

QUAD 303
POWER AMPLIFIER
Service Data

The Quad 303 comprises two separate identical circuits and a common power supply. The whole of each amplifier except the output transistors and 2000 μ F output feed capacitor, is carried on a hinged printed board (M12038 Stock no. Q03AMPA) and the power supply regulator circuit on another (M12035 Stock no. Q03REPA). The bottom transistors on the heat sink and printed circuit board nearest the front panel belong to the lefthand channel amplifier.

Output Stage

Each 'triple' configuration is the equivalent of a single transistor of exceptional performance. Thus Tr103, Tr105, and Tr1 can be drawn as an NPN device E1, and Tr104, Tr106 and Tr2 as a PNP device E2, each assumed to incorporate the associated resistors of these circuits. (See Fig. 1).

Driver Stage

The sole purpose of MR100, MR101 and R114 is to limit Tr102 current to about 7mA and these components may be ignored at this stage. The remainder of the Tr100, Tr101 and Tr102 circuitry may be regarded as a single device E3, provided the voltage across C101 remains constant at 9 volts. (See Fig. 1).

From serial no. 11500 MR103/104 are replaced by Tr107, C110, R131/132.

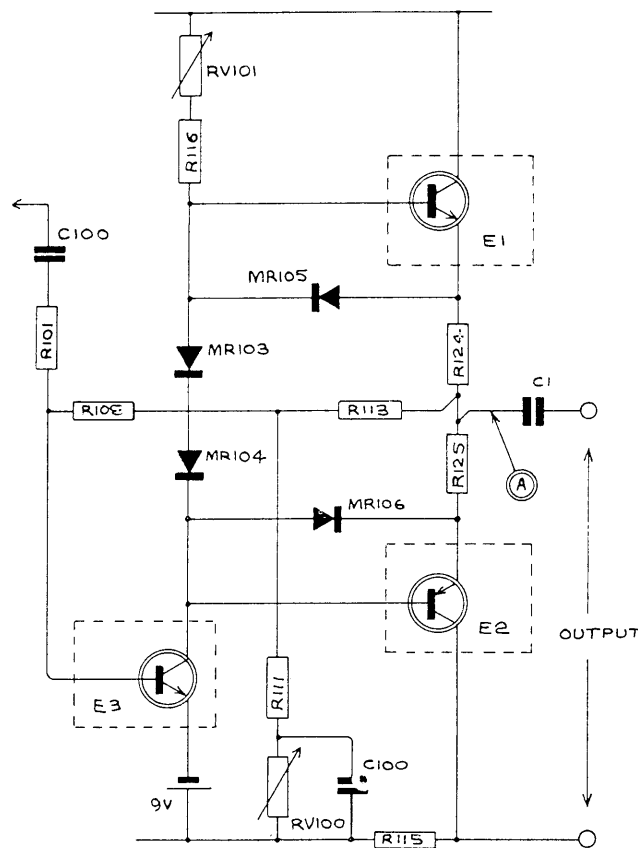


Fig. 1 Simplified circuit, Quad 303

Simplified Circuit

Substituting these three equivalents and regarding MR103 and MR104 as a battery providing steady bias, produces Fig.1 The whole amplifier is enclosed in a DC feedback loop via R113, R111, R110 and RV100, which stabilises the centre point of the output stage (point A) by determining the base voltage of Tr100 with respect to the emitter potential set by R104, R102. The AC gain is set by the ratios of R113/R111 and R101/R108.

RV101 controls the quiescent current of the output stage (see Setting Up). This should lie between 5 and 10mA with no signal input to the amplifier.

Each output transistor is protected from passing excessive current by the limiting action of three of the four diodes MR103–MR106, which may be regarded as 65 volt limit batteries. Tr1 is protected by MR105, 103 and 104 and Tr2 by MR103, 104 and 106, and the maximum voltage which can be developed in either R124 or R125 is 1.3 volts or 4.3 amps in 0.3 Ω . In sets after serial no. 11,500 read TR107 etc, for MR103/104.

If RV100 controls the voltage of point A correctly it is likely that all the transistors are working.

If E3 is cut off (by shorting Tr102 base to earth) point A should rise to HT rail voltage. If it is turned on (by shorting Tr101 base to earth) point A should fall almost to earth, say +2 to +3 volts. These two tests check the normal functioning of the circuit and

may help to pinpoint a fault affecting the voltage at A.

An open circuit in MR103 or MR104 (or TR107 etc.) would probably be accompanied by damage to one or more of Tr102, Tr103, Tr104, Tr105, Tr106, Tr1 and Tr2. In addition the power supply and regulator circuit should be checked.

Regulator Board

The Regulator Tr3 is in the negative lead of the supply and is controlled by Tr201 which in turn is controlled by Tr200. If the supply voltage rises, the voltage across R204 rises while that across the zener MR201 remains constant. This turns off Tr200, Tr201 and Tr3 and reduces the terminal voltage.

As this form of regulator is not self-starting R200, R201 and MR200 are included to ensure that the terminal voltage never falls below half the input voltage.

RV200 sets the base voltage of Tr200 and therefore the regulated terminal voltage.

After repairing the Quad 303 follow the instruction to set the mid point volts and quiescent current.

1. Ensure the mains voltage adjustment is correctly set for the mains supply in use.
2. Adjust RV200 for 67 volts DC between tags 1 and 9 on one driver board.
3. Adjust RV100 for 33.5 volts between tags 5 and 9 on lefthand channel driver board.
4. Adjust RV101 for 5 to 10mA quiescent collector current measured by breaking the external lead to tag 2 of the lefthand driver board and inserting a meter in series at this point, with no signal drive.
5. Repeat 3 and 4 for righthand channel.

Modifications

1. From serial number 11500, Tr107 and its associated components replaced MR103/104, enabling RV101 (quiescent current control) to vary the voltage between Tr103 and Tr104 bases without altering Tr102 collector current.
2. R202 was 6.8k, now 8.2k.
3. On most amplifiers the rectifier bridge MR1-4 is an encapsulated assembly AEI type PM7A2L.
4. Tr100 was BC154, now BC214C.
5. From serial number 80,500, the mains input plug was changed to the CEE22 (Europlug) connector.
Stock numbers PPP579A – chassis mounted plug
PSP587A – cable ended socket.

Early versions of the Quad 303 have the 2000µF electrolytic capacitors mounted with the tags facing downwards. When replacing the electrolytic capacitors (stock no. C2K2UTA) it is advisable to invert the electrolytics so that the tags are uppermost as shown in Fig 2. A kit providing tagboard and extensions to the wiring harness is available. Order stock no. Q03CAPI.

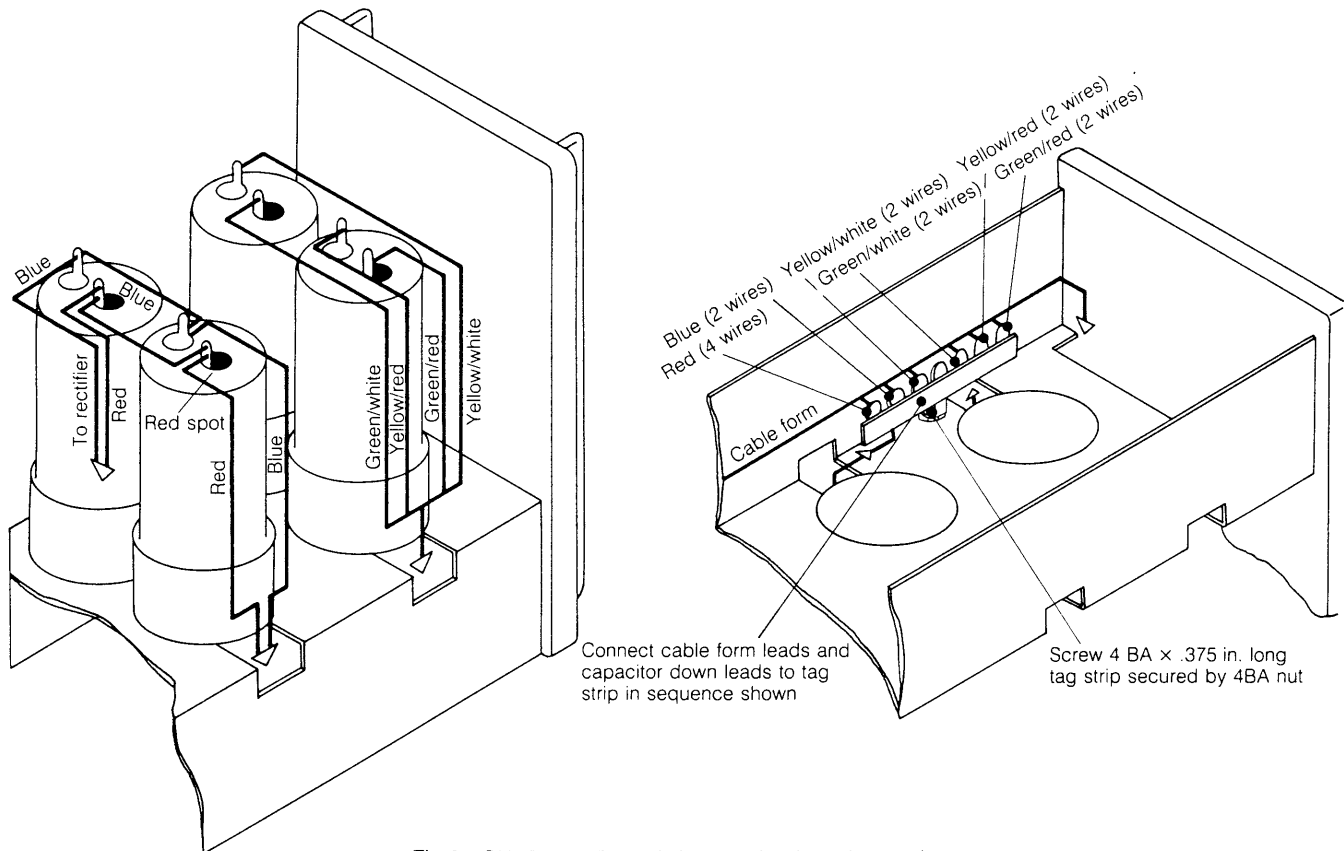


Fig 2 QUAD 303-Electrolytic capacitor inverting mod.

COMPONENTS LIST

Components and circuit detail may vary slightly depending on the age of the equipment. In case of doubt please refer the query to Acoustical.

Assembly No. Q03AM1A 303 Driver board

| Part No. | Description | Qty | Circuit reference |
|----------|-----------------------------|-----|-----------------------|
| 1 | DIS920B Diode IS920TB | 4 | MR100/101/ 105/106 |
| 2 | R100RJ1 Resistor 100 5 050 | 4 | R109/114/120/ 121 |
| 3 | R10R0K1 Resistor 10 10 050 | 2 | R122/126 |
| 4 | R150KJ1 Resistor 150K 5 050 | 1 | R130 |
| 5 | R1K00J1 Resistor 1K 5 050 | 2 | R118/119 |
| 6 | R1K80J1 Resistor 1K8 5 050 | 1 | R107 |
| 7 | R220KJ1 Resistor 220K 5 050 | 1 | R100 |
| 8 | R220RJ1 Resistor 220 5 050 | 1 | R106 |
| 9 | R22K0J1 Resistor 22K 5 050 | 3 | R101/104/108 |
| 10 | R2K20J1 Resistor 2K2 5 050 | 2 | R111/R132 |
| 11 | R39K0J1 Resistor 39K 5 050 | 1 | R112 |
| 12 | R3K30J1 Resistor 3K3 5 050 | 1 | R131 |
| 13 | R3K90J1 Resistor 3K9 5 050 | 1 | R102 |
| 14 | R4K70J1 Resistor 4K7 5 050 | 3 | R105/116/117 |
| 15 | R68R0K1 Resistor 68 10 050 | 2 | R123/127 |
| 16 | R82K0J1 Resistor 82K 5 050 | 1 | R113 |
| 17 | R8K20J1 Resistor 8K2 5 050 | 1 | R110 |

Assembly No. Q03AM2A 303 Driver board

| Part No. | Description | Qty | Circuit reference |
|----------|-------------------------------------|-----|-------------------|
| 1 | C0U68KT Capacitor .68u 10 35V TANT | 1 | C100 |
| 2 | C100PMI Capacitor 100p RT10FM100PMS | 2 | C103/105 |
| 3 | C10U0ZE Capacitor 10u 63V EK | 1 | C104 |
| 4 | C1N00MI Cap 1000p 20 RT12K101NOMS | 2 | C109/110 |
| 5 | C3P30CI Capacitor 3.3p RT10CG03P3CS | 1 | C107 |
| 6 | C470UZE Capacitor 470u 10V EK | 1 | C101 |
| 7 | C47U0ZB Capacitor 47u 40V EK | 1 | C106 |
| 8 | C10N0E1 Capacitor .01u RT17K310N0ES | 1 | C102 |
| 9 | C100NKM Capacitor .1u 20 352-44104 | 1 | C108 |
| 10 | D38495X Transistor 38495 | 1 | TR106 |
| 11 | D38496X Transistor 38496 | 1 | TR105 |
| 12 | DBC184X Transistor BC184 | 2 | TR107 |
| 13 | DZTX304 Transistor ZTX304 | 2 | TR102/103 |
| 14 | DZTX504 Transistor ZTX504 | 1 | TR104 |
| 15 | DBC214C Transistor BC214C | 1 | TR100 |
| 16 | L12406A Choke DRWG A4/12406 440B | 1 | L100 |
| 17 | R0R30JX Resistor 0R3 5 FCA2 | 2 | R124/125 |
| 18 | R10R0JA Resistor 10 5 075 | 2 | R128/129 |
| 19 | R2R20DS Resistor 2R2 0.5 ohm Type S | 1 | R115 |
| 20 | RP2K20A Potentiometer Type 10C 2K2 | 1 | RV101 |
| 21 | RP5K00A Potentiometer Type PT10C 5K | 1 | RV100 |

Assembly No. Q03CH1X 303 Chassis

| Part No. | Description | Qty | Circuit reference |
|----------|---------------------------------------|-----|-------------------|
| 1 | C2K2UTA Capacitor 2200u 100V -10 + 50 | 4 | C1/2/3 |
| 2 | L12085A Transf 303 mains A12085 | 1 | T1 |

Assembly No. Q03FP1A 303 Front plate

| Part No. | Description | Qty | Circuit reference |
|----------|---------------------------------------|-----|-------------------|
| 1 | N34LR5A Neon assembly 34LR/55 | 1 | V1 |
| 2 | PS04DNA Socket 4 pin DIN 2504 | 1 | SK1 |
| 3 | PS14130 Socket L1413 Black | 2 | SK3 |
| 4 | PS14132 Socket L1413 Red | 2 | SK2 |
| 5 | PPP579A Plug P579 Chassis A.C. input | 1 | PL1 |
| 6 | PF296SA Fuseholder F296S | 1 | |
| 7 | R2K20J1 Resistor 2K2 5 050 | 2 | R1 |
| 8 | SVB9AAA Voltage selector 83/209 | 1 | |
| 9 | UM02ADA Fuse glass cart 20mm 2AT 5917 | 1 | FS1 |

Assembly No. Q03HS1A 303 Heat sink

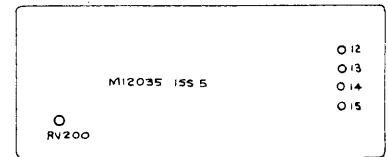
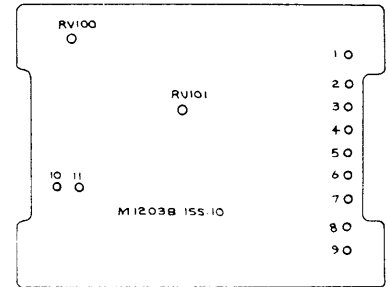
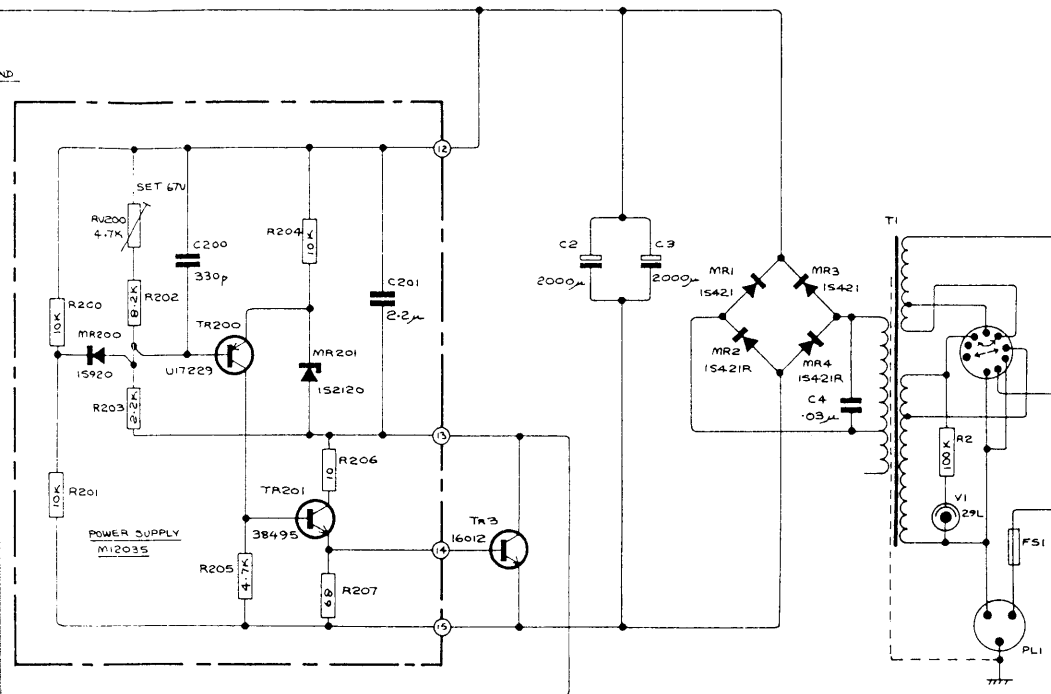
| Part No. | Description | Qty | Circuit reference |
|----------|--------------------------|-----|-------------------|
| 1 | D16112X Transistor 16112 | 1 | TR3 |
| 2 | D38494X Transistor 38494 | 4 | TR1/2 |

Assembly No. Q03RE1A 303 Regulator Board

| Part No. | Description | Qty | Circuit reference |
|----------|-------------------------------------|-----|-------------------|
| 1 | C2U20KM Capacitor 2.2u 10 250V | 1 | C201 |
| 2 | C330PMI Capacitor 330p RT10K1330PMS | 1 | C200 |
| 3 | D38495X Transistor 38495 | 1 | TR201 |
| 4 | DIS920B Diode IS920TB | 1 | MR200 |
| 5 | DZ12VAA Zener diode LR120C | 1 | MR201 |
| 6 | DZTX504 Transistor ZTX504 | 1 | TR200 |
| 7 | R10K0J1 Resistor 10K 5 050 | 2 | R200/201 |
| 8 | R10R0K1 Resistor 10 10 050 | 1 | R206 |
| 9 | R2K20J1 Resistor 2K2 5 050 | 1 | R203 |
| 10 | R4K70J1 Resistor 4K7 5 050 | 1 | R205 |
| 11 | R68R0K1 Resistor 68 10 050 | 1 | R207 |
| 12 | R6K80J1 Resistor 6K8 5 050 | 1 | R204 |
| 13 | R8K20J1 Resistor 8K2 5 050 | 1 | R202 |

Assembly No. Q03REST Q303 Miscellaneous

| Part No. | Description | Qty | Circuit reference |
|----------|--|-----|-------------------|
| 1 | C20N0Z1 Capacitor .02u CD16K320NO | 1 | C4 |
| 2 | DPM7A2M Bridge rect. PM7A2M | 1 | MR1/2/3/4 |
| 3 | PP04DNA Plug 4 pin DIN signal black 1054 | 1 | |
| 4 | PP387A0 Plug 4mm L378A4 Signal black 2 | 2 | |
| 5 | PP387A2 Plug 4mm L378A4 Signal red 2 | 2 | |
| 6 | PSP587A Socket P587 Cable-ended A.C. input | 1 | |
| 11 | M11821A 303 Baseplate AC67 | 1 | |
| 12 | M12046A 303 Cover AC63 | 1 | |

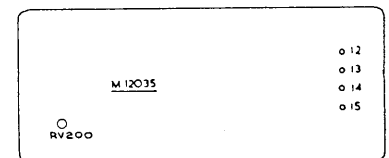
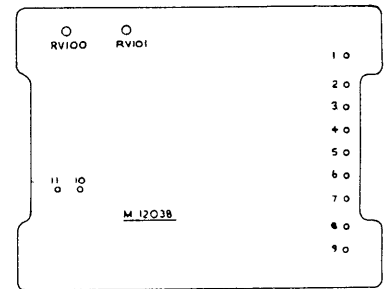
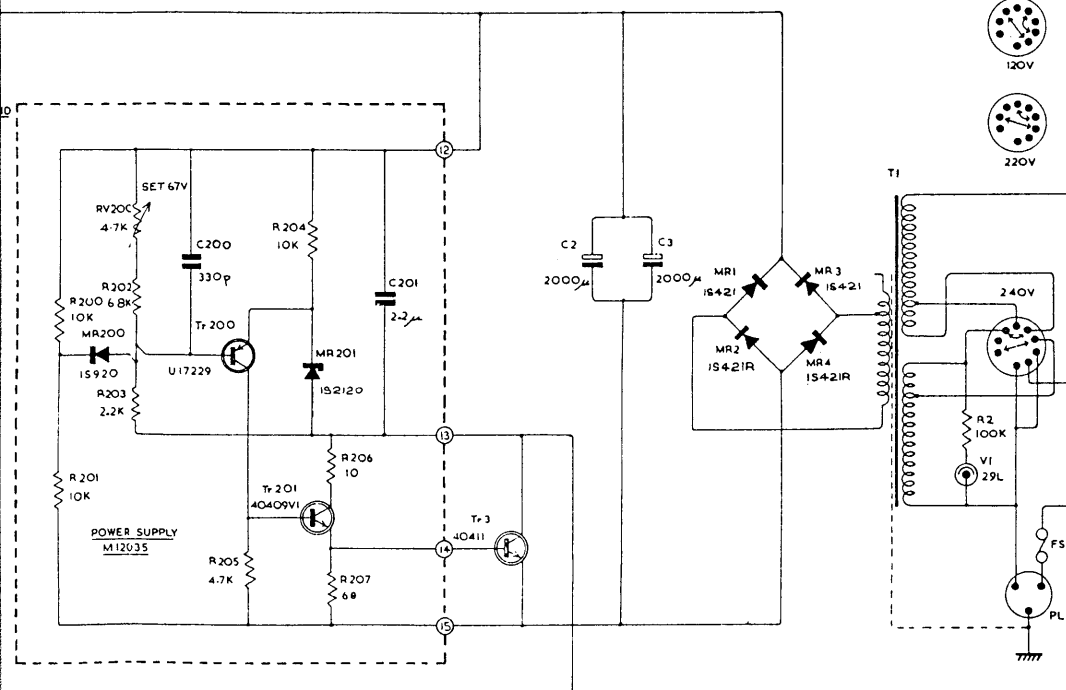


BOARDS VIEWED FROM COPPER SIDE

THE RIGHTHAND AMPLIFIER IS IDENTICAL TO THE LEFTHAND AMPLIFIER

THE FRONT BOARD AND THE BOTTOM TWO TRANSISTORS ON THE HEAT SINK ARE THE LEFTHAND CHANNEL

QUAD 303 Power Amplifier
(Serial No. 11500 and above)



BOARDS VIEWED FROM COPPER SIDE

THE RIGHTHAND AMPLIFIER IS IDENTICAL TO THE LEFTHAND AMPLIFIER

THE FRONT BOARD AND THE BOTTOM TWO TRANSISTORS ON THE HEAT SINK ARE THE LEFT HAND CHANNEL

QUAD 303 Power Amplifier
(Up to Serial No. 11500)