Technical Manual

K3808 K3838
Professional Kits

TANNOY®

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TANNOY 'K' SERIES DUAL CONCENTRIC INTEGRATED DRIVE SYSTEMS

Technical Manual and enclosure construction guide.

This manual relates to the two drive systems Type K3808 and K3838. Each kit of parts comprises the following:-

1. Dual Concentric Driver Type 3808 or 3838
2. Crossover Unit Type 1009 or 1011
3. Terminal Panel - active/passive (7600.0188)
4. Crossover trim panel K3808 or K3838
5. Bag containing fixing screws etc.

Please check all pieces of packaging material to ensure all components are found before disposing of the packing.

Before selecting a cabinet size from those given below, read through the operation and installation guidelines. Optimum results are ensured by following the recommendations below. You are advised not to deviate appreciably from the cabinet styles given.

Selection of Cabinet Style

Refer to the table in the Appendix, choosing a cabinet style which gives the best compromise between bandwidth, size and cost of building. Larger cabinets will give the deepest bass response, but at the expense of being cumbersome, expensive to build and also allowing the drive unit to become excursion limited under low frequency overload conditions. For mobile work styles I and III have an aspect ratio which is more maneoverable on locations if fitted with castors and carrying handles. For fixed or built-in installations styles II and IV are useful; *style IV being especially recommended for horizontal use, hanging from the ceiling.

Follow the recommended port area and length to achieve the correct cabinet tuning. The width of the port multiplied by the height will give the area; the length should be measured from the front face of the baffle to the end of the tunnel. The cabinet tuning may be altered by changing the port length in conjunction with the charts given in the Appendix. Where large cabinets are used in smaller control rooms, especially in corners, the room will influence the tuning to a certain extent and some degree of experimentation may effect better aural results where the environment proves troublesome.

Ported enclosures give a roll off rate in the bass which varies between 18dB per octave and 24dB per octave depending on the size of cabinet and the tuning frequency. For a more gentle rate of roll off (12dB per octave) with a more overdamped bass response the port may be blocked completely. This form of construction may be preferred where standing waves in the 30 to 50Hz region prove troublesome in the listening environment.

Cabinet construction

The necessity for a very rigid airtight cabinet construction cannot be over emphasised. Although cabinet styles I and II specify 18mm chipboard, an improvement can be realised by using birch plywood for the larger panels. In all cases the panels should be braced to each other to minimise panel radiations.

*Style IV is similar to the Tannoy Classic and Super Red Enclosure.

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All joints should be constructed using battens or glue blocks, glued and screwed to provide airtight joints with rigidity. Panels should be braced over their area by glueing and screwing hardwood battens (as shown in the diagrams) in asymmetrical patterns to break up resonances. In addition, the front and back panel should be braced to each other at two points.

The sub-baffles shown in the diagrams allow the drive unit to be mounted so that the front surface of the chassis is level with the front surface of the baffle, thus avoiding tunnel and diffraction effects that might adversley affect the frequency/amplitude response. Depending on the front baffle thickness, some adjustment may be required to achieve this condition by building up the sub-baffle locally with thinner plywood.

Grille Construction

The grille construction will depend on the particular cabinet design. No specific grille construction details are provided, except for the following guidelines:-

1.0 The grille should be as shallow and open as possible. A simple framework made from 25mm square hardwood is best.

2.0 Make sure that the grille gives clearance for the movement of the loudspeaker cone assembly. A minimum distance of 18mm should be allowed between the front face of the driver chassis and the grille cloth.

3.0 The grille cloth should be chosen with care to prevent attenuation of the high frequencies. There seems to be little correlation between optical and acoustic opacity in grille cloth design. If you are in any doubt about the suitability of a particular cloth then apply the following simple test:-

Feed the loudspeaker with pink noise, or if a pink noise generator is not available use a tuner-amplifier combination or receiver and select VHF/FM. (Tune to a fairly high frequency (105 - 108MHz) where there are no broadcasts and listen to the interstation noise, you may have to release any "muting" switch facility).

Listen carefully to the high frequency spectrum from the loudspeaker and then introduce the grille cloth between the high frequency unit and your ear. If any aural attenuation of the high frequency sound is heard the cloth is unsuitable.

4.0 The grille assembly should be removeable to allow access to the crossover controls. One way of doing this is to use 'Velcro' hook and pile fastening pads, stapled and glued at various locations on the frame and positioned to mate with complementary pads similarly fixed to the front baffle of the enclosure.

Cabinet Internal Treatment

All inside surfaces of the cabinet should be lined with a suitable absorption material. Glass fibre thermal insulation is suitable for this purpose in the thickness shown in the chart. This material is readily available on the retail market. Alternatively there are proprietary brands of mineral wool sound insulation materials available which are equally suitable. Expanded urethane foam is also suitable for cabinet styles I and II although glass fibre is preferrable.

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INSTALLATION

1. Initial positioning

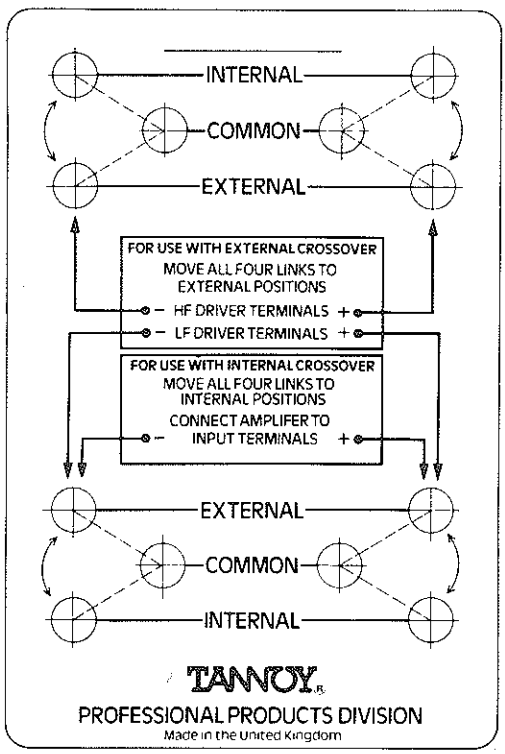
Locate the loudspeakers so that the listening position at the mixing console is approximately 15^{o} from the axis of the Dual Concentric drive unit. This will give the optimum spread of treble energy and ensure a flat amplitude vs. frequency response in the monitoring area. Where possible avoid mounting the monitors close to side walls, floors and ceilings. Mounting the cabinets so that the front baffle is flush with the wall will give the minimum number of diffractions from the cabinet surfaces and is the preferred method where this is possible. However, where space and building structures preclude this, aim to position the cabinets either on an open framework or hang them from the ceiling. Ensure that the mixing console position does not obscure the direct sound radiation from the Dual Concentric drive unit. The mixing engineer and producer should have a clear uninterrupted view of the drive unit and the control panel.

2. Mode of operation

You have a choice of either using the passive internal crossover with the control range as detailed on the crossover nameplate, or using an external crossover operating at high impedance with two power amps per cabinet. The Tannoy electronic dividing network type XO5000 is recommended in the latter case. This unit is available with a specially designed plug-in module which defines the correct crossover responses and introduces a time delay to provide a coincident virtual sound source. A single point parametric equaliser operating in the frequency range 20Hz - 200Hz is also incorporated to allow different low frequency bandwidth and maximum sound power levels to be set.

Having decided whether you wish to operate in the "active" or "passive" mode, follow the next section carefully to ensure that the links on the termination panel are correctly positioned and you know which terminals to connect to the power amplifier.

3. Termination Panel Settings



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The termination panel as shown on the previous page allows the Dual Concentric driver to be operated either through the internal passive crossover, or an external crossover. When in the "internal" mode, only two connections are needed to the power amplifier. When in the "external" mode, the low frequency and high frequency driver terminals are brought out directly to the panel. Therefore in the latter case there are two sets of leads required, one connecting the L.F. section of the driver to the power amplifier and another to connect the H.F. section of the H.F. power amplifier. WHEN OPERATING IN THE ACTIVE MODE GREAT CAUTION MUST BE OBSERVED TO PREVENT DC SWITCHING TRANSIENTS, OFFSET VOLTAGES AND SIGNALS WITH SUBSTANTIAL ENERGY CONTENT BELOW 1KHZ BEING FED TO THE H.F. DRIVER TERMINALS.

CAUTION: In the active mode the driver voice coils are connected DIRECTLY to the terminals on the rear panels.

Each of the four links on the panel connects a "common" terminal to either an "internal" or an "external" terminal. The panel acts therefore as a two-way four pole switch, with the added advantage of reliability due to the gold plating and large contact areas. In addition some of the terminals are used as the input connections, and these are clearly shown by the diagram printed on the panel.

The links pivot about the "common" terminal. A small lug at one end of the link assists in balancing to make changing over easier, and also acts as a small handle. When changing a link over unscrew the outermost terminals fully and then release the brown terminal only sufficiently to allow the link to move. (This will prevent the link falling out and possible loss). The link can then be slid away from either the "internal" or "external" terminal to be changed over easily.

The links are pre-set at the factory for "internal" operation thereby using the passive crossover supplied with the drive unit.

Internal Operation

Make sure the links are connecting between the "common" and the "internal" terminals. Connect the power amplifier to the "input terminals" (Red and Black, +ve and -ve respectively) indicated by the long straight arrows as detailed on the panel.

External Operation

Move the links over so that they connect between the "common" and the "external" terminals. Connect the low frequency power amplifier to the "L.F. Driver Terminals" as indicated, and the high frequency power amplifier to the "H.F. Driver Terminals" as indicated. Observe correct polarity to preserve the phase relationship between L.F. and H.F.radiation from the Dual Concentric Drive Unit.

Note: In the "external" mode the passive internal crossover is completely disconnected.

4. Power Amplifier - Requirements

The power output performance of the loudspeaker is directly related to the power amplifier output. The conversion of electrical power to axial sound pressure is governed by the sensitivity specification of the individual

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drive unit. Please read the full technical specification in the Appendix. The figures given refer to the sound pressure generated ±15° from the axis of the drive unit at a 1 metre distance for an input power of 1 watt. As a rule, the sound pressure will decrease by 6dB for each doubling of distance from the loudspeaker and increase by 3dB for each doubling of power input. This rule applies to anechoic conditions. In a more reverberant room such as a control room or broadcast studio there will be some increase in sound pressure over the anechoic distance figures depending on the size of the room and the absorption coefficients of the surfaces. An example of typical sound pressures measured in a large control room is given in the technical specification.

The power amplifier requirements are a function of the sound pressure level required, the size of the control room, the distance of the monitoring position from the loudspeakers, and, most important of all, the amount of headroom required when dealing with signals of wide dynamic range. A full discussion on this subject is beyond the scope of this manual but a few general guidelines can be given.

(i) For most applications a power amplifier of 150 watts continuous power output is adequate for each loudspeaker.

(ii) Where more headroom is required a power amplifier of 300 watts continuous power output per channel will normally be adequate, but precautions must be taken to make sure that the continuous power fed to the loudspeaker is not greater than the specified rating. This means in normal circumstances that provided there is no evidence of amplifier clipping and the signals have a wide dynamic range (i.e. not heavily limited or compressed) a 300 watt amplifier will be safe.

(iii) For small control rooms, the sensitivity of the loudspeakers is high enough to give adequate sound levels from 50 watt to 100 watt power amplifiers. However, remember that a smaller amplifier driven into clipping can do more damage to a loudspeaker than a large amplifier operating within its maximum output rating.

CAUTION: Clipping amplifiers are the evil of loudspeakers. Clipping produces an excess of H.F. energy which can destroy the High Frequency compression driver over quite short periods (approximately 5 minutes). Clipping also usually produces some d.c. offset which will upset the position of the Low Frequency driver and drastically reduce its thermal power handling, resulting in early failure.

Above all, clipping amplifiers do not sound good.

GOLDEN RULE IF THE AMPLIFIER CLIPS, EITHER REDUCE THE GAIN, OR GET A MORE POWERFUL AMPLIFIER.

(iv) Overload Precautions: Provided the loudspeakers are used in a sensible way no special overload precautions are necessary. However, if some failsafe precautions are required one method of protection is a 4 amp slow blow fuse housed in an in-line connector which must be replaced at the beginning of each session. (Fuses tend to "age" and become unreliable when operated over long periods close to their fusing point). To protect

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the H.F. section from d.c. switching signals and "power on" offset voltages generated by the H.F. power amplifier when using an external crossover a 30mfd 150 volt d.c. working capacitor may be wired in series with the H.F. terminals. To do this, remove the gold plated link from the +ve H.F. terminal (yellow) and wire the capacitor between this terminal and the adjacent brown terminal. Use a solid dielectric capacitor, NOT an electrolytic type.

(v) When using an external crossover and separate power amplifiers for L.F. and H.F. drivers the same comments above apply to the L.F. power amplifier. Although the H.F. power amplifier will normally be providing less power output then the L.F. power amplifier do not assume that the H.F. amplifier can be of a much lower power rating. The transient and dynamic characteristics of most music programme shows a low average power requirement for high frequencies but a high peak power requirement. Unless this high peak power is catered for the amplifier will be driven into clipping with all the attendant problems. Therefore the H.F. power amplifier must have a peak power output at least equal to the continuous power output of the L.F. power amplifier. A good system design would use the same power amplifier specification for both L.F. and H.F., although the slew rate restrictions could possibly be eased for the L.F. requirement.

(vi) It is essential when operating in the "external" mode, that the power amplifier feeding the H.F. unit does not produce a d.c. swing during switch-on or switch-off. This therefore precludes the use of amplifiers with output capacitors unless separate precautions are taken (e.g. a changeover relay connecting an 8 ohm resistor to the power amplifier output during switch-on and switch-off).

5. Connections to Power Amplifier

Always aim to position the power amplifier as close to the monitors as possible. This will ensure the shortest lead length. Avoid long cable runs as the extra resistance introduced by the cable loses power and reduces the damping on the loudspeaker. Long cable runs can also introduce capacitance and inductance, which may affect the stability of the power amplifier causing problems with the aural treble quality (e.g. "grittiness" and harshness).

Use substantial multistranded connecting cable, preferrably 2.5 square millimetre crossection or larger, to keep the resistance to a minimum and maintain damping.

Observe correct polarity at the loudspeaker and amplifier terminals to preserve the phase of the stereo pair. This is equally important when using an external crossover.

When using amplifiers in "bridge" mode be careful not to accidentally connect either loudspeaker lead to a common earth through any ancilliary equipment.

Absolute Polarity The convention with all Tannoy loudspeakers is as follows:-

A positive going signal (i.e. +ve terminal of 1.5 volt cell) connected to the positive input terminal of the system causes the L.F. cone to move into the cabinet. In this way the absolute polarity of the signal from microphone capsule to monitoring loudspeaker may be preserved.

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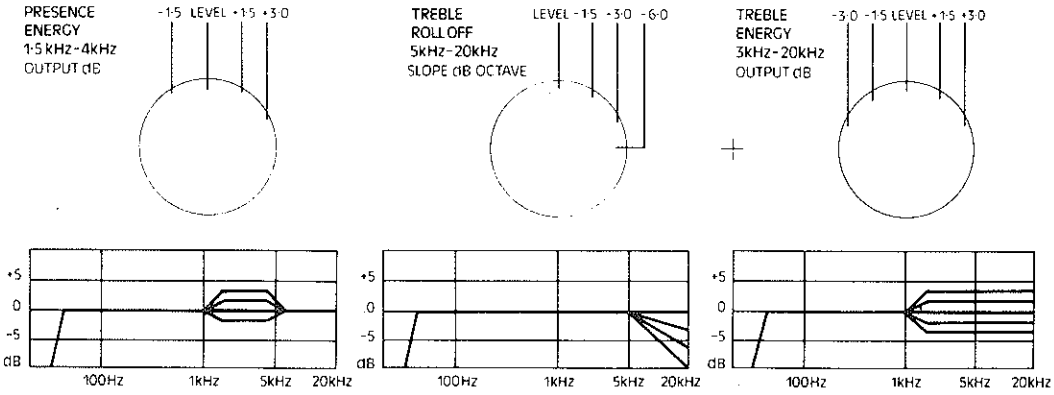
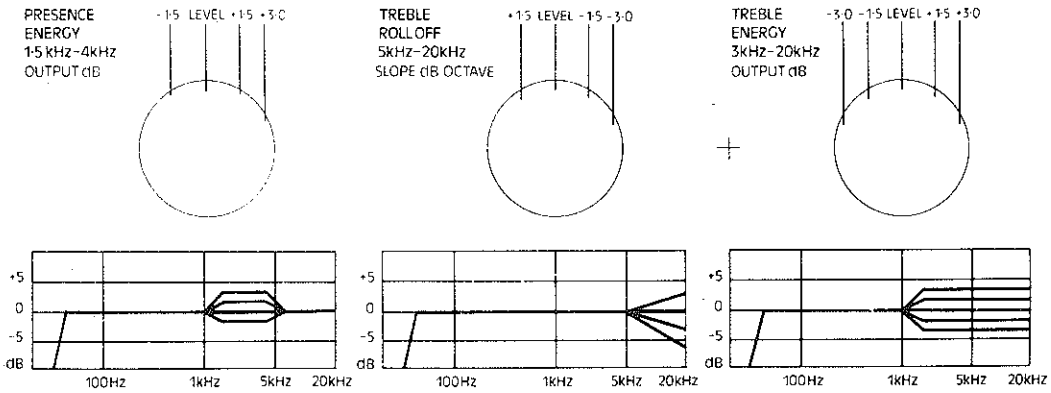
6. Loudspeaker System Adjustment - (Internal Mode Only).

The crossover panels indicate the range of adjustment available:-



K3808 (as used in Super Red)



K3838 (as used in Classic)

The differences between the two types lie in the control designated "roll off" and graphical representation of the effects of this control.

In general, deviations from the "level" position should be considered with caution and the controls should be set up preferably with the aid of a one-third octave analyser and pink noise signal, to provide the flattest response in the vicinity of the recording engineer and producer. The effects of the controls are graphically represented on the panel. The range of control is purposely restricted since large deviations usually infer that something is wrong with the signal, or control room/loudspeaker interface, or both.

Remember that the changes that can be effected by rotating a control from one position to another are usually quite subtle and may not be heard at all if the programme has very little energy in the frequency band under consideration. However, the combined effect of all the controls set to their extremes can produce quite grotesque responses and such settings should be avoided.

If you are in any doubt about the control settings, leave them set to "level".

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MAINTENANCE AND GUARANTEE

No maintenance of the loudspeakers is necessary. All components are guaranteed for a period of five years from date of manufacture, subject to the absence of evidence of misuse, overload or accidental damage. Such determination to be made solely by Tannoy Authorised Service Stations.

TECHNICAL DESCRIPTION

The now famous Tannoy 15" (380mm) Dual Concentric drive unit has been further refined specially for the loudspeaker kits described in this manual.

Drive Unit Types 3808 and 3838

An aluminium alloy high quality gravity die cast chassis provides locations in machined recesses for the magnet structure and the low frequency cone assembly. A two piece anisotropic high energy barium ferrite magnet drives two co-axial air gaps in series. Definition of the low frequency and high frequency gap flux ratios is by means of a patented magnetic shunt arrangement which apportions the reluctance of the total magnetic circuit to give 8500 gauss (0.85 Tesla) for the low frequency air gap and 12500 gauss (1.25 Tesla) for the high frequency gap.

The low frequency motor unit consists of a very robust high temperature four layer coil running in a wide air gap giving a large amount of thermal capacity. The coil is bonded through a heat barrier to a rigid pretreated felted paper cone structure with an acoustically terminating suspension assembly.

The high frequency diaphragm is driven by a low mass aluminium coil running in a precise clearance air gap. The radiation from the diaphragm is collected by a series of phase compensating tubes which add the total diaphragm radiation in phase at the horn throat. The wavefront then propagates down the horn with the wavefront area expanding in an exponential manner to couple the radiated sound from the diaphragm correctly into the monitoring area.

The advantages of a compression driver for upper midrange and high frequencies are:-

(i) High efficiency
(ii) High power handling
(iii) Detailed, sensitive response
(iv) Excellent transient response

See diagrams of Tannoy Dual Concentric Driver Type 3838 and 3808, overleaf.

Coupling these advantages with those of dual concentric construction:-

(i) Phase, amplitude response substantially independent of listening position.
(ii) Coherent sound source throughout the audio frequency band.
(iii) Ease of serviceability
(iv) Absence of spurious phase effects due to multiple driver sources.

- gives Tannoy loudspeakers unique advantages for monitoring and broadcast situations.

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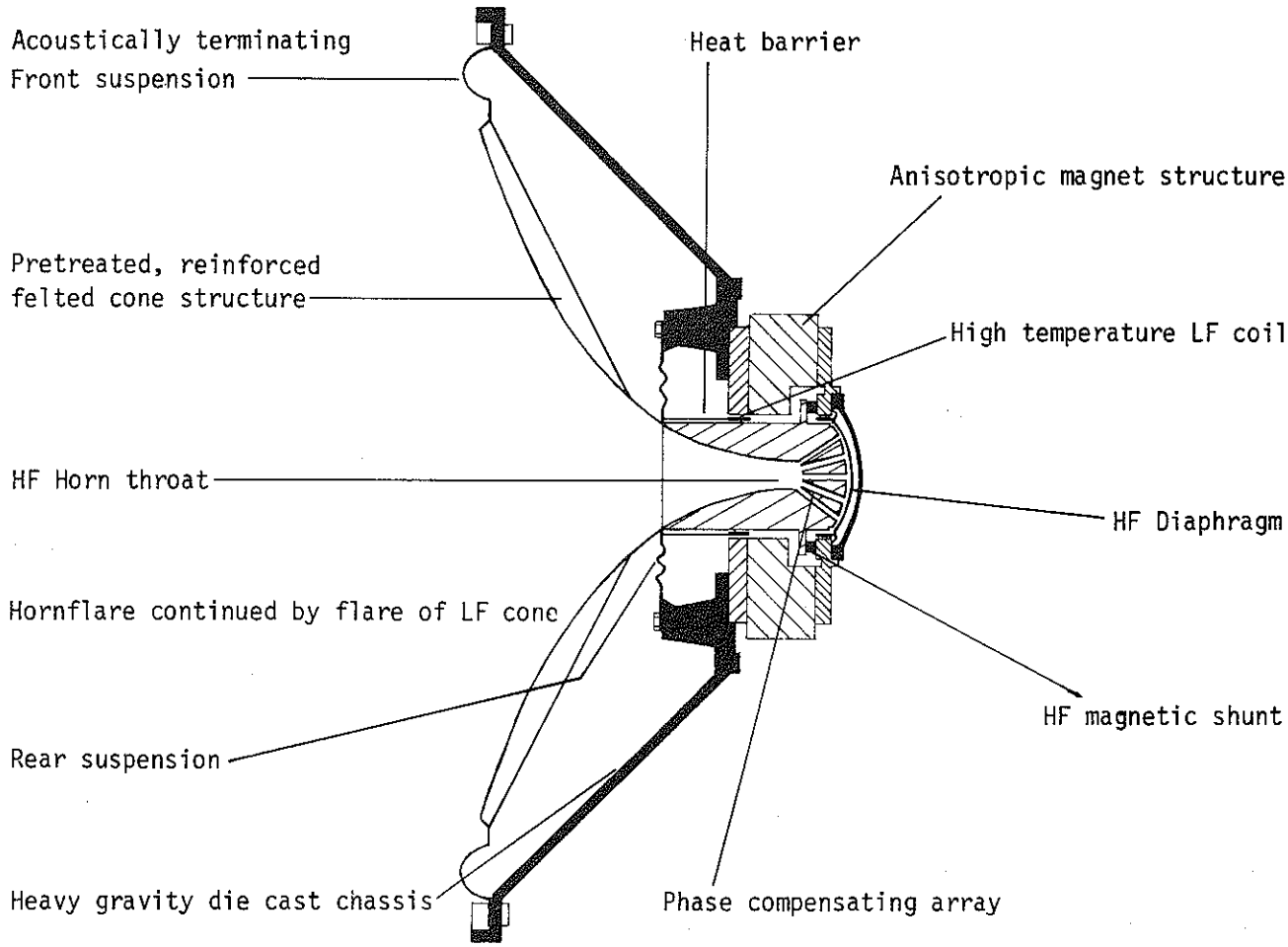
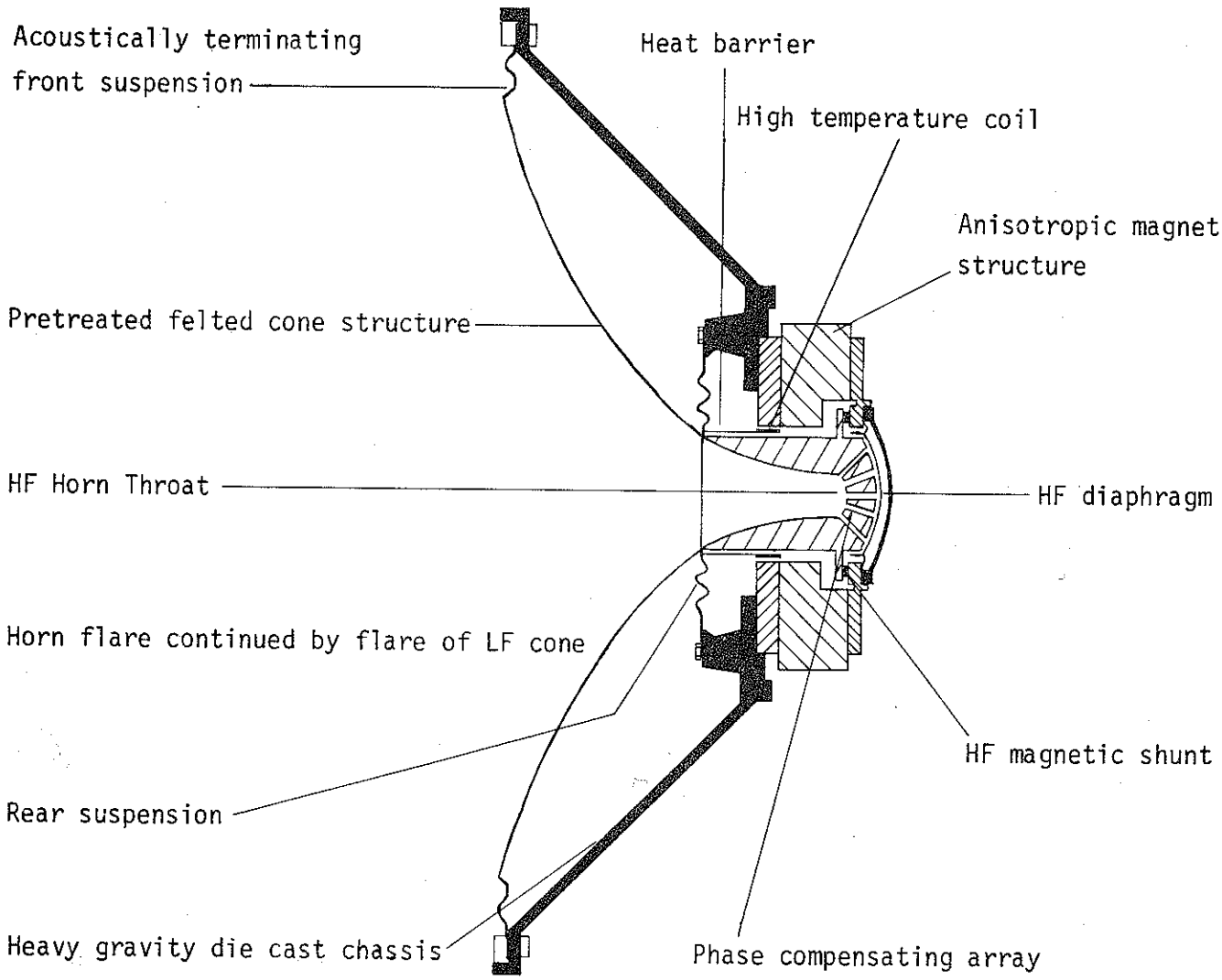


TANNOY DUAL CONCENTRIC DRIVER TYPE 3838

DIAGRAM ONE



TANNOY DUAL CONCENTRIC DRIVER TYPE 3808

DIAGRAM TWO

Crossover Type 1009 and 1011

All the components are rigidly mounted on a glass fibre reinforced printed circuit board with a specially heavy grade of copper cladding. Power resistors are mounted on stand-off pillars for cooler running at continuous high power levels and capacitors are solid dielectric capable of withstanding high slew rate voltages. An auto transformer feeds the high frequency section allowing for impedance and sensitivity matching. A fairly complex switching circuit controls the attenuation at various points in the frequency spectrum to give the control functions.

Terminal Panel

The termination panel is the switching centre and distribution point between the internal crossover and the Dual Concentric Drive Unit. In the "internal" mode the input terminals feed the crossover unit which then returns the L.F. and H.F. feed to the terminal panel for distribution to the drive unit. In the "external" mode the terminal panel linking disconnects the internal cross-over and routes the drive unit feed points directly to the relevant terminals for external connection.

Gold plated links and insulated screw terminals are used in preference to a two way 4 pole switch for low contact resistance and reliability over long periods of service.

TECHNICAL SPECIFICATIONS

K3808

1) Maximum Input Power

70Hz*	-	1kHz	120 watts continuously	(31 volts r.m.s.)
1kHz	-	20kHz	60 watts continuously	(22 volts r.m.s.)
70Hz*	-	1kHz	500 watts peak	(63 volts peak)
1kHz	-	20kHz	250 watts peak	(44.7 volts peak)

Recommended amplifier power = 150-200 watts per channel into 8 ohms.
* dependant on cabinet selection.

2) Maximum Output Power

120 watts (31 volts r.m.s.) produces 114dB sound pressure level (re: $2 \times 10^{-5} N/m^2$) at a distance of 1 metre under anechoic conditions (4π steradians) over the frequency range 50Hz - 20kHz measured in octave bands. Peak SPL - 121dB at 500 watts peak input.

1 pair of loudspeakers mounted in cabinet style III each fed with 60 watts (half power input) (22 volts r.m.s.) pink noise band limited to 50Hz - 20kHz produce 110dB* (re: $2 \times 10^{-5} N/m^2$) at a distance of 3 metres in a control room measuring 7m x 9m x 2.3m and having a reverberation time of 0.35 $\pm$ 0.1 seconds over the band 100Hz - 10kHz.

*WARNING Continuous sound levels of over 100dB can cause permanent hearing damage. Maximum recommended exposure time, for example, at 115dB is not longer than 15 minutes.

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3) Sensitivity

1 watt (2.83 volts r.m.s.) produces an average level of 94dB SPL (re: $2 \times 10^{-5} N/m^2$) at one metre under anechoic conditions (4π steradians) over the frequency range 50Hz - 20kHz.

4) Impedance

8 ohms nominal
5.5 ohms minimum

5) Frequency vs SPL response

50Hz - 20kHz ± 4dB measured in 1/3 octave bands at any power up to 120 watts (31 volts r.m.s.) when fitted to Cabinet style IV.

6) Dispersion

90^{o} vertical and horizontal included angle at -6dB points at 10kHz.

7) Distortion

When fitted to Cabinet Style IV less than 2% third harmonic products at half rated input power (60 watts input, 111dB output) over the band 100Hz to 15kHz.

For 90dB SPL, less than 0.5% third harmonic over 50Hz - 20kHz
For 110dB SPL, less than 2.0% third harmonic over 100Hz - 15kHz
For 114dB SPL, less than 5% third harmonic over 100Hz - 10kHz.

8) Crossover frequency

1kHz

9) Control Network

A comprehensive calibrated control network provides adjustment of the amplitude response as follows :-

1kHz	-	3kHz	-1.5dB to +3.0dB in 4 positions
1kHz	-	20kHz	-2.0dB to +3.0dB in 5 positions
5kHz	-	20kHz	variable slope roll off in 4 positions.

In all cases flat anechoic response positions are clearly indicated.

10) Accessories (Not included)

Electronic time delay compensated twin channel stereo dividing network with plug-in card defining crossover voltage responses and slope coupled with parametric equalisation in the range 20Hz to 200Hz.

K3838

1) Maximum Input Power

50Hz*	-	1kHz	120 watts continusouly	(31 volts r.m.s.)
1kHz	-	20kHz	60 watts continuously	(22 volts r.m.s.)
50Hz*	-	1kHz	500 watts peak	(63 volts peak)
1kHz	-	20kHz	250 watts peak	(44.7 volts peak)

* Dependant on cabinet selection.

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2) Maximum Output Power

120 watts (31 volts r.m.s.) produces 112dB sound pressure level (re: $2 \times 10^{-5} N/m^2$) at a distance of 1 metre under anechoic conditions (4 π steradians) over the frequency range 40Hz - 20kHz measured in octave bands. Peak SPL = 119dB at 500 watts peak input.

1 pair of loudspeakers mounted in cabinet style IV each fed with 60 watts (half power input) (22 volts r.m.s.) pink noise band limited to 40Hz - 20kHz produce 108*dB (re: $2 \times 10^{-5} N/m^2$) at a distance of 3 metres in a control room measuring 7m x 9m x 2.3m and having a reverberation time of 0.35 $\pm$ 0.1 seconds over the band 100Hz - 10kHz.

*WARNING Continuous sound levels of over 100dB can cause permanent hearing damage. Maximum recommended exposure time, for example, at 115dB is not longer than 15 minutes.

3) Sensitivity

1 watt (2.83 volts r.m.s.) produces an average level of 92dB SPL (re: $2 \times 10^{-5} N/m^2$) at 1 metre under anechoic conditions (4π steradians) over the frequency range 40Hz - 20kHz.

4) Impedance

8 ohms nominal
5.5 ohms minimum

5) Frequency vs SPL response

40Hz - 20kHz $\pm$3dB measures in 1/3 octave bands at any power up to 120 watts (31 volts r.m.s.) when fitted to cabinet Style IV.

6) Dispersion

90^{o} vertical and horizontal included angle at -6dB points at 10kHz.

7) Distortion

When fitted to cabinet style IV less than 2% third harmonic products at half rated input power (60 watts input, 109 dB SPL output) over the band 80Hz - 20kHz.

For 90dB SPL less than 0.5% third harmonic over 40Hz - 20kHz
For 110dB SPL less than 2.0% third harmonic over 80Hz - 20kHz
For 112dB SPL less than 3.0% third harmonic over 80Hz - 20kHz

8) Crossover Frequency

1kHz.

9) Control Network

A comprehensive calibrated control network provides adjustment of the amplitude response as follows :-

1kHz	-	3kHz	-1.5dB to +3.0dB in 4 positions
1kHz	-	20kHz	-3.0dB to +3.0dB in 5 positions
5kHz	-	20kHz	variable slope roll off in 4 positions.

In all cases flat anechoic positions are clearly indicated.

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10) Accessories (Not included)

Electronic time delay compensated twin channel (stereo) dividing network with plug-in card defining crossover voltage responses and slope coupled with parametric equalisation in the range 20Hz to 200Hz.

SPARE PARTS LIST

DESCRIPTION	K3838	K3808
MAIN ASSEMBLIES		
Dual Concentric Drive Unit, complete	7900.0056	7900.0053
Crossover Assembly complete 1011	7300.0054	-
Crossover Assembly complete 1009	-	7300.0053
Termination Panel complete	7600.0188	7600.0188
Crossover Panel Trim	7401.0016	6401.0017
Carton Kit	6730.0020	6730.0020
Owners' Manual	6481.0090	6481.0090
SUB ASSEMBLIES		
Frame and cone assembly Kit	7900.0020	7900.0022
Recone Kit	7900.0039	7900.0037
HF Diaphragm assembly	7100.0026	7100.0026
HF Diaphragm assembly (3 pack)	7900.0040	7900.0040
HF Diaphragm assembly (27 pack)	7900.0061	7900.0061
Front trim ring	6839.0052	6839.0052
Rear sealing gasket	6839.0048	6839.0048
Dust Cap	6839.0009	6839.0009
Magnet Assembly	7600.0126	7600.0126
Frame Assembly C/W plug	7600.0215	7600.0215
Cover rear carton	6220.0017	6220.0017
TERMINATION PANEL		
Connecting Link, gold	6560.0002	6560.0002
Terminal, black	4783.0144	4783.0144
Terminal, red	4783.0145	4783.0145
Terminal, brown	4783.0146	4783.0146
Terminal, yellow	4783.0149	4783.0149
Terminal, blade crimp	4783.0103	4783.0103
Plug, 4 way housing	3431.0002	3431.0002
Contact for above (per 4)	3439.0002	3439.0002
CROSSOVER - TYPE 1011(K3838) & TYPE 1009 (K3808)		
Knob, less clip	6131.0006	6131.0006
Clip for knob	4765.0002	4765.0002
Sealing gasket	6839.0009	6839.0009
Nut, spire, captive.	4656.0001	4656.0001
Lead assembly	7500.0113	7500.0113
Switch 4-way 2-pole rotary	3411.0004	3411.0004
Switch 5-way 2-pole rotary	3411.0005	3411.0005
3R3 Resistor 6W (R1)	2252.4227	2252.4227
10R Resistor 9W (R3)	2252.4239	2252.4239
20R Resistor 9W (R4, R6)	2252.4246	2252.4246
30R Resistor 9W (R5)	2252.4250	2252.4250
47R Resistor 17W (R2)	2252.3040	2252.3040
1.5µf 100V DC (C5)	2605.0048	2605.0048
4.7uf 100V DC (C6)	2605.0051	2605.0051
6.8uf 100V DC (C1, C2, C3, C4)	2605.0251	2605.0251
Transformer (T1)	3212.1000	3212.1000
Choke 2.7mH (L1)	6811.0001	6811.0001
Choke 1.65mH (L2)	6811.0002	6811.0002

continued.....

FAULTFINDING AND SERVICE INSTRUCTIONS

A few simple tests will usually locate the source of any problems. Some test instruments are required together with tools as detailed below:-

Test instruments

Sine wave oscillator with frequency range 20Hz to 20kHz. This must be either a BFO type or RC type. Do not use a synthesised sine function generator, as although with this type the quoted distortion may be low it is nearly always audible.

Power amplifier capable of giving 50 watts continuous power, input sensitivity to match the oscillator above.

Multimeter, capable of reading 0-25AC volts, (linear ±0.5dB over the range) and resistance in the range 0 to 12 ohms with a resolution of 0.5 ohms.

1.5 volt battery with polarity indication.

Tools required

6mm Allen key or hexagonal socket spanner.
4mm Allen key or hexagonal socket spanner.
2.5mm Allen key or hexagonal socket spanner.
7mm open ended spanner.
small instrument screwdriver (2mm).
large instrument screwdriver (6mm).
soldering iron.

Materials required to replace L.F. cone assembly

No. 10 artists' brush.
1" wide surgical quality adhesive tape.
Cotton Wool
Clean, lint free cotton rag.
"Tannoy" recone kit.
sharp, flexible knife.

Materials required to replace H.F. Diaphragm

"Tannoy" replacement H.F. diaphragm assembly
Multicore solder.

Faultfinding

The type of fault will usually be obvious by the nature of the sound quality and can be narrowed down to a problem either in the L.F. or H. F. section.

The L.F. or H.F. drive units can be tested without removing the driver from the cabinet by sweeping a sine wave from 20Hz to 20kHz via the power amplifier as follows:-

1. Adjust the termination panel for "external" operation.
2. To test the L.F. driver, connect the oscillator and power amplifier to the "L.F. Driver Terminals". Set output at 5 volts, 1kHz and sweep through 20Hz to 5kHz, carefully listening for distortions.

continued.....

3. To test the H.F. driver, connect the oscillator and power amplifier to the "H.F. Driver Terminals". Set output at 3 volts, 1kHz and sweep through 250Hz to 20kHz listening for distortions. Below 1kHz the sound radiation will be rich in upper harmonics due to the operation of the horn loaded compression unit outside its pass band. Do not confuse this sound with buzzing or rattling due to an off centre coil or damaged phase plug.

The passive internal crossover network may be tested as follows:-

1. Adjust the termination panel for "internal" operation.
2. Connect the sweep oscillator and power amplifier to the "input terminals". Set for 5 volts at 1kHz and measure voltages as follows:-
3. Connect test meter between input common and lower red terminal. Plot the characteristic of the voltage over the frequency range 100Hz to 5kHz. This gives the characteristic of the L.F. passive crossover network.
4. Connect test meter between input common and upper yellow terminal (adjacent to the word "INTERNAL"). Plot the characteristic of the voltage over the frequency range 800Hz to 20kHz with all controls set to "level".
5. Compare the responses with those given in the table below:-

FREQUENCY HZ	L.F. SECTION VOLTAGE	H.F. SECTION VOLTAGE	
		K3808	K3838
100	5.05		
200	4.20		
300	4.2		
500	4.7	0.15	0.15
700	5.25	0.4	0.4
1kHz	4.30	0.65	0.65
1.5kHz	1.80	1.1	1.1
2.0kHz	0.9	1.6	1.55
3.0kHz	0.4	1.4	1.3
5.0kHz	0.1	2.2	1.7
7.0kHz		3.3	2.2
10.0kHz		4.95	2.8
15kHz		6.05	3.5
20kHz		6.0	3.75

6. Always check the response of the oscillator, amplifier and test meter combination by running through the frequency table measuring the output of the amplifier with the test meter and noting the meter readings. The meter should not vary by more than ±0.5dB over the range (5.3 to 4.7 volts for a nominal 5 volts at 1kHz).

Non destructive Inspection

The Dual Concentric drive unit may be inspected by dismantling, as follows:-

1. Remove drive unit from the cabinet by releasing the four M8 hexagonal bolts (use 6mm socket spanner) and unplugging the connecting lead.
2. Place drive unit face down on a clean surface. Release the three M5 socket screws holding the magnet assembly to the frame (use 4mm socket spanner), retaining all the washers carefully. Unsolder the leads to the H.F. diaphragm making careful note of the polarity.
3. Lift the magnet assembly (complete with H.F. diaphragm attached) vertically taking care not to tilt it and damage the L.F. coil.
4. The L.F. coil, coil to cone joint and rear suspension joint can now be inspected:-

   a. if the coil shows signs of overheating there are three possibilities:-

continued.....

1) The system has been overdriven by a large amplifier e.g. 300 watts continuous power.

2) the system has been connected to the correct power amplifier which has been driven hard into clipping.

3) if only part of the coil shows signs of overheating the power amplifier has suffered from a d.c. offset voltage at the output terminals whilst delivering a large amount of power.

b. If the coil shows no signs of overheating but is open circuit, the drive units may have been subjected to excessive sudden amplitudes caused by switching impulses of faulty electronics.

c. If the coil former is damaged, the drive unit may have been subjected to excessive stress due to the power amplifier being driven hard into the clip point by a very high slew rate overload transient. In this case the H.F. diaphragm assembly should also be inspected.

5. The low frequency magnet air gap may be inspected for ferrous particles and debris and should always be cleaned using adhesive tape wrapped round a piece of thin card.

IT IS ESSENTIAL AT THIS POINT THAT THE AIR GAP IS SCRUPULOUSLY CLEAN.

Cover the air gap with tape to protect it.

6. Place the magnet assembly down on the bench so that it rests on the horn mouth. Release the four slotted head screws holding the H.F. diaphragm assembly to the magnet back plate, and remove the assembly by lifting vertically. Note carefully the orientation of the paper packing rings if fitted.

7. The H.F. diaphragm, coil and adhesive joints may now be inspected, together with the H.F. magnetic air gap and the phase plug tubes.

a) If the H.F. coil shows signs of overheating then the system has been subjected to sustained overloading in the frequency range 1kHz - 20kHz. This is usually caused by the power amplifier being driven hard into clipping, continuous sine wave testing beyond the power given in the technical specifications, or full power tape rewinding/editing.

b) If the H.F. diaphragm is distorted in any way then the unit may have been subjected to unauthorised inspection.

The H.F. diaphragm assembly is replaced as a complete unit.

8. Reassemble the drive unit in the reverse order, noting that:-

i) the H.F. assembly is self centering due to the close machined tolerances.
ii) the paper packing rings under the diaphragm (if fitted) must be replaced in the correct orientation.
iii) The magnet assembly is self centering on the frame (remove any tape fitted to protect air gap before reassembly).
iv) both magnetic air gaps must be scrupulously clean and free from any visible small particles.

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Replacing L.F. and H.F. Assemblies

Remember spare cones and diaphragms are very fragile in their unmounted form, and must be treated with great care.

All screws, bolts and nuts removed during repairs should be very carefully preserved. Thread and dimensional standards vary widely throughout the world and a repair can be delayed for days or weeks for the loss of a single screw.

If difficulty is experienced with fitting self-centering H.F. diaphragms this may be overcome by turning the diaphragm through 90° and re-locating with respect to fixing holes; these difficulties should not normally occur.

Replacing L.F. Cone assembly

The reconing kit comprises:-

1 cone, voice coil, dust cap and rear suspension assembly
1 front trim ring
1 Tube adhesive (cone to frame).

READ INSTRUCTIONS FROM START TO FINISH BEFORE COMMENCING WORK.

Carefully unpack the replacement cone and check the kit against this parts list. Place the cone face down in a safe place, do not touch the voice coil, particularly the unprotected bottom edge of the voice coil former. Prepare a clean bench space and cover with clean paper, remove all magnetic bits and pieces, i.e. nuts, bolts, etc.

To remove the old cone:-

1. Remove lead out terminations from plug on voice coil frame, they may be gently eased out with a small screwdriver.

2. Remove 4 hex headed bolts securing spider mounting rings.

3. Remove front trim ring from outer suspension, by gently pulling.

4. Release outer suspension from frame using a sharp flexible knife and lift out old cone.

5. Inspect magnetic gap for old coil debris and clean if necessary with adhesive tape wrapped round a piece of card. When gap is clean immediately seal with clean adhesive tape.

6. Carefully clean outer suspension flange on frame, gently scraping off any remaining debris and wipe thoroughly with industrial solvent, e.g. carbon tetrachloride or trichlorethylene.

To fit new cone:-

7. Remove sticky tape seal from gap and gently lower new coil and cone into frame and gap. Make sure the voice coil leadouts line up with plug on frame, if all lines up satisfactorily remove replacement from frame.

8. Apply a thin smooth layer of adhesive to the outer suspension flange, do not use too much or it will squeeze out and adhere to the flexible suspension.

continued.....

9. Gently lower cone into frame as in (7). Insert rear suspension fixing bolts by a few threads.

10. Gently press down outer suspension onto glued flange, ensuring it is evenly spaced with respect to frame edge. Leave to dry for 12 hours.

11. The trim ring. If the trim ring supplied is not self-adhesive fix using the adhesive contained in the recone kit.

12. When the outer suspension and trim ring are in place and the adhesive has set, connect a 3 volt 50/60 Hz supply to the voice coil and gently move the rear suspension until a clear sound is obtained with the voice coil moving freely in the gap. Tighten rear suspension bolts a few turns at a time in rotation, being careful not to move or strain the rear suspension ring. The unit will then be in centre.

Replacing the H.F. Diaphragm Assembly

The replacement H.F. diaphragm assembly kit consists of:-

1 Diaphragm and voice coil assembled on metal centering ring and moulded acoustic throat.

THIS DIAPHRAGM IS FRAGILE AND MUST BE HANDLED WITH CARE.

1. Clear bench space, removing all small metal objects e.g. spare nuts, washers etc. and cover with clean sheet of paper to serve as working surface.

2. Place loudspeaker to be repaired face down on sheet of paper.

3. Remove soldered connections from H.F. diaphragm; note which colour wire goes to which tag.

4. Remove four securing screws and lift diaphragm clear of magnet assembly.

5. Inspect magnetic gap and remove any foreign matter with adhesive tape wrapped round thin card.

6. Carefully fit new diaphragm ensuring that metal mounting ring sits snugly in recess in magnet. Ensure connection tags line up with H.F. connecting wire.

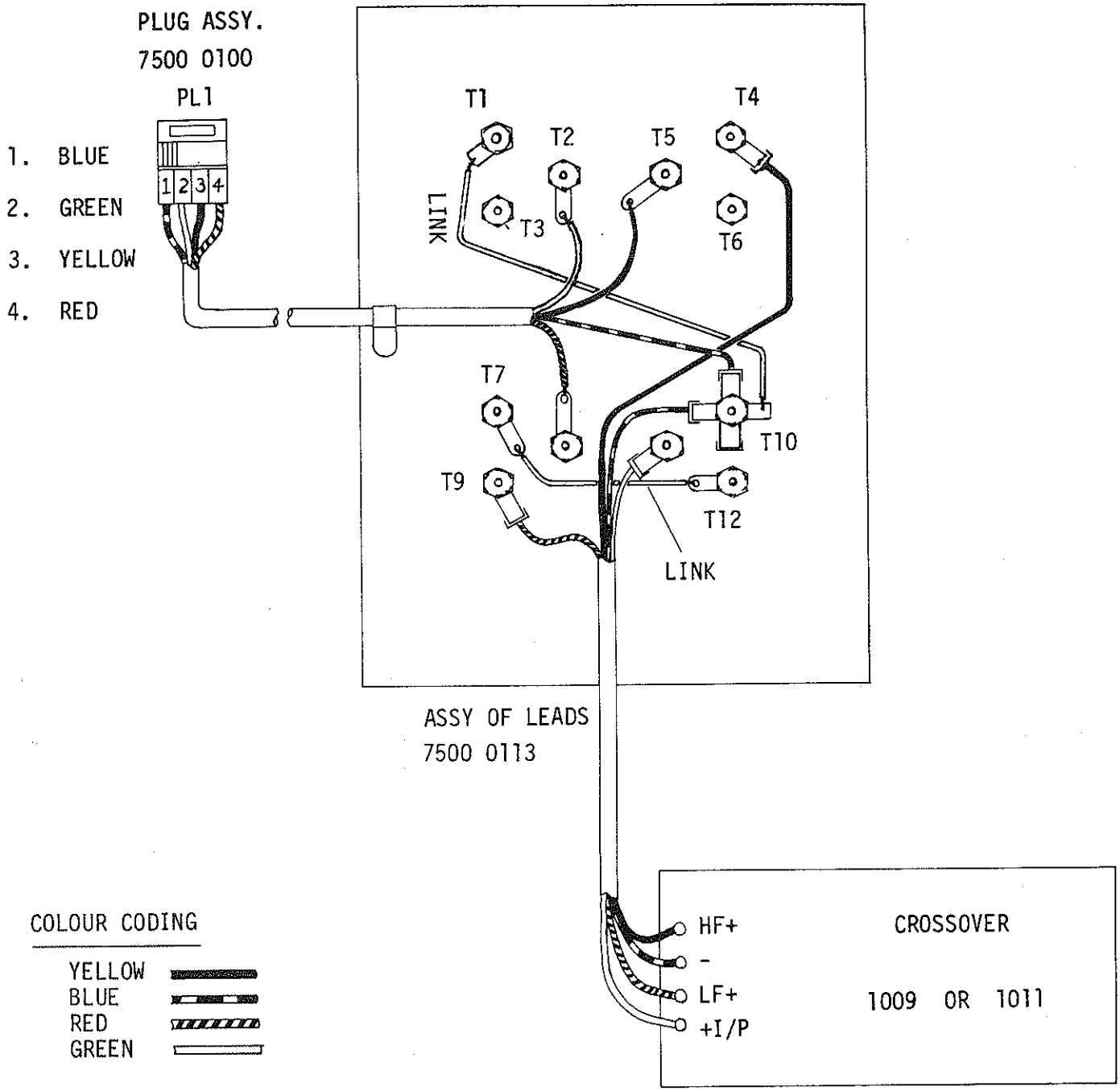
7. Reinsert fixing screws, tightening up each one in turn a little at a time to avoid putting unequal tension on diaphragm assembly. DO NOT OVER-TIGHTEN.

8. Resolder connections to diaphram as original, do not reverse them.

The loudspeaker is now ready for service.

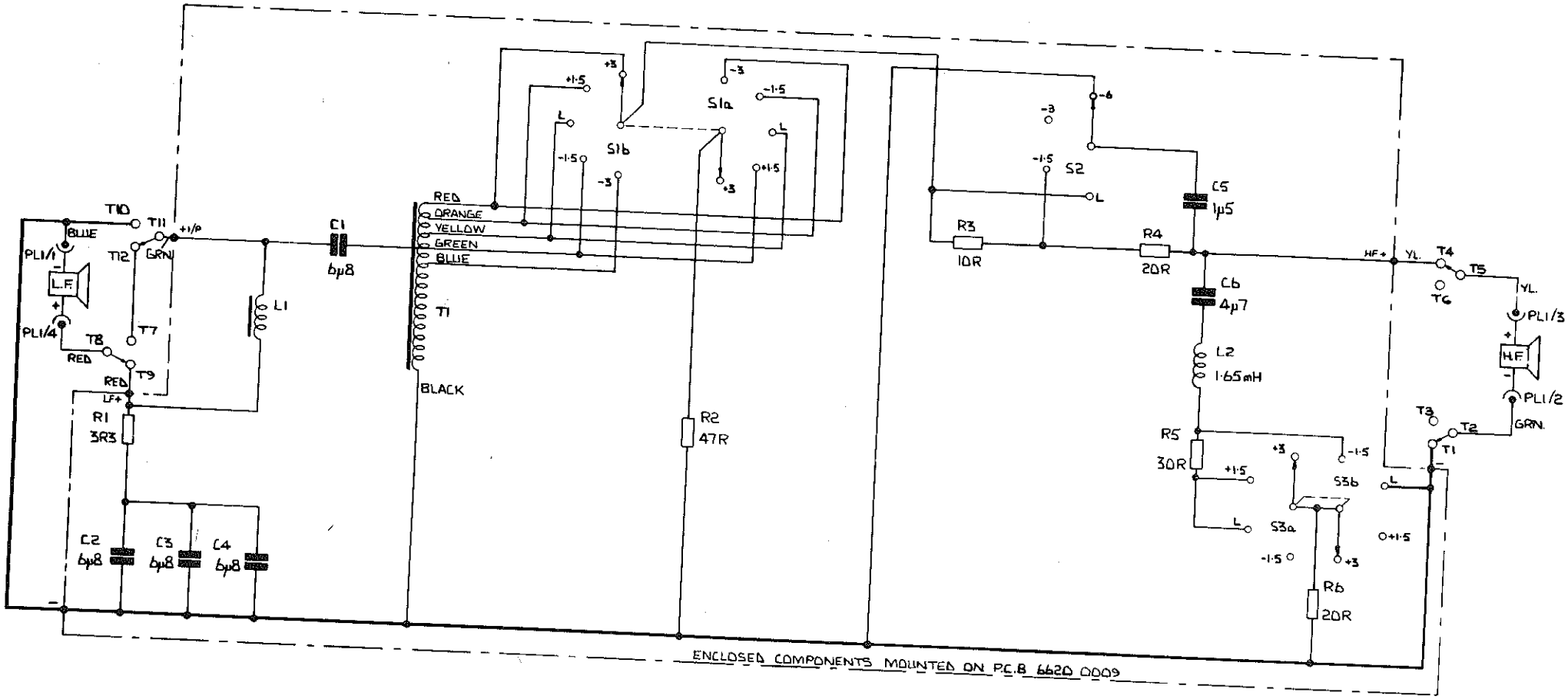
Replacing Crossover Components

Capacitors mounted against the printed circuit board are secured by an "Hot Melt" type of adhesive. To free a suspect capacitor, remove the solder from the leads and copper pad so that the component is free. Give the side of the component a sharp blow to break the adhesion and remove it. Clean off any remaining adhesive with a hot soldering iron and sharp flexible knife. Always secure replacements with a similar type adhesive or an Epoxy Resin.



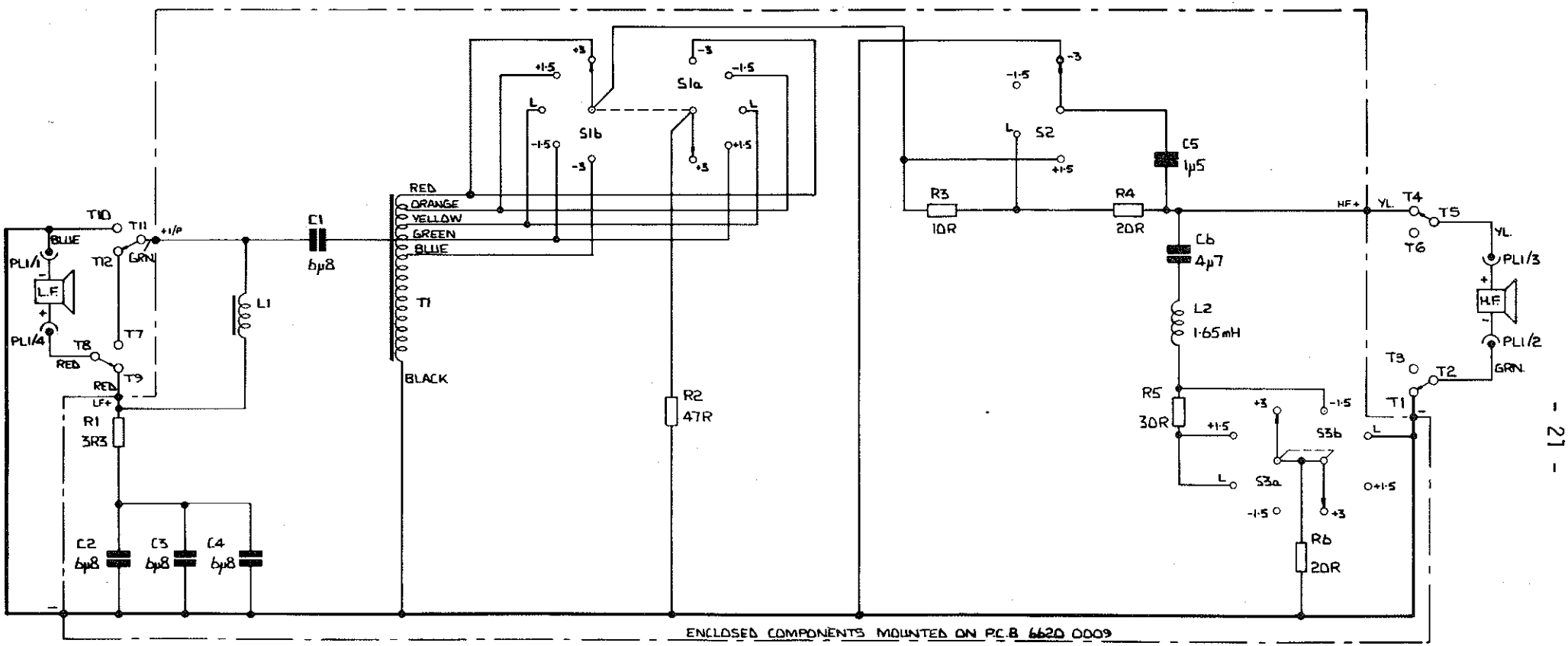
WIRING DIAGRAM: K3808 (CROSSOVER TYPE 1009)

K3838 (CROSSOVER TYPE 1011)



TERMINALS 'T' SHOWN CONNECTED IN INTERNAL MODE

CIRCUIT DIAGRAM FOR K3808 (SUPER RED MONITOR)



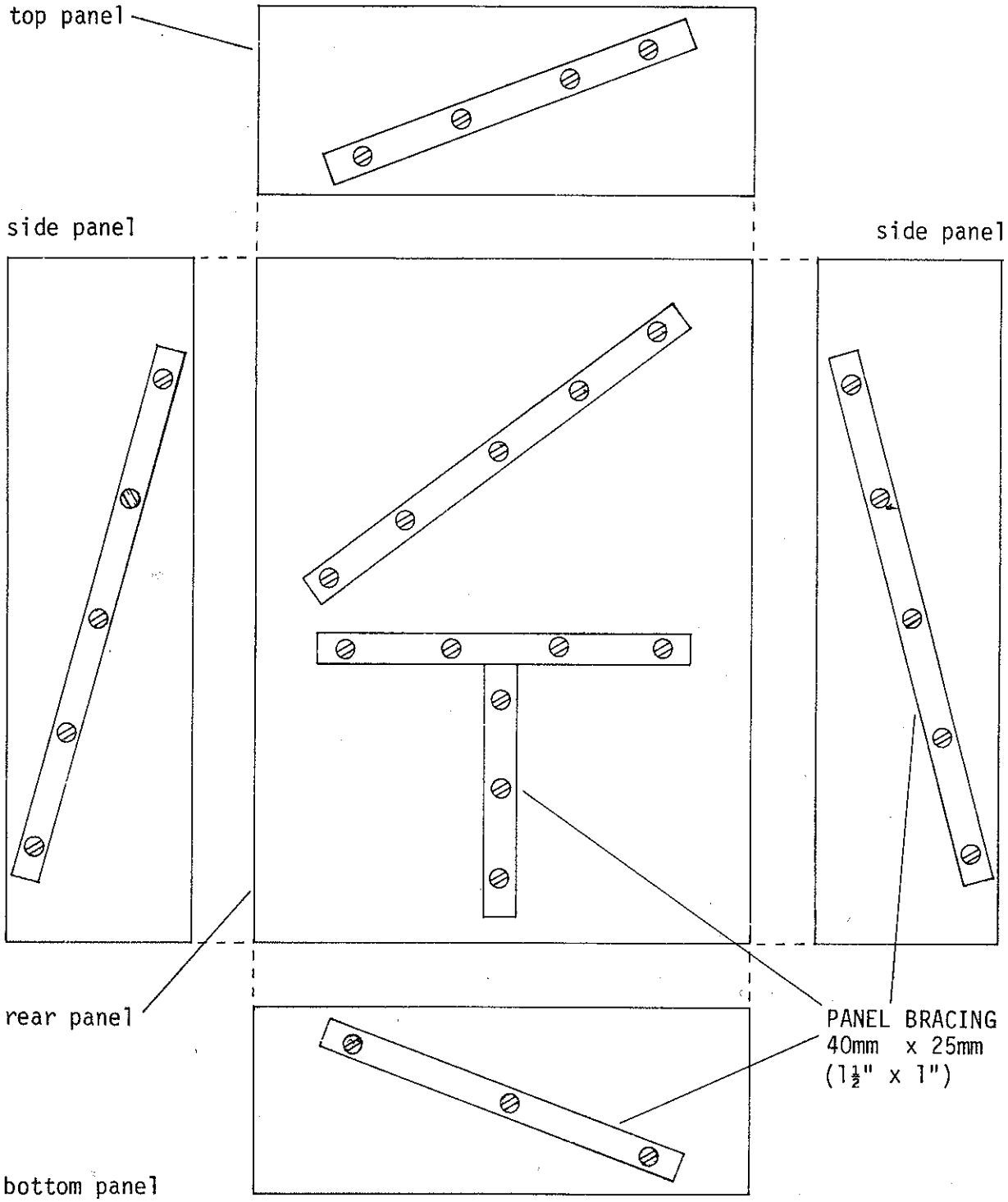
TERMINALS 'T' SHOWN CONNECTED IN INTERNAL MODE

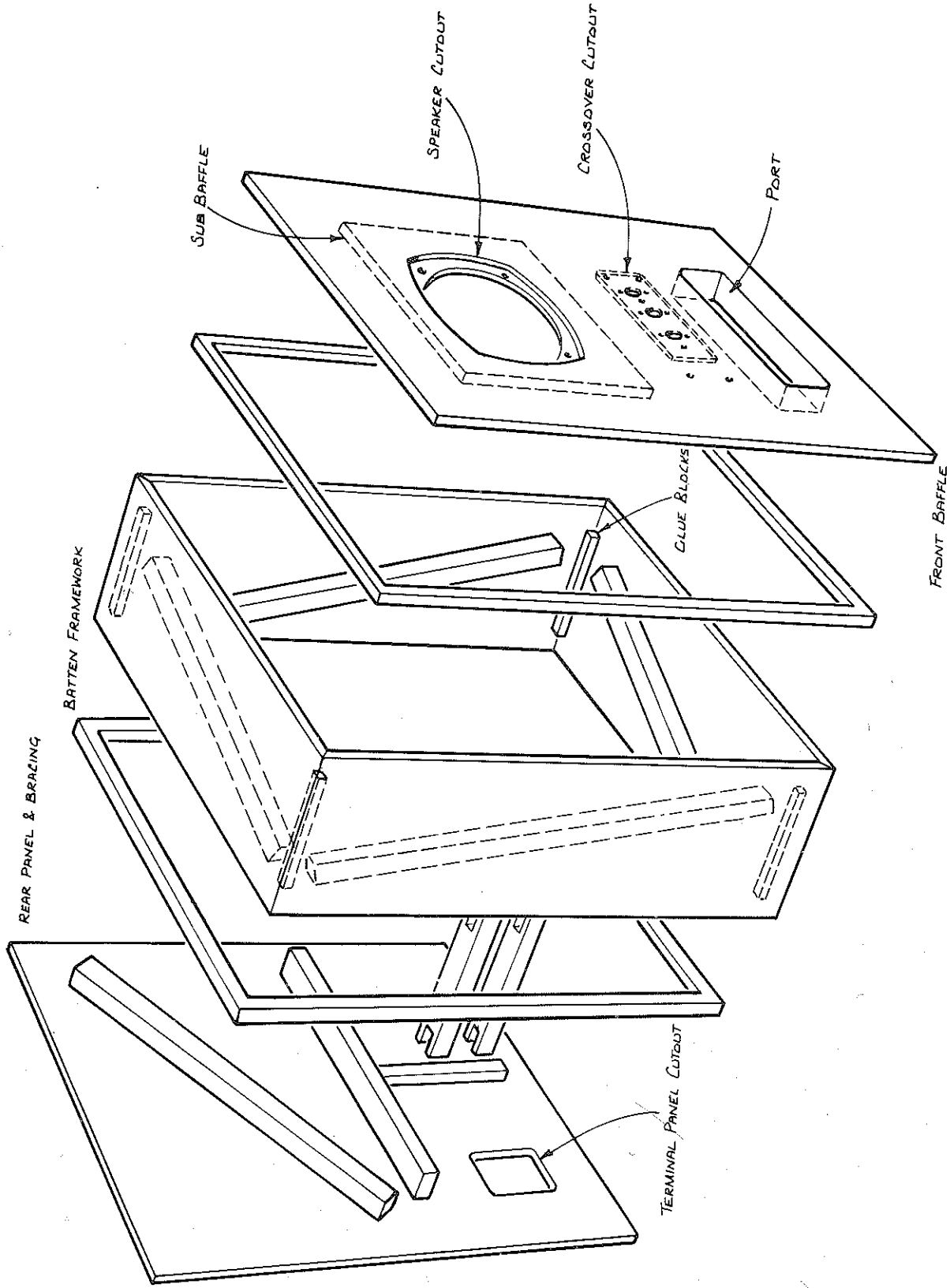
CIRCUIT DIAGRAM FOR K3838 (CLASSIC MONITOR)

CABINET STYLE:-	I	II	III	IV **
NET INTERNAL VOLUME* LITRES (CU FT)	95 (3.3)	175 (6.2)	200 (7.1)	230 (8.1)
RECOMMENDED INTERNAL * DIMENSIONS H x W x D mm(ins)	755 x 499 x 271 (29.7x19.6x10.7)	866 x 609 x 318 (34.1x24x12.5)	966 x 550 x 407 (38x21.7x16.0)	980 x 672 x 386 (38.6x26.4x15.2)
PANEL CONSTRUCTION	18mm CHIPBOARD	18mm or 25mm CHIPBOARD OR PLY	25mm CHIPBOARD OR PLY	25mm PLYWOOD
PANEL LAGGING THICKNESS:	50mm (2")	50mm (2")	80mm (2½")	100mm (4")
K3808 CABINET TUNING	38 Hz	38 Hz	35 Hz	35 Hz
K3838 CABINET TUNING	35 Hz	32.5 Hz	30 Hz	32 Hz
RECOMMENDED PORT AREA: SQ CMS (SQ.INS)	77 (11.9)	240 (37.2)	240 (37.2)	320 (49.6)
PORT LENGTH: mm (ins) K3808 K3838	91 (3.58) 121 (4.76)	148 (5.83) 254 (10.0)	157 (6.18) 264 (10.4)	183 (7.2) 250 (9.84)
SYSTEM BANDWIDTH: K3808 K3838	60Hz-20kHz+4dB 50Hz-20kHz±4dB	55Hz-20kHz+4dB 45Hz-20kHz±4dB	52Hz-20kHz+4dB 44Hz-20kHz±4dB	50Hz-20kHz+4dB 40Hz-20kHz±4dB

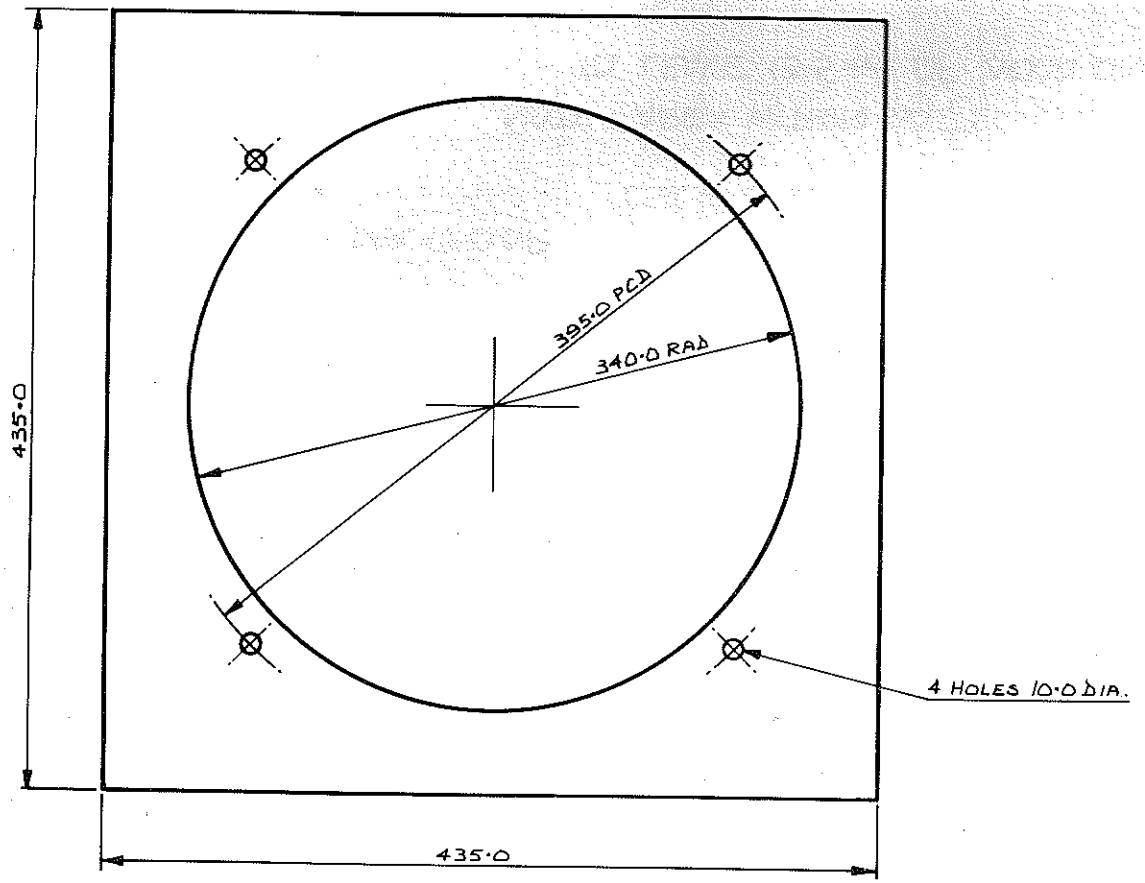
* VOLUME MAY BE VARIED BY ±10% OF THIS VALUE BY ADJUSTING INTERNAL DIMENSIONS.
** STYLE IV IS SIMILAR TO TANNOY CLASSIC AND SUPER RED ENCLOSURES.

RECOMMENDED CABINET CONSTRUCTION

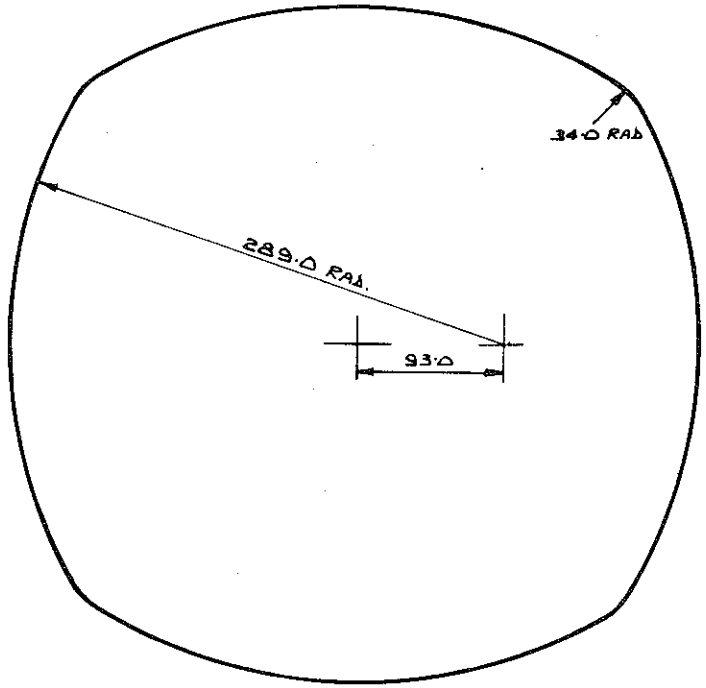



SUB BAFFLE
SPEAKER CUTOUT
CROSSOVER CUTOUT
PORT
FRONT BAFFLE
GLUE BLOCKS
BATTEN FRAMEWORK
REAR PANEL & BRACING
TERMINAL PANEL CUTOUT

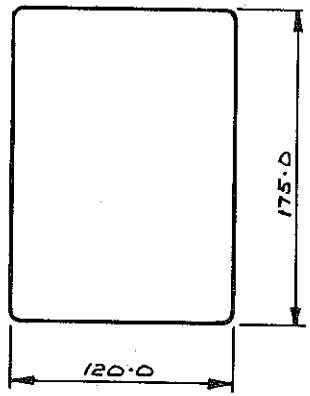
SUB BAFFLE DETAILS

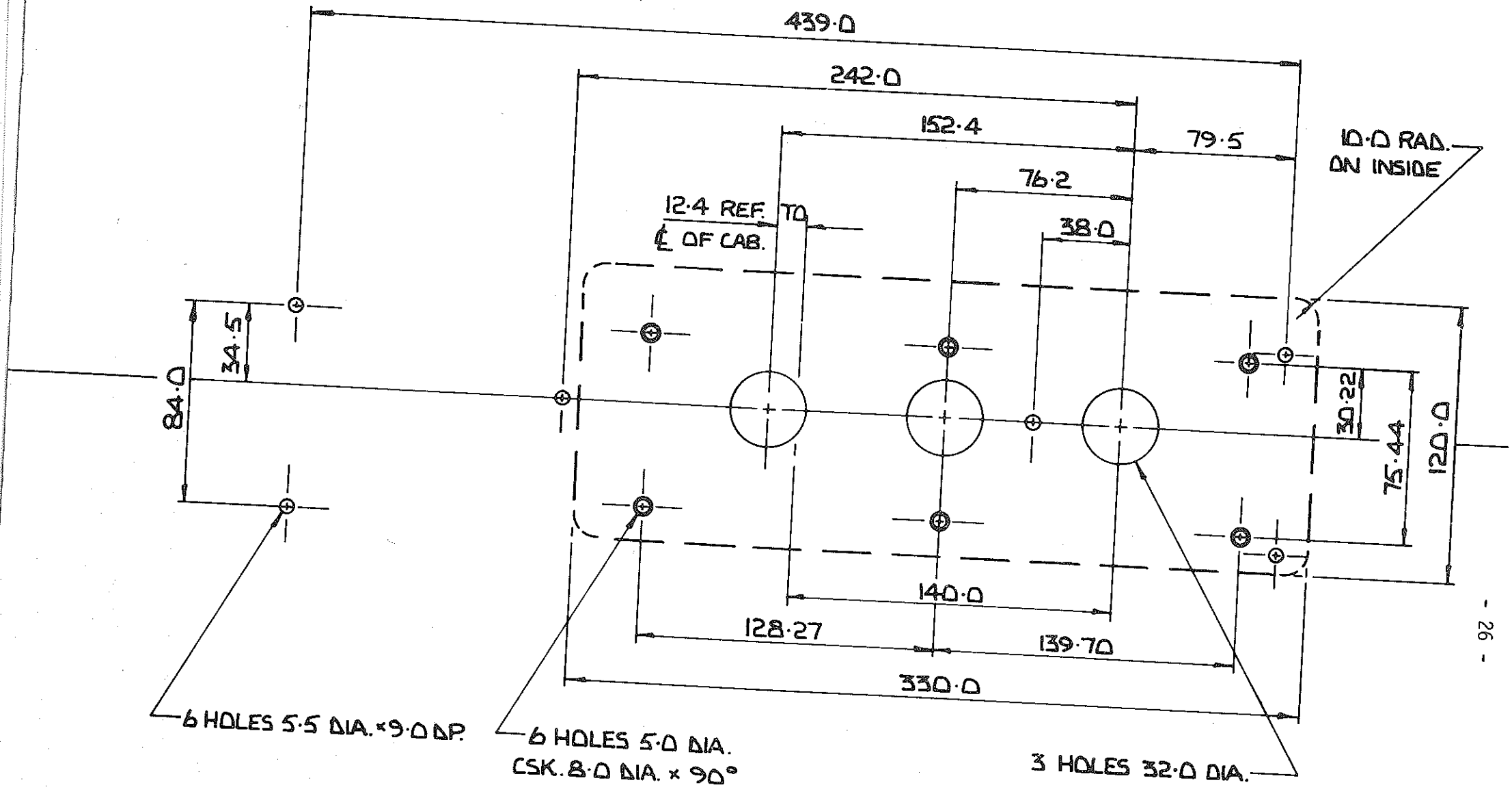


LOUDSPEAKER CUTOUT

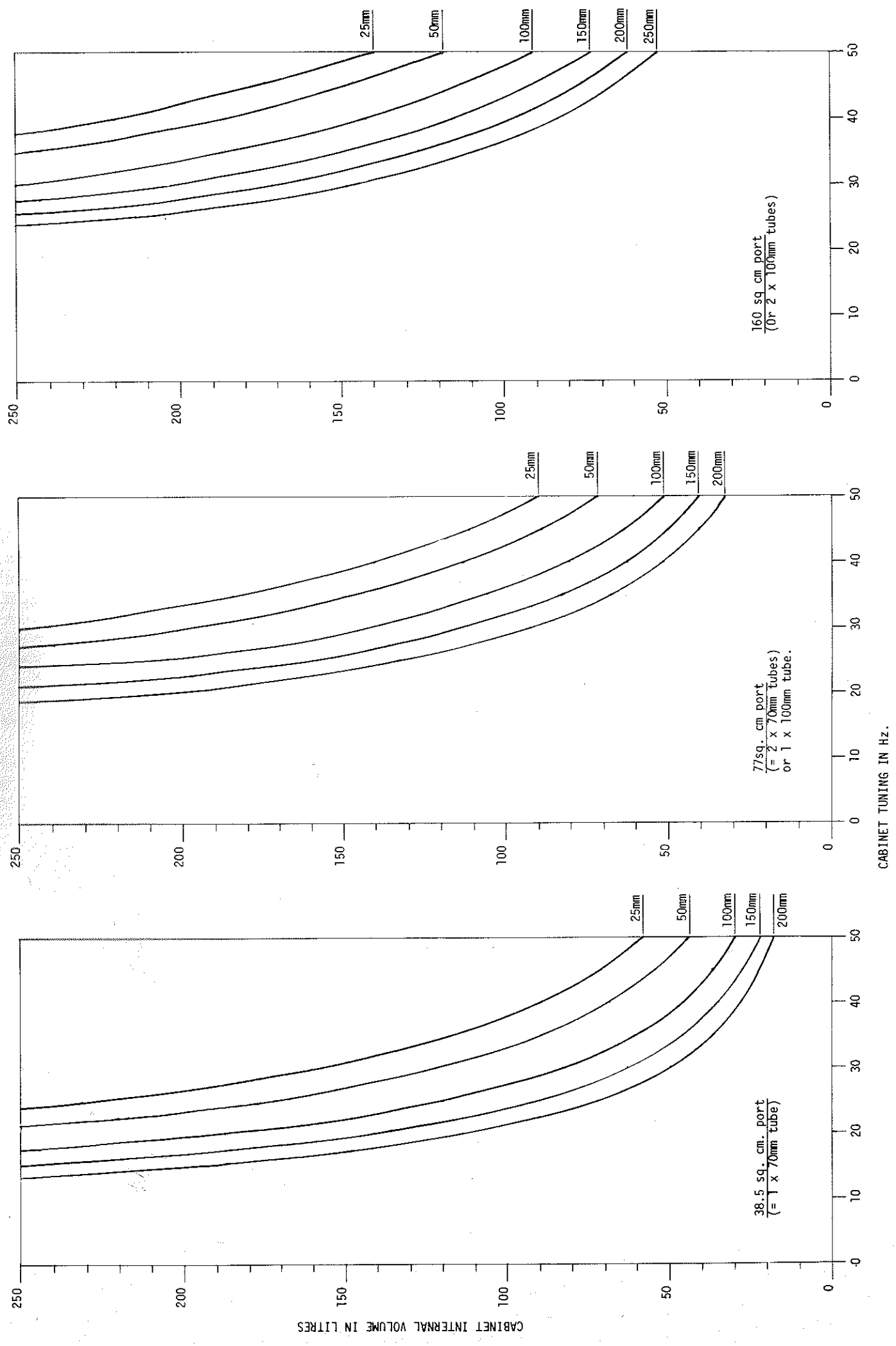


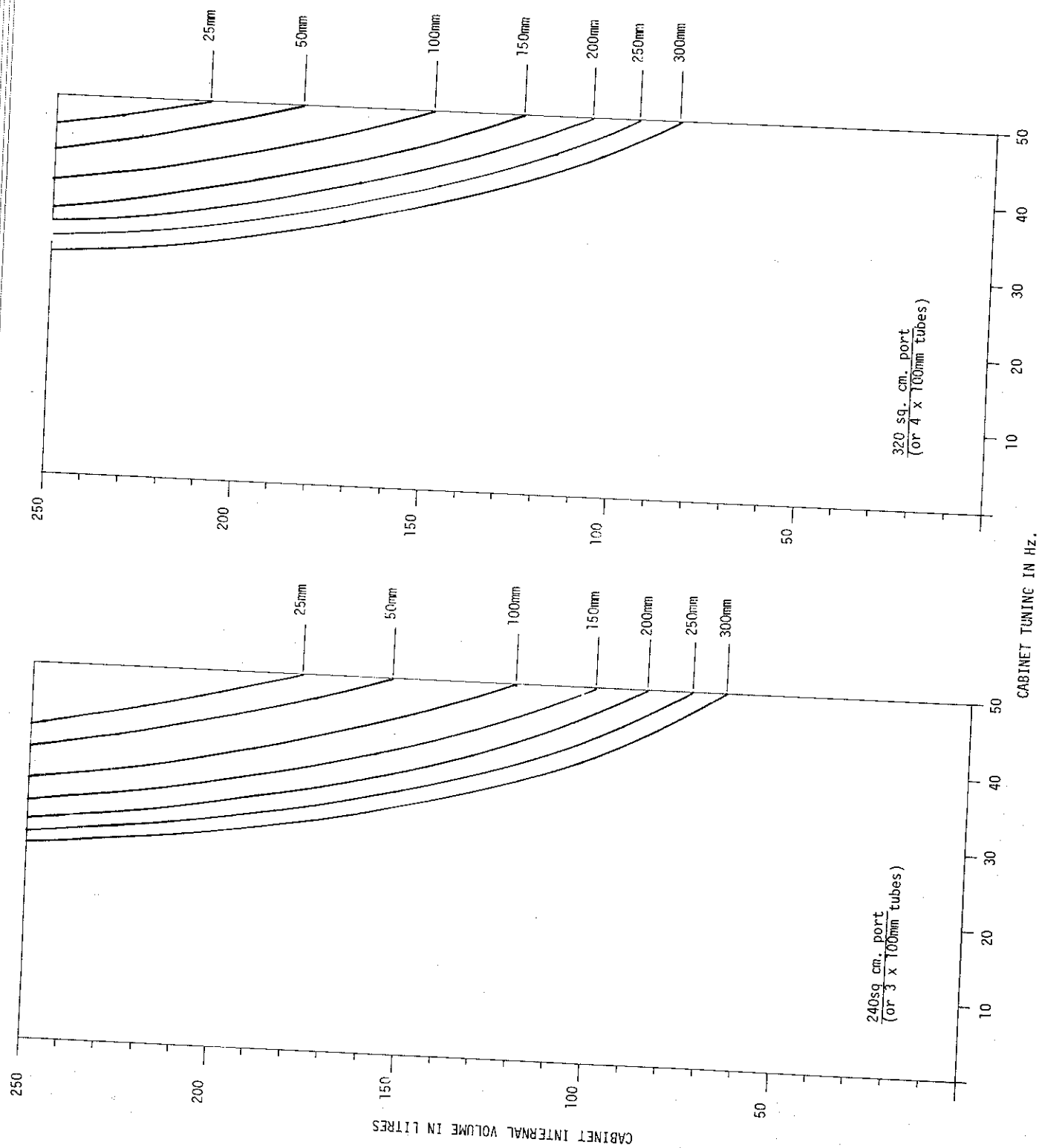
TERMINAL PANEL CUTOUT





NOTE : AREA WITHIN DOTTED LINE SHOULD BE ROUTED TO LEAVE 13·5mm OF WOOD ON FRONT OF BAFFLE.


25mm
50mm
100mm
150mm
200mm
250mm
160 sq cm port
(Or 2 x 100mm tubes)
77sq. cm port
(= 2 x 70mm tubes)
or 1 x 100mm tube.
38.5 sq. cm. port
(= 1 x 70mm tube)
CABINET INTERNAL VOLUME IN LITRES
CABINET TUNING IN Hz.
0
50
100
150
200
250
10
20
30
40


25mm
50mm
100mm
150mm
200mm
250mm
300mm
320 sq. cm. port
(or 4 x 100mm tubes)
240sq cm. port
(or 3 x 100mm tubes)
CABINET INTERNAL VOLUME IN LITRES
CABINET TUNING IN Hz.
250
200
150
100
50
10
20
30
40
50

This loudspeaker kit has been improved by the addition of our SyncSource® electrical network. This network introduces a frequency invariant time delay to the high frequency compression driver to align the acoustic centres of the two sections of the drive unit to a single point source on the axis, 20mm behind the high frequency unit.

Fitting the network is very simple as all components are mounted on a printed circuit board. A plug on a flying lead connects the network to the drive unit and a socket mounted on the printed circuit board accepts the existing lead and plug from the crossover.

When the SyncSource® network has been fitted, the loudspeaker system is also converted to "Positive Acoustic Polarity" convention. This means that when a positive-going signal is applied to the positive (red) input terminal the loudspeaker produces a positive acoustic compression wave to the monitoring area. Subjective tests show that if Positive Acoustic Polarity is maintained throughout the monitoring system from microphone to loudspeaker the quality of sound reproduced by the loudspeaker is improved.

The SyncSource® printed circuit board may be conveniently screwed into place on the loudspeaker back panel. The lead and plug from the terminal panel assembly connects directly into the socket on the printed circuit board and the lead and plug from the printed circuit board connects to the dual concentric drive unit.

Effects of SyncSource®

The point source monitoring qualities that your loudspeakers now possess will be evident in an increase in the amount of midrange detail that can be heard together with a smoothing of the treble response. The qualities of acoustic source alignment are best demonstrated on recorded material where the phase of the original sound field has been preserved i.e. crossed pair microphone positioning. An increased awareness will be evident in multimicrophone recording techniques of instrument positioning (and microphone phase irregularities). The loudspeakers will now provide extremely accurate information about the detail of a recording process and therefore provide a true monitoring tool in the production of recorded material.

Service/Testing of the Loudspeaker

During the service or testing of a loudspeaker it is often necessary to measure the voltage feed from the crossover network to the individual sections of the drive unit. When testing a loudspeaker with the SyncSource® network installed it is essential that any instrumentation has fully floating input circuitry. If either terminal of the test equipment is earthed the results will be erroneous and invalid. Damage may result to the SyncSource® network components under these conditions which is outside any warranty provisions. If tests show that a component in the SyncSource® network might be faulty, it is essential that the complete printed circuit board is returned to the factory or a service replacement fitted. Close tolerancing and matching of components is required to maintain the constant time delay performance with a calibrated amplitude response.