SERVICE MANUAL

THORN

AUDIO SYSTEM 80
MODELS 820, 851 & 854

TECHNICAL SPECIFICATIONS

AMPLIFIER

Power output	Continuous power output of 25 watts per channel min. into 8Ω from 40-20,000 Hz with no more than 0.5% total harmonic distortion
PHONO frequency response (RIAA equalization)	70-15,000 Hz
input sensitivity/impedance	PHONO: 2.5mV/50kΩ AUX: 150mV/30kΩ MIC: 4.5mV/10kΩ TAPE MONITOR: 150mV/30kΩ
Output level/Impedance	REC OUT: 150mV/10kΩ HEADPHONE: 8-600Ω SPEAKER: 8Ω

TUNER

FM

Frequency range	88-108 mHz
Usable sensitivity	3.0μV
50dB quieting sensitivity	mono 20μV stereo 90μV
Stereo separation	35dB (at 1 kHz)
Capture ratio	2.5dB
Selectivity	50dB
Signal-to-noise ratio 55uV input	70dB (mono) 65dB (stereo)

AM

Frequency range	525-1,620 kHz
Usable sensitivity	300uV/m (Bar antenna)
Selectivity	25dB

CASSETTE

Wow and flutter	0.125% DIN Weighted
Frequency range	40Hz– 12.5kHz (normal tape) 40Hz– 14kHz (Chrome tape)
Signal-to-noise-ratio	Dolby NR ON – 60dB Dolby NR OFF– 50dB
Channel separation	35dB at 1kHz
MOTOR	DC with Electronic Speed Control
COUNTER	3 Digit with push button reset
Spooling Performance with C60 Cassette	
Fast Forward	100 sec.
Rewind	100 sec.
Erase System:	AC Erase
Recording System:	AC Bias 85 kHz
4 track 2 channel stereo	

Memory Rewind operates when counter reaches '000'

RECORD PLAYER

Wow and flutter	0.15% (WRMS)
Speed	33 & 45 (r.p.m.)
Platter	310mm (12¼")
Drive system	Belt drive
Motor	DC servo control
Cartridge	Magnetic Audio Technica AT 936
Recommended stylus pressure	3.5gm
Strobe	Neon Illuminated
Power Source	230V 50Hz
Power Consumption	75W

"Dolby" and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation

Noise Reduction System manufactured under license from Dolby Laboratories Licensing Corporation.

Manufactured in New Zealand by

THORN EMI
Consumer Electronics
N.Z. Limited

36-38 Hastie Ave, Mangere Bridge, Auckland.
P.O. Box 59051, Mangere Bridge.

HEAD CLEANING

After removing the cassette, press the Play key (leaving the cassette compartment door in the open position) and the Record/Playback and Erase Heads will move upwards giving easier access. Clean the oxide residue from the heads with a soft lint free cloth or cotton bud moistened with alcohol (pure methylated spirit). Do not use any solution other than alcohol or a commercial tape head cleaner.

CAPSTAN

Press the Stop key to retract the rubber pressure roller from the Capstan, and clean the Capstan with a soft cloth. Never apply alcohol or any other solution to the rubber pressure roller.

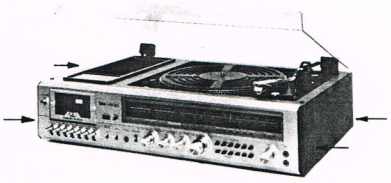
CAUTION:

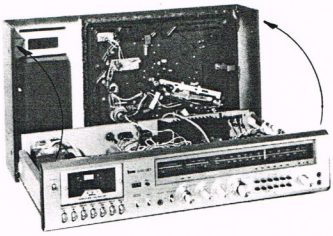
Keep iron products, magnets or screw drivers away from the heads.

ACCESS FOR SERVICE

Models 820 & 851. Remove the lid from Model 851. Remove the four screws (2 at each end of the cabinet) and slide the cabinet back about 5mm. Lift from the front edge and stand it up behind the chassis after removing mat and platter.

Access to the print side of the circuit boards can be gained by removing the four feet and fixing screws from the under side of the unit and removing the base.

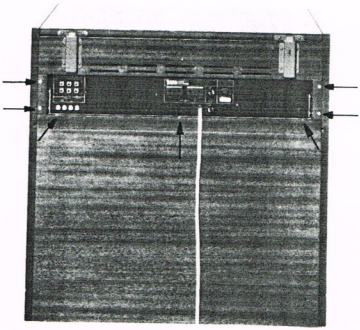


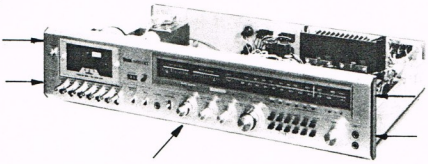


Model 854. Remove the record player. This is done by lifting the lid on top of the cabinet to the vertical position and lifting the mat and platter from the player taking care to disengage the rubber drive belt from the motor pulley. Unscrew the front fixing screw for the turntable one turn and slide it to the back of the slot. Lift the front left corner of the turntable base and move it forward until the rear turntable holding bracket comes free of the turntable well. Then continuing to raise the left hand side of the turntable base pivot it backwards on the back right hand corner until the right hand holding bracket comes clear of the turntable well. Disconnect the pick up, motor power supply and neon mains supply leads and lift the turntable clear of the cabinet.

Unscrew the two wooden blocks at either end of the chassis back panel and also the wooden rail immediately below it. Now withdraw the cabinet front flap by sliding it to the rear of the cabinet. Open the two doors to the

record storage section of the cabinet to gain access to the four fixing screws which hold the chassis in place and remove these. Support the chassis with one hand and slide it slowly forward until the escutcheon disengages from the cabinet. Slide it a little further forward until the two screws which locate the back of the chassis disengage from the slots into which they fit. Now move the chassis forward, tilting as necessary to clear the turntable well until the chassis is clear of the cabinet. To reassemble the unit carry out the above procedure in reverse.



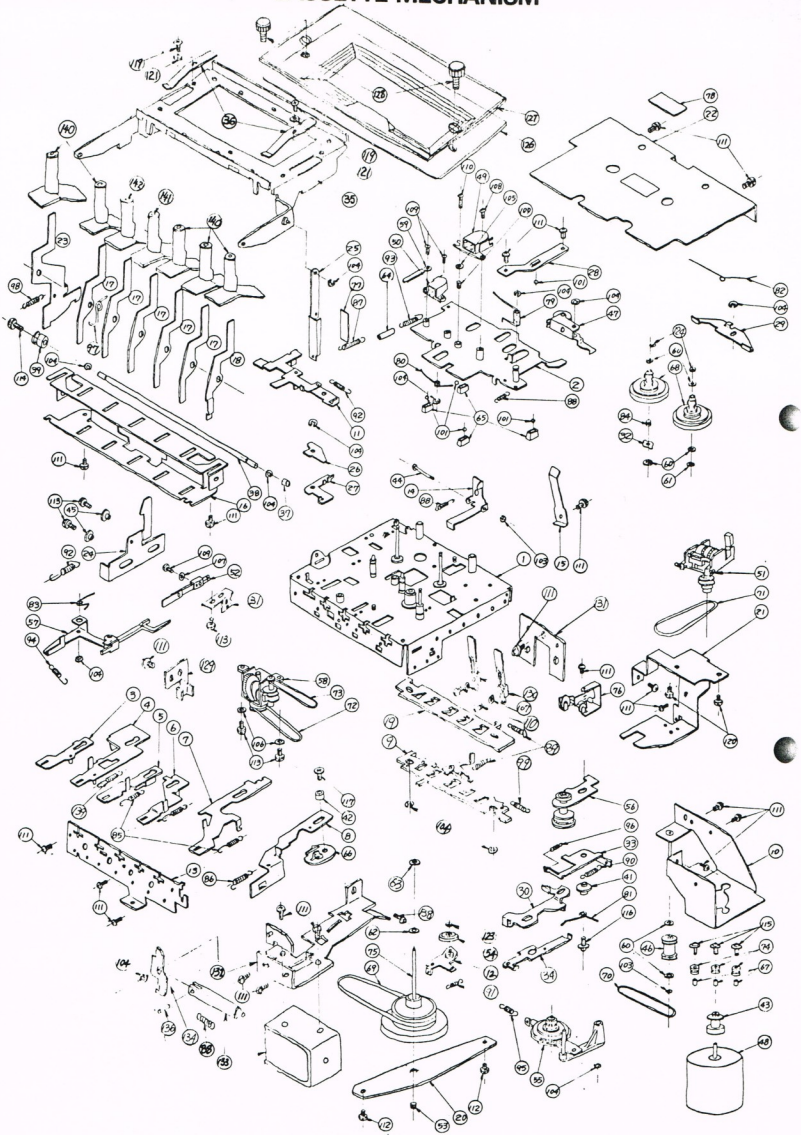


To remove the front control panel set all toggle switches in the horizontal position and withdraw control knobs from the shafts. Set the twelve pushbuttons in the out position and place a large bulldog clip over them. This is to ensure that they stay in place when the front panel is removed from the chassis. Unscrew the large nut on the record level control shaft and then remove the four countersunk screws (two at each end of the panel) holding the plastic end caps onto the chassis metalwork. Withdraw the panel forward, taking care that it does not foul any of the controls. Leave the bulldog clip attached to the push buttons.

To re-assemble reverse the procedure taking care that the counter zero push button is not trapped behind the panel.

Check operation of all controls particularly the twelve pushbuttons and the cassette door. Adjustment of the cassette door can be made by unscrewing the knurled knobs and adjusting the position of the door. The two holes used to hold the clear door panel are over size thus allowing adjustment when the door is in position in the panel.

CASSETTE MECHANISM



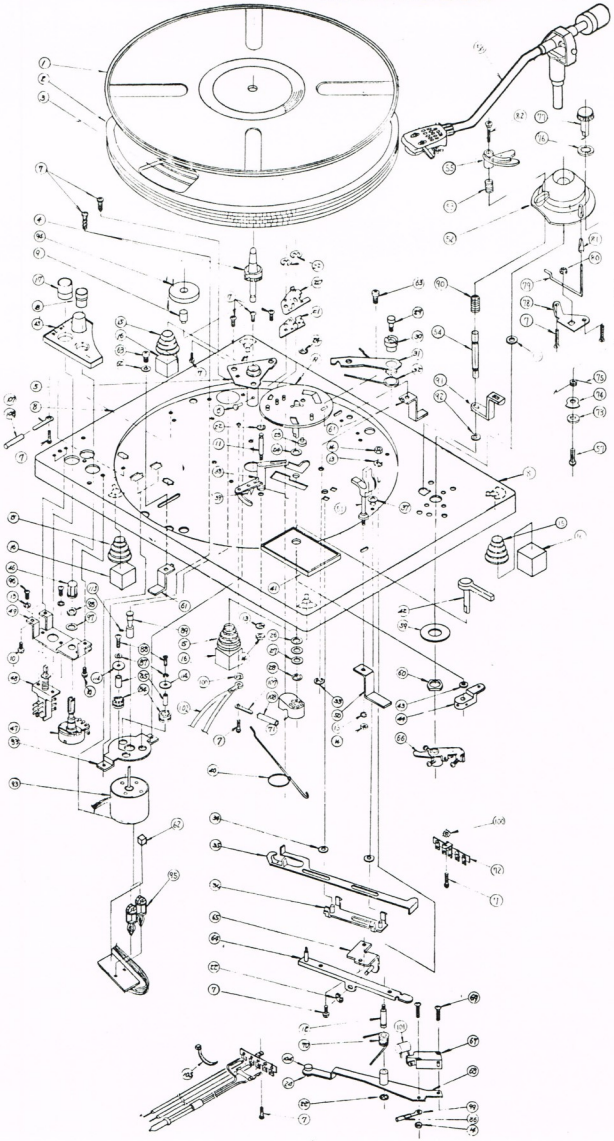
CASSETTE MECHANISM PARTS LIST

PART No.	DESCRIPTION
1	Main Chassis
2	Head Chassis
3	Stop Lever
4	REC Lever
5	PLAY Lever
6	REW Lever
7	FF Lever
8	PA Lever
9	FAS Stop Lever
10	Motor Bracket
11	EJ Lock Lever
12	REW Roller Arm
13	Lever Guide
14	REC Safety Plate
15	Casette Hold Spring
16	PIANO Main F
17	PIANO Lever D
18	PIANO LEVER E
19	Cue A
20	Flywheel Shaft A
21	Counter Bracket
22	Mech Cover
23	EJ Arm
24	EJ Arm B
25	Damp Arm
26	Cue Review Lever
27	EJ Lock Lever A
28	Head Chassis Spring
29	Brake Plate
30	Brake Operation Plate
31	Leaf S/W Bracket
32	Washer for spring
33	Idler Clutch A
34	Idler Clutch B
35	Cassette Holder
36	Cassette Spring
37	Spacer
38	PIANO Shaft
39	EJ Arm Collar
40	—
41	Center Idler Collar
42	PA Collar
43	Motor Pulley
44	REC Lock Lever Shaft
45	Play Lever Bush
46	FAS Center Pulley
47	Pinch Roller
48	Motor
49	REC/PLAY Head
50	Erase Head

PART No.	DESCRIPTION
51	Counter
52	Leaf Switch
53	Capstan Screw
54	REW Roller
55	FWD Assy.
56	Center Idler
57	FAS Realease Lever
58	FAS Gear Box
59	Cord Clamp
60	Washer
61	Washer
62	Washer
63	Oil Cut
64	PVC Tube
65	Support
66	Pause Lock Pce
67	Spacer
68	Reel Base
69	Main Belt
70	FAS Drive Belt
71	Counter Belt
72	FAS Drive Belt
73	FAS Belt
74	Motor Cushion
75	Flywheel
76	Governor
77	S Rubber
78	Escutcheon Cover
79	Pinch Roller Spring
80	Head Chassis Spring
81	Center Idler Press Spring
82	Brake Spring
83	Stop Lever return Spring
84	BT Spring
85	Lever return Spring
86	PA Lever Return Spring
87	Holder Lock Plate Spring
88	PA Lever return Spring
89	Cue return spring
90	Center Idler return Spring
91	RWD Roller press Spring
92	EJ Lock Lever release Spring
93	Head Chassis return Spring
94	FAS release Lever return spring
95	FWD press Spring
96	Idler press Spring
97	Piano Lever return Spring
98	Push Lever Spring
99	Lock Lever Cue Spring
100	Rec/Play Head adjust Spring

PART No.	DESCRIPTION
101	Steel Ball
102	—
103	E Ring
104	E Ring
105	Flat Washer
106	Flat Washer
107	Spring Washer
108	Screw
109	Screw
110	Screw
111	Screw
112	Screw
113	Screw
114	Screw
115	Screw
116	Screw
117	Screw
118	—
119	Screw
120	Screw
121	Spring Washer
122	—
123	PS Washer
124	PS Washer
125	—
126	Door interior
127	Window cassette
128	Decoration Screw
129	Switch Operation Metal
130	LEAF SWITCH
131	REW S/W Plate
132	Solenoid Bracket
133	Solenoid
134	MS Rlease Plate
135	—
136	Spring Pin
137	—
138	Screw
139	Lever return spring
140	Key Button Silver
141	Key Button Blue
142	Key Button Red

TURNTABLE MECHANISM PARTS LIST.

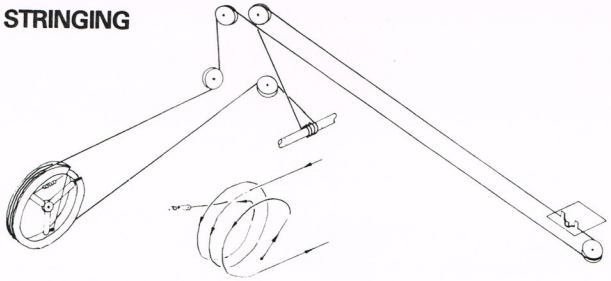


TURNTABLE MECHANISM

PART No.	DESCRIPTION
1	TT Sheet
2	TT
3	Belt
4	TT Shaft Assy
5	TT Shaft Bracket Assy
6	Pin
7	BT ⊕ 3x8
8	Top Plate Assy
9	Adaptor Shaft
10	FMT ⊕ 3x6
11	Rej Lever Shaft
12	Rej Lever Shaft
13	S.S. W3
14	F.L.N. 3
15	Mounting Spring
16	Moltplain
17	Push Button
18	VR Knob
19	R gear Assy
20	Clutch Plate
21	Clutch Guide
22	E-32
23	Eccentric Pin
24	Spring Washer
25	Fibre Washer
26	Fibre Washer
27	Fibre Washer
28	E-4
29	GS Stud
30	GS Eccentric Shaft
31	GS Arm
32	GS Spring
33	Spring Washer
34	Operation Washer
35	Operation Arm Assy
36	Operation Base
37	CS Ring
38	Kick Lever
39	Return Spring
40	REJ Spring
41	Reject Cover Assy
42	Reject Lever Assy
43	Fibre Washer
44	S/W Lever Assy
45	SP Cover Assy
46	Shaft Cover
47	VR
48	Push S/W
49	SP S/W Base
50	Stopper
51	Arm Rest Assy
52	PU Base
53	Elevation Spring
54	Elevation Shaft
55	Elevation Plate
56	FT ⊖ 2.6x4
57	TDT ⊕ 3x8

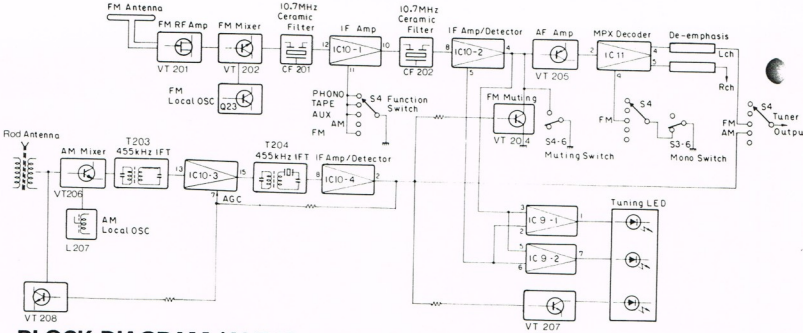
PART No.	DESCRIPTION
58	PU Assy
59	Washer 10Ø
60	LN 10
61	Stopper 2
62	Rubber
63	FM ⊕ 4x12
64	See Saw Arm Assy
65	See Saw Base Assy
66	Forward Arm Assy
67	Micro S/W
68	S/W Arm Assy
69	FM ⊖ 3x16
70	Arm Assy
71	S/W Lever Assy
72	5P Lug
73	Rubber Bushing
74	IFC Cam
75	IFC Spring
76	Metal Spring
77	IFC Knob Assy
78	PU Base Plate
79	Cuing Lever
80	E-2
81	Cuing Cap
82	FM ⊕ 3x12
83	Motor Bracket
84	Cushion Rubber
85	Pipe
86	UL Tube
87	S.S.W. 2.6
88	FM ⊖ 2.6x12
89	Pulley
90	Spring
91	Cuing Arm
92	E-3
93	Motor Assy
94	Adaptor
95	PC Support
96	FM ⊕ 3x6
97	Washer
98	LN Ø 7 Ø
99	Lug
100	TOW-3
101	Maylar Cap
102	Earth Wire Assy
103	FW 102 Ø x 22 Ø
104	Eccentric Pin
105	Wire Fastener
106	Neon Lamp
107	Lug Terminal
108	UL Tube
109	—
110	—
111	—
112	—
113	T 2x3
114	FW3.2 Ø x 13 Ø

DIAL STRINGING

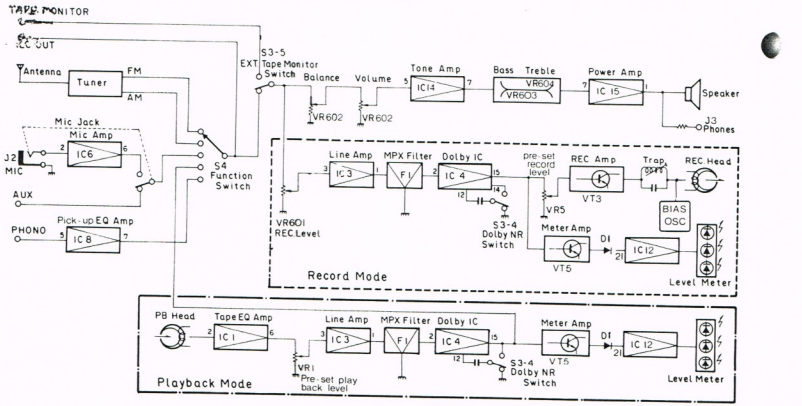


CIRCUIT DESCRIPTION

BLOCK DIAGRAM (TUNER SECTION)

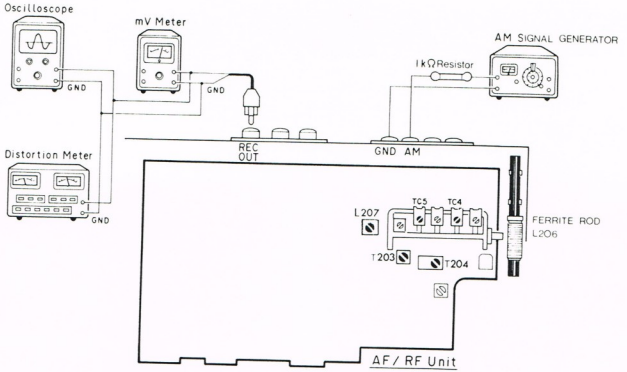


BLOCK DIAGRAM (AUDIO SECTION)



TEST EQUIPMENT REQUIRED

1. AF Oscillator
2. AM Signal generator 30% modulation.
3. Millivolt meter.
4. Distortion meter
5. Oscilloscope.
6. Frequency counter capable of counting up to 100 kHz.
7. FM stereo signal generator capable of 400Hz mono 75kHz deviation and 1kHz stereo 67.5kHz deviation.
8. Standard Reference blank cassette TEAC MTT-502.
9. Dolby NR level calibration cassette TEAC MTT-150 400Hz 200nWb/m.
10. Azimuth 10kHz cassette TEAC MTT-114.



AM RADIO ADJUSTMENTS

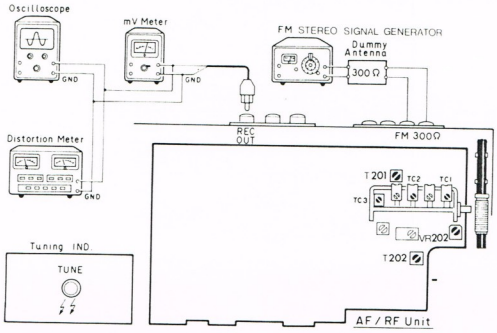
Set function switch to AM.

Connect test equipment to unit as shown above. Set dial pointer to the datum mark at the left hand end of the scale with the gang closed.

1. Short the AM oscillator section of the tuning gang to the frame of the gang.
2. Tune signal generator to 455kHz 30% modulation high output.
3. Advance volume control until a tone is heard and tune the IF Transformers T203 and T204 for maximum reading on the millivoltmeter. Reduce the generator output and repeat the adjustment. Repeat the adjustment a number of times each time reducing the output from the generator and tuning T203 and T204 for maximum on the millivoltmeter. Continue until no further improvement can be obtained.
4. Remove the shorting link from the oscillator section of the gang and tune the receiver and signal generator to 600kHz with an output level of 60dB (1mV).
5. Adjust L207 for maximum output and then the aerial coil L206 for maximum output.
6. Tune the receiver and signal generator to 1400kHz and adjust trimmer TC5 for maximum output and then trimmer TC4 for maximum output.
7. Repeat the adjustments of L207, 206, TC5 and TC4 a number of times each time reducing the output level from the signal generator until no further improvement can be made.
8. Tune the signal generator and receiver to 1000kHz and adjust T204 and T203 for maximum output on a low level signal. This is to ensure that T203 is tuned to exactly the same frequency as T204.

FM TRACKING ADJUSTMENT

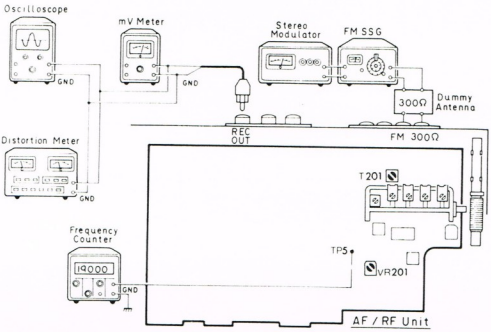
Set function switch to FM and FM mode switch to MONO. MUTE switch OFF.



1. Adjust FM signal generator to 400Hz (mono) 75kHz deviation (100% modulation).
2. With an output of 60-80dB (1-10mV) from the generator at 98MHz tune the receiver to 98Mz.
3. Adjust TC3 for maximum output.
4. With the receiver still tuned to 98MHz reduce the output from the generator to 10-30dB (3-10μV) and adjust TC1 and TC2 for maximum output.
5. Now adjust T201 for maximum output.
6. Increase the output from the stereo signal generator to 60dB (1mV) and adjust T202 for minimum distortion.
7. Reduce the output from the generator to 35dB (50μV) and adjust VR202 until the green tuning indicator lamp comes on.
8. Verify that the red indicator lamp on the right comes on when the receiver is tuned to the right, and that the left lamp comes on when the receiver is tuned to the left.
9. Reduce the output from the generator and tune the receiver through the signal making sure that the Red Lamps either side of the green tuning indicator are balanced at low levels of signal. If not adjust VR202 until this condition is achieved.

FM MULTIPLEX ADJUSTMENT

Set function switch to FM and FM MODE switch to Stereo. MUTE switch off.



1. Adjust the stereo signal generator (stereo mode of operation) to give an output of 60dB (1mV) at 98MHz with 1kHz modulation and 67.5kHz deviation. Set the pilot signal to 19kHz with 7.5kHz deviation.
2. Tune the receiver to 98MHz.
3. Cut the 1kHz modulation and adjust VR201 for a reading of 19kHz ± 20Hz on the frequency counter. With the stereo modulation applied to either the Left or the Right Channel only adjust T201 for minimum distortion. (Do not turn T201 more than ± 90°.)
4. Check that stereo indicator operates when a stereo signal is being received.

HEAD ADJUSTMENT

The erase head is not adjustable but the Left Hand fixing of the record/play head is spring loaded and adjusting the screw on this side of the head will enable azimuth adjustment to be made. Normally readjustment should not be required unless the factory setting has been disturbed or a replacement head has been fitted.

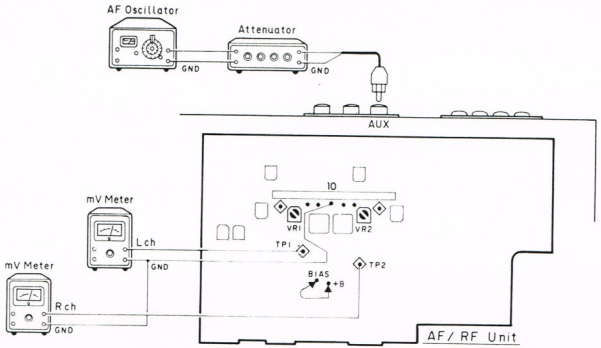
Access to the adjusting screw is gained by unscrewing the two silver decorative screws on the front of the cassette door and removing the clear plastic door panel. **Note:-** The screw holes in this panel are over size to allow adjustment with the front panel when reassembling. Access to the azimuth screw is gained through the slot beneath the door with the play Key depressed. To adjust the azimuth play a 10kHz azimuth test tape (Teac MTT-114) and adjust the azimuth screw for maximum reading on both LED level displays. Seal the screw with screw locking adhesive. (Do not fill the slot in the head.) Reassemble door panel. Take care to ensure that the panel does not foul the surrounding metal work when in the closed position.

DOLBY NR PLAYBACK ADJUSTMENT

Select Aux function.

Bias/Equalisation switch to normal.

Dolby NR Switch off.



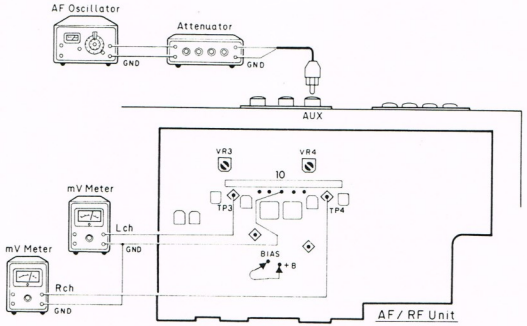
1. Load the recorder with a Dolby NR level calibration tape (Teac Test Tape MTT-150 400Hz 200nWb/m) and play back.
2. Adjust VR1 and VR2 until the millivolt meters read exactly 1V.

DOLBY NR LAW ADJUSTMENT

Select Aux function.

Bias/Equalisation switch to normal.

Dolby NR Switch OFF → ON.

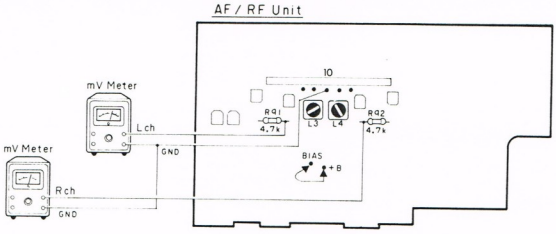


1. Apply a 1kHz Signal from the AF Generator.
2. Insert an unrecorded cassette into the recorder and press the Play and Record Keys.
3. Turn the Record level control knobs until the millivoltmeters read 10mV.
4. Press the Dolby NR Switch in and adjust VR3 and VR4 until the millivoltmeters read 20mV (+6dB ± 0.1dB).

TRAP ADJUSTMENT

Bias and Equalisation switches in the normal position.

Dolby NR switch OFF.



1. Insert an unrecorded cassette into the recorder and press the Play and Record Keys.
2. Turn the Record level control fully anticlockwise.
3. Adjust L3 and L4 for minimum readings on the millivoltmeters. Switching the "OSC" switch, adjust L3 and L4 for equivalent minimum reading on each position of the "OSC" Switch. **NOTE** MPX Filters 1 & 2 and L6 and L7 have been set up in the factory and should not be adjusted.

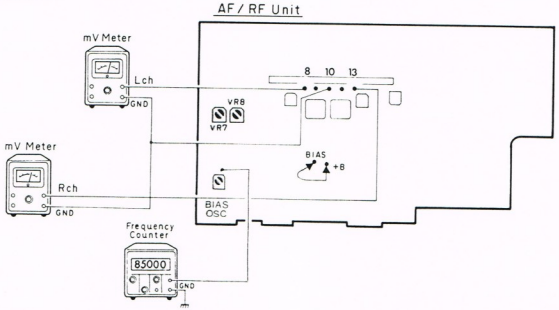
BIAS ADJUSTMENT

Select Record mode of operation on tape deck.

Oscillator frequency shift switch in up position.

Bias/equalisation switch normal.

Dolby NR Switch OFF.



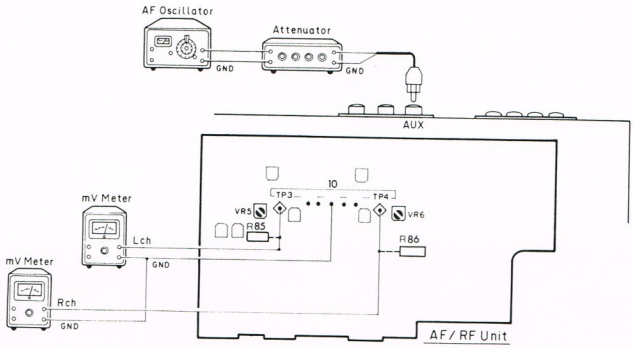
1. Adjust core in bias oscillator coil until the frequency display on the counter reads 85kHz.
2. Insert a blank tape and press the pause key for recording.
3. Turn the record level controls VR601-1VR601-2 fully anticlockwise.
4. Adjust VR7 and VR8 for a reading of 3.5mV (350μA). Press Bias Button and check that the level increases to 5.4mV to 5.8mV (540μA to 580μA).

RECORD/PLAYBACK LEVEL ADJUSTMENT

Select Aux function.

Bias/Equalisation switch to NORMAL.

Dolby NR Switch OFF.



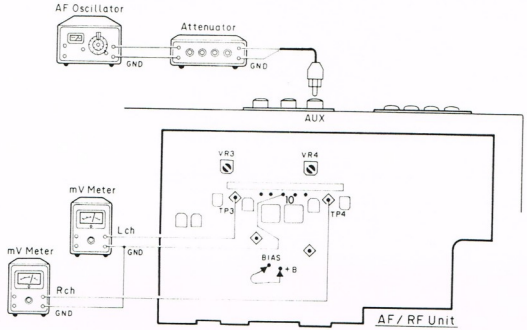
1. Apply a 1kHz– 10dB (316mV) signal to the AUX input.
2. Load a Standard Reference Blank cassette (TEAC MTT502) into the recorder and press the Pause, Record and Play Keys.
3. Turn the record level control VR601-1 and VR601-2 until the output levels at TP3 and TP4 read exactly 1V.
4. Reconnect the millivoltmeters to the collectors of VT3 and VT4 (R85 and R86) and adjust VR5 and VR6 for a reading of approx.– 10dB (316mV). Press the Pause Key and make a recording.
5. Play the recording back and measure the output at TP3 and TP4 for a reading of 1V.
6. If this level is high or low make another recording after having made a small readjustment to VR5 and VR6 until a figure of 1V is achieved on playback at TP3 and TP4.

RECORD/PLAYBACK FREQUENCY CHARACTERISTIC CHECK

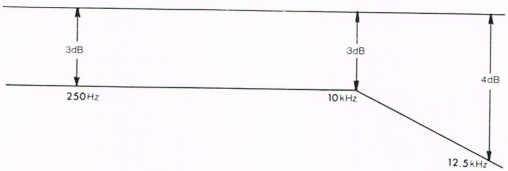
Select Aux function.

Bias/Equalisation switch to normal.

Dolby NR switch off.



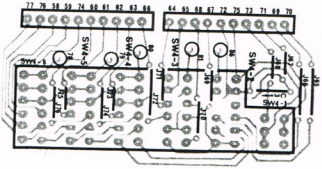
1. Apply a 1kHz– 10dB (316mV) signal to the Aux input.
2. Insert a standard Reference Blank Cassette (TEAC MTT502) into the recorder and press the Pause, Record & Play Keys.
3. Turn the record level controls until the millivoltmeters read–25dB (56.2mV) at TP3 and TP4.
4. Depress the Pause Key and make a few seconds recording at 1kHz then change frequency and record at 250Hz, 10kHz and 12.5kHz.
5. Playback and see that the readings are within 3dB at 250Hz, 1kHz and within 4dB at 12.5kHz.



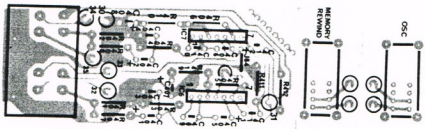
DOLBY NOISE REDUCTION CIRCUIT LIMITS

PRINTED CIRCUIT BOARD LAYOUTS

SWITCH PCB

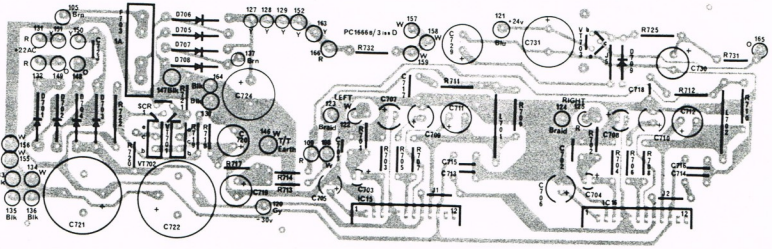


MIC PCB MEMORY, OSC. PCB

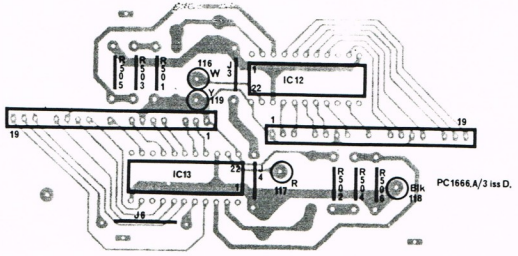


LED INDICATORS PCB

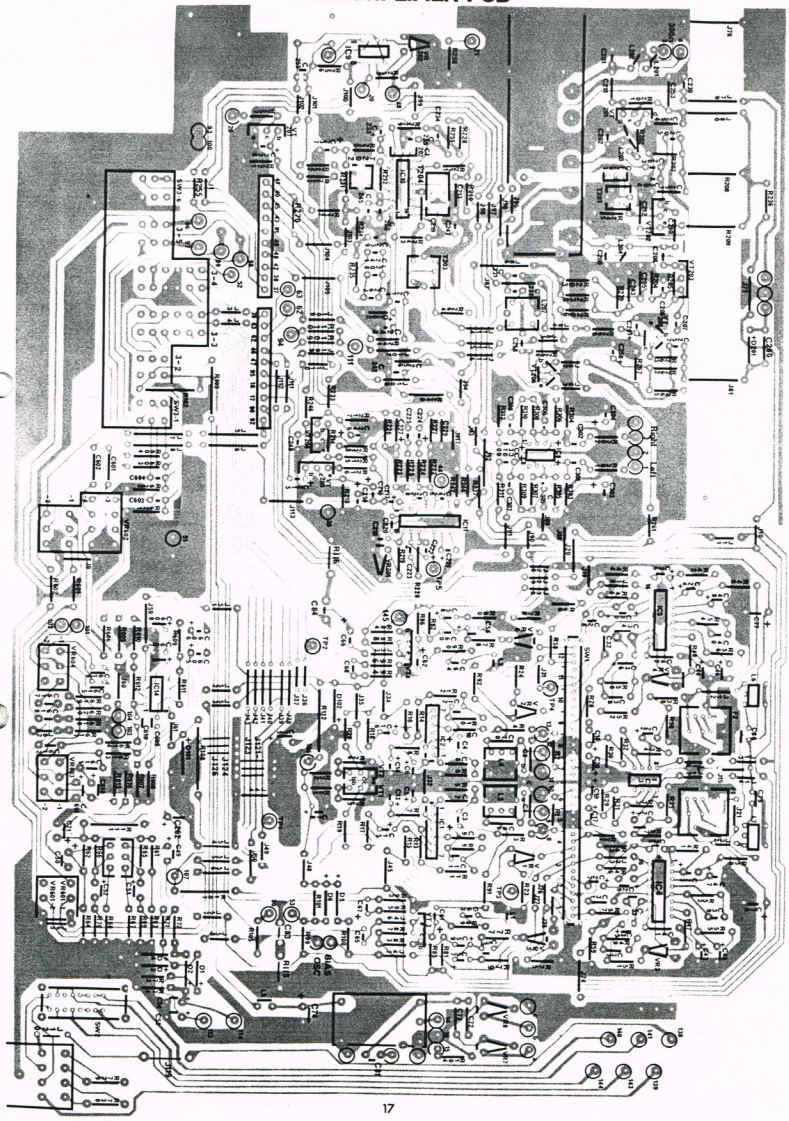
POWER AMP PCB

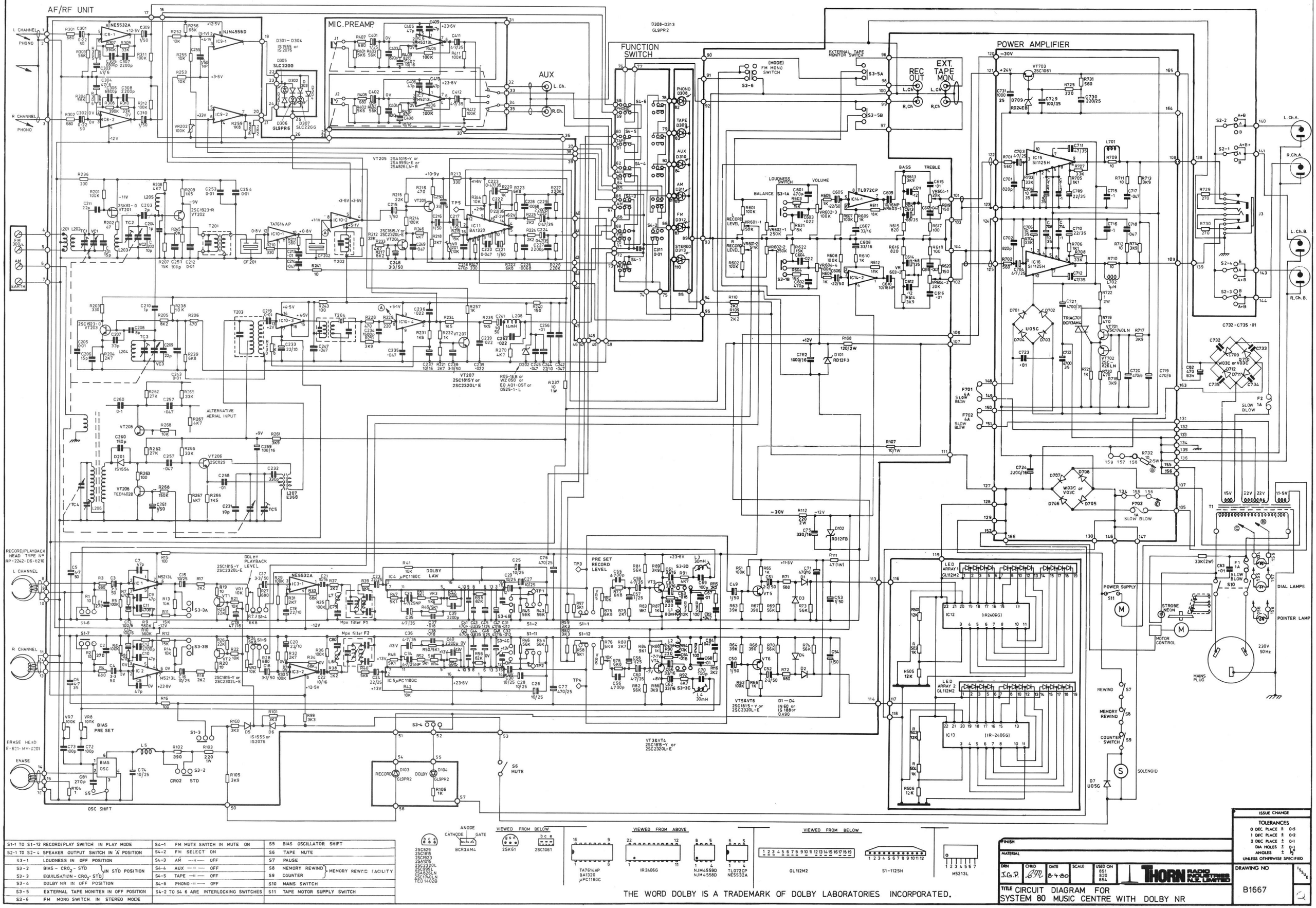


LED DISPLAY PCB



PREAMPLIFIER PCB





S1-1 TO S1-12 RECORD/PLAY SWITCH IN PLAY MODE	S4-1 FM MUTE SWITCH IN MUTE ON	S5 BIAS OSCILLATOR SHIFT	
S2-1 TO S2-4 SPEAKER OUTPUT SWITCH IN 'A' POSITION	S4-2 FM SELECT ON	S6 TAPE MUTE	
S3-1 LOUDNESS IN OFF POSITION	S4-3 AM —○| |○— OFF	S7 PAUSE	
S3-2 BIAS – CRO_2 – STD IN STD POSITION	S4-4 AUX —○| |○— OFF	S8 MEMORY REWIND } MEMORY REWIND FACILITY
S3-3 EQUILISATION – CRO_2 – STD	S4-5 TAPE —○| |○— OFF	S9 COUNTER
S3-4 DOLBY NR IN OFF POSITION	S4-6 PHONO —○| |○— OFF	S10 MAINS SWITCH
S3-5 EXTERNAL TAPE MONITER IN OFF POSITION	S4-2 TO S4 6 ARE INTERLOCKING SWITCHES	S11 TAPE MOTOR SUPPLY SWITCH	
S3-6 FM MONO SWITCH IN STEREO MODE			

2SC829 2SC1815 2SC1923 2SA1015 2SC2320L 2SC999L 2SA826LN 2SC1740LN TED1402B — VIEWED FROM BELOW

ANODE CATHODE GATE BCR3AM4

2SK61 — VIEWED FROM BELOW

2SC1061 — VIEWED FROM BELOW

TA7614AP BA1320 μPC1180C — VIEWED FROM ABOVE

IR2406G — VIEWED FROM ABOVE

NJM4559D NJM4558D — VIEWED FROM ABOVE

TL072CP NE5532A — VIEWED FROM ABOVE

GL112M2 — VIEWED FROM BELOW

S1-1125H — VIEWED FROM BELOW

M5213L — VIEWED FROM BELOW

ISSUE CHANGE

TOLERANCES
0 DEC PLACE ± 0·5
1 DEC PLACE ± 0·2
2 DEC PLACE ± 0·1
DIA HOLES ± 0·1
ANGLES ± ½
UNLESS OTHERWISE SPECIFIED

FINISH
MATERIAL

DRN	CHKD	DATE	SCALE	USED ON
J.G.P.	[illegible]	8-4-80		851 820 854

THORN RADIO INDUSTRIES N.Z. LIMITED

TITLE CIRCUIT DIAGRAM FOR SYSTEM 80 MUSIC CENTRE WITH DOLBY NR

DRAWING NO B1667

ISSUE 1