator to 10·7 Mc/s and adjust the IF rejector L17 for minimum signal output. Disconnect the short across D4 before putting the set back into its case.

VOLTAGE ANALYSIS

Typical voltage readings for each stage are given in the Table which follows. All readings were taken under no-signal conditions on Range 5 (except as indicated) using a testmeter with a sensitivity of 20,000Ω/V. A tolerance of 20% should be allowed.

Reference	Collector	Base	Emitter
TR1	6·1V	0·95V	0·65V
TR2	6·3V	1·25V	1·3V
TR3	6·1V	1·5V	1·5V
TR4*	5·0V	2·5V	2·4V
TR5	5·0V	1·15V	0·95V
TR6	8·0V	0·7V	0·45V
TR7	6·4V	0·5V	0·45V
TR8	0·16V	4·2V	4·6V
TR9	4·7V	0·16V	—
TR10	—	4·8V	4·9V
TR11	9·0V	5·0V	4·9V
TR12**	6·5V	2·25V	2·1V
TR13**	6·5V	3·1V	2·9V

* Switch to FM Band.

** Not accessible for direct check. Voltage to FM Unit is —6·5V.

Voltages are negative w.r.t. earth.

SPARES

The following list details all major spares for the EB35 receiver. The Serial No. of the receiver must be quoted in all correspondence. Orders and enquires should be directed to the "Sales and Service Dept."

Inductors and Transformers

L1	465 kc/s IF Rejector coil	D3204
L2	Range 1 RF (Aerial) coil	D3517
L3	Range 2 RF (Aerial) coil	D3191
L4	Range 3 RF (Aerial) coil	D3192
L5	Range 4 RF (Aerial) coil	D3193
L6	Range 5 RF (Aerial) coil	D3518
L7	Range 1 Mixer coil	D3519
L8	Range 2 Mixer coil	D3196
L9	Range 3 Mixer coil	D3197/1
L10	Range 4 Mixer coil	D3198
L11	Range 5 Mixer coil	D3520
L12	Range 1 Oscillator coil	D3521
L13	Range 2 Oscillator coil	D3201
L14	Range 3 Oscillator coil	D3202
L15	Range 4 Oscillator coil	D3203
L16	Range 5 Oscillator coil	D3522
L17	10·7 Mc/s IF Rejector coil	D3525
L18–L22 (Part of FM Tuner Unit — not available separately).		
IFT1	1st 465 kc/s IF transformer	6653P
IFT2	2nd 465 kc/s IF transformer	6654P
IFT3	3rd 465 kc/s IF transformer	6655P
IFT4	1st 10·7 Mc/s IF transformer	6933P
IFT5	2nd 10·7 Mc/s IF transformer	6933P
IFT6	3rd 10·7 Mc/s IF transformer	6934P

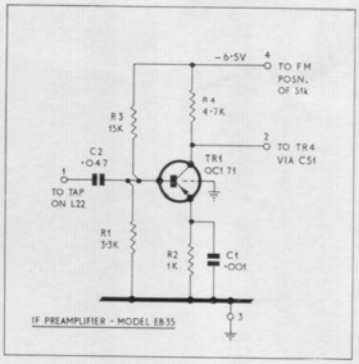
Transistors

TR1—6	Mullard Type OC171
TR7	Mullard Type GET880
TR8 & 10	Mullard Type AC127
TR9	Mullard Type OC81D
TR11	Mullard Type OC81
TR12	Mullard Type AF114
TR13	Mullard Type AF115

Miscellaneous Items

Range Switch	Clicker mechanism	6923P
	Wafers: Sla/d, Slf/g, Slh	5393P
	Wafers: Slb, Slk, Sll	D3524
	Wafers: Slc, Sle, Sli, Slj	5404P
Supply Switch (S2)		6916P
Dial Light Switch (S3)		6918P
Volume Control (RV3)		6860P
Tone Control (RV2)		6860/1P
Dial Bulbs (L.E.S., 50mA., 6·7mm.)		6659P
Dial Bulb Holder		6600P
Phone Jack		6660P
Loudspeaker (10Ω, 5 inch round)		6939P
Drive Assembly		LP2864
Pointer Assembly		D3215
Dial Glass (calibrated)		D3516
Knobs	Tuning	6915P
	Wavechange	6874/1P
	Volume, Tone, Supply	6874P
Tape Socket		6941P
AF Input Socket		6942P
Tape Plug (white)		6943P
AF Input Plug (black)		6943/1P
FM Tuner Unit		6940P

MODEL EB35



This receiver is now fitted with an additional 10.7 Mc/s Amplifier which provides greater sensitivity on the FM Band. An OC171 transistor is employed, the stage being assembled on a small printed board located at the input end of the main IF/AF board. The latter has been moved slightly to provide room for the extra board.

The new stage is fed direct from the tap on L22, its output being taken via C51 to the existing 10.7 Mc/s Stages. No tuning adjustment is required, and present alignment procedure is unaffected.

Voltages taken at FM position of Wavechange Switch are as follows:—

Collector: 2.25V. Base: 1.1V. Emitter: 0.85V.

June 1965