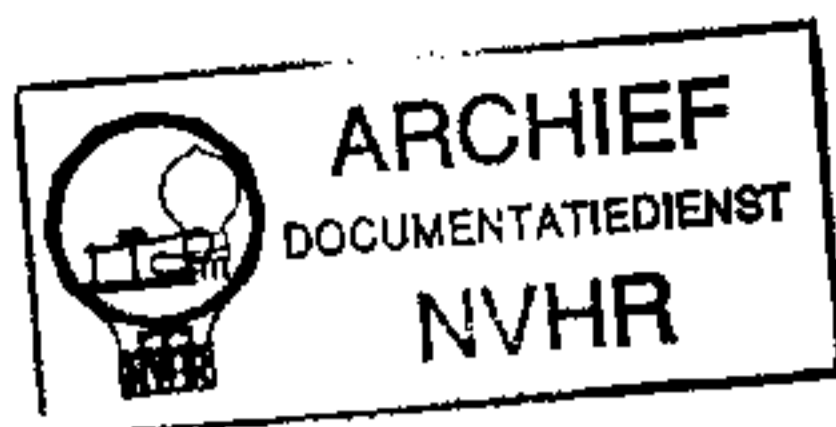


Service
Service
Service

Ned. Ver. v. Historie v/d Radio



38 348 A12

Met dank aan www.radiomuseum-hengelo.nl

Service Manual

12 V

GB SPECIFICATIONS

| | |
|--------------------------------------|---------------------|
| Output power (4 Ω) | : 2x 70 W THD ≤ 10% |
| | 2x 60 W THD ≤ 0.5% |
| Power bandwidth (-3 dB) | : 20-20.000 Hz |
| Signal to noise ratio | : 62 dB |
| Input impedance | |
| Line input | : 20 kΩ |
| Speaker input | : 1 kΩ |
| Input sensitivity (for rated output) | |
| Line input | : 630 mV |
| Speaker input | : 5.3 V |
| Power supply voltage | : 14.4 V |
| Power consumption | : max. 30 A |
| Dimensions (wxhxd) | : 22x7.5x23 mm |

NL TECHNISCHE GEGEVENS

| | |
|------------------------------|---------------------|
| Uitgangsvermogen (4 Ω) | : 2x 70 W THD ≤ 10% |
| | 2x 60 W THD ≤ 0.5% |
| Vermogensbandbreedte (-3 dB) | : 20-20.000 Hz |
| Signaal/ruisverhouding | : 62 dB |
| Ingangsimpedantie | |
| Lijningang | : 20 kΩ |
| L.S. ingang | : 1 kΩ |
| Ingangsgoedigheid | |
| Lijningang | : 630 mV |
| L.S. ingang | : 5.3 V |
| Voedingsspanning | : 14.4 V |
| Stroomopname | : max. 30 A |
| Afmetingen (bxhxl) | : 22x7.5x23 mm |

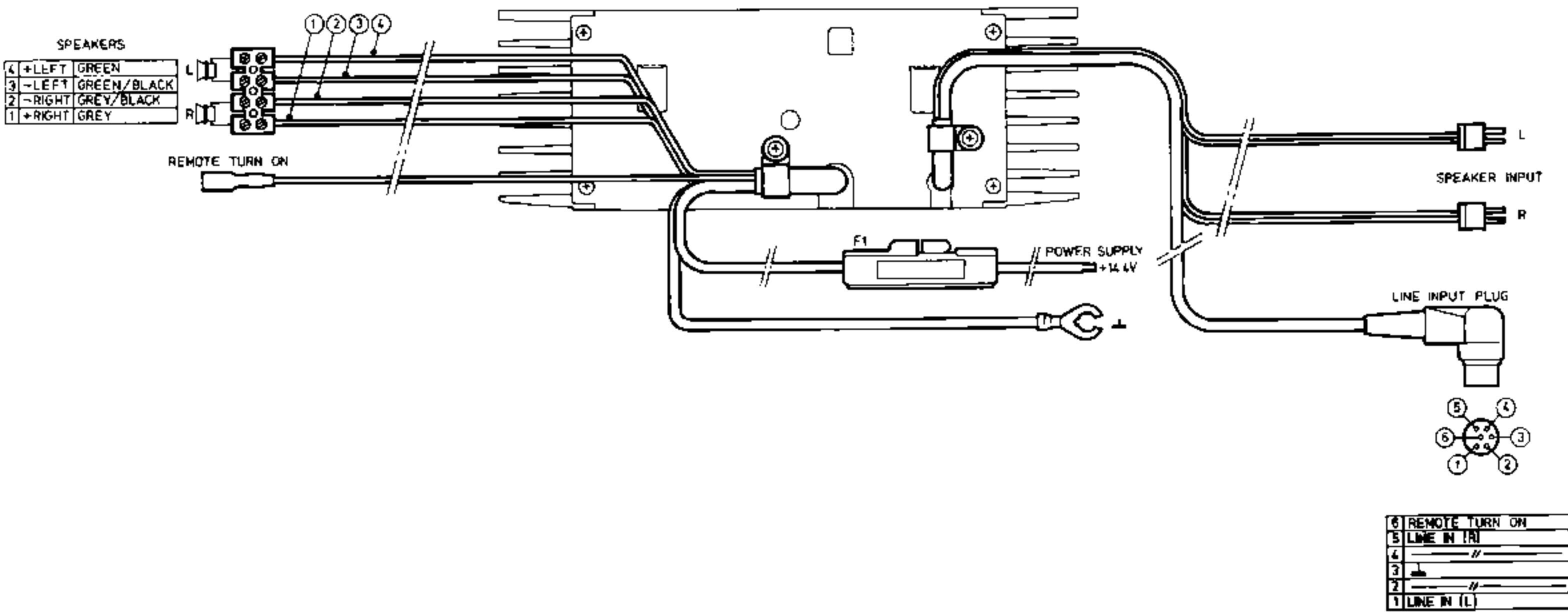
F CARACTERISTIQUES TECHNIQUES

| | |
|------------------------------------|---------------------|
| Puissance de sortie (4 Ω) | : 2x 70 W THD ≤ 10% |
| | 2x 60 W THD ≤ 0.5% |
| Puissance largeur de bande (-3 dB) | : 20-20.000 Hz |
| Rapport signal/bruit | : 62 dB |
| Impedance d'entrée | |
| Entrée de ligne | : 20 kΩ |
| Entrée d'haut-parleur | : 1 kΩ |
| Sensibilité d'entrée | |
| Entrée de ligne | : 630 mV |
| Entrée d'haut-parleur | : 5.3 V |
| Tension d'alimentation | : 14.4 V |
| Absorption | : max. 30 A |
| Encombrement (larg.xhaut.xprof.) | : 22x7.5x23 mm |

D TECHNISCHE DATEN

| | |
|---|---------------------|
| Ausgangsleistung (4 Ω) | : 2x 70 W THD ≤ 10% |
| | 2x 60 W THD ≤ 0.5% |
| Leistungsbandbreite (-3 dB) | : 20-20.000 Hz |
| Signal/Rausch-Verhältnis | : 62 dB |
| Eingangsimpedanz | |
| Line-Eingang | : 20 kΩ |
| Lautsprechereingang | : 1 kΩ |
| Eingangsempfindlichkeit (für Normausgang) | |
| Line-Eingang | : 630 mV |
| Lautsprechereingang | : 5.3 V |
| Speisespannung | : 14.4 V |
| Leistungsaufnahme | : max. 30 A |
| Abmessungen(BxHxT) | : 22x7.5x23 mm |





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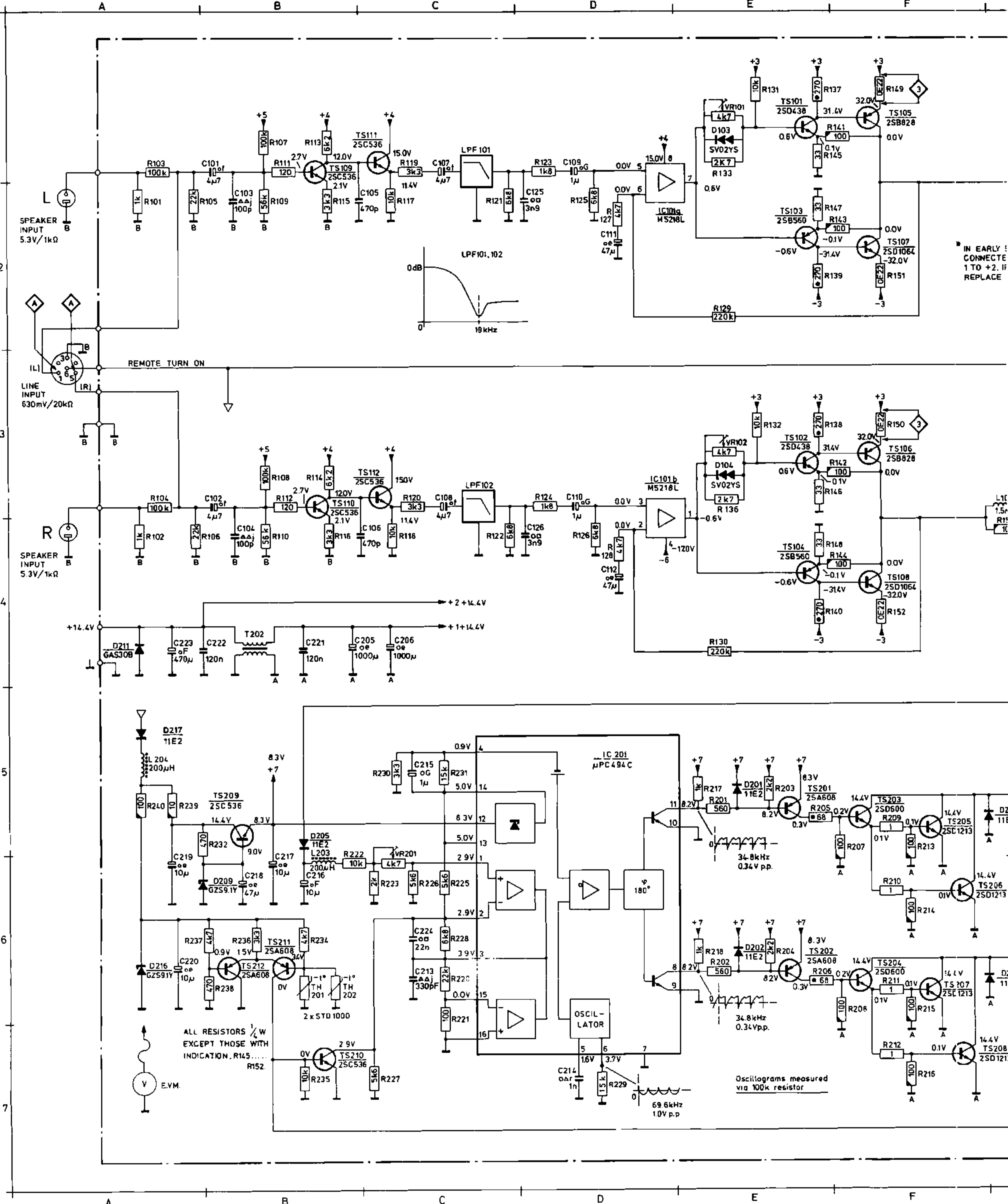
CHECKS

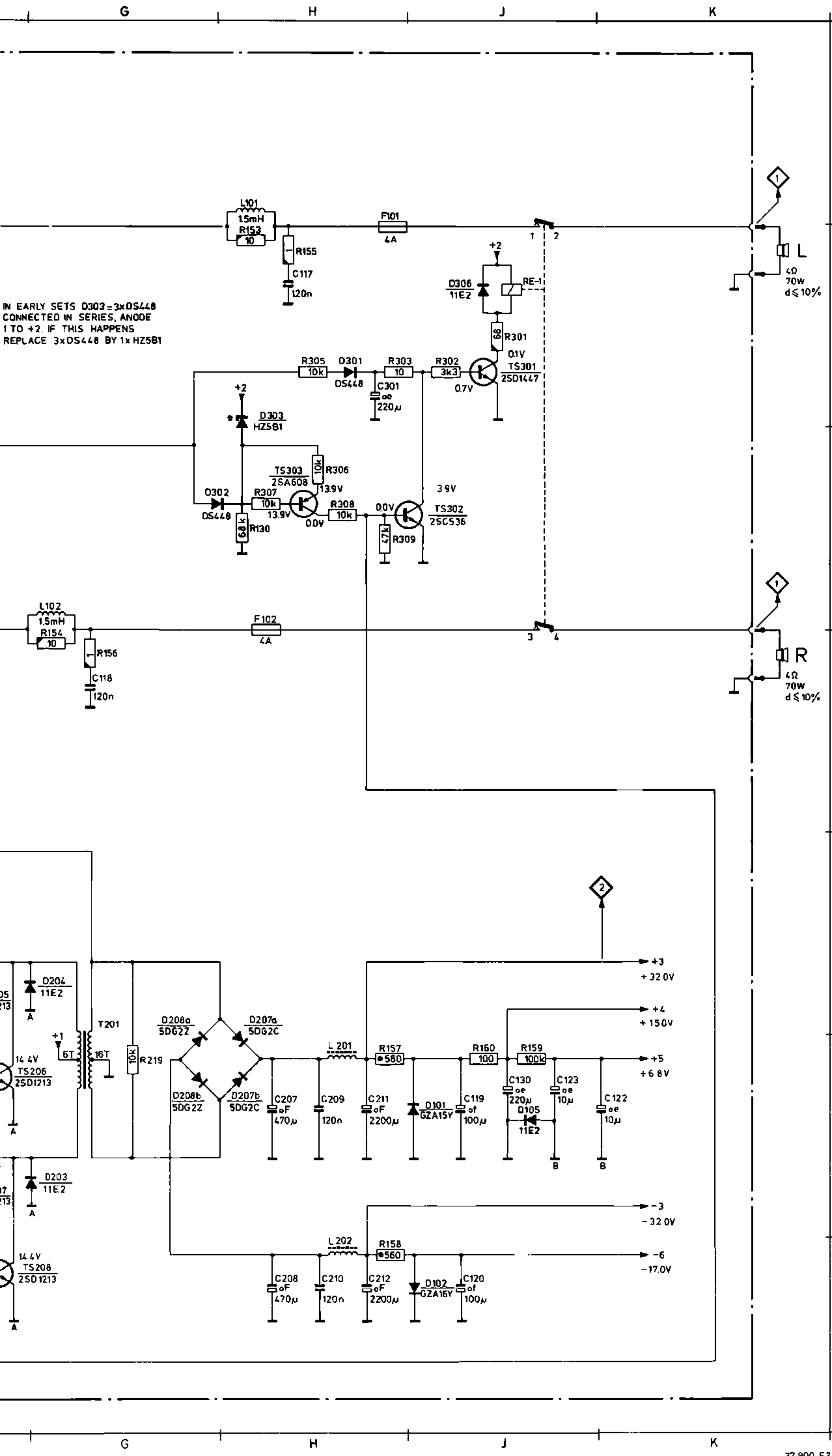
| Check | | |
|-------------------------------|-----------|---|
| Internal Power supply Voltage | No signal | 2 32 V $\overline{\dots}$ -0,5 V |
| Quiescent Current | No signal | 3 2.5-6 mV |

ADJUSTMENTS

| Adjustment | Power supply voltage | | | | | |
|-------------------------------|---------------------------|-----------|---|------------------|---------------------------------------|-------------------|
| Internal power supply Voltage | 14.4 V $\overline{\dots}$ | No signal | - | VR201 | 2 32 V $\overline{\dots}$ -0,5 | |
| Quiescent current | 10.6 V $\overline{\dots}$ | 10 kHz | | Gen. | 1 500 mV | 25-50 μ s |
| | | | | VR101 VR102 | 1 | |
| Low pass filter | 14.4 V $\overline{\dots}$ | 19 kHz | | LPF101 LPF102 | 1 min | |

1 Turn VR101, VR102 counterclockwise before adjustment





| | | | | | |
|------|-----|--------|-----|-------|-----|
| C101 | B01 | R131 | E01 | TS206 | F06 |
| C102 | B03 | R132 | E03 | TS207 | F06 |
| C103 | B02 | R133 | E01 | TS208 | F07 |
| C104 | B04 | R135 | G02 | TS209 | B05 |
| C105 | C02 | R136 | E03 | TS210 | A07 |
| C106 | C04 | R137 | E01 | TS211 | B06 |
| C107 | C01 | R138 | E03 | TS212 | B06 |
| C108 | C03 | R139 | E02 | TS301 | J02 |
| C109 | D01 | R140 | E04 | TS302 | H03 |
| C110 | D03 | R141 | F01 | TS303 | H03 |
| C111 | D02 | R142 | F03 | VR101 | E01 |
| C112 | D04 | R143 | F02 | VR102 | E03 |
| C117 | G02 | R144 | F04 | VR201 | C05 |
| C118 | G04 | R145 | B01 | | |
| C119 | J06 | R146 | E03 | | |
| C120 | J07 | R147 | E02 | | |
| C122 | K06 | R148 | E04 | | |
| C123 | J06 | R149 | F01 | | |
| C125 | D02 | R150 | F03 | | |
| C126 | D04 | R151 | F02 | | |
| C130 | J06 | R152 | F04 | | |
| C205 | B04 | R155 | G02 | | |
| C206 | C04 | R156 | G04 | | |
| C207 | H06 | R157 | H06 | | |
| C208 | H07 | R158 | H07 | | |
| C209 | H06 | R159 | J06 | | |
| C210 | H07 | R160 | J06 | | |
| C211 | H06 | R201 | E05 | | |
| C212 | H07 | R202 | E06 | | |
| C213 | C06 | R203 | E05 | | |
| C214 | D07 | R204 | E06 | | |
| C215 | C05 | R205 | E05 | | |
| C216 | B06 | R206 | E06 | | |
| C217 | B06 | R207 | F05 | | |
| C218 | B06 | R208 | F06 | | |
| C219 | A06 | R209 | F05 | | |
| C220 | A06 | R210 | F06 | | |
| C221 | B04 | R211 | F06 | | |
| C222 | B04 | R212 | F07 | | |
| C223 | A04 | R213 | F05 | | |
| C224 | C06 | R214 | F06 | | |
| C301 | H02 | R215 | F06 | | |
| D101 | J06 | R216 | F07 | | |
| D102 | J07 | R217 | E05 | | |
| D103 | E01 | R218 | E06 | | |
| D104 | E03 | R219 | G06 | | |
| D105 | J06 | R220 | C06 | | |
| D201 | E05 | R221 | C06 | | |
| D202 | E06 | R222 | B05 | | |
| D203 | G06 | R223 | C06 | | |
| D204 | G05 | R225 | C06 | | |
| D205 | B05 | R226 | C06 | | |
| D207 | H05 | R227 | C07 | | |
| D208 | G05 | R228 | C06 | | |
| D209 | B06 | R229 | D07 | | |
| D211 | A04 | R230 | C05 | | |
| D216 | A06 | R231 | C05 | | |
| D217 | A05 | R232 | B05 | | |
| D301 | H02 | R234 | B06 | | |
| D302 | G03 | R235 | A07 | | |
| D303 | H02 | R236 | B06 | | |
| D306 | J02 | R237 | A06 | | |
| F101 | H01 | R238 | B06 | | |
| F102 | H03 | R239 | A05 | | |
| L101 | G01 | R240 | A05 | | |
| L102 | G03 | R301 | J02 | | |
| L201 | H06 | R302 | J02 | | |
| L202 | H07 | R303 | H02 | | |
| L203 | B05 | R305 | H02 | | |
| L204 | A05 | R306 | H03 | | |
| R101 | A02 | R307 | H03 | | |
| R102 | A04 | R308 | H03 | | |
| R103 | A01 | R309 | H03 | | |
| R104 | A03 | RE-1 | J02 | | |
| R105 | B02 | T201 | C05 | | |
| R106 | B04 | T202 | B04 | | |
| R107 | B01 | IC101A | D02 | | |
| R108 | B03 | IC101B | D03 | | |
| R109 | B02 | IC201 | D05 | | |
| R110 | B04 | LPF101 | C01 | | |
| R111 | B01 | LPF102 | C03 | | |
| R112 | B03 | TH201 | B06 | | |
| R113 | B01 | TH202 | B06 | | |
| R114 | B03 | TS101 | E01 | | |
| R115 | B02 | TS102 | E03 | | |
| R116 | B04 | TS103 | E02 | | |
| R117 | C02 | TS104 | E04 | | |
| R118 | C04 | TS105 | F01 | | |
| R119 | C01 | TS106 | F03 | | |
| R120 | C03 | TS107 | F02 | | |
| R121 | C02 | TS108 | F04 | | |
| R122 | C04 | TS109 | B01 | | |
| R123 | D01 | TS110 | B03 | | |
| R124 | D03 | TS111 | C01 | | |
| R125 | D02 | TS112 | C03 | | |
| R126 | D04 | TS201 | E05 | | |
| R127 | D02 | TS202 | E06 | | |
| R128 | D04 | TS203 | F05 | | |
| R129 | E02 | TS204 | F06 | | |
| R130 | E04 | TS205 | F05 | | |

| | | | | | |
|------|-----|--------|-----|-------|-----|
| C101 | A02 | R131 | B01 | TS205 | D01 |
| C102 | A03 | R132 | B03 | TS206 | D04 |
| C103 | A02 | R133 | B02 | TS207 | C01 |
| C104 | A04 | R136 | B03 | TS208 | C04 |
| C105 | A02 | R137 | B01 | TS209 | D04 |
| C106 | A03 | R138 | B04 | TS210 | D04 |
| C107 | A02 | R139 | A01 | TS211 | C03 |
| C108 | A03 | R140 | A04 | TS212 | C03 |
| C109 | A02 | R141 | B01 | TS301 | B03 |
| C110 | A03 | R142 | B04 | TS302 | B03 |
| C111 | A02 | R143 | A01 | TS303 | C01 |
| C112 | A03 | R144 | A04 | VR101 | B02 |
| C117 | B02 | R145 | B02 | VR102 | B03 |
| C118 | B03 | R146 | B03 | VR201 | E03 |
| C119 | A02 | R147 | B02 | | |
| C120 | A03 | R148 | B03 | | |
| C122 | A03 | R149 | B01 | | |
| C125 | A02 | R150 | B04 | | |
| C126 | A03 | R151 | B02 | | |
| C130 | A02 | R152 | B04 | | |
| C205 | E02 | R153 | B02 | | |
| C206 | D02 | R154 | B03 | | |
| C207 | C02 | R155 | B02 | | |
| C208 | C03 | R156 | B03 | | |
| C209 | B02 | R157 | B02 | | |
| C210 | B03 | R158 | B03 | | |
| C211 | B02 | R159 | A03 | | |
| C212 | B03 | R160 | A02 | | |
| C213 | E03 | R201 | E03 | | |
| C214 | B03 | R202 | E03 | | |
| C215 | D04 | R203 | E02 | | |
| C216 | C03 | R204 | E02 | | |
| C217 | D04 | R205 | E01 | | |
| C218 | D04 | R206 | E01 | | |
| C219 | D04 | R207 | D01 | | |
| C220 | C04 | R208 | D01 | | |
| C221 | E02 | R209 | D01 | | |
| C222 | D02 | R210 | C01 | | |
| C223 | D02 | R211 | D04 | | |
| C224 | D04 | R212 | C04 | | |
| C301 | A03 | R213 | D01 | | |
| C310 | A03 | R214 | C01 | | |
| D101 | B02 | R215 | D04 | | |
| D102 | B03 | R216 | C04 | | |
| D103 | A02 | R217 | E03 | | |
| D104 | B04 | R218 | E03 | | |
| D107 | A03 | R219 | C03 | | |
| D201 | E02 | R220 | E04 | | |
| D202 | E02 | R221 | E04 | | |
| D203 | D03 | R222 | D03 | | |
| D204 | C01 | R223 | D03 | | |
| D205 | D03 | R225 | E04 | | |
| D207 | C02 | R226 | E03 | | |
| D208 | C03 | R227 | E03 | | |
| D209 | D04 | R228 | E04 | | |
| D211 | D02 | R229 | E03 | | |
| D216 | C04 | R230 | E03 | | |
| D217 | C04 | R231 | E04 | | |
| D301 | A02 | R232 | D04 | | |
| D302 | C01 | R234 | C03 | | |
| D303 | C01 | R235 | C03 | | |
| D306 | B03 | R236 | C03 | | |
| F101 | B02 | R237 | C03 | | |
| F102 | B03 | R238 | C03 | | |
| L101 | B02 | R239 | D03 | | |
| L102 | B03 | R240 | C04 | | |
| L201 | B02 | R301 | B03 | | |
| L202 | B03 | R302 | B03 | | |
| L203 | D04 | R303 | A03 | | |
| L204 | C04 | R305 | A02 | | |
| R101 | A01 | R306 | C01 | | |
| R102 | A04 | R307 | C01 | | |
| R103 | A01 | R308 | C01 | | |
| R104 | A04 | R309 | C01 | | |
| R105 | A01 | R310 | C01 | | |
| R106 | A04 | RE-1 | B02 | | |
| R107 | A02 | T201 | D03 | | |
| R108 | A03 | T202 | D02 | | |
| R109 | A01 | IC101 | A03 | | |
| R110 | A04 | IC201 | E04 | | |
| R111 | A02 | LPF101 | A02 | | |
| R112 | A03 | LPF102 | A03 | | |
| R113 | A02 | TR201 | C01 | | |
| R114 | A03 | TR202 | C04 | | |
| R115 | A01 | TS101 | B01 | | |
| R116 | A04 | TS102 | B04 | | |
| R117 | A02 | TS103 | B01 | | |
| R118 | A03 | TS104 | A04 | | |
| R119 | A02 | TS105 | B01 | | |
| R120 | A03 | TS106 | B04 | | |
| R121 | A02 | TS107 | A01 | | |
| R122 | A03 | TS108 | A04 | | |
| R123 | A02 | TS109 | A02 | | |
| R124 | A03 | TS110 | A04 | | |
| R125 | A02 | TS111 | A02 | | |
| R126 | A03 | TS112 | A03 | | |
| R127 | A02 | TS201 | E01 | | |
| R128 | A03 | TS202 | E02 | | |
| R129 | A01 | TS203 | D01 | | |
| R130 | A04 | TS204 | E01 | | |

TS109
 E = 2.1V
 B = 2.7V
 C = 12.0V

TS111
 E = 11.4V
 B = 12.0V
 C = 15.0V

TS302
 E = 0.0V
 B = 0.0V
 C = 3.9V

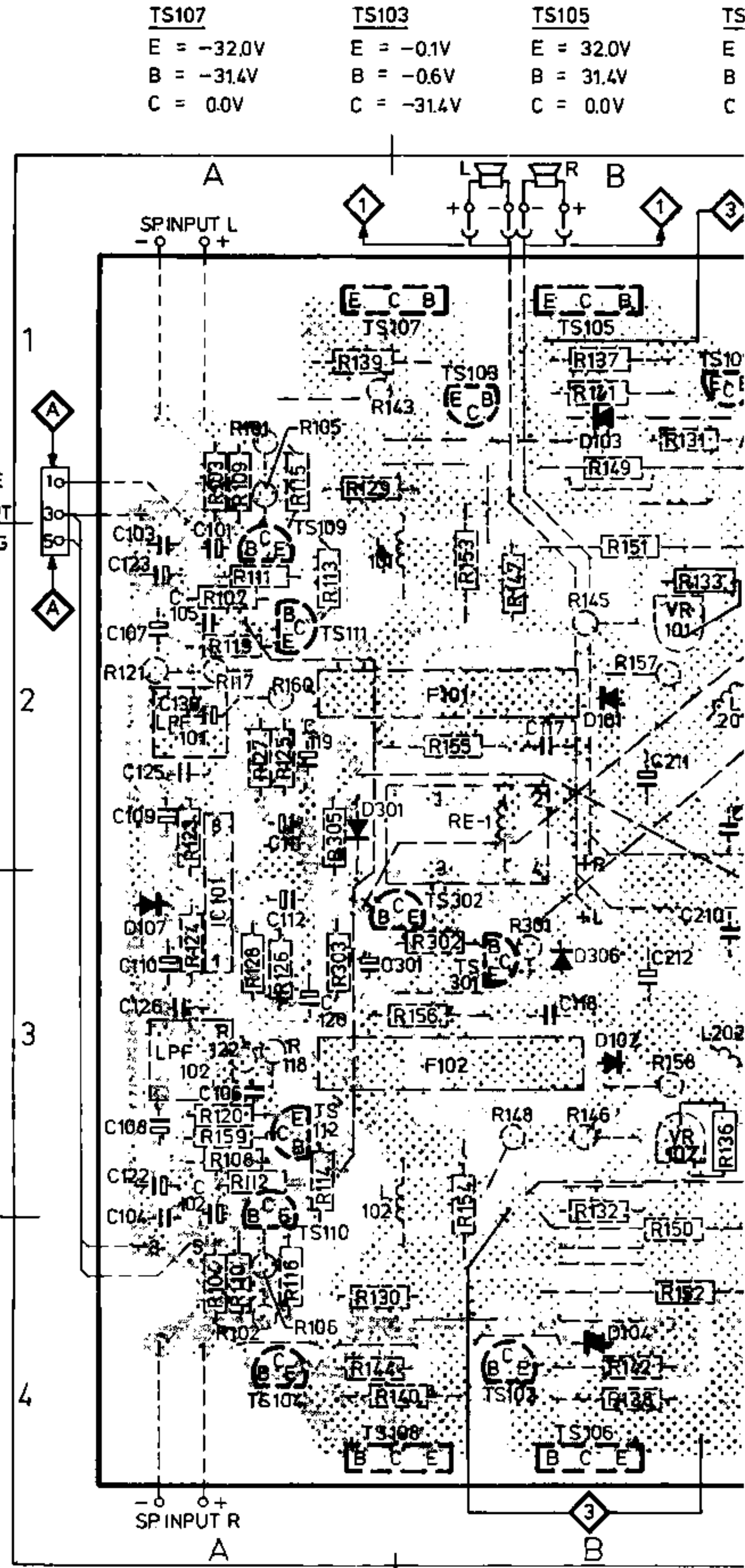
IC 101
 1 = -0.6V
 2 = 0.0V
 3 = 0.0V
 4 = -17.0V
 5 = 0.0V
 6 = 0.0V
 7 = -0.6V
 8 = 15.0V

TS301
 E = 0.0V
 B = 0.7V
 C = 0.06V

TS112
 E = 11.4V
 B = 12.0V
 C = 15.0V

TS110
 E = 2.1V
 B = 2.7V
 C = 12.0V

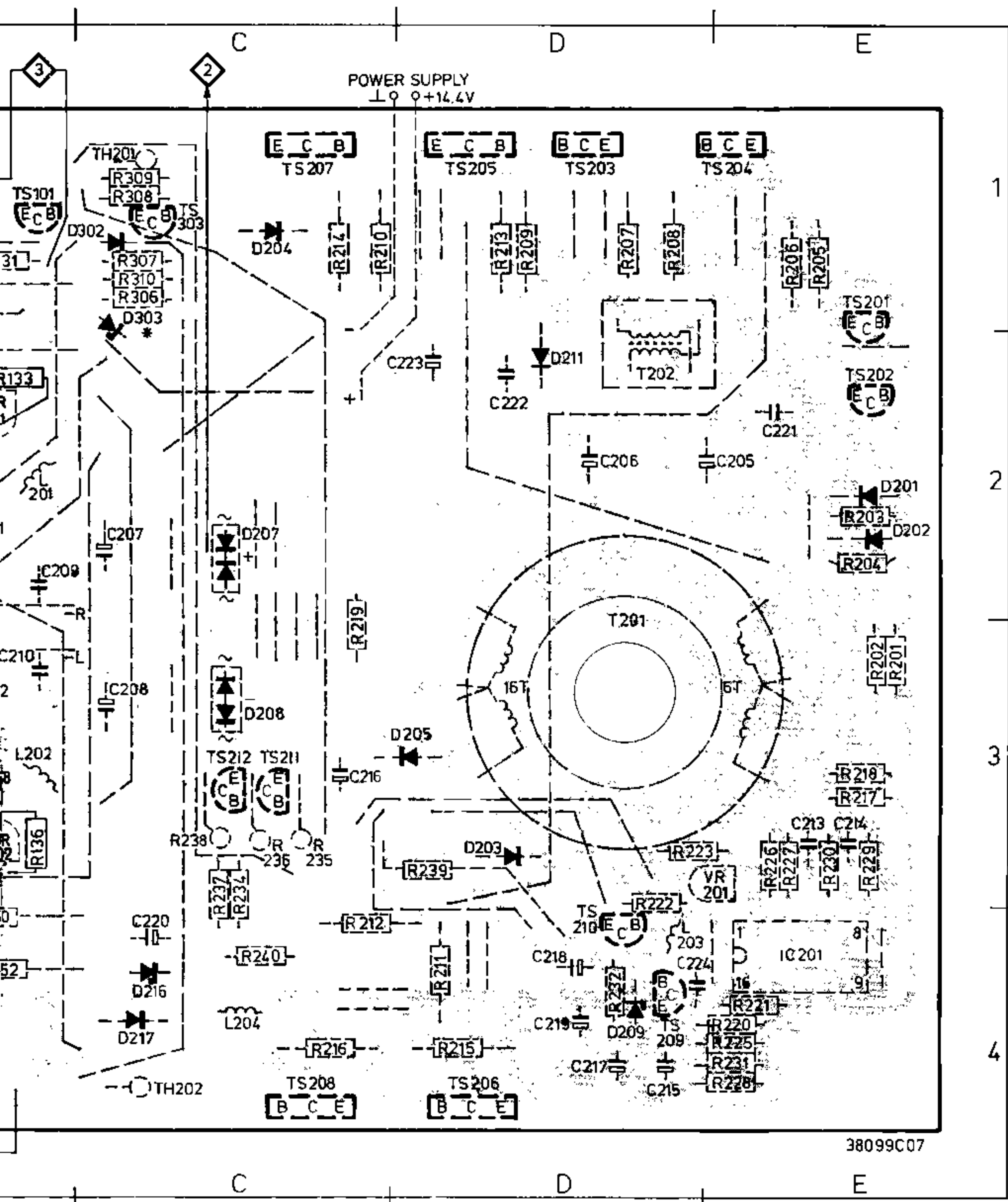
VOLTAGES MEASURED WITHOUT INPUT SIGNAL



| | | | |
|--------------|--------------|--------------|-----------|
| TS107 | TS103 | TS105 | TS |
| E = -32.0V | E = -0.1V | E = 32.0V | E |
| B = -31.4V | B = -0.6V | B = 31.4V | B |
| C = 0.0V | C = -31.4V | C = 0.0V | C |

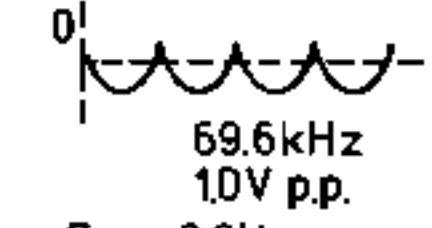
| | | | |
|--------------|--------------|--------------|--------------|
| TS104 | TS108 | TS102 | TS106 |
| E = -0.1V | E = -32.0V | E = 0.1V | E = 32.0V |
| B = -0.6V | B = -31.4V | B = 0.6V | B = 31.4V |
| C = -31.4V | C = 0.0V | C = 31.4V | C = 0.0V |

| | | | | | |
|---|--|---|---|---|---|
| TS101 E = 0.1V B = 0.6V C = 31.4V | TS303 E = 13.9V B = 13.9V C = 0.0V | TS207 E = 0.0V B = 0.1V C = 14.4V | TS205 E = 0.0V B = 0.1V C = 14.4V | TS203 E = 0.1V B = 0.2V C = 14.4V | TS204 E = 0.1V B = 0.2V C = 14.4V |
|---|--|---|---|---|---|

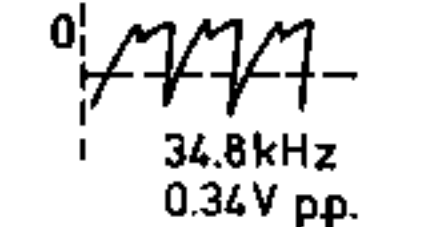


| |
|--|
| TS201 E = 8.3V B = 8.2V C = 0.3V |
| TS202 E = 8.3V B = 8.2V C = 0.3V |

| |
|---|
| IC 201 1 = 2.9V 2 = 2.9V 3 = 3.9V 4 = 0.9V 5 = 1.6V 6 = 3.7V |
|---|



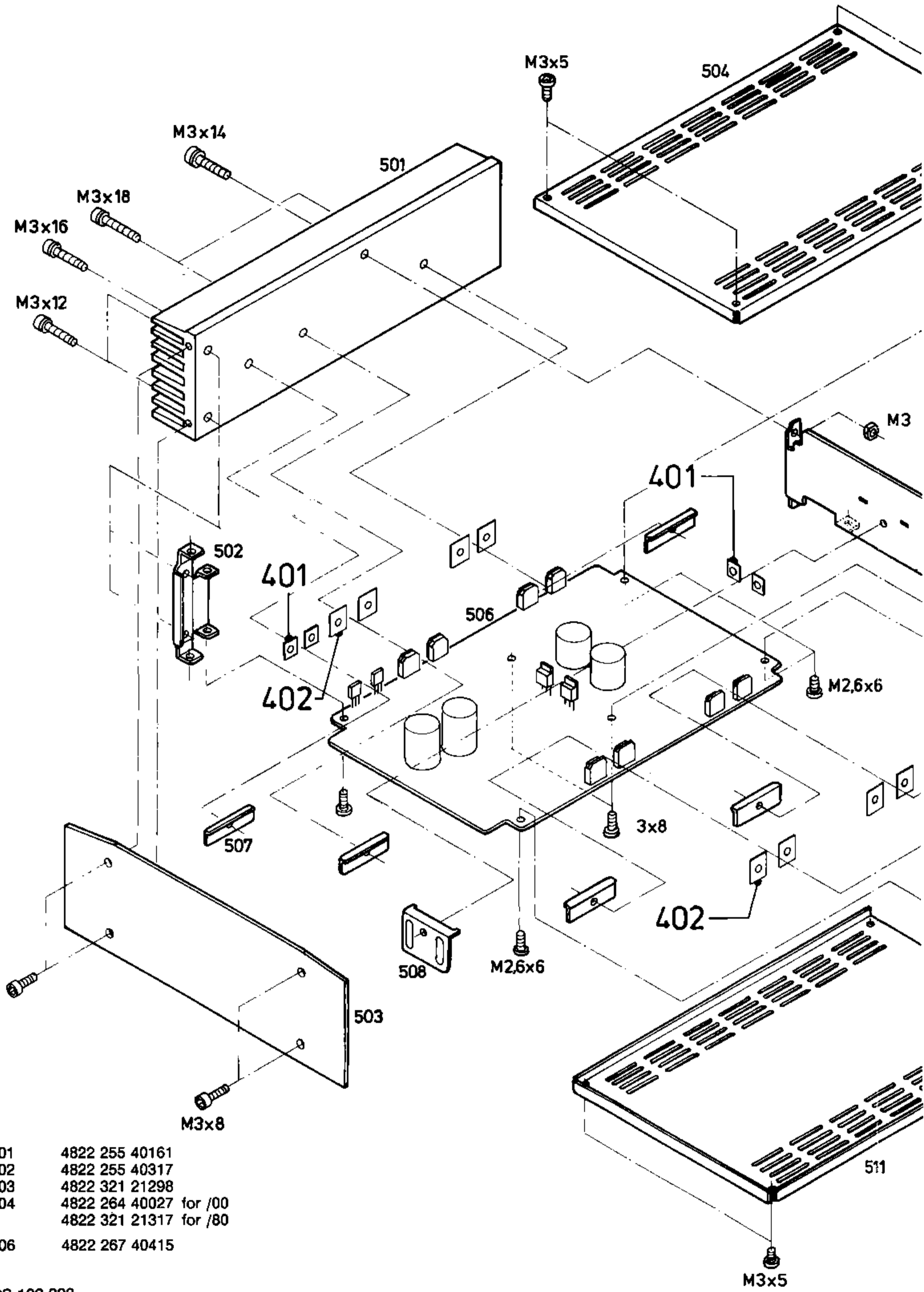
| |
|-----------|
| 7 = 0.0V |
| 8 = 8.2V |
| 9 = 0.0V |
| 10 = 0.0V |
| 11 = 8.2V |



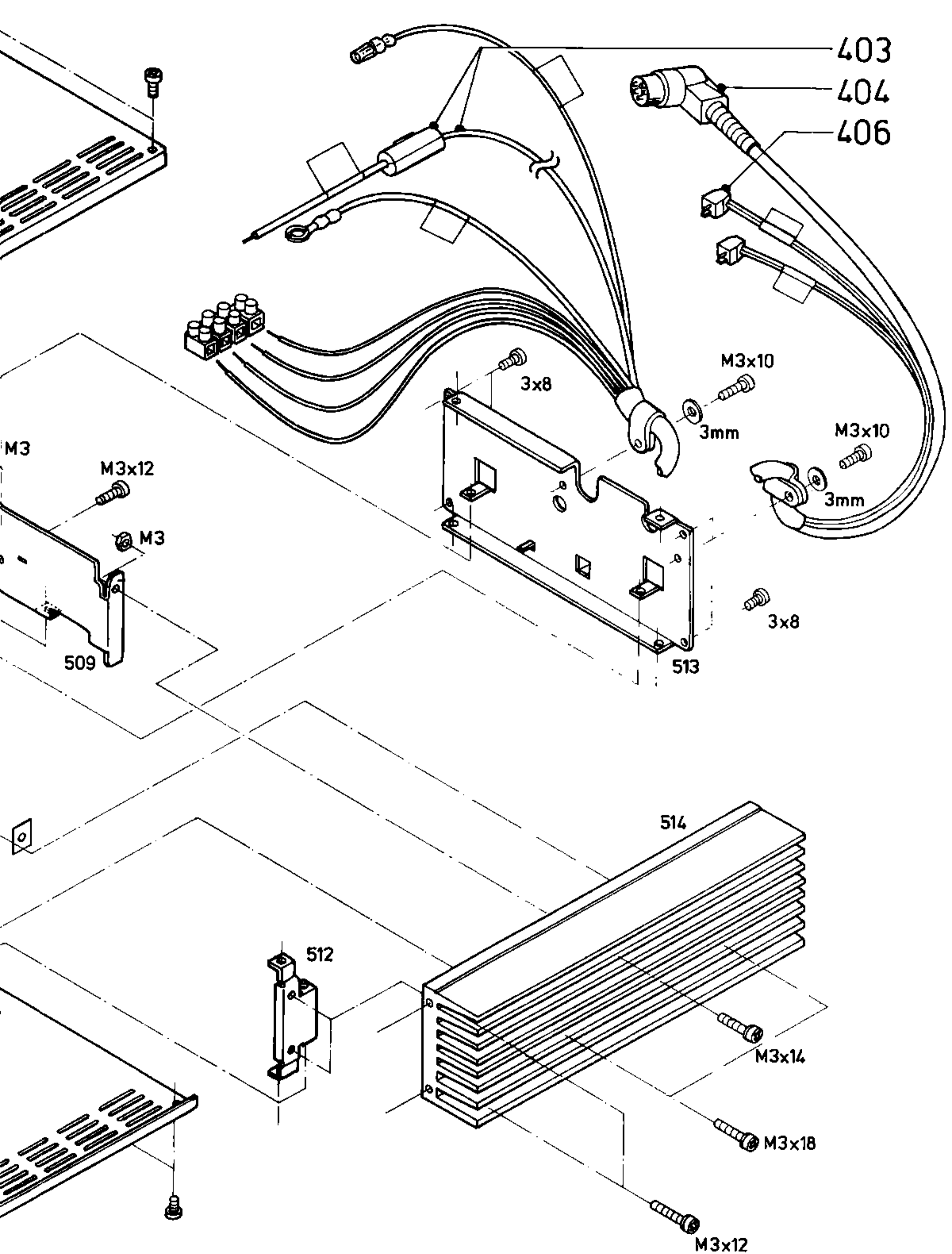
| |
|-----------|
| 12 = 8.3V |
| 13 = 5.0V |
| 14 = 5.0V |
| 15 = 0.0V |
| 16 = 0.0V |

| | | | | | | |
|------|--|--|---|---|--|---|
| 2.0V | TS212 E = 1.5V B = 0.9V C = 0.0V | TS211 E = 1.5V B = 3.4V C = 0.0V | TS208 E = 0.0V B = 0.1V C = 14.4V | TS206 E = 0.0V B = 0.1V C = 14.4V | TS210 E = 0.0V B = 0.0V C = 2.9V | TS209 E = 8.3V B = 9.0V C = 14.4V |
|------|--|--|---|---|--|---|

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| | |
|-----|------------------------|
| 401 | 4822 255 40161 |
| 402 | 4822 255 40317 |
| 403 | 4822 321 21298 |
| 404 | 4822 264 40027 for /00 |
| | 4822 321 21317 for /80 |
| 406 | 4822 267 40415 |



| 4.7 μ F | 50% | 63 V | 4822 124 40246 | 05AZ15Y | 4822 130 34281 |
|-------------------|-----|------|----------------|----------------------|----------------|
| 4.7 μ F | ALU | 25 V | 4822 124 21772 | 05AZ16Y | 4822 130 34268 |
| 1 μ F | | 50 V | 4822 124 21486 | 2SV02YS | 4822 130 32942 |
| 47 μ F | ALU | 16 V | 4822 124 21771 | S5277D | 4822 130 32941 |
| 120 nF | 5% | TF | 4822 121 42499 | DSF10C-BT | 4822 130 32508 |
| 100 μ F | 20% | 25 V | 4822 124 21775 | 5DG2C | 4822 130 32943 |
| 10 μ F | ALU | 16 V | 4822 124 21769 | 5DG2Z | 4822 130 32944 |
| 220 μ F | 20% | 16 V | 4822 124 21774 | 05AZ9.1Y | 4822 130 30862 |
| 1000 μ F | 20% | 16 V | 4822 124 40335 | 30D1 | 4822 130 32945 |
| 470 μ F | 20% | 35 V | 4822 124 21777 | DS-448 | 4822 130 31018 |
| 2200 μ F | 20% | 35 V | 4822 124 21776 | HZ5B | 4822 130 32946 |
| 1 μ F | ALU | 50 V | 4822 124 21773 | S5277D | 4822 130 32941 |
| 10 μ F | 50% | 50 V | 4822 124 40435 | | |
| | | | | | |
| 33E | 5% | 3 W | 4822 116 60249 | 2SD438F | 4822 130 41313 |
| 0E22 | 5% | 5 W | 4822 113 80377 | 2SB560F | 4822 130 41309 |
| 10E | 5% | 1 W | 4822 116 60251 | 2SB828Q | 4822 130 42726 |
| 1E | 5% | 1 W | 4822 116 60252 | 2SD1064Q | 4822 130 42727 |
| 68E | 5% | 1 W | 4822 116 60253 | 2SC536E | 4822 130 42728 |
| NTC | | | 4822 116 30296 | 2SA673C | 4822 130 41412 |
| Potm. trimmer 4k7 | | | 4822 100 10937 | 2SD600E | 4822 130 42724 |
| | | | | Miscellaneous | |
| 1,5 μ H | | | 4822 157 52365 | LPF101,102 | 4822 152 10112 |
| T201 | | | 4822 148 80271 | RE-1 | 4822 280 60487 |
| T202 | | | 4822 152 20584 | Fuse 4A(F) | 5322 253 40059 |
| 30 μ H | | | 4822 152 20583 | Fuse 25A | 4822 253 50101 |
| 0,2 μ H | | | 4822 152 20582 | | |
| | | | | | |
| M5218L | | | 4822 209 83348 | | |
| μ PC494C | | | 4822 209 83349 | | |

| | | | | | | | | |
|--|-----------------------|--------|------|----|--|--|------------|---|
| | Carbon film | 0.2 W | 70°C | 5% | | Ceramic plate | | *a = 2,5 V b = 4 V c = 6,3 V d = 10 V e = 16 V f = 25 V g = 40 V h = 63 V j = 100 V l = 125 V m = 150 V n = 160 V q = 200 V r = 250 V s = 300 V t = 350 V u = 400 V v = 500 V w = 630 V x = 1000 V A = 1,6 V B = 6 V C = 12 V D = 15 V E = 20 V F = 35 V G = 50 V H = 75 V I = 80 V |
| | Carbon film | 0.33 W | 70°C | 5% | | Tuning ≤ 120 pF NP.0 | 2% | |
| | Metal film | 0.33 W | 70°C | 5% | | Others | -20/+80% | |
| | Carbon film | 0.5 W | 70°C | 5% | | Polyester flat foil | 10% | |
| | Carbon film | 0.67 W | 70°C | 5% | | Metalized polyester flat film | 10% | |
| | Carbon film | 1.15 W | 70°C | 5% | | Polyester flat foil small size (Mylar) | 10% | |
| | Chip component | | | | | Polystyrene film/foil | 1% | |
| | | | | | | Tubular ceramic | | |
| | | | | | | Miniature single | | |
| | | | | | | Subminiature tantalum | $\pm 20\%$ | |