QUAD

ESL-63

service data

CAUTION

Extreme care should be exercised when working on the ESL 63 as contact with the secondary side of audio transformers under signal conditions can be fatal.
Read all instructions carefully before proceeding with any work.

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QUAD ESL-63 service data

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description

The Quad ESL-63 is a full range electrostatic loudspeaker doublet. It consists of a very light electrically polarised diaphragm suspended between two sets of concentric annular electrodes. Signal is fed to the electrodes via sequential delay lines and the motion of the diaphragm produces a sound pressure pattern which is an exact replica of that from an ideal source placed some 30 cms behind the plane of the diaphragm.

protection circuits

The audio input is fed to the audio transformers via a clamp circuit. Input signals in excess of 40$\hat{V}$ are then clamped such that signal fed to the loudspeaker elements is kept within safe limits. If however, the clamp circuit runs continuously it can overheat and become damaged.
Sparks occurring within the loudspeaker are detected by an antenna situated in the loudspeaker base. The detector circuit will then cause temporary shutdown of the loudspeaker by short circuiting the input for a pre-determined period of time. The detector circuit will also operate if input signal is applied in the absence of AC supply volts.

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fault finding

Fault Finding on a 63 may most easily be carried out by following the flow diagram on (Fig. 1), however it is important that the following notes be read prior to proceeding with any work.

CAUTION

When fault finding under no circumstances should contact be made with the secondary side of the audio transformers under signal conditions as this can be fatal.

Contact with the EHT path should be avoided both when the loudspeaker is connected to or recently disconnected from the AC supply volts. If the nature of the work being undertaken necessitates contact, the EHT should first be discharged by short circuiting point A (Fig. 5) to earth, with AC supply volts disconnected.

The flow diagram (Fig. 1) refers to several tests which must be carried out in order to isolate faults. The test equipment layout shown in Fig. 2 is used as a basis for all tests, unless otherwise stated.

Exit from the diagram will be at one of the diagnoses each of which is clearly defined below.

Shutdown refers to the state which exists when the spark detector circuit is operating. It may be identified by its distorting and muffling effect on the audio.

FLOW DIAGRAM INSTRUCTIONS

Guidance for pulling down the loudspeaker cloth and removing grilles can be found under service notes 2 (a)(b).

When disconnecting the antenna the following instructions should be followed. Disconnect AC supply and audio leads. The loudspeaker should be inverted and stood on a firm clean surface. Remove the 12 screws securing the baseplate after which the baseplate may be lifted out. The antenna should then be unsoldered from the reverse side of the clamp/detector board.

AUDIO SHOULD NEVER BE RE-APPLIED UNTIL WORK BEING CARRIED OUT WITHIN THE LOUDSPEAKER BASE IS COMPLETED.

After this the appropriate test conditions should be re-applied.

diagnoses

DIAGNOSIS A

(i) O/C AC supply fuse.
(ii) Voltage selector in between 110V and 240V.
(iii) Intermittent AC supply switch.

DIAGNOSIS B

A spark in the base of the loudspeaker will generally be an indication of the fault producing it.

(i) Dry joint.
(ii) Broken connection.
(iii) Faulty audio transformer.

DIAGNOSIS C

(i) Faulty IC1 holding T1 'on'.

DIAGNOSIS D

(i) Faulty element.
(ii) Speaker frame resonances due to loose fittings.

DIAGNOSIS E

(i) Faulty delay line coil. The fault may be narrowed down to one of two coils, these being the coils which feed the two copper rings between which the spark is occurring.
(ii) Faulty element.

DIAGNOSIS F

Faults of this nature usually prove difficult to locate. The antenna being disconnected may cause the fault to progressively worsen resulting in the spark becoming visible. Test 6 may also encourage the spark to become visible.

(i) Dry joints on audio or EHT clips.
(ii) On some early 63's there may be discharges between the audio transformer shields and core straps, see 2b under modifications.
All else failing the fault may be isolated as far as either the base, the speaker elements or more commonly the coil board assembly.

The loudspeaker should be inverted with audio and AC supply leads disconnected. With the baseplate removed, reconnect the antenna and disconnect the red and white wires which run from the audio transformers to the coil boards, at the coil board end.

In the following tests loudspeaker shutdown may be identified by a flattening of the oscilloscope trace or illumination of an LED connected between T1 gate and earth.

Connect AC supply and audio leads. Apply test 4 or 6 exercising extreme care to avoid contact with the secondary side of the audio transformers.

If sparking is indicated the fault lies in the loudspeaker base.

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If sparking is not indicated disconnect the audio and AC supply. Remove the loudspeaker base as described in 1(a) and 1(c) under 'service'. Disconnect all of the black wires from the coil board, then refit the speaker base with the EHT and the red and white audio transformer wires re-soldered.
Apply AC supply and audio. If sparking is indicated the fault lies in the coil board, if no sparking is indicated the fault lies in the speaker elements or wiring.

DIAGNOSIS G
(i) Vr1, T2, (where fitted).
(ii) R1 a.b., R2 a.b. – O/C, D11, D12.
(iii) If the AC supply volts are low, particularly on early loudspeakers suspect T3.

DIAGNOSIS H
(i) IC1, T1, T2.

DIAGNOSIS I
(i) Clips or wire links dry joint.

DIAGNOSIS J
(i) No output, audio path O/C.

DIAGNOSIS K
(i) Speaker has been subjected to overload for too long. Replacement of these resistors should cure the fault though in some cases it may also be necessary to replace D11 and D12, TR1.

DIAGNOSIS L
(i) Faulty element.
(ii) Resonances within the loudspeaker due to loose fittings.

DIAGNOSIS M
(i) Loose dustcovers. This is recognisable by a wrinkling effect of the dustcover material and after having removed grilles and cloth (see service notes 2(a)(b)) may be cured as described in (e) on page 14.
(ii) Less commonly a faulty bass element.

DIAGNOSIS N
(i) Clips securing the wires to the louvres may be loose. Gentle tapping of these will secure them.
(ii) Less commonly a faulty treble unit.

DIAGNOSIS O
(i) Neon O/C.
(ii) R12 O/C.

DIAGNOSIS P
(i) Fault lies in EHT circuitry. In cases where EHT volts are slightly low, they can be increased by soldering a similar value resistor in parallel with R13 and R14.

DIAGNOSIS Q
(i) Faulty element due to excessive leakage across the diaphragm. Disconnect audio leads. Test 7 may help to identify the faulty element. Alternatively EHT should be disconnected from each element in turn (remembering to disconnect it from both edges of the diaphragm) working from the top of the loudspeaker downwards and re-checking the leakage by means of the neon flicker rate each time.

DIAGNOSIS R
(i) Faulty element due to O/C EHT on one element only. This may be an O/C diaphragm. Disconnect audio leads. The faulty element may be isolated by disconnecting EHT from each element in turn (remembering to disconnect it from both edges of the diaphragm) and applying audio each time. The faulty element will be the one which sounds no different whether it is connected to EHT or not.
N.B. It is sometimes possible for elements which have no EHT connected to charge up from adjacent diaphragms. In such cases each element will need to be physically removed to isolate the faulty element.

DIAGNOSIS S
(i) Faulty element.

DIAGNOSIS T
(i) Discontinuous EHT, suspect broken link.

MECHANICAL STABILITY
To improve the mechanical stability of early loudspeakers (fitted with cork feet) when used on thick spongey carpets, two part replacement feet are available and may be ordered as 4 x M12715A and 4 x NDP1187.
The two feet fitted to the rear of the 63 baseplate should not be fitted with plugs which will prevent the loudspeaker from leaning forward.

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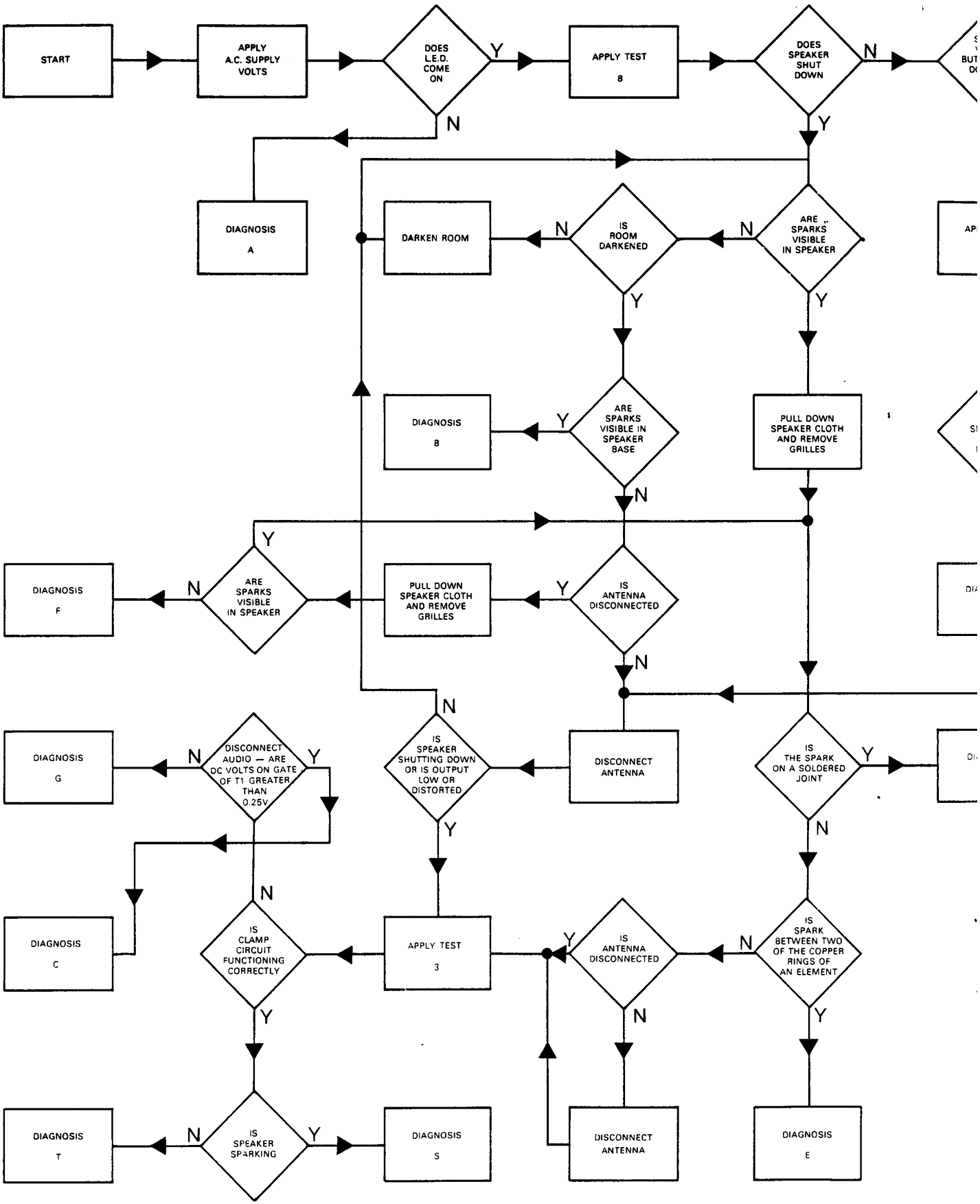

Fig. 1

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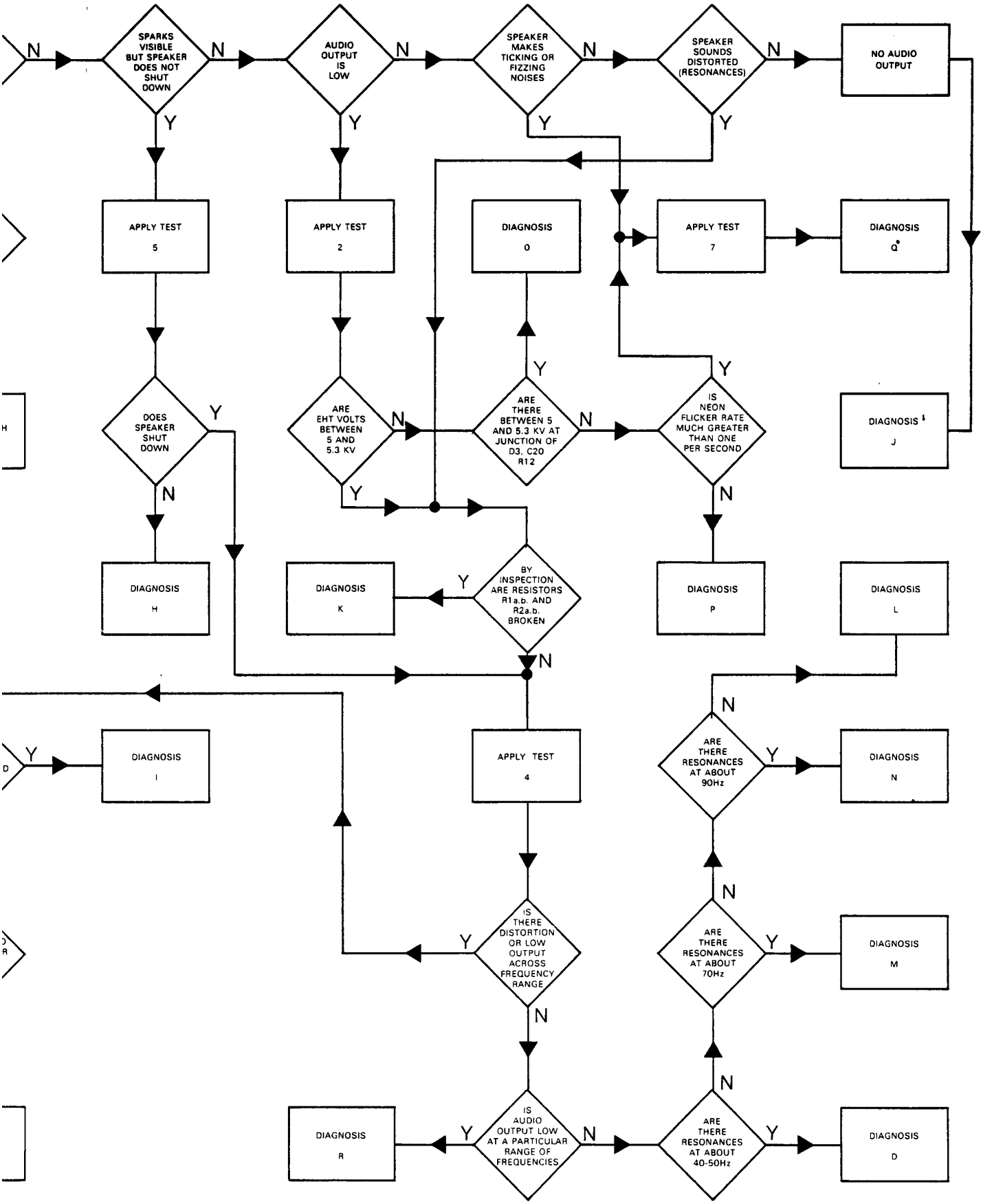

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testing

Complete testing of an ESL-63 may most easily be carried out by using the test equipment listed below and interconnecting these units as shown in Fig. 2.

TEST EQUIPMENT

AF Signal Generator
Programme Source
Pre-Amplifier
Power Amplifier – with S/C protection
Tone Burst Generator – see below
Voltmeter
Ammeter
Oscilloscope
Reference Loudspeaker
RF Spark Generator
EHT Meter – available from Quad Stock No. QEHTVMA

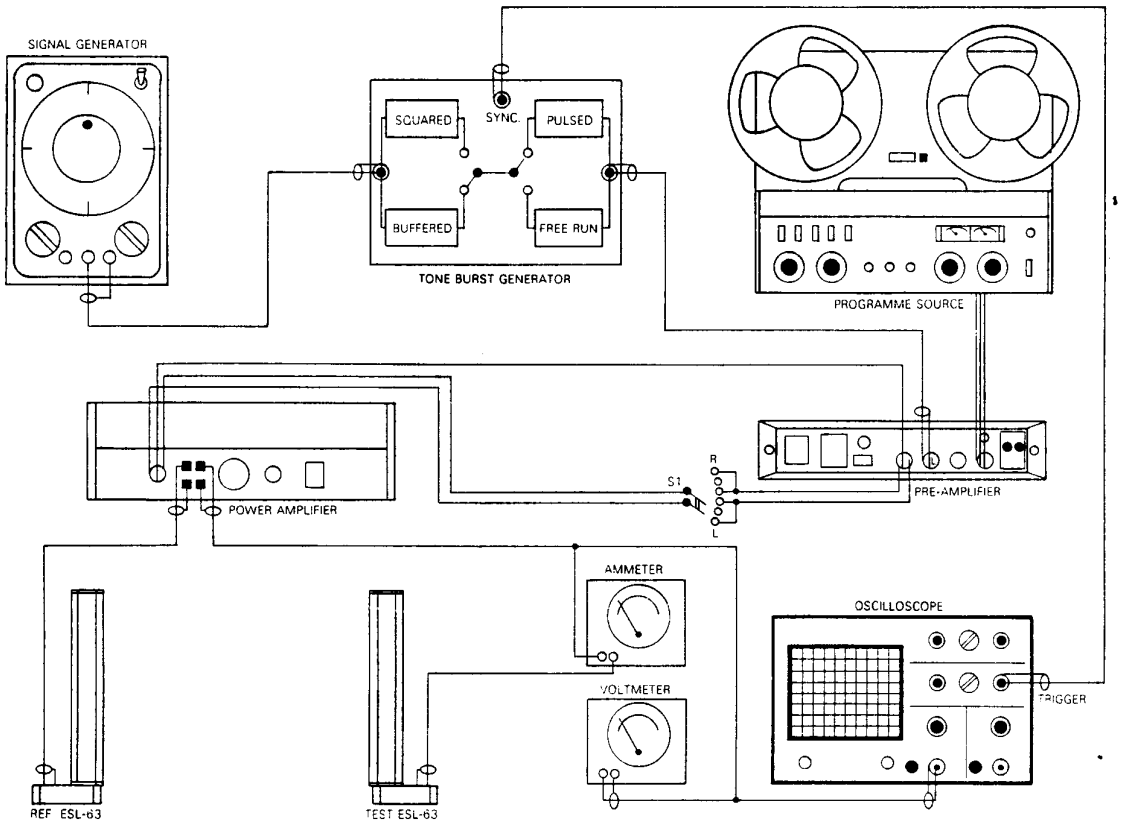

Fig. 2 *Suggested Test Instrument Layout for Complete Testing of ESL-63*

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TONE BURST GENERATOR

When applying Steady State input signals to the loudspeaker these should not exceed 10V rms. The tone burst generator is used to switch the output from the signal generator such that short bursts of signal are applied to the loudspeaker, which may then be subjected to overload for lengthy periods of time without damaging the clamp circuit. These extreme conditions will enable checking of the clamping level and will encourage any sparking faults.

Fig. 3 shows a simple TBG circuit where VR1 controls the pulse repetition rate and VR2 controls the pulse duration. It is important to ensure that the duty cycle does not exceed approximately 10%.

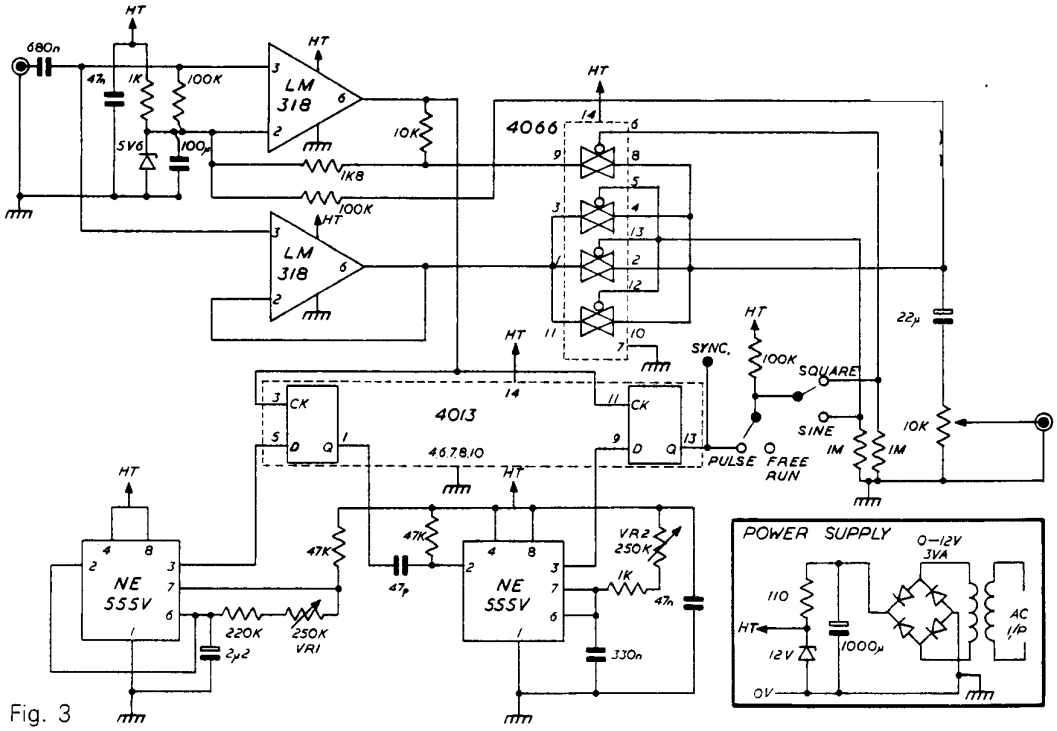

Fig. 3

CAUTION

Extreme care should be exercised when carrying out the following tests as contact with the secondary side of the audio transformers under signal conditions can be fatal.

Contact with the EHT path should be avoided both when the loudspeaker is connected to or recently disconnected from the AC supply volts. If the nature of the test being carried out necessitates contact the EHT should first be discharged by short circuiting point A (Fig. 5) to earth, with AC supply volts disconnected. In each of the following tests the loudspeaker is taken to be standing upright in its completed form unless otherwise stated.

1. IMPEDANCE

EQUIPMENT CONTROLS

Signal Generator	:	**1 kHz**	**Ammeter**	:	**0-300mA**
TBG	:	**Sine Waves**	**Voltmeter**	:	**0-10V**
		Free Run	**S1**	:	**L/C**
Pre-amp	:	**Input – TBG**			
		Volume – Zero			

Increase the volume on the pre-amplifier to a comfortable listening level. By taking voltage and current readings at several frequencies the impedance may be calculated and compared to the impedance modulus in Fig. 4. Large deviations from this curve indicate a fault in the audio circuitry.

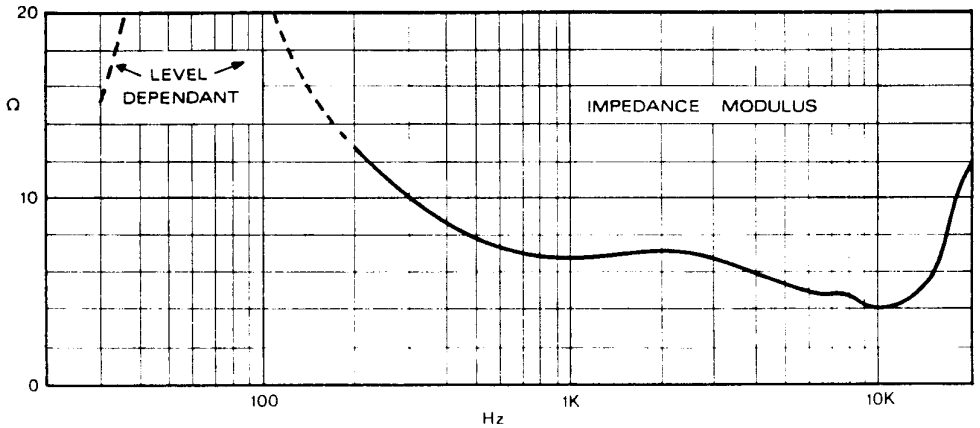

Fig. 4

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2. EHT VOLTS

AC supply and audio leads disconnected

(a) The loudspeaker should be inverted and stood on a firm, clean surface. The twelve screws securing the baseplate should be removed and the baseplate lifted out.

(b) AC supply volts should now be connected.
Measure the volts across the points labelled A and B in Fig. 5 which should be between 5 and 5.3 kV.

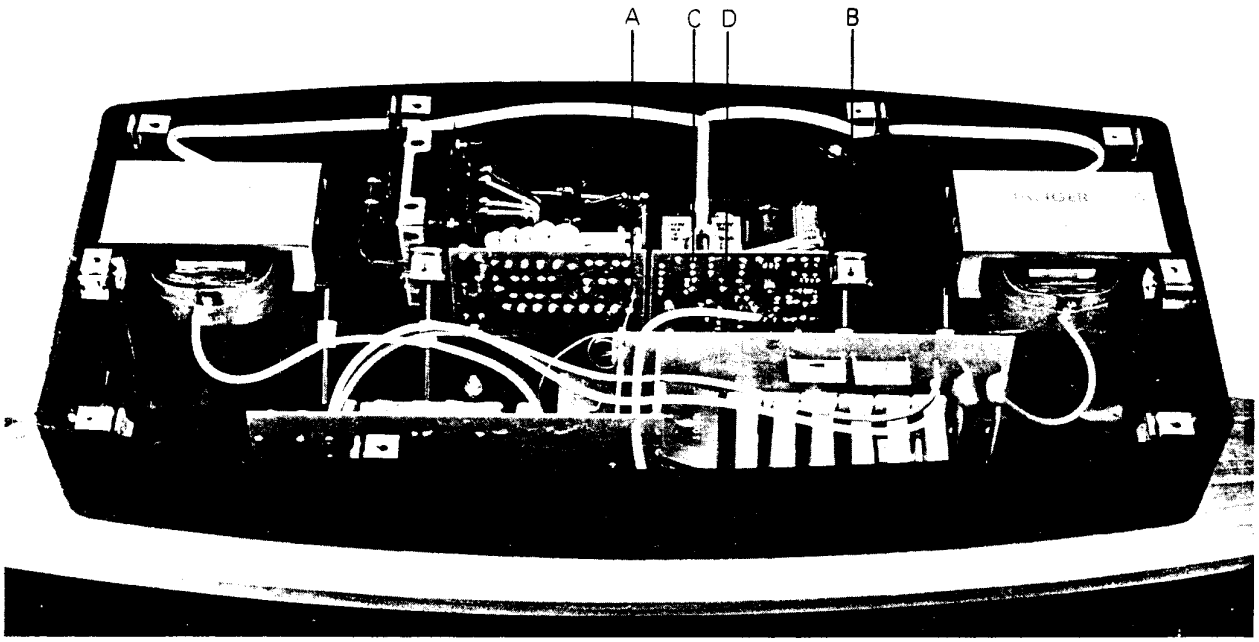

Fig. 5

3. CLAMP CIRCUIT

Signal Generator	:	**50Hz**
TBG	:	**Pulsed**
	:	**Sine Waves**
Pre-Amp	:	**Volume – Zero**
	:	**Input – TBG**
Ammeter and Voltmeter	:	**Disconnected**
S1	:	**L/C**
Oscilloscope	:	**Sensitivity 10V/cm**

Audio leads disconnected from loudspeaker

CAUTION

Extreme care should be exercised when carrying out the following test as contact with the secondary side of the audio transformer under signal conditions can be fatal.

(a) Follow instructions under Test 2 (a).

(b) To check that the clamp circuit is functioning correctly, points C and D Fig. 5 should be connected to the input of the oscilloscope.

(c) Connect the loudspeaker audio leads. Increase the volume on the pre-amp whilst observing the transient trace on the oscilloscope. At approximately 28$\hat{V}$ to 29$\hat{V}$ clipping should occur indicating that the signal is clamped.
For early loudspeakers with variable clamping levels it is advisable that modifications 1(a) be carried out.

4. RESONANCE CHECKS

EQUIPMENT CONTROLS

Signal Generator	:	**50 Hz**
TBG	:	**Free Run**
	:	**Sine Waves**
Pre-Amp	:	**Volume – Zero**
	:	**Input – TBG**
Ammeter	:	**Disconnected**
Voltmeter	:	**0 to 10V**
S1	:	**L/C**
Oscilloscope	:	**Disconnected**

(a) Increase the volume until the voltmeter reads 8V rms. Gradually sweep up and down the frequency range. The loudspeaker response should be pure and free from rattles at all frequencies except at approximately 50 Hz where diaphragm resonance occurs.

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5. SPARK DETECTOR CIRCUIT

EQUIPMENT CONTROLS

Pre-Amp	:	**Volume – normal listening level**
	:	**Input – programme source**
Ammeter and Voltmeter	:	**Disconnected**
S1	:	**L/C**
Oscilloscope	:	**Disconnected**

(a) Generate an Rf spark close to the base of the loudspeaker. This may be created using an electronic cigarette lighter. The loudspeaker should shutdown for 4 to 5 seconds (1 second on very early loudspeakers). Shutdown is recognisable by its quietning effect and whilst audio may still be heard it will be muffled and distorted.

6. SPARKING

EQUIPMENT CONTROLS

TBG	:	**Pulsed**
	:	**Sine Waves**
Pre-Amp	:	**Volume – Zero**
	:	**Input – TBG**
Ammeter and Voltmeter	:	**Disconnected**
S1	:	**L/C**
Oscilloscope	:	**10V/cm**

(a) Increase the volume to a bearable level and sweep up and down the frequency range listening for loudspeaker shutdown, indicating the presence of a spark. Sparking is generally as a result of insulation breakdown which is most likely under these extreme conditions.
At frequencies above 12 kHz where shutdown may be difficult to identify the oscilloscope should be observed. The transient waveform trace will decrease in amplitude if shutdown occurs.

7. LEAKAGE

Disconnect the audio leads from the loudspeaker. The loudspeaker should be silent.

8. PROGRAMME

EQUIPMENT CONTROLS

Pre-Amp	:	**Volume – normal listening level**
	:	**Input – programme source**
Ammeter and Voltmeter	:	**Disconnected**
S1	:	**R/C and L/C**
Oscilloscope	:	**Disconnected**

(a) By switching between R/C and L/C listen for any differences between the 63 under test and the reference loudspeaker.

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service

Service of the Quad ESL-63 is relatively straight forward once the fault has been diagnosed.

1. LOUDSPEAKER BASE

Disconnect audio and AC supply volts. Discharge EHT.

(a) Removing the base plate (12 screws) gives access to the input protection circuits, EHT power supply, audio transformers and the nuts securing the loudspeaker and delay lines to the base.

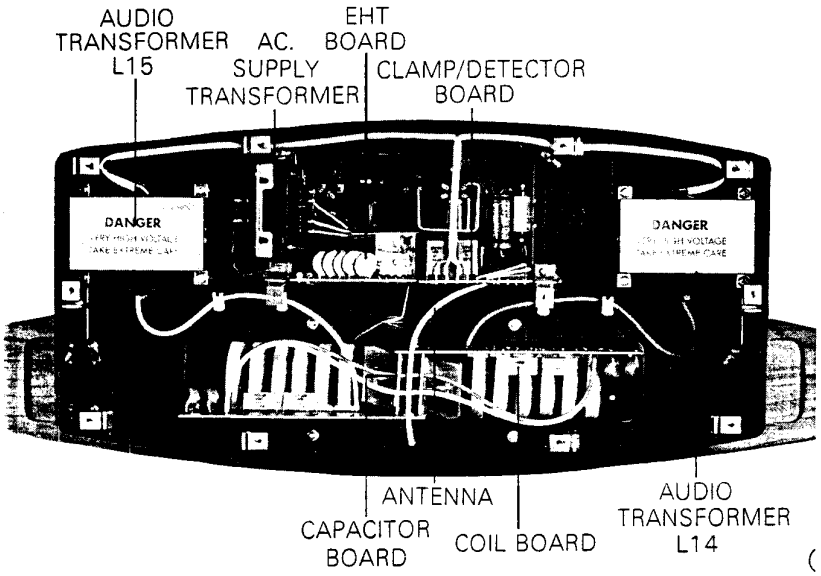

Fig. 6

(b) The sub chassis holding the protection circuits, EHT power supply, input and AC connectors and fuse can be removed by undoing the four screws. Replacement of the protection circuit and EHT power supply is then quite straightforward.

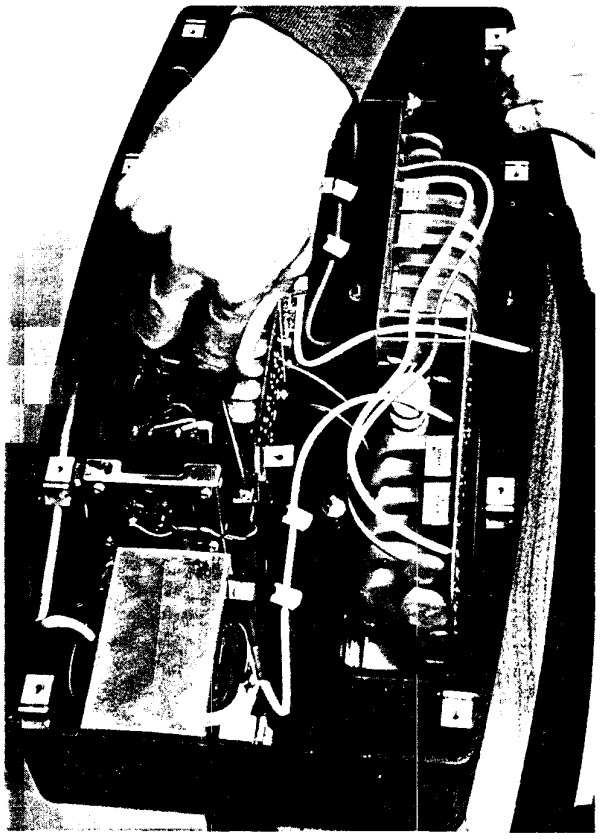

Fig. 7

(c) To remove the entire base of the loudspeaker it is simply necessary to unsolder the feed from both audio transformers (red and white wires), and the EHT supply (orange wire) and to unthread the protection circuit antenna and undo the eight nuts. The base may then be lifted off.

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2. REPLACING AN ELEMENT

Disconnect audio and AC supply volts. Discharge EHT.

(a) Remove the wooden top from the loudspeaker by sliding it to the right (viewed from the front). Detach the grille cloth from the velcro hooks as shown in Fig. 8, and pull the cloth down taking care not to ladder it.

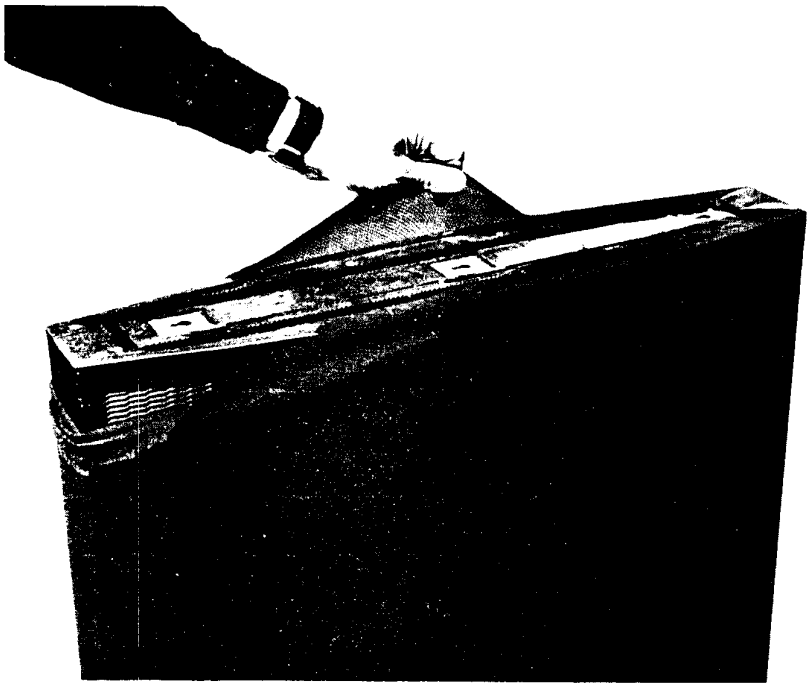

Fig. 8

(b) The grilles are taped top and bottom to prevent rattles and once the tape has been removed it is possible to prise the front and back grilles from their retaining slots in the side extrusion. Care should be taken when handling the grilles as it is relatively easy to distort the edges beyond repair.

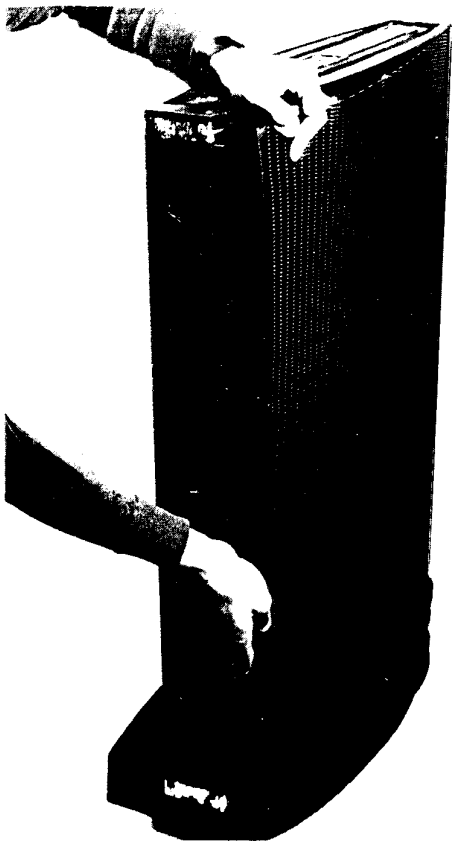

Fig. 9

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(c) The dust cover is fitted to a clip-on frame and is removed by inserting a screwdriver at either of the top corners and gently lifting a corner free.

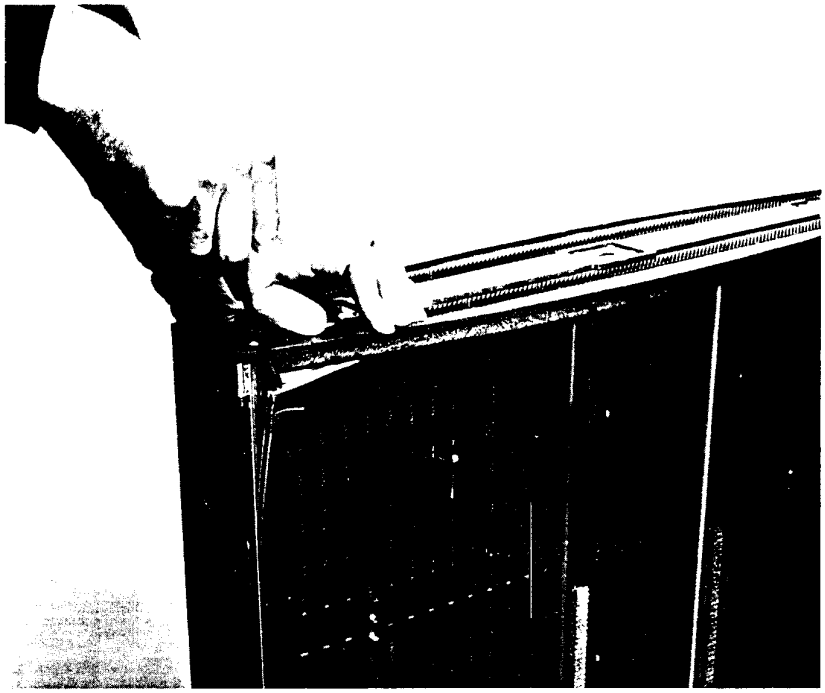

Fig. 10

The screwdriver is then slid down between dust cover and side frame. This should be repeated in each of the other three corners after which the dust cover can then be withdrawn.

Fig. 11

Great care should be taken as the dust cover is fragile. If the dust cover does become ruptured it will be necessary to replace the plastic film as described in '3'. When removed the dust covers should be placed well away from the working area so as to avoid being damaged by solder splashes or wire cuttings.

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(d) Having removed both dust covers it is necessary to unsolder the electrical connectors to the faulty element and remove its four fixing screws. Care must be taken not to overheat the clips as they may become unsoldered from the electrode.
On early loudspeakers these clips had a tag to which the soldered connection was made. On current production elements there is no tag and a wire link is soldered direct to the body of the clip. In some cases it may therefore be necessary to make up some wire links when replacing elements. For removal of the top element and the two lower elements additional items will need to be removed first.
(i) In the case of the top element remove also the top plate (8 screws).
(ii) In the case of the lower middle element the delay line leads will have to be unclipped from the louvre, first noting their sequence.
(iii) The bottom element cannot be removed with the lower middle element in place. The lower middle must therefore first be removed. The bottom element will then need to be lifted about 15 mm to clear the base.

For loudspeakers after serial number 11600 see modifications (5).

(e) With the faulty element replaced the loudspeaker can then be re-assembled in reverse order. Once the dust covers are in place they must be retensioned with a hot air blower to remove all wrinkles. A domestic hair dryer may not be hot enough but restricting the air flow by hand will raise the temperature sufficiently. The blower should be kept moving all the time in order to prevent burning a hole in the material.

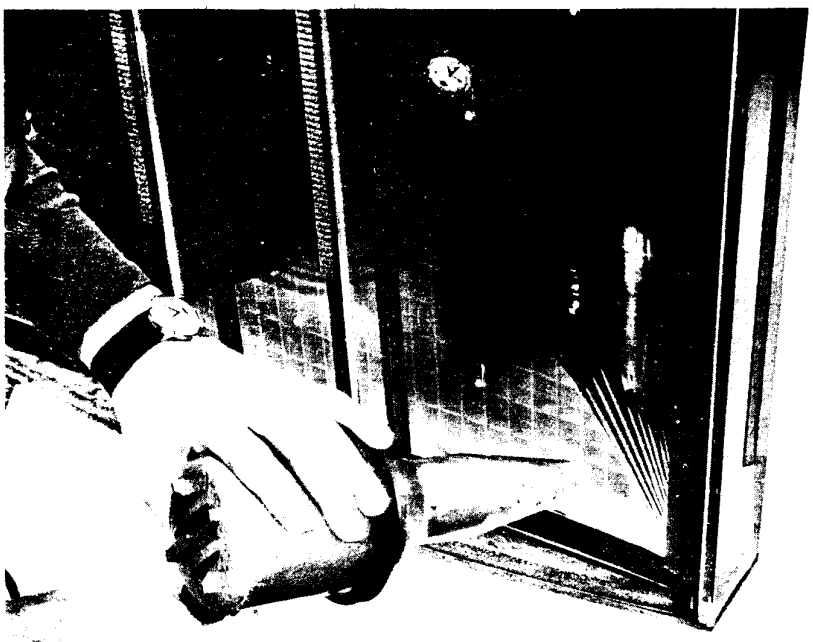

Fig. 12

3. REPAIRING A DAMAGED DUST COVER

Disconnect audio and AC supply volts. Discharge EHT.

It will first be necessary to obtain a dust cover repair kit which may be ordered [illegible] stock number Q63DCPA.

(a) The damaged dust cover should first be removed from the loudspeaker [illegible] as described in 2(a) (b) (c).

(b) Strip the old material and double sided sticky tape from the frame. Apply the replacement double sided sticky tape to the frame. Spread the material out on a smooth clean surface. Secure the four corners and sides with small pieces of sticky tape so that the material is smooth and free from wrinkles.
Enough mylar is supplied for two attempts so the sheet should be cut in two using a hot knife or soldering iron, never scissors or a knife.
Remove the protective paper from the double sided tape, carefully place the dust cover frame on the material and press down. Trim the edges with a hot knife or soldering iron.
Clip the dust cover frame on to the loudspeaker and remove all wrinkles as described in the latter part of 2(e).

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4. REPLACING GRILLE CLOTH

Disconnect audio and AC supply volts. Discharge EHT.

It will first be necessary to obtain a repair cloth kit which may be ordered as stock number EC3752A. The cloth used on loudspeakers manufactured after September 1981 is slightly different to the cloth used on loudspeakers manufactured prior to this date which is now obsolete. For the earlier loudspeakers it will therefore be necessary to order and replace two grille cloths in order to maintain matching pairs.

(a) Follow instructions 2(a), 1(a) and 1(c) respectively.

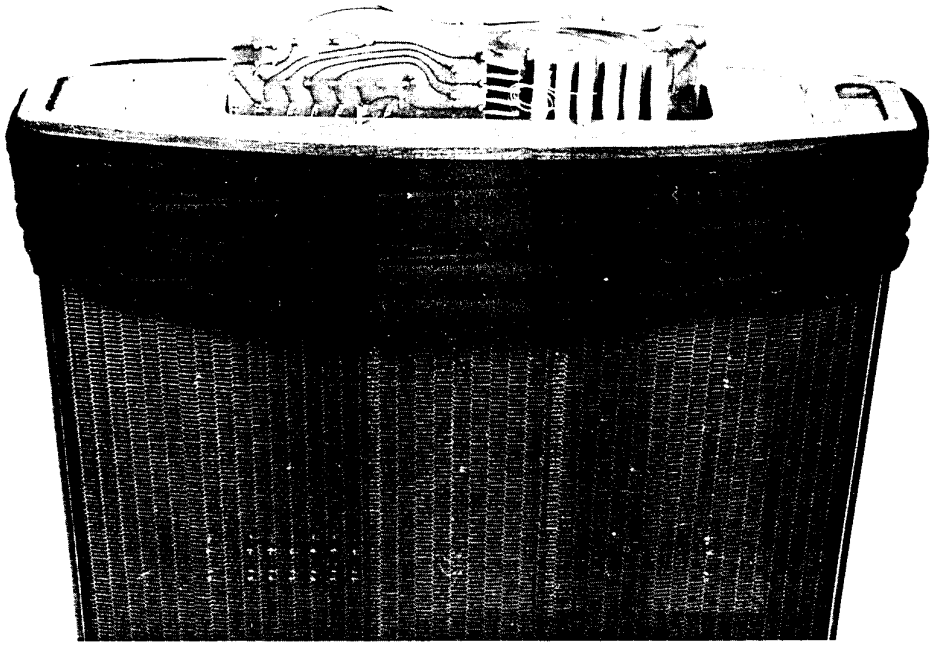

Fig. 13

(b) Lift off the wooden base. Disengage the existing cloth from the velcro fixings at the bottom of the loudspeaker assembly and remove. Slip the new cloth over the inverted loudspeaker leaving about 2" projecting above it, with creases down the middle of the sides. Align the pattern with the corners, always taking great care not to ladder the material. Fix the cloth to the velcro fixings starting at the centre of each side and working out to the ends. Fold to form mitre pleats at the corners and attach to the velcro at the ends. Recheck the alignment of the pattern and adjust if necessary.

(c) Ensure that the wooden base trim is free from dust and refit with the handle recesses away from the loudspeaker. Refit the base and baseplate and invert the loudspeaker.

(d) Starting at the middle of each side and working to the ends, lift the cloth stretching it sufficiently to make it tight but not to risk laddering or tearing, and fix to velcro. Trim off surplus cloth and check for alignment and evenness of stretch. Mitre pleat the corners as before and fix the ends to the velcro. Refit the wooden top.

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QUAD ESL-63 service data

modifications

ORIGINAL ISSUE BOARDS

Coil Board	**M12524-6**
Capacitor Board	**M12538-2**
Clamp/Detector Board	**M12418-7**
EHT Board	**M12525-2**
Neon Board	**M12582-1**

Pre- serial number 10,000 loudspeakers will correlate to modifications by their approximate date of manufacture.

1. JULY 1981

(a) R10, Tr2, Vr1, D2 and R11 removed from the clamp/detector board. D15, 24V Zener Stock No. D4824VA added. This fixes the clamping level. When carrying out this modification D15 should be connected as shown in the circuit diagram ISS 2 and may be accommodated using the vacated holes marked as E and F in Fig. 14. In some cases D15 is made up from 2 12V zeners and either a link or an ordinary diode.

(b) R19 changed from 1M to 10M, Stock No. R10M0J1. This increases loudspeaker shutdown time to approximately 4 seconds.

(c) D11, D12 changed from IS920 to 1N4003, Stock Number D1N4003.

2. AUGUST 1981

(a) Capacitor board M12538-2 changed back to the pre-release version, M12538-1. Using improved capacitors the need for the series resistors used on M12538-2 no longer exists.

(b) Audio transformer shrouds are no longer earthed. Earthing connections which previously ran from subchassis to grilles via the audio transformer shrouds, now run direct from the subchassis to the grilles. This overcomes sparking occurring between the shroud and the transformer core strap.

(c) C13 a.b.c.d. changed from 220pF to 330pF Stock Number C330PKP.

3. SEPTEMBER 1981

Louvre soldered clips changed to short necked type Stock No. FC2489A. Wire links are now used to connect clips from adjacent louvres.

4. APRIL 1982

(a) Loudspeaker frame modified in order to lower dust cover resonance.

(b) EHT board M12525-2 changes to M12525-3 for production purposes. Consequent with this the neon is now soldered and situated on the printed side of the board M12582-1, and the neon board orientation changes.
  (i) C16, C17 change from 20n to 10n Stock No. C10N0ZT.
  (ii) C18 – C23 change from 20n to two 10n capacitors connected in parallel, Stock No. C10N0ZT.

(c) Clamp/Detector board changes to ISS 9 for production purposes.
  (i) R21 100Ω Stock No. R100RJ1 added.

5. SERIAL NUMBER 11601

Loudspeakers are now fitted with modified white louvres. Delay line leads are no longer clipped to the louvre but are a push fit into tapered slots.

When replacing a black upper or lower middle element by one with white louvres it is advisable to replace both these centre elements to maintain the balance between them. The clips used for fixing the delay line leads will no longer be needed. The leads should be pushed into the louvre slots and have a small amount of compliant glue added to reinforce the fixing.

Top and bottom units are completely interchangeable.

COMPONENT ALTERNATIVES

D3 – D10, 1AV30, 1JK30.
D11, D12, 1N4003. IS920 may be used but should be avoided.
TR1, 2N6489, BD910, BD744D.
TR3, E5270, BC184, BC413C.
T1, T2800B. Selected values of T1C226B may be used if they are of type number Y1097.
T2, 2N4992, 2N4993, 2N4991, BS08A.

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clamp/detector

M12418 – ISS 7

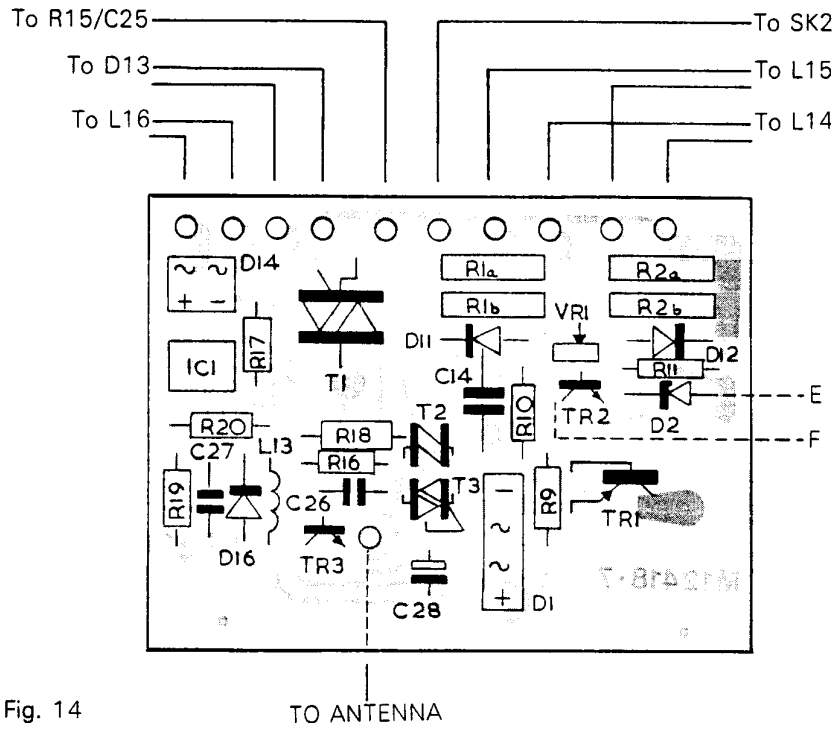

Fig. 14

M12418 – ISS 9, 10

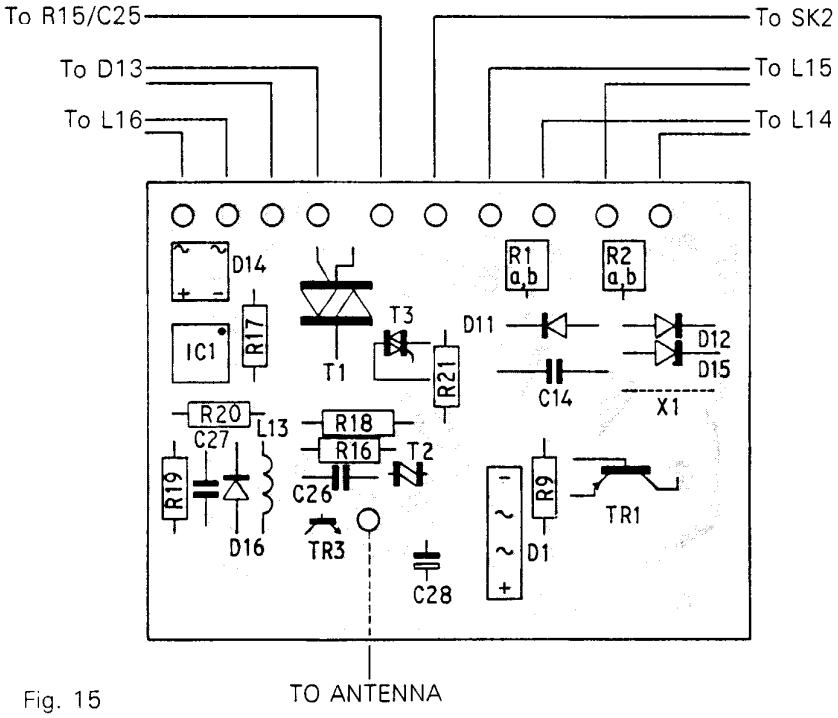

Fig. 15

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eht

M12525 – ISS 2

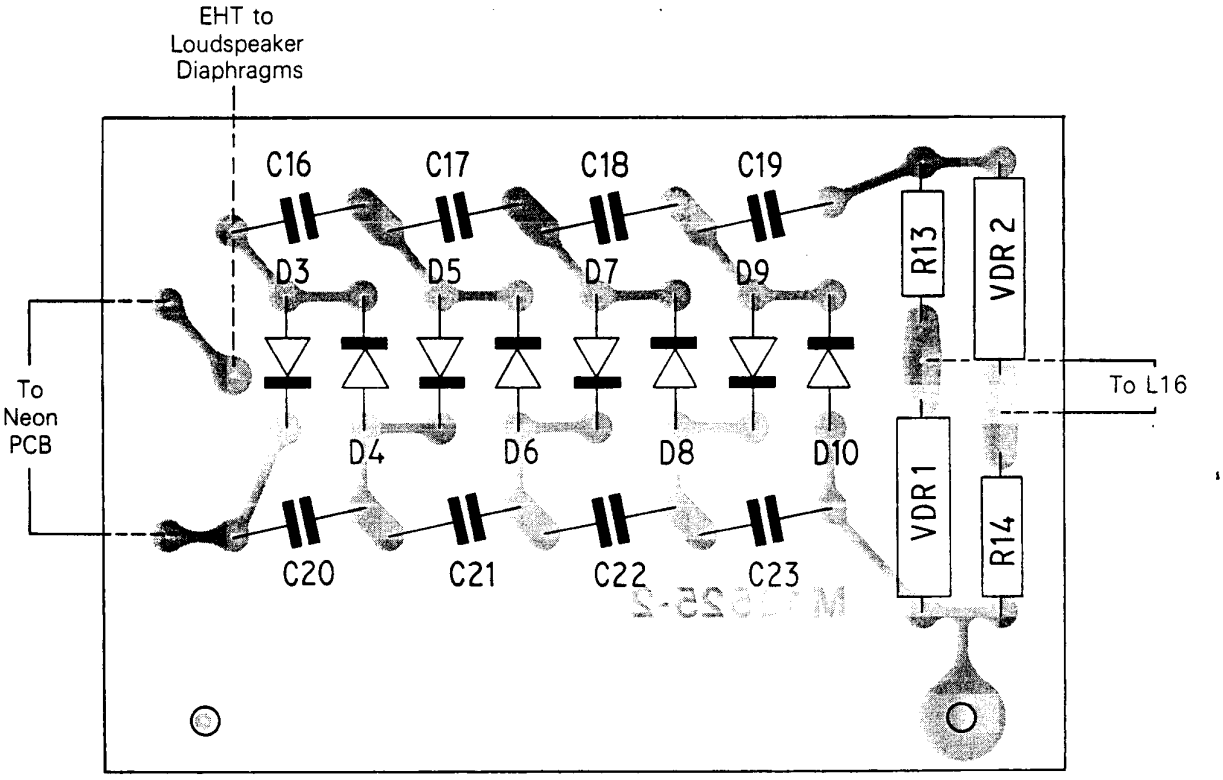

Fig. 16

M12525 – ISS 3

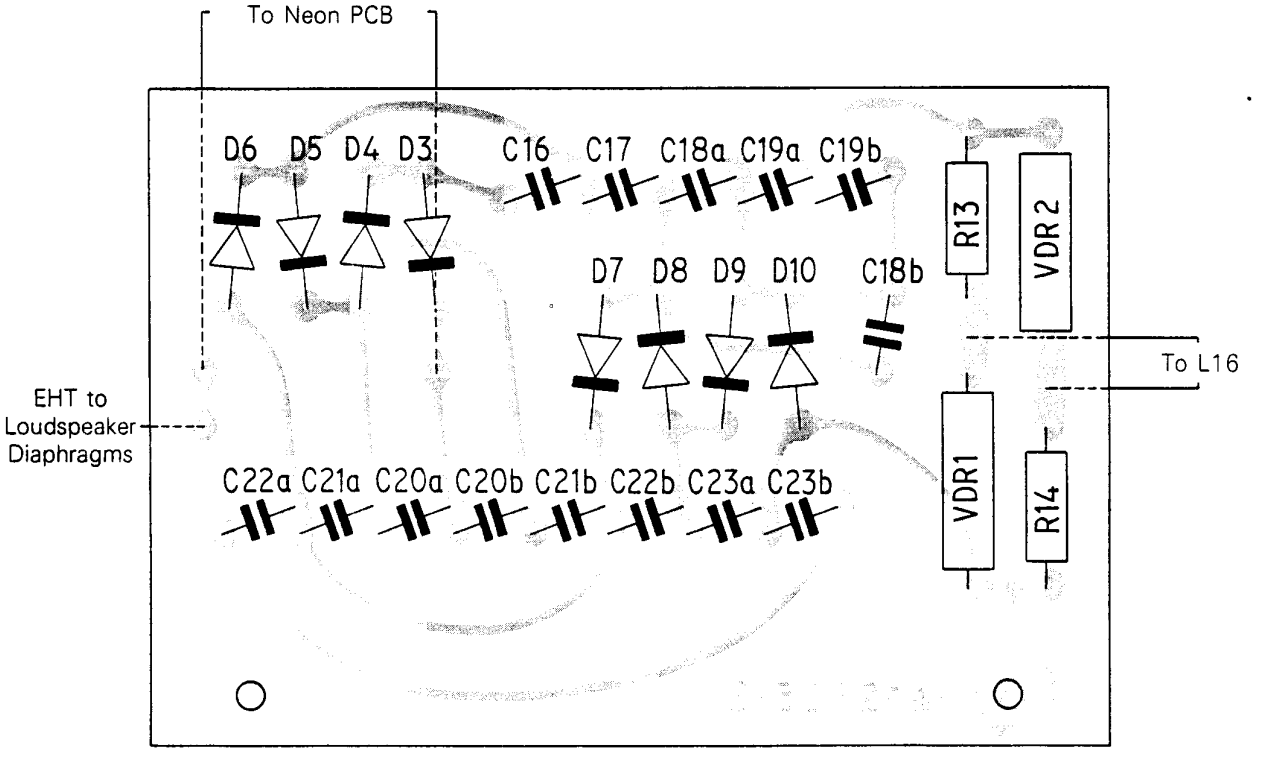

Fig. 17

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coil

M12524 – ISS 6

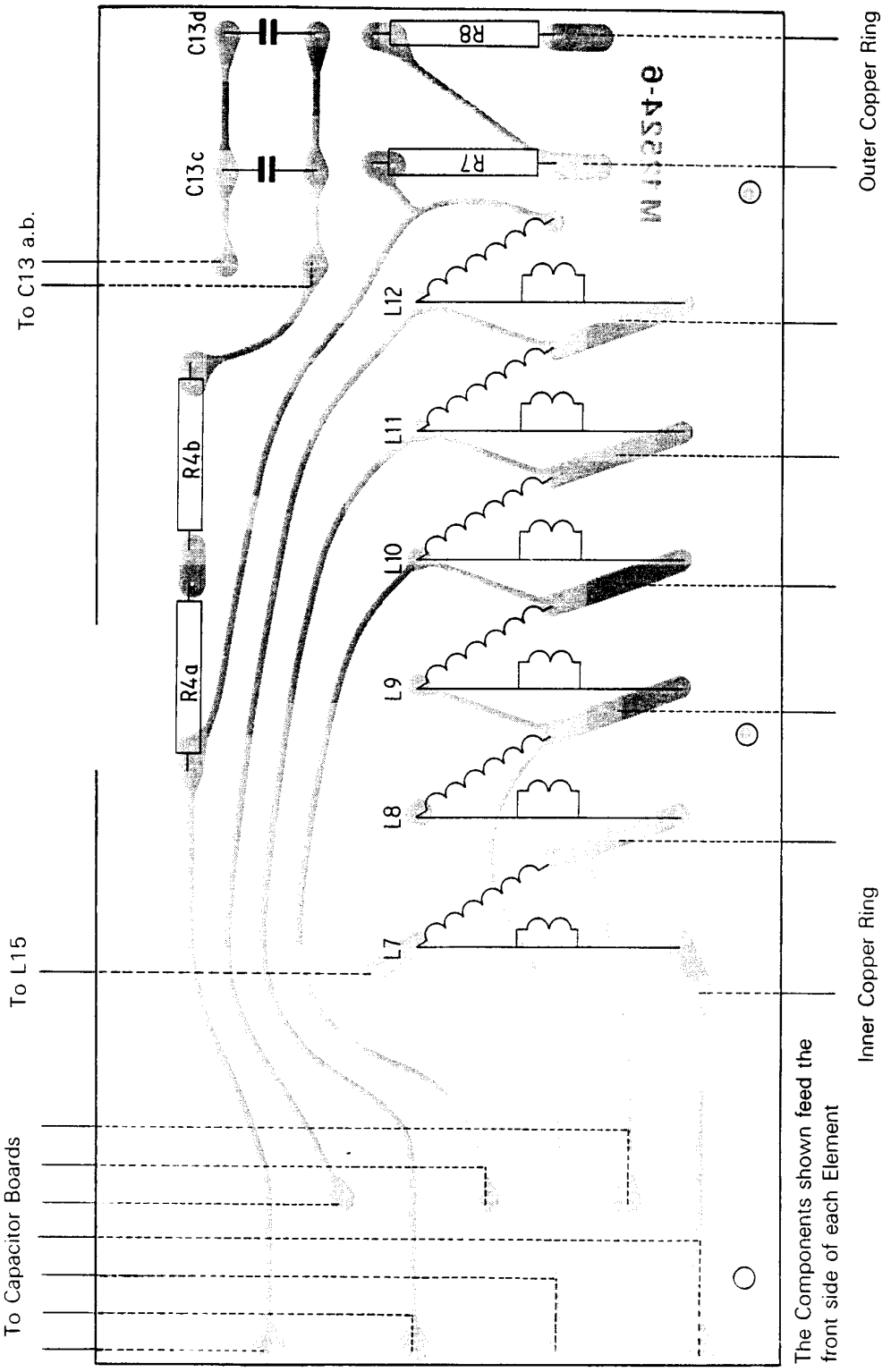

Fig. 18

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QUAD ESL-63 service data

components list

CLAMP BOARD ASSEMBLY

Part No.	Description	Circuit Ref.
C10N0JS	Capacitor 10nF 5 160V B32561	C26
C1K0UZE	Capacitor 1000μ 16V EK	C28
C1U50KS	Capacitor 1.5μF 10 100V B32562	C14
C330NJM	Capacitor 330nF 5 352-48334	C27
D2N6489	Transistor 2N 6489	TR1
DAA119X	Diode AA119	D16
DBS08AA	DIAC BS08A-01	T2
D2N4992	DIAC 2N4992	T2
DBY225X	Bridge Rectifier BY225-100	D1
DE5270X	Transistor E5270	TR3
D1N4003	Diode D1N4003	D11, D12
DNE555P	Timer NE555P	IC1
DNR231A	Metal HS Washer size TO220	
DT2800B	TRIAC T2800B	T1
TIC226B		
DTAG92A	TRIAC TAG92A-3	T3
DVM18XX	Bridge Rectifier VM18	D14

Part No.	Description	Circuit Ref.
DZ15VAA	Zener Diode BZY88C15V	D2
FE1210A	Eyelet LS1210 Med. Brass Yellow	
I12418C	PCB EL63 (Clamp) I12418 ISS10	
LSC1001	Choke RF 1mH SC10	L13
NHSTV5A	Heatsink TV5	
R100RJ1	Resistor 100 5 050	R9, R21
R10K0J1	Resistor 10K 5 050	R20
R120RJA	Resistor 120 5 075	R18
R1M00J1	Resistor 1M 5 050	R19
R2K20J1	Resistor 2K2 5 050	R16
R3R30JC	Resistor 3.3 ohm 5 Type TFP6V	R1a.b. R2a.b.
R680RJ1	Resistor 680 5 050	R17
TM308PA	Screw M3 8mm Sup. Pan. ST. BZP	
TM3FHPA	Nut M3 Full Hex ST BZP	
D4824VA	Zener Diode 24V 5W	D15
R10M0J1	Resistor 10M 5 050	R19

E.H.T. BOARD ASSEMBLY

Part No.	Description	Circuit Ref.
BN1630S	Neon	N1
C20N0ZB	Capacitor 20nF HD25 K3 20N0ZS	C16-C23
C47N0JS	Capacitor 47nF 5 250V B32561	C15
D1AV30X	Diode 1AV30	D3-D10
I12525A	EHT PCB M12525 ISS2	
I12582A	Neon PCB M12582 ISS1	
PAM4072	F – Tags	

Part No.	Description	Circuit Ref.
R10M0JA	Resistor 10M 5 UPM075	R12
R180KJA	Resistor 180K 5 075	R13, R14
R220KJA	Resistor 220K 5 075	R13, R14
RT298ZZ	Voltage Dependent Resistor	VDR1, VDR2
C10N0ZT	Capacitor 10nf –20 +50% 2KV	C16, C17 C18-C23-a.b.
I12525B	EHT PCB M12525 ISS 3	

CAPACITOR BOARD

Part No.	Description	Circuit Ref.
C10P0KB	Capacitor 10pF 10 HD25CG10P0KS	C11, C12
C22P0KB	Capacitor 22pF 10 HD25UJ22P0KS	C1-C10
R4K70J[1]	Resistor 4K7 5 050	Use on Issue 2 Board only
I12538B	Capacitor PCB M12538 ISS2	

Part No.	Description	Circuit Ref.
PAM4072	F – Tags	
I12538A	Capacitor PCB M12538 ISS1	
C22P0XX	Capacitor 22nF	Use on ISS 1
C10P0XX	Capacitor 10nF	Board

COIL BOARD ASSEMBLY M12542

Part No.	Description	Circuit Ref.
I12524A	PCB EL63 (Coil) M12542 ISS6	
R150KKQ	Resistor 150K 10 TF1169	R3a.b. R4a.b.
R360KJQ	Resistor 360K 5 TF1169	R5, R6, R7, R8

Part No.	Description	Circuit Ref.
C330PKP	Capacitor 330p 6KV	C13 a.b.c.d
L63C01A	Delay Line Coil	L1-L12

FRAME ASSEMBLY

Part No.	Description
EVEL12A	Cloth Securing Strip
FT2006A	Shakeproof Terminals
FU2945A	Spire Clip
IFVP1ZA	Vitoplast Strip 12mm x 10mm
IFVP3AA	Vitoplast Strip 3mm x 10mm
IP4701B	Sellotape Black
M12462A	Dust Cover Securing Plastic Extrusion
M12465B	Side Frame (809mm)
M12470A	Keyhole Plate
M12503A	Bottom Frame
M12504A	Top Frame

Part No.	Description
M12549A	Grille Spring
M12599A	Support Rail 790mm
TC408PA	Drive Screw 4A 8mm Sup. Pan.
TC615CA	Drive Screw 6A 15mm Sup. Csk.
TC620CA	Drive Screw 6A 20mm Sup. Csk.
TDM4SPA	Washer M4 9 ST. BZP
TM445PA	Screw M4 45mm Sup. Pan. ST. BZP
TM4FHPA	Nut M4 Full Hex ST. BZP
ZTCAUAA	Sellotape 1 in Clear
M12713A	Side Rails
M12712A	Rubber Inserts

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BASE ASSEMBLY

Part No.	Description
AFRA61A	Cork Feet
FC70490	Wire Securing Clip
FF35010	Push-on Fix
FTB6469	Soldertag 6BA Brass Hot Tinned
M12469A	Baseplate
M12507A	Earth Bracket
TM406PA	Screw M4 6mm Sup. Pan. ST. BZP
M12547A	Base Moulding
L12395A	Audio Transformer — L14, L15
M12468A	Audio Transformer Shroud

SUB-CHASSIS ASSEMBLY

Part No.	Description	Circuit Ref.
BL5053R	LED XC5053R Red	D13
C220UKE	Capacitor 220µF 20 50V non-pol	C25
FCC200X	LED Holder C200	
FT1757B	Black Input Terminal	SK2
FT1757R	Red Input Terminal	SK1
FTB6SS5	Soldertag 6BA	
IG3758A	Grommet	
PF3961A	Fuseholder	
PPP579A	Plug 3 pin AC Eur. Input - Panel	
R1R50JC	Resistor 1.5 ohm 5	R15
S630FFA	AC Supply Switch	S1

Part No.	Description	Circuit Ref.
SV71085	Voltage Selector	
TDB6NLF	Washer Shakeproof 6BA	•
TM306PA	Screw M3 6mm Sup. Pan.	
TM308CA	Screw M3 8mm Sup. Csk.	
TM330PA	Screw M3 30mm Sup. Pan.	
TM3FHPA	Nut M3 Full Hex	
TM406PA	Screw M4 6mm Sup. Pan.	
UMA10DA	Fuse 20mm 100mA Delay	
M12467A	Chassis	
L12394A	AC Supply Transformer	L16

DUST COVER ASSEMBLY

Part No.	Description
EFMY02A	Mylar 2.5µ 650mm Wide
IP5474A	Tape 5474 Black 1mm x 25mm
M12464A	63 Dust Cover Support 600mm
M12464B	63 Dust Cover Support 780mm
M12488A	63 Dust Cover Bracket

MISCELLANEOUS COMPONENTS

Part No.	Description
EA402AA	Exp. Alum. 650 LWM x 805 SWM
IFVP6AA	Sponge Strip 6mm x 10mm
M12458A	Base Trim
M12459A	Top Trim
TC620PA	Drive Screw 6A 20mm Sup. Pan.
TC622PA	Drive Screw 6A ⅞" Sup. Pan
TC812FA	Drive Screw 8A 12mm Sup. Flange
TC812PA	Screw Selftap No8 12mm Pan.
TM306PA	Screw M3 6mm Sup. Pan. ST. BZP
FF13060	Louvre Push On Fix Clips
FTB4SS5	Soldertag 4 B.A.
IP1070A	Foilex Metal Tape
TM308CA	Screw M3 8mm Sup. Csk.
TM330PA	Screw M3 30mm Sup. Pan.
TM3FHPA	Nut M3 Full Hex.
FC2489A	Louvre Soldered Clips
TC408PA	Drive Screw 4A 8mm Sup. Pan.
M12532A	Insulator PVC (Bottom) 585mm
M12522A	Coil Holder PVC 350mm
IFVP3AA	Sponge Strip 3mm x 10mm

COMPLETE SUB-ASSEMBLIES

Part No.	Description
Q63BS1A	Base Assembly
Q63CA1A	Capacitor Board Assembly
Q63CH1A	Chassis Assembly
Q63CL1A	Clamp Board Assembly
Q63C01A	Coil Board Assembly
Q63CV1A	Dust Cover Assembly
Q63DE1A	Delay Line Assembly
Q63FR1A	Frame Assembly
Q63HT1A	E.H.T. Board Assembly
Q63LA1A	Audio Transformer Assembly
Q63ELMA	Lower Middle Element Assembly
Q63ETBA	Top and Bottom Element Assemblies
Q63EUMA	Upper Middle Element Assembly
PSP588A	Angled AC Supply Socket
Q63NE1A	Neon Assembly
Q63DCPA	Dust cover Repair Kit

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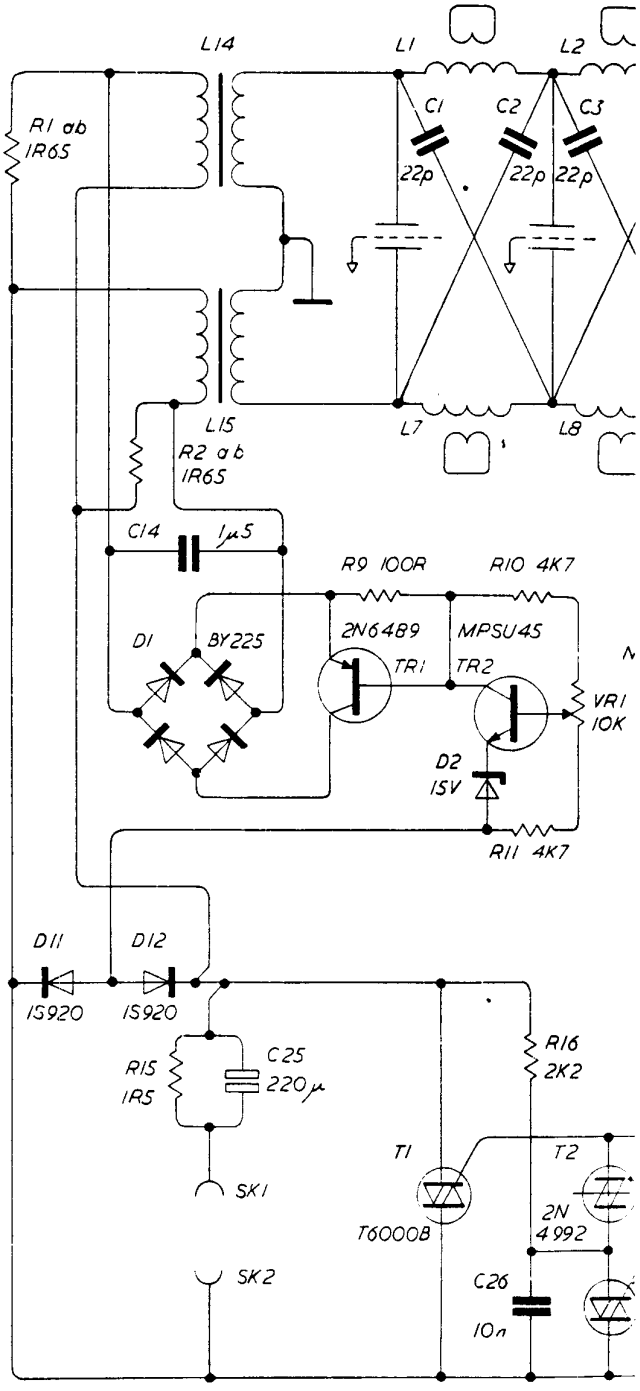
circuit diagram

M12541 – ISS 1

Qty	Ref. No.	Stock No.	Description
4	R1 a.b. R2 a.b.	R3R30JC	Resistor 3R3
4	R3 a.b. R4 a.b.	R150KKQ	Resistor 150K
4	R5. R6. R7. R8.	R360KJQ	Resistor 360K
1	R9	R100RJ1	Resistor 100R
2	R10. R11	R4K70J1	Resistor 4K7
1	R12	R10M0J1	Resistor 10M
2	R13. R14	R180KJA	Resistor 180K
1	R15	R1R50JC	Resistor 1R5
1	R16	R2K20J1	Resistor 2K2
1	R17	R680RJ1	Resistor 680R
1	R18	R120RJA	Resistor 120R
1	R19	R1M00J1	Resistor 1M
1	R20	R10K0J1	Resistor 10K
1	RV1	RP10K0C	Pre-set Resistor 10K
2	VDR1 VDR2	RT298ZZ	Voltage Dependant Resistor E298-22-06
10	C1 – C10	C22P0KB	Capacitor 22p
2	C11. C12	C10P0KB	Capacitor 10p
4	C13 a.b. c.d.	C220PK1	Capacitor 220p
1	C14	C1U50KS	Capacitor 1μ5
1	C15	C47N0JS	Capacitor 47n
8	C16 – C23	C20N0ZB	Capacitor 20n
1	C25	C220UKE	Capacitor 220μ
1	C26	C10N0JS	Capacitor 10n
1	C27	C330NJM	Capacitor 330n
1	C28	C1K0UZE	Capacitor 1000μ
1	D1	DBY225X	Bridge Rectifier BY 225-100
1	D2	DZ15VAA	Zener Diode BZY 88C 15V
8	D3 – D10	D1AV30X	Diode 1AV30
2	D11. D12	D1S920B	Diode 1S920
1	D13	BL5053R	LED XC5053
1	D14	DVM18XX	Bridge Rectifier VM 18
1	TR1	D2N6489	Transistor 2N6489
1	TR2	DPSU45X	Transistor MPSU45
1	TR3	DE5270X	Transistor E5270
1	T1	DT2800B	TRIAC T2800B
1	T2	D2N4992	DIAC 2N4992
1	T3	DMAC923	TRIAC MAC 92.3
12	L1 – L12	L63C01A	Coil
1	L13	LSC1022	Choke 22μH
2	L14. L15	L12395A	Audio Transformer
1	L16	L12394A	Mains Transformer
1	FS1	UMA10DA	Fuse T100mA



CIRCUIT DIAGRAM ERRORS

1. D13 should be reversed.
2. D16 should be added as shown in ISS 2 circuit diagram.
3. T3 should be TAG94A.
4. T1 should be T2800B.

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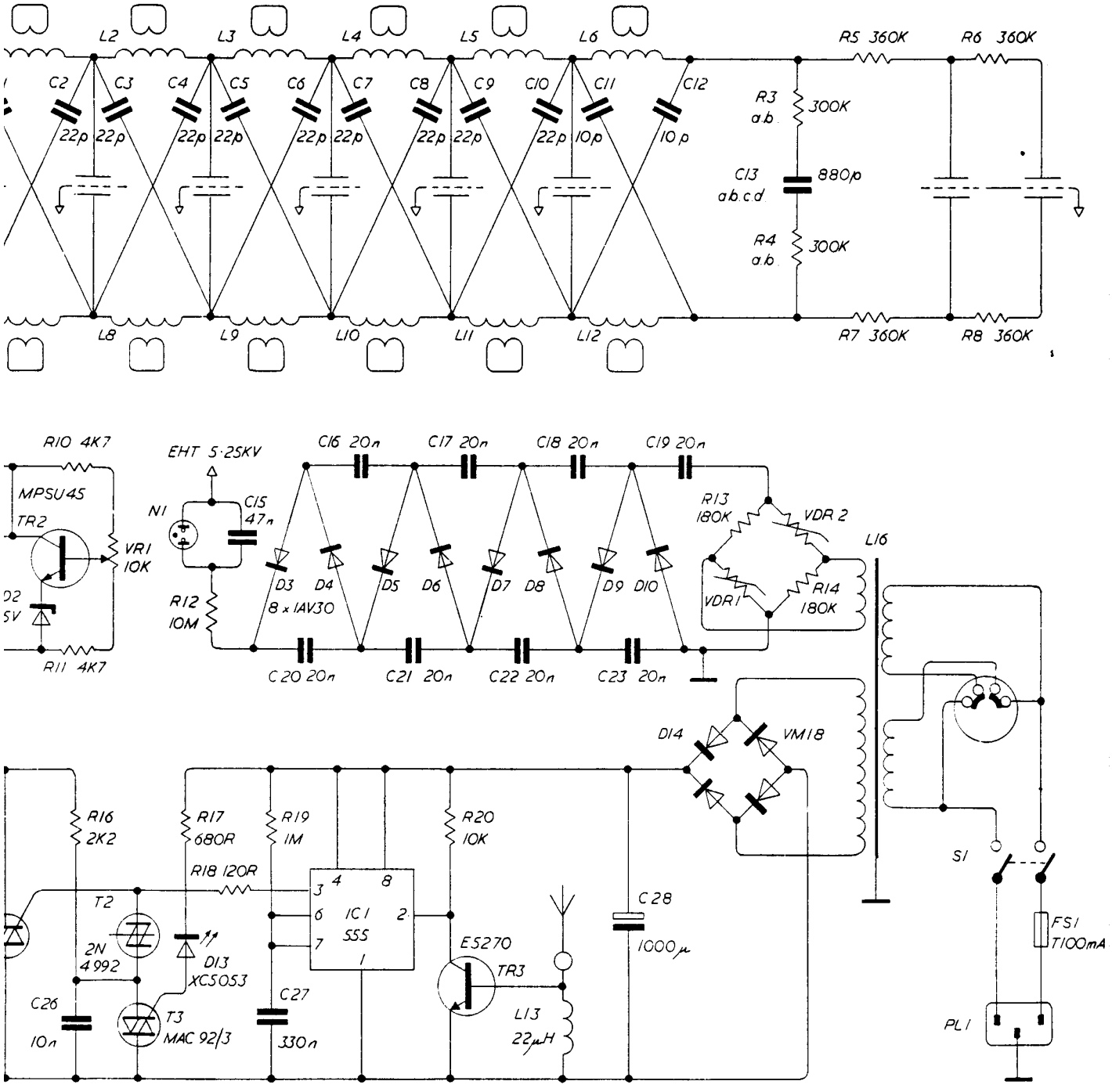

QUAD ELECTROACOUSTICS LTD, HUNTINGDON, ENGLAND

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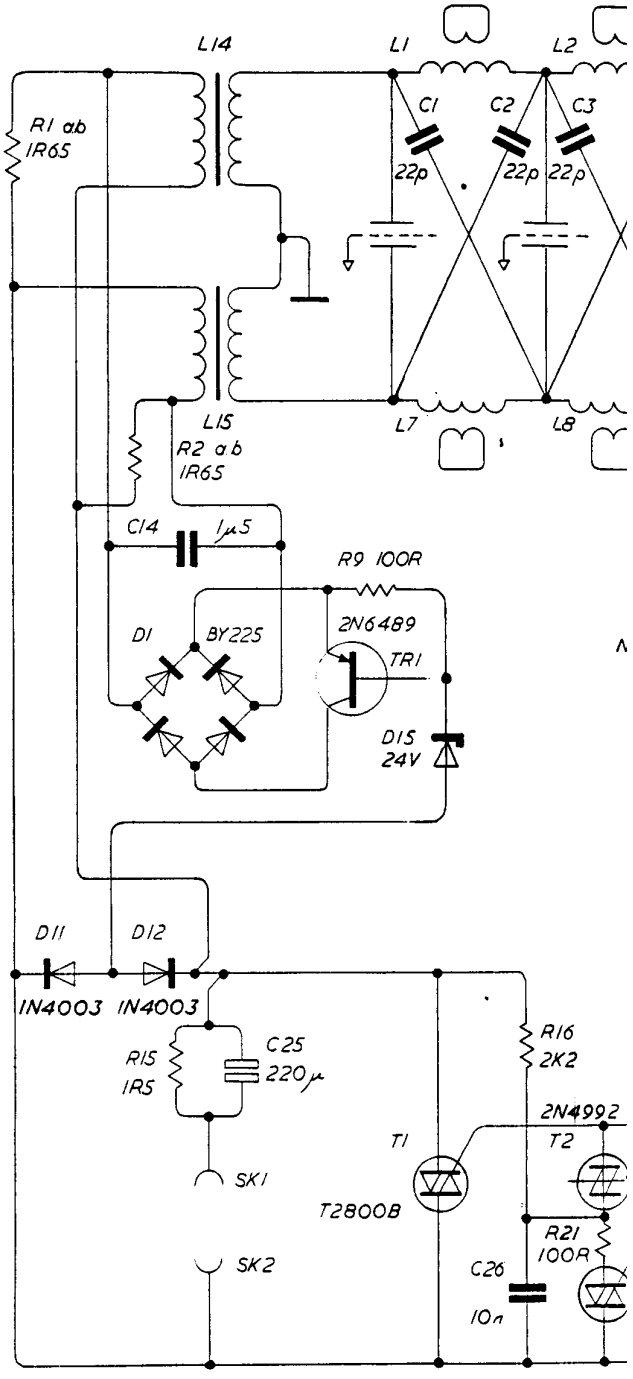
circuit diagram

M12541 – ISS 2

Qty	Ref. No.	Stock No.	Description
4	R1 a.b. R2 a.b.	R3R30JC	Resistor 3R3
4	R3 a.b. R4 a.b.	R150KKQ	Resistor 150K
4	R5. R6. R7. R8.	R360KJQ	Resistor 360K
1	R9. R21	R100RJ1	Resistor 100R
1	R12	R10M0J1	Resistor 10M
2	R13. R14	R180KJA	Resistor 180K
1	R15	R1R50JC	Resistor 1R5
1	R16	R2K20J1	Resistor 2K2
1	R17	R680RJ1	Resistor 680R
1	R18	R120RJA	Resistor 120R
1	R19	R10M0J1	Resistor 10M
1	R20	R10K0J1	Resistor 10K
2	VDR1 VDR2	RT298ZZ	Voltage Dependant Resistor E298-22-06
10	C1 – C10	C22P0KB	Capacitor 22p
2	C11. C12	C10P0KB	Capacitor 10p
4	C13 a.b. c.d.	C330PKP	Capacitor 330p
1	C14	C1U50KS	Capacitor 1μ5
1	C15	C47N0JS	Capacitor 47n
6	C18 – C23 a.b.	C10N0ZT	Capacitor 10n
1	C25	C220UKE	Capacitor 220μ
1	C26	C10N0JS	Capacitor 10n
1	C27	C330NJM	Capacitor 330n
1	C28	C1K0UZE	Capacitor 1000μ
2	C16. C17	C10N0ZT	Capacitor 10n
1	D15	D4824VA	Zener Diode 24V
1	D1	DBY225X	Bridge Rectifier BY 225-100
1	D16	DAA119X	Diode AA119
8	D3 – D10	D1AV30X	Diode 1AV30
2	D11. D12.	D1N4003	Diode 1N4003
1	D13	BL5053R	LED XC5053
1	D14	DVM18XX	Bridge Rectifier VM18
1	TR1	D2N6489	Transistor 2N6489
1	TR3	DE5270X	Transistor E5270
1	T1	DT2800B	TRIAC T2800B
1	T2	D2N4992	DIAC 2N4992
1	T3	DTAG94A	TRIAC TAG94A
12	L1 – L12	L63C01A	Coil
1	L13	LSC1001	Choke 1mH
2	L14. L15	L12395A	Audio Transformer
1	L16	L12394A	Mains Transformer
1	FS1	UMA10DA	Fuse T100mA



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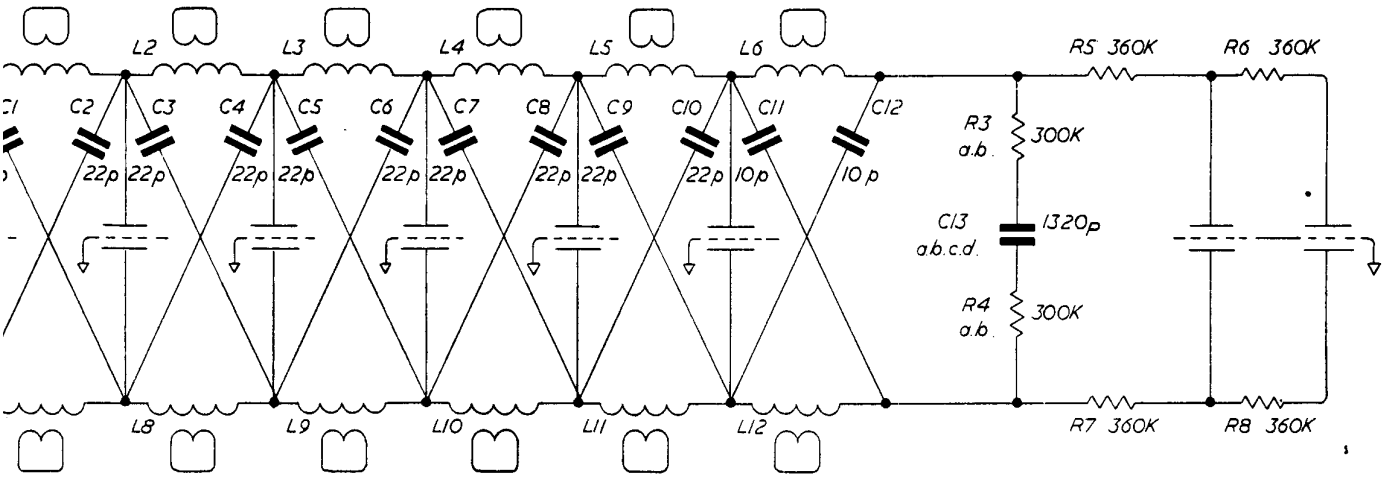

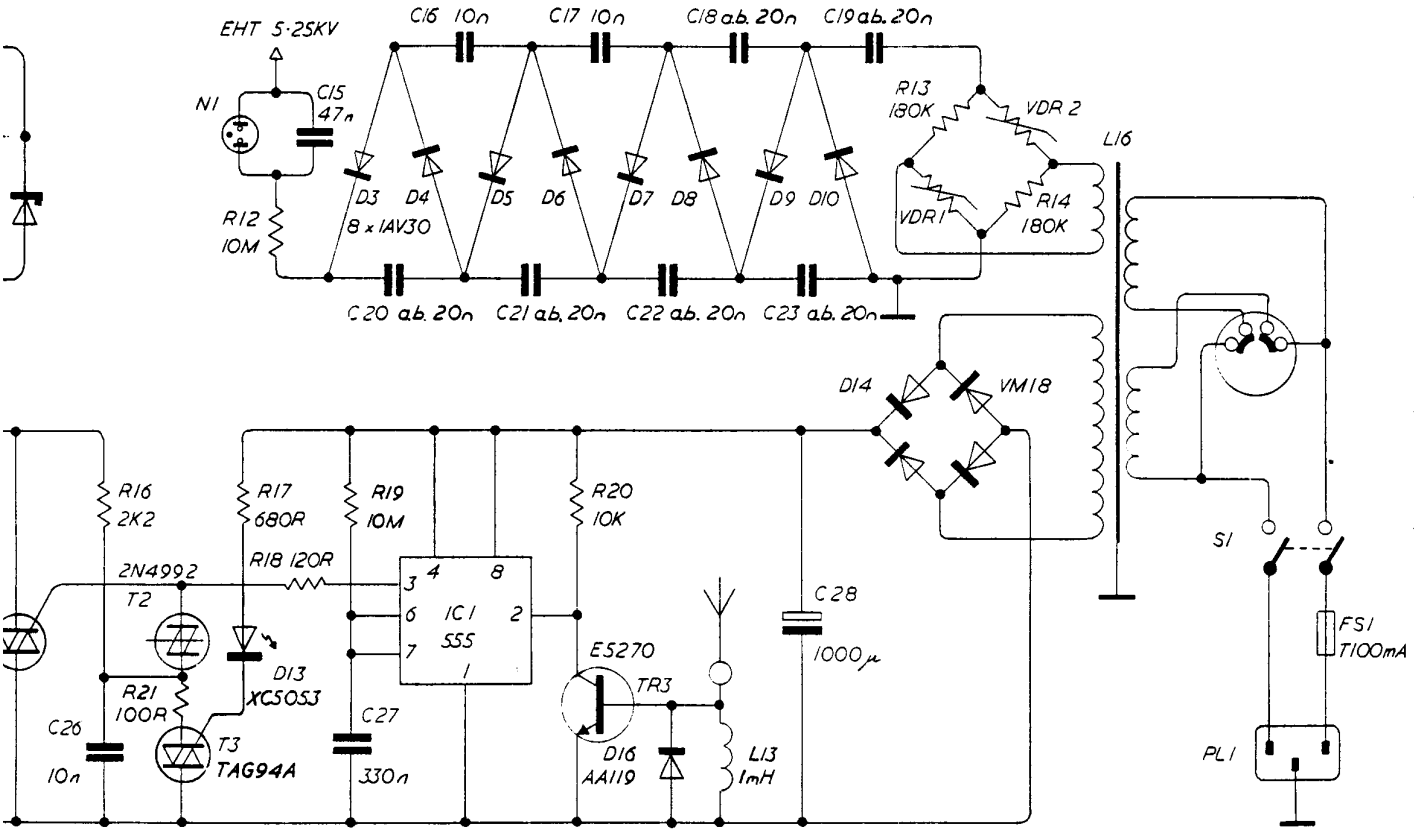

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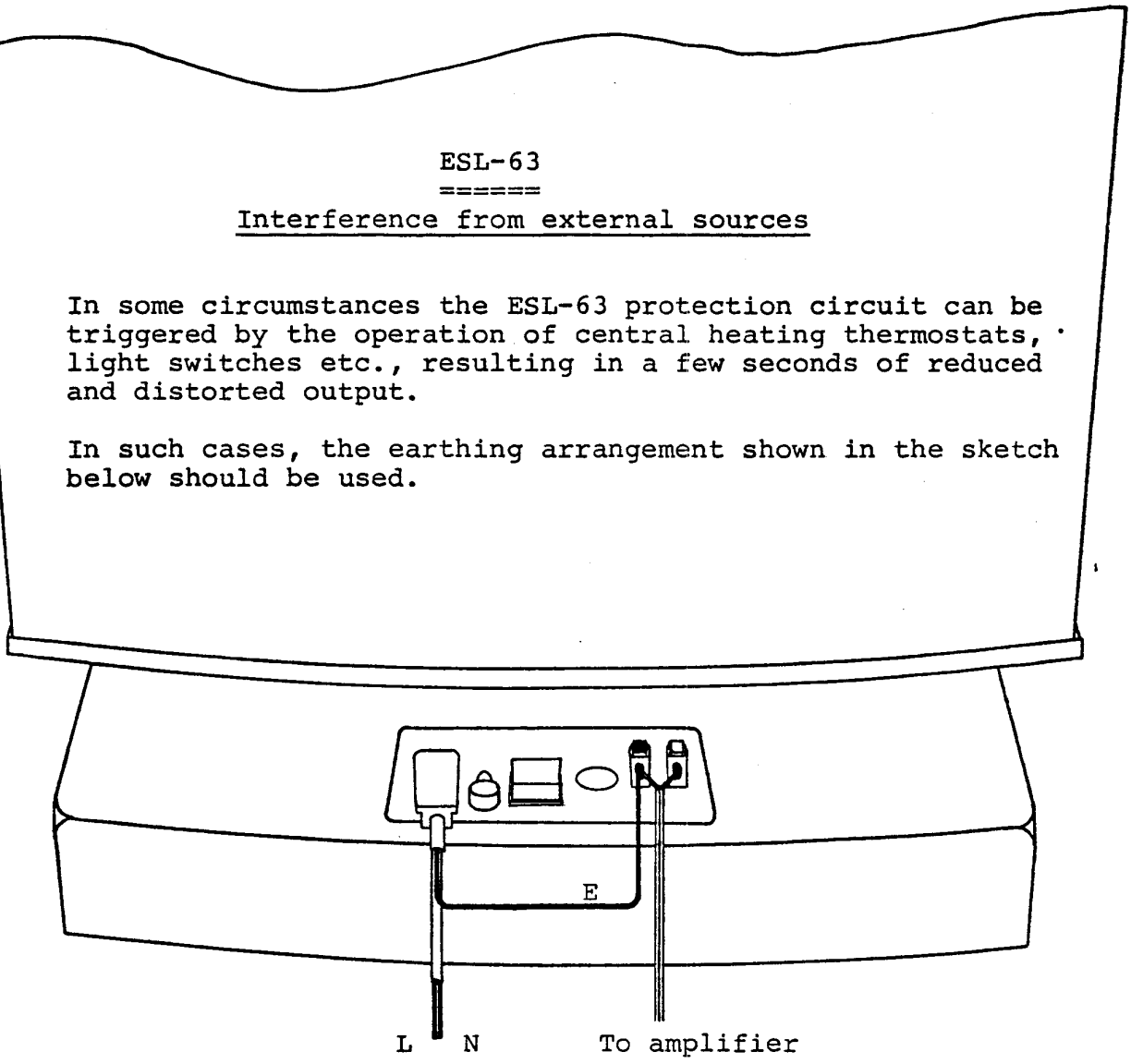
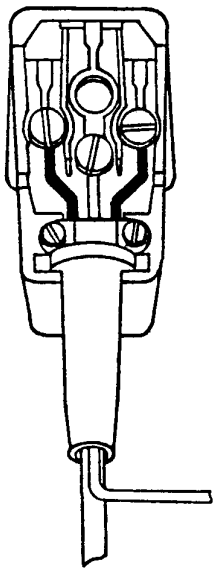
ESL-63
======

Interference from external sources

In some circumstances the ESL-63 protection circuit can be triggered by the operation of central heating thermostats, light switches etc., resulting in a few seconds of reduced and distorted output.

In such cases, the earthing arrangement shown in the sketch below should be used.





A.C. Power Supply Socket Connections

Using two core flex, connect the Brown wire to the terminal marked L and the Blue wire to the terminal marked N.

Using a separate length of wire connect the terminal marked E to the Black audio input terminal.

June, 1983

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ESL-63 Loudspeaker

Replacing Speaker Units

A change of moulding tool has resulted in a slight difference in sensitivity between units using the older black louvres and those with the newer white louvres.

When replacing a black upper or lower-middle unit by one with a white louvre, we recommend replacing both these centre units to maintain the balance between them.

Top and bottom units are not affected.

23rd June, 1983

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