

TRANSISTOR-AMPLIFIER 35 M

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The 35 M is a fully transistorized amplifier, free from iron cores and unaffected by supply voltage variations. Output is 60 W. music power. Distortion is less than 1% at 20 W. sine output in frequency range of 20 cs to 20 Kcs. The amplifier has 16 transistors and 12 silicone diodes.

1. PRE-AMPLIFIER

The audio signal from the cartridge is amplified by high input impedance transistor T1 and passed to the base transistor T2. In order to obtain a constant output volume on records with varying recording levels, the next stage acts as AVC amplifier. After being amplified by T2, the audio signal is tapped before C16, and is coupled to the base of T3. The output of T3 in conjunction with D1, D2 and D3 forms a variable internal resistance: If the strength of the incoming signal changes, the AC-impedance of the network will also change and control the signal at the base of T2. Therefore, high signals will be amplified less and low signals will be amplified more. To reduce the background noise of old and worn records, a record noise compensating switch, with 3 positions, has been fitted into the circuit. To reduce the noise of the needle setting down on the record and entering the first groove, the AVC will allow the volume to reach its preset level with an 3 to 4 second delay. The output of each channel can be adjusted over 10 db. with the level controls.

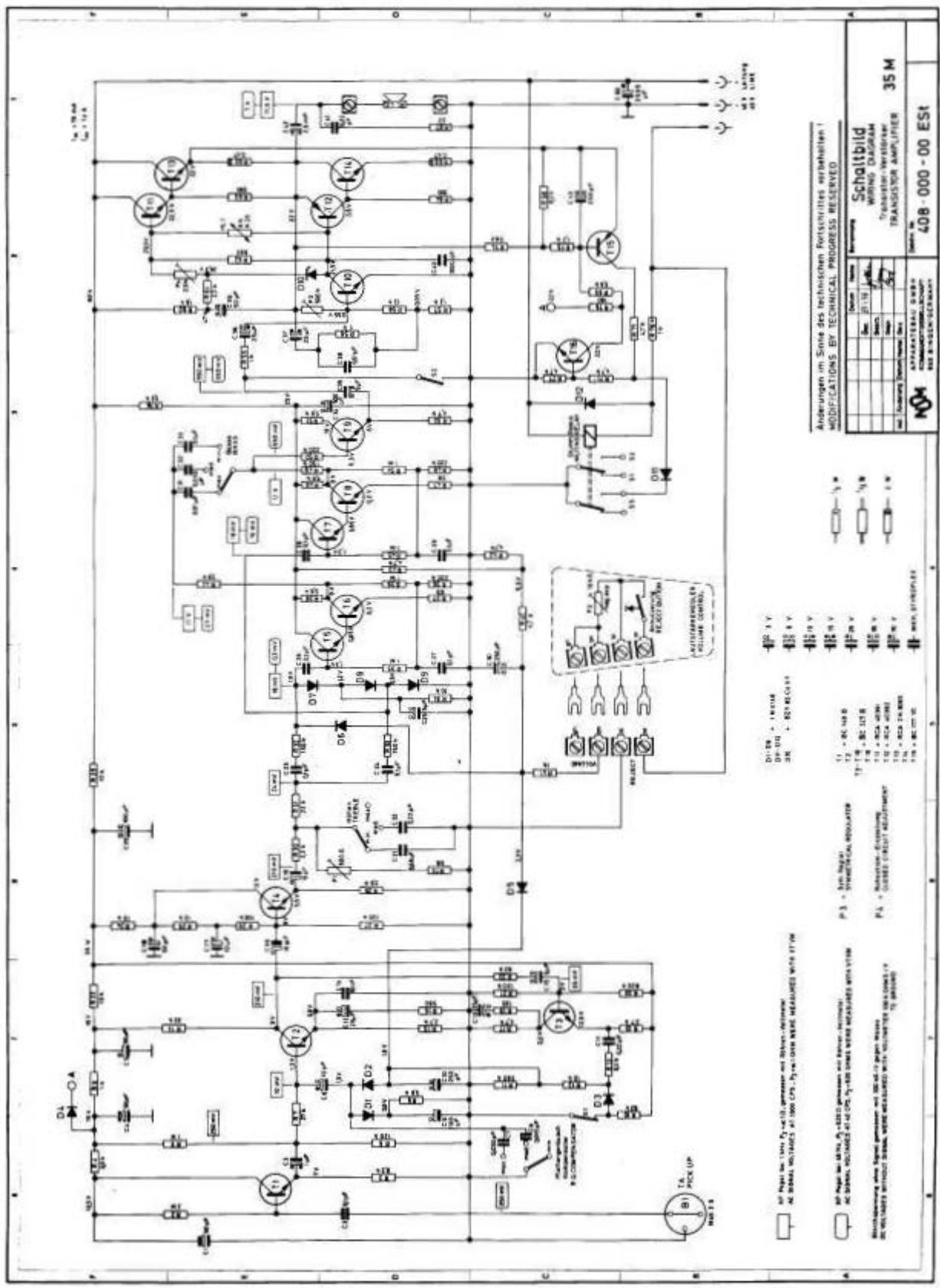
2. VOLUME CONTROL

The signal coming from emitter-follower T4 goes over level control P1 to the volume control circuit. Diodes D6, D7, D8 and D9, and transistors T5, T6, T7 and T8 make up the two wire volume control and bass boost circuit. With full volume, the volume control has zero resistance. No current will flow through the diodes, thus they have a very high resistance, several M ohms. Therefore, the signal going to T5 and T7 is of the same amplitude. T6 and T8 are the drivers for T9. The combination of T5 and T6 drives the bottom end of the bass boost circuit. At full volume, the amplitude and phase of the output of T6 and T8 are the same, so the signal is the same on each end of the bass boost circuit, that means no filtering takes place and the frequency response is flat. As the volume is turned down, current will flow through the diodes, and their resistance decreases. Due to the shunting effect of resistor R34 and capacitor C25, diodes D6 and D7 start reducing the signal before D8 and D9. This means smaller input to T5 and thus smaller output from T6. Since the signal over the bass boost is now different, the higher frequencies will be cut, thus giving the desired bass boost. As the volume control is turned down more, more current will flow through the diodes, D8 and D9 will start to conduct. This in turn will reduce the input to T7 and thus the output of T8, hereby reducing the total volume.

The bass boost will continue throughout the entire volume range, because D6 and D7 will always conduct more current than D8 and D9. Diode D5 is to turn off the AVC, thus achieving complete turn off of the amplifier with minimum volume. T9 is an emitter-follower to match the low impedance of the next stage. With volume control, the volume of both channels can be adjusted together. There are 2 switches each having 3 positions for adjusting the treble and bass.

3. PHASE SPLITTER AND OUTPUT STAGE

The signal from T9 goes over amplifier T10 to the complementary pair phase splitters T11 and T12, these drive the transformerless push-pull output pair T13 and T14. The thermistor HL1 in base of T11 and T12 gives the circuit good thermal stability. Fine control P3 keeps both drivers symmetrical, and P4 adjusts the rest current (no signal) of the output stage. The overload protection is determined by the emitter current of the output stage. The voltage over R65, created by the emitter current flowing through it, is coupled to T15 over an integrating network with a time constant of 1 sec. When T15 starts conducting, the base of T16 becomes positive, thus placing point A in the plate at ground potential. This point is the voltage supply of the input stage. The audio signal is hereby completely cut-off. When the record rejects, the muting relay is energized. One of the muting contacts will bring the collector of T15 and the base of T16 back to negative, driving these transistors in cut-off, this on condition that the overload is removed from the circuit. In the muted state, the base of T10 is to ground over contacts S2, and the ground line to diode D3 is open over contacts S1.



Änderungen im Sinne des technischen Fortschrittes vorbehalten |
 MODIFICATIONS BY TECHNICAL PROGRESS RESERVED

Schaltbild
 WIRING DIAGRAM
 TRANSISTOR-VERSTÄRKER
 TRANSISTOR AMPLIFIER

35 M

Typen-Nr. 408-000-00 EST

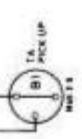
VERBODEN TOEGANG TO TECHNICAL INFORMATION



- 12 - 1 V
- 13 - 0.5 V
- 14 - 0.1 V
- 15 - 0.05 V
- 16 - 0.02 V
- 17 - 0.01 V
- 18 - 0.005 V
- 19 - 0.002 V
- 20 - 0.001 V
- 21 - 0.0005 V
- 22 - 0.0002 V
- 23 - 0.0001 V
- 24 - 0.00005 V
- 25 - 0.00002 V
- 26 - 0.00001 V

10 Page No. 1304 P₁ with generator and detector sections
 11 Same circuitry at 1000 cps, type code 1304

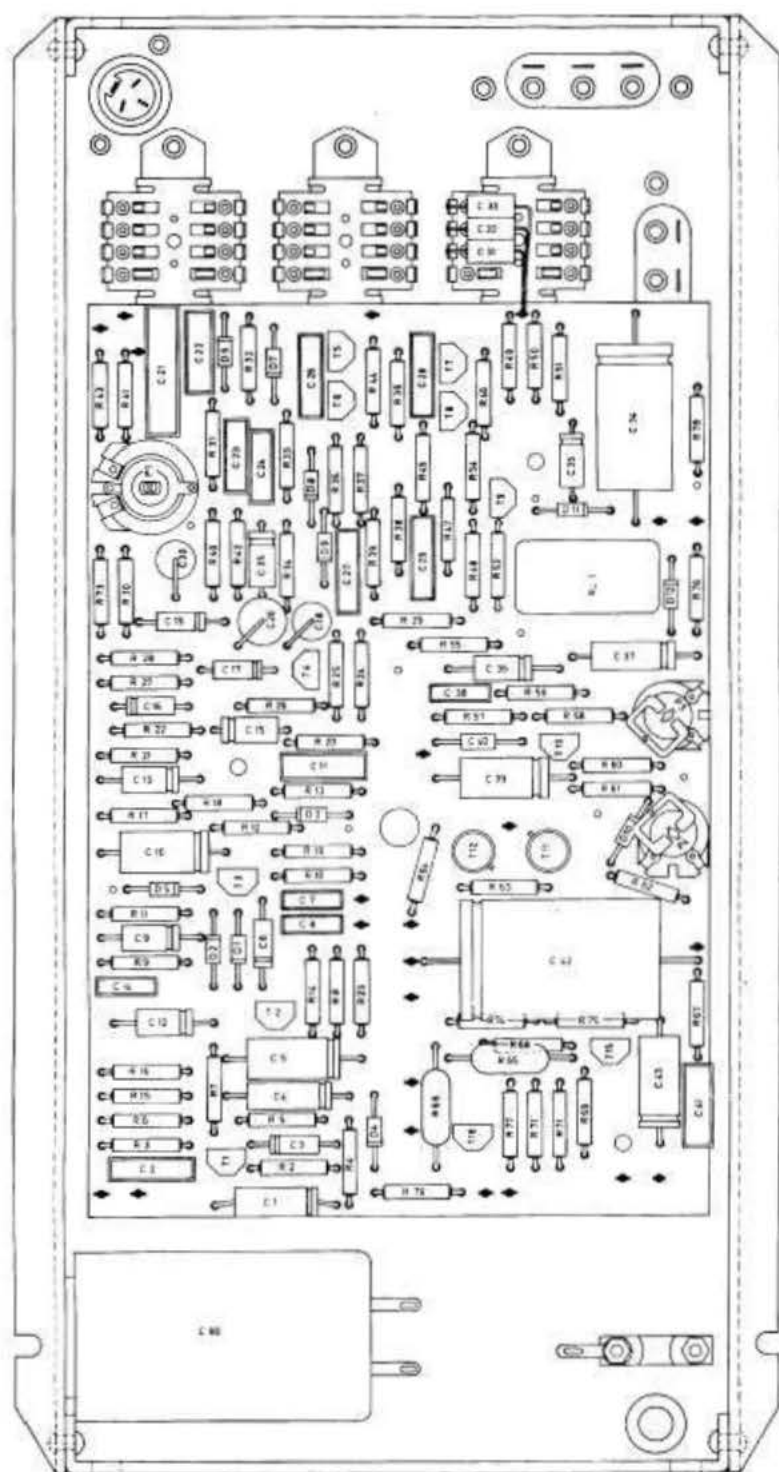
12 Page No. 1304 P₂ with generator and detector sections
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14 Page No. 1304 P₃ with generator and detector sections
 15 Same circuitry at 1000 cps, type code 1304

16 Page No. 1304 P₄ with generator and detector sections
 17 Same circuitry at 1000 cps, type code 1304

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R 2	Carbon resistor	2 Megohm	1/2 W.	± 10%	P 1	Trimmer resistor	250 Ohm	1/2 W. lin.
R 3	Carbon resistor	8 200 Ohm	1/2 W.	± 10%	P 3	Adjusting resistor	500 000 Ohm, lin.	
R 4	Carbon resistor	3 300 Ohm	1/2 W.	± 10%	P 4	Adjusting resistor	2 500 Ohm, lin.	
R 5	Carbon resistor	1 Megohm	1/2 W.	± 10%	C 1	Lytic	50 Mfd	
R 6	Carbon resistor	120 000 Ohm	1/2 W.	± 10%	C 2	Mylar	0.1 Mfd	
R 7	Carbon resistor	27 000 Ohm	1/2 W.	± 10%	C 3	Lytic	1 Mfd/ 35 V	
R 8	Carbon resistor	1 000 Ohm	1/2 W.	± 10%	C 4	Lytic	50 Mfd/ 15 V	
R 9	Carbon resistor	3 900 Ohm	1/2 W.	± 10%	C 5	Lytic	50 Mfd/ 25 V	
R10	Carbon resistor	82 000 Ohm	1/2 W.	± 10%	C 6	Lytic	10 Mfd	
R11	Carbon resistor	390 000 Ohm	1/2 W.	± 10%	C 7	Mylar	0.033 Mfd	
R12	Carbon resistor	10 000 Ohm	1/2 W.	± 10%	C 8	Mylar	0.015 Mfd/ 400 V	
R13	Carbon resistor	8 200 Ohm	1/2 W.	± 10%	C 9	Lytic	100 Mfd/ 3 V	
R14	Carbon resistor	22 000 Ohm	1/2 W.	± 10%	C10	Lytic	250 Mfd/ 6 V	
R15	Carbon resistor	2 700 Ohm	1/2 W.	± 10%	C11	Mylar	0.22 Mfd	
R16	Carbon resistor	560 Ohm	1/2 W.	± 10%	C12	Lytic	25 Mfd/ 10 V	
R17	Carbon resistor	4 700 Ohm	1/2 W.	± 10%	C13	Lytic	25 Mfd/ 10 V	
R18	Carbon resistor	120 Ohm	1/2 W.	± 10%	C14	Mylar	0.01 Mfd	
R19	Carbon resistor	27 000 Ohm	1/2 W.	± 10%	C15	Lytic	5 Mfd/ 35 V	
R20	Carbon resistor	820 000 Ohm	1/2 W.	± 10%	C16	Lytic	10 Mfd/ 25 V	
R21	Carbon resistor	120 000 Ohm	1/2 W.	± 10%	C17	Lytic	10 Mfd/ 25 V	
R22	Carbon resistor	82 000 Ohm	1/2 W.	± 10%	C18	Lytic	50 Mfd/ 25 V	
R23	Carbon resistor	10 000 Ohm	1/2 W.	± 10%	C19	Lytic	10 Mfd/ 25 V	
R24	Carbon resistor	10 000 Ohm	1/2 W.	± 10%	C20	Lytic	100 Mfd/ 35 V	
R25	Carbon resistor	10 000 Ohm	1/2 W.	± 10%	C21	Mylar	0.68 Mfd	
R26	Carbon resistor	100 000 Ohm	1/2 W.	± 10%	C22	Mylar	0.22 Mfd	
R27	Carbon resistor	120 000 Ohm	1/2 W.	± 10%	C23	Mylar	0.1 Mfd	
R28	Carbon resistor	3 900 Ohm	1/2 W.	± 10%	C24	Mylar	0.1 Mfd	
R29	Carbon resistor	10 000 Ohm	1/2 W.	± 10%	C25	Lytic	5 Mfd/ 35 V	
R30	Carbon resistor	2 200 Ohm	1/2 W.	± 10%	C26	Mylar	0.1 Mfd	
R31	Carbon resistor	22 000 Ohm	1/2 W.	± 10%	C27	Mylar	0.1 Mfd	
R32	Carbon resistor	150 000 Ohm	1/2 W.	± 10%	C28	Mylar	0.1 Mfd	
R33	Carbon resistor	150 000 Ohm	1/2 W.	± 10%	C29	Mylar	0.1 Mfd	
R34	Carbon resistor	10 000 Ohm	1/2 W.	± 10%	C30	Lytic	250 Mfd/ 6 V	
R35	Carbon resistor	1 Megohm	1/2 W.	± 10%	C31	Mylar	0.01 Mfd	
R36	Carbon resistor	5 600 Ohm	1/2 W.	± 10%	C32	Mylar	0.033 Mfd	
R37	Carbon resistor	68 Ohm	1/2 W.	± 10%	C33	Mylar	0.1 Mfd	
R38	Carbon resistor	1 Megohm	1/2 W.	± 10%	C34	Lytic	500 Mfd	
R39	Carbon resistor	220 000 Ohm	1/2 W.	± 10%	C35	Lytic	5 Mfd/ 35 V	
R40	Carbon resistor	4 700 Ohm	1/2 W.	± 10%	C36	Lytic	25 Mfd/ 10 V	
R41	Carbon resistor	15 Ohm	1/2 W.	± 10%	C37	Lytic	25 Mfd/ 35 V	
R42	Carbon resistor	4 700 Ohm	1/2 W.	± 10%	C38	Mylar	0.01 Mfd	
R43	Carbon resistor	4 700 Ohm	1/2 W.	± 10%	C39	Lytic	50 Mfd/ 35 V	
R44	Carbon resistor	3 900 Ohm	1/2 W.	± 10%	C40	Mylar	0.001 Mfd/ 160 V	
R45	Carbon resistor	1 Megohm	1/2 W.	± 10%	C41	Mylar	0.22 Mfd	
R46	Carbon resistor	5 600 Ohm	1/2 W.	± 10%	C42	Lytic	2500 Mfd/ 35 V	
R47	Carbon resistor	68 Ohm	1/2 W.	± 10%	C43	Lytic	250 Mfd/ 6 V	
R48	Carbon resistor	220 000 Ohm	1/2 W.	± 10%	C80	Lytic	2500 Mfd/ 70 V	
R49	Carbon resistor	150 000 Ohm	1/2 W.	± 10%	D 1	Silicon diode	1 N 4148	
R50	Carbon resistor	220 000 Ohm	1/2 W.	± 10%	D 2	Silicon diode	1 N 4148	
R51	Carbon resistor	5 600 Ohm	1/2 W.	± 10%	D 3	Silicon diode	1 N 4148	
R52	Carbon resistor	4 700 Ohm	1/2 W.	± 10%	D 4	Silicon diode	1 N 4148	
R54	Carbon resistor	1 Megohm	1/2 W.	± 10%	D 5	Silicon diode	1 N 4148	
R55	Carbon resistor	1 000 Ohm	1/2 W.	± 10%	D 6	Silicon diode	1 N 4148	
R56	Carbon resistor	1 000 Ohm	1/2 W.	± 10%	D 7	Silicon diode	1 N 4148	
R57	Carbon resistor	1 200 Ohm	1/2 W.	± 10%	D 8	Silicon diode	1 N 4148	
R58	Carbon resistor	12 000 Ohm	1/2 W.	± 10%	D 9	Silicon diode	1 N 4148	
R60	Carbon resistor	1 800 Ohm	1/2 W.	± 10%	D10	Zener diode	BZY 85 C 4 V 7	
R61	Carbon resistor	2 700 Ohm	1/2 W.	± 10%	D11	Silicon diode	1 N 4148	
R62	Carbon resistor	560 Ohm	1/2 W.	± 10%	D12	Silicon diode	1 N 4148	
R63	Carbon resistor	330 Ohm	1/2 W.	± 10%	T 1	Transistor	BC 149 B	
R64	Carbon resistor	330 Ohm	1/2 W.	± 10%	T 2	Transistor	BC 149 B	
R65	Wire resistor	0.47 Ohm	2 W.	± 10%	T 3	Transistor	BC 147 B	
R66	Wire resistor	0.47 Ohm	2 W.	± 10%	T 4	Transistor	BC 147 B	
R67	Carbon resistor	22 Ohm	1/2 W.	± 10%	T 5	Transistor	BC 147 B	
R68	Carbon resistor	8 200 Ohm	1/2 W.	± 5%	T 6	Transistor	BC 147 B	
R69	Carbon resistor	5 600 Ohm	1/2 W.	± 5%	T 7	Transistor	BC 147 B	
R71/R71	Carbon resistor	4 700 Ohm	1/2 W.	± 5%	T 8	Transistor	BC 147 B	
R73	Carbon resistor	68 Ohm	1/2 W.	± 10%	T 9	Transistor	BC 147 B	
R74	Carbon resistor	1 000 Ohm	1/2 W.	± 5%	T10	Transistor	BC 147 B	
R75	Carbon resistor	1 200 Ohm	1/2 W.	± 5%	T11	Transistor	40361 RCA	
R76	Carbon resistor	1 000 Ohm	1/2 W.	± 10%	T12	Transistor	40362 RCA	
R77	Carbon resistor	4 700 Ohm	1/2 W.	± 5%	T13	Transistor	2N 3055 RCA	
R78	Carbon resistor	3 300 Ohm	1/2 W.	± 10%	T14	Transistor	2N 3055 RCA	
R79	Carbon resistor	180 Ohm	1/2 W.	± 5%	T15	Transistor	BC 177 VI/BC 157 A	
RL 1	Mute relay	V 23154 — NO 721 — B 110			T16	Transistor	BC 147 B	