H.M.V. Model 2404 'Unit Audio'

General Description: Separate tuner-amplifier, record player and loudspeaker enclosures. The combination is designed to provide high fidelity stereo or mono reproduction from gramophone records or V.H.F./F.M. broadcasts.

A.C. Mains Connections: The tuner-amplifier and transcription unit are each independently fitted with a three-core mains lead conforming to the new colour code specification, i.e. Live—Brown, Neutral—Blue, and Earth—Green/Yellow, and must be connected to the mains supply via 3-pin plugs. If the mains plug incorporates provision for a fuse, one rated at 2 or 3 amps should be fitted to each plug.

Mains Voltage Adjustment: The transcription unit is normally set for 200–250 V A.C. operation. The tuner-amplifier mains voltage adjustment, at the rear of the instrument, should be set as follows: For 200–225 V supplies, set at 220 V; for 230-250 V supplies, set at 245 V. *Caution:* On some selectors the 120 V position may be located between the 220 V and 245 V positions.

Fuses: Three 20 mm cartridge type fuses are fitted in the tuner amplifier. These are located on the chassis left-hand end panel: F1, 1 amp surge proof, mains input; F2, 1 amp, in the panel lamp circuit; F3, 4 amp, in the power rectifier feed lead.

Loudspeakers: The tuner-amplifier provides an output power of 25 watts (speech and music) on each channel at an impedance of 4 ohms. Loudspeakers of less than 4 ohms impedance or of inadequate power handling capabilities must not be connected to the tuner-amplifier. The system comprises a 12 in. longthrow bass unit and a 4 in. sealed back mid-frequency and treble unit in a sealed and acoustically damped enclosure.

For access to loudspeakers, take out screws securing cabinet back, then remove acoustic damping material.

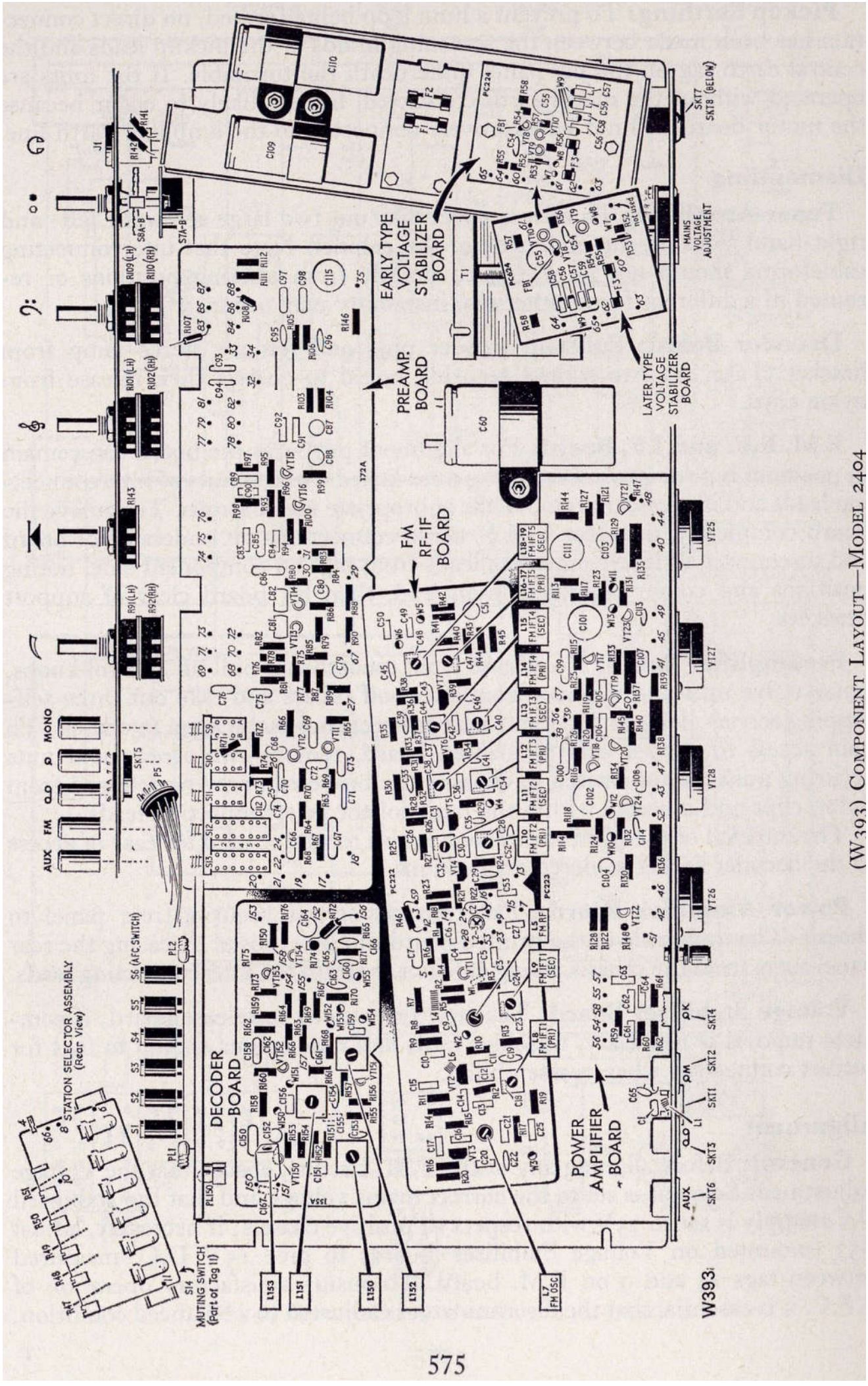
If for any reason, the loudspeakers are to be operated with the back cover removed it is essential that the volume is kept well attenuated otherwise damage to the high compliance cones may occur.

Input/Output: The tuner-amplifier facilities are: *Tape socket:* Input—300 mV into 56 kΩ; Output—60 mV at 68 kΩ with 1 mV V.H.F./F.M. input (25 kHz deviation).

Stereo headphone socket: Output impedance 300 Ω–600 Ω.

Auxiliary input socket: 20 mV into 6·8 kΩ.

Pickup Lead: Two pickup sockets are fitted in the tuner amplifier: *Magnetic*—marked M—6·8 mV into 47 kΩ, marked K; *Ceramic*—220 mV into 1·2 MΩ. The latter socket (K) is for use with ceramic type pickups only. The transcription unit pickup lead should be connected to magnetic (M) socket.



(W393) Component Layout—Model 2404

Pickup Earthing: To prevent a hum loop being formed, no direct connection has been made between the screening braids of the pickup leads and the central earth tag on the tag panel underneath the turntable. If the units are operated without the mains earth connected, hum is likely to occur because the motor board will not be effectively connected to the amplifier earth line.

Dismantling

Tuner-Amplifier: To release cover take out two large screws at left- and right-hand sides on the underside of the cabinet. Note that interconnecting cableforms should not be disturbed unduly from existing positions or re-routed in a different form, otherwise instability may occur.

Decoder Board: Pull out decoder plug and remove stereo lamp from bracket. Take out two screws securing board to chassis then release from nylon clips.

F.M. R.F. and I.F. Board: For alignment purposes the board can remain in position, but for general servicing raise board within limits of interconnecting leads and if necessary remove the appropriate metal screen. To remove the board completely, unsolder V.H.F. aerial connections on underside of board and disconnect all interconnecting leads from tags on component side, noting positions and colour coding of each lead, then lift board clear of support brackets.

Preamplifier Board: To release front escutcheon, pull off control knobs, remove five nuts and washers from stand-off pillars and take out three self-tapping screws along underside front edge securing escutcheon to chassis. To gain access to copper side of printed board, remove two screws and nuts securing push-button switch to chassis; the board can now be released from nylon clips and inverted within the limits of the interconnecting leads.

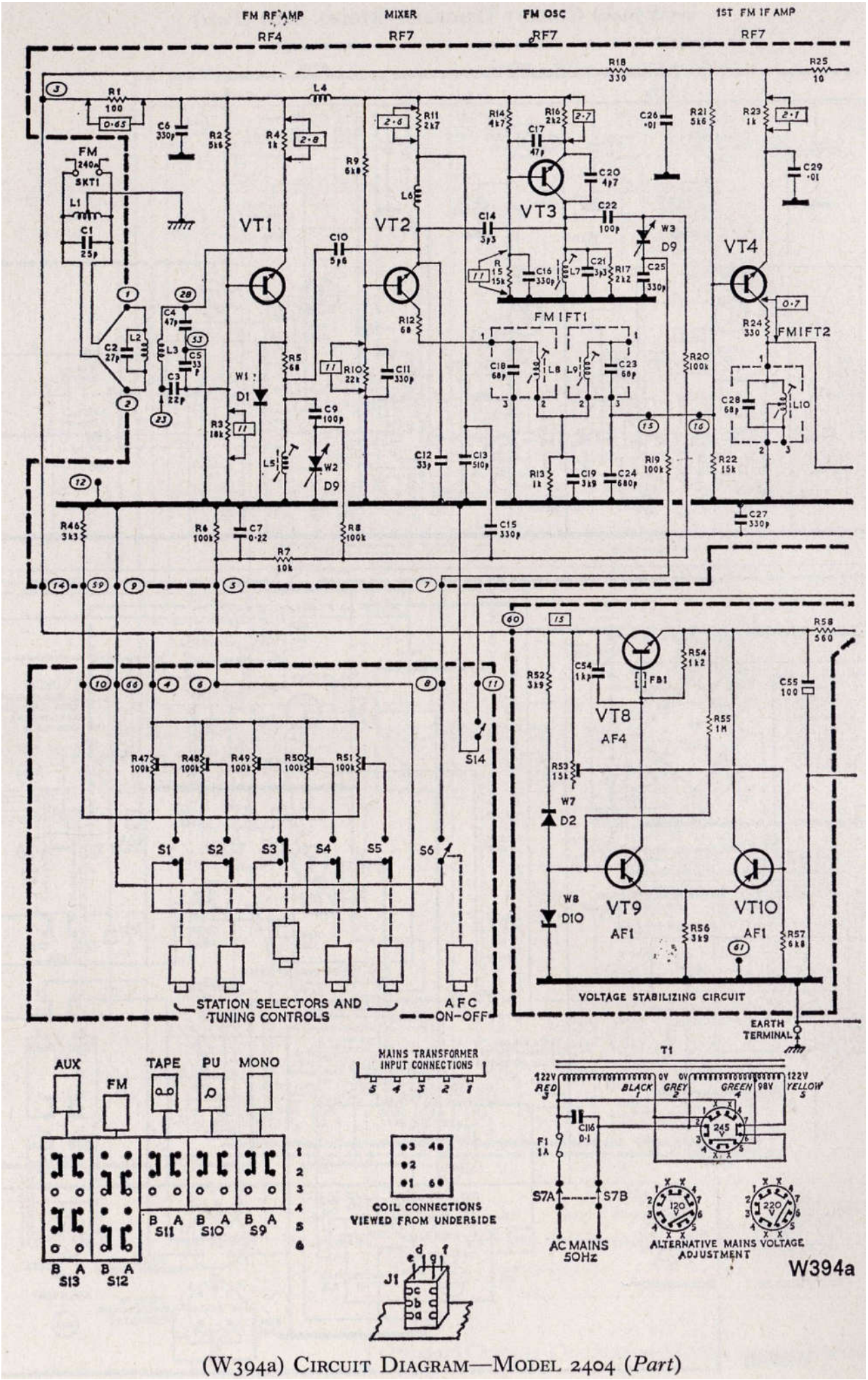
The removal of the front escutcheon is also recommended for ease of access to the decoder socket soldered connections.

Power Amplifier Board: Take out six screws securing rear panel to chassis. The underside of the printed board can be exposed by easing the rear panel away from the chassis taking care not to strain the interconnecting leads.

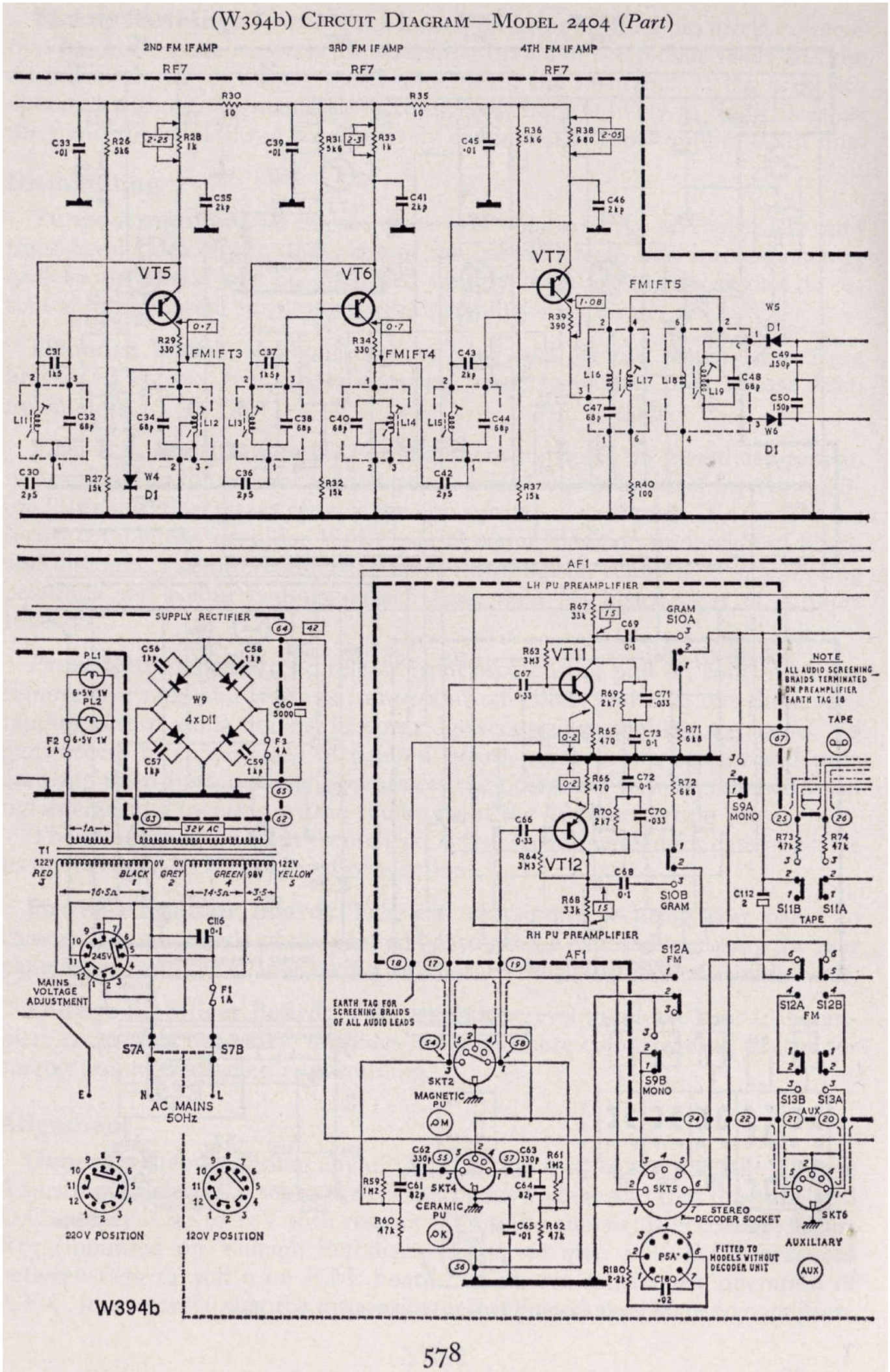
Voltage Stabiliser Board: Take out two screws to release board; if complete removal is necessary, unsolder leads and note colour coding to tags for correct connection when reassembling.

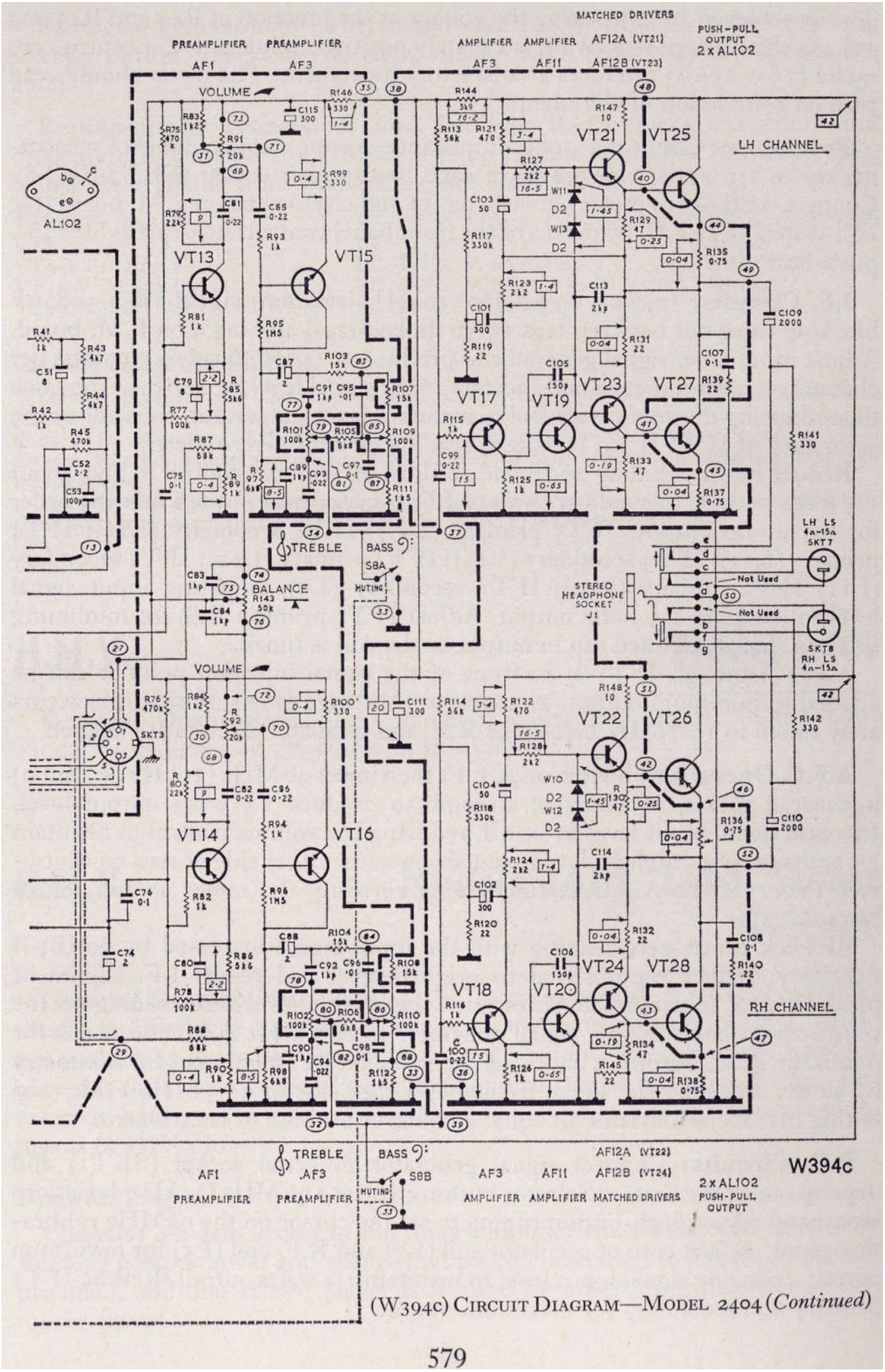
Alignment

General: Before aligning any of the F.M. circuits, ensure that the Voltage Adjustment Selector is set to the correct mains voltage and that the stabilised D.C. supply is set to 15V with respect to positive chassis; if necessary, adjust R53 (mounted on Voltage Stabiliser Board) to give 15V D.C. measured between tags 14 and 9 on F.M. board. To ensure satisfactory operation of A.F.C. it is essential that the discriminator is adjusted to a balanced condition.



(W394a) Circuit Diagram—Model 2404 (*Part*)


(W394b) Circuit Diagram—Model 2404 (Part)
2ND FM IF AMP
3RD FM IF AMP
4TH FM IF AMP
RF7
VT5
VT6
VT7
FMIFT3
FMIFT4
FMIFT5
AF1
LH PU PREAMPLIFIER
RH PU PREAMPLIFIER
SUPPLY RECTIFIER
W9
4xDII
PL1
PL2
6·5V 1W
F2 1A
F3 4A
T1
122V
32V AC
MAINS VOLTAGE ADJUSTMENT
F1 1A
S7A
S7B
AC MAINS 50Hz
220V POSITION
120V POSITION
GRAM S10A
S10B GRAM
VT11
VT12
S9A MONO
S9B MONO
TAPE
S11B
S11A
S12A FM
S12B FM
S13B AUX
S13A AUX
SKT2 MAGNETIC PU
SKT4 CERAMIC PU
SKT5 STEREO DECODER SOCKET
SKT6 AUXILIARY
FITTED TO MODELS WITHOUT DECODER UNIT
EARTH TAG FOR SCREENING BRAIDS OF ALL AUDIO LEADS
NOTE
ALL AUDIO SCREENING BRAIDS TERMINATED ON PREAMPLIFIER EARTH TAG 18
W394b



(W394c) Circuit Diagram—Model 2404 (*Continued*)

This is achieved by measuring the voltage at the junction of R44 and R45 (tag 13). As this voltage will swing alternately positive and negative, a centre-zero meter (25-0-25 μA) produces a satisfactory movement. The meter should read zero on completion of alignment.

Procedure: Connect a 4 ohm impedance output meter capable of measuring up to 1·5 watts (sine wave) to each loudspeaker socket (SKT7-SKT8). Connect centre-zero meter between tag 13 and chassis line on F.M. board (tag 12), switch off A.F.C. by means of the front panel control and depress the F.M. push-button.

I.F. Circuits: Inject a 10·7 MHz (50 kHz deviation) signal via a 5000 pF blocking capacitor between tags 15/16 (linked tags) and tag 9 on F.M. board. Adjust input from signal generator to produce an output level of 1·5 watts per channel on output meters and increase input signal level by 20 dB, at the same time reducing the volume control to maintain 1·5 watts output, then adjust the secondary of IFT5 (L19) for a zero reading on centre-zero meter.

Reduce input signal by 20 dB and readjust the volume control to give about 1·5 watts output, then adjust cores of I.F. transformers in the following order for maximum output: IFT5 primary (L17); IFT4 secondary (L15); IFT4 primary (L14); IFT3 secondary (L13); IFT3 primary (L12); IFT2 secondary (L11) IFT2 primary (L10); IFT1 secondary (L9), adjusting input signal level to maintain 1·5 watts output. Adjust IFT1 primary (L8) for minimum, this is a sharply defined dip in output as the coil is tuned.

Note: Although IFT1 is in front of the signal injection point it can be aligned to minimum output, as above, at this stage to ensure that it is accurately tuned to 10·7 MHz before the R.F. and oscillator circuits are aligned.

A.F.C. Operation: Switch on A.F.C. then inject 96 MHz (25 kHz deviation) into aerial socket, of sufficient strength to produce 1·5 watts output level. Increase signal input level by 20 dB, reducing the volume control to maintain 1·5 watts output. Slightly detune signal generator either side of zero on centre-zero meter; if the A.F.C. is functioning correctly the meter should return towards zero.

Recheck centre-zero reading with the input signal increased by 20 dB; if necessary, reduce input signal to original level and repeat I.F. alignment procedure for maximum F.M. output consistent with a zero reading on the centre-zero meter. Switch signal generator to 10·7 MHz A.M. and check for minimum A.M. output. A check can be made on I.F. alignment for symmetry by slowly swinging the signal frequency either side of 10·7 MHz F.M., and noting that meter deviates an equal amount either side of centre-zero.

R.F. Circuits: Connect signal generator to aerial socket (SKT1) and depress one of the Station Selector buttons. Inject a 96 MHz (25 kHz deviation) signal and adjust push-button tuning to set the cursor on the 96 MHz calibration point. Adjust core of oscillator coil (L7) and R.F. coil (L5) for maximum output, reducing signal input level to maintain 1·5 watts output. Retune IFT1 primary and secondary for maximum output.

Set signal generator to 88MHz and check calibration by rotating tuning selector button; repeat at 108MHz; finally check sensitivity throughout the band.

Replacement Transistors and Diodes: Replacement transistors and diodes are obtainable from BRC Service Depots. Suitable Mullard types, which are available from wholesalers, are listed below:

VT2-VT7 (incl.)	BF194	VT151-VT153 (incl.)	BC109 or BC108B
VT8	BFY52	VT154	AC128
VT9-VT14 (incl.)	BC187	W1-W6 (incl.) ..	OA90
VT15-VT18 (incl.)	BC108B	W7 and W10-W13 (incl.)	BA114
VT19, VT20	BC186	W150-W155 (incl.)	OA90

Circuit Diagram Notes:

Voltage measurements shown in rectangles were taken relative to positive chassis line (except where otherwise indicated) with a 20,000 ohm/voltmeter under "no-signal" conditions. D.C. resistances of the mains transformer windings are given where these are 1Ω or greater. All other inductances are less than 1Ω. Ringed figures indicate printed board tag connection points.

The following differences from the circuit diagram may be found in some tuner-amplifiers: C115 and C116—not fitted. R144—4·7kΩ; R146, R147 and R148—not fitted.

H.M.V. Models 2414, 2416 'Stereo System'

General Description: The H.M.V. "Stereo System" 2416 incorporates a tuner-amplifier type 2414 which is electrically similar to the H.M.V. Model 2404 which is described elsewhere in this volume. The turntable unit employed is the Garrard type SP25 with a Goldring 800H pickup cartridge. Two external loudspeaker enclosures, disignated type 2415, are connected by means of DIN plugs.

Dismantling

Chassis: To gain access to the tuner-amplifier chassis proceed as follows: Remove perspex cover and ensure that pickup is secured to its rest by the clip provided, and that record player is secured by unscrewing transit screws to fullest extent.

Place the instrument on one end on a grit free resilient surface and remove screws and cup washers at each end of the base board securing cabinet and motor board. Return instrument to the horizontal position and raise cabinet within the limits of interconnecting leads on record player. Pull out motor mains plug and pickup plug to release cabinet and turntable unit from the tuner-amplifier chassis.

Record Player: To remove the record player from the cabinet, unscrew transit screws to fullest extent to lock unit, then secure pickup and remove cabinet as described earlier. Screw transit screws fully in; pivot clips on the underside of transit screws to allow them to pass through holes in motor board, then lift record player clear.

Loudspeaker System: Each enclosure contains two separate dual cone, high compliance, $5\frac{1}{2}$ in. diameter permanent magnet units, suitably damped to reduce resonances.

The loudspeaker can be removed from the front after pulling off the front fabric panel which adheres by a special process permitting it to be pressed back into place again. Do not operate the loudspeaker at high volume when it is outside of the cabinet otherwise damage may be caused to the high compliance cone.

Note : Out-of-phase loudspeakers give impaired quality of reproduction on stereo. If, therefore, a loudspeaker is replaced it is essential to reconnect it in the same phase. The "positive" tag of each loudspeaker is marked with a red spot.