

F 300 EXPANDER/GATE

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1. INTRODUCTION

The F 300 Expander-Gate is a sophisticated device whose unique design characteristics include averaging as well as peak sensing side chains and variable slope/range control. Boasting EXPANDER or NOISE GATE operating modes and exclusive 'anti-hunting' circuits the F 300 can handle complex waveforms of widely varying dynamics effortlessly, thus providing those comprehensive facilities now demanded by the discerning Sound Engineer.

The operating instructions in this manual are divided into two parts:

- i) operational — aimed at the user
- ii) technical — for the user's maintenance department.

Whereas it is not essential that all users are necessarily familiar with both parts, an initial reading is recommended for overall understanding and appreciation.

Wherever possible pictures are used to give a clear indication and explanation — any queries raised should be directed to your local distributor or, if more convenient, directly to Sales Admin. at Audio & Design.

We believe that the most can only be got out of your new investment by understanding it fully; with that in mind —

— *HAPPY READING!* —

2 OPERATIONAL SECTION

2.1 Controls

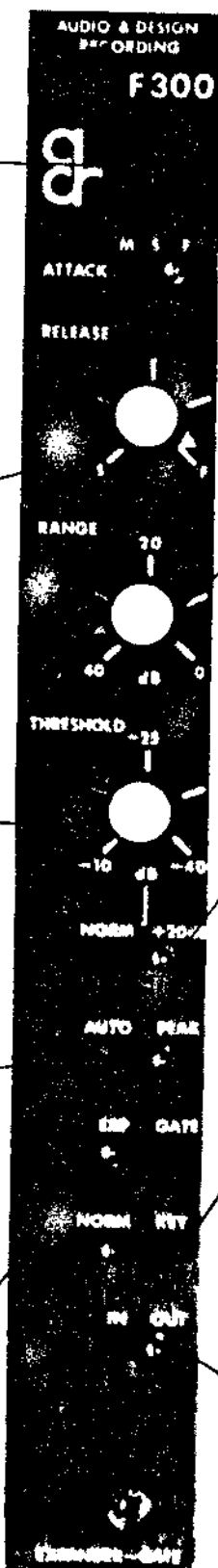
INDICATOR. A green light indicates the operational status of the device:
 FULLY ON — unity gain
 FULLY OFF — max. attenuation.
 The light's ballistics give an indication of the degree of attenuation occurring.

RELEASE controls the 'close' time or attenuation rate when the signal has fallen below the threshold level.
 Operates on 'PEAK' sensing only.
 25mS — 2.5 Secs

THRESHOLD sets the point at which the device changes from a 1:1 unity gain device to an attenuating slope.

AUTO/PEAK. Peak sensing side chain operates on selection of 'PEAK'; in the AUTO mode an averaging side-chain functions with the 'PEAK' side chain operating 10dB above it.

EXPANDER/GATE. The 'EXP' position operates giving variable slope as the 'RANGE' control is adjusted; the 'GATE' mode selects a fixed 20:1 slope.



ATTACK determines the 'open' speed of the device:

F	— 25 μ S	} per 40dB
M	— 1mS	
S	— 10mS	

RANGE. The 'Range' control determines the maximum attenuation setting which is variable from 0-40dB. In the 'EXP' mode (below) the slope varies from 1:1 for 0dB; 1.5:1 @ 10dB; 2:1 @ 20dB and 3:1 @ 40dB

NORM/ +20dB. The 'NORM' threshold position relates to the marking on the threshold control; the +20dB position (for effects) raises the threshold levels by 20dB (i.e. -10 to +10dBm).

NORM/KEY. In the 'KEY' mode an external source can be used through the separate balanced input to open the device.

IN/OUT by-passes the varioloss amplifier, but retains balanced drive capability.

2. OPERATIONAL SECTION

2.2. Establishment in the Channel

The module is designed for incorporation into a SCAMP rack system. (If supplied without the rack/power supply it will be necessary to provide a split rail $\pm 28\text{v}$ and 0 $\pm 10\%$ supply well smoothed). Each module has its own regulation chips, but care should be taken to ensure proper regulation is being obtained.

Supplied as a rack system, the unit comes complete with power pack. It is necessary only to wire inputs and outputs to the solder pins on the p.c. mounted mother board as per 'Module Connections' (ref. 3.2). It is suggested that the rack be wired to a patch panel to enable easy routing as required. There could be advantages in arranging the units to be inserted into the desk system just before channel faders, since any noise contributed by channel EQ will also be attenuated.

The inputs and output are electronically balanced floating. The input impedance is $40\text{k}\Omega$ for unbalanced use; the negative input is grounded at the source. A 600Ω load resistor can be strapped across if termination of 600Ω line is required. The output has a very low source impedance and will drive 600Ω balanced/unbalanced to $+24\text{dBm}$. A 6dBm attenuator switch is on the board to give unity gain under balanced drive conditions; this must be switched to 'unbalanced' prior to grounding the audio return.

The SCAMP rack itself should not be mounted directly above equipment producing large amounts of heat, e.g. valve power amps. A gap above the rack of 1u or $1\frac{3}{4}$ inches is also recommended for connection cooling, in any case the equipment should not be operated where ambient temperatures are likely to exceed 130°F (54°C).

2. OPERATIONAL SECTION

2.3 Application Notes

Noise reduction: a complementary system (e.g. Dolby; DBX) will increase the dynamic range of the tape medium, but cannot help in attenuating unwanted source noises such as ambience, cross-mic pickup, rumble, hum, hiss etc.

The F 300 is a 'single-ended' processor that will dramatically clean up low level noise, though, used in this way, will not increase the dynamic range of the transmission channels. Where the dynamic requirements of each signal track are reasonable (not exceeding 40-50dB), complementary noise reduction would be unnecessary and the F 300 alone will prove entirely satisfactory, since noise build-up in multi-track mix down is prevented by either signal masking or automatic channel attenuation as useful signal ceases to be present on given track.

In this application units can more or less be pre-set, assuming a standard recording practice is adopted in the use of tracks and that channel levels are fully modulated. On mix-down through the expander the overall signal dynamics can be wider than individual tracks, dependent on channel fader level setting between signals. A typical control setting might be: Attack set 'F'; Release 'F'; Range 40dB; Threshold -25 (NORM); AUTO sensing; EXPAND. Where wider dynamics are required a lower threshold of -40 would be set or the RANGE reduced to 20dB to obtain a softer expand slope (2:1). In practice, for 'pop' applications it will be found that higher rather than lower thresholds will be required in order to reduce studio source noise and cross talk, since dynamics on individual tracks are limited, with settings of -10dBm being not uncommon.

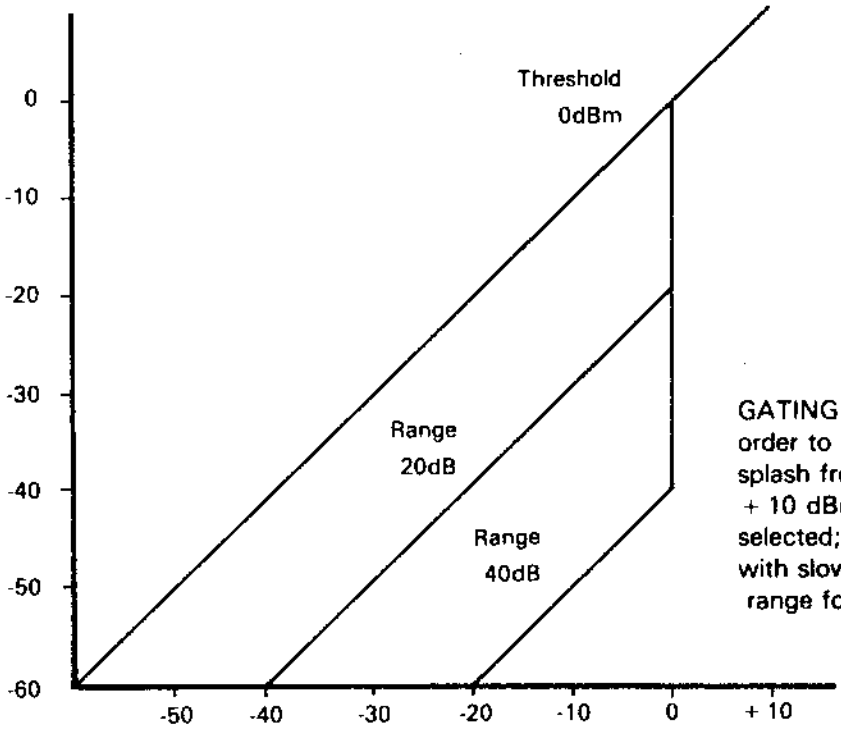
The idea is, of course, to get rid of the low level noise content as soon as the level of wanted signal has fallen; so thresholds will be set as high as possible consistent with this and release times kept reasonably short.

On occasions it will be necessary to compromise between having all the signal and getting rid of a high level of source noise (usually cross-mic pickup), and it may be necessary to expand or gate out the bottom part of the wanted signal by setting a higher threshold level.

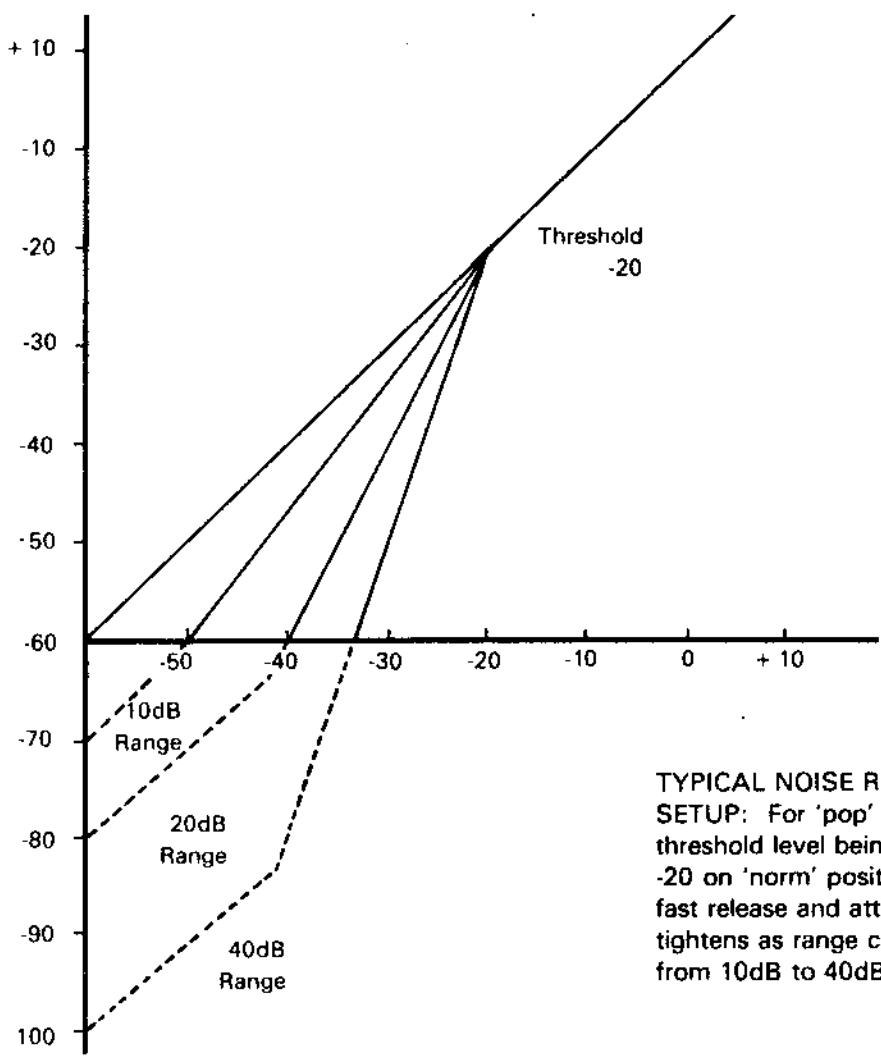
At this point one is verging on use of the device for effect (e.g. drum track punching through a slow attack at high threshold with fastest release in the PEAK mode).

2 OPERATIONAL SECTION

2.3 Application notes ctd



GATING THE BASS DRUM TRACK In order to reduce cross-mic pickup and splash from hi-hat threshold at 0 or + 10 dBm with + 20 threshold range selected; use peak sensing gate mode with slow attack and fast release; adjust range for attenuation.



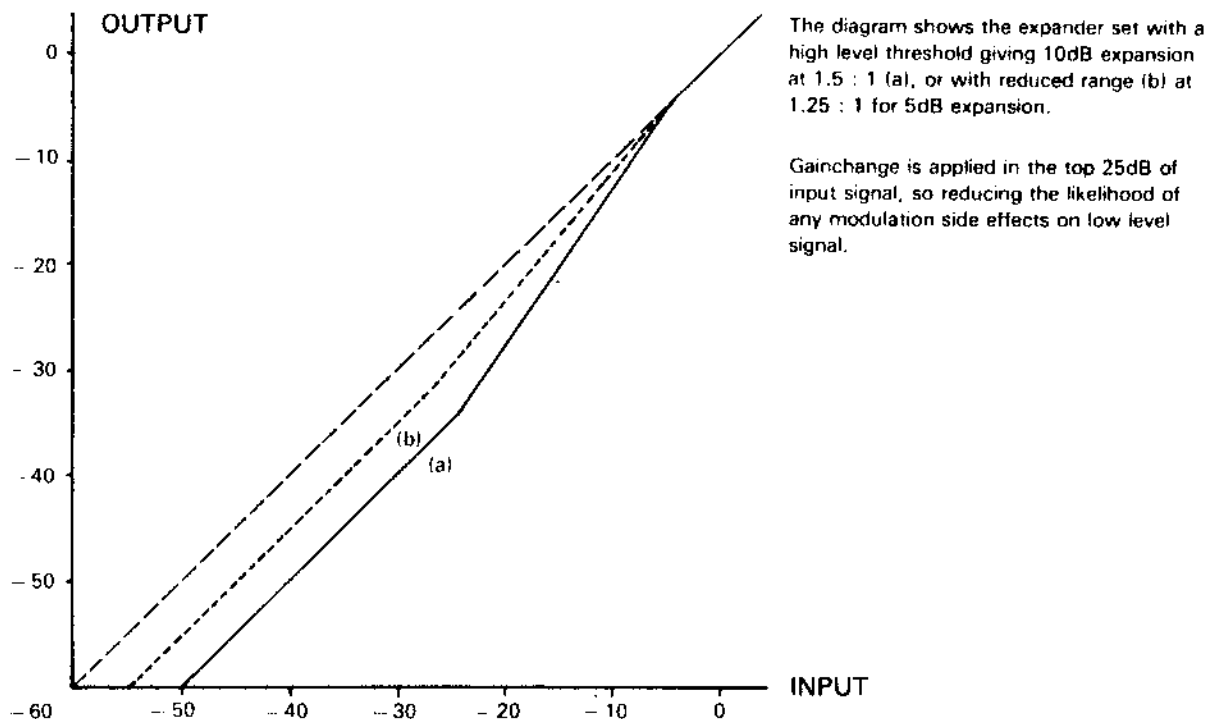
TYPICAL NOISE REDUCING SETUP: For 'pop' work typical threshold level being between -10 and -20 on 'norm' position; 'auto sensing, fast release and attack. Note how slope tightens as range control is increased from 10dB to 40dB attenuation.

2. OPERATIONAL SECTION

2.3 Application Notes ctd

Of course, one *can* expand the dynamic range of the signal itself; applying this either to the high or low end of the signal. It is least noticeable when applied to high signal level rather than low signal (since noise cannot then be modulated). The RANGE control will determine the amount of expansion (e.g. 10dB RANGE will give 10dB expansion at 1.5 : 1 slope.), and the threshold will be set so high that the unit is just coming out of attenuation on peaks (i.e. indicator light just coming on). This will be quite subtle and could be used to reprocess older classics in combination with the dynamic noise filters (SCAMP S 05 & S 06). The position of the threshold and the input signal will determine the portion of the signal being expanded.

HIGH LEVEL EXPANSION



Naturally the availability of expanders should not detract from efforts to obtain good mic placement. The better the separation to start with, the easier it will be to use expanders to obtain clean, tight, effective results. To this end it is preferable to have a 'dead-ish' acoustic so that ambient changes are less detectable as channels open and close. The send to an echo device should be sourced from after the expanders. If the reverberation system itself proves to be a source of noise, it could well be worth applying a complementary noise reduction system around it; since this, more than tape, has need of a wider dynamic range and will provide the low level reverberant ambience to the signal.

3. TECHNICAL SECTION

3.1. General Description & Design

3.1.1 Technical Specification

INPUT:	<10k Ω balanced — unity gain
OUTPUT:	<1 Ω unbalanced — maximum + 24dBm (unity). balanced
DISTORTION:	<0.1% THD at line levels rising to a maximum of 0.3% for 10dB expansion (worst case)
RESPONSE:	\pm 0.5dB 20Hz — 20kHz
THRESHOLDS & NOISE	Normal: -40 to -10dBm noise < -98dBm ref + 8dBm (wt. -3dB @ 25kHz). Effects: -20 to + 10dBm noise < -86dB ref + 8dBm (wt. -3dB @ 25kHz)
RELEASE (close):	25mS — 2.5Secs
ATTACK (open):	25 μ S/40dB (fast); 1mS (medium); 10mS (slow)
RANGE:	0 — 40dB continuously variable
SLOPES:	Expand: 1:1 to 3:1 1.5 : 1 at 10dB range 2:1 at 20dB range 3:1 at 40dB range
AUTO MODE:	Gate: 20:1 (with hysteresis) an averaging characteristic network, operating 10dB below the peak sensing side-chain threshold
FORMAT:	Card module 1x8" for SCAMP rack system
POWER:	\pm 24v on module)
SYSTEM CODE:	F 300-S (module only) F 316-R sixteen modules in rack system complete with power supply unit. F 308-R eight modules in rack system complete with power supply unit.

The rack will accept other SCAMP modules.

3. TECHNICAL SECTION

3.2 Module Connections

1	+ Ve in
2	-Ve in
3	0v
4	0v
5	Stereo link S 05
6	Stereo link S 06
7	+ 48v Phantom Supply
8	0v Phantom Supply
9	Stereo link S 01
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	Output + phase
20	Output -phase
21	Earth
22	Key input + phase
23	Key input -phase
24	Chassis earth
25	Input + phase
26	Input -phase
27	Chassis earth

Input Connections

From *balanced*/ floating source: Connect + and -phase as normal.

From *unbalanced* source: Connect - phase to signal earth of source, + phase to signal output of source, earth to chassis earth of source.

Output Connections

To *balanced*/ floating load: Switch on board to '*BAL*', connect + and - phase and chassis earth as normal.

To *unbalanced* load: Switch on board to '*UNBAL*'. Connect - phase to signal earth of load, + phase to signal input of load, earth to chassis earth of load.

N.B.. Tracks 34 through 45 should be cut with a track cutter between channels.

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3. TECHNICAL SECTION

3.3 Setup Procedure

3.3.1 Common Mode Rejection

Input Amp

Set front panel controls:

System out.

- i) Feed in 0dB @ 1kHz on pins 27 - 0v/ 25 Phase.
Connect Phase and inverted inputs together (Pins 25 and 24).
- iii) Adjusting pre-set No.1, read output to measure -70dBm or better.
- iv) Increase frequency to 10kHz and check output measures -50dBm or better.
- v) Reconnect inputs for normal operation.
N.B. Ground inverted input for unbalanced system.

Key Amp

Set front panel controls:

System remains out.

- vi) Feed in 0dBm @ 1kHz on pins 24 -0v/ 22 -Phase.
- vii) Connect phase and inverted inputs together (pins 22 and 23).
- viii) Adjusting pre-set No.2, read output to measure -70dBm or better.
N.B. Output for key amp obtained at T.P.3.
- ix) Increase frequency to 10kHz and check output measures -50dBm or better.

3. TECHNICAL SECTION

3.3 Setup Procedure ctd.

3.3.2 Rectifier Balance

Set front panel controls:

Attack sw	F
Release pot	Fast
Range pot	40dB
Threshold pot	-40dB

Switches	Norm	→	+ 20
	Auto	→	Peak
	Exp	←	Gate
	Norm	←	Key
	In	←	Out

- i) Feed in 0dBm @ 1kHz.
- ii) Back off threshold pot until rectifier is out of saturation.
- iii) Balance rectifier wave form via pre-set No.7 at T.P.1.



Correct



Incorrect

3.3 TECHNICAL SECTION

3.3 Setup Procedure ctd.

3.3.3 Inverter Offset

Set front panel controls:

Attack sw	F
Release pot	Fast
Range pot	40dB
Threshold pot	-40dB

Switches	Norm	←	+ 20dB
	Auto	→	Peak
	Exp	→	Gate
	Norm	←	Key
	In	←	Out

- i) Feed in 0dBm @ 1kHz.
- ii) Set T.P.2 to 0v pre-set No.6 ± 10 mv
N.B. Use D.V.M. 1 Volt scale measure between 0v and T.P.2.
- iii) Switch from Norm → Key.
T.P.2 should rise F to 7 Volts positive.

3.3.4 Range

Set front panel controls:

Attack sw	F
Release pot	Fast
Range pot	40dB
Threshold pot	-40dB

Switches	Norm	←	+ 20dB
	Auto	→	Peak
	Exp	→	Gate
	Norm	→	Key
	In	←	Out

- i) Feed in -10dBm @ 1kHz.
- ii) Adjust pre-set No.5 for -53dBm at the output.
(Biased to 43dB attenuation.)

3. TECHNICAL SECTION

3.3 Setup Procedure ctd

3.3.5 Rectifier Offset

Set front panel controls:

Attack sw	F
Release pot	Fast
Range pot	40dB
Threshold pot	-40dB

Switches	Norm	←	+ 20dB
	Auto	→	Peak
	Exp	←	Gate
	Norm	→	Key
	In	←	Out

- i) Feed in -10dBm @ 1kHz.
- ii) Adjust pre-set No.8 to raise output from -53dBm to -52dBm.

3.3.6 Distortion

Set front panel controls:

Attack sw	F
Release pot	Fast
Range pot	40dB
Threshold pot	-40dB

Switches	Norm	←	+ 20dB
	Auto	→	Peak
	Exp	←	Gate
	Norm	←	Key
	In	←	Out

- i) Feed in 0dBm @ 1kHz (Null frequency).
- ii) Read distortion to be better than 0.1%. (adjust preset No. 3)
- iii) Now recheck output at 3.3.4 and 3.3.5. If necessary re-adjust pre-set No.5.
- iv) Switch from Peak to Auto. Output should not vary.
- v) Switch from Key to Norm, increase and decrease range. Output should not change by more than 1-1.5dB, ie -10 to -11.5dBm.

3. TECHNICAL SECTION

3.3 Setup Procedure ctd.

3.3.7 Auto Function/ Peak Function

Auto Function

Set front panel controls:

Attack sw	F
Release pot	Fast
Range pot	40dB
Threshold	-10dB

Switches	Norm	←	+ 20dB
	Auto	←	Peak
	Exp	←	Gate
	Norm	←	Key
	In	←	Out

- i) Feed in -20dBm @ 1kHz.
- ii) Turn threshold pre-set to No.4 out, ie fully clockwise.
- iii) Increase and decrease range.
 - Output should vary by 2 to 3dB, ie -20 to -23dBm.

Peak Function

- i) Switch from Auto to Peak, check range is at 40dB.
- ii) Adjust pre-set No.4 until output reads -30dBm.
- iii) Switch back to auto output should recover to -20 (±3)

3.3.8 Gating

Set front panel controls:

Attack sw	F
Release pot	Fast
Range pot	40dB
Threshold pot	-10dB

Switches	Norm	←	+ 20dB
	Auto	→	Peak
	Exp	→	Gate
	Norm	←	Key
	In	←	Out

- i) Feed in -10dBm @ 1kHz.
- ii) Reduce input level until output switches down. Now increase input level until output is recovered.

Check Hysteresis. Gating should occur after input is reduced by 5-7dB and output should recover after input is then increased by 7-10dB. (25-45° knob rotation)

3. TECHNICAL SECTION

3.3 Setup Procedure ctd

3.3.9 Attack

Set front panel controls:

Attack sw	F
Release pot	Fast
Range pot	40dB
Threshold pot	-40dB

Switches	Norm	→	+ 20dB
	Auto	→	Peak
	Exp	←	Gate
	Norm	←	Key
	In	←	Out

- i) Feed in -10dBm @ 1kHz
- ii) Reduce threshold pot until output drops 10dB
- iii) Switch attack to 'S' — output should drop a further 7dB
- iv) Switch attack to 'M' — output should recover approx 2 – 5dBs

3.3.10 Lamp

- i) Increase threshold so output is -15dBm.
- ii) Adjust pre-set No.9 so that the lamp is just on.

3.3.11 Release

Set front panel controls:

Attack sw	F
Release pot	Fast
Range pot	40dB
Threshold pot	-10dB

Switches	Norm	←	+ 20dB
	Auto	→	Peak
	Exp	←	Gate
	Norm	←	Key
	In	←	Out

- i) Feed in 0dBm @ kHz.
- ii) Switch from Norm to Key. Output should drop instantly.
- iii) Switch back to Norm. Output will recover.
- iv) Increase Release to 'S'.
- v) Switch from Norm to Key. Output should drop slowly and should take approx 2.5secs to fully attenuate output.

3. TECHNICAL SECTION

3.3 Setup Procedure ctd

3.3.12 Frequency Response & Noise

Set front panel controls:

Attack sw	F
Release pot	Fast
Range pot	40dB
Threshold pot	-40dB

Switches	Norm	←	+ 20dB
	Auto	→	Peak
	Exp	←	Gate
	Norm	←	Key
	In	←	Out

- i) Feed in 10dBm @ 1kHz
- ii) Output should be 10dBm -(REF)
- iii) Decrease frequency, sweeping to 20Hz. Output should not vary by more than + 0 - 0.5dB.
- iv) Increase frequency, sweeping to 25kHz. Output should not vary by more than + 0 - 0.5dB.
- v) Adjust Range pot to 0dB.
- vi) Remove input at pin 25 and connect pin 25 to pin 27. (Ref input to 0v)
- vii) Measure noise to be better than -90dB ref to 0dBm, on wt. curve network -3dB @ 20Hz and -3dB @ 25kHz.

3 TECHNICAL SECTION

3.4 Routine Servicing

3.4.1 Preventative Maintenance

The F 300 Expander-Gate is an all transistor device, thus the only maintenance necessary is to keep the unit clean. (Contaminants may lead to short circuits, high resistance or generally erratic operation.)

The front panel is of brushed anodised aluminium hence any proprietary household detergent should do the job without fear of damage to nomenclature or plastic parts.

The pots/switches are not, in the interest of economy, hermetically sealed and hence may in time become erratic because of wear, corrosion or dirt deposits. They may be cleaned with a commercial spray type contact cleaner but avoid letting excess cleaner contaminate other parts. Alignment instructions included in this manual are mainly for reference, it is recommended that only skilled, experienced and suitably equipped technicians attempt maintenance. (See also 3.4.3 Factory Servicing).

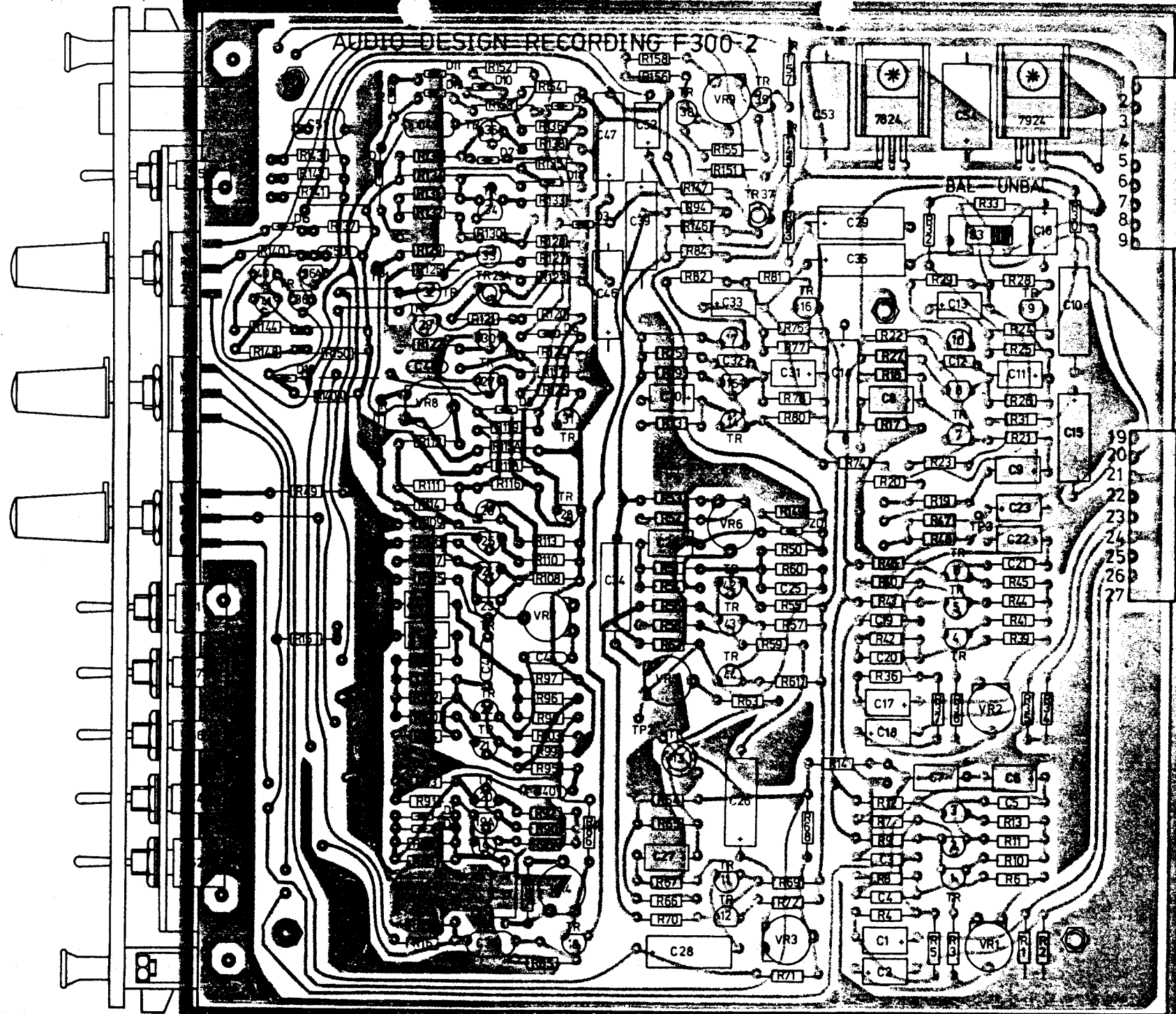
3.4.2 Fault Repair Maintenance

The F 300 Expander-Gate is of highly advanced circuit design and technology. Where failure occurs it is advisable that repairs be performed by the factory, where specific skills and correct parts are available. Customer initiated repairs should only be attempted by competent technicians experienced in the area of linear IC's (where applicable) and skilled in the art of working on double-sided printed circuit boards. Additionally, a number of specialised parts are used which must be replaced by direct equivalents or performance degradation may occur.

3.4.3 Factory Servicing

Servicing is available at any time after expiry of the warranty (ref. 4.0), at a reasonable charge for parts, labour and handling. However, before returning the unit to us, it would be prudent to write or telephone, giving as much information about the fault as is to hand. Often the problem may be resolved in this fashion saving everybody time, effort and money whilst minimising your inconvenience.

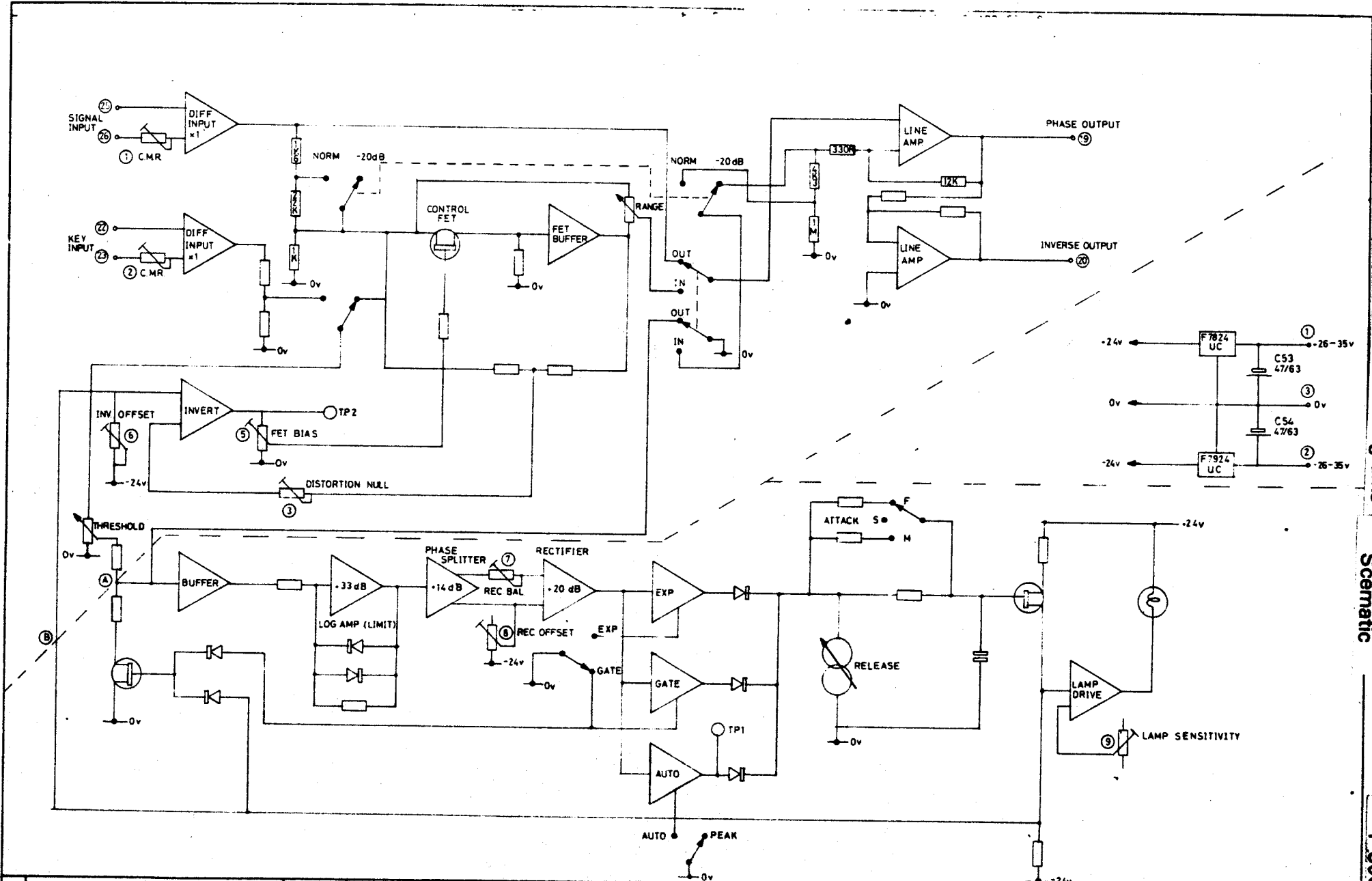
AUDIO DESIGN RECORDING F300-2



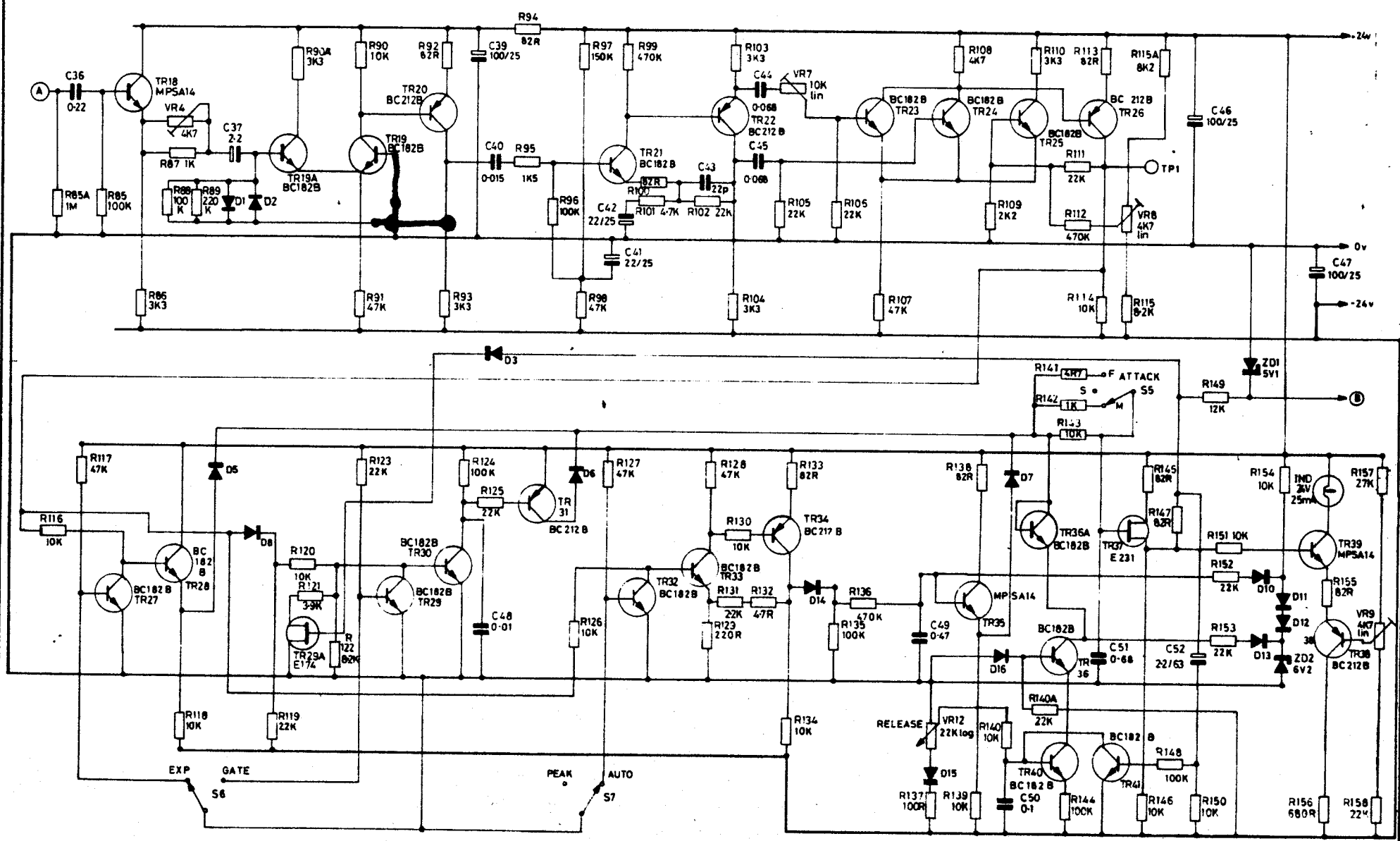
HT +ve
HT -ve
0V

PHASE 0/P
INVERSE 0/P

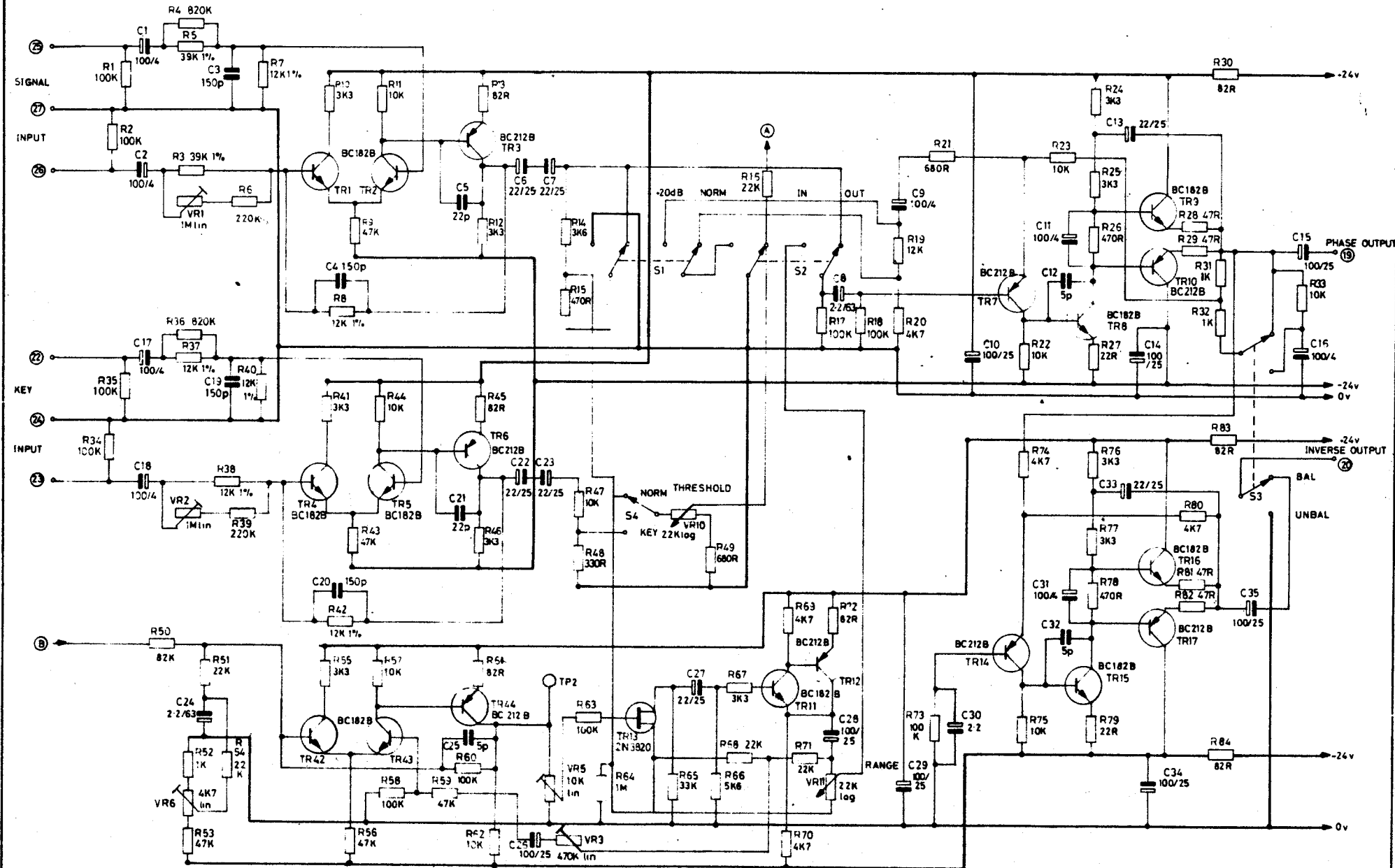
KEY I/P +ve
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0V
SIGNAL I/P +ve
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MATERIAL		FINISH		SCALE		TITLE	
				1/8" = 1"		F300-2 SCHEMATIC	
A		AUDI & DESIGN RECORDING FRANBORNE ASSOCIATES		DATE		DRG No ADR-0232-S	
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		DIODE D9 DELETED,		MATERIAL		FINISH		<small>UNLESS OTHERWISE SPECIFIED: RESISTORS - 1% TOLERANCE CAPACITORS - 5% TOLERANCE DIMENSIONS - DECIMALS IN INCHES PLACES DECIMALS & DIMENSIONS SHALL BE TO UNLESS OTHERWISE SPECIFIED</small>		SCALE		<small>DATE</small> <small>SIG.</small> <small>ISS.</small>		TITLE F300-2 SIDE-CHAIN		A2	
A		ALTERATION		USED ON				AUDIO & DESIGN RECORDING CRANBOURNE ASSOCIATES		DATE 3/6/76		SIG.		DRG. No. ADR-0234-C1			



ALTERATION		USED ON	MATERIAL	FINISH	SCALE	TITLE
ISS						F 300-2 MAIN AUDIO PATH
						DRG No ADR-0233-C 1
					DATE	SIG.
					2/6/76	ISS

AUDIO & DESIGN RECORDING
CRANBOURNE ASSOCIATES