AO4, AO5, AO6, AO7, AO8 CHASSIS MANUAL

TECHNICAL SERVICE DATA

THIS CHASSIS MANUAL APPLIES TO MODELS

SR-2100, SR-2080, SR-2060, SA-2100, SA-2060

54-7206-01 Issue 1

THIS INFORMATION IS UP TO DATE AS OF MAY 1975

ELECTROHOME LIMITED - KITCHENER - ONTARIO - CANADA

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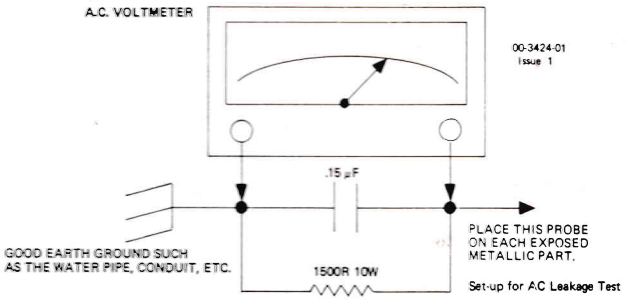
PRODUCT SAFETY SERVICING GUIDELINES

CAUTION
No modification of any circuit should be attempted. Service work should be performed only after you are thoroughly familiar with all of the following safety checks and servicing guidelines. To do otherwise increases the risk of potential hazards and injury to the user.

SAFETY CHECKS
Subject: Fire and Shock Hazard

1. When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the power supply circuitry area. Where a short circuit has occurred replace those components lead dress in the power supply circuitry area. Where a short circuit has occurred replace those components
2. After re-assembly of the set, always perform an A.C. leakage test on the exposed metallic parts of the cabinet such as the function selector knob, antenna terminals, etc. to be sure the set is safe to operate without such as the function selector knob, antenna terminals, etc. to be sure the set is safe to operate without voltmeter having 1000 ohms per volt or more sensitivity in the following manner: Connect a 1500 ohm 10 watt resistor, paralleled by a .15 mfd, AC-type capacitor between a known good earth ground (water pipe, conduit etc.) and the exposed metallic parts, one at a time. Measure the A.C. voltage across the combination 1500 ohm resistor and .15 uf capacitor. Reverse the AC plug on the set and repeat AC voltage measurements for each exposed metallic part. Voltage measured must not exceed .3 volts RMS. This corresponds to 0.5 milliamp AC.
   Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.
3. Check for frayed insulation on wires including the AC cord.
4. Check across-the-line components for damage and replace if necessary.



Set-up for AC Leakage Test

FORWARD

This manual, containing technical information for the two channel chassis type AO4, AO5, AO6, AO7 and AO8 is intended for use by a knowledgeable and experienced person who clearly understands the normal operation of these units.

The five chassis types are:

AO4 – Two Channel Receiver
AO5 – Two Channel Receiver
AO6 – Two Channel Receiver
AO7 – Control Amplifier
AO8 – Control Amplifier

The A05, A06 Receivers are lower power versions of the A04 receiver, with VU meters deleted.

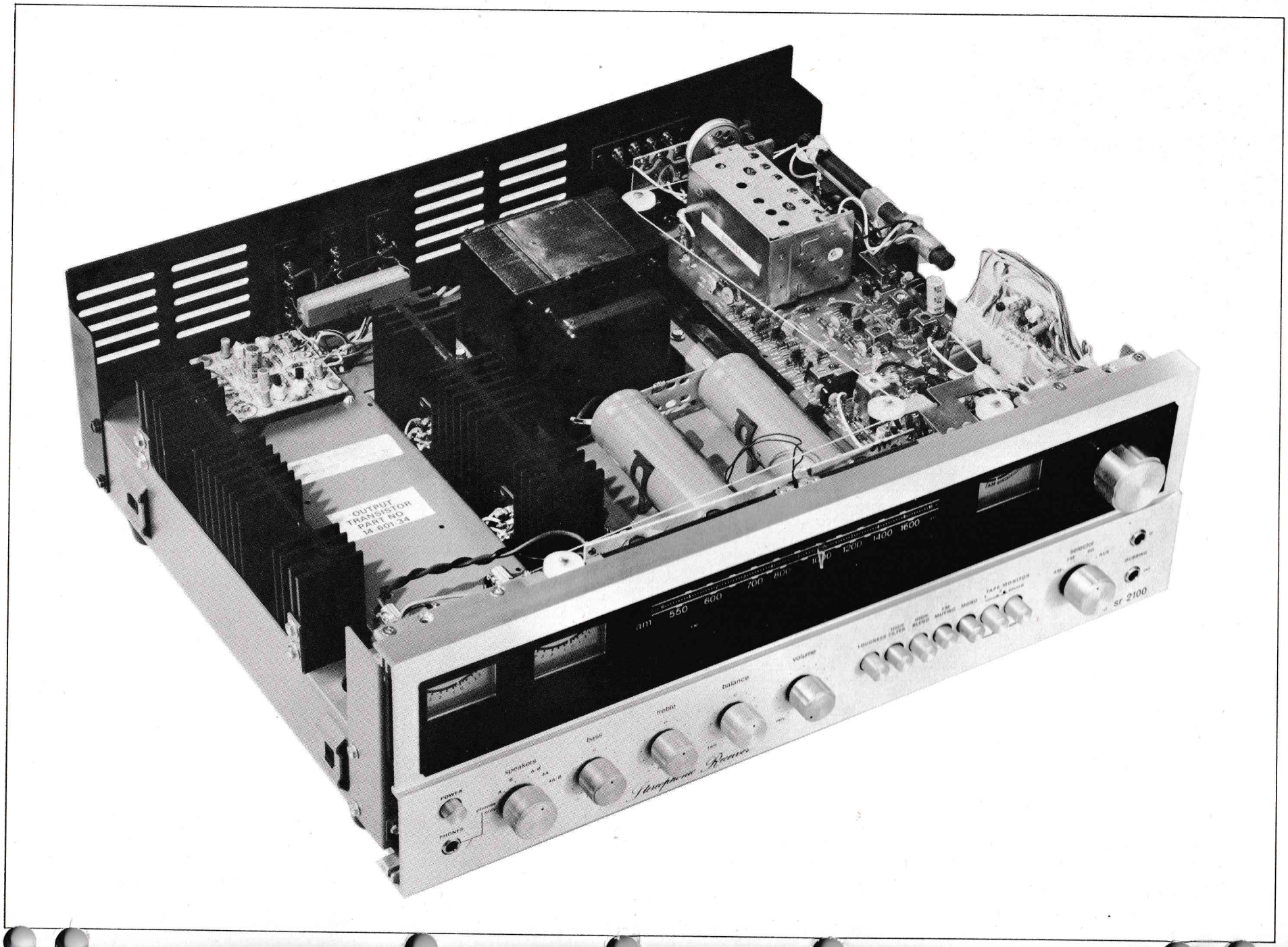
The A07 control amplifier, is a lower power version of the AO8; unlike the A08, A07 has no VU meters of function lightning.

With the similarities of the basic chassis all five units can be effectively covered by this single manual. Take care to clearly note various diversions from the basic A04 chassis at appropriate points in the text.

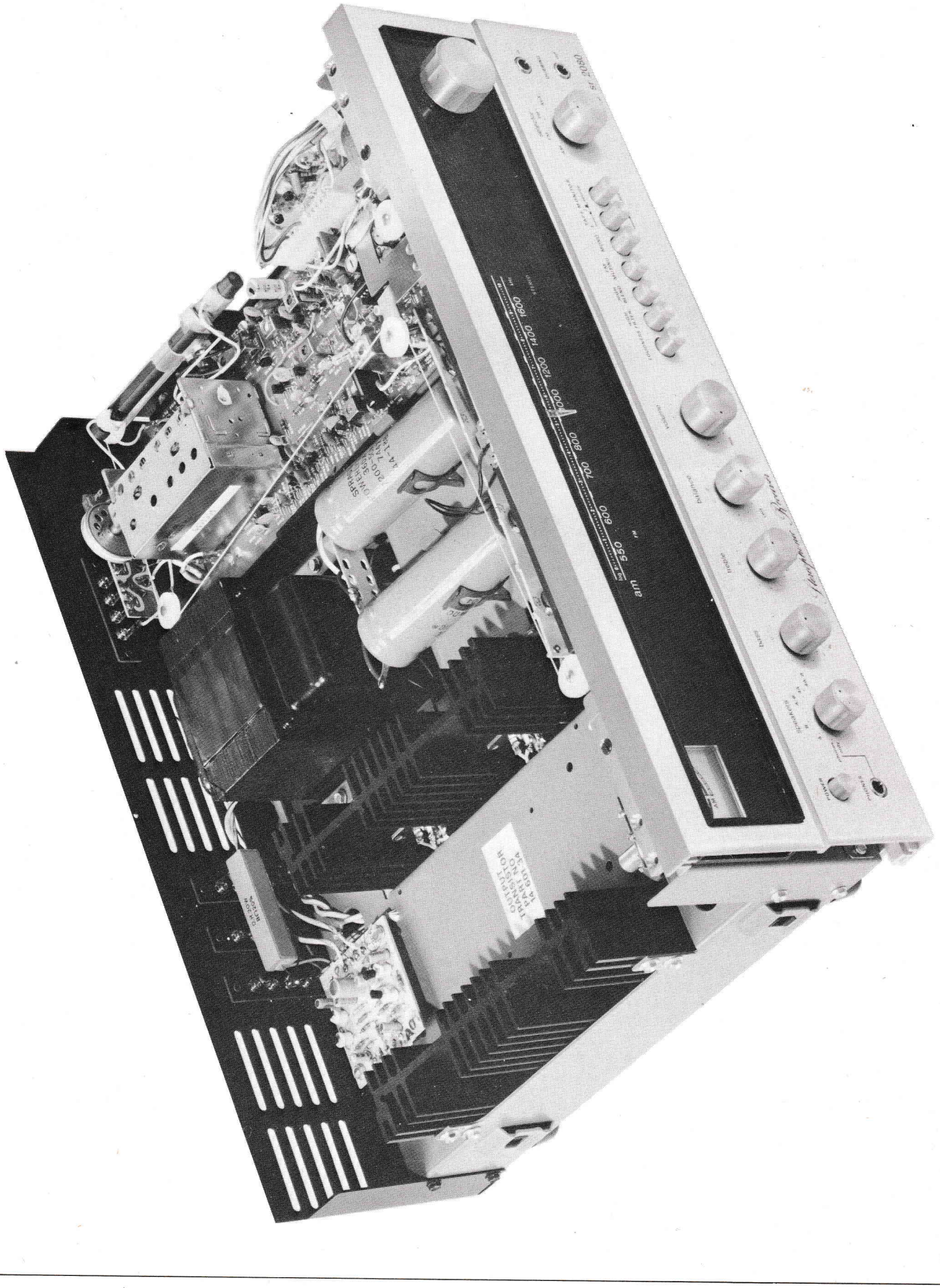
As can be seen from the table of contents the following discussion is broken down into four sections.

1. Front and rear panel feature items.
2. A detailed discussion of the individual block components.
3. Appendix
   (i) List of PCBDs used.
   (ii) Transistor ID chart.
   (iii) Replacements parts.
   (iv) PCBD artwork.
   (v) Chassis Layout Diagrams - top and bottom.
   (vi) Additional test information.

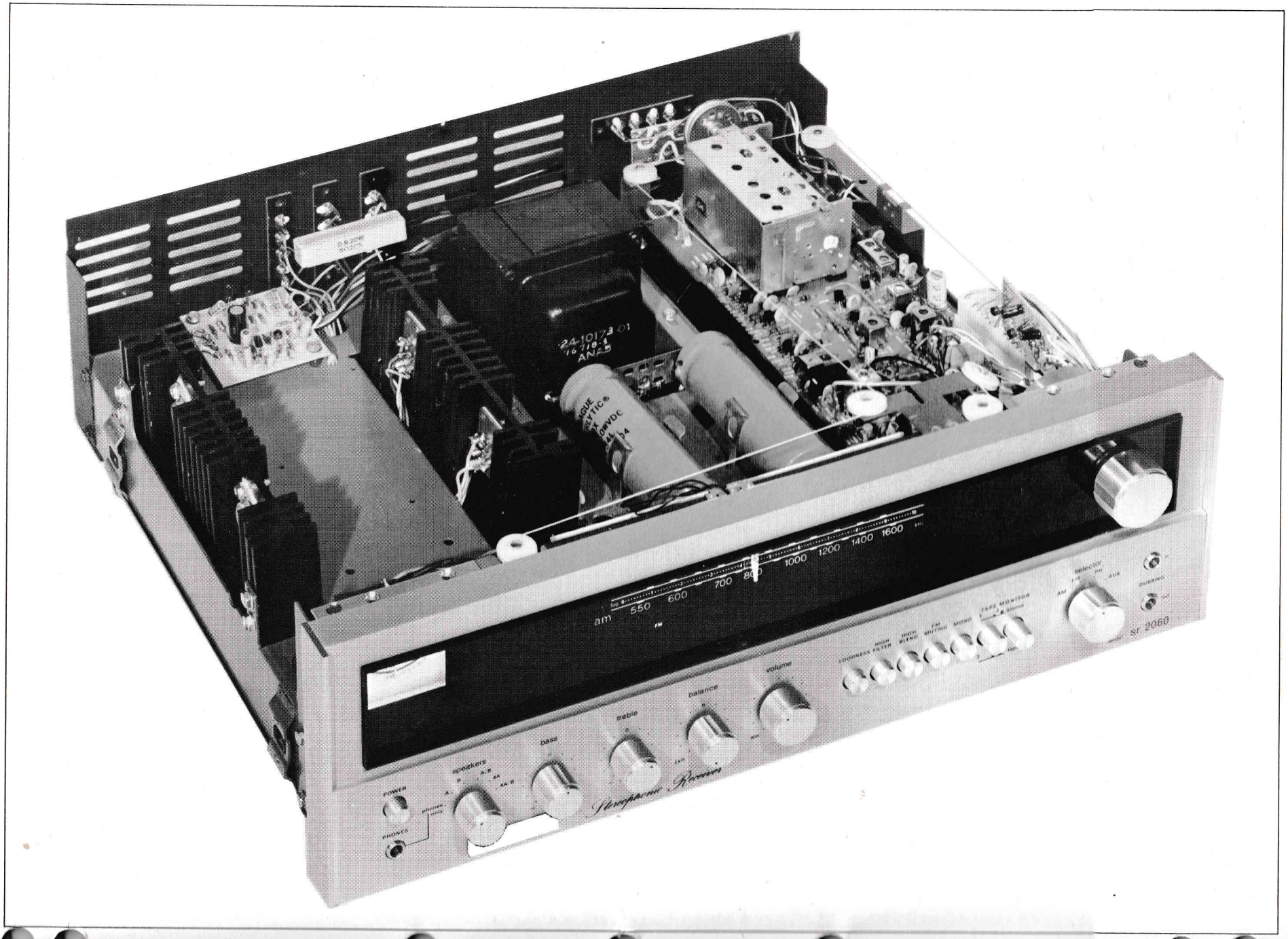
A04 FRONT PANEL



A05 FRONT PANEL

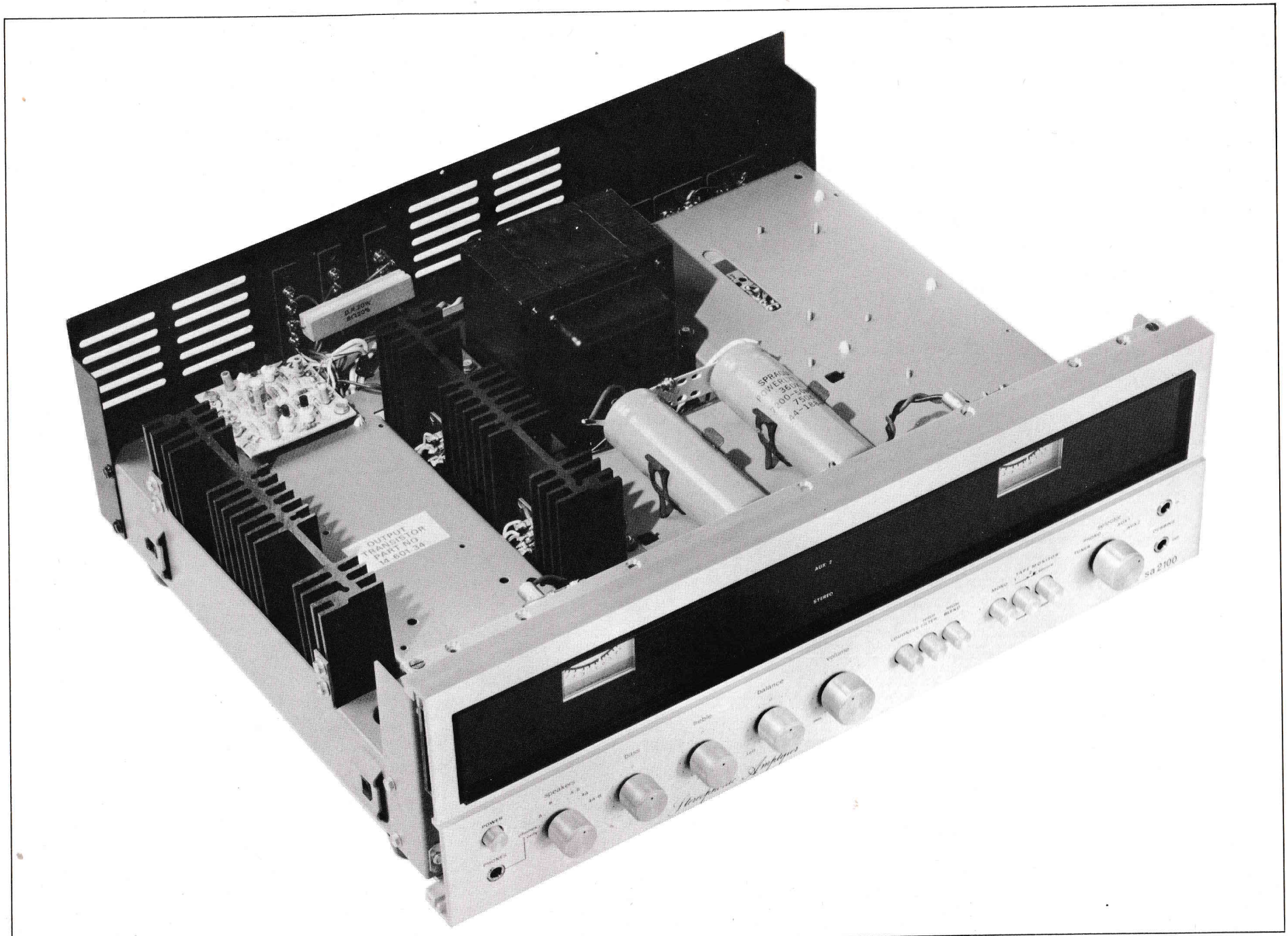


A06 FRONT PANEL



A07 FRONT PANEL

A08 FRONT PANEL



FRONT PANEL FEATURES

HEADPHONE JACKS
The headphone jack is provided on the front panel for easy accessibility.

SPEAKER SWITCH
The speaker selection switch provides the following functions:
- Main (A)
- Remote (B)
- Main and Remote (AB)
- Main and Rear (4A)
- Main, Rear and Remote (4 A/B)

the "4" refers to the synthesized rear channel outputs.

SEPARATION SWITCHING
Mono Push button
This control in the "IN" position ties the two audio input signal lines together providing the same output for both channels. In the "OUT" position the unit is in a stereo or full separation mode.

Hi-Blend (Push Button)
If the mono switch is "OUT" and the Hi-blend button is "IN" the unit will have high frequency blend between the right and left channels.

FILTER SWITCHING
High Filter Push Button
This control, if activated, will partially eliminate high frequency noise, hiss and scratching by rolling off the high frequency spectrum.

TAPE/MONITOR PUSH BUTTONS
These two switches control dubbing direction and provide tape monitor facility.

LOUDNESS PUSH BUTTON
This push button at the "IN" position provides compensation for non-linearities in the human ear in the form of "volume-dependent" bass boosting.

BALANCE CONTROL
A standard shunt type balance control is provided to control left to right channel level.

VOLUME CONTROL
A two gang, closely matched volume control with smooth feel is provided for level control.

BASS AND TREBLE CONTROLS
The detented bass and treble controls provide approximately ± 10dB control at 100 Hz and 10KHz. They form part of a negative feedback. low distortion tone circuitry.

FM MUTE PUSH BUTTON (A04, A05 & A06 ONLY)
This push button, when activated, provides a factory set – FM input signal threshold which provides muting of inter station noise and weak stations below the threshold level. This level can be adjusted by VR102 on the tuner board assembly.

TUNER METER
A signal strength/centre tune meter is provided on the A04, A05 and A06 only.

VU METERS (A04 and A08 only)
Two VU meters are provided on the AO4 and AO8 models in the dial area. These meters indicate relative signal level of the two slave amplifiers.

The O VU point is set at the rated power output level and level indications above this point - into the red - are in danger of distortion.

SELECTOR SWITCH
This four position switch provides sourcing of the on board facilities and the input jacks at the rear.

REAR PANEL FEATURES

Next, the rear panel features of the AO4, AO5, AO6, AO7 and AO8 will be discussed. Most jacks are labelled well enough to be self explanatory, but the following features will be expanded somewhat:–

QUADRICAST (AO4, AO5, AO6 only)
The jack provides an output from the FM detector which is unequalized and buffered. This output will be used to feed future four channel FM multiplex system adaptors.

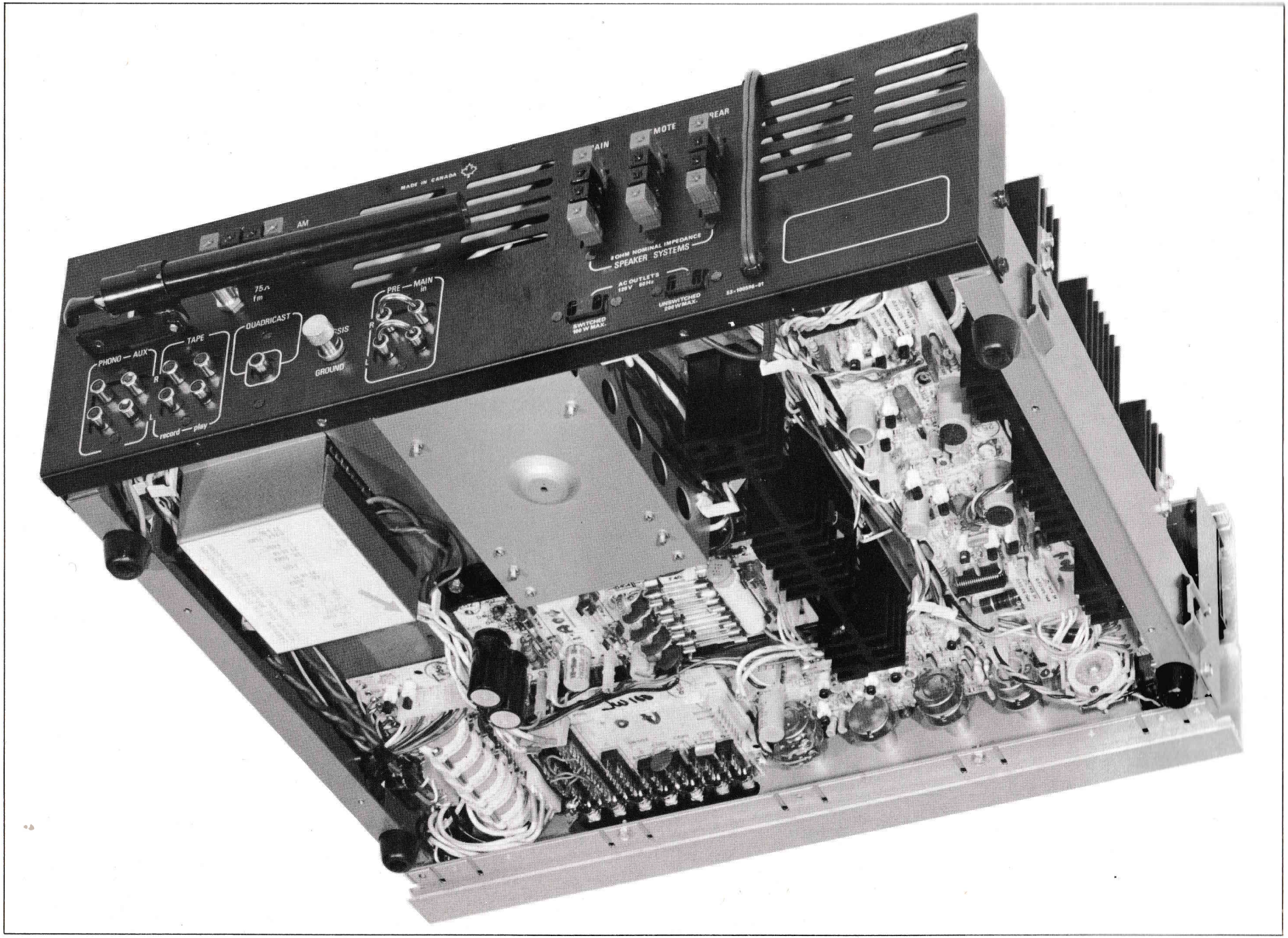
FM DE-EMPHASIS (AO4, AO5, AO6 only)
This switch allows the internally set de-emphasis to be changed from 75μs to 25μs for proper decoding of dolbyized FM broadcast with the aid of the a Dolby adaptor.

EXTERNAL ANTENNA CONNECTIONS
Along with the provision for the standard 300Ω twin lead antenna, 75Ω "F" connector is provided for cable hook-up. It must be kept in mind that to avoid mismatching these inputs, only one of the two should be hooked up at any one time.

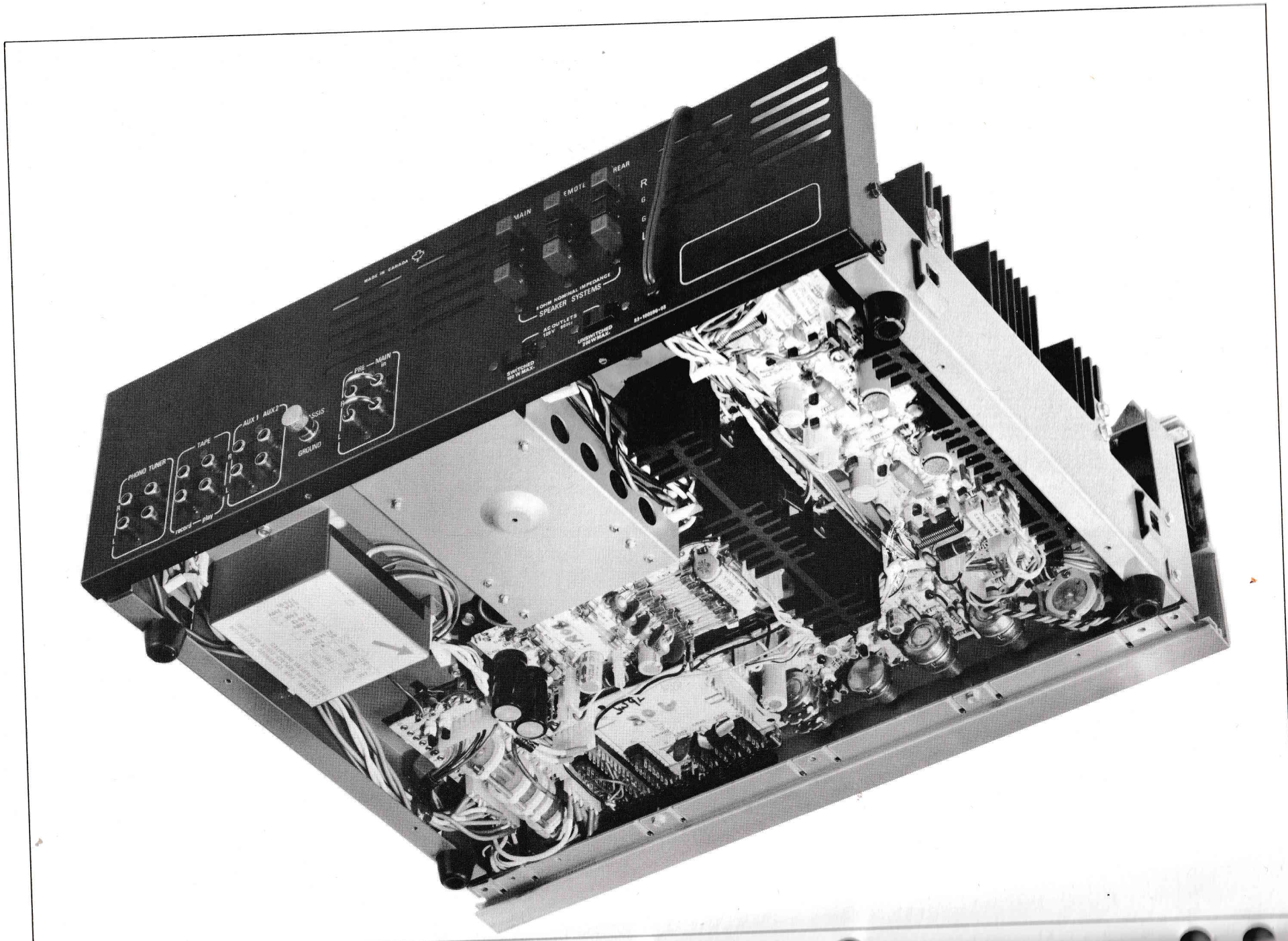
MAIN IN/PRE-OUT JACKS
These jacks provide a great deal of versatility because by removal of the "U" nails access to the slave inputs and the preamp output is provided. This facility provides possible source manipulation by bi-amping, equalizing, etc.

A04, A05 REAR PANEL

A06 REAR PANEL



A07, A08 REAR PANEL



DETAILED DISCUSSION

The system blocks, reviewed previously, are now discussed in detail. Printed circuit board artwork is provided to allow rapid pin-pointing of componentry.

The circuits discussed are:—

1) Power Supply
2) Tuner
3) F.M. Pre-amplifier
4) Magnetic Pre-amplifier
5) Tone control circuitry/VU meters.
6) Gain block circuit
7) Slave Amplifier

POWER SUPPLY

The power supply is similar for all two channel products with the exception of fusing and larger power rectifiers on A04, A05 and A08.

The supply is broken down into three separate areas:

1. The lamp supply
2. The main supply for the slave amplifiers.
3. The secondary supply for pre-amplifiers and the tuner.

These supplies are ground referenced to each other at certain points and it is important that these grounds not be altered. Improper grounding could result in oscillation, instability and/or degradation of hum and noise specification.

Note: Most of the parts on the power supply PCB are critical safety components and must be serviced with the correct safety parts.

THE TUNER

The tuner used in the A04, A05 & A06 is an AM, FM, FM multiplex unit. The "IF" stages of both AM and FM haver ceramic filters eliminating most of the required adjustments.

The front end section is totally enclosed and incorporates FM - RF stages, and features 4 gang FM and 2 gang AM tuning.

This tuner also facilitates FM de-emphasis switching circuitry (75μs - 25μs) for Dolby FM reception, FM centre tuning and field strength meter circuits, AM field strength circuits, and access to a buffered signal from the detector for future FM four channel decoding systems.

The following adjustments are made at 75 KHz deviation, in mono, and with an "RF" input to the receiver antenna of 1mV - unless otherwise specified. See appendix (vi) for the required test set-ups.

FM SECTIONS

Calibration (Set-Up No. 3)

With the gang fully closed adjust the pointer to exactly "log O".

Tune both the receiver and the generator to exactly 90 MHz and adjust LR3 (LO) so as to centre the tuning meter.

Similarly tune exactly to 106 MHz and adjust TC4. (TCO) so as to centre the tuning meter.

Repeat the above until pointer-width accuracy is achieved.

RF Alignment (Set-Up No. 1 or No. 3)

With the receiver and generator tuned to an interference-free spot on the low end of the band as above, adjust LA, LR1, LR2, and T1 (IF) for maximum and most symmetric output with the minimum input generator level.

Similarly, while tuned to the high end of the band, adjust TC1, (TCA), TC2 (TCR), and TC3 (TCR) for maximum and most symmetrical output with the minimum input generator level.

Repeat as required.

IF and Detector Alignment (Set-Up No. 2 or No. 3)

Although Set-Up No. 3 can be used for this adjustment; for the most accurate evaluation Set-Up No. 2 should be used.

With Set-Up No. 2 the ideal receiver will display a rectangular centre portion on maximum sweep width with the band ends indicated by the sweep going to zero. The discriminator (T102) primary and secondary (top and bottom slugs) should be adjusted to approach ideal as close as possible - at least for a **bandwidth portion** 250 KHz wide. The more symmetrical the resultant pattern the easier the receiver will be to tune, therefore also adjust T101 and FT1 for maximum symmetry of the output with the lowest useable input signal.

For final adjustments, reduce the sweep width to 250 KHz and optimize T120 primary (bottom) for the greatest linearity. (Check the flatness at various "RF" input levels and make the best compromise).

Finally reduce the deviation, of the generator, to zero so as to remain tuned to the centre of the "IF" pass band. Now adjust the top slug of T102 for correct centering of the tuning meter and T103 for maximum field strength meter indication.

Multiplex (Set-up No. 3)

Set the generator to stereo and adjust the pilot level as indicated in the alignment chart. While observing test point 11 adjust L101 for maximum output. Next observe test point 10 and adjust L102 for maximum (the level here will be approximately 30 dB higher than test point 11). Finally observe test point 12 and maximize the signal using L103.

The above should set the multiplex for best separation and distortion (a compromise is possible if one desires to sacrifice one for the other).

While observing the output, VR101 can be adjusted to further maximize the left/right separation.

Miscellaneous

Stereo trigger level is set by VR103 and is factory adjusted for 20μV input. Muting level is set by VR102 and is factory adjusted for 10μV. If adjustment is required by the customer, this control has a range of 7μV to 25μV.

AM SECTION

Calibration

Using a similar set-up to that of Set-Up No. 3, but with an "AM" generator output applied to the receiver antenna via hazeltine loop radiation; adjust the oscillator coil L105 (low end - 550 KHz) and trimmer TC6 (high end - 1600 KHz) as done for the FM section.

RF Alignment

Again similar to FM, the AM-RF section can be aligned for maximum output by adjusting L104 at the band's low end and TC5 at the high end.

IF Alignment

Coils T105, T106, and T107 can be adjusted for maximum and most symmetrical output while feeding these stages with an "AM – "IF" sweep signal from a generator as in the FM Set-Up No. 1.

FM Pre-Amplifier

This board is coupled to the main tuner P.C.B. Its' function is to boost the level of the F.M. signal by approximately 6 dB before the audio reaches the function switch.

Magnetic Pre-Amplifier

Located under a shield this board contains a two stage, direct-coupled amplifier with negative feedback, providing low distortion and RIAA equalization. This stage has an overall gain

of approximately 40 dB giving a system sensitivity of 2mV nominal.

Tone Control Circuitry

The tone circuitry is a Baxandall negative feedback amplifier which provides low distortion and facilitates linear controls for bass and treble. Q503 and Q603 are buffer stages that offer a high impedance input to the rear panel and a low Z output to source the Baxandall bridge.

This board also carries the circuitry for the VU meters (A04, A08 only).

The Gain Board

This circuit provides the necessary boosting of the processed signal from the tone control board to produce approximately 1 volt at the "U" nails for the slaves to be driven to full power with the proper source input signal level.

This circuit is also a feedback type circuit providing low impedance output to the "U" nails for various external processing and a high input impedance to the tone control circuitry.

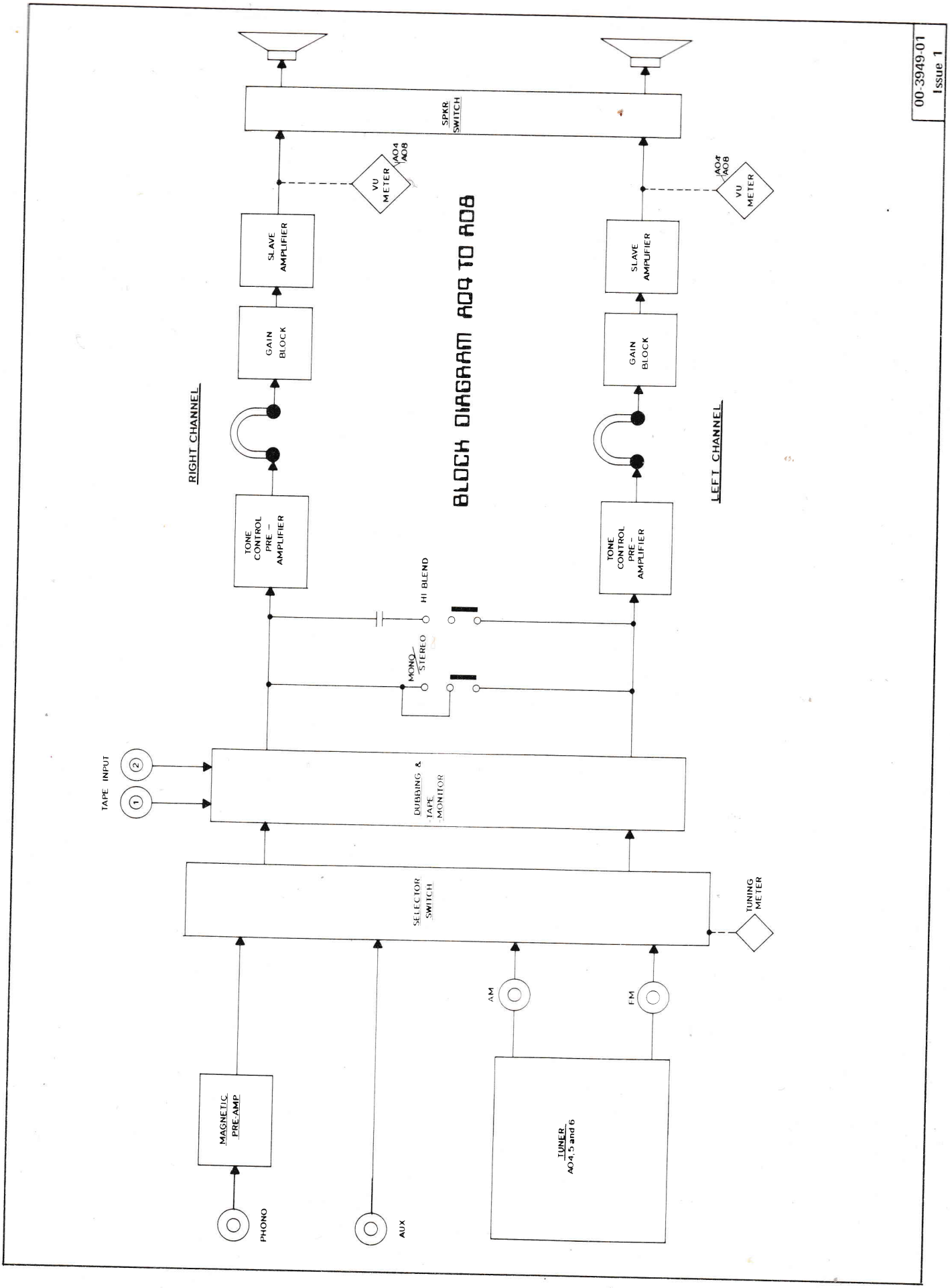
AUDIO SLAVE AMPLIFIERS

The only setting required on these direct coupled audio power amplifiers is that for bias (25mV across R694 and R594) and mid point adjustment for minimum D.C. off-set (OV±10MV) at the output (adjust R670 and R570).

These amplifiers are in the standard class "B" configuration with the following features: (One channel only described).

1. Power limiting formed by Q675, A677, A674 and a divider sense circuit. This circuit senses the voltages across R693 and R694 which represents the current flowing through Q680 and Q681 and the voltage across Q680 and Q681 with reference to ground. This data is processed by Q676, A677 and A674 and if the "SOA" limits of the devices are exceeded the drivers are limited preventing damage to the output stages.
2. The front end of this amplifier comprises of a long tail pair Q671 and Q672 which provide common mode rejection to unwanted signals and input isolation from the feedback path of the output stages.
3. An adjustable bias circuit with gain is provided by Q675 which is strapped to the heat sink for optimum tracking.

BLOCK DIAGRAM



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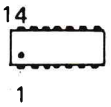
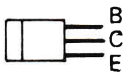
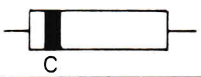
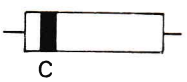
Issue 1

APPENDIX (i) PRINTED CIRCUIT BOARDS

DESCRIPTION	PC BOARD NO.	ASSEMBLY NO.	MODEL				
			A04	A05	A06	A07	A08
Tuner Board	10-94-01	02-120049-03	X	X	X		
F.M. Amplifier	50-1219-01	02-120057-01	X	X	X		
Magnetic Pre-Amplfier	50-1217-01	02-120051-01	X	X	X	X	X
Function Switch Board	50-1214-01	02-120053-01	X	X	X		
		02-120053-02				X	X
Push button Board	50-1215-01	02-120054-01	X	X	X		
		02-120054-02				X	X
Tone Control Board	50-1216-01	02-120055-01	X				X
		02-120055-02		X	X	X	
Audio Gain Amplifier	50-1221-01	02-120060-01	X	X	X	X	X
Slave Board Audio	50-1207-01	02-120050-01	X				X
		02-120050-02		X			
		02-120050-03			X	X	
Power Supply Board	50-1213-01	02-120052-01	X	X			X
		02-120052-03			X	X	
Dial Lighting Board	50-1208-01	02-120043-03	X	X	X		
		02-120043-04				X	
Dial Lighting Board	50-1209-01	02-120056-01					X

APPENDIX (ii) TRANSISTOR ID CHART

SYMBOL	TUNER REF. NO.	ELECTROHOME PART NO.	BASING	FUNCTION
IC101	UPC 577H	ZM 37901002		FM GAIN AND LIMITER
IC102	UPC 554C	ZM 37901003		MULTIPLEX DECODER
Q101	2SC839	14-855-32		1st FM IF AMP
Q102				2nd FM IF AMP
Q103				3rd FM IF AMP
Q104				4th FM IF AMP
Q105				1st FM SIGNAL AMP
Q106				2nd FM SIGNAL AMP
Q107				FM AUDIO PRE–AMP
Q108				AM RF AMP AND MIXR
Q109				AM OSCILLATOR
Q110				2st AM IF AMP
Q111				2nd AM IF AMP
Q2	2SC535	ZM-35940202		FM MIXER
Q3	2SC461	ZM-35943302		FM OSCILLATOR
Q1	2SK19	ZM-35120325		FM RF AMP
D101	OA90	ZM 36002511		LIMITER DIODES
D102				
D103	2OA90	ZM 36002513		RATIO DETECTOR DIODES
D104				
D105				METER RECTIFIERS
D106				
D107				MUTING RECTIFIER
D108				AM DETECTOR
D109				METER RECTIFIER

THE DASH NUMBERS OF NEW ELECTROHOME TRANSISTOR PART NUMBERS RELATE TO LEAD IDENTIFICATION: EMITTER-1, BASE-2, COLLECTOR-3. READ FIRST TWO LEADS FROM LEFT, WHILE LEADS ARE FACING YOU AND FLAT (OR OPEN TRIANGLE) POINTS DOWNWARD. ALTERNATE BASING MAY BE USED -12, -32, -23 IN ORDER OF PREFERENCE.

TRANSISTOR ID CHART

FUNCTION		PART NO.	SYMBOL
STEREO DRIVERS	CURRENT AMPLIFIER	14-808-12	Q401
	LAMP SWITCH	14-808-12	Q402
MAGNETIC PRE-AMP	VOLTAGE AMPLIFIERS	14-801-12	Q601, Q501
	VOLTAGE AMPLIFIERS	14-801-12	Q602, Q502
FM PRE-AMP	VOLTAGE AMPLIFIERS	14-801-12	Q261, Q251
TONE CONTROL PRE-AMP	BUFFER STAGE	14-801-12	Q603, Q503
	VOLTAGE AMPLIFIERS	14-801-12	Q604, Q504
	LOW Z DRIVERS	14-801-12	Q605, Q505
GAIN BLOCK	VOLTAGE AMPLIFIERS	14-801-12	Q631, Q531
	VOLTAGE AMPLIFIERS	14-803-12	Q632, Q532
SLAVE AMPLIFIER	DIFFERENTIAL AMPLIFIERS	14-804-12	Q671, Q571
	DIFFERENTIAL AMPLIFIERS	14-804-12	Q672, Q572
	POWER LIMIT SWITCH	14-806-12	Q674, Q574
	BIAS TRANSISTOR	14-870-12	Q675, Q575
	POWER LIMIT SWITCH	14-806-12	Q676, Q576
	POWER LIMIT SWITCH	14-808-12	Q677, Q577

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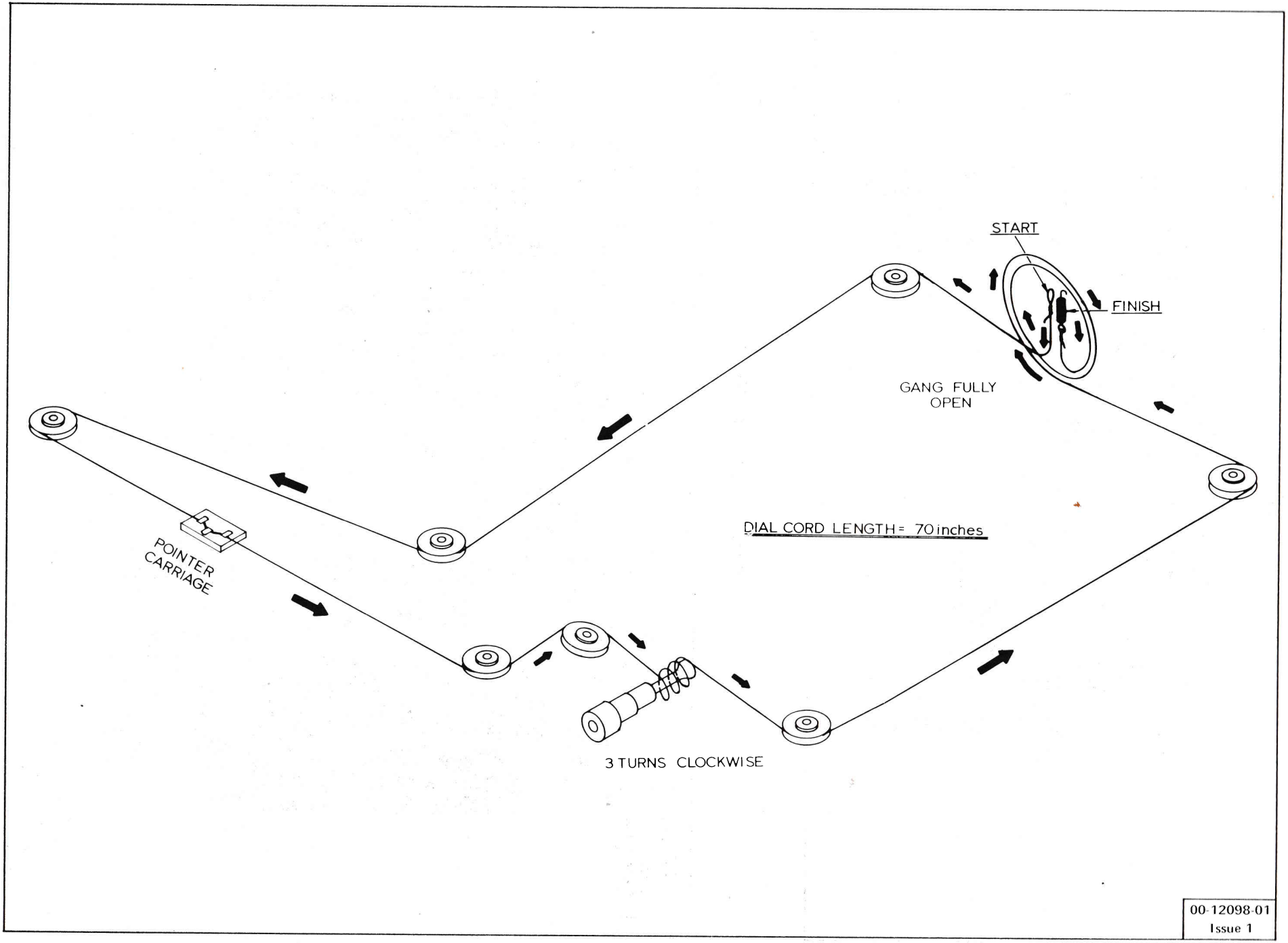
Sheet 1 & 2

DRIVER AND OUTPUT TRANSISTORS

MODEL	DRIVERS- Q573, Q578 Q673, Q678	Q579 Q679	OUTPUT- Q580, Q581 Q680, Q681
AO4, AO8	14-921-23	14-922-23	14-601-34
AO5	14-921-23	14-922-23	14-601-33
AO6, AO7	14-923-23	14-924-23	14-601-24

DIAL STRINGING



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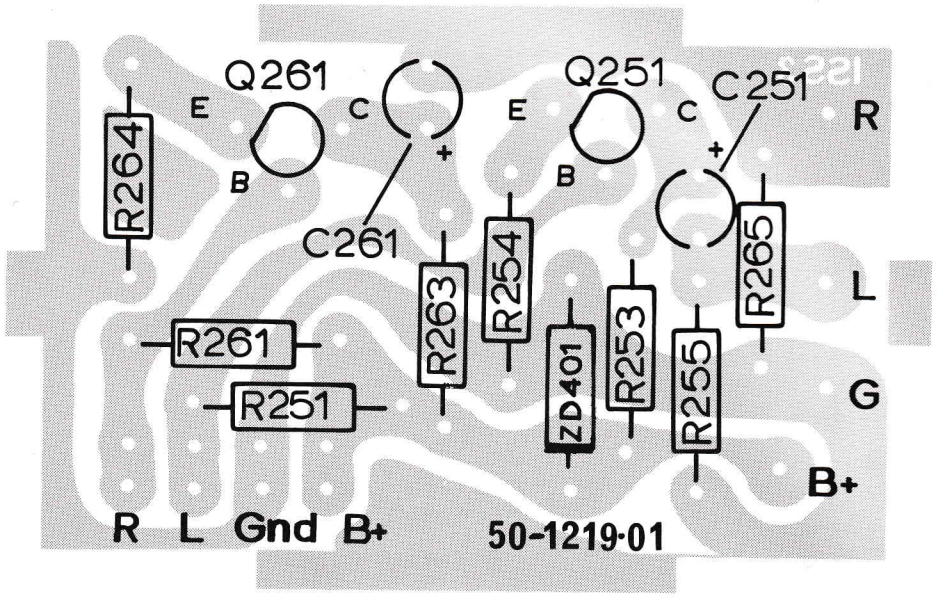
Issue 1

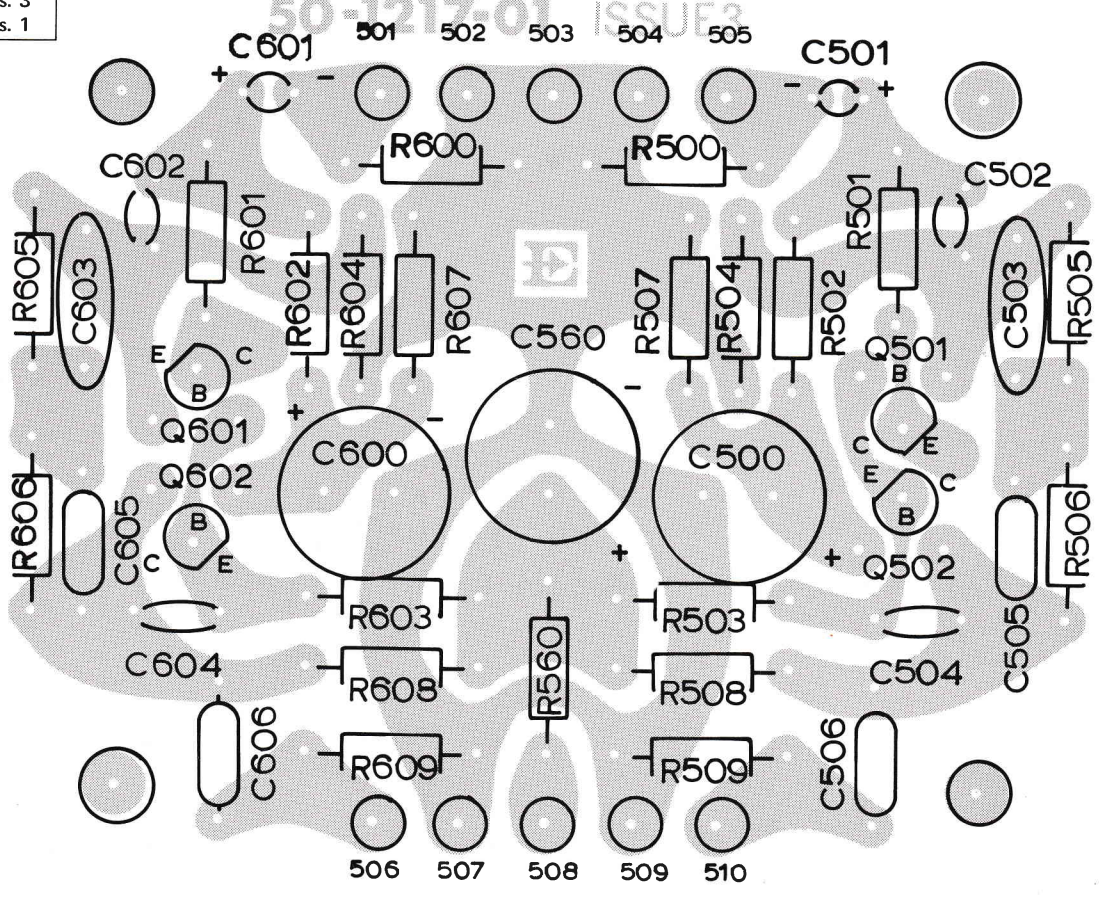
FM PREAMP LAYOUT

50-1219-01
Sheet 2 - Iss. 3
Sheet 4 - Iss. 2

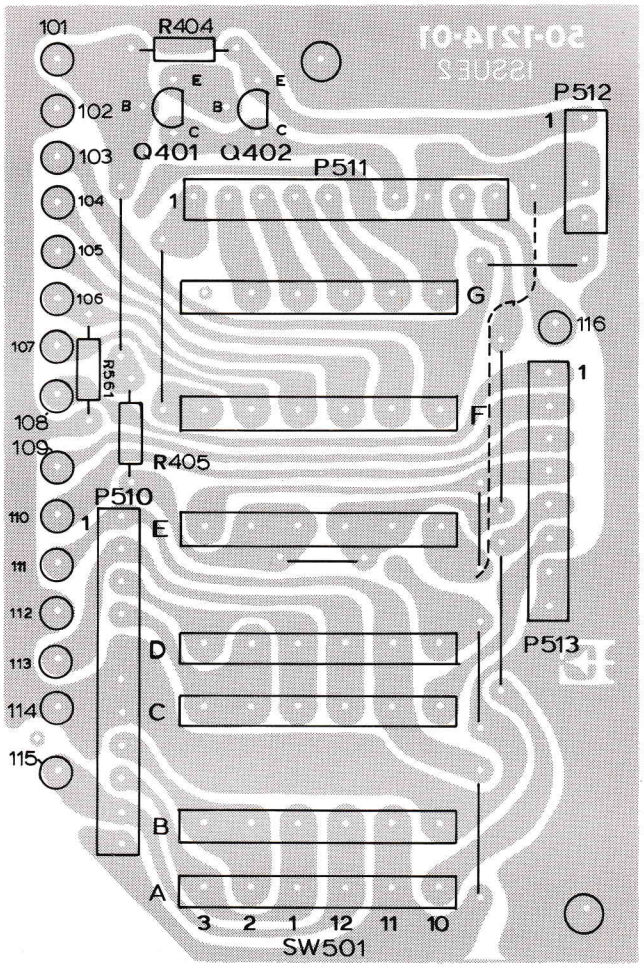


MAG. AMP. LAYOUT

50-1217-01
Sheet 2 - Iss. 3
Sheet 4 - Iss. 1



FUNCTION SWITCH LAYOUT



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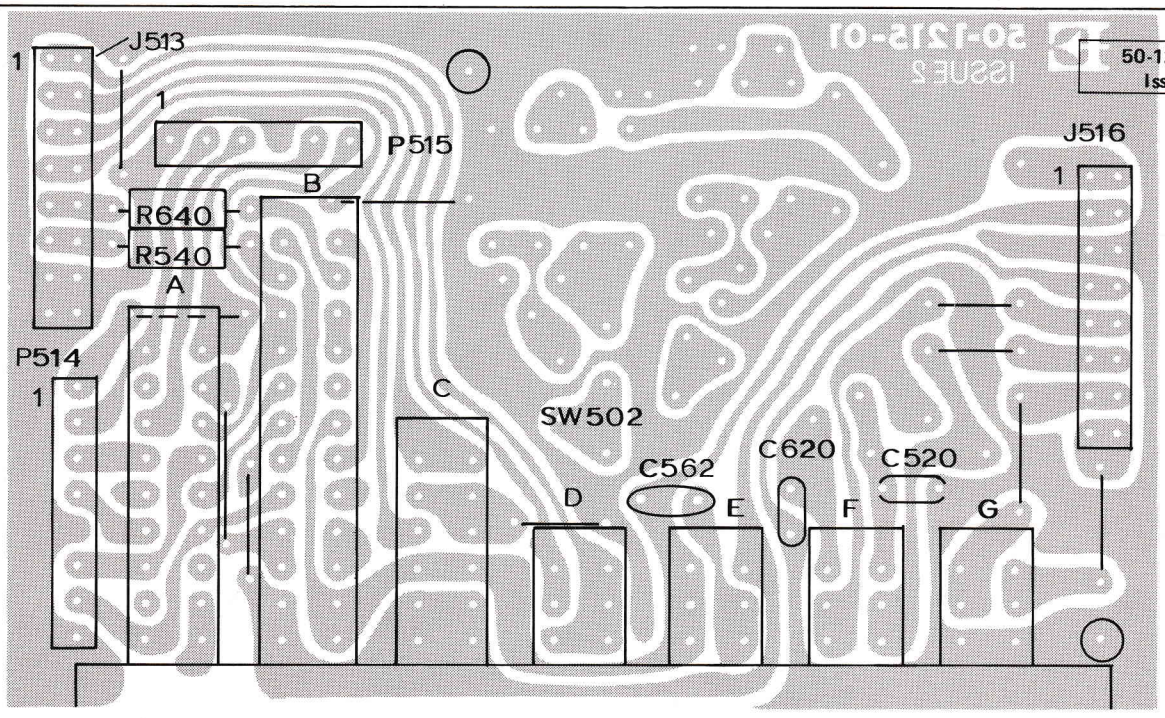
Issue 2

PUSH BUTTON LAYOUT



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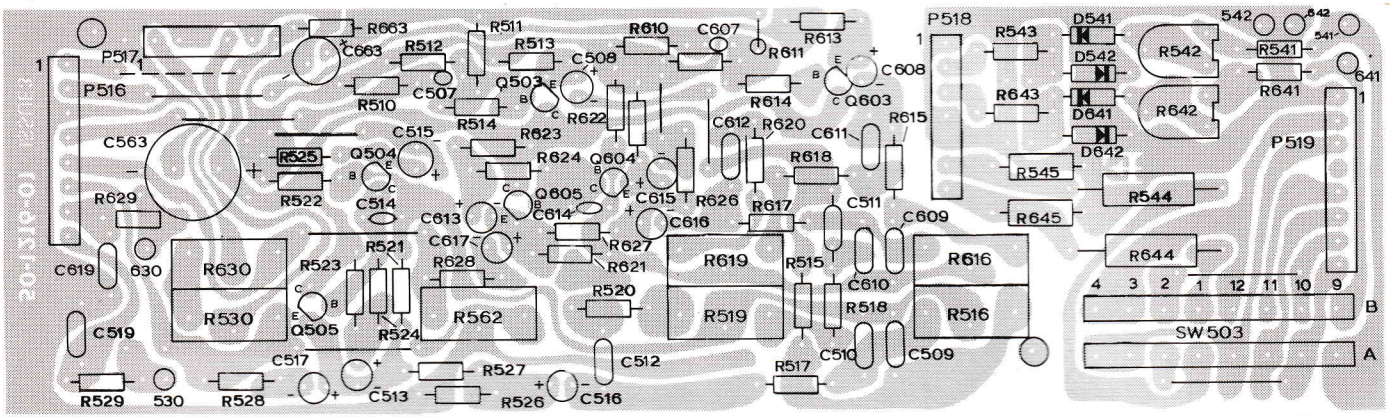
Issue 2

TONE CONTROL LAYOUT



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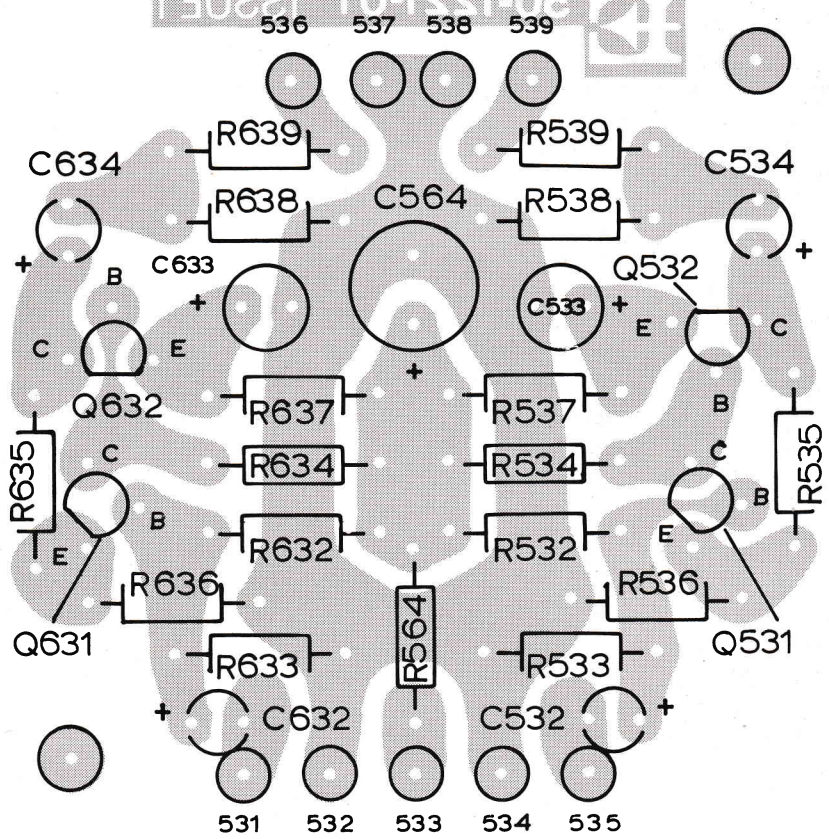
Sheet 2 - Iss. 3
Sheet 4 - Iss. 2

GAIN BOARD LAYOUT



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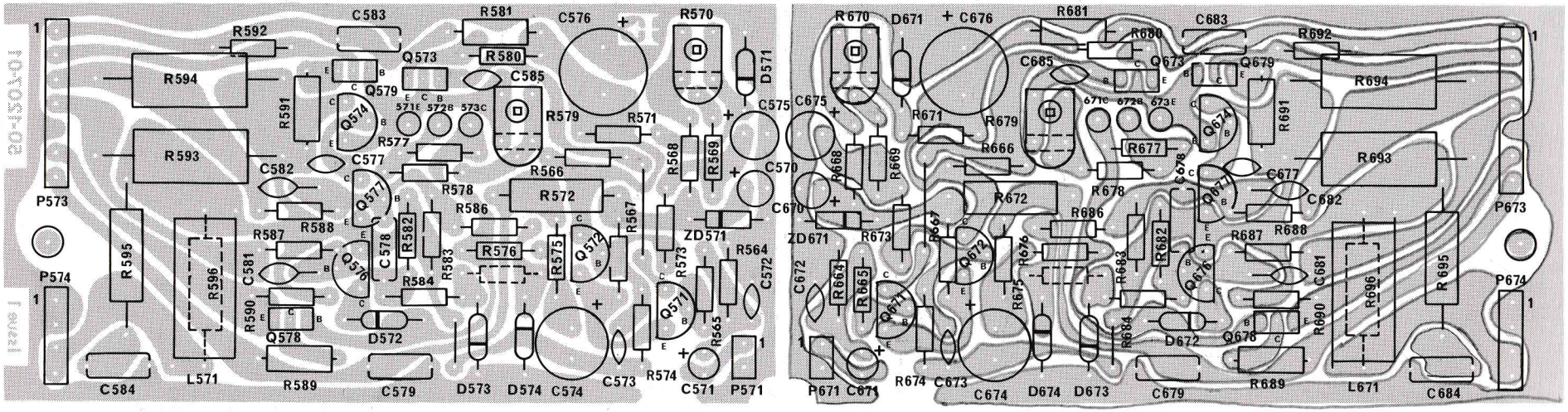
Issue 1

SLAVE BOARD



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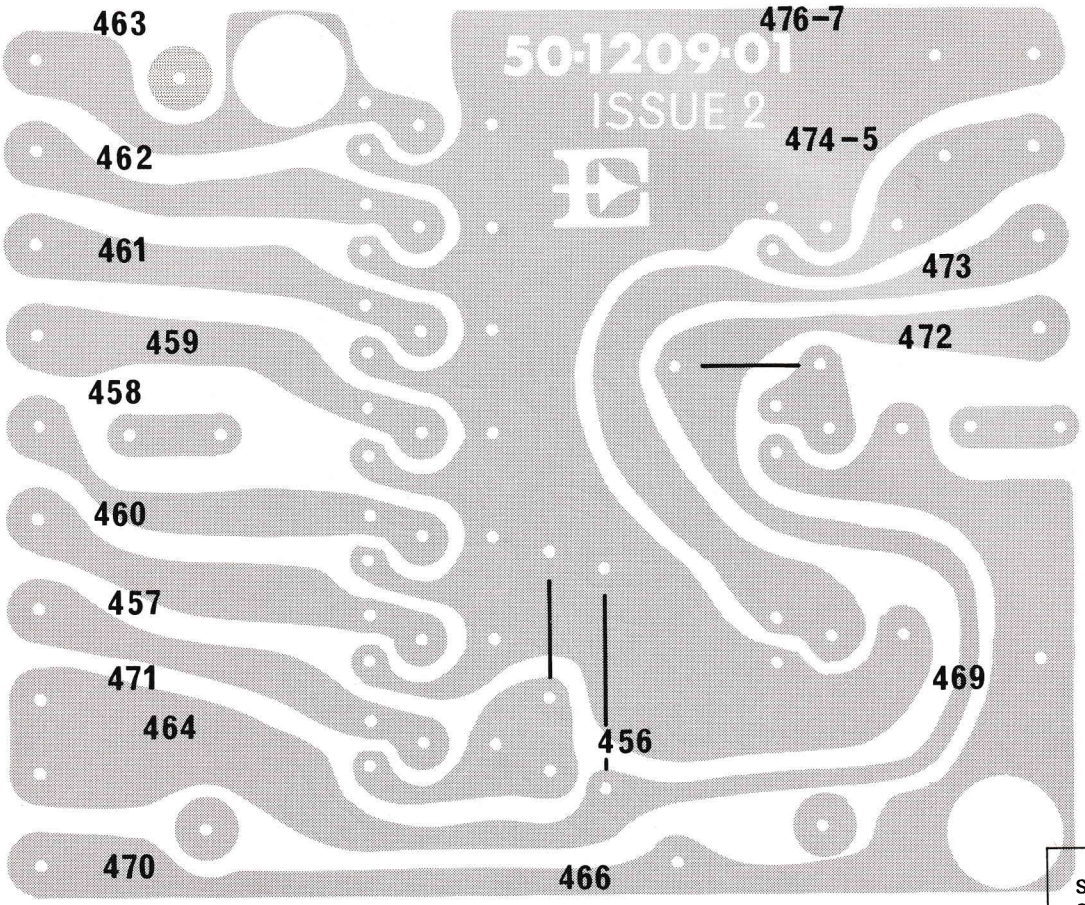
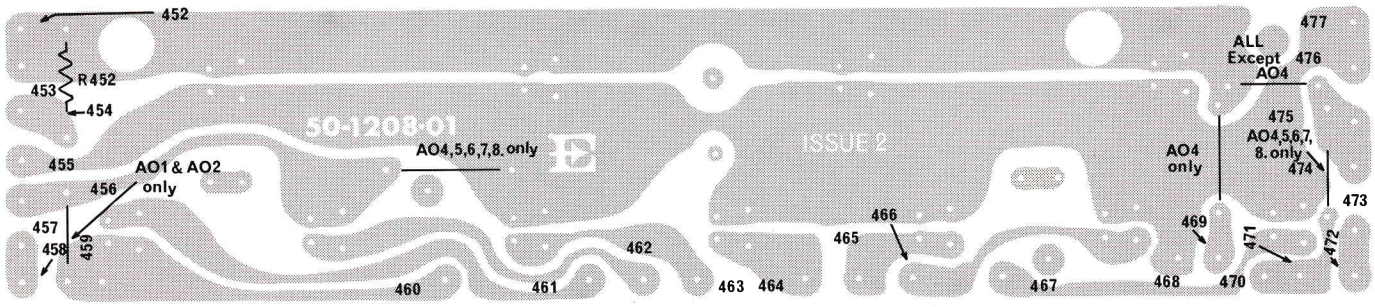
Issue 1

FUNCTION LIGHT BOARD



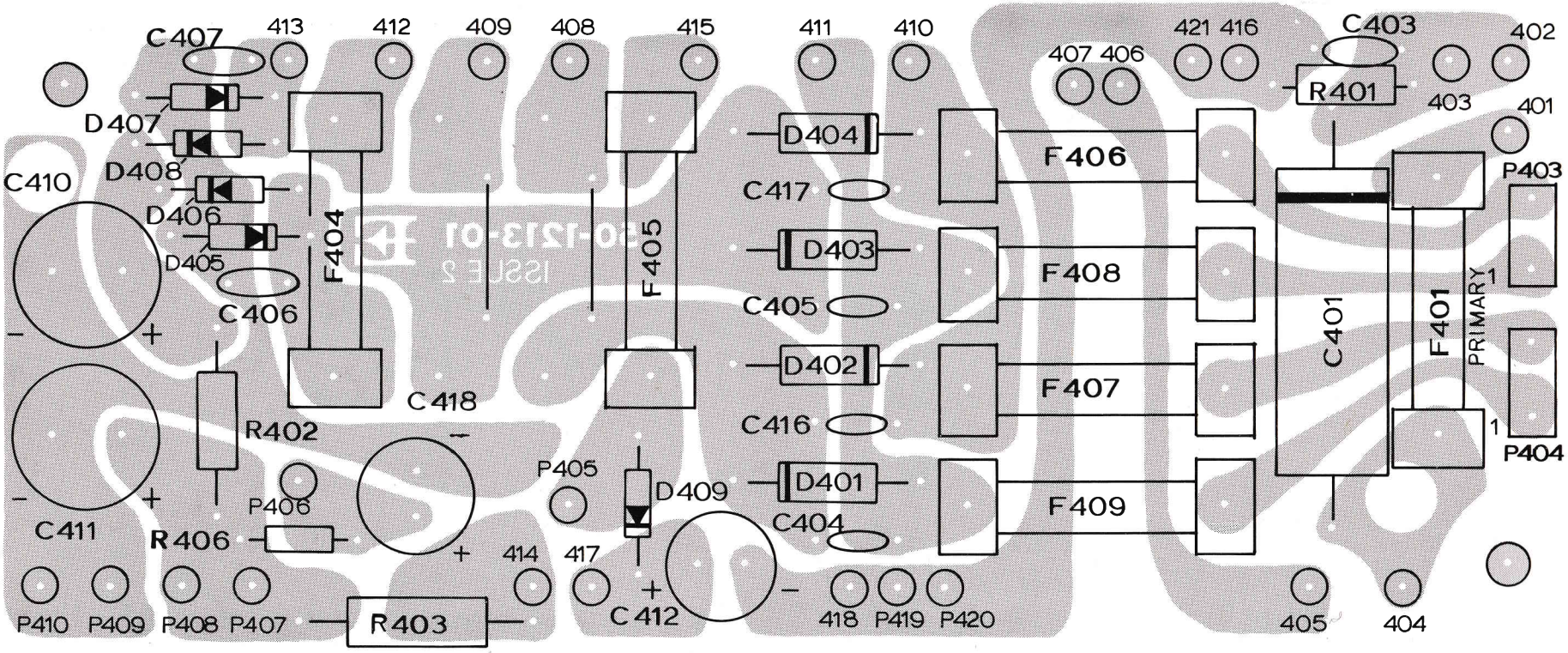
50-1209-01
Sheet 2 - Iss. 2
Sheet 5 - Iss. 1

DIAL LIGHT BOARD



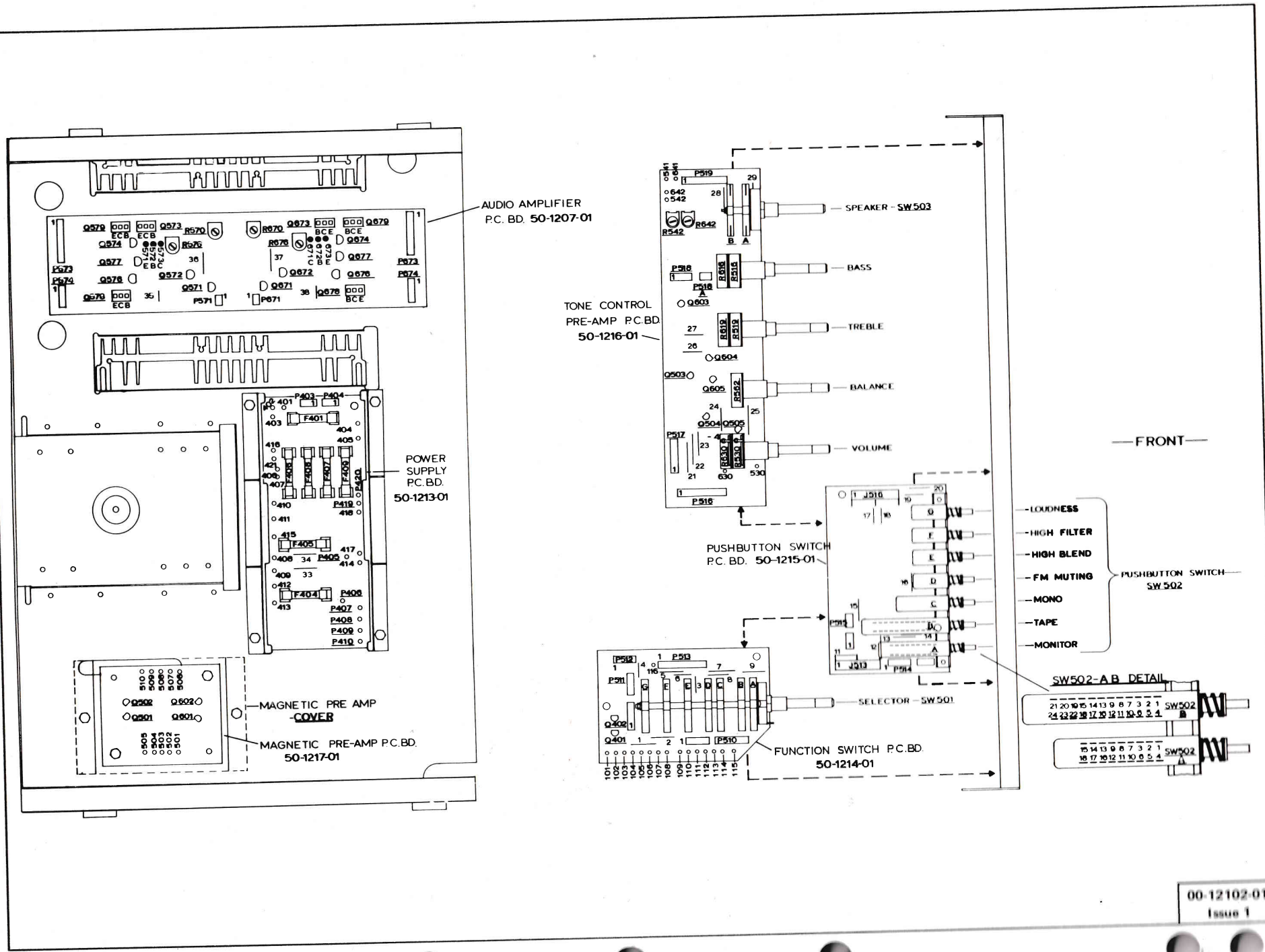
50-1208-01
Sheet 2 - Iss. 2
Sheet 4 - Iss. 1

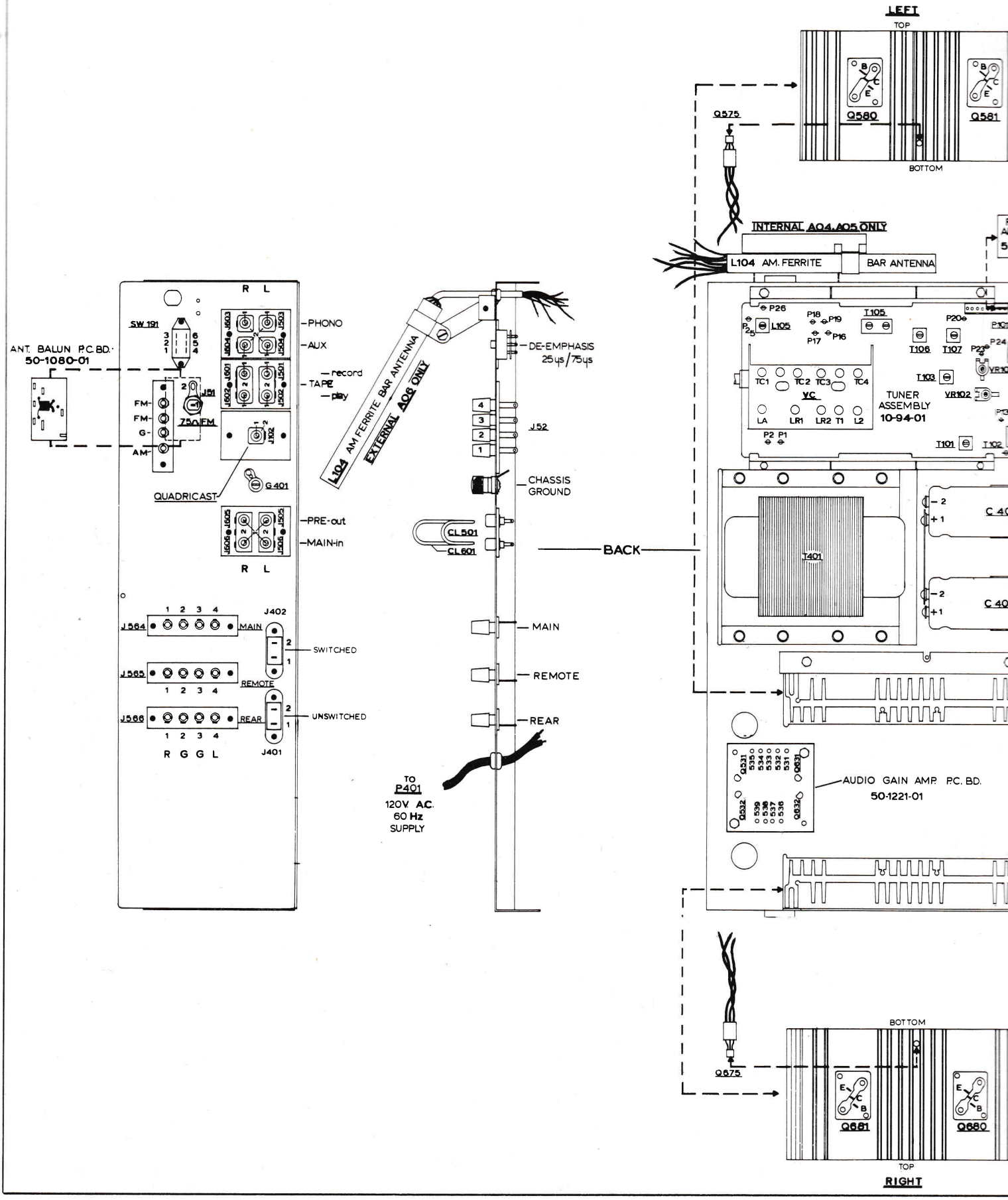
POWER SUPPLY BOARD LAYOUT



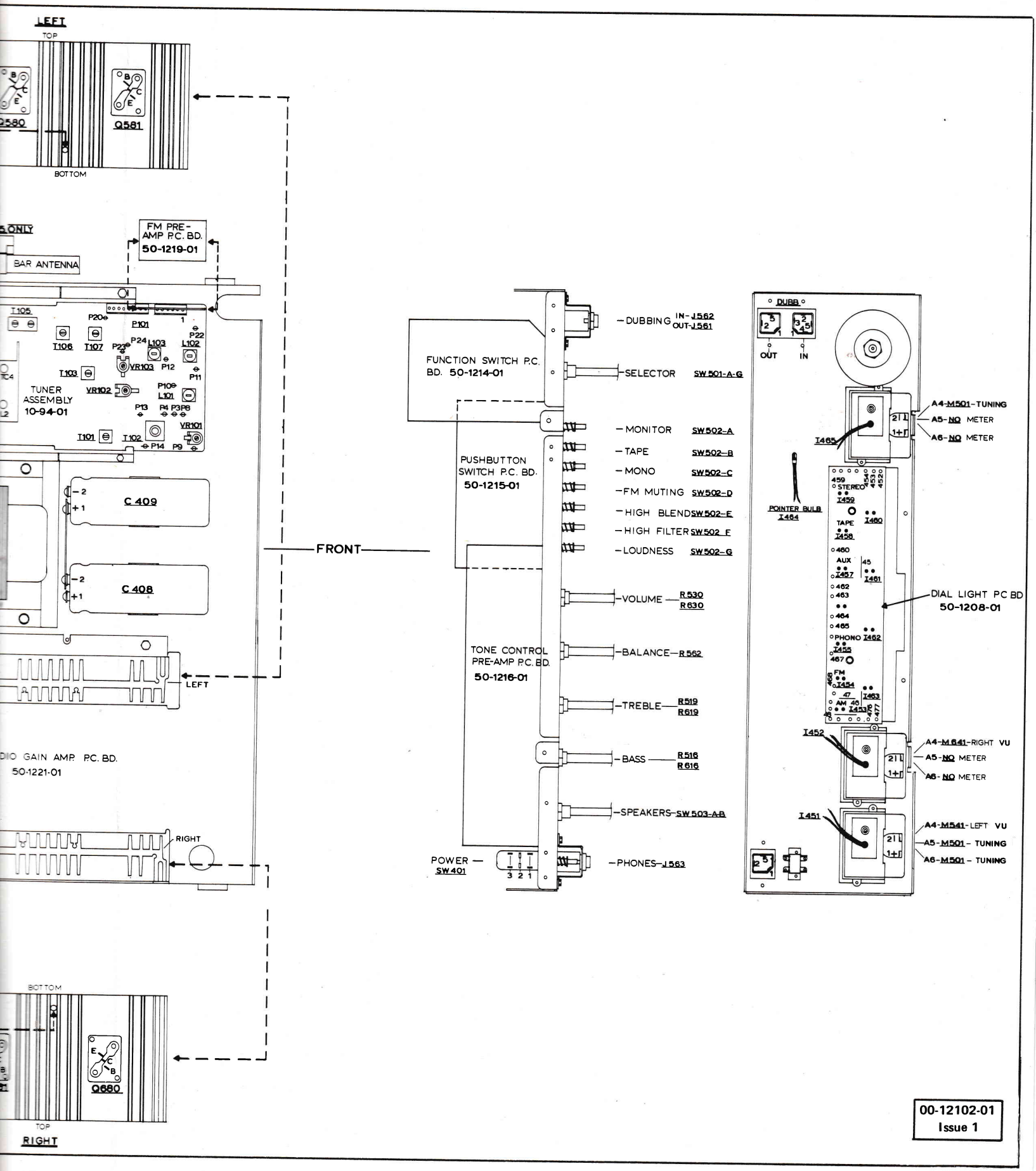
50-1213-01
Sheet 2 - Iss. 2
Sheet 4 - Iss. 4

CHASSIS LAYOUT - AUDIOPHILE RECEIVER - BOTTOM VIEW



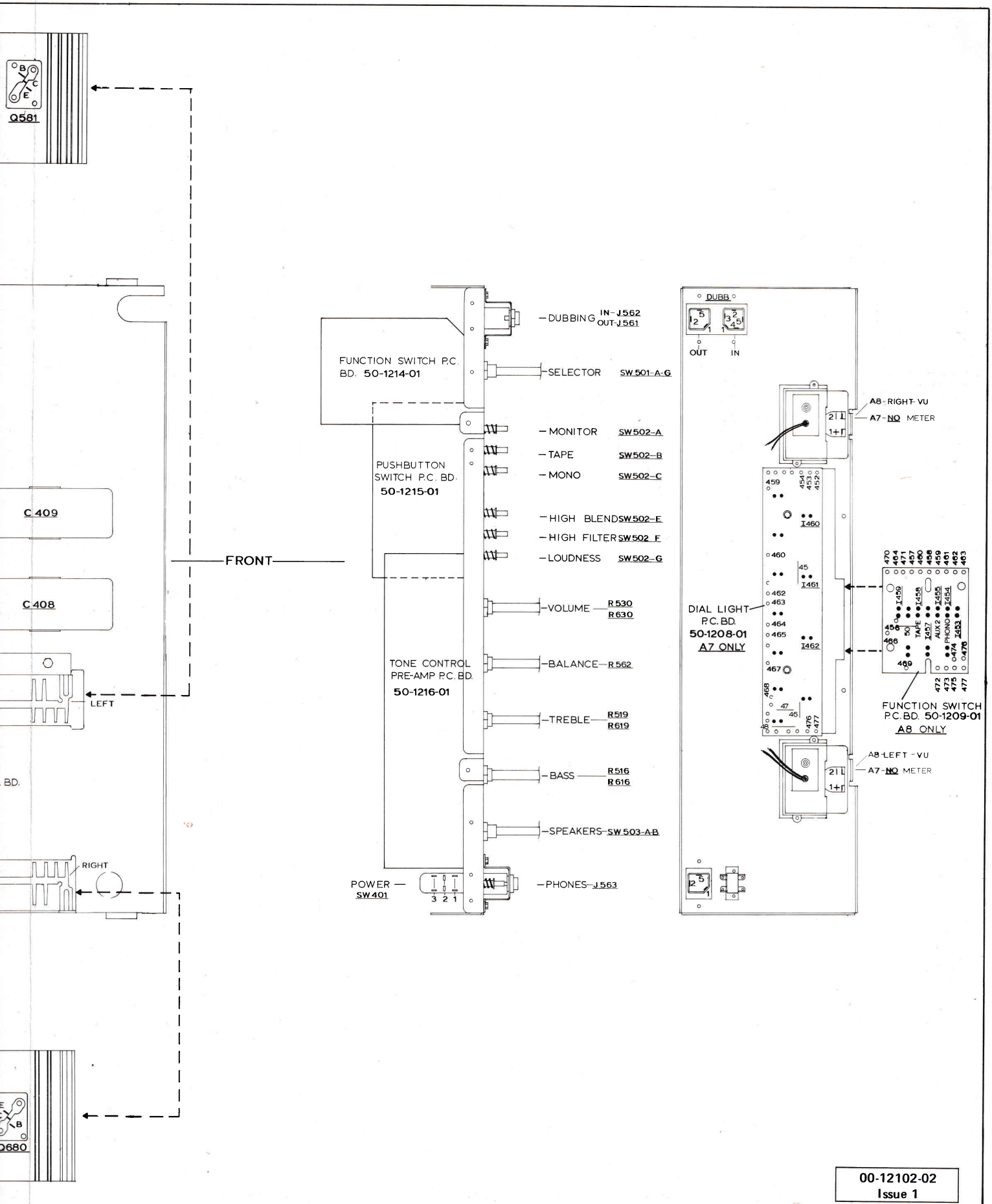

LEFT
TOP
Q580
Q581
BOTTOM
Q575
INTERNAL AO4, AO5 ONLY
L104 AM. FERRITE BAR ANTENNA
ANT. BALUN P.C.BD.
50-1080-01
SW 191
R L
PHONO
AUX
record
TAPE
play
FM-
FM-
G-
AM-
75Ω FM
QUADRICAST
G 401
PRE-out
MAIN-in
R L
J402
J564
MAIN
SWITCHED
J565
REMOTE
J566
REAR
UNSWITCHED
R G G L
J401
L104 AM FERRITE BAR ANTENNA
EXTERNAL AO5 ONLY
DE-EMPHASIS
25μs/75μs
J52
CHASSIS GROUND
CL 501
CL 601
BACK
MAIN
REMOTE
REAR
TO P401
120V. AC.
60 Hz
SUPPLY
P26
L105
T105
T106
T107
TC1
TC2
TC3
TC4
VC
LA
LR1
LR2
T1
L2
P2
P1
T103
VR102
TUNER ASSEMBLY
10-94-01
T101
T401
AUDIO GAIN AMP. P.C.BD.
50-1221-01
Q675
BOTTOM
Q681
Q680
TOP
RIGHT

AUDIOPHILE RECEIVER - TOP VIEW

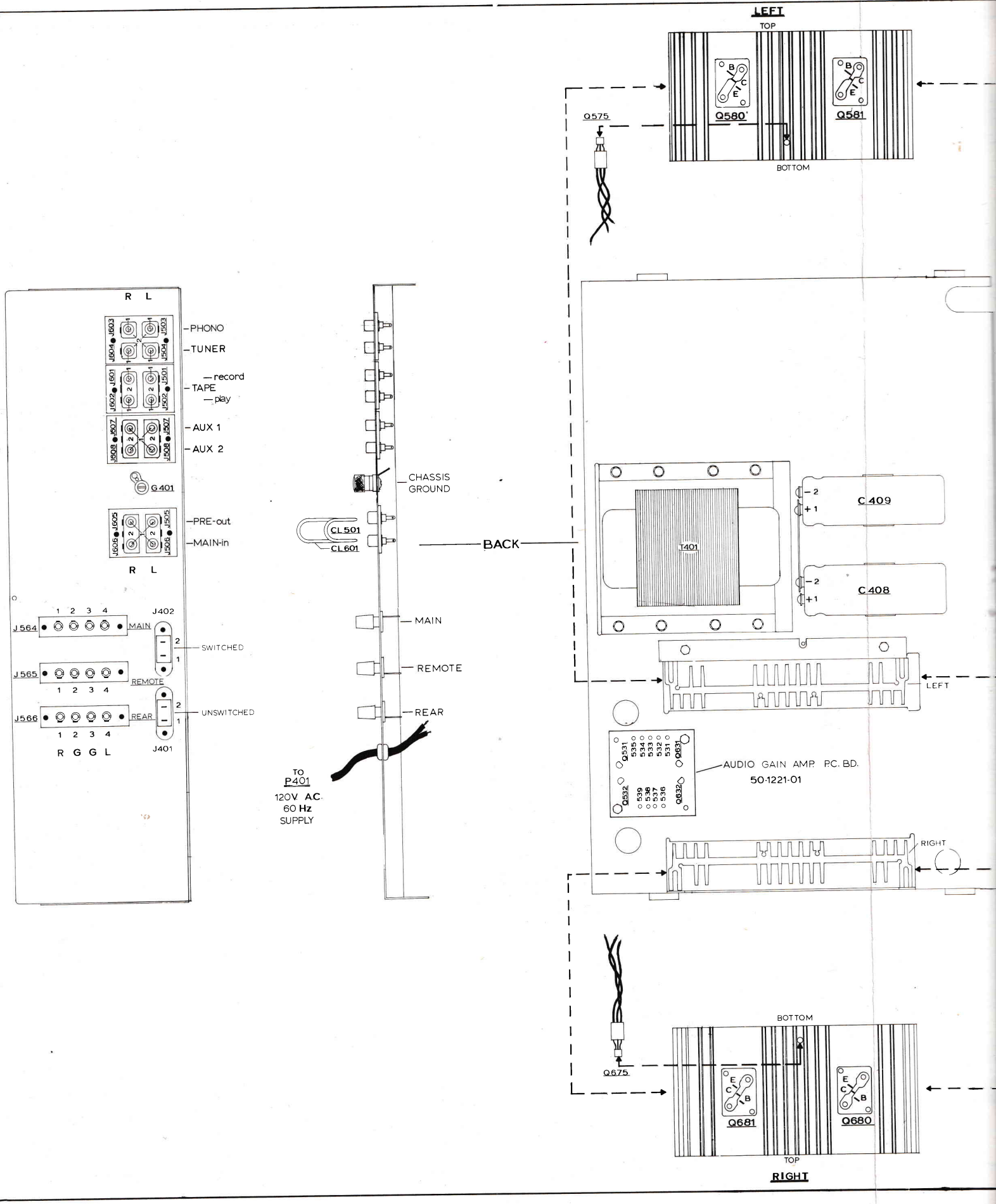


00-12102-01
Issue 1

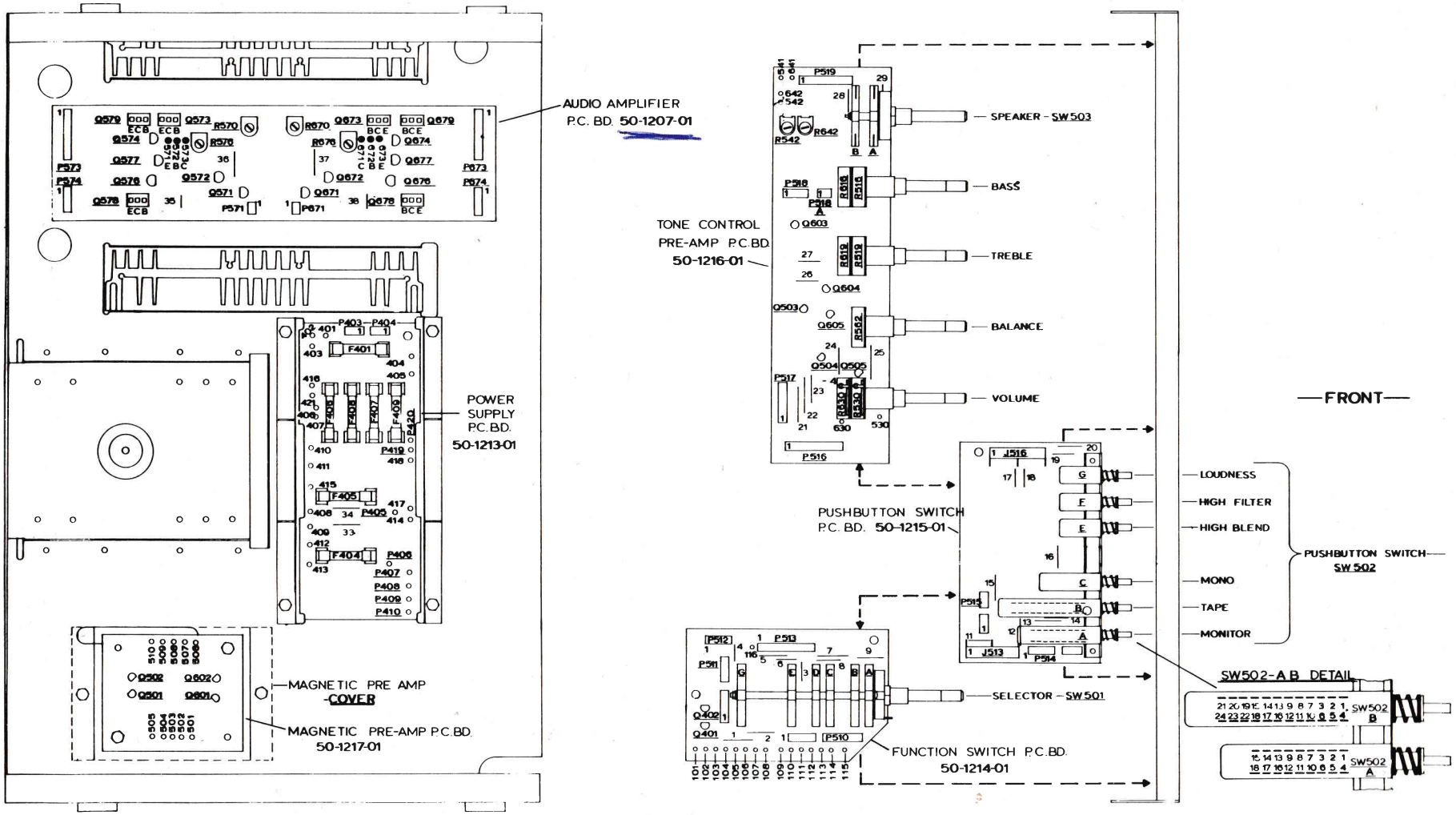
DIOPHILE AMPLIFIER - TOP VIEW



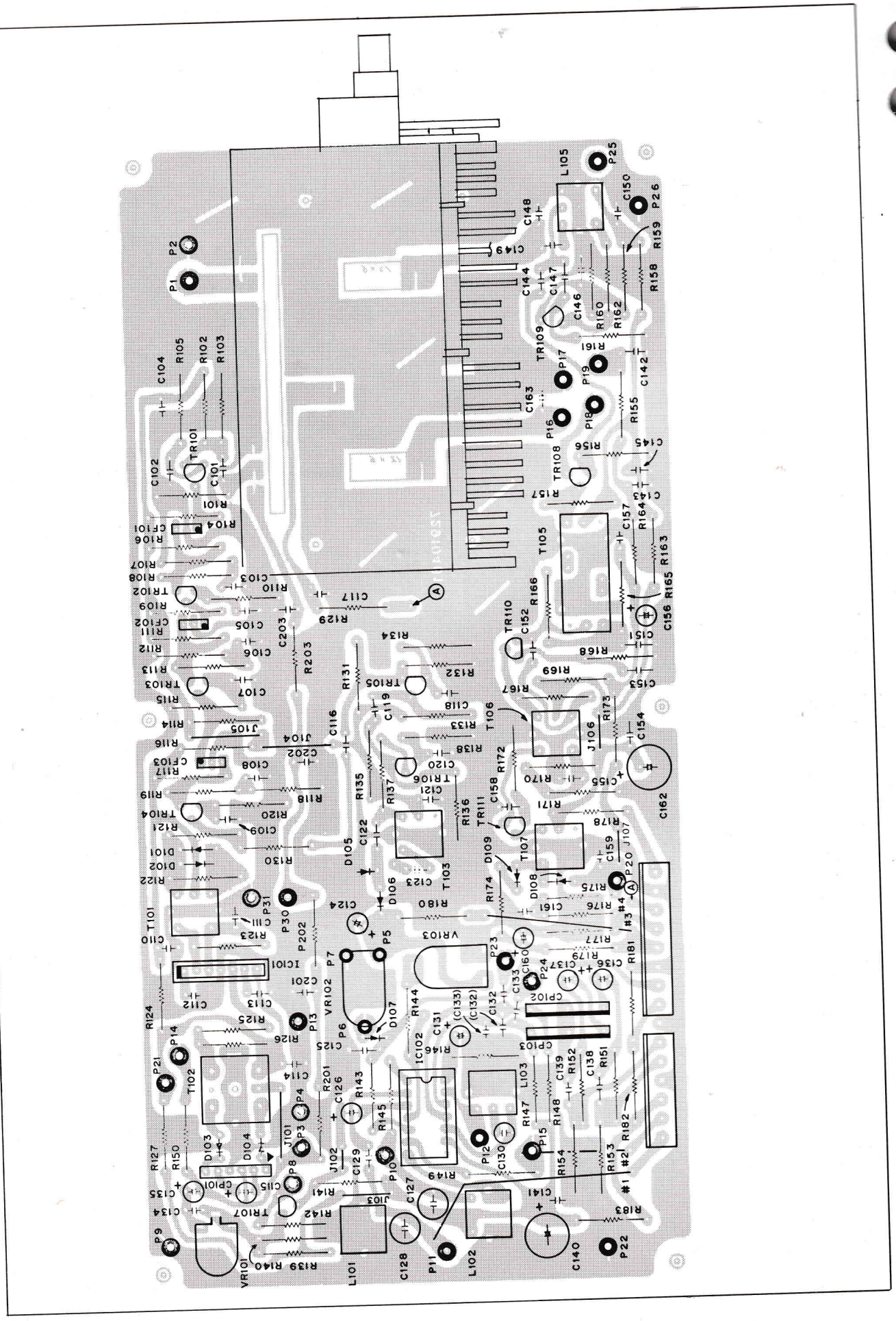
00-12102-02
Issue 1


LEFT
TOP
Q580
Q581
BOTTOM
Q575
R L
PHONO
TUNER
record
TAPE
play
AUX 1
AUX 2
G401
PRE-out
MAIN-in
R L
J564
MAIN
J565
REMOTE
J566
REAR
J402
SWITCHED
UNSWITCHED
J401
R G G L
CHASSIS GROUND
CL 501
CL 601
BACK
MAIN
REMOTE
REAR
TO P401
120V AC 60 Hz SUPPLY
T401
C 409
C 408
LEFT
AUDIO GAIN AMP. P.C. BD.
50-1221-01
RIGHT
Q675
BOTTOM
Q681
Q680
TOP
RIGHT

CHASSIS LAYOUT - AUDIOPHILE AMPLIFIER - BOTTOM VIEW



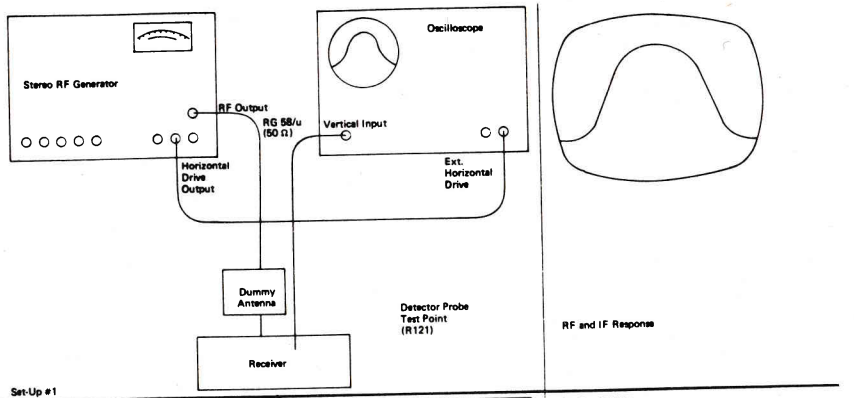
TUNER LAYOUT



ADDITIONAL TEST INFORMATION

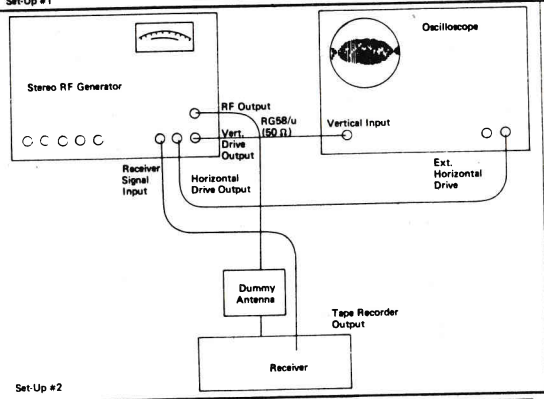
STEP	ADJUSTMENT PROCEDURE	SYSTEM CONNECTIONS	CONTROLS	RECEIVER CONTROLS	ALIGN FOR
1.	IF Alignment Sweep	Set-Up No.1	**Function:** Dual Sweep **RF Level:** 100uV or less **Frequency:** Tune to receiver **Sweep Width:** 600 kHz **Phase:** To superimpose scope forward and reverse traces	**Mode:** Monaural, FM **Muting:** Off **Tuning:** To a dead spot in the fm band	Maximum amplitude and symmetry of the scope display.
	IF Alignment Alternate Method	Set-Up No.3	**Function:** Monaural **RF Level:** 100uV or less **Frequency:** Tune to receiver **Input:** Left **Osc. Level:** 100% modulation	Same as above	Sync scope on INT OSC output of GEN. Reduce RF level below limiting. Align for max. audio output.
2.	Peak Tuning Meter Adjustment	–	Same as IF alignment method used except set RF Level to 30 uV.	Same as above	Fine tune GEN to center of IF bandpass. Reduce SWEEP WIDTH to zero (or set OSC LEVEL to zero). Adjust for peak reading on meter.
3.	Local Oscillator Alignment	–	Use accurate 90 MHz and 106 MHz sources.	**Mode:** Monaural, FM **Muting:** off **Tuning:** 90MHz for coil slug, 106MHz for trimmer capacitor	Complete any mechanical dial adjustments first. Align local oscillator for dial accuracy (coil slug at 90MHz, trimmer capacitor at 106MHz).
4.	RF Alignment Sweep	Set-Up No.1	**Function:** Dual Sweep **RF Level:** 3 uV to 30 uV **Frequency:** Tune to receiver **Sweep Width:** 600 kHz **Phase:** To superimpose scope forward and reverse traces.	Same as above.	Maximum amplitude and symmetry of the scope display. Adjust coils at 90MHz, capacitors at 106MHz.
	RF Alignment Alternate Method	Set-Up No.3	**Function:** Monaural **RF Level:** 100uV **Frequency:** Tune to receiver **Input:** Left **Osc. Level:** 100% modulation	Same as above	Sync scope on INT OSC output of GEN. Reduce RF LEVEL below limiting. Align RF coils at 90MHz, trimmer capacitors at 106MHz for max. audio output.
5.	FM Detector Alignment Sweep	Set-Up No.2	**Function:** Dual Sweep **RF Level:** 1000 uV **Frequency:** Tune to receiver **Sweep Width:** 250kHz **Phase:** To superimpose scope forward and reverse traces.	**Mode:** Monaural, FM **Muting:** Off **Tuning:** To a dead spot in the fm band.	Tune for symmetrical pattern with flat top. Reduce SWEEP WIDTH to zero and adjust secondary to center zero-tune meter if receiver has one. Increase SWEEP WIDTH to 250 kHz and adjust primary for optimum flatness.
	FM Detector Alignment Alternate Method	Set-Up No.3 (Tape record output to THD analyser)	**Function:** Monaural **RF Level:** 1000uV **Frequency:** Tune to receiver **Input:** Left **Osc. Level:** 100% modulation	Same as above.	Adjust secondary to center zero-tune meter, if receiver has one. Adjust primary for a minimum reading on the distortion analyzer.
6.	Stereo Decoder 19kHz Coils	Set-Up No.3 (Tape record output to scope vertical)	**Function:** Stereo **RF Level:** 1000 uV **Frequency:** Tune to receiver **Pilot Level:** 8% **Input:** Left or Right **Osc. Level:** 100% modulation	Same as above.	Gradually decrease pilot level while adjusting coils for max. separation.
7.	Stereo Decoder 38kHz Coil	Same as above	Same as above except: **Pilot Level:** 10% **Input:** Left or Right	Same as above	Adjust for maximum amplitude of scope display
8.	Stereo Decoder Stereo Separation Control	Same as above	Same as above except: **Input:** Left or Right	Same as above	Adjust for maximum separation

NTX TUNER SET-UP DIAGRAM

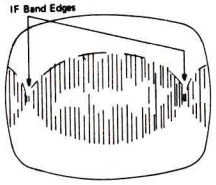


Set-Up #1

RF and IF Response

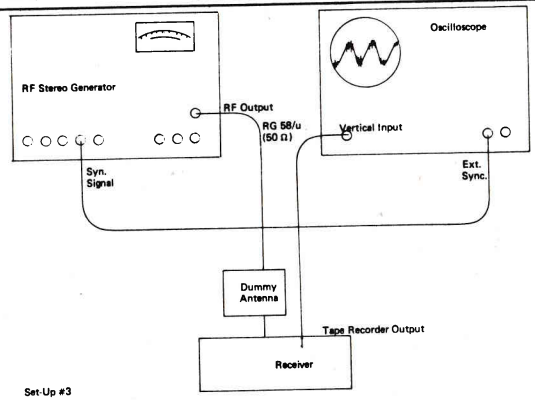


Set-Up #2

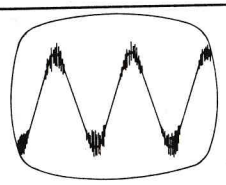


IF Band Edges

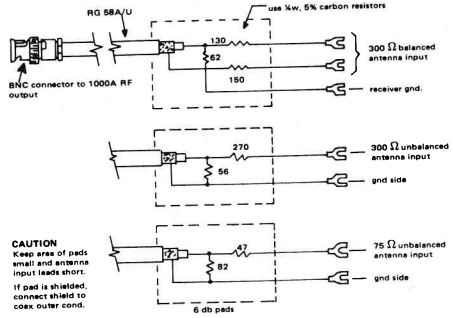
Dual Sweep Response (Detector Alignment)



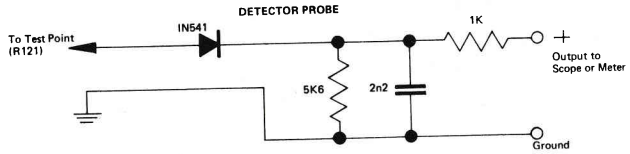
Set-Up #3

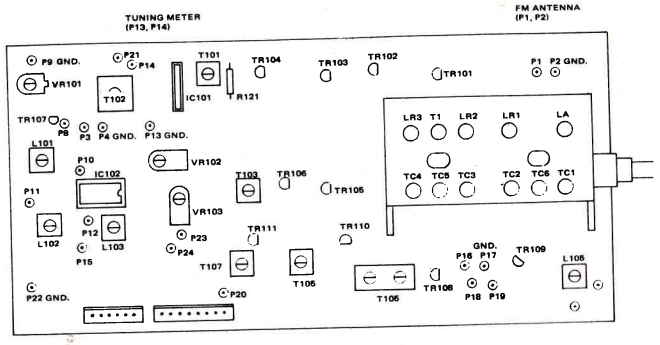


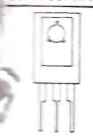
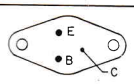
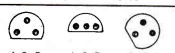
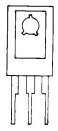
Three Percent Distortion and Noise



DUMMY ANTENNAS





TYPICAL - 13 CONFIGURATIONS	TYPICAL — 33 CONFIGURATIONS	TYPICAL — 12 CONFIGURATIONS	TYPICAL - 23 CONFIGURATIONS
 2 3 1 (B) (C) (E) 14 - 917 - 13 14 - 918 - 13	 14 - 601 - 33 14 - 601 - 30 14 - 601 - 34	 1 2 3 (E)(B)(C) 1 2 3 (E)(B)(C) 1 2 3 (E)(B)(C) 14 - 802 - 12 14 - 801 - 12 14 - 803 - 12 14 - 804 - 12 14 - 806 - 12 14 - 870 - 12 14 - 808 - 12	 1 3 2 (E) (C) (B) 14 — 922 — 23 14 — 921 — 23

Notes

A.C. Voltages

1. All DC voltages should be measured with a high impedance meter.
2. The reference "Line Input" should be 120 V.A.C. ±2% at 60 Hz.
3. Measured values should fall within ±10% of those shown.
4. Voltage shown are in the normal discrete, auxiliary, and 2 channel mode.

Capacitors - Resistance (R or Ω), Kilohm (k), or megohms (M), ¼ watt, ±5% tolerance unless otherwise noted.

Capacitors - capacity in picofarads (p), nanofarads (n), femtofarads (f), microfarads (μ), 100V and tolerance noted where critical.

Special capacitors are identified as follows:

P.S. - Polystyrene P.P. - Polypropylene
M.L. - Metalized Mylar M. - Mica
N.P. - Non-Polarized T.M. - Tantalum
Comp. - Composition Z5P - Temperature Tolerance - (±10%)

N750 - Temperature coefficient - negative positive zero.
P 150 - Temperature coefficient - negative 150/P/M/°C.

Inductors - Inductance in micro henries (uH) or millihenries (mH).

Zener diodes - Zener voltage in volts.

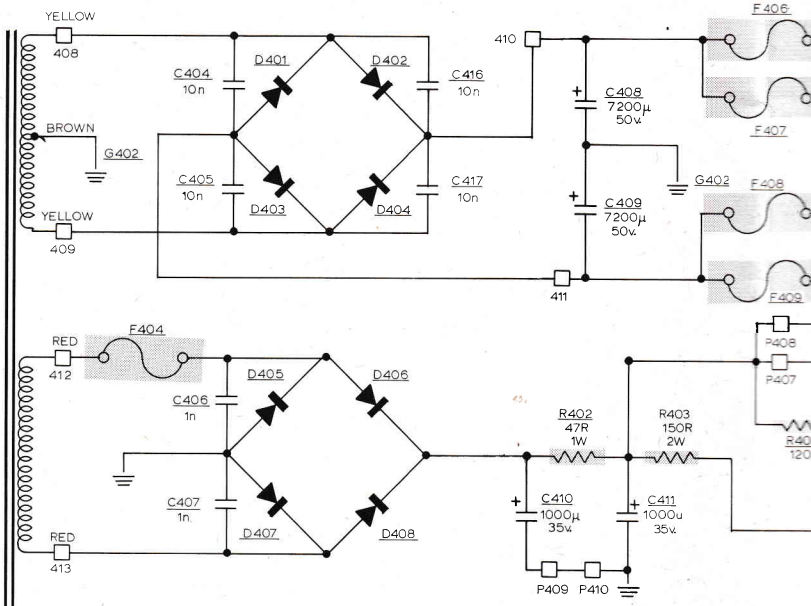
Multiplier Notations

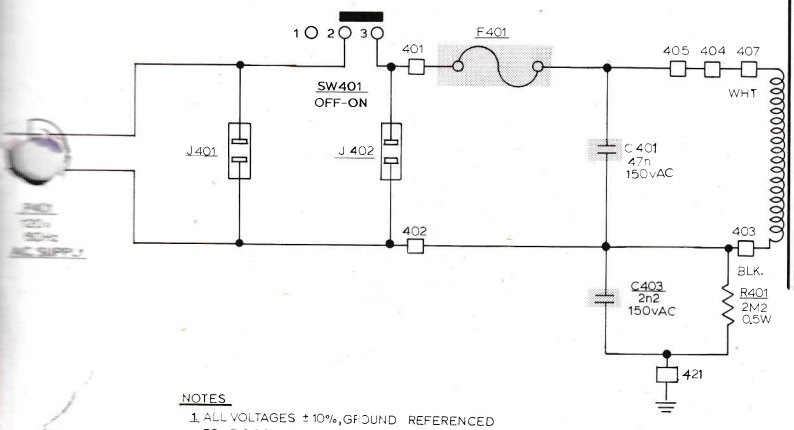
Multiplier	Prefix	Symbol
10^6	Mega	M
10^3	Kilo	k
10^{-3}	Milli	m
10^{-6}	Micro	μ
10^{-9}	Nano	n
10^{-12}	Pico	p
10^{-15}	Femto	f

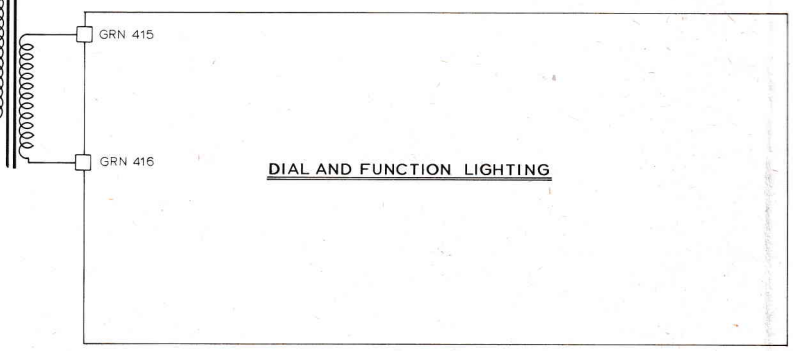
Examples for Capacitors and Resistors

2.2 = 2.2%	4n7 = 4.7n	2k2 = 2.2 kΩ
= 2.2 x 10^{-9} Farad	= 4.7uF	180R = 180Ω
= 100n uF		5R6 = 5.6Ω
= 2700pF		

T401 POWER TRANSFORMER







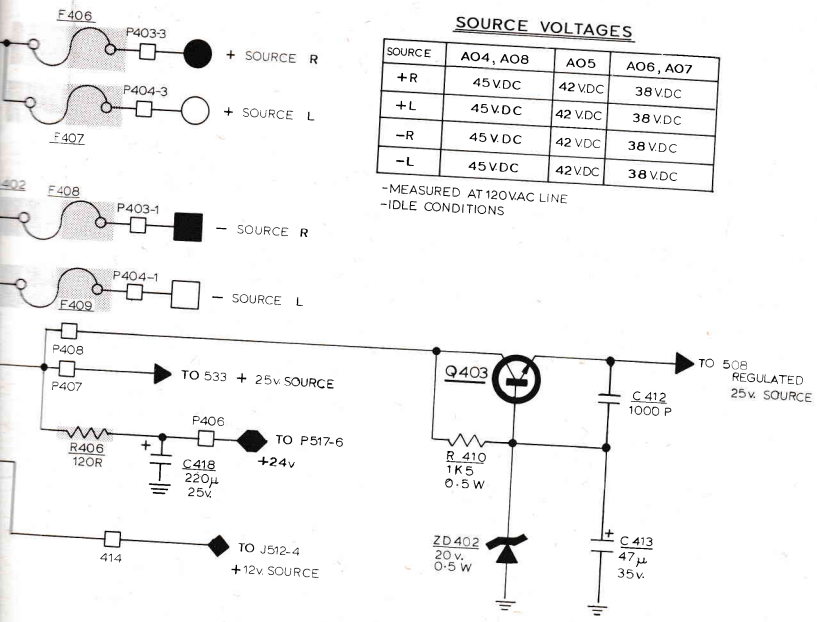
NOTES

1. ALL VOLTAGES ± 10%, GROUND REFERENCED TO P.C.BD. BEING MEASURED.
2. TEST VOLTAGES ON SLAVE AMPLIFIER ARE FOR A04, A08 ONLY. VOLTAGES ON A05, A06, A07 WILL BE LOWER RESPECTIVELY DUE TO SOURCE VOLTAGE.

SCHEMATIC 00-3202-01 SHEET 1 of 2

STEREO AUDIOPHILE: RECEIVERS A04, A05, A06 AMPLIFIERS A07, A08

CAUTION: FOR CONTINUED SAFTEY RE
IN SHADED AREAS WITH EXACT REPLAC
CONSULT SERVICE MANUAL PARTS LIST



SOURCE VOLTAGES

SOURCE	AO4, AO8	AO5	AO6, AO7
+R	45 V.DC	42 V.DC	38 V.DC
+L	45 V.DC	42 V.DC	38 V.DC
–R	45 V.DC	42 V.DC	38 V.DC
–L	45 V.DC	42 V.DC	38 V.DC

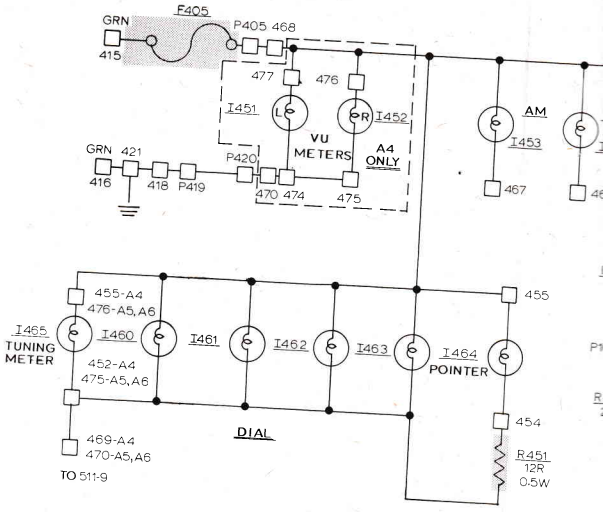
-MEASURED AT 120VAC LINE
-IDLE CONDITIONS

FUSE REQUIRMENTS AO4 to AO8

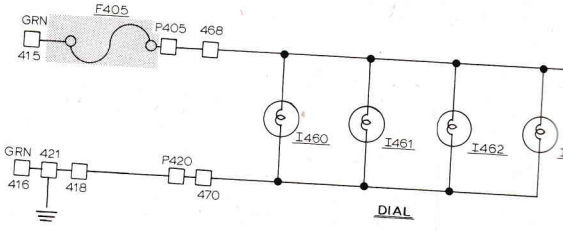
FUSE	AO4	AO5	AO6	AO7	AO8
F401	5A.SB	5A.SB	3A.SB	3A.SB	5A.SB
F404	¼A.SB	¼A.SB	¼A.SB	¼A.SB	¼A.SB
F405	3A	3A	3A	3A	3A
F406	4A.	4A.	3A.	3A.	4A.
F407	4A.	4A.	3A.	3A.	4A.
F408	4A.	4A.	3A.	3A.	4A.
F409	4A.	4A.	3A.	3A.	4A.

FTEY REPLACE COMPONENTS
REPLACEMENT PARTS ONLY. -
TS LIST "SAFTEY COMPONENTS"

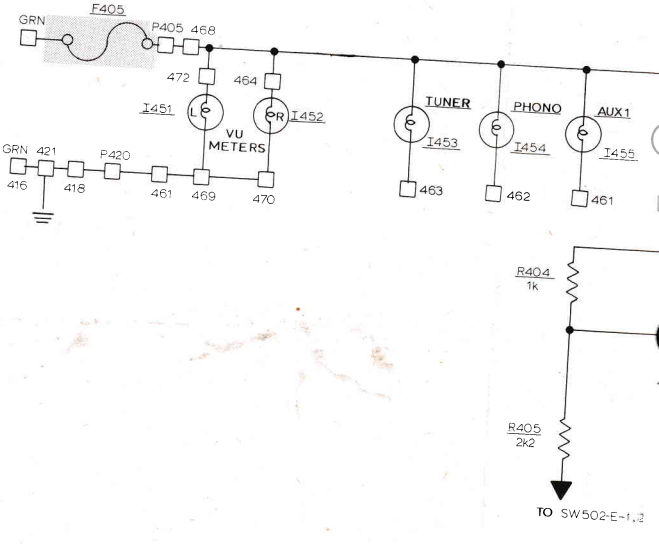
DIAL AND FUNCTION LIGH



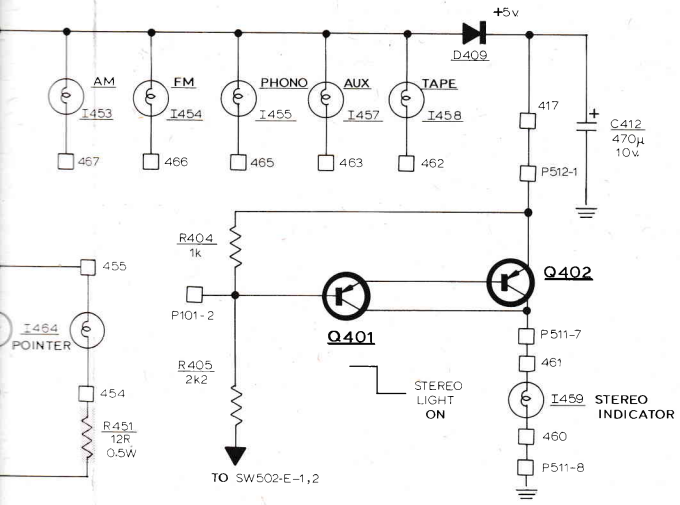
DIAL AND FUNCTION LIGHTIN



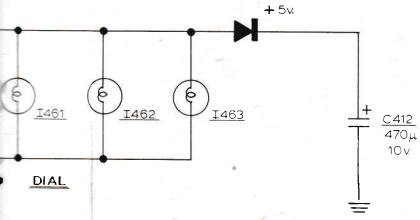
DIAL AND FUNCTION LIGHTING-A



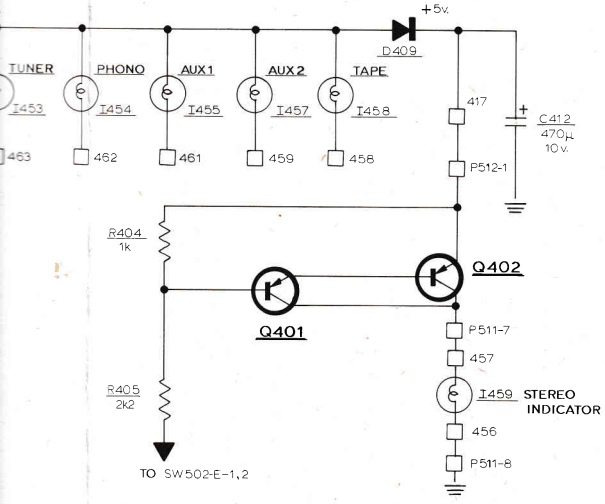
ND FUNCTION LIGHTING -A4
-A5
-A6



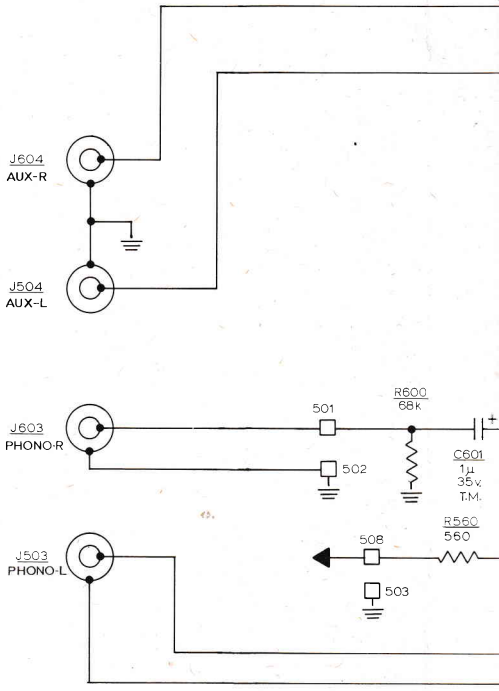
ND FUNCTION LIGHTING -A7



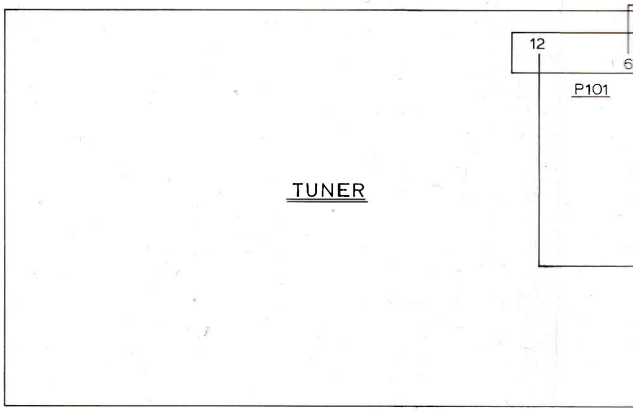
ND FUNCTION LIGHTING-A8



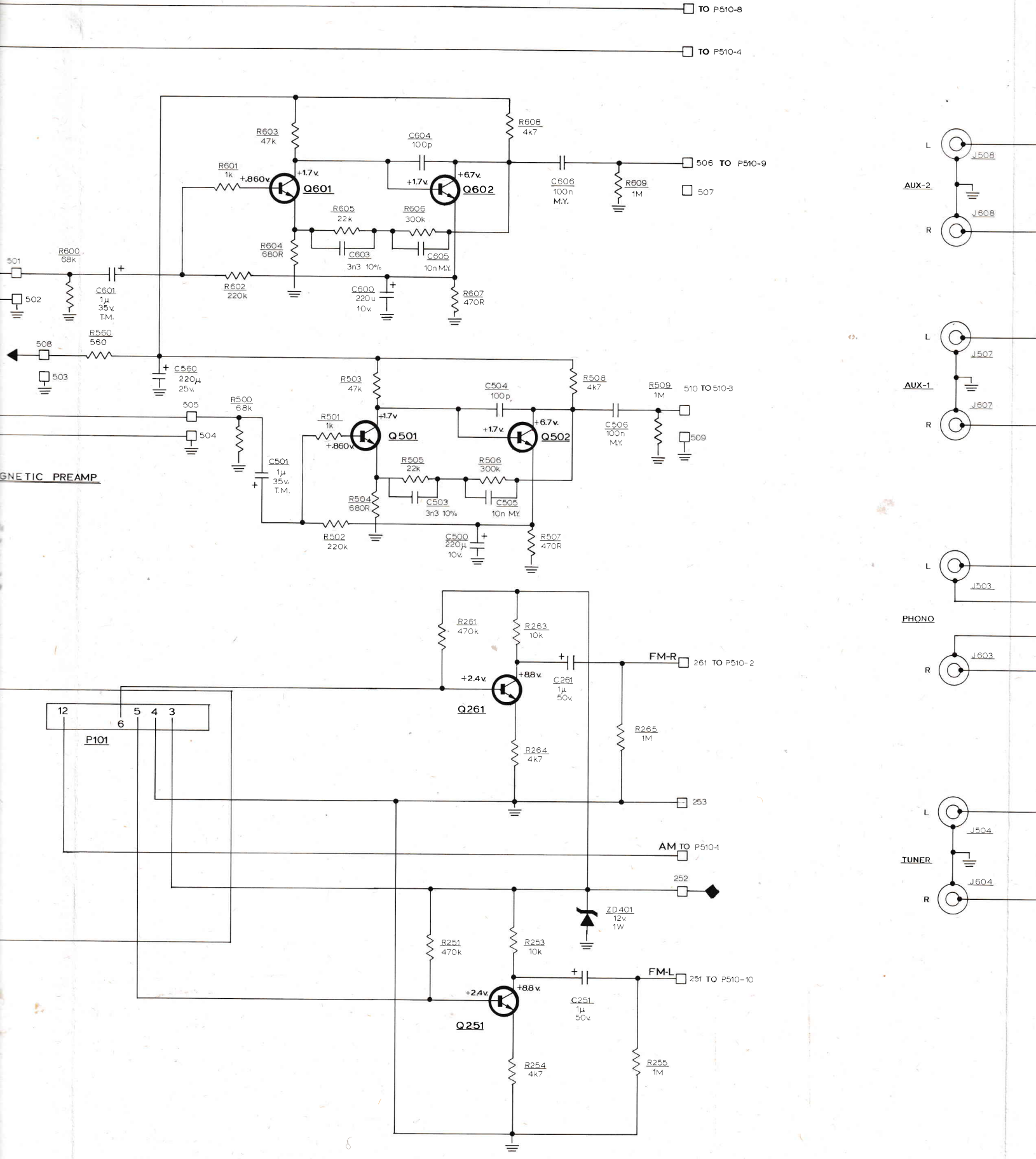
RECEIVE



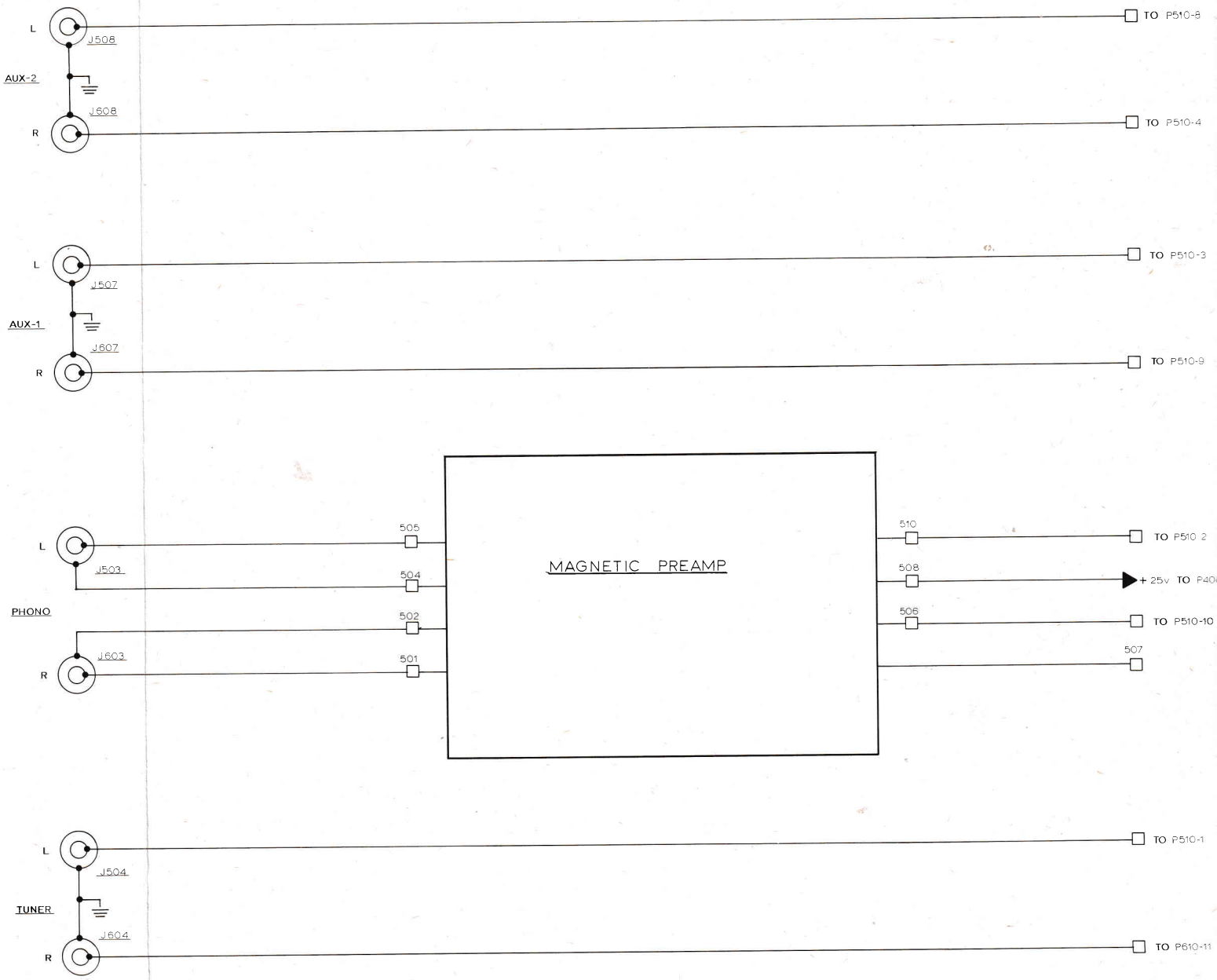
MAGNETIC PREAMP

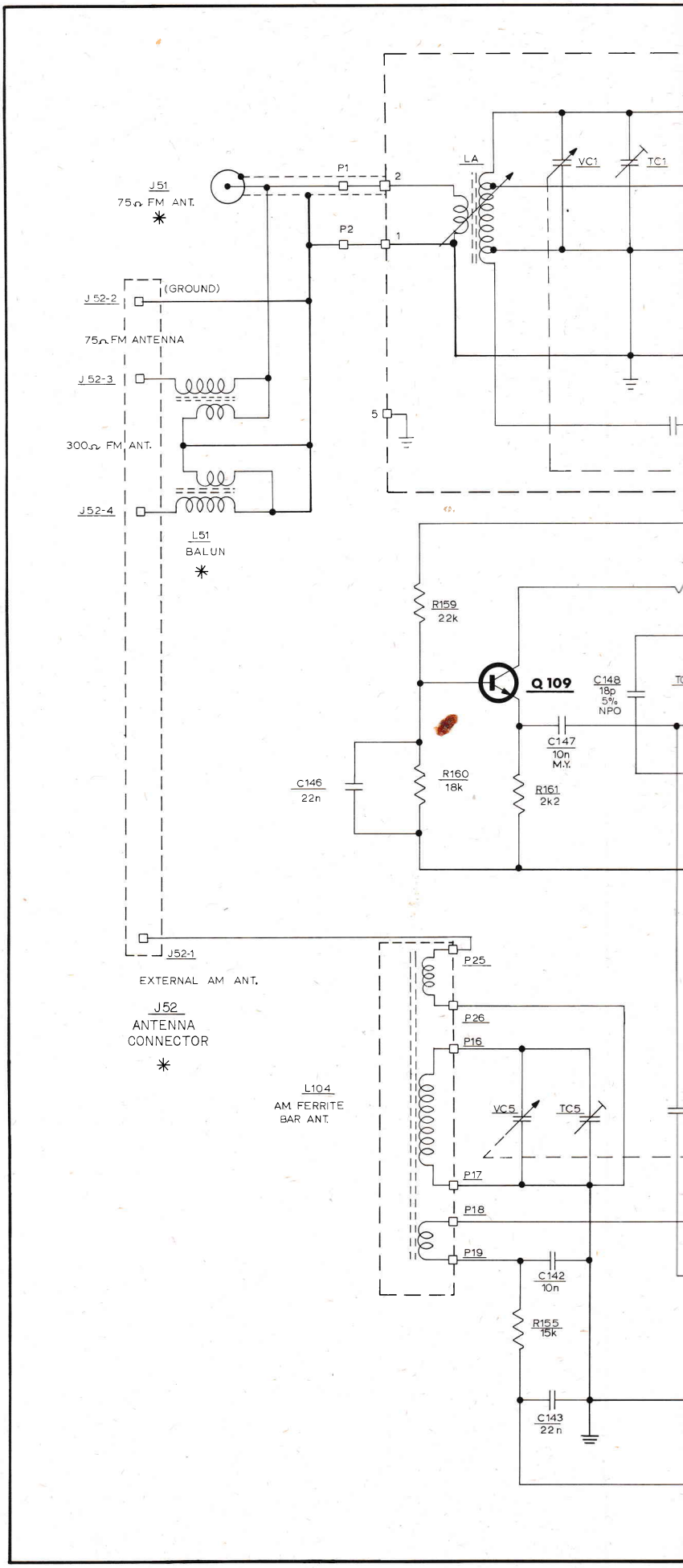


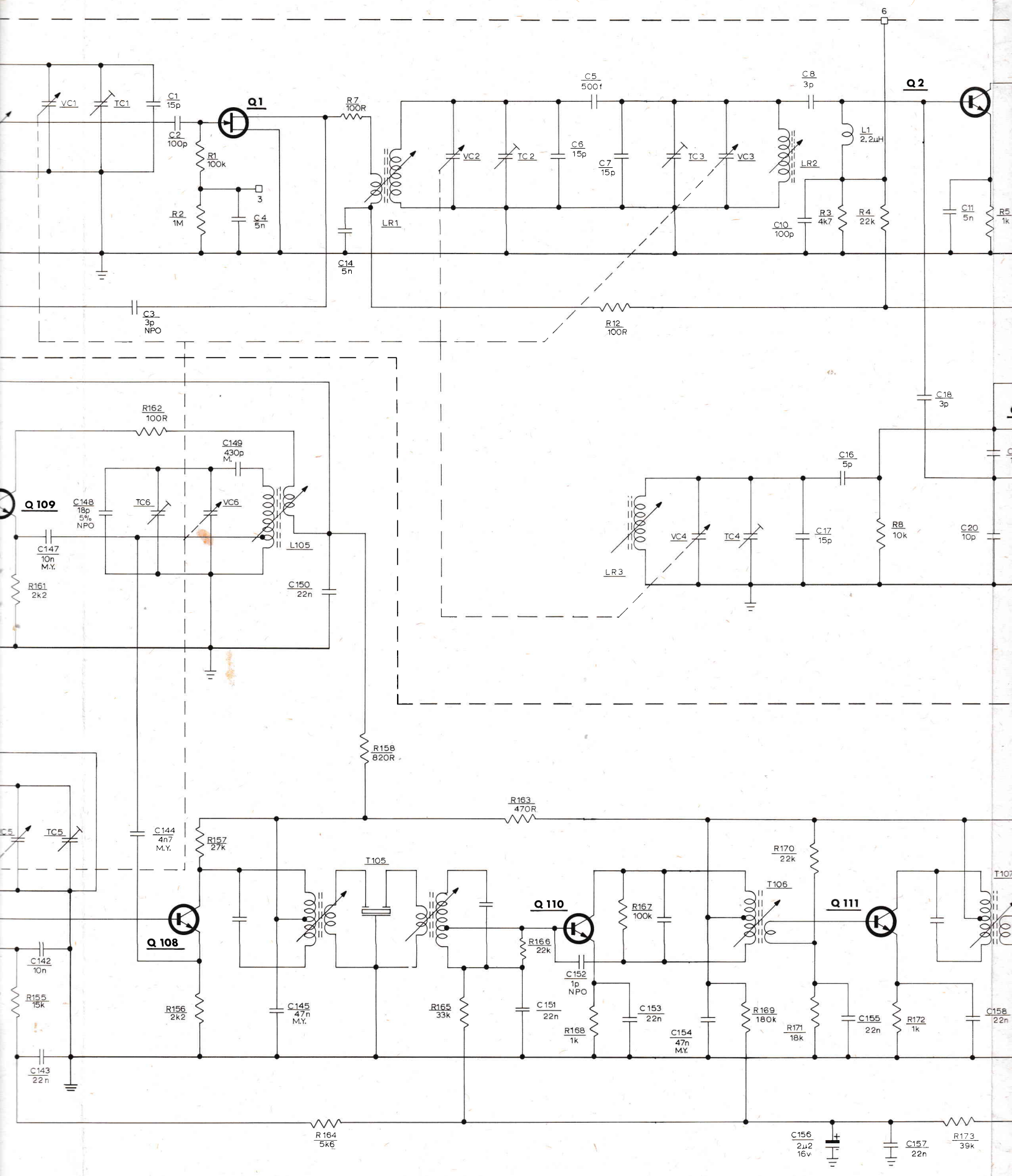
RECEIVER FUNCTION SWITCH INTERFACE

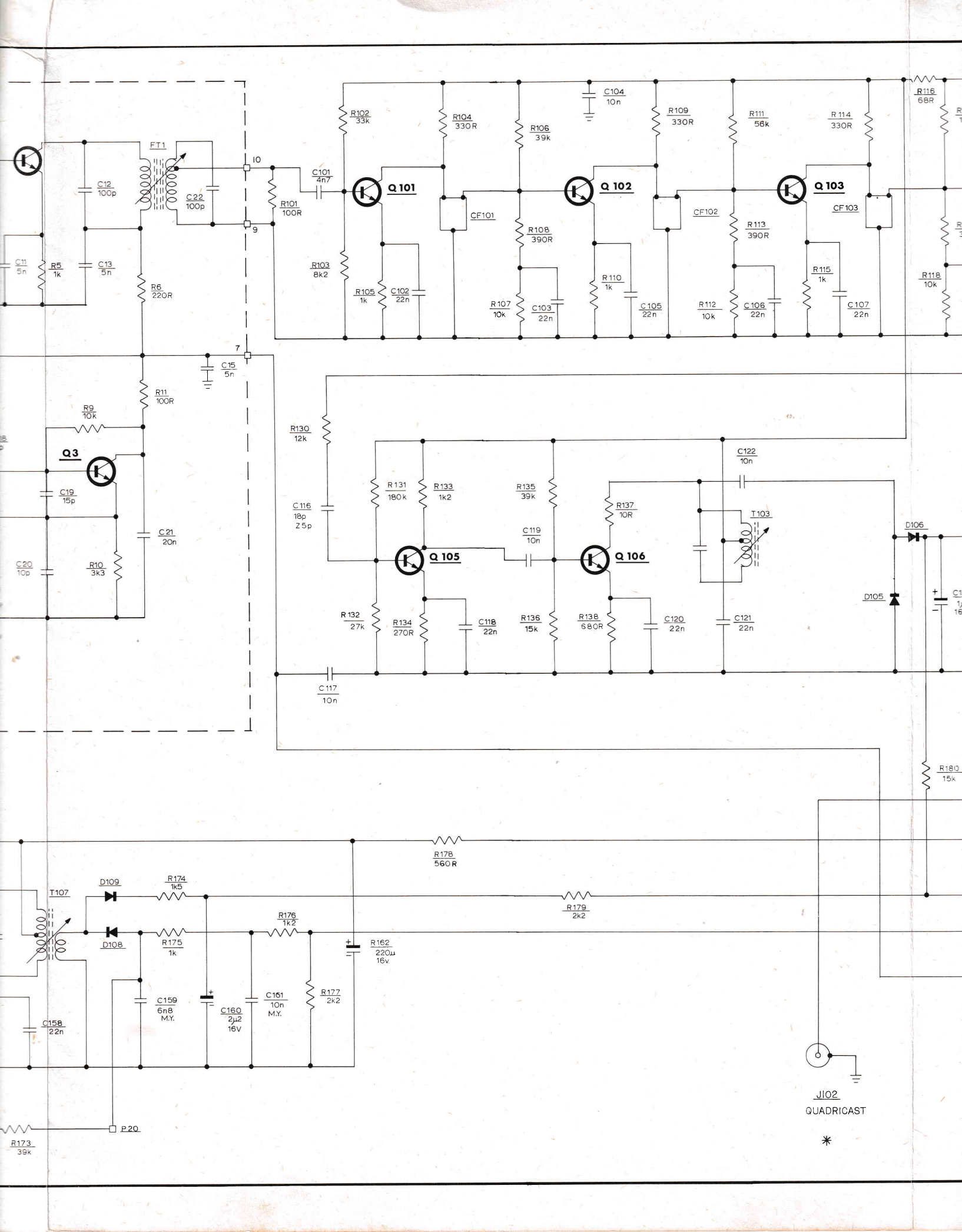


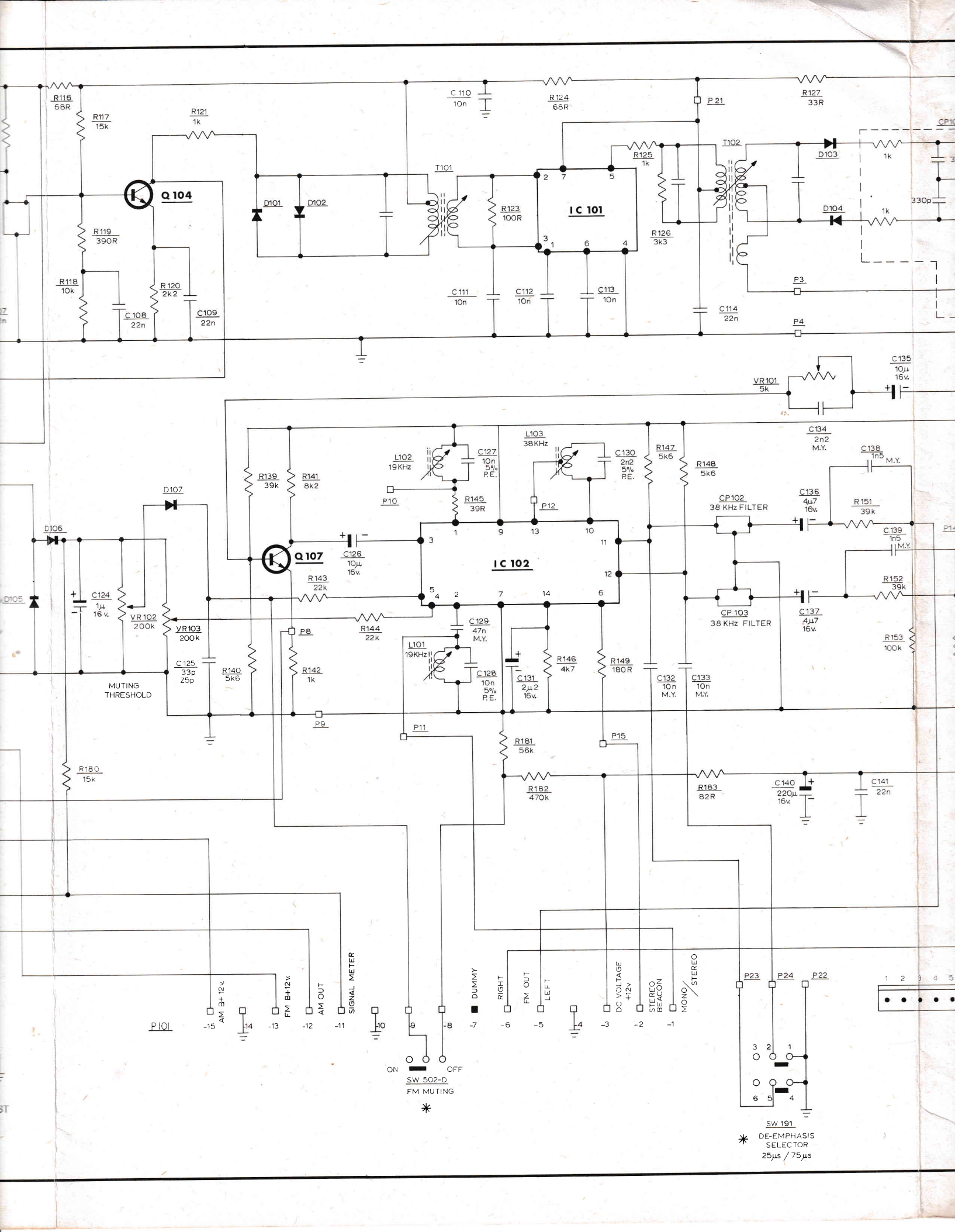
AMPLIFIER FUNCTION SWITCH INTERFACE

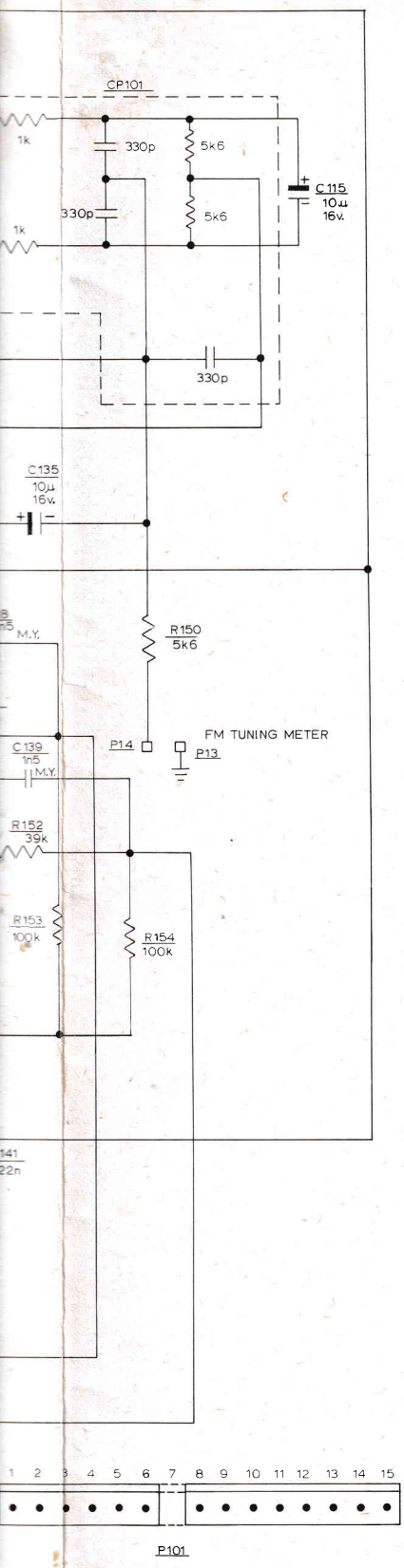



J51
75Ω FM ANT.
*
P1
P2
2
1
LA
VC1
TC1
J52-2
(GROUND)
75Ω FM ANTENNA
J52-3
300Ω FM ANT.
J52-4
5
L51
BALUN
*
R159
22k
Q109
C148
18p
5%
NPO
C147
10n
M.Y.
C146
22n
R160
18k
R161
2k2
J52-1
EXTERNAL AM ANT.
J52
ANTENNA
CONNECTOR
*
L104
AM FERRITE
BAR ANT.
P25
P26
P16
VC5
TC5
P17
P18
P19
C142
10n
R155
15k
C143
22n


6
VC1
TC1
C1 15p
C2 100p
R1 100k
R2 1M
C4 5n
3
Q1
R7 100R
C5 500f
C8 3p
Q2
L1 2.2µH
VC2
TC2
C6 15p
C7 15p
TC3
VC3
LR2
LR1
C10 100p
R3 4k7
R4 22k
C11 5n
R5 1k
C14 5n
C3 3p NPO
R12 100R
C18 3p
R162 100R
C149 430p M.
C16 5p
Q 109
C148 18p 5% NPO
TC6
VC6
L105
VC4
TC4
C17 15p
R8 10k
C20 10p
C147 10n M.Y.
R161 2k2
C150 22n
LR3
R158 820R
R163 470R
C144 4n7 M.Y.
R157 27k
T105
R170 22k
T106
Q 110
Q 111
R167 100k
Q 108
R166 22k
C152 1p NPO
C142 10n
R155 15k
R156 2k2
C145 47n M.Y.
R165 33k
C151 22n
C153 22n
R169 180k
R171 18k
C155 22n
R172 1k
C158 22n
R168 1k
C154 47n M.Y.
C143 22n
R164 5k6
C156 2µ2 16v
C157 22n
R173 39k


FT1
C12 100p
C22 100p
C11 5n
R5 1k
C13 5n
R6 220R
R11 100R
R9 10k
Q3
C19 15p
C20 10p
R10 3k3
C21 20n
C15 5n
10
9
7
R101 100R
C101 4n7
R102 33k
R103 8k2
Q 101
R104 330R
CF101
R105 1k
C102 22n
R106 39k
R107 10k
C103 22n
R108 390R
C104 10n
Q 102
R109 330R
CF102
R110 1k
C105 22n
R111 56k
R112 10k
C106 22n
R113 390R
R114 330R
Q 103
CF103
R115 1k
C107 22n
R116 68R
R118 10k
R130 12k
C116 18p Z5p
R131 180k
R133 1k2
Q 105
R132 27k
R134 270R
C118 22n
R135 39k
C119 10n
Q 106
R136 15k
R137 10R
R138 680R
C120 22n
C122 10n
T103
C121 22n
C117 10n
D106
D105
R180 15k
R178 560R
T107
D109
R174 1k5
D108
R175 1k
R176 1k2
R179 2k2
R162 220µ 16v
C159 6n8 M.Y.
C160 2µ2 16V
C161 10n M.Y.
R177 2k2
C158 22n
P20
R173 39k
J102
QUADRICAST
*


R116 68R
R117 15k
R121 1k
Q 104
R119 390R
R118 10k
C 108 22n
R 120 2k2
C109 22n
D101
D102
T101
C 110 10n
R124 68R
R123 100R
IC 101
C 111 10n
C112 10n
C113 10n
P 21
R127 33R
R125 1k
R126 3k3
T102
D103
D104
1k
330p
P3
C114 22n
P4
VR101 5k
C135 10µ 16v.
L102 19KHz
C127 10n 5% P.E.
L103 38KHz
C130 2n2 5% P.E.
R147 5k6
R148 5k6
C134 2n2 M.Y.
C138 1n5 M.Y.
R139 39k
R141 8k2
P10
R145 39R
P12
CP102 38 KHz FILTER
C136 4µ7 16v.
R151 39k
C139 1n5 M.Y.
D107
D106
Q 107
C126 10µ 16v.
IC 102
R143 22k
C124 1µ 16 v.
VR 102 200k
VR103 200k
R144 22k
C129 47n M.Y.
L101 19KHz
C128 10n 5% P.E.
C131 2µ2 16v.
R146 4k7
R149 180R
C132 10n M.Y.
C133 10n M.Y.
CP 103 38 KHz FILTER
C137 4µ7 16v.
R152 39k
R153 100k
D105
C125 33p 25p
R140 5k6
R142 1k
MUTING THRESHOLD
P8
P9
P11
P15
R180 15k
R181 56k
R182 470k
R183 82R
C140 220µ 16v.
C141 22n
P101
-15 AM B+ 12 v.
-14
-13 FM B+ 12 v.
-12 AM OUT
-11 SIGNAL METER
-10
-9
-8
-7 DUMMY
-6 RIGHT
-5 FM OUT LEFT
-4
-3 DC VOLTAGE +12v
-2 STEREO BEACON
-1 MONO / STEREO
ON OFF
SW 502-D
FM MUTING
*
P23 P24 P22
1 2 3 4 5
3 2 1
6 5 4
SW 191
* DE-EMPHASIS SELECTOR
25µs / 75µs



D.C. VOLTAGES

1. MEASURED WITH HIGH-IMPEDANCE METER & 120 V.AC. LINE.
2. ALL DC VOLTAGES INDICATED ARE POSITIVE ± 10% UNLESS OTHERWISE SPECIFIED.
3. A VOLTAGE NOT ENCLOSED AS 11v. INDICATES VALUE FOR ZERO SIGNAL AT FM FUNCTION IN "MONO" MODE.
4. A VOLTAGE ENCLOSED AS [13v.] INDICATES VALUE FOR STEREO SIGNAL AT FM FUNCTION IN "STEREO" MODE.
5. A VOLTAGE ENCLOSED AS 17v. INDICATES VALUE FOR ZERO SIGNAL AT "AM" FUNCTION.

LEGEND

1. RESISTORS - RESISTANCE IN OHMS (R or Ω), KILOHM (k), OR MEGOHMS (M), 1/4 WATT, ± 5% TOLERANCE UNLESS OTHERWISE NOTED.
2. CAPACITORS - CAPACITY IN PICOFARADS (p), NANOFARADS (n), FEMTOFARADS (f), MICROFARADS (µ); DCWV AND TOLERANCE NOTED WHERE CRITICAL.
3. SPECIAL CAPACITORS ARE IDENTIFIED AS FOLLOWS:
   - P.S. — POLYSTYRENE
   - P.P. — POLYPROPYLENE
   - M.Y. — METALIZED MYLAR
   - M. — MICA
   - NP — NON-POLARIZED
   - TM — TANTALUM
   - CM — COMPOSITION
   - NPO — TEMPERATURE COEFFICIENT = NEGATIVE POSITIVE ZERO
   - N150 — TEMPERATURE COEFFICIENT = NEGATIVE 150/P/M/°C
4. INDUCTORS - INDUCTANCE IN MICROHENRIES (µH).
5. ZENER DIODES - ZENER VOLTAGE IN VOLTS.
6. ELECTROLYTICS & TANTALIUMS — CAPACITY IN (µ) MICROFARADS, DCWV IN (v) VOLTS.

MULTIPLIER NOTATION

MULTIPLIER	PREFIX	SYMBOL
10^{6}	MEGA	M
10^{3}	KILO	k
10^{-3}	MILLI	m
10^{-6}	MICRO	µ
10^{-9}	NANO	n
10^{-12}	PICO	p
10^{-15}	FEMTO	f

EXAMPLES FOR CAPACITORS AND RESISTORS

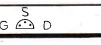
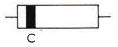
2n7 = 2.7n = 2.7 x 10^{-9} FARAD = .0027 µF = 2700 pF

4µ7 = 4.7µ = 4.7µF

2k2 = 2.2 kΩ
180R = 180Ω
5R6 = 5.6Ω

NOTE: ON TUNER PC BOARD ROADMAP THE SYMBOL NUMBER FOR TRANSISTOR MAY READ "TR" INSTEAD OF "Q".

I.C., TRANSISTOR AND DIODE CHART

SYMBOL	TUNER REF. NUMBER	ELECTROHOME PART NO.	BASING	FUNCTION
IC 101	UPC 577H	ZM 37901002		FM GAIN AND LIMITER
IC102	UPC 554C	ZM 37901003		MULTIPLEX DECODER
Q101	2SC839	ZM 35045806		1st FM IF AMP
Q102				2nd FM IF AMP
Q103				3rd FM IF AMP
Q104				4th FM IF AMP
Q105				1st FM SIGNAL AMP
Q106				2nd FM SIGNAL AMP
Q107				FM AUDIO PRE-AMP
Q108				AM RF AMP AND MIXR
Q109				AM OSCILLATOR
Q110				1st AM IF AMP
Q111				2nd AM IF AMP
Q2	2SC535			FM MIXER
Q3	2SC461			FM OSCILLATOR
Q1	2SK19			FM RF AMP
D101	OA90	ZM 36002511		LIMITER DIODES
D102				
D103	20A90	ZM 36002513		RATIO DETECTOR DIODES
D104				
D105				METER RECTIFIERS
D106				
D107				MUTING RECTIFIER
D108				AM DETECTOR
D109				METER RECTIFIER

THE DASH NUMBERS OF NEW ELECTROHOME TRANSISTOR PART NUMBERS RELATE TO LEAD IDENTIFICATION: EMITTER-1, BASE-2, COLLECTOR-3. READ FIRST TWO LEADS FROM LEFT, WHILE LEADS ARE FACING YOU AND FLAT (OR OPEN TRIANGLE) POINTS DOWNWARD. ALTERNATE BASING MAY BE USED -12, -32, -23 IN ORDER OF PREFERENCE.

✳ ASTERISK DESIGNATES EXTERNAL TUNER ASSOCIATED PARTS.

AUDIOPHILE TUNER

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