

# Eddystone

## AM/FM RECEIVERS MODEL EB35 Mk II & Mk II/S

### SUPPLEMENT TO EB35 INSTRUCTION MANUAL



The EB35 Mk.II and Mk.II/S are current production replacements for the basic EB35 AM/FM Broadcast Receiver, and are fitted with re-styled cabinets to be more compatible with current trends.

The standard Mk.II version retains all the facilities of the EB35 but features improved performance on VHF by virtue of a new FM Tuner Unit and an additional IF Stage, the latter having been fitted also on late versions of the standard receiver.

The Mk.II/S is identical in most respects to the Mk.II version, but also incorporates facilities for stereo working by the addition of a stereo decoder unit and an automatic frequency control (AFC) circuit. Outputs from the LH and RH channels are brought out to sockets at the rear and may be used to drive an external dual-channel power amplifier.

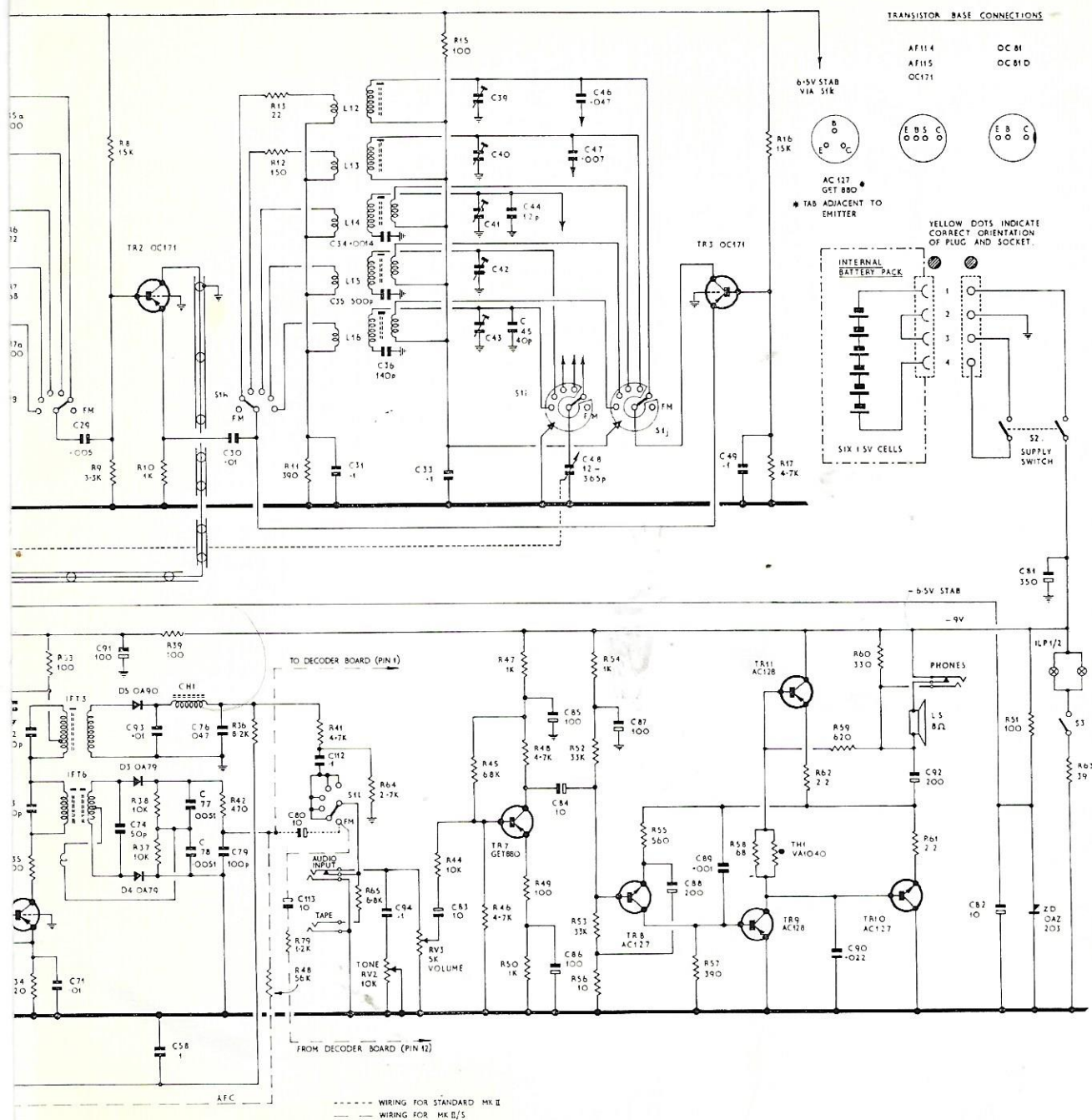
Alternatively, one channel can be reinserted into the internal audio amplifier, and the other fed to an external "mono" amplifier of similar rating to complete the stereo system. The level of output from the RH and LH outlets is of the order 0.7V from a source impedance of 220 ohms.

During Mono broadcasts the absence of the pilot tone makes the balanced ring demodulator inoperative and the Mono signals are allowed through both channels.

All notes relating to Installation, Operation and Maintenance contained in the standard EB35 Instruction Manual are equally applicable to the Mk.II and Mk.II/S. Additional information relevant to the Mk.II versions is contained in this Supplement.



R1, 24, 45  
R2, 10, 19,  
R3, 21, 23,  
R4, 7, 58  
R5, 5a, 7a,  
R6, 13  
R8, 16, 17a  
R9, 18, 25  
R11, 57  
R12 ..  
R14, 40, 43  
R17, 20, 32  
R26, 30, 37  
R28 ..  
R29, 60  
R31 ..  
R34 ..  
R36 ..  
R52, 53



#### EB35 Mk.II/S Additional Components

C110 6pF Tubular Ceramic  $\pm 10\%$  750V DC wkg.  
C111, 113 10 $\mu$ F Tubular Electrolytic  $+50\%$   $-10\%$  16V DC wkg.

Note C105 and 108 changed to 39pF Tubular Ceramic  $\pm 5\%$  750V DC wkg. on Mk.II/S version.

#### RESISTORS

R1, 24, 45	68,000 $\Omega$
R2, 10, 19, 47, 50, 54	1,000 $\Omega$
R3, 21, 23, 42	470 $\Omega$
R4, 7, 58	68 $\Omega$
R5, 5a, 7a, 15, 16a, 22, 33, 35, 39, 49, 51	100 $\Omega$
R6, 13	22 $\Omega$
R8, 16, 17a, 27	15,000 $\Omega$
R9, 18, 25	3,300 $\Omega$
R11, 57	390 $\Omega$
R12	150 $\Omega$
R14, 40, 43, 66, 67	References not allocated
R17, 20, 32, 41, 46, 73	4,700 $\Omega$
R26, 30, 37, 38, 44	10,000 $\Omega$
R28	270 $\Omega$
R29, 60	330 $\Omega$
R31	47,000 $\Omega$
R34	220 $\Omega$
R36	8,200 $\Omega$
R52, 53	33,000 $\Omega$

R55, 71	560 $\Omega$
R56	10 $\Omega$
R59	620 $\Omega$
R61, 62	2.2 $\Omega$
R63	39 $\Omega$
R64	2,700 $\Omega$
R65	6,800 $\Omega$
R68	12,000 $\Omega$
R69	4,700 $\Omega$
R70	680 $\Omega$
R72	15,000 $\Omega$
R74, 75	12,000 $\Omega$
R76	0.1M $\Omega$
TH1	VA1040

#### 10.7MHz IF Pre-amplifier

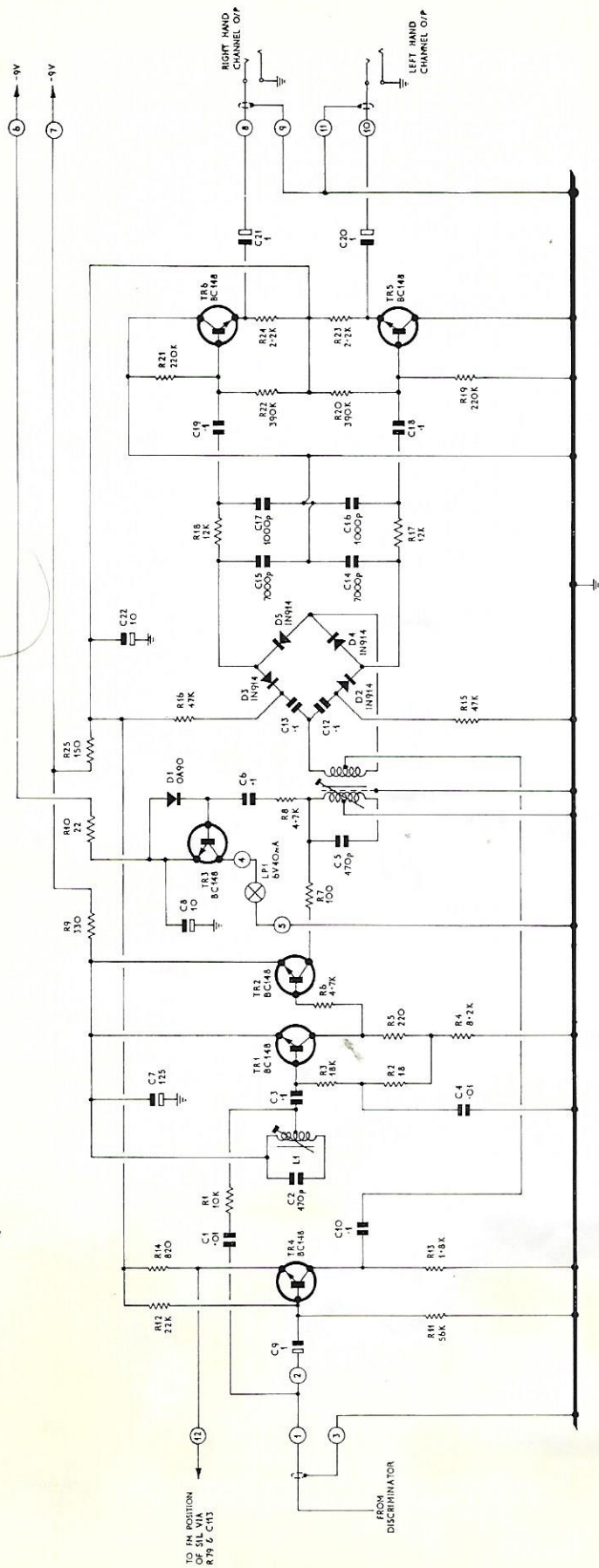
R1	3,300 $\Omega$
R2	1,000 $\Omega$
R3	15,000 $\Omega$
R4	4,700 $\Omega$

#### EB35 Mk.II/S Additional Components

R48	56,000 $\Omega$
R76	0.1M $\Omega$
R78	82,000 $\Omega$
R79	1,200 $\Omega$

All resistors are 10%  $\frac{1}{2}$  watt except R61, 62 : 5% 3W and R63 5%  $\frac{1}{2}$  watt.





## STEREO DECODER — MODEL EB35 Mk II/S

### LIST OF COMPONENTS

#### CAPACITORS

C1, 4, 6	..	..	0.01μF Ceramic —20% + 80% 30V DC wkg.
C2, 5	..	..	470pF Polystyrene ±5% 125V DC wkg.
C3, 10, 12, 13, 18, 19	..	..	0.1μF Polycarbonate ±20% 100V DC wkg.
C7	..	..	125μF Electrolytic +50% —10% 16V DC wkg.
C8, 22	..	..	10μF Electrolytic +50% —10% 16V DC wkg.
C9, 20, 21	..	..	1μF Electrolytic +50% —10% 15V DC wkg.
C11	..	..	Not allocated.
C14, 15	..	..	0.007μF Polystyrene ±5% 125V DC wkg.
C16, 17	..	..	0.001μF Polystyrene ±5% 125V DC wkg.

#### RESISTORS

R1	..	..	10,000 Ω
R2, 3	..	..	18,000 Ω
R4	..	..	8,200 Ω
R5	..	..	220 Ω
R6, 8	..	..	4,700 Ω
R7	..	..	100 Ω
R9	..	..	330 Ω
R10	..	..	22 Ω
R11	..	..	56,000 Ω
R12	..	..	22,000 Ω
R13	..	..	1,800 Ω
R14	..	..	820 Ω
R15, 16	..	..	47,000 Ω
R17, 18	..	..	12,000 Ω
R19, 21	..	..	0.22M Ω
R20, 22	..	..	0.39M Ω
R23, 24	..	..	2,200 Ω
R25	..	..	150 Ω

All resistors 5%  $\frac{1}{4}$  watt.

### VOLTAGE ANALYSIS

Transistor	Collector	Base	Emitter
TR1	..	7.9V	8.5V
TR2	..	OV	8.5V
TR3	..	OV	9.0V
TR4	..	3.3V	5.6V
TR5	..	OV	2.5V
TR6	..	OV	4.5V

All voltages taken under no-signal conditions.

Refer to EB35 Instruction Manual for other voltages but note that voltages for TR12 and TR13 should read as follows:

TR12 :: C : OV/B : 4.7V/E : 5.5V.

TR13 :: C : OV/B : 4.9V/E : 5.7V.

IF Pre-amplifier voltages: C : 2.25V/B : 1.1V/E : 0.85V.



## CIRCUIT DESCRIPTION

**Circuit Description**—Models EB35 Mk.II and EB35 Mk.II/S.

### Ranges 1—5

The RF Section on Ranges 1—5 comprises TR1, TR2 and TR3 (3 x OC171). TR1 is a grounded-base amplifier with signal input applied to the emitter from a tap on the appropriate tuned circuit which is selected by S1a, c and d. L1 and C2 serve as a 465kHz IF rejector circuit, while diodes D6/7 provide protection for the input circuits and TR1 in the event of high induced voltages appearing in the aerial circuit. The RF Stage is coupled to the Mixer by L7—L11 which have low impedance secondaries to match the base impedance. Oscillator injection is to the emitter and IF output is taken from the collector to the 1st IF transformer IFT1.

A tuned collector circuit is employed in the Local Oscillator TR3 which tracks above the signal frequency on all ranges. Injection for the Mixer is taken from a low impedance link winding on the appropriate oscillator coil.

The RF Section is operated from a stabilised supply provided by the zener diode ZD. This gives a nominal 6.5V and maintains sensibly constant performance with falling battery voltage. All tuned circuits not in use are shorted out to prevent absorption and dead spots in the tuning of the range in use.

IF amplification at 465kHz is provided by TR5 and TR6.

The diode D2 which serves as the Detector is housed in the IFT3 screening can, and also provides the AGC voltage which is applied to TR1 and TR5 via the filter R36/C58. Audio output from the Detector is routed to the Audio Section via S11.

### FM Band

The FM Tuner Unit operates over the band 88.0—108.0MHz. Aerial input is applied to a broadband tuned circuit L18, C96, C97 and amplified by TR12. L17 and C95 serve as a 10.7MHz IF rejector circuit. L19 and C100 in the collector circuit of TR12 provide selectivity at aerial frequency, L19 being permeability tuned and ganged to the oscillator coil L20.

The oscillator frequency is  $F_s$ —10.7MHz (77.3 to 97.3MHz) and when mixed with the aerial frequency in the Mixer TR13, produces an IF of 10.7MHz. IF output is filtered by tuned circuits L21, L22 and C109 and amplified by an untuned pre-amplifier TR1. Further IF amplification is provided by TR4, TR5 and TR6.

D3/D4 serve as a Foster-Seeley Discriminator with audio output taken from the junction of R42 and C79 via C80 to the FM position on S11.

In the Mk.II/S version an AFC circuit is incorporated, this comprising variable capacitance diode D1, C110, C111, R76 and R78. The capacitance of D1 will vary with the change of DC potential derived from the discriminator circuit. An AFC switch is provided to enable the circuit to be disabled when tuning to a station.

In this version, output from the Discriminator is taken from the junction of R42 and C79 (C80 deleted) to pin 1 on the stereo decoder board. It is then taken from pin 12 and reinserted via R79 and C113 to the FM position on switch S11.

### Audio Section

AM or FM audio is selected by S11 and then fed to the volume control RV3. Two sockets are provided at this point in the circuit, one of which permits direct connection to any standard domestic tape recorder or hi-fi audio amplifier. The other is arranged to interrupt the normal signal path and can be used to feed signals derived from a microphone or other audio source into the receiver audio stages for amplification. A TONE control RV2 is included and is operative in all modes of operation.

Five transistors (TR7—TR11) are employed in the Audio Section, TR10 and TR11 being a complementary transformerless output circuit connected to the 8  $\Omega$  loudspeaker. A telephone headset can be connected to a socket at the rear, in which case the internal loudspeaker is automatically disabled. An external 8  $\Omega$  speaker can be connected to the same socket when extension speaker facilities are required.

### Stereo Decoder (Model EB35 Mk.II/S only)

The input to the Stereo Board (Pin 1) contains, during stereo transmissions, both the left-hand and right-hand channel information plus the 19kHz pilot tone.

The pilot tone is extracted by tuned circuit L1/C2 and is amplified by TR1. TR2, tuned circuit T1 primary and C5 act as a frequency doubler circuit to produce a 38kHz sampling signal. The biasing and operating conditions of TR1 and TR2 are arranged such that varying input levels of pilot tone do not affect the input/output phase relationship thus maintaining optimum channel separation.

The LH and RH channel information is taken from the collector of TR4 via C10 to the centre-tap of T1 secondary winding. Diodes D2, D3, D4 and D5 are phase sensitive detectors which series gate the LH and RH channel information to their respective circuits during each half cycle of the 38kHz sampling signal.

Filter C15, R18, C17 and C14, R17, C16 form a de-emphasis network and at the same time remove any of the 38kHz component which has not been cancelled in the balanced ring demodulator.

TR6 and TR7 are incorporated as impedance matching devices providing low-level outputs of the order 0.7V p-p.

## MAINTENANCE

### Re-alignment

Instructions for re-alignment of the Mk.II receiver can be taken from the Instruction Manual for the standard receiver. It should be noted, however, that the 10.7MHz IF sensitivity is somewhat higher on the Mk.II version, due to the pre-amplifier stage which has been added. A figure of the order 7—10  $\mu$ V is typical for 50mW output. When carrying out FM alignment on the Mk.II/S version it is essential to disable the AFC circuit.

The following additional instructions are applicable only to the Mk.II/S fitted with Stereo Decoder.

### Re-alignment of Stereo Decoder (Model EB35 Mk.II/S)

To align the Stereo Decoder correctly an accurate 19kHz signal must be used. Since this may not readily be available the method proposed uses the transmitted 19kHz pilot tone.

Disconnect the input lead to pin 1 on the Decoder Board. Connect a 25K potentiometer between the input lead and earth and connect the wiper to pin 1.

Adjust potentiometer for maximum input. Tune L1 and T1 so that the Stereo Indicator Lamp lights. Repeat this several times, progressively reducing the input so that T1 is kept below saturation.

Reconnect the input lead to pin 1, and compare the input signal with that obtained at the junction of R7/C5 by connecting the "X" input of an oscilloscope to this junction and the "Y" input to pin 1.

Rotate the core of L1 a few degrees in an anti-clockwise direction to obtain a Lissajous figure resembling a figure of eight.



## INSTALLATION AND OPERATION

### Model EB35 Mk.II

The notes given in the standard EB35 Instruction Manual are directly applicable to the Mk.II version, except that the telephone headset socket is located at the rear of the set instead of on the panel. Note also that the tuning scales on the Mk.II versions of the EB35 are calibrated in kHz and MHz. These abbreviations (KILOHERTZ and MEGAHERTZ) have only recently been introduced on receivers manufactured in this country. 1kHz = 1kc/s. 1MHz = 1Mc/s.

### Model EB35 Mk.II/S

The following paragraphs are devoted to installation and operation of the Mk.II/S version for FM and stereo working. In all other respects it is identical to the standard Mk.II receiver and the reader is directed to the notes on installation given in the EB35 Instruction Manual.

A normal stereo system will comprise an EB35 Mk.II/S receiver together with a high quality dual-channel stereo amplifier and a pair of matching loudspeaker units.

Two plugs are provided to mate with the STEREO O/P sockets at the rear of the receiver, which must be connected to the respective input connectors on the particular amplifier employed. Interconnecting leads should be made up with screened cable, and reference should be made to the handbook supplied with the amplifier for details of all other connections required. The receiver audio stages are not employed in this mode of operation, so the VOLUME control should be set to minimum to eliminate output from the receiver speaker.

If a single-channel (mono) amplifier only is available, a simple stereo system can be set up by using the receiver audio stages for one channel, and the external amplifier for the other. It is still preferable that two matched loudspeakers should be used, but reasonable results may be achieved by using a combination of the internal loudspeaker and one other. When separate speakers are employed, one should be connected to the external amplifier, and the other to the PHONES socket at the rear of the receiver. Insertion of the plug into this socket will automatically interrupt the normal speaker circuit.

In stereo installations of this type, one STEREO O/P socket is connected via screened lead to the external amplifier as in a normal system. The other STEREO O/P socket is linked to the receiver AUDIO I/P socket using a relatively short length of screened cable terminated with two of the miniature plugs supplied with the receiver. The normal receiver VOLUME and TONE controls provide adjustment of the output on this channel, while similar controls on the external amplifier permit adjustment of the other channel.

It is most important that the two loudspeakers are positioned correctly in relation to the listener if true stereophonic results are to be obtained. They should be between 8 and 12 feet apart, angled towards the listening position which should be located some 6 to 8 feet from the centre of a line between the two speaker positions.

It is also important to check that the two loudspeakers are phased correctly. To verify this, walk in turn towards each speaker from the correct listening point, while tuned to a stereophonic music transmission. Incorrect phasing would be apparent if there is a sudden reduction in bass output when walking towards one of the two speakers. In this event the connections to either speaker (not both) should be reversed, either at the speaker itself or at the amplifier, whichever is most easily accessible.

Checks should also be carried out to determine the most suitable settings of the VOLUME and TONE controls on the two channels. This can be done most conveniently by listening to a "mono" transmission, adjusting all controls in turn until it is judged that the tonal quality and level from both speakers are most closely matched.

### Tuning an FM Station on the EB35 Mk.II/S

The EB35 Mk.II/S incorporates an automatic frequency control (AFC) circuit which corrects any tendency for the receiver to drift off tune when listening to transmissions on the FM Band. The circuit must be disabled to allow the receiver to be tuned accurately to the desired station, this being achieved by depressing the AFC SWITCH on the panel.

### Stereo Indicator Lamp

The stereo indicator lamp at the bottom left-hand corner of the dial will glow when the received signal is transmitted with stereophonic sound. Three peaks of brightness will be noted when tuning across a stereo signal (AFC SWITCH depressed). The correct tuning point is the centre one. The lamp will extinguish when the transmitting station reverts to "mono" transmission.

## SPARES

The following additional items are applicable to the Mk.II and Mk.II/S versions of the EB35.

FM Tuner Unit	..	..	..	..	..	7655P
19kHz Inductor (Stereo Decoder)	..	..	..	..	..	D4103
38kHz Inductor (Stereo Decoder)	..	..	..	..	..	D4104
Stereo Indicator Lamp	..	..	..	..	..	7838P
AFC Switch	..	..	..	..	..	6918P
Dial Glass (Calibrated) Mk.II	..	..	..	..	..	D3516B
Mk.II/S	..	..	..	..	..	D3516B/1

Manufacturers:



**EDDYSTONE RADIO LTD.**  
MEMBER OF GEC-MARCONI ELECTRONICS LIMITED  
**ALVECHURCH ROAD, BIRMINGHAM 31.**

Telephone: 021-475 2231

Cables: EDDYSTONE, BIRMINGHAM

Telex: 33708

