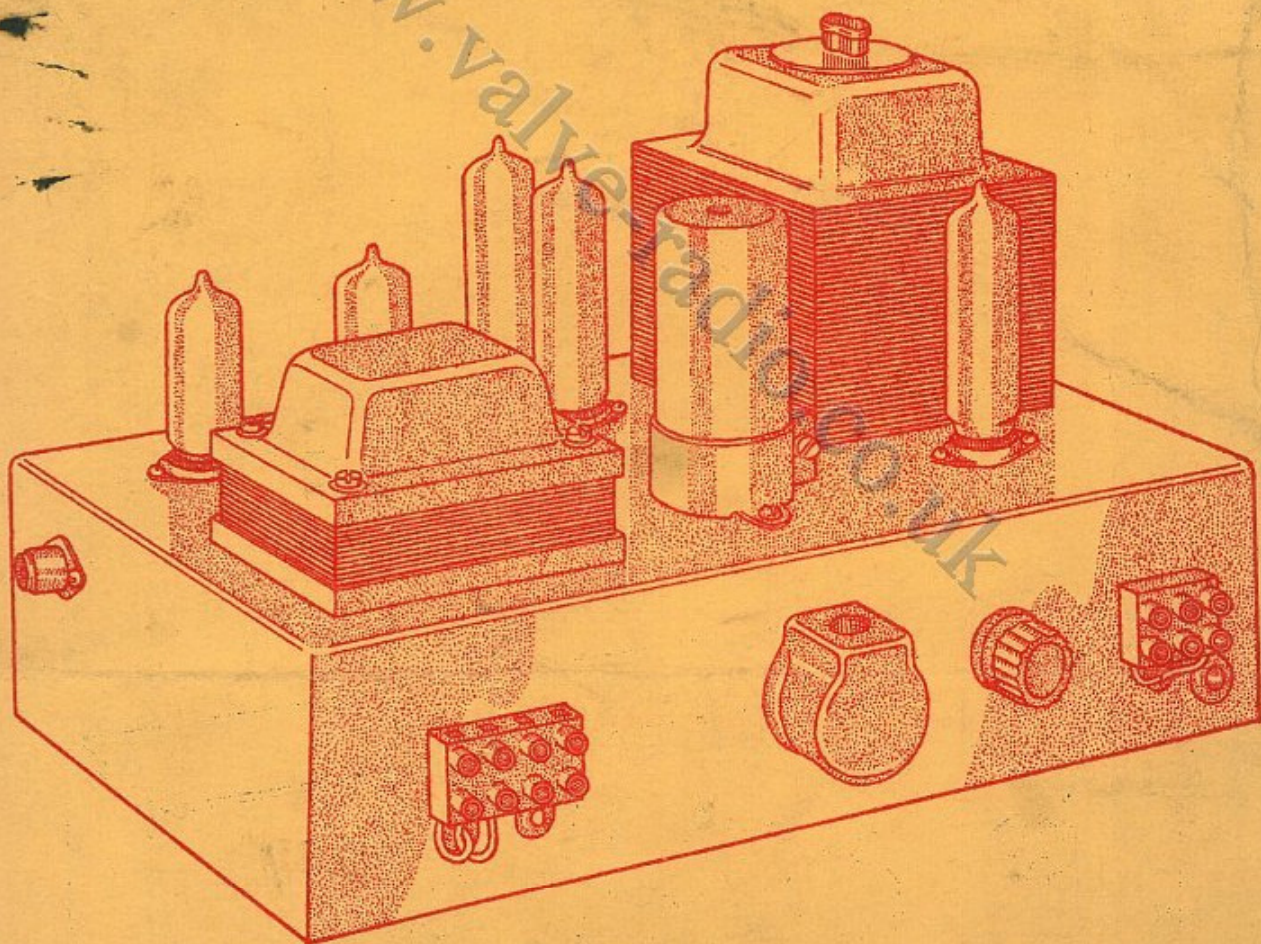


# Stern's

COMPLETE ASSEMBLY DATA and DIAGRAMS FOR  
THE CONSTRUCTION OF

## THE MULLARD "5-10" POWER AMPLIFIER AND REMOTE CONTROL UNIT (INCORPORATING MODIFIED LAYOUT)



STERN RADIO LTD,  
109 and 115, FLEET STREET, E.C.4

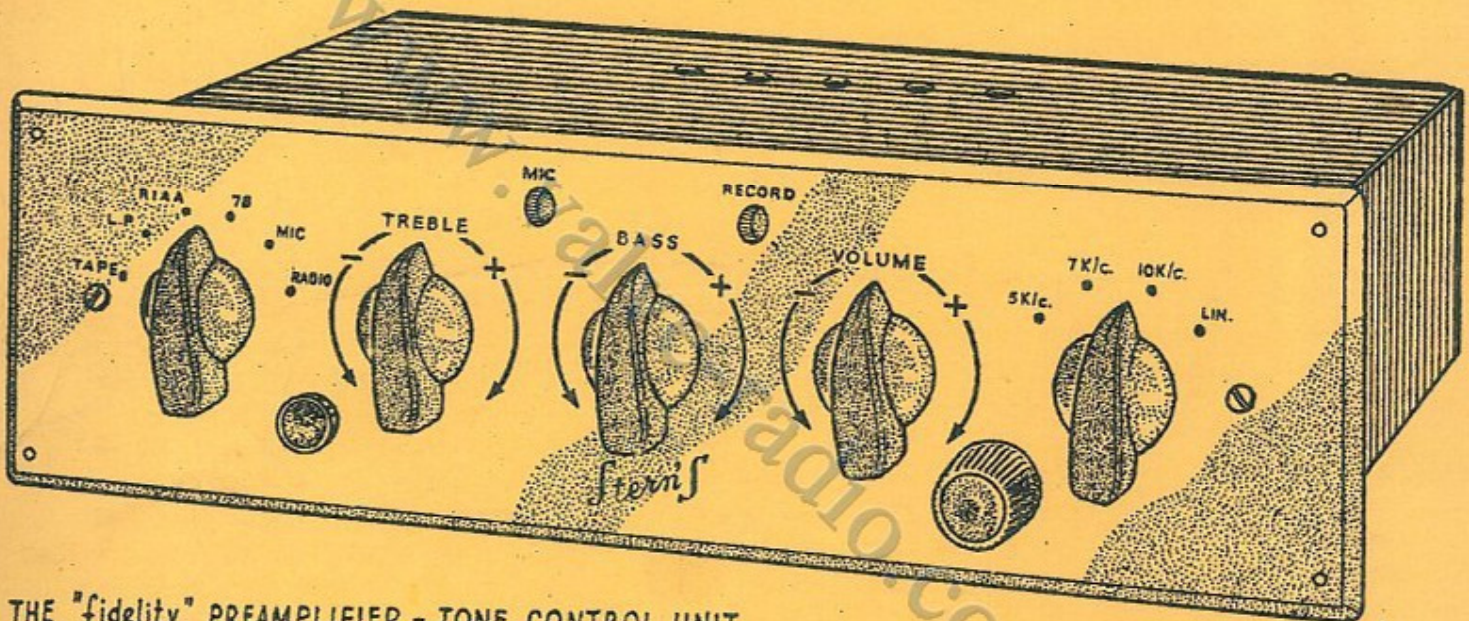
Telephone: FLEET STREET 5812-3-4

### HUM - LOOP GAIN EFFECT.

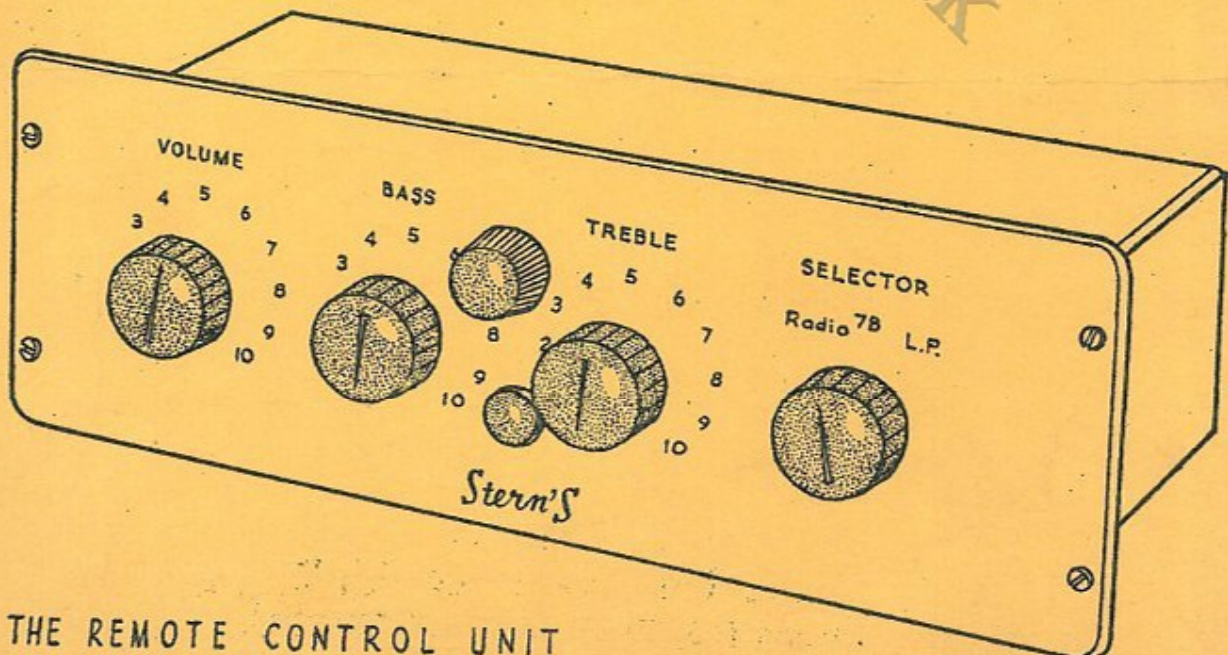
In some instances it is possible that a slightly noticeable hum level is present when the Pre-Amp. Power Supply Plug is inserted in the Main Amplifier. This does not occur in all cases but should it be apparent - disconnect the earth return wire on the Main Amplifier Power Supply Socket (the lead connected between the Earth Tag of C1/C2 Condenser to the - Socket of the Power Supply Socket), leaving the screening of the audio lead as the only "earth" connection between the two Units.

This will cure the "loop gain effect", but switch "OFF" the mains supply before disconnecting the Pre-Amplifier Audio Input Plug from the Main Chassis or a shock may be experienced.

ALWAYS SWITCH "OFF" BEFORE ATTEMPTING ANY ADJUSTMENTS.



THE "fidelity" PREAMPLIFIER - TONE CONTROL UNIT



THE REMOTE CONTROL UNIT

## S T E R N ' S

### T H E M U L L A R D 5 - 1 0 A M P L I F I E R

The MULLARD "5-10" is now quite famous for its excellent performance characteristics and certainly needs no further recommendation from us. We present the design incorporating improvements on the original layout, these in no way effect the excellent performance of the Amplifier, but undoubtedly makes for a more compact and simplified Unit which even an inexperienced Home Constructor can successfully assemble.

We comply entirely with Mullard circuit specification, including the supply of specified components and we incorporate the latest ULTRALINEAR OUTPUT TRANSFORMER made specially for us by ELECTROVOICE LTD., thus ensuring maximum undistorted output and the widest frequency response. We also incorporate a HEAVY DUTY MAINS TRANSFORMER which has sufficient reserve of output to supply both a PREAMPLIFIER TONE CONTROL UNIT and a RADIO TUNING UNIT, the reserve supply is 6.3 Volts at 2.5 amps, and H.T. 250 Volts at 50 m/a can also be drawn.

The manner in which we present this design (i.e., separate Main Amplifier) gives the Home Constructor the choice of using it with either our REMOTE CONTROL UNIT or the STERN'S "fidelity" PREAMPLIFIER-TONE CONTROL UNIT. Full constructional data to build both the Main Amplifier and the Remote Control Unit are contained in this Assembly Manual but the Preamplifier-Tone Control Unit is frequently used with other "Hi-Fi" Main Amplifiers and in consequence is the subject of a separate Assembly Manual (price 1/3) the specification of it however is given overleaf.

The REMOTE CONTROL UNIT is essentially for simple domestic installations combined with High Fidelity reproduction. The Tone Control facilities are equal to those on the more elaborate Preamplifier, but the input requirement to give correct output to fully load the Amplifier is, in comparison, restricted. 600 m/Volts is in fact required, thus all of the popular modern Record Players, such as B.S.R., Collaro and Garrard with high gain Grystal Pick Ups, and the modern Radio Tuner Units amply fulfill this requirement. The Unit can be accommodated in any position on a Cabinet and the front panel contains (a) Coloured Pilot Lamp Indicator, (b) Separate Bass and Treble Controls, (c) Volume Control (e) Mains On/Off Switch, (d) 3 position Selector Switch giving Radio Tuner - L.P. and 78 r.p.m. positions. Input Sockets for Radio and Gram are contained on back of Unit, together with Power Output Socket to feed the Radio Tuner.

#### TECHNICAL DATA - MAIN AMPLIFIER ONLY

POWER OUTPUT (Sine Wave Input)  
Rated Output ... 10 Watts.  
Max. Output ... 14 Watts  
(approx)

TOTAL HARMONICS  
Normal loading, sinusoidal  
test frequencies at 400 c/s  
... 0.3% total harmonics at  
10 Watts.

FREQUENCY RESPONSE  
At 1 Watt: within 1db of  
1 Kc/s level from 5 c/s to  
20 Kc/s.  
At 10 Watts: within 1db of  
1 Kc/s level from 30 c/s to  
15 Kc/s.

PHASE SHIFT  
Approx 20° at 20 c/s and  
10 Kc/s.

HUM and NOISE  
At least 75db below 10 Watts.

SENSITIVITY  
40 mV. for 10 Watt Output.

LOOP GAIN  
26db at 1 Kc/s.

POWER CONSUMPTION  
approximately 60 Watts.

DIMENSIONS  
11" x 7" x 7" high.

### TECHNICAL DATA - REMOTE CONTROL UNIT

SENSITIVITY ... RADIO and GRAM LP .. 500 m/Volts - GRAM 78 rpm .. 600 m/V.  
TONE CONTROL ... BASS ... Continuously variable -5db to +12db.  
TREBLE ... Continuously variable -11db to +10db.  
INPUT SOCKETS ... (a) Radio Tuner Unit.  
(b) High Gain Pick Ups.  
SELECTOR SWITCH ... A 3 position Switch provides for selection of  
Gram, L.P. and 78 records and a Radio Tuner Unit.  
DIMENSIONS ... 10" x 4" x 3 $\frac{1}{2}$ " high.

### THE "FIDELITY" PREAMPLIFIER - TONE CONTROL UNIT.

Has established for itself a reputation of excellent quality of reproduction with ability to give adequate gain from low output "High Fidelity" Pick Ups. It has extreme flexibility of Bass and Treble control and due to negative feed back over all stages the noise level is held to a minimum. It is the choice of the "music lover" because of its adaptability to operate well with all types of High Fidelity Amplifiers including the Williamson.

The completed Unit is totally enclosed in a Steel Case of which the top and bottom covers are readily removed to give immediate access to the wiring. The whole Unit is very attractively finished in Golden Hammer with a separate front panel which is clearly engraved.

### TECHNICAL DATA ... PREAMPLIFIER-TONE CONTROL UNIT

INPUT SOCKETS FOR ... (a) Microphone  
(b) Low Gain Pick Ups  
(c) High Gain Pick Ups  
(d) Radio Tuning Unit - This is combined with a Power Outlet Socket to Feed Tuning Unit.  
(e) Tape Recording and Playback Facilities.  
SELECTOR SWITCH ..... A 6 position switch is incorporated, this provides for the above inputs and also for the equaliser.  
\*  
EQUALISATION FOR .... 78 rpm and two positions for Long Play.  
\*FILTER ..... A 4 position Low Pass Filter provides cut-offs at 5 Kc/s - 7 Kc/s - 10 Kc/s and a linear position.  
TONE CONTROL ..... Continuously variable Bass and Treble, each giving variations  $\pm$  18db to the linear position.  
SIGNAL INPUT ..... The Maximum undistorted output is 10 Volts. 2 Volts output is obtained for the following input voltages ...  
(a) Microphone ..... 10 m/Volts.  
(b) Pick Up (Low Gain) ..... 30 m/Volts.  
(c) Pick Up (High Gain) ..... 1 Volt.  
(d) Radio Tuner ..... 100 m/Volts.  
(e) Tape ..... 150 m/Volts.  
OUTPUT CONTROL ..... An Output Control is provided so that the output may be varied to suit all makes and types of Main Amplifiers.  
POWER REQUIREMENTS .. 0.9 amps at 6.3 Volts, and H.T. 250/350 Volts at 5 m/a.  
VALVES ..... 2 off type ECC83 / 12AX7.  
MAIN SWITCH ..... A mains On/Off Switch is mounted separately thus avoiding pick up of mains hum.  
DIMENSIONS ..... 10 $\frac{3}{4}$ " x 6 $\frac{1}{2}$ " x 2 $\frac{3}{4}$ " (Panel 11 $\frac{1}{2}$ " x 3 $\frac{1}{4}$ " x 3/16").

\*The EQUALISER and FILTER UNITS are supplied (in the Kit) completely assembled and of course thoroughly tested. The remainder of the Control Unit is very simple to assemble, the drawings supplied being drawn in great detail so that a quite inexperienced Home Constructor can successfully complete the assembly.

continued ...

THE COMPLETE KIT OF PARTS to build the "fidelity" PREAMPLIFIER-TONE CONTROL UNIT is available for £6 - 6 - 0 (plus 5/- carriage and insurance).

The Assembly Manual is available for 1/3d. It includes Component Price List and "wire-to-wire" diagrams.

COMPONENT PRICE LIST - MAIN AMPLIFIER ONLY

RESISTORS		s	d	CONDENSERS	
R1	3.3 Meg $\frac{1}{2}W$ . Or-Or-Grn.		4	C1)	50-50 mfd. 350V. 16 0
R2	100K High Stability	1	6	C2)	
R3	470K $\frac{1}{2}W$ . Yell-Mauve-Yell		4	C3	8 mfd. 350/450V. 3 6
R4	1.8K $\frac{1}{2}W$ . Brown-Grey-Red		4	C4	8 mfd. 350/450V. 3 6
R5	100 ohm. $\frac{1}{2}W$ . Brn-Blk-Brn		4	C5	100 mfd. 12/25V. 3 0
R6	100K $\frac{1}{2}W$ . Brn-Blk-Yellow		4	C6	.05 mfd. 350/500V. Tube 1 0
R7	68K $\frac{1}{2}W$ . Blue-Grey-Orange		4	C7	.1 mfd. 350/450V. Tube 1 0
R8	1 Meg $\frac{1}{2}W$ . Brn-Blk-Green		4	C8	.1 mfd. 350/450V. Tube 1 0
R9	100K $\frac{1}{2}W$ . Brown-Blk-Yellow		4	C9	.1 mfd. 350/450V. Tube 1 0
R10	100K $\frac{1}{2}W$ . Brown-Blk-Yellow		4	C10	50mfd. 25V. (or 50mfd 50V) 2 6
R11	33K $\frac{1}{2}W$ . Orange-Orange-Orange		4	C11	50mfd. 25V. (or 50mfd 50V) 2 6
R12	820K $\frac{1}{2}W$ . Grey-Red-Yell. H/S	1	0	C12)	270pF (for 3ohm Spk's) 9
R13	820K $\frac{1}{2}W$ . Grey-Red-Yell. H/S	1	0		120pF (for 15ohm Spk's) 9
R14	4.7K $\frac{1}{2}W$ . Yellow-Mauve-Red		4	C13	330pF Tube or S/Mica (or 300pF) 9
R15	4.7K $\frac{1}{2}W$ . Yellow-Mauve-Red		4		
R16	270/300ohm 5W. (as marked)	1	6	TRANSFORMER, CHASSIS, etc.	
R17	270/300ohm 5W. (as marked)	1	6	1	Drilled Chassis 12 9
R18	5.6K 10W. (as marked)	2	0	1	Mains Trans. Type 5/10M £1 18 6
R21)	15K (for 3ohm) Brn-Grn-Or.		4	1	Electrovoice Ultralinear O/P Trans. Type 5/10P. £1-5-6.
R21)	33K (for 15ohm) Or-Or-Or		4	5	B9A Valveholders. 3 9
R22	10K $\frac{1}{2}W$ . Brown-Blk-Orange		4	1	16 Way Component Assembly Board. 2 0
R27	250/300ohm 3W. (as marked)	1	3	1	Co-Axial type Input Socket and Plug 2 6
R28	250/300ohm 3W. (as marked)	1	3	1	5 Way Plug and Socket 2 6
R29	1K $\frac{1}{2}W$ . Brown-Black-Red		4	1	3 Way Terminal Block 9
R30	47 ohm $\frac{1}{2}W$ . Yell-Mauve-Blk		4	1	4 Way Terminal Block 1 0
R31	47 ohm $\frac{1}{2}W$ . Yell-Mauve-Blk		4	1	3 Way Tag Strip 4
				3	Single Tag Posts 6
				1	Fuse Holder 2 6
				1	1 amp Fuse 6
MISCELLANEOUS				VALVES	
4	4BA Bolts c/s. $\frac{5}{16}$ " or $\frac{1}{2}$ " )			New Mullard (or BVA equivalents).	
4	4BA Bolts R/H. $\frac{1}{4}$ " )			V1, Type EF86 price £1 - 4 - 4.	
8	4BA Nuts. )			V2, Type ECC83 price 19/6d.	
12	6BA Bolts R/H $\frac{1}{4}$ " )			V3, Type EL84 price 16/-.	
4	6BA Bolts R/H $\frac{1}{8}$ " )			V4, Type EL84 price 16/-	
16	6BA Nuts )			V5, Type EZ81 price 11/10d.	
2	6BA Solder Tags )	4	6	ALTERNATIVELY WE OFFER .....	
1	2 Way Tag Strip )			A COMPLETE SET OF NEW SURPLUS	
3	Grommets $\frac{1}{4}$ " )			VALVES - PRECISE EQUIVALENTS TO	
1	Grommet $\frac{3}{8}$ " )			ABOVE for ..... £2 - 14 - 3	
3	yds. PVC Connecting Wire )				
1	yd. Sleeving )				
3	yds. Twin Mains Flex. )				

PLEASE INCLUDE 1/- EXTRA WITH SUNDRY ORDERS FOR CARRIAGE and INSURANCE.

COMPONENT PRICE LIST OF REMOTE CONTROL UNIT ...

1	Control Box with engraved Panel and bracket.	9	6	1	2 Pole 3 Way Switch	2	9
R1	150K $\frac{1}{2}$ W. Brown-Grn-Yellow		4	1	Single Pole On/Off Rotary Switch	2	9
R2	1.5 Meg $\frac{1}{2}$ W. Brn-Grn-Grn.		4	1	Spindle Shaft		4
R3	33K $\frac{1}{2}$ W. Ornge-Orange-Orange		4	1	Spindle Coupler		10
R4	3.3 Meg $\frac{1}{2}$ W. Ornge-Ornge-Grn		4	1	Indicator Type D270	2	3
VR5	1 Meg Potentiometer	3	3	1	6 Volt Indicator Bulb		9
VR6	2 Meg Potentiometer	3	3	2	Co-Axial Sockets	2	6
VR7	2 Meg Potentiometer	3	3	2	Co-Axial Plugs	2	6
C1	300pF S/Mica or Tube.		9	5	Control Knobs	4	2
C2	3000/3300pF Ceramic Tube		9	1	International Octal V/Holder		9
C3	680/700pF Silver Mica or Tube		9	2	Single Tag Posts		4
C4	33pF Silver Mica or Tube		9	1	$\frac{1}{8}$ " Grommet		2
C5	30pF Silver Mica or Tube		9	5	4BA R/H $\frac{1}{4}$ " Bolts and Nuts		4
C6	270/300pF S/Mica or Tube		9	1	4BA Solder Tag		1
$\frac{1}{2}$ yds	Single Screened Sheathed Wire	1	6	4	6BA R/H $\frac{3}{8}$ " Bolts and Nuts		4
				1	yd 4 Core Cable	1	3
					12" 20 swg Tinned Copper		2
		<u>£1</u>	<u>6</u>		1 yd Twin Flex, White or Transparent.		3
			<u>7</u>		1 Cable Clip		2
					8 PK Screws		6
						<u>£1</u>	<u>3</u>
							<u>2</u>

PLEASE INCLUDE 1/- EXTRA WITH SUNDRY ORDERS TO COVER CARRIAGE & INSURANCE.

SPECIAL PRICE REDUCTIONS

We Will Supply The Complete KITS OF PARTS as follows .....

- (a) TO BUILD THE 5-10 MAIN AMPLIFIER ONLY ..... £9 - 10 - 0  
(plus 5/- carriage and ins.)
- (b) TO BUILD THE REMOTE CONTROL UNIT ONLY ..... £2 - 5 - 0  
(plus 2/6 carriage and ins.)
- (c) TO BUILD BOTH THE 5-10 AMPLIFIER and THE REMOTE CONTROL UNIT ..... £11 - 11 - 0  
(plus 7/6 carriage and ins.)
- (d) TO BUILD BOTH THE 5-10 AMPLIFIER and the "fidelity" PREAMPLIFIER-TONE CONTROL UNIT £15 - 15 - 0  
(plus 7/6 carriage and ins.)

ALTERNATIVELY WE SUPPLY THE ABOVE COMPLETELY ASSEMBLED ...

- (a) The 5-10 MAIN AMPLIFIER ... Fully Tested ..... £11 - 10 - 0
- (b) The REMOTE CONTROL UNIT ... Fully Tested ..... £2 - 17 - 6
- (c) BOTH THE 5-10 MAIN AMPLIFIER and the REMOTE CONTROL UNIT ..... £14 - 0 - 0

Credit Sale Terms ... Deposit £3-10-0 and 9 monthly payments of £1-5-8.

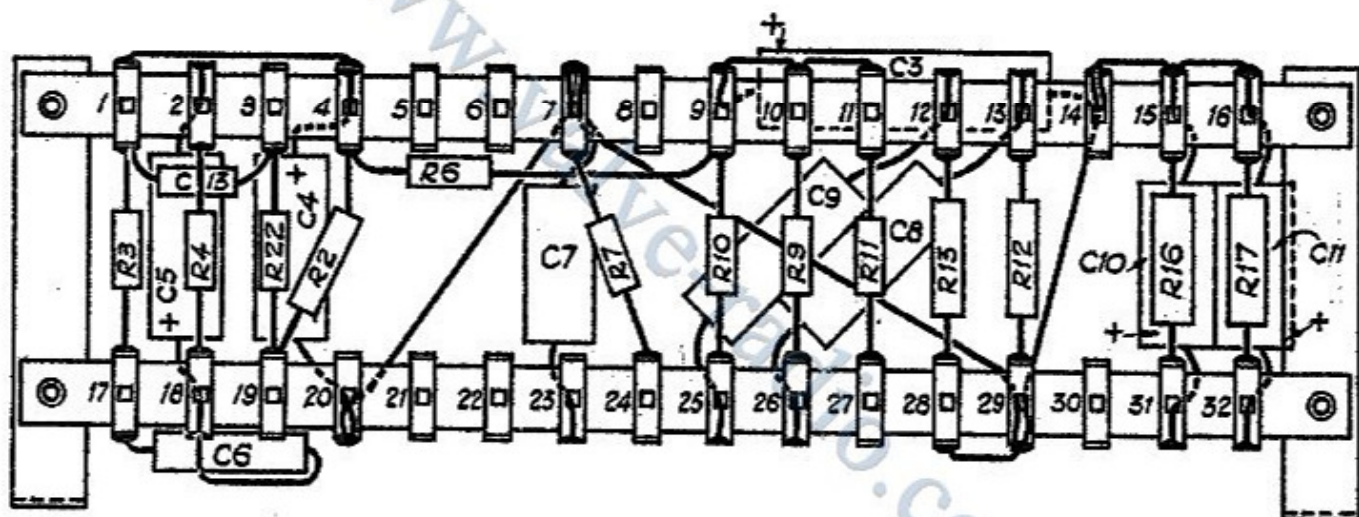
H.P. Terms ... Deposit £7-0-0 and 8 monthly payments of £1-0-0

- (d) BOTH THE 5-10 MAIN AMPLIFIER and the "fidelity" PREAMPLIFIER-TONE CONTROL UNIT ..... £18 - 18 - 0

Credit Sale Terms ... Deposit £4-15-0 and 9 monthly payments of £1-14-7.

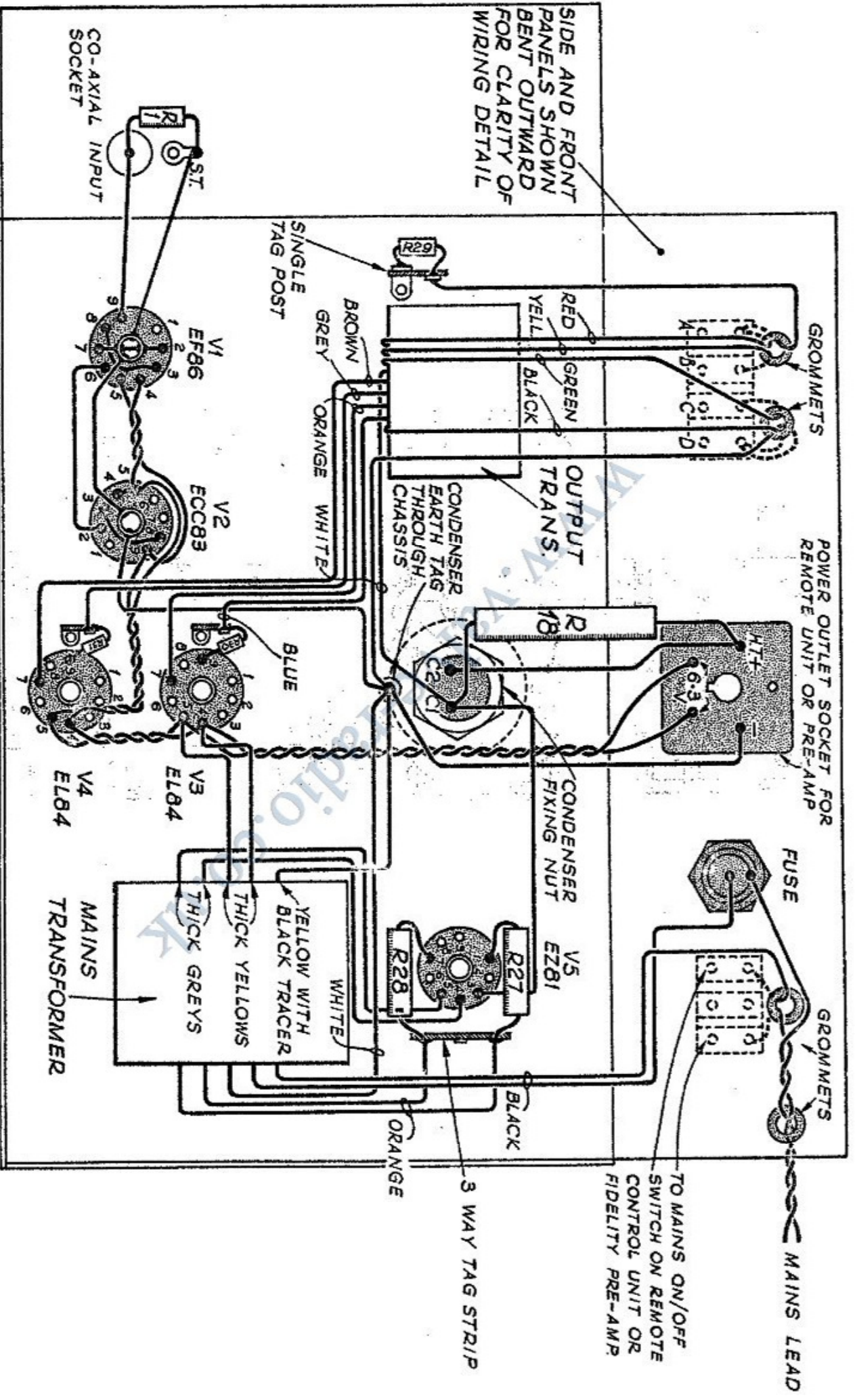
H.P. Terms ... Deposit £9-9-0 and 11 monthly payments of 19/2d.

PLEASE INCLUDE COST OF CARRIAGE AND INSURANCE AS SHOWN FOR KITS



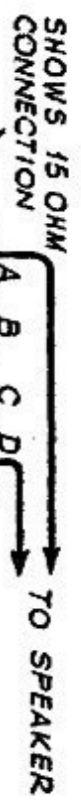
COMPONENT GROUP ASSEMBLY

COMPLETE WIRING AS SHOWN  
BEFORE MOUNTING INTO CHASSIS.

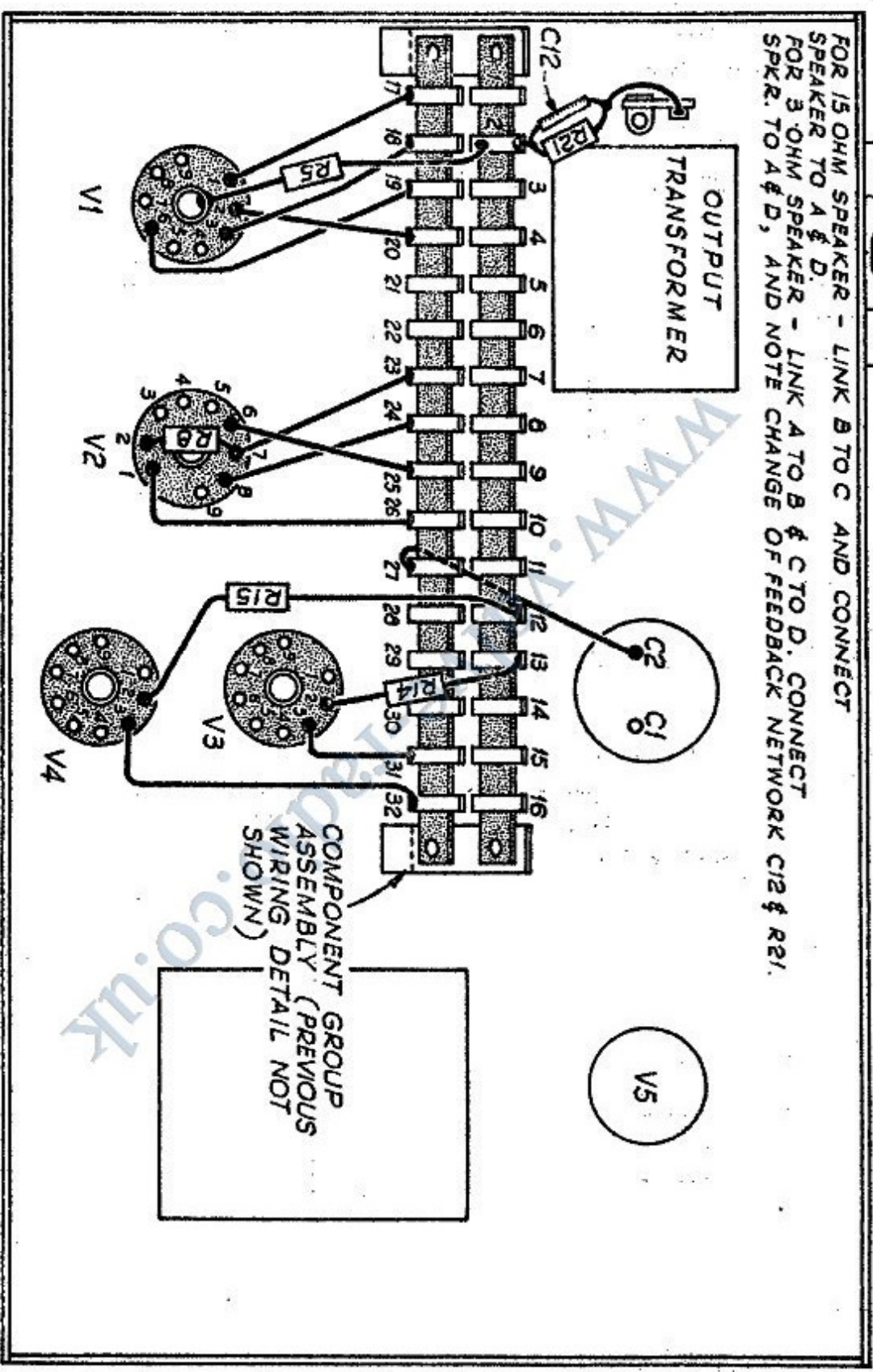


STERN'S "MULLARD 5-10 AMPLIFIER" UNDER CHASSIS LAYOUT AND WIRING 1ST STAGE

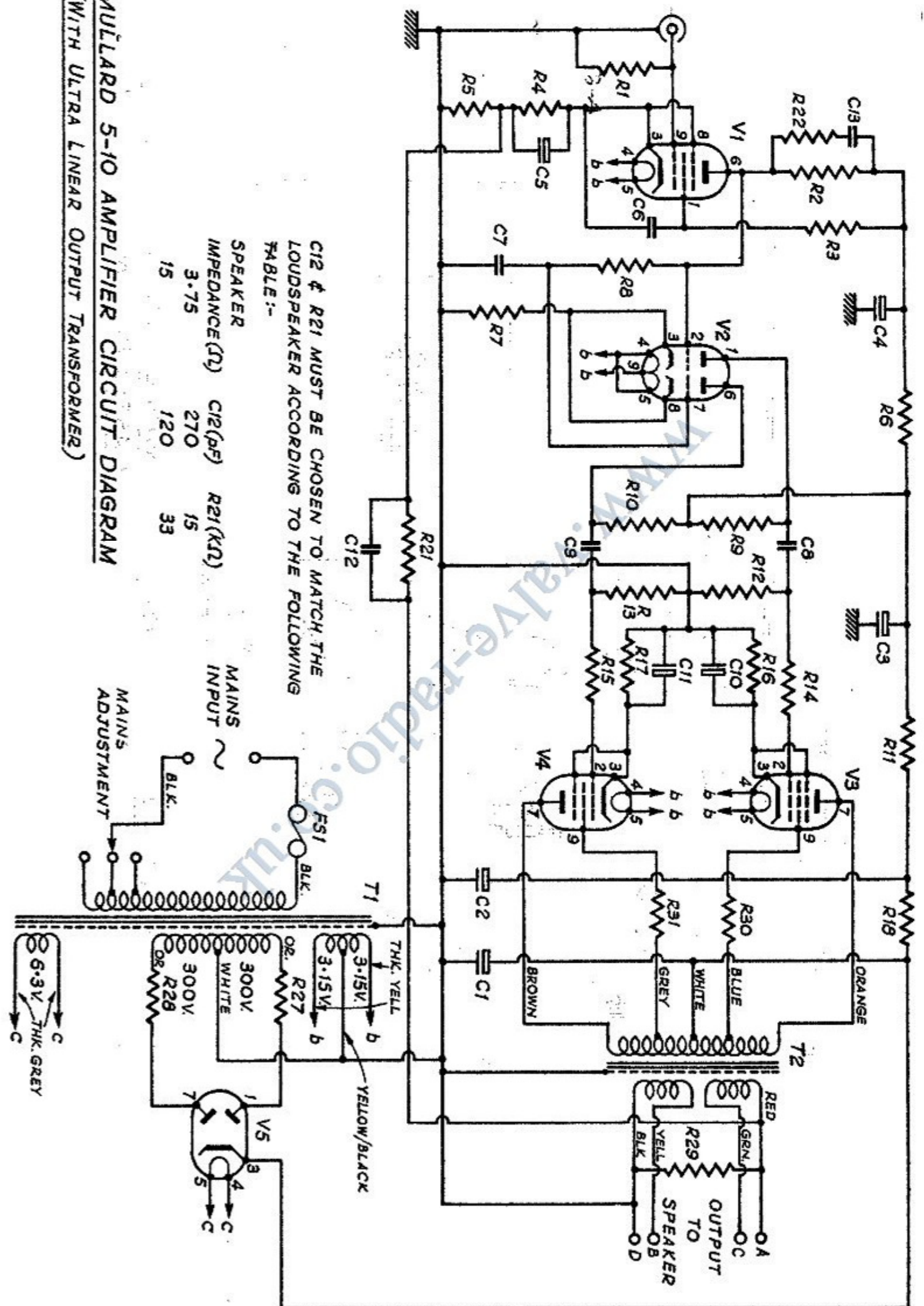




FOR 15 OHM SPEAKER - LINK B TO C AND CONNECT SPEAKER TO A & D.  
 FOR 3 OHM SPEAKER - LINK A TO B & C TO D. CONNECT SPKR. TO A & D, AND NOTE CHANGE OF FEEDBACK NETWORK C12 & R21.



**STERN'S 'MULLARD 5-10 AMPLIFIER' FINAL WIRING WITH COMPONENT GROUP ASSEMBLY IN POSITION**

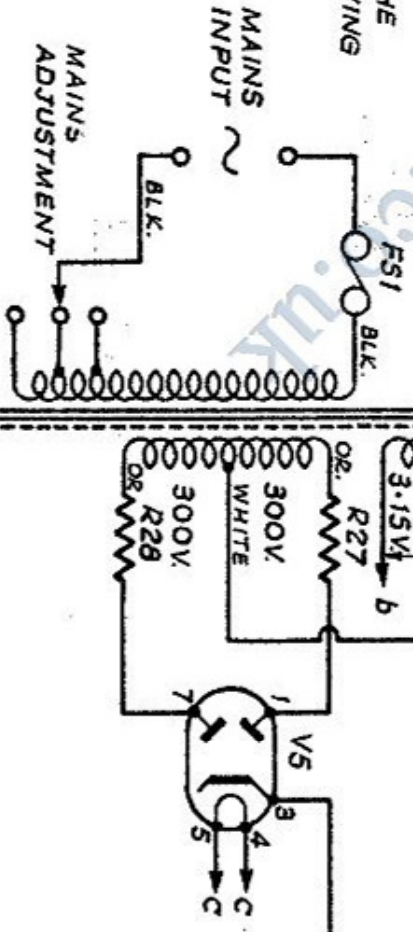


C12 & R21 MUST BE CHOSEN TO MATCH THE LOUDSPEAKER ACCORDING TO THE FOLLOWING TABLE:-

SPEAKER IMPEDANCE ( $\Omega$ )	C12 ( $\mu$ F)	R21 ( $k\Omega$ )
3.75	270	15
15	120	33

**MULLARD 5-10 AMPLIFIER CIRCUIT DIAGRAM**

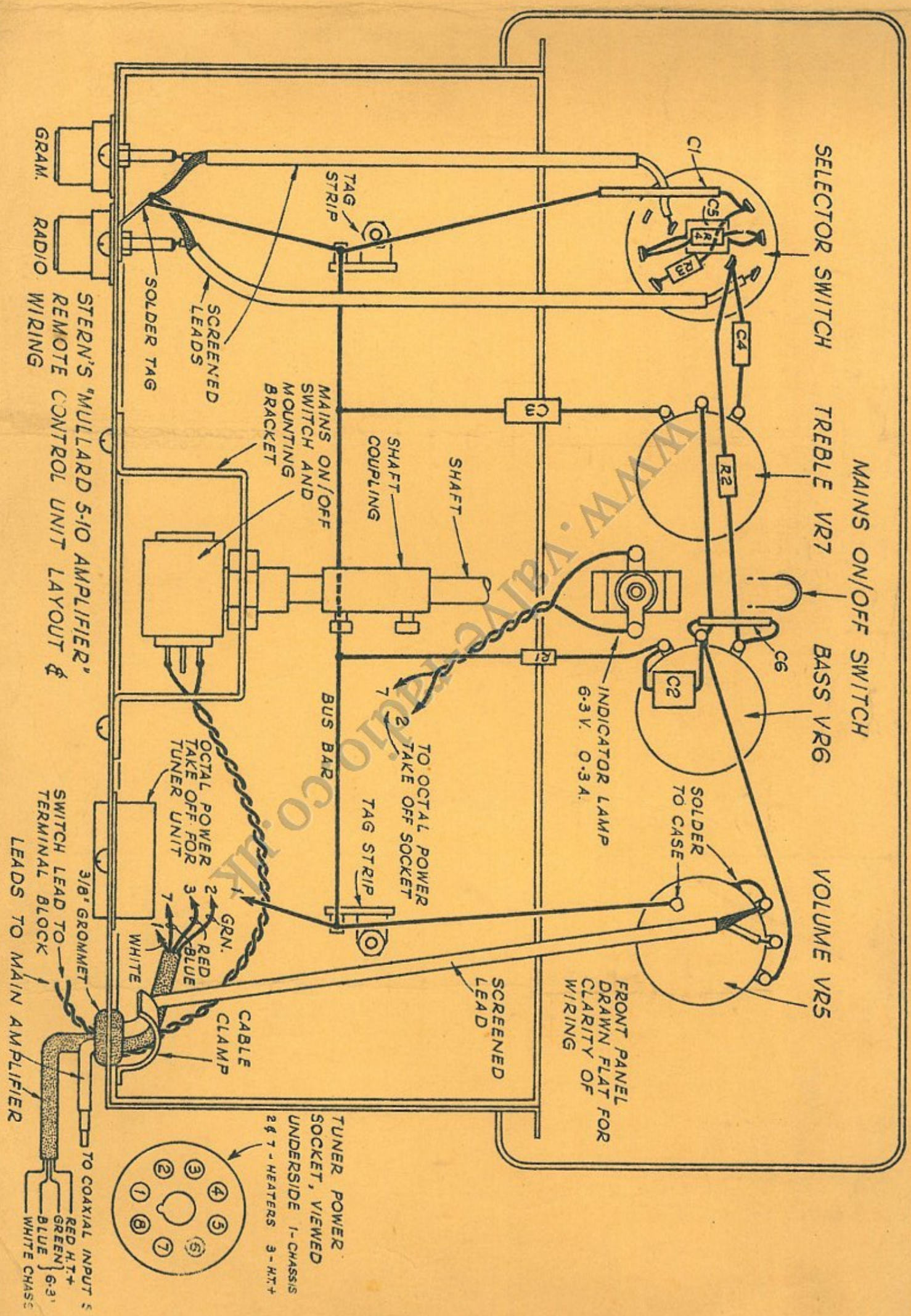
(WITH ULTRA LINEAR OUTPUT TRANSFORMER)



6.3V THK. GREY  
C

THK. YELL  
3.15V  
b  
YELLOW/BLACK

RED  
GRN.  
R29  
YELL  
BLK.  
SPEAKER  
TO  
OB  
OD



SELECTOR SWITCH

TREBLE VR7

BASS VR6

VOLUME VR5

MAINS ON/OFF SWITCH

FRONT PANEL DRAWN FLAT FOR CLARITY OF WIRING

INDICATOR LAMP 6.3V. 0.3A.

SCREENED LEAD

SHAFT COUPLING

SHAFT

TAG STRIP

MAINS ON/OFF SWITCH MOUNTING BRACKET

SCREENED LEADS

SOLDER TAG

STERN'S "MULLARD 5-10 AMPLIFIER" REMOTE CONTROL UNIT LAYOUT

GRAM. RADIO WIRING

BUS BAR

TO OCTAL POWER TAKE OFF SOCKET

OCTAL POWER TAKE OFF FOR TUNER UNIT

GRN. RED BLUE WHITE

CABLE CLAMP

3/8" GROMMET

SWITCH LEAD TO TERMINAL BLOCK

LEADS TO MAIN AMPLIFIER

TUNER POWER SOCKET, VIEWED UNDERSIDE 1-CHASSIS 2 & 7 - HEATERS 3 - HT+

