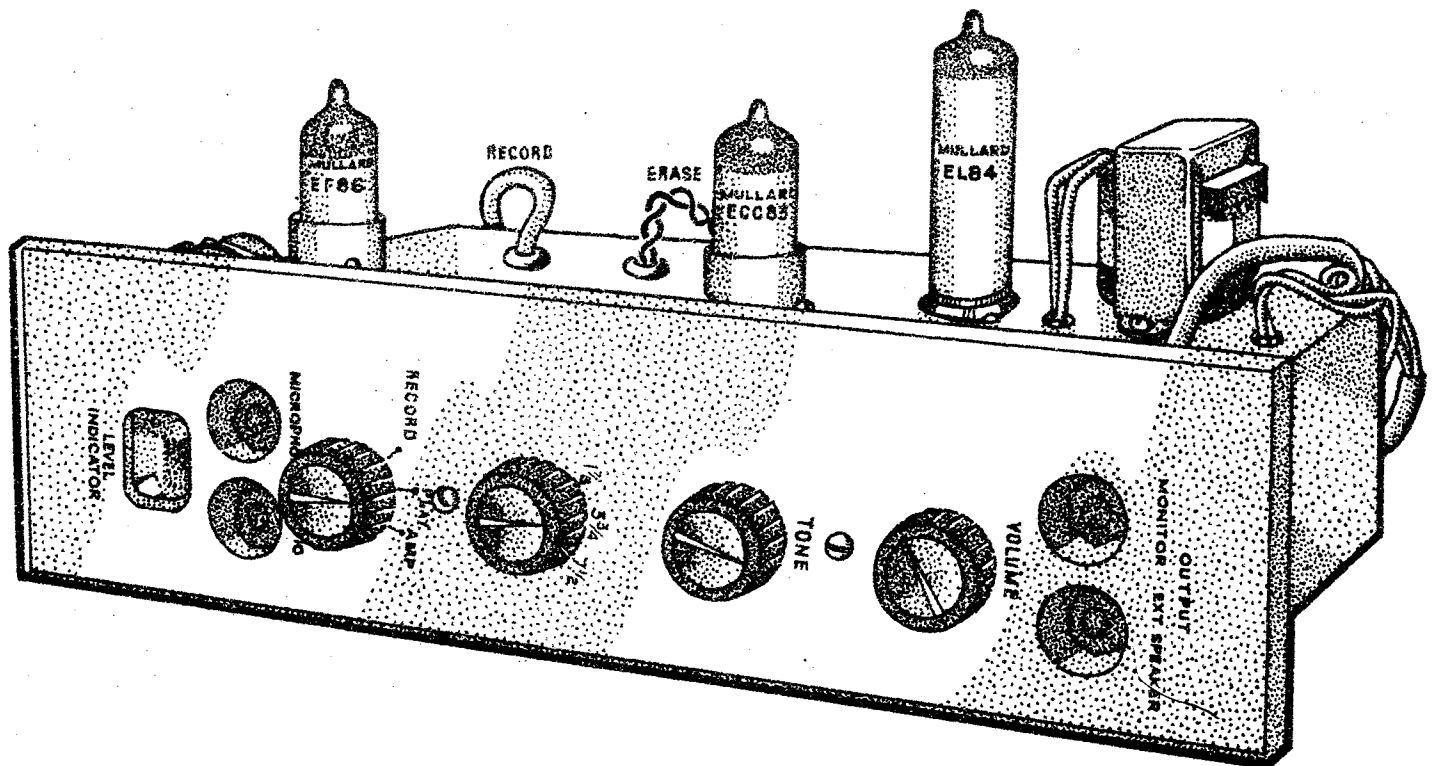


Stern's

COMPLETE ASSEMBLY DATA and DIAGRAMS
FOR THE CONSTRUCTION OF

HIGH QUALITY TAPE AMPLIFIER MODEL HF/TR3 (MKII)

- ⊙— BASED ON A VERY SUCCESSFUL DESIGN BY MULLARD Ltd.
- ⊙— CAN BE MATCHED FOR USE WITH MOST TAPE DECKS.
- ⊙— TREBLE EQUALISATION BY FERROXCUBE POT CORE INDUCTOR.
- ⊙— PROVIDES FOR 3, 7.5 or 15 ohm LOUDSPEAKERS.
- ⊙— INPUTS FOR MICROPHONE PICK UP/VHF RADIO, ETC.
- ⊙— OUTPUTS FOR EXTENSION SPEAKER, HEADPHONE MONITORING ON RECORD & FOR HIGH FIDELITY REPLAY THROUGH EXISTING AUDIO SYSTEMS.



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INTRODUCTION

This high quality Tape Amplifier is based on a design of Mullard Laboratories. First published in 1956 it has proved to be of outstanding performance and is certainly one of the best tape amplifiers available. Recent modifications have been incorporated to ensure that the amplifier will give optimum performance with the improved tape heads and recording tape now currently available.

The Amplifier is completely self contained. The Power Supply is constructed as a separate unit to ensure the lowest possible level of hum in the amplifier. Together with one of the first class tape decks now available it makes an ideal combination to incorporate in portable tape recorder cases or alternatively in permanent domestic installations. The design incorporates input Jack Sockets for Microphones and Radio-Gram. An output Jack Socket for the connection of an Extension Loud-speaker and a low level output for Monitoring with headphones on Record, or for feeding the Record signal to a high fidelity external amplifying system on Replay. Equalization depends on the tape speed used and facilities are provided by means of the switch S2 to select correct equalization for any one of the three different tape speeds. Treble equalization is achieved by means of a resonant circuit between the first and second stages of the amplifier, and is applied during the recording process using the latest Ferroxcube pot core inductor, Bass equalization is a function of the Replay amplifier and is arranged for the different tape speeds by selective feed back. The recording level is set in conjunction with a Mullard EM81 magic eye indicator conveniently viewed through a window in the amplifier chassis. Only top grade components, including Mullard B.V.A. valves, and a specially designed output transformer by Gilson are supplied.

The layout and easy to follow stage by stage drawings have been carefully produced for simplicity. We are confident therefore that even the semi-experienced constructor will have no difficulty in building a truly professional amplifier that will prove robust and reliable in operation and provide endless enjoyment from the ever growing science of Tape Recording.

CIRCUIT DESCRIPTION.

A three stage circuit is employed for both Recording and Replay processes with a fourth stage acting as a bias oscillator when Recording and the Audio output stage during Replay. The switching between the Record and Replay conditions is effected by a three way - three bank switch S1 (also coded SA). the third position providing for the amplifier to be used for "straight through" reproduction from gramophone records or a Radio Tuner. Equalization for three different tape speeds is selected by a three position single bank switch (S2).

INPUT STAGE V1.

A Mullard low noise pentode valve EF86 acts as a voltage amplifier for both Record and Replay processes. Two input Jack sockets are provided, Microphone (J1) and Pick-Up/Radio (J2) both are fed to the grid of the EF86., J2 input being attenuated to the level of the microphone by means of a resistive network R1 and R2. Switching is achieved by inserting the Jacks so that only one input may be used at a time.

EQUALISER. STAGE V2a and b

The first half of the Mullard double triode valve ECC83 is used to provide Recording and Playback equalization, while the second section is used as the output stage on Record and acts as a voltage amplifier on Replay. During recording a resonant circuit incorporating a tuned Ferroxcube pot core inductor (LA42) in the lower arm of an attenuator is used to provide treble boost. The frequency at which maximum treble boost occurs is determined by the switch S2 selecting the tuning capacitor C5 - C6 or C7.

The amount of treble boost is controlled by the resistors R8 & R12. Should the amount of boost be excessive with certain tape heads the inductor (LA42) may be damped by connecting a resistor across each tuning capacitor. The optimum values should be determined by listening tests. The values of resistors R9-R10 and R11 switched by J2 have been chosen to give the correct feedback between the anode and grid of the first section of the ECC83 for base equalisation during Replay. The tone control VR2 with Capacitor C16 is operative only during Replay giving continuously variable treble cut.

A low level output 250mV at 56K source impedance is taken from part of the anode load of this stage. It can be used for headphone monitoring on Record and for feeding an external amplifier on Replay. The output level may be modified by adjusting the values of R13 - R14. The full output from the equalisation stage is fed via the Level-Volume Control (VR1) to the grid of the second section of the ECC83. The recording signal is fed to the recording head by way of a parallel - T network which is tuned to the bias frequency. This arrangement produces a substantially constant drive to the head and at the same time provides efficient rejection of the bias voltage at the anode of the recording output stage. Parallel bias injection is made to the recording head via C22 the value of which determines the bias current.

OSCILLATOR & POWER OUTPUT V3.

A Mullard output pentode valve EL84 provides the RF oscillations for the bias and erase signals on Record, and is the power output stage on Replay. Bias output is taken from the anode of the EL84 connected in a Hartley-type oscillator circuit. The oscillator coil and the primary winding of the output transformer are arranged in series, the latter being short-circuited during Record. The oscillator coil and some components in the oscillator circuit may be varied in accordance with the Table on Page 8 to provide the correct conditions for different Record and Erase Heads. The frequency of oscillation is determined by the capacitor C24 and the fine adjustment of the variable dust core of the coil TDO/2S. The presence of the capacitor C23 prevents the abrupt cessation of oscillations when the switch SA8 is switched from the Record to Replay position, this section of the switch has a break-before-make contact, and this prevents the Record/Replay head from being permanently magnetised. The Erase Head is fed from the low impedance secondary of the coil TDO/2S. During Replay the Erase Head is earthed at SA5, and approximately 10dB of negative feedback is applied from the secondary winding of the Output Transformer to the cathode of the 2nd section of V2 (ECC83). A high grade sectionalised output transformer allows for loudspeakers of different impedance 3.75-7.5 or 15 ohms to be used. The Jack Socket (J4) is connected in the secondary of the output transformer and allows for the connection of an external loudspeaker. The insertion of the Jack Plug into this socket automatically disconnects the internal speaker.

RECORDING LEVEL INDICATOR V4.

A Mullard Signal-Level Indicator Valve EM81 is fed from the anode circuit of the second section of V2 via a Germanium Diode OA81 detector circuit. The value of the resistor R23 governs the sensitivity of the indicator and has been chosen to give sufficiently high sensitivity to allow a large series Resistor R24 to be used to minimise the loading effect on the recording output stage (V2b). Conditions are such that the target shadow closes for a recording current of 80uA. In the Replay position SA6 disconnects the H.T. supply from the EM81 anode, making the indicator inoperative in this position.

POWER UNIT V5.

The power unit is of conventional form and uses a Mullard EZ81 full wave rectifier valve. Resistive-Capacitive network ensures adequate filtering. A floating mains ON/OFF switch fits conveniently to the Studio Tape Deck, slight variations are incorporated for use with the Truvox Tape Deck. The smoothed H.T. rail is 300 volts. The mains transformer TSC/1 is designed for the amplifier requirements, no extra power to feed the auxiliary equipment is therefore available from the power unit.

BUILDING THE AMPLIFIER.

The drawings give simple stage by stage instructions for assembly and wiring of the amplifier. No difficulty will be experienced by the home constructor if these are followed precisely and in the sequence given, provided all components are exactly as specified.

Ensure that each connection is effected with neat and positive soldered joints and that the wiring and components are positioned precisely as shown in the practical diagrams. This will avoid the possibility of instability that may result from indifferent wiring.

TOOLS.

The main requirements are a small Soldering Iron of the Instrument Type, a screwdriver a small pair of pliers or strong tweezers, a pair of side cutters, and a reel of 18 swg Ersin Multicores Solder.

COMPONENTS

The wire ends of Condensers and Resistors should be trimmed to the required length by first arranging the component in its approximate correct position bending the leads as necessary and cutting them at the proper point, allowing of course sufficient wire to make the solder joint. Sleeving should be used wherever necessary to prevent shorting to other components. Always observe the polarity of Electrolytic Condensers., the black ring round one end of paper condensers indicates "outside foil" and should be treated as the "Earthy End".

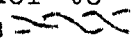
SOLDERING

It is most important to ensure good soldered joints. We recommend therefore that a small electric Iron of the instrument type be used. Use a good flux-cored solder such as Ersin Multicores 18 swg. The best method is where possible to first secure the component or wire to the tag so that it will remain in position without having to hold it, then lay the point of the solder over the joint and apply the tip of the iron on top. The iron must never be applied for longer than is necessary to secure a good joint, otherwise overheating of the components or plastic wire will cause damage. Too much solder should be avoided as it will run down the tag and possibly form a short circuit to an adjacent tag. This can very easily happen when soldering the valve sockets as the pins are spaced close to one another. If the solder does not run easily, the tag or wire should be slightly scraped with a small blade and then the cleaned part should be well 'tinned' before actually soldering to its appropriate connecting point.

Remember that the golden rule for soldering is to ensure that the wires to be soldered Must be clean and then if the two surfaces to be joined are heated simultaneously and good cored solder used, a perfect electrical joint will result.

GENERAL

Keep a continuous watch on the stage wiring and instructions and always check each stage, very carefully before proceeding to the next - it will be much easier to trace an incorrect connection in this way than having to fault find when the amplifier has been completed.

It will be observed that as the stage wiring progresses the wiring shown in the previous stage has been omitted for clarity. The heater wiring and any wires carrying A.C. must be lightly twisted together to avoid hum radiation, such wiring is indicated on the drawing thus  The wire supplied for the heater wiring is thin green plastic, and will lend itself very readily for the purpose.

Tinned copper wire is supplied for the mains wiring and this should be bent and cut, and then sleeved as necessary before fitting into the chassis.

Wiring shown dotted ----- on drawing indicates that it runs underneath the components.

Plastic connecting wires must be handled carefully and attention given to rapid soldering to avoid overheating which would cause damage to the plastic insulation.

FEEDBACK... It is essential that the feedback applied from the Secondary winding of the output transformer to the cathode of the second section of V2 (ECC83) should be correctly phased. Negative feedback reduces distortion-positive feedback causes oscillation.

Therefore should a howl or severe oscillation be apparent when the amplifier is first switched On (In Replay Position) - Switch Off immediately and Reverse the two leads connected to the output transformer secondary (Top Tags). Prolonged oscillation due to incorrectly phased feedback will damage the Loudspeaker.

FINAL ADJUSTMENT... The Cores of Denco Oscillator Coils are pre-set in the approximate working position, therefore no critical adjustment involving the use of instruments will be necessary, and a CORRECTLY assembled amplifier should operate first time. If incomplete erasure is apparent the core should be adjusted up to 3 turns in either direction, but if this does not provide the cure then a careful inspection of the ERASE HEAD itself should be made. The following points are important.

- (1) That the head gap is at all times clear of oxide deposit from the tape; Clean with a soft cloth damped with methylated spirit.
- (2) Ensure that the gap is truly vertical and that the pressure pads ensure intimate contact between tape and head face.
- (3) That the head connecting leads are correctly connected, and that they are as short as practical. Short leads are essential when connecting high impedance heads due to the capacity of the screened cable introducing losses.
- (4) Obvious lack of erasure and a severely distorted recording indicates a defect in the oscillator circuit, and therefore no H.F. bias - Check carefully that the wiring of the stage is correct, and that components TD02/S - C21 - C24 - are in order.

"WHISTLE" WHEN RECORDING FROM RADIO RECEIVER... Indicates that the oscillator in the receiver is "Beating" with that in the tape amplifier. Slight readjustment of the core of the oscillator coil in the HF/TR3 will shift the frequency sufficiently to move the "beat note" away from the critical position of the Radio transmission being received.

EXCESSIVE HUM LEVEL OF REPLAY... It is of major importance to first position the power supply unit as described in Stage Six. When the hum level has been reduced to a minimum by this means, a simple but effective method to eliminate the remaining hum is to position a tiny chip of Mu-Metal either on the rear of the Record/Play Head or on the back of the pressure arm, normally directly behind the pressure pad. The correct shape and size of the Mu-Metal chip must, however, be found by experiment. The following procedure should therefore be adopted assuming of course that the hum experienced is not due to a fault in the amplifier such as defective smoothing or heater cathode leakage in V1 or V2.

- (1) Reverse the mains input plug connections at the mains supply point.
- (2) Carefully orientate the Power Supply Unit (See Stage Six).
- (3) Attach a chip of Mu-Metal approx $\frac{1}{4}$ " x $\frac{1}{4}$ " to match stick with a strong adhesive. Switch the amplifier to Replay, and set the volume control approx $\frac{3}{4}$ of rotation. Move the Mu-Metal round the rear of the Record/Play head or along the pressure arm until a particular position of almost inaudible hum is found. The Mu-Metal should then be stuck with adhesive to the head or pressure arm. Due to the extremely critical position it will probably be necessary to slightly readjust before the glue finally sets. The performance of the head is not effected by this operation.

Finally hum of a low pitch can also be caused if the tape deck is operated directly over power cables, or near equipment with high external fields - for instance - a magnetic field exists around any cable carrying A.C., such as the leads to a table lamp that may be positioned close to the recorder. Unless this simple cause is eliminated much time and unnecessary effort may be wasted searching for a non-existent fault in the equipment.

IMPORTANT.

It is essential that a tool made of Non-Magnetic material be used for making adjustments of any kind to tape heads. If a screwdriver that has become magnetised by previous contact with a magnet is used, permanent magnetisation of the head would occur causing poor results and possible serious damage to the head.

ALTERNATIVE SPEED EQUALISATION.

The assembly drawings show the component values for three speed equalisation i.e. 1-7/8". 3-3/4". 7-1/2" inches per second. A simple modification to the equaliser components and switching allows for the alternative combination of 3-3/4. 7-1/2. 15 inches per second to be incorporated. The constructor should follow the modifications shown in Table "B" carefully in conjunction with Stage One drawing.

It will be observed that the 1-7/8 inch per second components are removed entirely and the 3-3/4. 7-1/2 inch components are moved one position round the switch (S2) to enable the 15 inch per second switching to be in the correct sequence.

~ TABLE A. ~			
SPEED.	SWITCH.S2.	RESISTOR.	CAPACITOR.
1 7/8 IN SEC.	POSITION 1	R9. 2.2 M	C5. 330 Ppf.
3 3/4 IN SEC.	POSITION 2	R10. 1.2 M	C6. 330 Ppf.
7 1/2 IN SEC.	POSITION 3	R11. 560K	C7. 120 Ppf.

~ TABLE B. ~			
SPEED.	SWITCH.S2.	RESISTOR.	CAPACITOR.
3 3/4 IN SEC.	POSITION 1	R9. 1.2 M	C5. 330 Ppf.
7 1/2 IN SEC.	POSITION 2	R10. 560K	C6. 120 Ppf.
15 IN SEC.	POSITION 3	R11. 270K	C7. 56 Ppf.

FITTING THE HF/TR3 INTO STERN PORTABLE CABINETS.

- (1) Secure the Amplifier to the cabinet by two 4BA Bolts which should locate through the Perspex and the wooden control panels into Hank Bushes provided on the Amplifier Chassis.
- (2) Secure the Perspex Control Panel by small panel pins in each corner.
- (3) Secure the Power Unit to the Rear Wall of the Collaro "Studio" Cabinet (T10) with short wood screws.
Secure the Power Unit to the Base of the Truvox cabinet (T13) with short wood screws.

IN ALL CASES THE POWER UNIT MUST BE POSITIONED FOR MINIMUM HUM AS OUTLINED ON PAGE 4 AND STAGE SIX SPECIAL INSTRUCTIONS

- (4) Fit the Mains input socket to the hole provided on the Rear Wall of the Cabinet and connect to the Power Supply Unit as detailed in Stage Six.

Take great care to ensure correct connections between the Power Unit-Mains Socket, and Mains Input Plug.

TRUVOX - MOTEK - TAPE DECKS - OSCILLATOR MATCHING.

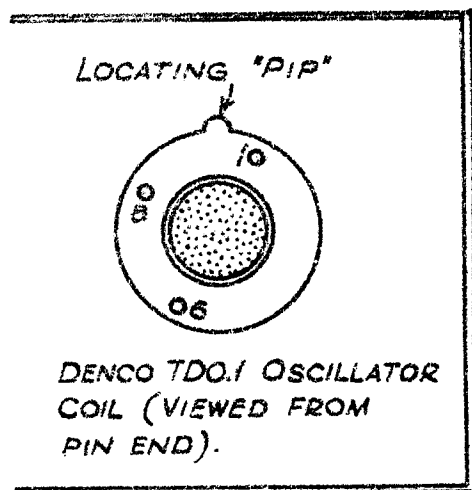
The manual has been prepared illustrating the oscillator arrangements for the Collaro "Studio" or Brenell Tape Decks, which incorporate a high impedance Record/Play Head and a low impedance Erase Head. Some other manufacturers however prefer to fit both heads (Record & Erase) at high impedance, such as, the very popular and excellent range by Truvox Ltd. For the benefit of those who prefer to use different tape decks or heads simple modification details together with a conversion table are given, these should be followed very carefully to ensure correct head matching :-

STAGE 1.

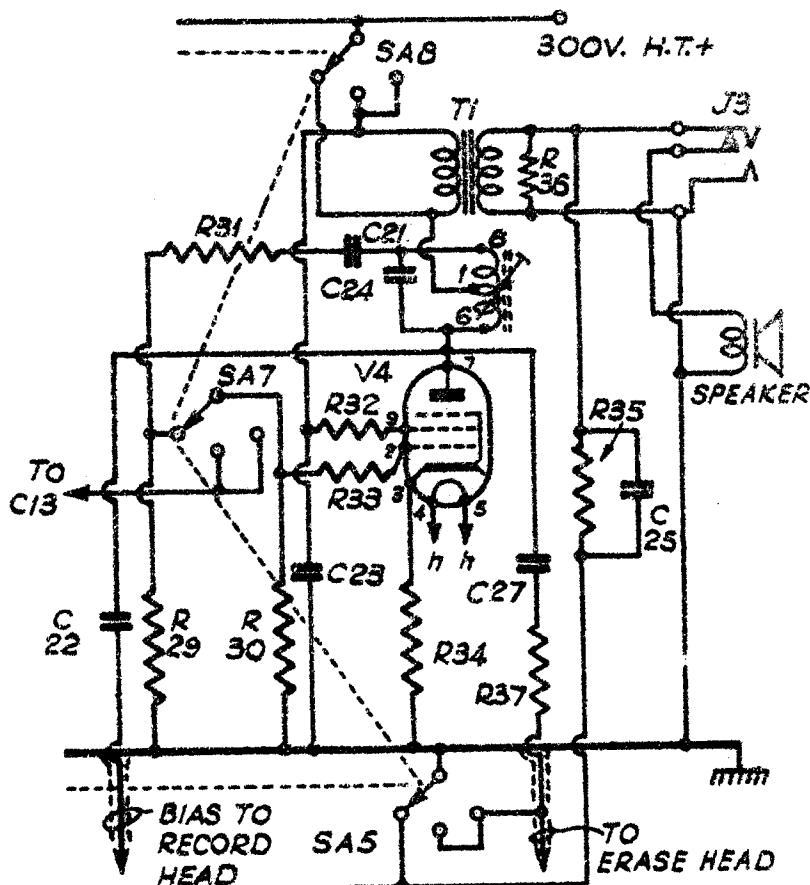
MODIFY VALUES AS SHOWN IN CONVERSION TABLE.

STAGE 5

1. FIT THE TDC/I Oscillator Coil in place of the TDO 2/S.
2. Omit the connection shown between Pin 2 on the TDO 2/S Oscillator Coil to the 2 way Tag Strip. NOT REQUIRED WHEN USING THE TDO/I COIL
3. Connect the wire shown connected to Pin 3 on the TDO 2/S. to Pin 1. on the TDO/I.
4. Connect the wire shown connected to Pin 4 on the TDO 2/S. to Pin 6 on the TDC/I.
5. Connect the wire shown connected to Pin 1 on the TDO 2/S. to Pin 8 on the TDO/I.
6. Use Co-axial Cable to feed the Erase Head in place of the Twisted Flex. DO NOT connect the Outer Braiding of This Lead at THE TAPE DECK END.



MODIFIED THEORETICAL DIAG. (TRUVOX, Etc. OSCILLATOR ARRGT.)

WEARITE TAPE DECK

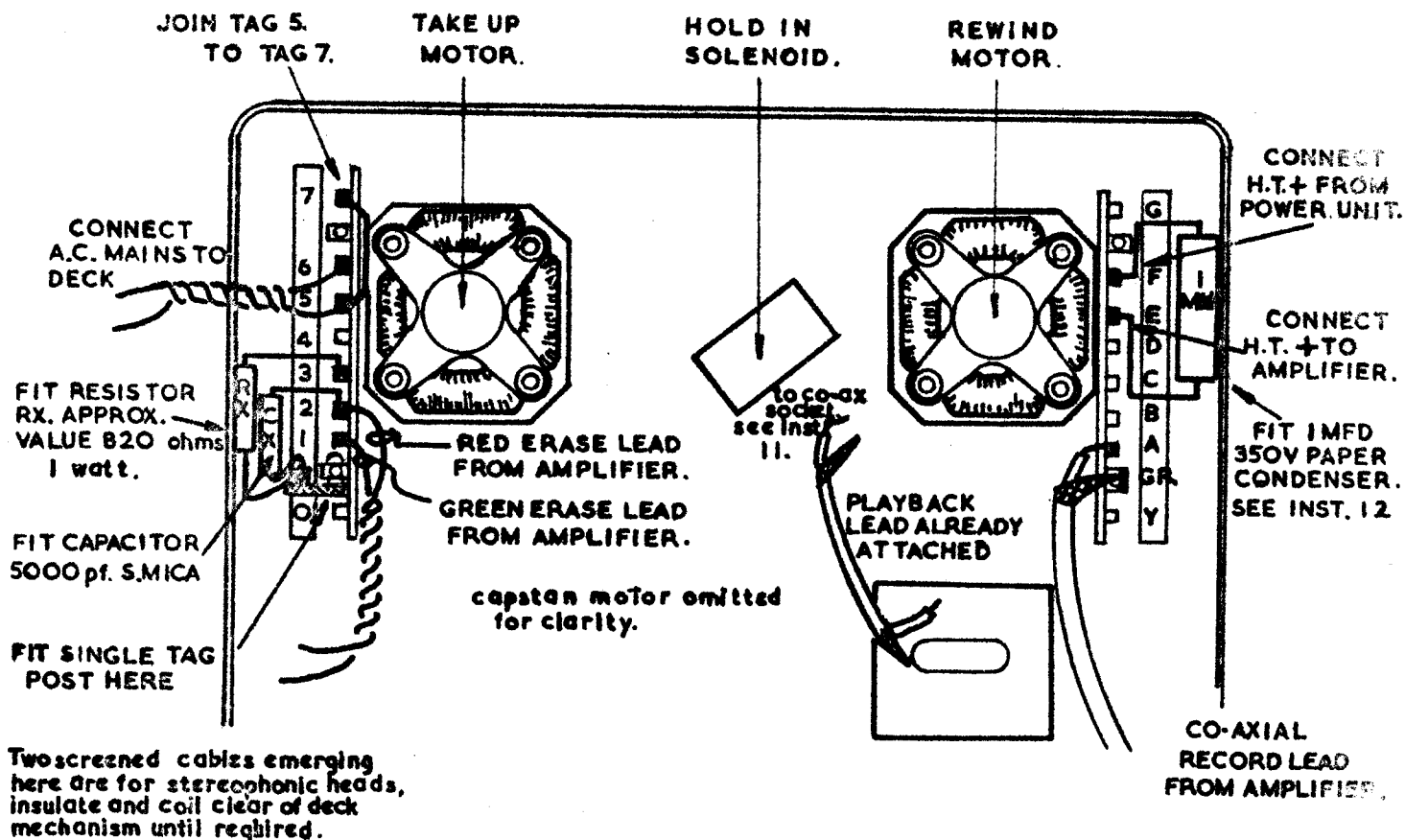
The Heads incorporated on the Wearite Deck are both relatively low impedance.

The Record/Play head has a tapped winding for a Bias injection on Record, and a Head Lift Transformer is necessary on Replay. Therefore the modifications to the standard Amplifier are rather complex and should only be undertaken by the experienced constructor, who has sufficient knowledge to elaborate on the brief details published here, and is equipped to drill the extra fixing holes required in the standard chassis.

- (1) Omit the connection from Contact 3 Wafer No I. to Contacts 3 & 4 Wafer No 3.
- (2) Omit the connection from Contact 2 Wafer No 3. to Tag Board No 6.
- (3) Wire oscillator circuit as detailed in Head Conversion Table.
- (4) Fit the Wearite head lift transformer (Type 977) to screen "A" in the HF/TR3 amplifier just above the grommet hole adjacent to C3 (Stage Four). Fixing holes require two x 6BA Clearance.
- (5) Fit a Co-axial Socket between the EM81 and EF86 valve bases and join the White tag on the head lift transformer to the "Live" Centre Pin of the Socket. Fixing holes required 1 x 1/4". 2 x 6BA Clearance.
- (6) LINK THE GREEN AND BLUE tags on the head lift transformer together and connect to the solder tag (S.T) underneath the EF86 fixing bolt.
- (7) CONNECT THE RED tag on the head lift transformer to contact 3 Wafer No.I. The connection pins on the head lift transformer should be cut down to minimum length so that the transformer is not short circuited when the amplifier under cover is fitted

CONNECTIONS TO DECK

- (8) Connect the Co-axial Record Lead from the amplifier to the lettered tag strip on the Wearite Deck.- Live Centre Core to A. Outer Screened Braiding to Gr.
- (9) Fit a single tag post to the Wearite Deck in the position shown in the sketch. Wire in the Bias Feed capacitor Cx 5000pf and the Bias Feed resistor Rx. The actual value of the RX depends on the head requirements stated on the manufacturers label attached to the tape deck. In view of this the value stated by us is approximately correct for a Bias Voltage of 10/12 Volts (Valve Voltmeter Reading).
- (10) CONNECT the RED flexible ERASE lead from the amplifier to Tag 2 on the Tape Deck. CONNECT the GREEN flexible Erase lead from the amplifier to Tag I on the Tape Deck.
- (11) FIT a Co-axial plug to the PLAYBACK lead which is already attached to the Tape Deck (see sketch) and connect to the co-axial socket fitted in (5) above.
- (12) The Deck is fitted with a Solenoid which locks the Start Button in position. It is necessary to feed this with 30 to 60 mA D.C., therefore the H.T. plus line from the power unit must be fed through the Solenoid (Tag F on tape deck and then to the HF/TR3 amplifier from Tag E on the tape deck. It will be appreciated that the Solenoid is in series with the amplifier H.T. + Line and that the current drawn by the amplifier is adequate for its operation. A 1 MFD capacitor should be fitted across the Solenoid tags E & F. The ADDITIONAL COMPONENTS required to build the HF/TR3 Mk II for operation with the Wearite tape deck are available from stock at £1.18.6. extra.

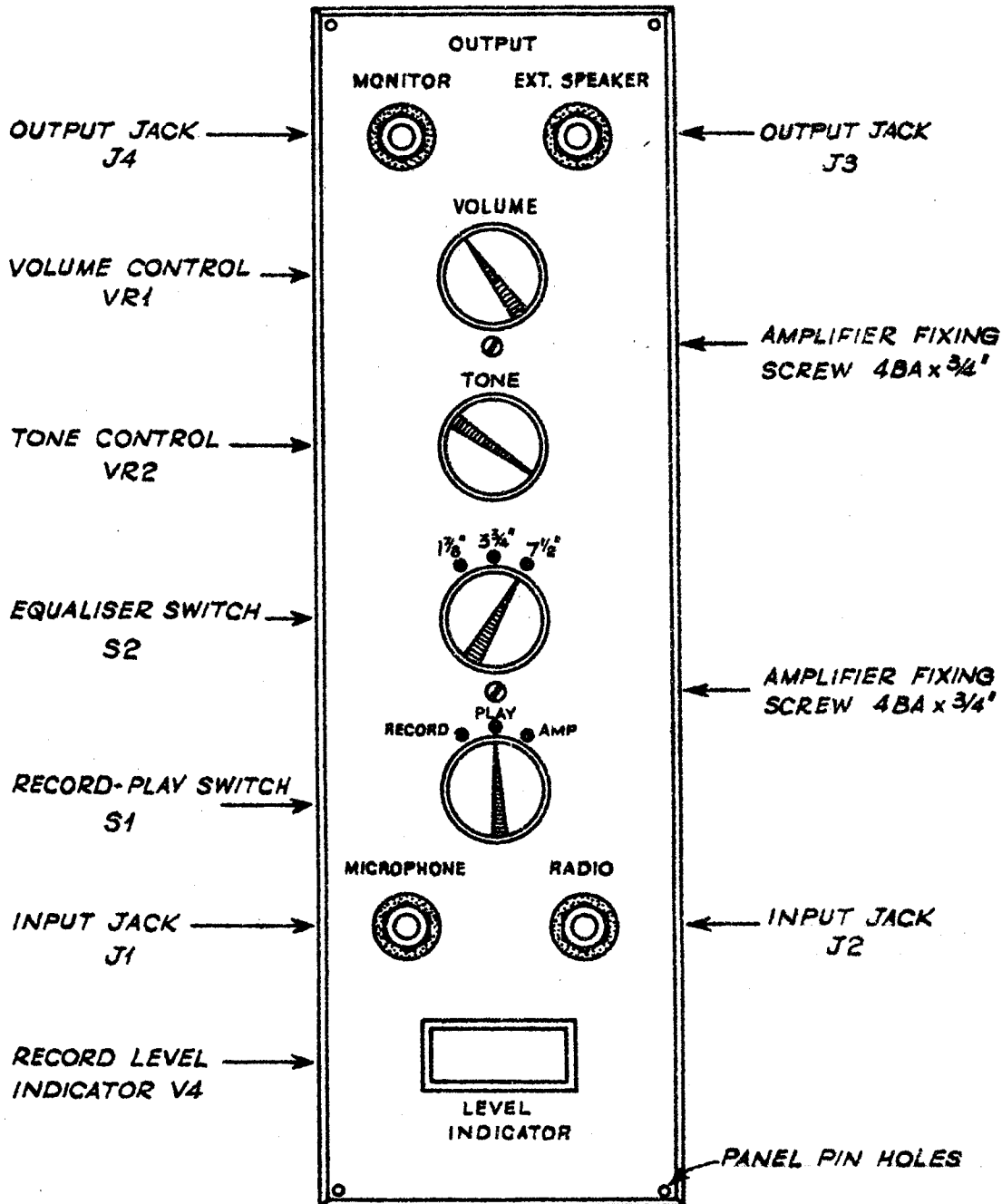


WEARITE 4A TAPE DECK. UNDERSIDE.

HEAD MATCHING CONVERSION TABLE - C.

TYPE OF HEADS	REFER TO	OSC. COIL	R31	R37	C22	C24	C27	SPECIAL INSTRUCTIONS
BRENELL MK IV MK V (BRENELL HEADS)	STAGE 1	*	*	NOT REQ'D	68PF S.Mica	*	NOT REQ'D	ADD DIRECT LINK T/BOARD G IN PLACE R37
COLLARO MK III MK IV TRANS- CRIPTOR (RENTER HEADS)	STAGE 1	*	*	NOT REQ'D	82 pF	*	NOT REQ'D	ADD DIRECT LINK T/BOARD G IN PLACE R37
COLLARO STUDIO I (RENTER HEADS)	STAGE 1	*	*	NOT REQ'D	82 pF	*	NOT REQ'D	ADD DIRECT LINK T/BOARD G IN PLACE R37
COLLARO STUDIO II (BRADOMATIC HEADS)	STAGE 1	*	*	*	68 pF S.Mica	*	NOT REQ'D	
GARRARD (MARRIOT HEADS)	STAGE 1	*	*	100 OHM 1 WATT	56 pF S.Mica	*	NOT REQ'D	LINK TOGETHER THE TWO TAGS CARRYING THE BLUE CABLES ON GARRARD CONNECTION BLOCK.
MOTEK HIGH IMP RECORD HEAD LOW IMP ERASE HEAD	STAGE 1	*	*	NOT REQ'D	100 pF S.Mica	*	NOT REQ'D	ADD DIRECT LINK T/BOARD G IN PLACE R37
MOTEK HIGH IMP RECORD HEAD HIGH IMP ERASE HEAD	STAGES 1-4	TDO/1	100K	NOT REQ'D	56 pF S.Mica	1800 pF Moulded Mica	82 pF S.Mica	USE CO-AXIAL CABLE FOR ERASE FEED. ADD DIRECT LINK T/BOARD G IN PLACE R37
TRUVOX MK IV (TRUVOX BLACK HEADS)	STAGES 1-4	TDO/1	100K	6-8 K 1 WATT	200 pF S.Mica	1200 pF Moulded Mica	1000 pF S.Mica	USE CO-AXIAL CABLE FOR ERASE FEED. REFER ALSO TO PAGE 6.
TRUVOX MK VI (TRUVOX MK VI HEADS)	STAGES 1-4	TDO/1	100K	6-8 K 1 WATT	200 pF S.Mica	1200 pF Moulded Mica	1000 pF S.Mica	USE CO-AXIAL CABLE FOR ERASE FEED. REFER ALSO TO PAGE 6.
WEARITE	STAGE 1-2	*	*	NOT REQ'D	See Special Instructh	*	Not REQ'D	C22 Removed Completely. In place of R37 fit instead a .01uF 350V Paper Condenser. REFER ALSO TO PAGES 6 & 7

* INDICATES VALUES AS SPECIFIED IN STAGE DRAWINGS



LAYOUT OF CONTROL PANEL

The mains ON/OFF switch is attached to a "floating lead" from the Power Supply unit to allow for it to be fitted to the most convenient position in a variety of cabinets and to suit different tape decks. With the Collaro Studio Tape Deck the switch is fitted in the spare hole on the left hand side of the deck plate, alternatively with the Truvox Tape Decks the switch is fitted to a metal plate, which is then normally located on the rear of the cabinet. It is most important to use High Grade Screened Cable with the screened braiding connected to the Jack Plug Sleeve for all connections to J1 - J2 and J4.

INPUT JACK (J1)

For Recording direct from the MICROPHONE-CRYSTAL SET-RADIO JACK, or LOW OUTPUT PICK-UP.

INPUT JACK (2)

For Recording from AMPLIFIERS-PRE-AMPLIFIERS-TUNERS-medium or high output CRYSTAL/MAGNETIC PICK UPS or from the EXTENSION SPEAKER sockets of standard radio receivers.

OUTPUT JACK (3)

For connecting an EXTENSION LOUDSPEAKER to the Amplifier. The insertion of a Jack Plug into this socket automatically disconnects the Internal Speaker.

OUTPUT JACK (4)

On Replay provides an audio signal of approx 250 milli-volts to feed into an EXTERNAL PRE-AMPLIFIER or AMPLIFIER for high quality REPLAY, or for additional amplification in halls etc., and may also be used to MONITOR with high impedance

VOLUME CONTROL (V.R1).

Adjusts the "RECORDING MODULATION LEVEL" Control on Record, and acts as the Volume Control during Replay, or when used as a Straight Amplifier.

TONE CONTROL.(V.R2).

Continuously variable Treble Attenuation. Provides 18dB of Treble Cut in the maximum position. (Fully anti-clockwise). Operative on Replay only.

RECORD-REPLAY-AMPLIFIER SWITCH (S1).

A three position switch that is self-explanatory. If this switch is in the RECORD position and the tape deck RECORD BUTTON is depressed a recorded tape will be AUTOMATICALLY ERASED whether a new input is made or not. The third position provides for the amplifier to be used for "Straight through" reproduction of Gramophone Records, Tuners, Microphones etc.,

EQUALISER SWITCH (S2).

A three position switch for Pre-emphasis of treble signals on RECORD and bass boost on REPLAY. Must be set to the appropriate tape speed on both RECORD and REPLAY functions.

RECORD LEVEL INDICATOR.

A "Magic Eye" Recording Level Indicator. By observing it in conjunction with the adjustment of the Level Control (VR1) the correct recording MODULATION LEVEL is obtained. Operative on RECORD ONLY.

STRAIGHT THROUGH AMPLIFIER.

With S1 in the "AMP" position any input applied to J1 or J2 will be reproduced by the loudspeaker. The amplifier can therefore be used for "straight through" reproduction from Microphone-Tuner Units-Record Players etc., The INPUT connections being precisely as specified for making a recording.

GENERAL GUIDE TO RECORDING.

The choice of a microphone must be left to the individual. Generally speaking Crystal Microphones will give good results for average purposes such as speech, dance music etc., For more serious work particularly where wide frequency range instruments are to be recorded the better grade Moving Coil or Ribbon Microphones are to be preferred. A few suggestions are given on the use of microphones but the user will rapidly become accustomed to the best method to suit the application.

- (1). Speak in your normal voice with the Microphone approx 12 inches away, this distance will vary with the type of Microphone and Room Acoustics, the best position being found after one or two test recordings. A little time spent experimenting by moving the Microphone into different positions in the room will be well worth the trouble taken.
- (2). Do not position the Microphone close to the tape deck or it will pick up the noise of the motors, and produce a noisy background to your recordings.
- (3). REMOVE the Microphone from the input (J1) when the recording is completed. If the Amplifier is switched to "AMP" with the Microphone connected to (J1), a loud howl will be apparent if the volume is increased beyond a certain point. This is a form of feedback between the Microphone and Loudspeaker, due to them being in close proximity. When using the HF/TR3 MK11 as a "straight" Microphone Amplifier it is recommended that an Extension Loudspeaker connected to output Jack (J3) be used. This can then be carefully positioned away from the Microphone, and sited in the room or hall where the acoustic effect is at a minimum.
- (4). It is bad practice to make a recording from a Radio Set by standing the Microphone in front of the Set Loudspeaker, because although a recording can be made, all external noise will be picked up by the Microphone also the acoustics of the room, speaker, etc., will "colour" the sound and make the recording sound unnatural. First class results are assured if a connection is made from the Extension Speaker sockets of the Radio Set and fed into the input Jack (J2) on the Tape Amplifier.
- (5). Finally if the user has never before heard his own voice recorded, do not be surprised or blame the recording equipment because one seldom recognises one's own voice at first. Therefore for speech quality tests, it is always best to have someone else judging.

PREPARING TO RECORD... The Recording Level should always be set before commencing the actual recording. As an example let us assume that a recording is to be made using a microphone.

- (a) Select the tape speed on the deck speed control switch, and set the Equaliser Switch (S2) on the Amplifier to coincide.
- (b) Turn the Amplifier "ON" and allow a few minutes for the valves to reach the correct operating temperature.
- (c) Turn the Amplifier Record/Replay Switch (S1) to Record. (The Level indicator V4 should now glow). Do not start the tape movement at this stage
- (d) Plug the Microphone into the input Jack (J1).
- (e) Speak into the microphone in your normal voice and whilst observing the Level Indicator (V4) gradually turn the Volume Control (VR1) clockwise. As the Volume Control is turned clockwise the moving sections of the Level Indicator will fluctuate. The approximately correct modulation level will be when the moving sections of the Indicator just fail to close on the LOUDEST PASSAGE of your voice. Due however to the varying sensitivity of "Magic Eye" level indicators this must only be taken as a general setting. It is up to the individual to decide, after one or two trial recordings, the actual amount of closure for correct Modulation Level with his specific Amplifier.

Two golden rules are :-

(1) If the moving sections of the Level Indicator are completely "Closed" by the loudest passage being recorded (VR1 too far advanced) then OVER MODULATION of the tape will occur resulting in a distorted recording.

(2) If the moving sections of the Level Indicator do not fluctuate sufficiently then UNDER MODULATION of the tape will occur resulting in a lack of Volume and a high noise level when the recording is Replayed.

(f) When the correct Modulation-Level has been obtained the tape movement should be started by depressing the appropriate Record button on the tape deck. The Volume Control (VR1) should not be moved from its original setting during the Recording process. It can however be used to gradually fade the voice into the background, (turn VR1 anti-clockwise) just prior to the conclusion of the recording.

(g) A similar procedure is adopted to obtain the Recording Level for all types of recordings. It is most important to note however that when Recording from RADIO PICK-UPS V.H.F. TUNERS etc., the controls on these units must first be adjusted so that the output from them correctly loads the HF/TR3 11 input (J2). Too great a signal level will overload the input stage of the Amplifier, and cause a distorted recording. As a general rule the tone control on Radio-Receivers should be adjusted for maximum treble response to ensure that the H.F. response is not cut before the signal reaches the Tape Amplifier input.

(h) Remember that for the highest possible fidelity of music it is essential to use the faster tape speed. For example $1\frac{7}{8}$ in/sec Speech. $3\frac{3}{4}$ inches/sec. Dance Music etc. $7\frac{1}{2}$ inches/sec Orchestral.

(i) Before rewinding ready for Replaying your Recording ALWAYS turn the Amplifier Record/Replay switch (S1) to the Replay position.

TO REPLAY YOUR RECORDING

- (a) Remove the microphone from the HF/TR3 MK11 input socket.
- (b) Ensure that the Record/Play switch (S1) is in the REPLAY position.
- (c) Rewind the tape back to the original position before the RECORDING was started.
- (d) Ensure that the tape deck speed control and the Amplifier Equaliser switch (S2) are in the same position as that used for the Recording.
- (e) Depress the tape deck Replay button. Adjust the volume level by rotating VR1 clockwise.
- (f) The tone may be varied by adjusting the Tone Control (VR2). In the fully anti-clockwise position approx. 18 dB of Treble cut occurs.

IMPORTANT NOTE ... Your recording will be automatically ERASED if the HF/TR3 Record/replay switch (S1) is left in the RECORD position. Therefore always ensure that the Level Indicator is OUT before commencing to Replay a recorded tape:

EDITING.

If you have recorded throughout the entire length of a tape and only wish to keep a certain section of the recording, any part of the tape can be cut out, and the two ends remaining on the spool can easily be joined together again by using a special jointing compound or SPECIAL EDITING tape. (We have these in stock). The method employed is to cut the tape at an oblique angle and assuming you are using the editing tape, line up the loose edges and join them together with about an inch of tape. Make sure that the joint is straight and does not form a kink. The tape is stuck on the back (shiny side) of the tape. It will be seen therefore that unwanted material can be discarded, or additional recorded matter can be inserted (even from other tapes) to make up a continuous programme from existing recordings.

KEEPING RECORDINGS.

A recorded tape may be stored indefinitely. Care should be taken however to box and identify each spool with TITLE, SPEED and RECORDING SENSE. Store in a dry place and every few months respool by winding on to an empty spool by means of one of the "Fast Winds" of the Recorder.

NOTE: It is not possible to replay at one speed a recording made at another speed.

TECHNICAL SPECIFICATION HF/TR3 Mk II.

RECORDING SENSITIVITY ... Measured at 1 Kc/s for the peak recording level of 80 micro Amps.

J1 MICROPHONE 1 mV. Input impedance 2.2 Meg-ohm.

J2 RADIO/PICK-UP 250 mV. Input impedance 680 K ohm.

REPLAY SENSITIVITY ... Measured at 5 Kc/s for output power of 3 Watts or a LOW LEVEL output voltage of 250 mV at J4

Tape Speed $1\frac{7}{8}$ inches per second 1.5 mV.

$3\frac{3}{4}$ inches per second 2.5 mV.

$7\frac{1}{2}$ inches per second 4.5 mV.

15 inches per second 7.5 mV.

OSCILLATOR ... Hartley Type circuit, Operative only on RECORD Frequency 51/54 Kc/s.

OVERALL NOISE.. 50 dB below signal at full output.

FREQUENCY RESPONSE ...

REPLAY Equalisation at $7\frac{1}{2}$ in/sec conforms to the C.C.I.R. Characteristic (International Consultive Committee) and gives very good reproduction with PRE-RECORDED tapes.

RECORDING Characteristic arranged to give flat frequency response conjunction with this REPLAY Characteristic

TREBLE BOOST is incorporated during RECORD and BASS BOOST during REPLAY. Separate Equalisation is provided for tape speeds of $1\frac{7}{8}$ - $3\frac{3}{4}$ and $7\frac{1}{2}$ in/sec., or alternatively $3\frac{3}{4}$ - $7\frac{1}{2}$ and 15 in/sec.

15 in/sec \pm 3dB relative to the level at 1 Kc/s from 35c/s to 17 Kc/s

$7\frac{1}{2}$ in/sec \pm 3dB relative to the level at 1 Kc/s from 35c/s to 15 Kc/s

$3\frac{3}{4}$ in/sec \pm 3dB relative to the level at 1 Kc/s from 40c/s to 8 Kc/s

$1\frac{7}{8}$ in/sec \pm 3dB relative to the level at 1 Kc/s from 40c/s to 6 Kc/s

VALVE COMPLEMENT ...

V1 EF86 Mullard .. Input Stage for Recording and Replay functions.

V2 ECC83 Mullard .. (a) On Record Equaliser and Output Stages.
(b) On Replay Equaliser and A.F. Amplifier

V3 EL84 Mullard .. (a) On Record Oscillator.
(b) On Replay Power Output.

V4 EM81 Mullard .. Record level indicator out of circuit on Replay.

V5 EZ81 Mullard .. Full Wave Rectifier .. located in Power Unit.

MR1 OA81 Mullard .. Germanium Diode .. Tuning Indicator Rectifier.

MAINS TERMINATIONS AND SWITCH ...

Mains 3 pin Bulgin Socket - Mains ON/OFF Switch - On fly leads from Power Unit. May be varied to suit different Tape decks and cabinets.

GENERAL ...

Dimensions of Amplifier Chassis 11" x 6" x 6" high.

Weight 4 lbs.

Dimensions of Power Unit TCS/1 $7\frac{1}{2}$ " x 3" x $4\frac{1}{4}$ " high

Weight $3\frac{3}{4}$ lbs.

Dimensions of Control Panel (Studio) $13\frac{7}{8}$ " x 3" x $\frac{1}{8}$ " thick.

Polished Black Perspex with Gold Engraving.

OPERATION ... 200/250 Volts A.C. Mains, 50 cycles per second.

CONSUMPTION ... 50 Watts. Amplifier. - (Studio Tape Deck 40 Watts)

TEST AND PERFORMANCE CHARACTERISTICS ...

The tests are intended as simple, yet effective, checks for the combined Record/Replay Amplifier, and there are for the Service engineer and technician only.

The values and figures given in the tables were obtained from the Prototype Amplifier, using COLLARO Record/Replay & Erase heads. The bias current used throughout was 0.2 mA at a frequency of 55 Kc/s. The Erase-head voltage was approximately 22 V, at a frequency of 55 Kc/s.

TEST 1 - D.C. VOLTAGES ... (Measured on a Avometer Model 8)

The D.C. voltages and test points are given in Table 1.

TEST 2 - AMPLIFIER ON REPLAY ... Equipment required for this test:-

- (1) A signal generator covering frequency range from 20 c/s to 20Kc/s
- (2) A valve voltmeter covering a frequency range from 20c/s to 20Kc/s
- (3) A load resistor of 15 ohms carbon 6 Watt rating.

The 15 ohm Resistor should be connected across the Speaker output. The Record/Replay switch S1 in the Replay position, and the Tone control set for flat response. (Fully clockwise).

Apply a 5 Kc/s Signal to the Record/Replay Co-axial lead. The consequent output signal should be measured on the valve voltmeter, at the Low-Level output Jack (J4) and across the Load Resistor.

Adjust the input voltage to produce an output of approximately 6.8 volts across the load Resistor for the three tape speeds. The input required for this should approximate to the voltage figures given in Table 2.

The input voltage at 5 Kc/s should be varied until the output voltage falls to 250 mV. The frequency of the signal should be reduced to 40 c/s and the values of Boost in Table 3 should be observed across the 15 ohm load Resistor. The Bass Boost characteristics for the three tape speeds are shown in Fig. 3..

The Tone Control (VR2) should have a maximum Treble Attenuation of 18 dB at 10 Kc/s.

TEST 3 - AMPLIFIER ON RECORD ... Equipment required for this test:-

- (1) A signal generator covering a frequency range from 20 c/s to 20 Kc/s
- (2) A valve voltmeter covering a frequency range from 20 c/s to 20 Kc/s

The record/replay and Erase heads should be connected to the Amplifier. The Record/Replay Switch (S1) must be in the RECORD Position.

Apply a 1 Kc/s signal to the Radio input (J2). The magnitude of this should be such, that an output of 50 mV is obtained at the Low-Level Output (J4).

The Boost indicated in Table 4 should be obtained at the appropriate Tape Speed when the signal frequency is altered to the value shown in the Table

The treble boost characteristics for the three Tape Speeds are shown in Figure 2..

Values for the Recording sensitivity for an output voltage measured at the second anode of the ECC83 (V2) are given in Table 5.

A test of the Recording level indicator should show that the EM81 "closes" with approximately 9/10 V at this anode.

An alternative method of checking the Record Amplifier is possible. For each tape speed, the voltage developed across a 10 ohm resistor connected in series with "EARTHY END" of the Record head can be observed for the full range of signal frequencies. The response figures so obtained should agree with the values obtained with the prototype amplifier, listed under Frequency Response. For these observations, it will be necessary to disconnect one end of resistor R31 (18K ohm), Tagboard No.5 otherwise only the Bias signal will be measured.

FOR ACCURATE RESULTS, two separate pieces of p.v.c. covered wire are recommended for the connections to the valve voltmeter. Co-axial cable may result in considerable errors in measurements, due to the parallel capacitance which is introduced.

TEST 4 - BIAS LEVEL TEST

Equipment required for this test:

- (1). A valve voltmeter which will indicate accurately at frequencies of up to 70 Kc/s.
- (2). A resistor of 10 ohms.

The 10 ohm resistor should be soldered in series with the "EARTHY END" of the Record/Replay head, as close to the head as possible, and the voltage developed across this resistor, with no input signal, should be measured with the v/voltmeter.

The voltage developed across the resistor should be 2mV (2000 Micro-Volts which corresponds to a Bias current of 0.2mA (200 Micro-Amps)).

As a further example - If a 50 ohm resistor were used for the Bias current measurement (TRUVOX) a voltage of 50 mV across the resistor would correspond to a current of 1.0 mA flowing in the circuit.

TABLE 1.

POINT OF MEASUREMENT.		SI. AT RECORD. (VOLTS)	SI. AT REPLAY. (VOLTS)	AVOMETER D.C. RANGE (VOLTS)
	C4	218	210	1000
	C9	245	240	1000
	C15	280	275	1000
	C28	310	300	1000
	C29	350	340	1000
EF86	Anode pin 6	60	60	1000
	Screen Grid pin 1	75	75	1000
	Cathode pin 3	1.8	1.8	10
ECC83	First Anode pin 1	160	160	1000
	First Cathode pin 2	1.7	1.7	10
	Second Anode pin 6	180	180	1000
	Second Cathode pin 8	1.5	1.5	10
EM81	Anode pin 7	30	0	1000
	Target pin 9	180	0	1000
EL84	Anode pin 7	310	280	1000
	Screen Grid pin 9	250	260	1000
	Cathode pin 1	7	8	10

TABLE 2.

REPLAY SENSITIVITY. Signal Frequency: 5 Kc/s.			
SPEED. Inch/sec.	INPUT. mV.	OUTPUT. J4. mV.	OUTPUT. (15ohm load) volts.
1 7/8	1.5	240	6.8
3 3/4	2.5	240	6.8
7 1/2	4.5	240	6.8

TABLE 3.

BASS BOOST. Signal Frequency: 40c/s. Output voltage J4 for 5Kc/s = 250mV.		
SPEED. inch/sec.	VOLTMETER READING. volts.	OUTPUT BOOST. dB.
1 7/8	1.7	16
3 3/4	3.0	22
7 1/2	4.0	25

TABLE 4.

TREBLE BOOST. Output voltage J4. for 1 Kc = 50 mV.			
SPEED. Inch/sec.	SIGNAL FREQUENCY. Kc/s.	VOLTMETER READING. mV.	OUTPUT. BOOST. dB.
1 7/8	4.7	650	22
3 3/4	11.5	300	16
7 1/2	13.5	250	14

TABLE 5.

RECORDING SENSITIVITY. Signal Frequency: 1Kc Tape Speeds: 1 7/8 3 3/4 7 1/2 inch sec.	
VOLTAGE AT 2nd ANODE. ECC83.	9/10v.
MICROPHONE INPUT.	1 mV
RADIO INPUT.	250 mV

Resistance of AVOMETER MODEL B. - 1000V Range. Resistance 20 Meg-ohm.
 - 100V Range. Resistance 2 Meg ohm.
 - 10V Range Resistance 200K ohm.

Figures Quoted in Tables 2-3-4 and 5, Obtained with HATFIELD Valve Voltmeter.

TYPICAL TEST TABLES.

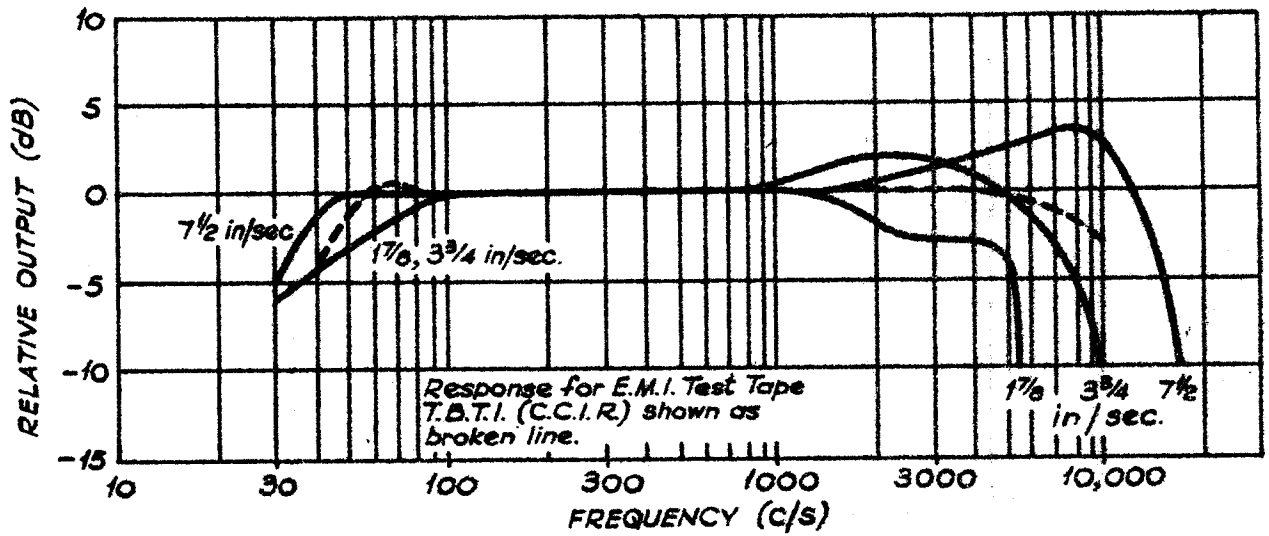


FIG. 1. FREQUENCY-RESPONSE CHARACTERISTICS.

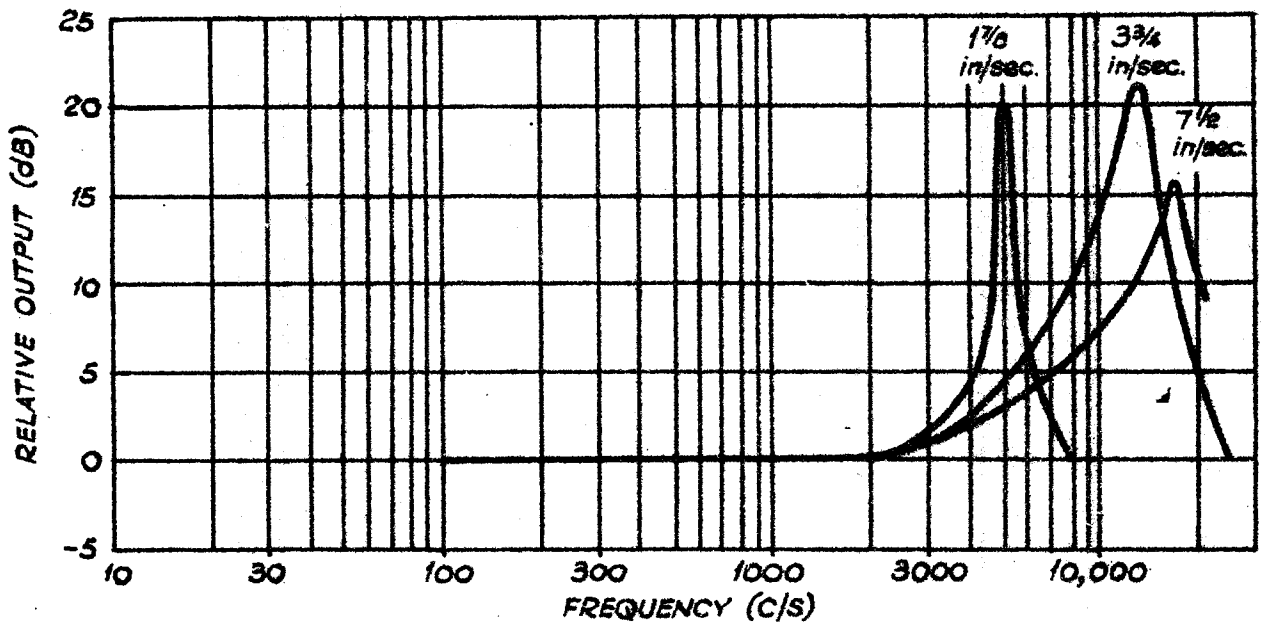
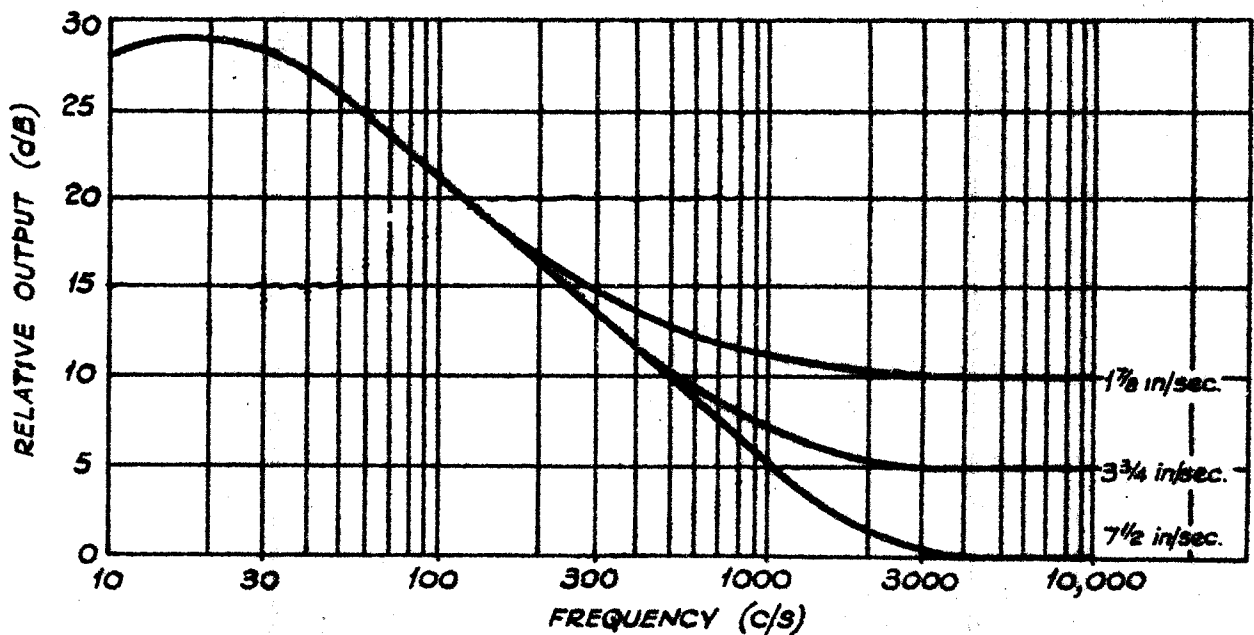


FIG. 2. TREBLE-BOOST CHARACTERISTICS



COMPONENT PARTS AND PRICE LIST - AMPLIFIER

RESISTORS All 1/2 Watt Rating 10% Tolerance unless otherwise stated.

R1	1 Meg	Brown-Black-Green	4
R2	3.9K	Orange-White-Red	4
R3	2.2 Meg	Red-Red-Green	4
R4	2.2K	As marked, H.S. 10%	1/-
R5	1 Meg	As marked, H.S. 10%	1/-
R6	220K	As marked, H.S. 10%	1/-
R7	33K	Orange-Orange-Orange	4
R8	390K	Orange-White-Yellow	4
R9	2.2 Meg	Red-Red-Green	4
R10	1.2 Meg	Brown-Red-Green	4
R11	560K	Green-Blue-Yellow	4
R12	12K	Brown-Red-Orange	4
R13	56K	Green-Blue-Orange	4
R14	150K	Brown-Green-Yellow	4
R15	1 Meg	Brown-Black-Green	4
R16	4.7K	Yellow-Mauve-Red	4
R17	27K	Red-Mauve-Orange	4
R18	100K	Brown-Black-Yellow	4
R19	1.5K	Brown-Green-Red	4
*R20	470 ohm	Yellow-Mauve-Brown	4
R21	10K	Brown-Black-Orange	4
R22	560K	Green-Blue-Yellow	4
R23	100K	Brown-Black-Yellow	4
R24	470K	Yellow-Mauve-Yellow	4
R25	2.7 Meg	Red-Mauve-Green	4
R26	56K	Green-Blue-Orange	4
R27	56K	Green-Blue-Orange	4
R28	27K	Red-Mauve-Orange	4
R29	22K	Red-Red-Orange	4
R30	680K	Blue-Grey-Yellow	4
!R31	18K	Brown-Grey-Orange	4
R32	6.8K	1 Watt Blue-Grey-Red	6
R33	1K	Brown-Black-Red	4
R34	150 ohm	1 Watt Brn-Grn-Brn	6
R35	2.2K	Red-Red-Red	4
R36	1K	Brown-Black-Red	4
!R37	220 ohm	1 Watt Red-Red-Brn	6
VR1	500K	Carbon Log Potentiom'r	3/3
VR2	100K	Carbon Log Potentiom'r	3/3
*R20	220 ohm	Red-Red-Brown (15 ohm Speakers)	4
R20	330 ohm	Orange-Orange-Brown (7.5 ohm Speakers)	4

VALVES B.V.A. Guaranteed.

V1	Mullard	EF86	15/9
V2	Mullard	ECC83	12/10
V3	Mullard	EL84	11/1
V4	Mullard	EM81	13/5
MR1	Mullard	OA81	3/-

RECOMMENDED OSCILLATOR COILS

Denco TD02/S	Collaro-Brenell	5/-
Denco TD0/1	Truvox-Motek	5/-

CONDENSERS ...

C1	0.5 mfd.	150/350V Paper	1/6
C2	50 mfd.	12/25V Electrol'c	2/-
C3	0.1 mfd.	350V Paper	1/1
C4	8 mfd.	350V Electrolytic	3/6
C5	3300pF.	S/Mica (or tube)	1/3
C6	330 pF.	S/Mica (or tube)	9
C7	120 pF.	S/Mica (or tube)	9
C8	180 pF.	S/Mica (or tube)	9
C9	8 mfd.	350V Electrolytic	3/6
C10	0.1 mfd.	350V Paper	1/1
C11	50mfd	12/25V Electrolytic	2/-
C12	0.1 mfd.	350V Paper	1/1
C13	0.1 mfd.	350V Paper	1/1
C14	50mfd	12/25V Electrolytic	2/-
C15	16 mfd	350V Electrolytic	3/9
C16	0.02 mfd.	350V Paper	1/-
C17	0.05 mfd.	350V Paper	1/-
C18	100 pF.	S/Mica (or tube)	9
C19	47 pF.	S/Mica (or tube)	9
C20	47 pF.	S/Mica (or tube)	9
C21	0.01 mfd.	S/Mica	1/6
!C22	82 pF.	S/Mica	9
C23	0.5 mfd.	350V Paper	1/6
!C24	3000 pF.	Moulded Mica	4/9
C25	1800 pF.	S/Mica (or tube)	1/-
C26	82 pF.	S/Mica (or tube)	9
!C27	Not required for Collaro		9

MISCELLANEOUS ...

1	Output Transformer(Gilson)	1.5.6
1	Ferroxcube Potted Inductor	
	LA42	1.2.6
!1	Oscillator Coil Denco TD02/S	5/-
4	Jack Sockets, Igranic	13/-
1	Record/Play Switch S1(2712)	12/6
1	Equaliser Switch S2 (2722)	5/6
1	Chassis, Screens & Bracket	18/6
2	Valveholders B9A (Skirted)	1/6
2	Valveholders B9A	1/4
1	Engraved Front Panel (Studio 7887)	7/9
4	10 Way Tag Boards, Denco	6/8
2	5 Way Tag Boards, Denco	2/4
1	4 Way Tag Strip	4
1	2 Way Tag Strip	3
2	Single Tag Posts	4
4	Control Knobs	3/-
6	yds 22 swg Tinned Copper Wire	9
5	ft Thin Green Plastic Flex	4
6	yds 1/2 mm. Sleeving	1/6
2	ft Twin Flex (Speaker)	3
1	yd 4 Core Cable	1/3
	18 ins. Co-Axial Cable	4
	18 ins. Thin Twisted Flex Red and Green	4
	1 pkt. Nuts and Bolts	5/-
	1 Instruction Manual	3/-
	18 ins Co-Axial Cable (Truvox)	4

! Values Depend on Impedance of Tape Heads, Refer to Table on Page 8

POWER SUPPLY UNIT - TYPE TCS/1

R38	680 ohm, 5 Watt Wirewound	1/6	1	Condenser Paxolin Mounting	
R39	500 ohm, 5 Watt Wirewound	1/6		Base	
C28)	50-50 mfd 350/450V Wkg.	7/9	1	6 Way Connection Block	1/6
C29)	Electrolytic		1	4 Way Miniature Socket	6
1	Mains Transformer, Andec		1	4 Way Miniature Plug	6
	TCS/1	£1.17.6	1	Plug Top Cover	2
1	Chassis TS/49	5/-	1	3 Pin Miniature Socket)
1	B9A Valveholder	8	1	3 Pin Plug with Sleeve) 4/-
✓	1 Rotary On/Off Switch			Bulgin)
	(Standard)	2/9	1	yd. 22 swg Tinned Copper Wire	2
1	Studio Control Knob	1/9	1	yd. 1/2 mm. Sleeving	3
1	Mullard EZ81 Valve	8/2		18 ins. Twin Flex	2
	(B.V.A. Guaranteed).			18 ins. 3 Core Cable	5
✓	(Toggle On/Off Switch for Truvox)			3 yds. 3 Core Cable	2/3
				1 pkt. Nuts, Bolts, Grommets	1/6

ADDITIONAL COMPONENTS TRUVOX DECK

ONLY

R40	500 ohm, 5 Watt Wirewound	1/6
1	Single Tag Post	2
1	Mounting Plate 3 1/2" x 2"	9
18 ins.	Flexible Cable, Green	2
18 ins.	Flexible Cable, Black	2

WE OFFER THE COMPLETE KIT OF PARTS EXACTLY AS SPECIFIED HERE

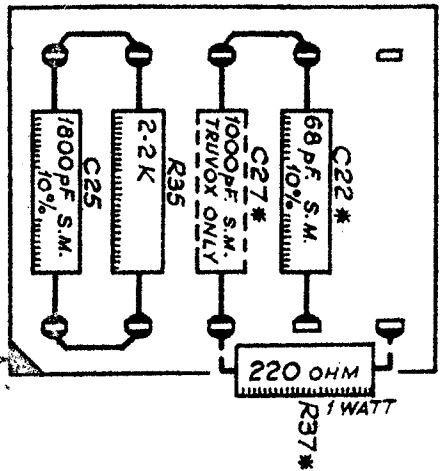
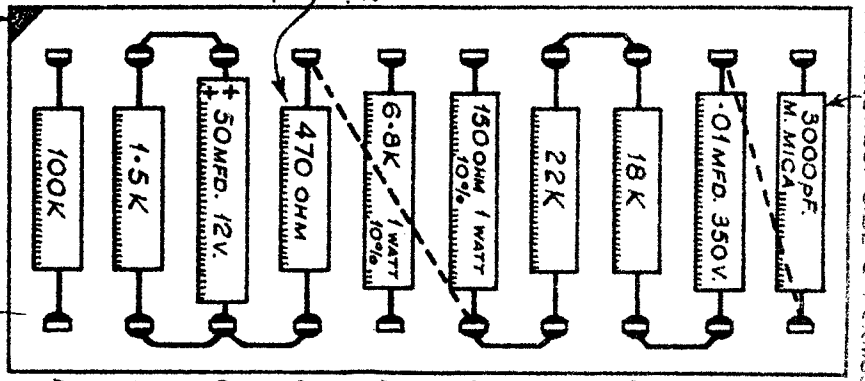
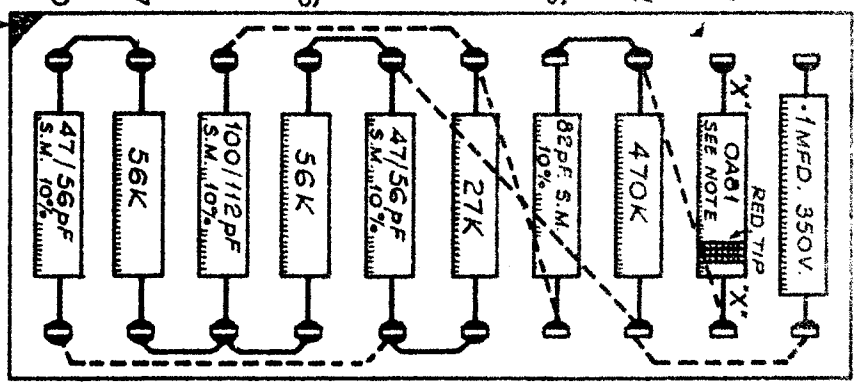
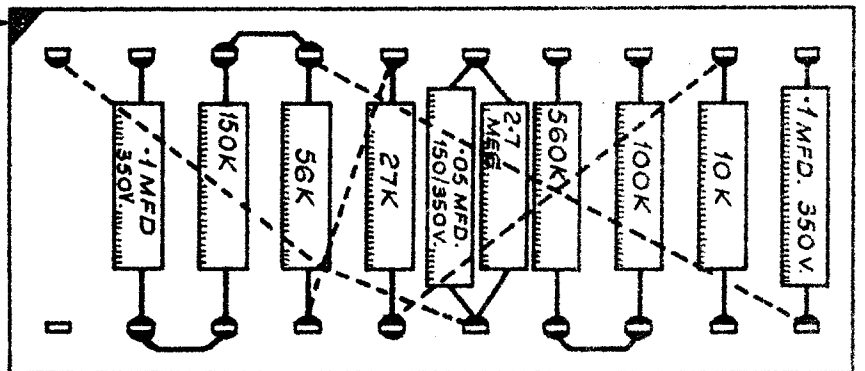
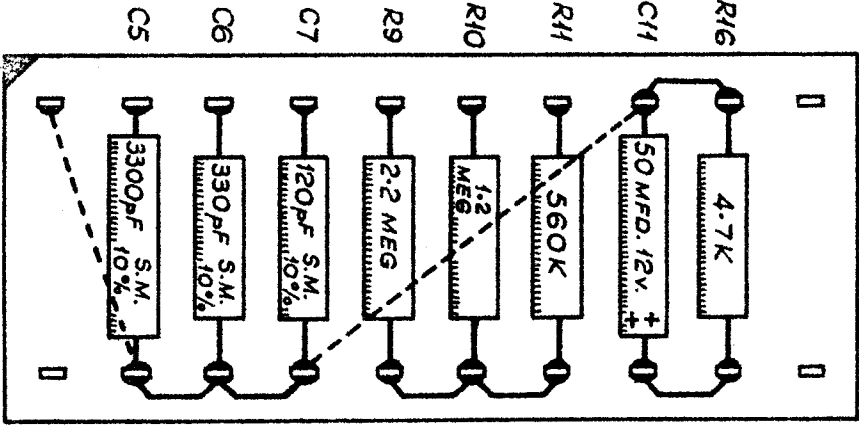
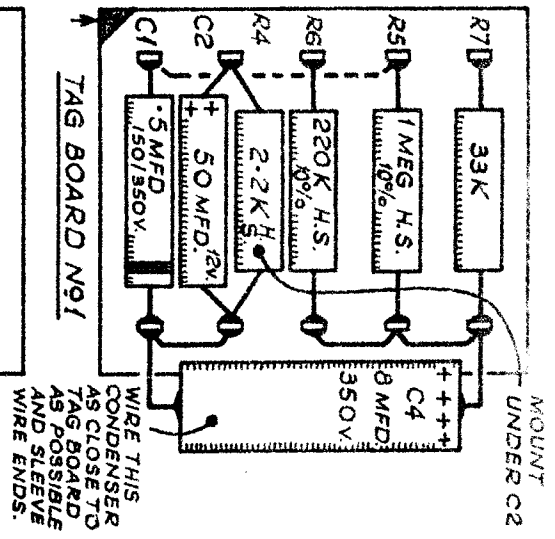
AT SPECIALLY REDUCED PRICES :

- (a) To Build the HF/TR3 TAPE AMPLIFIER ONLY £10.15.0
 - (b) To Build the TCS/1 POWER SUPPLY UNIT £ 3. 5.0
 - (c) To Build the HF/TR3 Complete With TCS/1 Power Unit £13.13.0
- OR ALTERNATIVELY WE OFFER THE UNITS FULLY ASSEMBLED AND TESTED ...
- (a) The HF/TR3 TAPE AMPLIFIER only £16. 0.0
 - (b) The TCS/1 POWER SUPPLY UNIT only £ 4. 5.0
H.T. 300V at 60mA. L.T. 6.3V at 2 Amps.
 - (c) The HF/TR3 TAPE AMPLIFIER & TCS/1 POWER UNIT £19. 0.0

ALL KITS AND ASSEMBLED UNITS INCLUDE MULLARD B.V.A. VALVES

Carriage and Insurance on above items is 5/- extra.

SEND S.A.E. FOR SPECIAL PRICE REDUCTIONS ON COMPLETE EQUIPMENT
i.e., TAPE DECK - AMPLIFIER - CABINET - MICROPHONE - TAPE
ETC., ETC.



SPECIAL INSTRUCTIONS:

1. WIRING SHOWN THUS----MUST BE CONNECTED FIRST, RUN FLAT ON TAG BOARD AND INSULATED WITH SLEEVING.
2. WIRING SHOWN THUS--- ARE SHORT DIRECT LINKS AND NEED NOT BE SLEEVED WITH THE EXCEPTION OF C4 & THE MOUNTED MICA CAPACITOR C24.
3. ALL RESISTORS ARE 1/2 WATT RATING UNLESS OTHERWISE STATED. TOLERANCE 10%.
4. THE CRYSTAL DIODE (MR1) MUST BE SOLDERED RAPIDLY. WHEN SOLDERING GRIP THE WIRE END OF THE COMPONENT WITH A PAIR OF PLIERS (ILLUSTRATED 'X') TO CONDUCT THE HEAT AWAY FROM THE CRYSTAL ELEMENT. THE RED TIP INDICATES THE POLARITY WHICH MUST BE STRICTLY OBSERVED.
5. THE VALUE OF COMPONENTS MARKED (*) DEPEND ON THE TYPE AND MAKE OF TAPE HEADS TO BE USED. TABLE 'C' ON PAGE 8, SHOWS THE VARIOUS CHANGES FOR DIFFERENT HEAD MATCHINGS.
6. ALTERNATIVE VALUES FOR TAG BOARD N°2 ARE GIVEN IN TABLE 'B' TO PROVIDE FOR SPEED EQUALISATION IF REQUIRED.
7. CHECK CAREFULLY ALL COMPONENT VALUES AND WIRING, ENSURE PERFECT SOLDERING AND THEN PROCEED TO STAGE TWO.

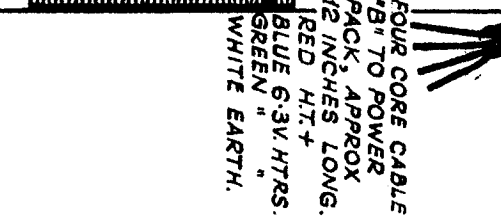
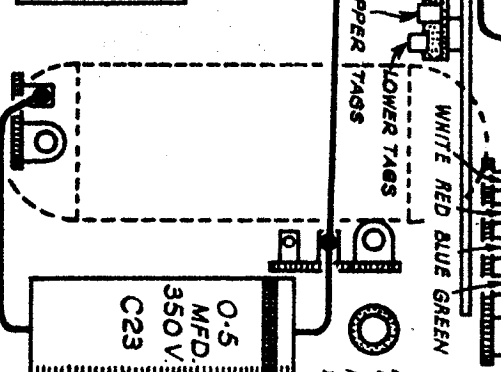
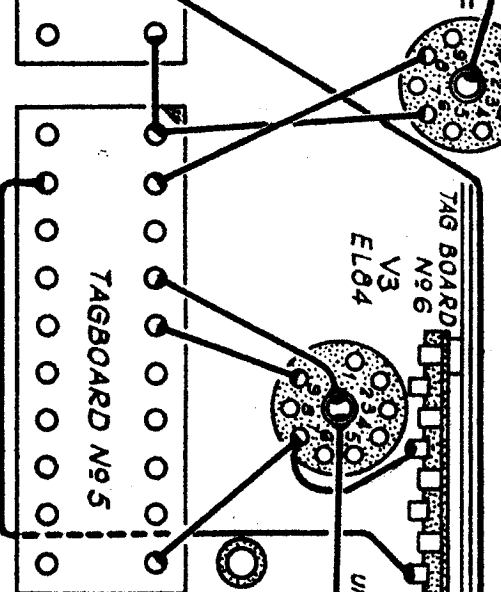
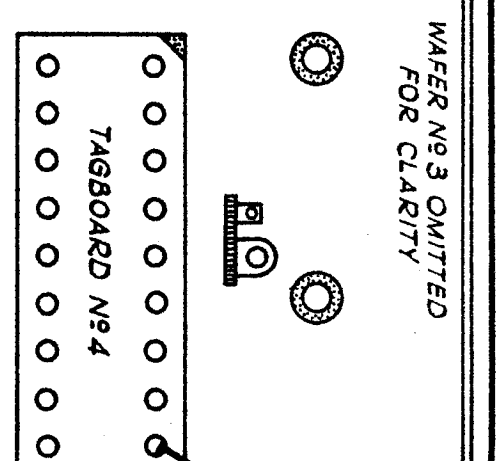
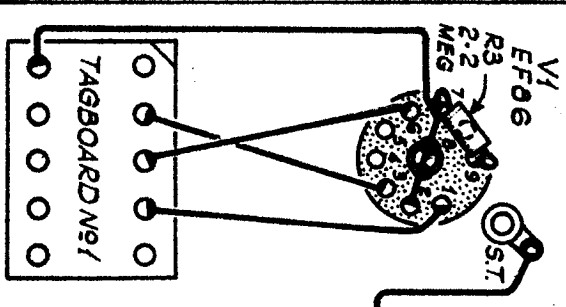
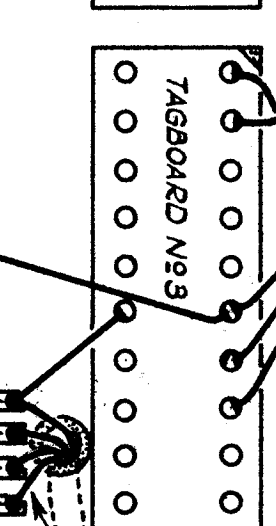
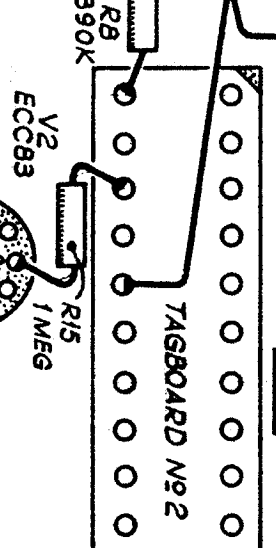
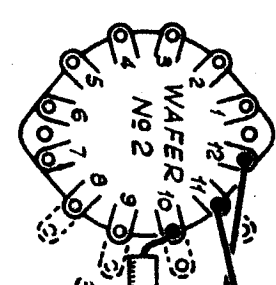
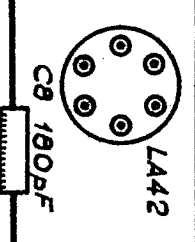
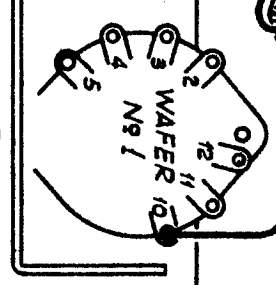
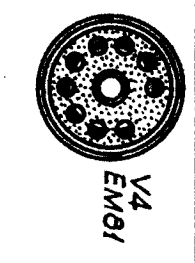
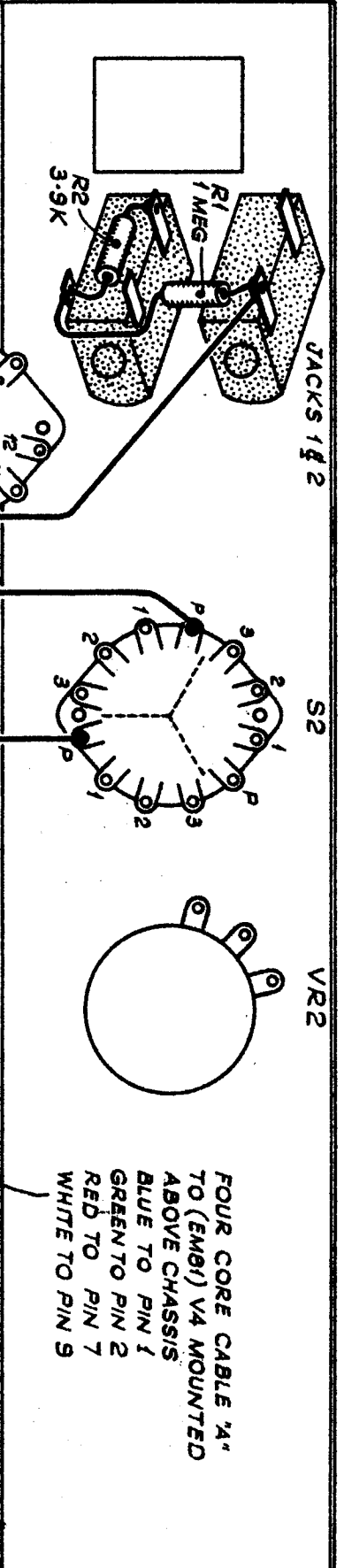
STAGE ONE ~ TAG BOARD COMPONENT MOUNTING & WIRING.

MOUNT UNDER C2

MOUNT WITH NARROWEST SIDE UP/PERMOUNT

CONDENSER AS CLOSE TO TAG BOARD AS POSSIBLE AND SLEEVE WIRE ENDS.

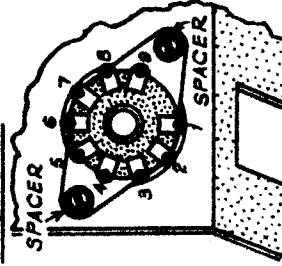
220 OHM FOR 15 OHM LOUD SPEAKER.
330 OHM FOR 7.5 OHM LOUD SPEAKER.



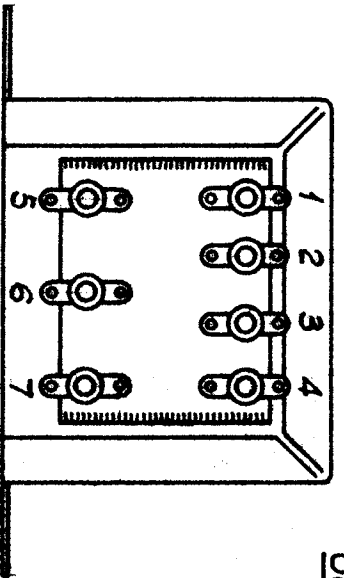
SOLDER QUICKLY TO AVOID DAMAGE TO PLASTIC INSULATION

STAGE FOUR ~ MAIN WIRING

TOP VIEW OF CHASSIS
SHOWS METHOD OF
MOUNTING V4
EMQ1 BASE.



OUTPUT TRANSFORMER CONNECTIONS (GILSON)

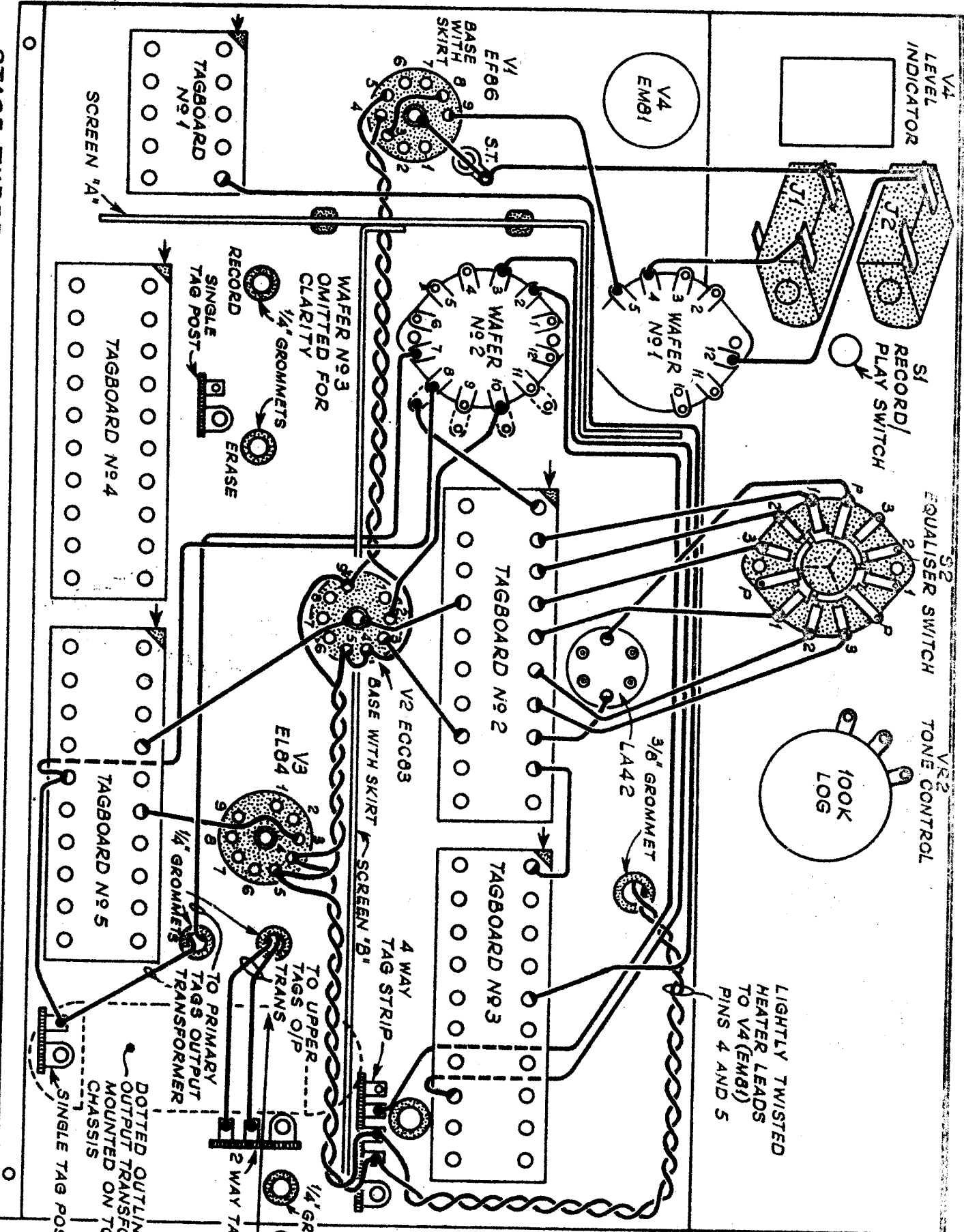


PRIMARY CONNECTIONS	5 & 6		
SECONDARY CONNECTIONS	3 OHMS	JOIN 1 to 2, JOIN 3 to 4	SPEAKER to 1 & 4
SECONDARY CONNECTIONS	7-5 OHMS	JOIN 2 to 3	SPEAKER to 1 & 7
SECONDARY CONNECTIONS	15 OHMS	JOIN 2 to 3	SPEAKER to 1 & 4

SPECIAL INSTRUCTIONS ~ STAGE THREE

1. MOUNT COMPONENTS PRECISELY AS SHOWN. IT WILL BE FOUND MORE CONVENIENT TO COMPLETE THE BASIC WIRING BEFORE MOUNTING THE EQUALISER SWITCH (S2).
2. THE WIRING SHOULD BE RUN IN THE POSITIONS SHOWN. WIRING FROM THE SWITCH S2 AND VR2 WILL BE SHORTER THAN ILLUSTRATED BECAUSE THE FRONT PANEL IS DRAWN FLATTENED FOR CLARITY. THE HEATER LEADS MUST BE LIGHTLY TWISTED TOGETHER TO AVOID HUM RADIATION.
3. THE MAJORITY OF COMPONENTS ARE FIXED BY G.B.A x 1/4 INCH BOLTS. SHORT BOLTS ARE ESSENTIAL TO FIT TAG BOARDS, IF TOO LONG THEY WILL PROTRUDE AND DAMAGE THE COMPONENT ABOVE. THE OUTPUT TRANSFORMER IS MOUNTED ON TOP OF THE CHASSIS BY 4B.A. BOLTS. THE CONNECTING TAGS SHOULD BE TOWARDS THE GROMMETS PROVIDED TO BRING THE TRANSFORMER PRIMARY AND SECONDARY LEADS THROUGH THE CHASSIS.
4. THE SOLDER TAG (S.T.) UNDER ONE FIXING BOLT OF THE EF06 (V1) VALVE BASE MUST BE THE ONLY CONNECTION OF THE EARTH LINE TO THE CHASSIS.
5. ENSURE THAT THE CORRECT TAGS ARE USED ON THE FERROXCUBE POT CORE INDUCTOR, L442. THE TWO TAGS WHICH CONNECT THE INTERNAL WINDING WILL BE EASILY SEEN BY OBSERVATION BEFORE FITTING THE COMPONENT ONTO THE CHASSIS, THE REMAINING TAGS ARE BLANK AND UNUSED.
6. CHECK CAREFULLY THAT COMPONENTS ARE MOUNTED IN CORRECT POSITIONS, THAT TAG BOARDS ARE THE RIGHT WAY ROUND AND THAT VALVE BASES ARE FITTED SO THAT THE PINS ARE POSITIONED AS SHOWN. CHECK WIRING, ENSURE PERFECT SOLDERING AND THEN PROCEED TO STAGE FOUR.

INPUT JACKS



LIGHTLY TWISTED HEATER LEADS TO V4 (EM81) PINS 4 AND 5

Note: The Equaliser Switch (S2) is shown in the 170 k.p.s. position, i.e., fully anti-clockwise.

STAGE THREE ~ COMPONENT MOUNTING & BASIC WIRING

PLACE LARGE SHAKEPROOF WASHER HERE BEFORE FIXING INTO MAIN CHASSIS

LEAVE FLOATING AND CONNECT TO JACK 1 (STAGE 3)

LEAVE FLOATING AND CONNECT TO JACK 2 (STAGE 4)

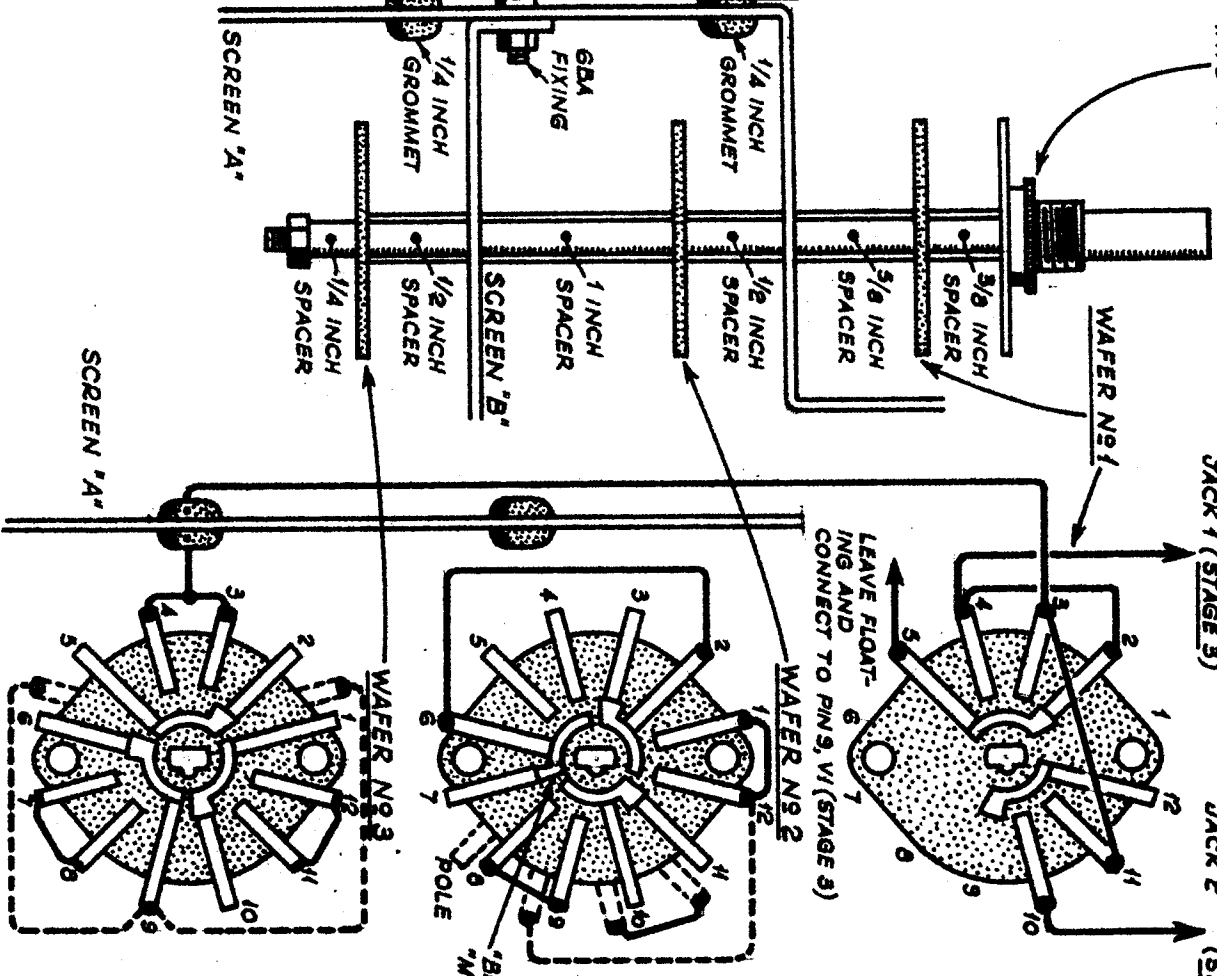


FIG. 1 SWITCH ASSEMBLED TOP VIEW

FIG. 2 BASIC WIRING REAR VIEW

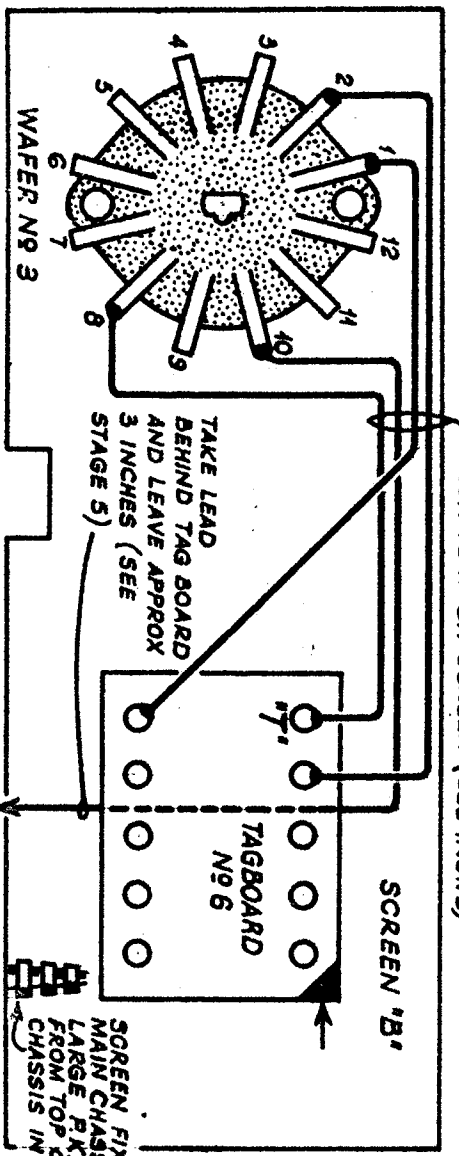


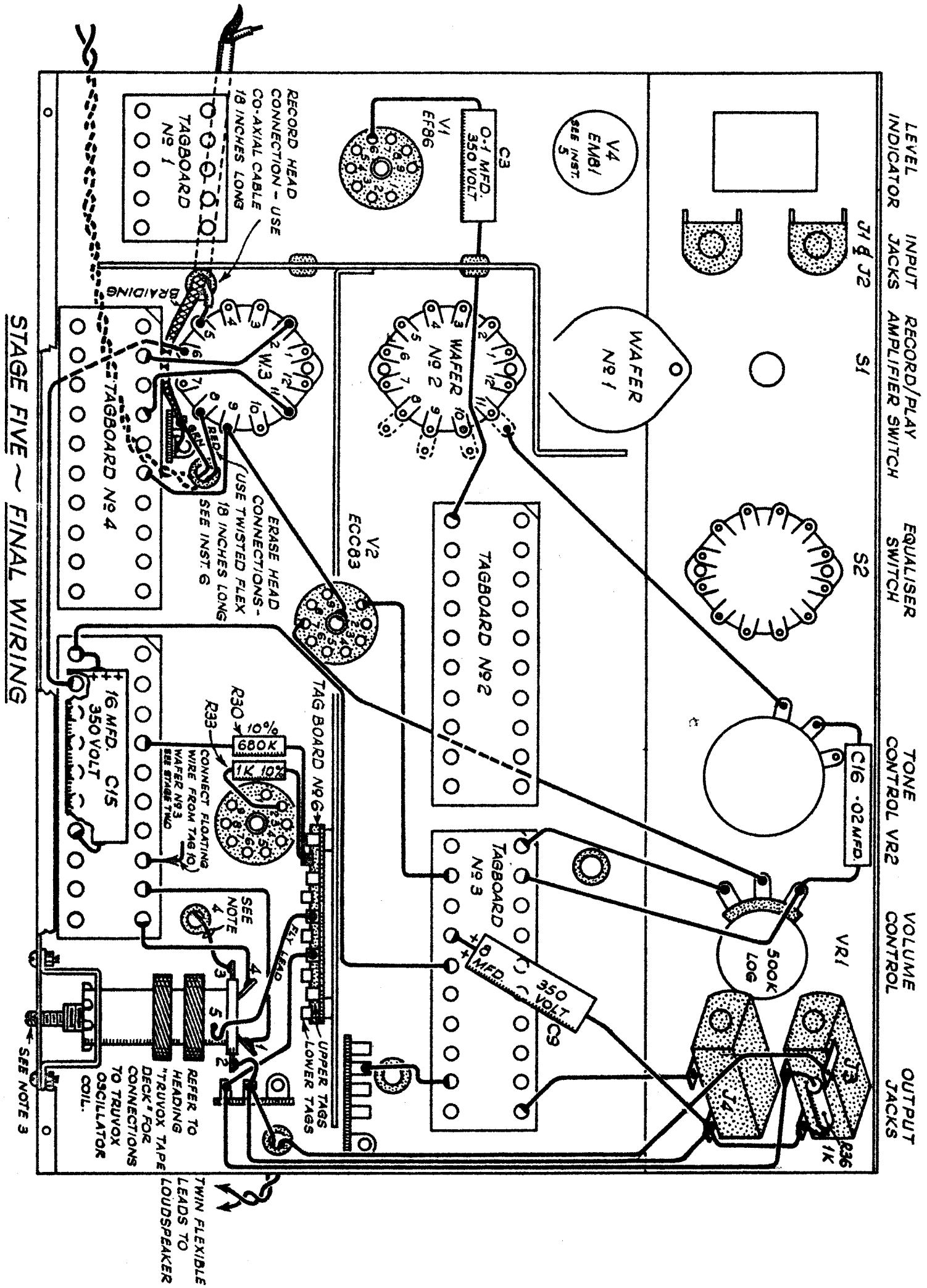
FIG. 3 IMPORTANT LAYOUT OF WIRING FROM WAFFER No 3 ALONG SCREEN 'B' REAR VIEW

- SPECIAL INSTRUCTIONS**
1. DISMANTLE THE SWITCH CAREFULLY. FIT SCREEN & ENSURE THAT THE SPACERS COMPLY WITH FIG. 1. THE WAFERS MUST BE REPLACED PRECISELY AS TAKEN OFF. ENSURE THAT THE ROTORS ARE NOT MOVED OUT OF POSITION DURING THE OPERATION. ROTORS SHOWN THUS D-4-PAINT SPOT.
 2. THE WIRING IN FIG. 2 MAY BE DIRECT LINKS ACROSS THE WAFERS. THE CONNECTIONS BETWEEN WAFFER No 1 & WAFFER No 3 MUST HOWEVER BE TAKEN THROUGH GROUPEM IN SCREEN 'A' AS SHOWN. THE DOTTED CONTACTS ON WAFFER No 2 ARE THE INSULATED CONTACTS DIRECTLY BEHIND THE WAFFER. THE DOTTED CONTACTS ON WAFFER No 3 SHOULD RUN BEHIND THE WAFFER. THE DOTTED CONTACTS 1 & 8 ON THE REVERSE SIDE OF THE WAFFER. THE CONNECTIONS SHOWN DOTTED SHOULD BE RUN BEHIND THE WAFFER. FIG. 3 ILLUSTRATES THE WIRING WHICH MUST BE POSITIONED EXACTLY AS SHOWN. EACH IT WILL BE OBSERVED THAT AS THE STAGES PROGRESS THE PREVIOUS WIRING DETAILS ARE OMITTED FOR CLARITY.
 3. CHECK CAREFULLY THE SWITCH ASSEMBLY, ROTOR POSITION, WIRING AND THEN PROCEED TO STAGE THREE.

STAGE TWO ~ ASSEMBLY OF RECORD/PLAY SWITCH (S1) WITH SCREENS & BASIC WIRING

SPECIAL INSTRUCTIONS ~ STAGE FOUR

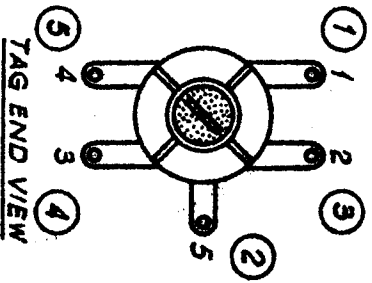
1. THE WIRING SHOULD BE RUN AS CLOSELY AS POSSIBLE IN THE POSITIONS SHOWN. THE WIRING FROM THE FRONT PANEL WILL BE SHORTER THAN ILLUSTRATED BECAUSE THE PANEL IS DRAWN "FLATTENED" FOR CLARITY.
2. SOLDER THE 4 CORE CABLES QUICKLY AND CAREFULLY. IF OVERHEATED THE PLASTIC INSULATION WILL BE DESTROYED CAUSING SHORT-CIRCUITS AND DAMAGE TO COMPONENTS.
3. RESISTORS SHOWN IN THIS STAGE ARE 1/2 WATT RATING 10% TOLERANCE. THE BLACK RING ON ONE END OF THE 0.5 MFD. CONDENSER INDICATES OUTSIDE FOIL AND SHOULD BE TREATED AS THE "EARTHY" END.
4. VALVE BASE V4 (EM81) IS MOUNTED UPSIDE DOWN ABOVE CHASSIS & SPACED AWAY FROM THE CHASSIS WITH TWO 3/8 INCH SPACERS. IT IS ESSENTIAL THAT THE VALVE PINS ARE LOCATED AS ILLUSTRATED.
5. CHECK WIRING & COMPONENT VALUES, ENSURE PERFECT SOLDERING AND PROCEED TO STAGE FIVE.



STAGE FIVE ~ FINAL WIRING

- LEVEL INDICATOR
- INPUT JACKS J1 & J2
- RECORD/PLAY AMPLIFIER SWITCH S1
- EQUALISER SWITCH S2
- WAFER N° 1
- TAAGBOARD N° 1
- TAAGBOARD N° 2
- TAAGBOARD N° 3
- TAAGBOARD N° 4
- ERASE HEAD
- RECORD HEAD
- W.1
- W.2
- W.3
- BRIDGING
- 16 MFD. 350 VOLT C15
- 680K R30
- 1K 10% R31
- 500K VR1
- 0.02 MFD. C16
- 0.1 MFD. 350 VOLT C3
- 0.1 MFD. 350 VOLT C1
- 6X4 V1
- 6AV6 V2
- 6X4 V3
- 6BE6 V4
- J3
- 1K R36
- UPPER TAGS
- LOWER TAGS
- SEE NOTE 3
- SEE NOTE 4
- SEE NOTE 5
- SEE NOTE 6
- SEE NOTE 7
- SEE NOTE 8
- SEE NOTE 9
- SEE NOTE 10
- SEE NOTE 11
- SEE NOTE 12
- SEE NOTE 13
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- SEE NOTE 100

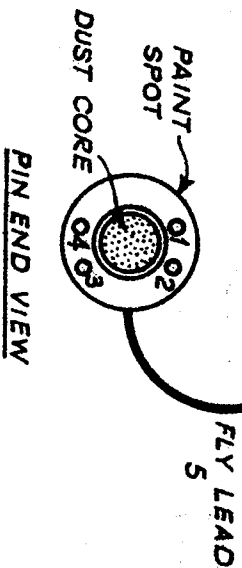
OSMOR OSCILLATOR COIL TYPE QT9



THE QT9 DOES NOT FOLLOW THE STANDARD TAG CODING. THE DENCO EQUIVALENT TAG NUMBERS ARE SHOWN 'RINGED': DUE ATTENTION MUST BE GIVEN TO ENSURE CORRECT CONNECTIONS IF THE OSMOR COIL IS USED.

DENCO OSCILLATOR COIL TYPE TDO.2/S

FOR BRENNEL, COLLARO, MOTEK K10 (RECORD HEAD HIGH IMPEDANCE. ERASE HEAD LOW IMPEDANCE)



STAGE FIVE ~ SPECIAL INSTRUCTIONS

1. POSITION WIRING AND COMPONENTS AS ILLUSTRATED. OBSERVE POLARITY WHEN CONNECTING THE ELECTROLYTIC CONDENSERS. ENSURE CORRECT CONNECTIONS TO THE UPPER AND LOWER TAGS OF TAG BOARD N° 6.
2. THE OSCILLATOR COIL ILLUSTRATED IS FOR OPERATION WITH BRENNEL, COLLARO AND MOTEK TAPE DECKS, I.E., HIGH IMPEDANCE RECORD HEADS, LOW IMPEDANCE ERASE HEADS. FOR ALTERNATIVE OSCILLATOR ARRANGEMENTS REFER TO TABLE 'C' PAGE 8 & TO OSCILLATOR MODIFICATIONS ON PAGE 6
3. INFORMATION ON "PEAKING" THE OSCILLATOR COIL CORE IS GIVEN UNDER "FINAL ADJUSTMENTS" PAGE 4.
4. THE PRIMARY WINDING, TAGS 5 & 6 ON THE OUTPUT TRANSFORMER HAVE ALREADY HAD TWO LEADS CONNECTED TO THEM IN STAGE THREE. ONE OF THESE LEADS CONNECTS DIRECTLY TO CONTACT 7 ON WAFER N° 2 (S1), THE H.T. TAP (3) ON THE DENCO OSCILLATOR COIL MUST BE JOINED TO THIS TAG ON THE OUTPUT TRANSFORMER.
5. THE LEVEL INDICATOR EMB1 MUST BE FITTED INTO ITS BASE BEFORE THE CHASSIS BASE COVER SCREEN IS FITTED. THE SCREEN IS SECURED BY P.K. SELF-TAPPING SCREWS. ENSURE THAT COMPONENTS ARE CLEAR OF THE SCREEN BEFORE IT IS FINALLY SCREWED INTO POSITION.
6. IF THE AMPLIFIER IS CONSTRUCTED FOR USE WITH A TAPE DECK INCORPORATING A HIGH IMPEDANCE ERASE HEAD CO-AXIAL CABLE SHOULD BE USED INSTEAD OF THE TWISTED RED & GREEN FLEX FOR THE HEAD CONNECTION. THE CENTRE CORE BECOMES THE 'RED' CONNECTION AND THE OUTER BRAIDING THE 'GREEN' CONNECTION.
7. THE AMPLIFIER HAS NOW BEEN COMPLETELY WIRED. TEST FIGURES ARE GIVEN FOR THE CONSTRUCTOR WITH TEST EQUIPMENT. IF THIS IS NOT AVAILABLE THE CONSTRUCTOR SHOULD SATISFY HIMSELF THAT THE WIRING & COMPONENT VALUES ARE CORRECT BY CAREFULLY RECHECKING THROUGH ALL THE STAGES. READ THE NOTE ON FEEDBACK BEFORE SWITCHING THE AMPLIFIER 'ON'.
8. PROCEED TO STAGE SIX - POWER PACK ASSEMBLY AND WIRING.

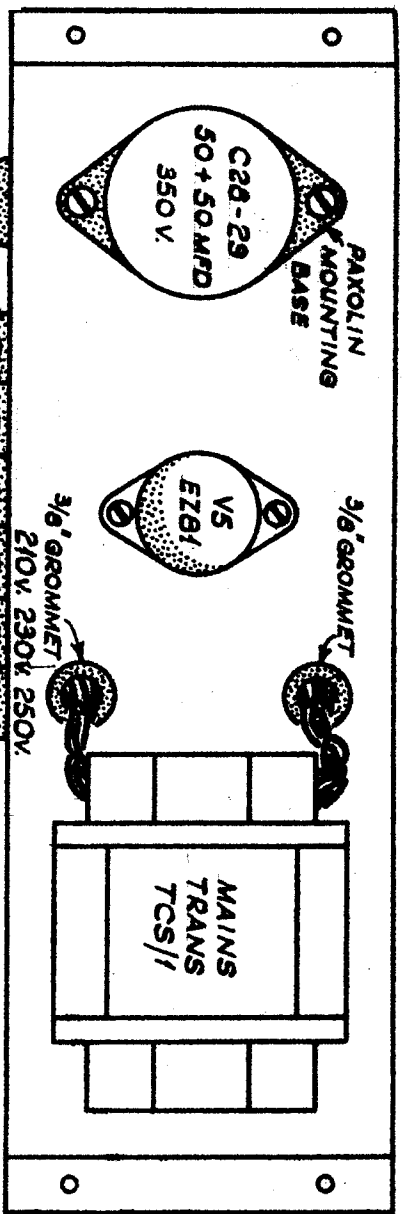


FIG. 1 TOP VIEW

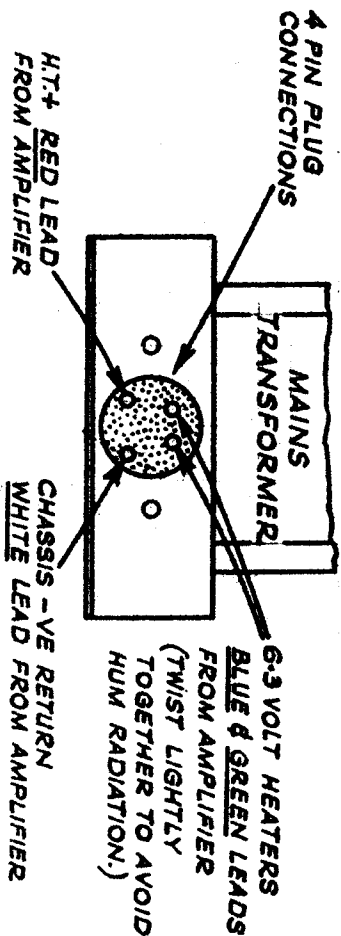
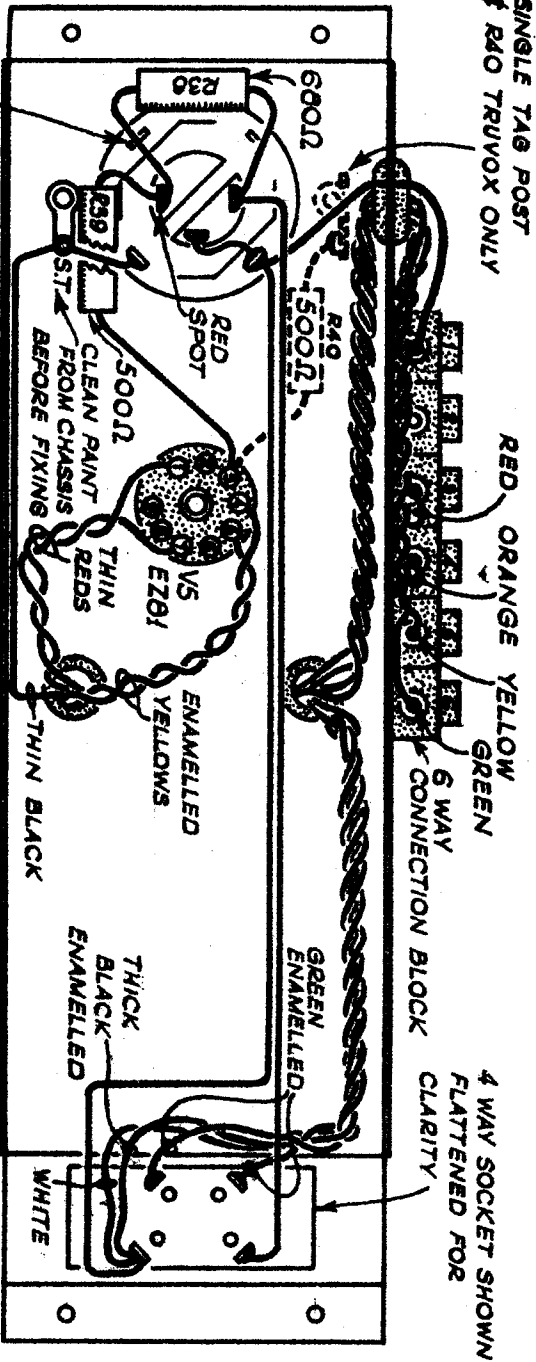


FIG. 2 END VIEW



OUTER LUGS PUSHED THROUGH SLOTS AND LIGHTLY TWISTED TO RETAIN CONDENSER

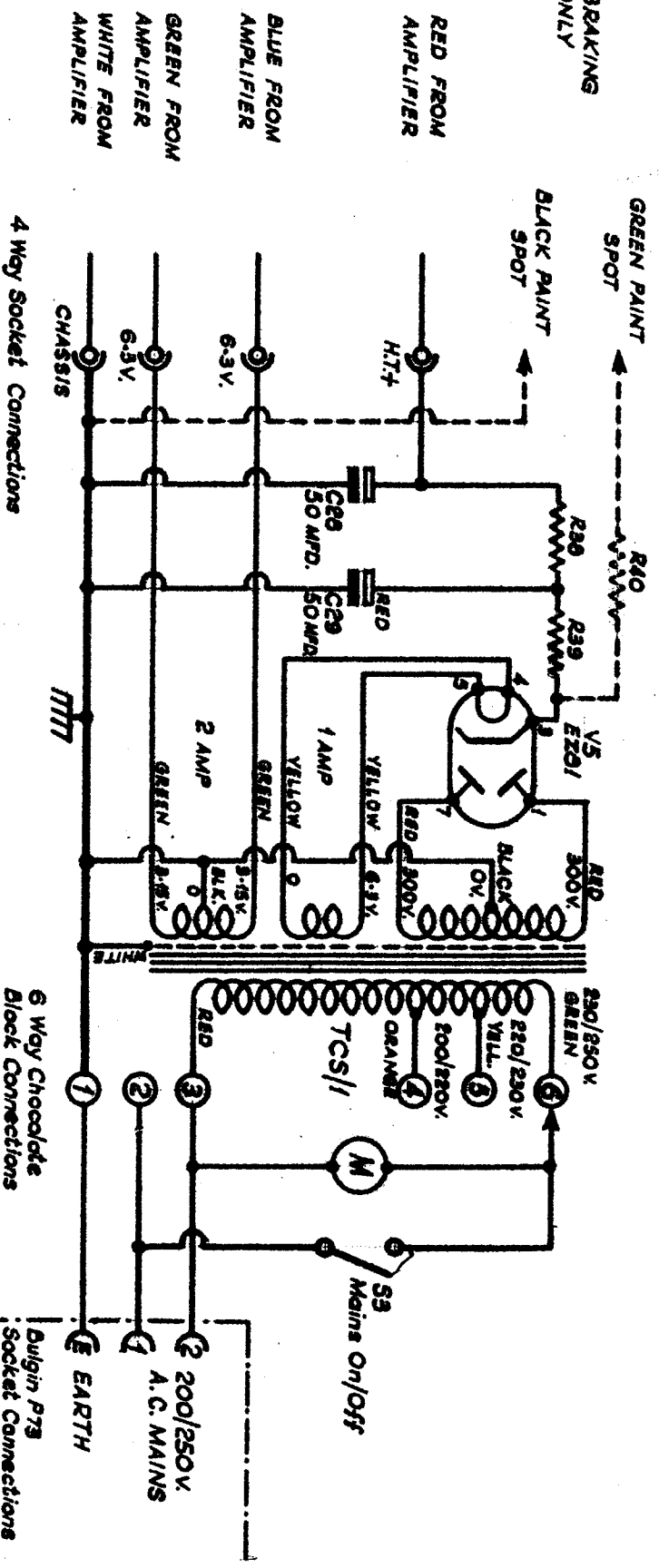
R38 - 39 - 40, 5 WATT WIRE-WOUND RESISTORS

FIG. 3 UNDERSIDE VIEW

POWER UNIT CONNECTION BLOCK (FIG. 1 REFERS)

1	EARTH	
2	(a) CONNECT TO ONE POLE A.C. MAINS SOCKET. (b) CONNECT TO ONE POLE 'ON/OFF' SWITCH.	
3	(a) CONNECT TO OTHER POLE OF A.C. MAINS SOCKET. (b) CONNECT TO DECK MOTOR (WHITE PAINT SPOT ON COLLARO STUDIO CONNECTION BLOCK). (RED PAINT SPOT ON TRUVOX SWITCH UNIT).	
4	USE WHICHEVER NUMBER CORRESPONDS TO YOUR A.C. MAINS SUPPLY VOLTAGE	(a) CONNECT TO REMAINING POLE ON 'ON/OFF' SWITCH. (b) CONNECT TO DECK MOTOR (WHITE PAINT SPOT ON COLLARO STUDIO DECK CONNECTION BLOCK) (RED PAINT SPOT ON TRUVOX SWITCH UNIT)
5		
6		

**TRUVOX BRAKING
CIRCUIT ONLY**



SPECIAL INSTRUCTIONS

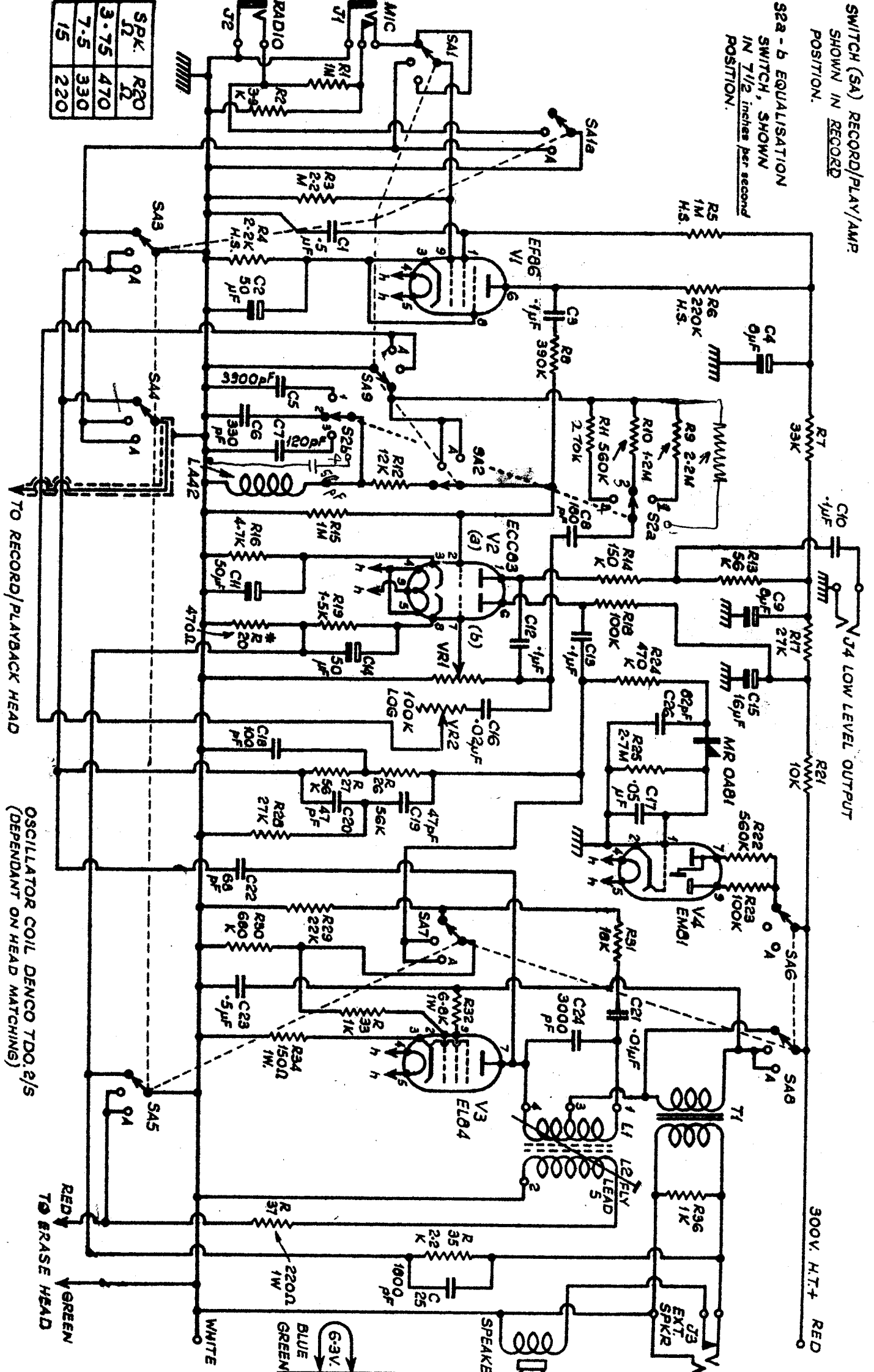
1. ASSEMBLE COMPONENTS AS SHOWN IN FIGS 1 & 3. LIGHTLY TWIST TOGETHER A.C. CARRYING LEADS TO PREVENT HUM RADIATION - SHOWN THIS WAY. ENSURE CORRECT CONNECTIONS TO THE SIX-WAY CONNECTION BLOCK OTHERWISE SERIOUS DAMAGE TO THE POWER UNIT MAY RESULT.
2. RESISTOR R40 AND THE DOTTED CHASSIS/EARTH CONNECTION SUPPLY THE D.C. CURRENT NECESSARY TO OPERATE THE ELECTRONIC BRAKING ON TRUVOX TAPE DECKS.
3. KEEP ALL LEADS FROM THE POWER UNIT AS SHORT AS PRACTICAL. LIGHTLY TWIST TOGETHER EACH PAIR OF LEADS CARRYING A.C. AND POSITION WELL CLEAR OF TAPE HEADS & THE INPUT STAGES OF THE AMPLIFIER.
4. A HIGH HUM LEVEL IN TAPE RECORDERS IS DUE MAINLY TO THE SENSITIVE REPLAY HEAD PICKING UP THE MAGNETIC FIELDS ASSOCIATED WITH THE MAINS TRANSFORMER, THEREFORE BEFORE FINALLY FIXING THE POWER UNIT TO THE CABINET IT IS MOST IMPORTANT TO FIND THE POSITION OF MINIMUM HUM. THIS IS BEST ACHIEVED BY SWITCHING THE AMPLIFIER TO REPLAY AND WITH THE VOLUME CONTROL SET FOR MAXIMUM OUTPUT CAREFULLY ORIENTATE THE POWER UNIT UNTIL THE HUM LEVEL IS AT A MINIMUM. IF THIS IS CARRIED OUT IN A PORTABLE CASE SLIGHT READJUSTMENT WILL BE NECESSARY WHEN THE TAPE DECK IS LOWERED INTO ITS WORKING POSITION. NOTE! NO METAL PART OF THE TAPE DECK MUST CONTACT THE POWER UNIT OR AMPLIFIER CHASSIS. THIS WOULD CAUSE HUM THROUGH MULTIPLE EARTHING. A SINGLE JOINT EARTH RETURN HAS BEEN MAINTAINED THROUGHOUT THE EQUIPMENT THE DECK BEING EARTHED VIA THE SCREENED BRAIDING OF THE LEAD TO THE RECORD/REPLAY HEAD. SOME TAPE DECKS HOWEVER HAVE THE TAPE HEADS ISOLATED FROM THE DECK PLATE, FOR THESE EXCEPTIONS A SEPARATE CONNECTION BETWEEN DECK PLATE AND POWER PACK CHASSIS BECOMES NECESSARY. EXAMPLES BEING THE GRANELL ML.5 & MOTEK K10. FURTHER INFORMATION ON HUM IS GIVEN ON PAGE 4.
5. DAMAGE TO THE ELECTROLYTIC CAPACITORS C28 & C29 MAY OCCUR IF THE POWER UNIT IS OPERATED WITHOUT A SUITABLE LOAD ACROSS THE H.T. TERMINATION.

STAGE SIX ~ THEORETICAL DIAGRAM TCS/1 POWER UNIT

SWITCH (S4) RECORD/PLAY/AMP
SHOWN IN RECORD
POSITION.

S2a - b EQUALISATION
SWITCH, SHOWN
IN 7 1/2 inches per second
POSITION.

SPK	R20
Ω	Ω
3.75	470
7.5	330
15	220



THEORETICAL DIAGRAM OF TAPE AMPLIFIER HF/TR3 MKII (STUDIO BRADMATIC)

OSCILLATOR COIL DENC0 TDO.2/S
(DEPENDANT ON HEAD MATCHING)

RED TO BRASE HEAD
GREEN
WHITE

TO RECORD/PLAYBACK HEAD

300V. HT+ RED

6.3V. BLUE GREEN

SPEAKE

J3 EXT SPKR

1K

25

1800 pF

220 Ω 1W

R 35

R 22

R 100K

R 37

37

1W

220 Ω

1W

37

1W

150 Ω

1W

R 34

150 Ω

1W

R 33

1K

R 32

6.9K

1W

R 31

1W

R 30

22K

R 29

22K

R 28

27K

R 27

56K

R 26

56K

R 25

27K

R 24

56K

R 23

47pF

C 20

47pF

C 19

56K

R 18

56K

R 17

56K

R 16

56K

R 15

56K

R 14

56K

R 13

56K

R 12

56K

R 11

56K

R 10

56K

R 9

56K

R 8

56K

R 7

56K

R 6

56K

R 5

56K

R 4

56K

R 3

56K

R 2

56K

R 1

56K

CONNECTION DATA - COLLARO STUDIO DECK MK II.
(BRADMATIC HEADS)

The latest type of Record/Play and Erase Heads (Bradmatic) are now being fitted to the Collaro "Studio" Tape Decks supplied to us. The following method of head connection is recommended.

- (1) Lift off Head Cover Carefully to avoid damage to Paxolin Pillars.
- (2) Wire Record/Play & Erase Heads as shown in Fig. I. Use care and solder rapidly, this will prevent the plastic insulation of the cable "running" due to overheating.
- (3) Use thin twin screened cable for the Record/Play Head connections. (length required 12 inches). Use thin twisted plastic cable for the Erase Head connections. (length required 12 inches).

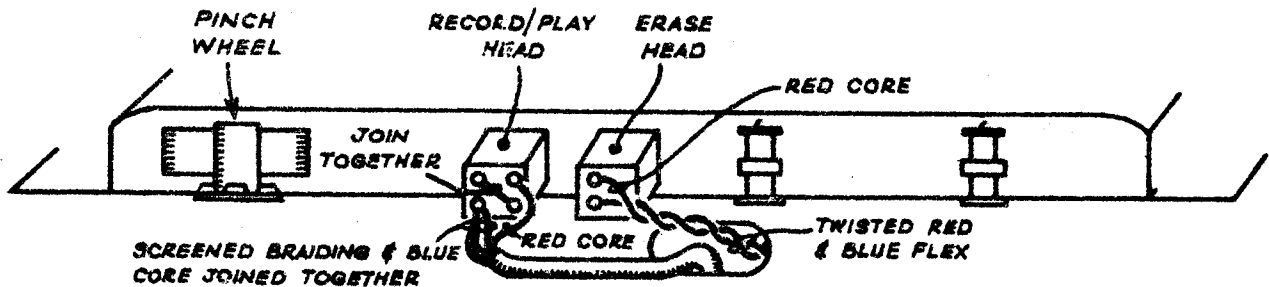


FIG. I. - VIEWED FROM TOP & REAR OF TAPE DECK

- (4) Fit a 3 way tag strip underneath the P.K. (self tapping) screw as illustrated on fig 2.
- (5) If a safety Erase switch is incorporated on the deck fit the 3 way tag strip in the alternative position illustrated in Fig 2. In this position it is important to;
 - (a) Scrape the paint from around the fixing to ensure a good electrical connection between the deck plate and "Earthy" contact on the tag strip.
 - (b) DEPRESS the deck START BUTTON to ensure that the tag strip is fitted in such a position that it is clear of the PINCH WHEEL SPRING (8396 Collaro Pictorial Diagram.) The spring moves towards the alternative position when the START button is DEPRESSED.
- (6) Terminate head leads and Amplifier head leads to the TAG-STRIP as illustrated.- CHECK THAT LEADS ARE CLEAR OF OPERATING MECHANISM.

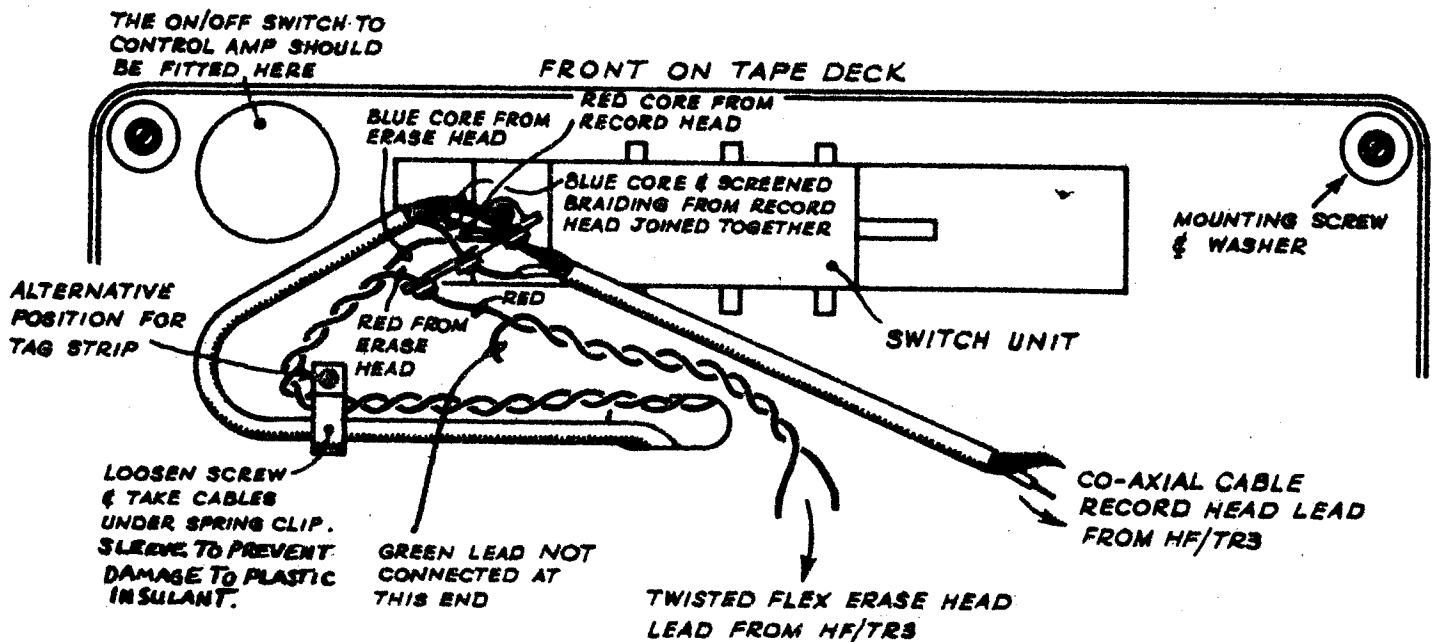
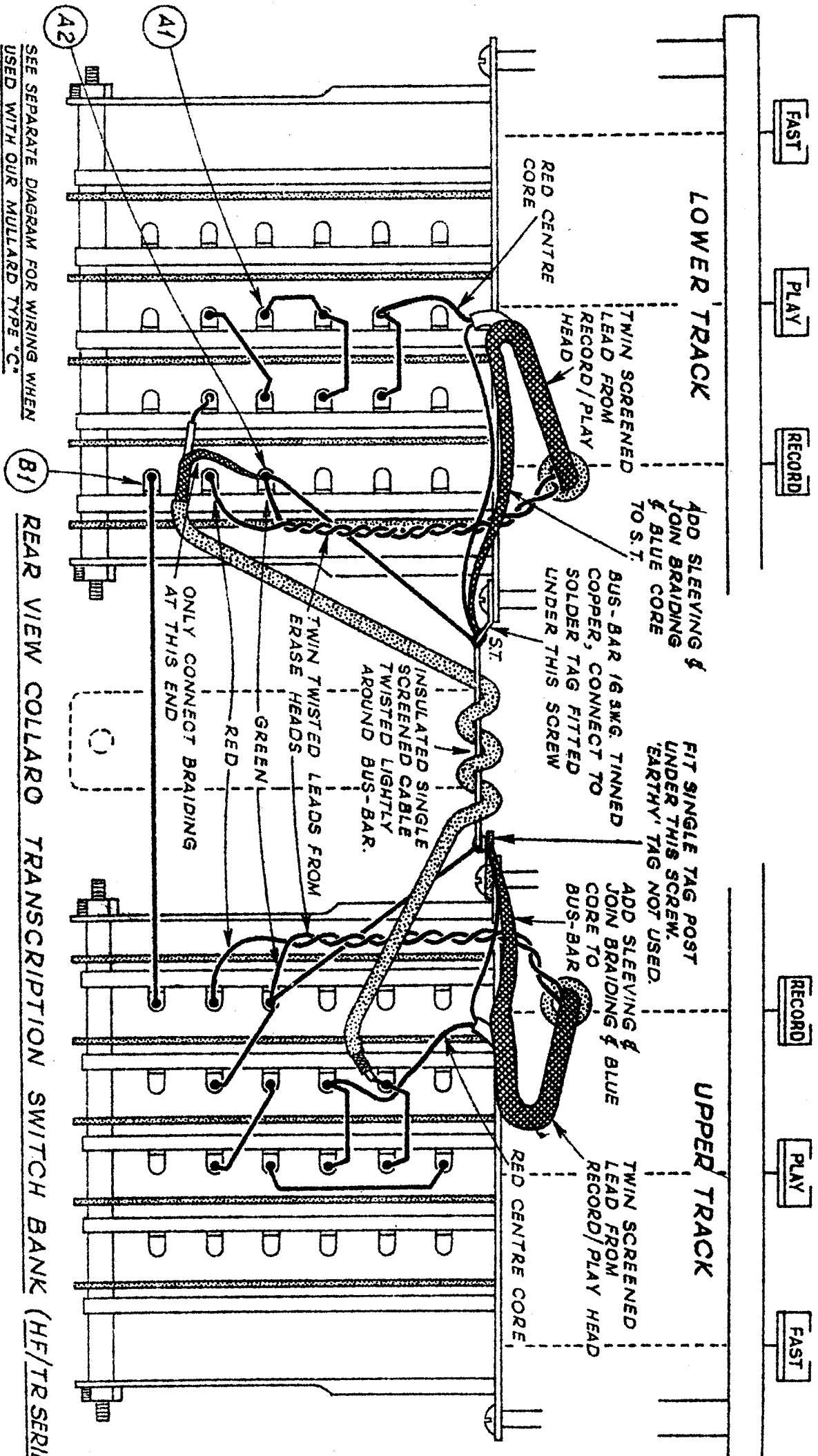


FIG. 2 - VIEWED FROM UNDERSIDE OF TAPE DECK



SEE SEPARATE DIAGRAM FOR WIRING WHEN USED WITH OUR MULLARD TYPE "C"

B1

REAR VIEW COLLARO TRANSCRIPTION SWITCH BANK (HF/TR SERIES)

CONNECTIONS FROM TAPE AMPLIFIER

1. Record Head Feed-Connect Live Centre Core to Tag on Switch Bank Coded A1.
2. Record Head Feed-Connect Outer Screened Braiding to Tag on Switch Bank A2.
3. Erase Head Feed-Connect the Red Lead to Tag on Switch Bank Coded B1.
4. Erase Head Feed-The Green Lead Must Not be connected To The Tape Deck or Switch Unit.

5. It is recommended that the Amplifier RECORD/PLAY Switch (SI) is Turned to The Replay Position Before Stopping the Transcripitor-This Avoids The Possibility Of Magnetizing The Heads.

PARTS LIST WIRING SWITCHES OF COLLARO TRANSCRIPTION

18 INCHES	16 SWG. TINNED COPPER WIRE.
18 INCHES	12 SWG. " "
12 INCHES	INSULATED SINGLE SCREENED CABLE.
1	23A. SOLDER TAG.
1	SINGLE TAG POST.

AVAILABLE AS AN OPTIONAL EXTRA - 9d PER PACKET

THE COLLARO TRANSCRIPTOR SWITCH WIRING
FOR USE WITH OUR CURRENT RANGE OF
TAPE AMPLIFIERS...

The overleaf drawing illustrates the Switch Banks as viewed from the Rear of the Tape Deck.

General Wiring Hints...

1. Wiring must be kept short and in the form of direct links. Ensure that the links are bent clear of the screened plates between switches. (Use 20 s.w.g. Tinned Copper Wire).
2. Fix a Solder Tag (S.T.) and a Single Tag Post under the fixing screws as shown. Solder one end of the Bus-Bar to the Solder Tag and the other end to the Insulated tag on the Single Tag Post. This ensures a single point earth connection for the Deck Wiring. (Use 16/18 s.w.g. Tinned Copper Wire).
3. The screened cable connecting the Two Switch Banks must be insulated to prevent the Braiding from shorting to Switch Contacts or forming a second Earth by contacting the Deck at an incorrect point.
4. When the Transcripator is fitted into the Stern Cabinet the Bracket shown dotted must be removed otherwise it will foul the loudspeaker. It is most important to replace the Bracket Fixing Screw plus a Washer to retain the Spring. This Bracket is not fitted on the latest Mk, IV Tape Decks.

TAPE RECORDING ACCESSORIES.

High Grade P.V.C. Tape, 1200 ft. 7,inch spool.....	from	£1. 1. 0.
E.M.I. 88/3 Magnetic Recording Tape 175 ft. 3 inch spool		7. 5.
E.M.I. 99/3 " " " 250 ft. 3 inch spool L.P...		9. 6.
E.M.I. 88/12 " " " 1200 ft. 7 inch spool	£1.15. 0.	
E.M.I. 99/18 " " " 1800 ft. 7 inch spool L.P...	£2.10. 0.	
Grundig Magnetic Recording Tape 850 ft. 5 $\frac{3}{4}$ inch spool	£1. 8. 0.	
Grundig " " " BASF 1200 ft. 7 inch spool	£1.15. 0.	
Grundig " " " BASF 1700 ft. 7 inch spool L.P.	£2.10. 0.	
Scotch Boy " " " 600 ft. 5 inch spool	18. 0.	
Scotch Boy " " " 1200 ft. 7 inch spool	£1.10. 0.	
E.M.I. Empty Spool in Carton AP93..3 inch	3. 0.	
E.M.I. " " " " AP85..5 inch	4. 6.	
E.M.I. " " " " AP87..7 inch	5. 0.	
Scotch Boy 5 inch empty spool in carton	4. 3.	
Scotch Boy 7 inch " " " "	4. 9.	
E.M.I. Leader Tape AP38 various colours	4. 6.	
E.M.I. Non-Magnetic Scissors AP39	16. 0.	
E.M.I. Jointing Block AP46	17. 6.	
E.M.I. Jointing Compound AP77	7. 6.	
E.M.I. Jointing Tape AP103 $\frac{1}{2}$ inch wide	7. 6.	
E.M.I. Accessory Kit	£1.17. 6.	
E.M.I. Storage Cases, 5 inch	3. 6.	
E.M.I. " " , 7 inch	4. 0.	
Bulgin Jack Plug P38	3. 0.	
Re-an Screened Jack Plug	3. 3.	
Bib Tape Splicer	18. 6.	
Stern extension microphone lead, 6 yards	17. 6.	
Acos Mic 40/1 Crystal Microphone	£1. 5. 0.	
Lustraphone Dynamic Microphone (High Impedance) LD61Z	£3. 7. 6.	
Extension Speaker WB HF 8 inch	£4. 3. 6.	
Extension Speaker WB HF 10 inch	£5. 0. 0.	
Truvox Radio Jack TA3 (Med.. W/band Light and Home)	£3. 8. 4.	
Truvox Telephone adapter	£2. 2. 0.	
Truvox "Stetho" (Pair stethoscopic ear pieces)	£3. 3. 0.	
Wearite Defluxer (for demagnetising Heads)	£2.10. 0.	
Acos Telephone adapter	£1. 1. 0.	

PORTABLE CASES are available to incorporate the HF/TR3 Mk II with the Truvox or Collaro Tape Decks. The cases are of robust construction and are attractively finished in high grade rexine. A gilt Loudspeaker Grill with matching fittings and Cream Pistol Grip carrying handle complete the contemporary design. PRICE £5. 0. 0. (Carriage and Insurance 5/- extra.)

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