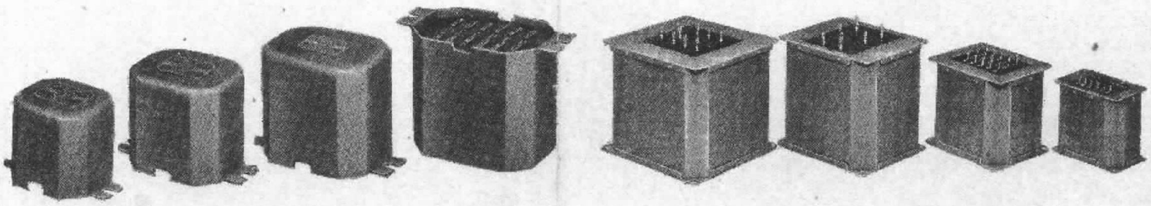
# TERMINAL ARRANGEMENTS

# TYPE S TRANSFORMERS



**UNITED TRANSFORMER COMPANY**
150 VARICK STREET • NEW YORK 13, N. Y.
EXPORT DIVISION: 13 EAST 40th STREET, NEW YORK 16, N. Y. CABLES: "ARLAB"

# TYPICAL MODULATOR COMBINATIONS

## S-21, Driver, S-9
## S-22, Driver, S-9

### S-21 — 115 WATTS MAX.

| P.P.-2A3 Driver S-9 Transf. Sec. Term. | P.P. Tubes | MODULATOR STAGE Watts Output | P.P. Load | Plate Volts | Plate Transf. | Bias Volts | Bias Trsf. |
|---|---|---|---|---|---|---|---|
| 2-2 | TZ-20 | 70 | 12000 | 800 | S-46 | 0 | |
| 1-1 | T-20 | 70 | 12000 | 800 | S-46 | 40 | S-51 |
| * | 845 | 75 | 4600 | 1000 | S-47 | 175 | S-52 |
| 3-3 | 4-46, 59 | 80 | 2500 | 470 | S-44 | 0 | |
| 1-1 | 807 | 80 | 6600 | 600 | S-45 | 30 | S-51 |
| 1-1 | 800, RK-30 | 90 | 6600 | 750 | S-45 | 40 | S-51 |
| 1-1 | 800, RK-30 | 100 | 12000 | 1000 | S-47 | 55 | S-51 |
| 3-3 | 809 | 100 | 8400 | 750 | S-45 | 5 | S-51 |
| 2-2 | 825 | 100 | 6600 | 850 | S-46 | 30 | S-51 |
| 2-2 | TZ-40 | 100 | 6000 | 750 | S-45 | 0 | |
| 2-2 | T-756 | 100 | 7000 | 850 | S-46 | 30 | S-51 |
| 1-1 | 50-T | 100 | 8000 | 1000 | S-47 | 90 | S-51 |
| 2-2 | RK-18 | 100 | 12000 | 1000 | S-47 | 50 | S-51 |
| 1-1 | HK-354 | 100 | 15000 | 1000 | S-47 | 60 | S-51 |
| * | 845 | 105 | 8800 | 1250 | S-47 | 225 | S-52 |
| 3-3 | RK-31 | 110 | 14000 | 1000 | S-47 | 0 | |
| 1-1 | 4-6L6 | 110 | 2000 | 400 | S-44 | 25 | S-51 |
| 2-2 | 35-T | 115 | 11000 | 1000 | S-47 | 30 | S-51 |

* Reverse S-9 transformer using terminals 1-1 for plates and P-P for grids.

### S-18 — 12 WATTS MAX.

**DRIVER TUBES:** In the combinations shown below, typical suitable driver tubes are: 27, 30, 37, 49, 53, 56, 76, 79, 89, 6A6, 6C5, 6C6 triode, 6E6, 6N7.

| DRIVER Transf. | Sec. Term. | P.P. Tubes | MODULATOR STAGE Watts Output | P.P. Load | Plate Volts | Bias Volts |
|---|---|---|---|---|---|---|
| S-2 | G-G | 6E6 | 1.6 | 14,000 | 250 | 27 |
| S-8 | G-G | 19, 1J6G | 2.1 | 10,000 | 135 | 0 |
| S-8 | G-G | 30 | 2.5 | 10,000 | 180 | 18 |
| S-8 | G-G | 49 | 3.5 | 12,000 | 180 | 0 |
| S-8 | G'-G' | 89 | 3.5 | 10,000 | 180 | 0 |
| S-2 | G-G | 25L6 | 4 | 4,000 | 110 | 7.5 |
| S-8 | G'-G' | 6Z7G | 4.2 | 12,000 | 180 | 0 |
| S-2 | G-G | 6Y6G | 7 | 4,000 | 135 | 13.5 |
| S-8 | G-G | 79, 6Y7G | 8 | 14,000 | 250 | 0 |
| S-8 | G'-G' | 6AC5G | 8 | 10,000 | 250 | 0 |
| S-8 | G'-G' | 53, 6A6, 6N6, 6N7 | 10 | 10,000 | 300 | 0 |
| S-2 | G-G | 2A3, 6A3, 6A5G, 6B4G | 10 | 5,000 | 325 | 750 ohms |
| S-2 | G-G | 6B5 | 10 | 10,000 | 300 | 0 |
| S-8 | G-G | 45 | 10 | 5,000 | 275 | 770 ohms |
| | | SINGLE TUBES | | | | Pri. Load |
| S-1 | F-G | 43, 45, 59, 71A, 12A5, 25A6, 25A7 | | | | 4000 ohms |
| | | 31, 46, 59, 6V6, 33 | | | | 6000 ohms |
| | | 33, 42, 46, 47, 49, 89, 2A5, 6F6, 6B5 | | | | 7000 ohms |
| | | 59, 89 pentode | | | | 8000 ohms |
| | | 10, 41, 42, 6G6, 6K6 | | | | 10,000 ohms |
| | | 38, 12A7 | | | | 14,000 ohms |

## BIAS TRANSFORMER CONNECTIONS
## S-51, S-52

Using the Special Series bias transformers any desired value of DC within the transformer rating can be obtained within approximately 6%. In most cases this eliminates the necessity for a voltage divider and improves the bias supply regulation accordingly.

The DC voltages shown are based at 200 Ma.—single section filter—choke input—120 ohm choke. Lower values of DC will increase the output voltage somewhat.

| Secondary Terminals | Primary Terminals 115 V. 50/60 cycles | S-51 A.C. Volts each side | S-51 D.C. Volts | S-52 A.C. Volts each side | S-52 D.C. Volts |
|---|---|---|---|---|---|
| 8-10-11-13 | 1 - 2 | 155 | 100 | 490 | 400 |
| | 1 - 3 | 141 | 87 | 445 | 360 |
| | 1 - 4 | 129 | 76 | 406 | 326 |
| | 1 - 5 | 119 | 67 | 376 | 298 |
| | 1 - 6 | 111 | 60 | 350 | 275 |
| | 1 - 7 | 106 | 55 | 326 | 254 |
| 9-10-11-12 | 1 - 2 | 94 | 45 | 300 | 230 |
| | 1 - 3 | 86 | 37 | 273 | 206 |
| | 1 - 4 | 78 | 30 | 249 | 184 |
| | 1 - 5 | 72 | 25 | 230 | 167 |
| | 1 - 6 | 67 | 20 | 214 | 152 |
| | 1 - 7 | 63 | 17 | 200 | 140 |
| 8-9-12-13 | 1 - 2 | 61 | 15 | 190 | 132 |
| | 1 - 3 | 55 | 10 | 173 | 117 |
| | 1 - 4 | 51 | 6 | 159 | 103 |
| | 1 - 5 | 47 | 3 | 147 | 92 |
| | 1 - 6 | 44 | — | 137 | 83 |
| | 1 - 7 | 41 | — | 127 | 74 |

### S-22 — 250 WATTS MAX.

| P.P.-2A3 Driver S-9 Transf. Sec. Term. | P.P. Tubes | MODULATOR STAGE Watts Output | P.P. Load | Plate Volts | Plate Transf. | Bias Volts | Bias Trsf. |
|---|---|---|---|---|---|---|---|
| 3-3 | RK-31 | 140 | 17000 | 1250 | S-47 | 0 | |
| * | 50 T | 135 | 12000 | 1250 | S-47 | 112 | S-52 |
| * | 50 T | 250 | 20000 | 2000 | S-50 | 180 | S-52 |
| * | 50 T | 160 | 17000 | 1500 | S-49 | 140 | S-52 |
| 2-2 | TZ-40 | 175 | 6800 | 1000 | S-47 | 0 | |
| 1-1 | T-55 | 175 | 6900 | 1000 | S-47 | 40 | S-51 |
| 1-1 | T-55 | 225 | 9400 | 1250 | S-47 | 50 | S-51 |
| 2-2 | HF-100 | 200 | 7000 | 1000 | S-47 | 35 | S-51 |
| 2-2 | HF-100 | 250 | 12000 | 1500 | S-49 | 52 | S-51 |
| 2-2 | 100 TH | 200 | 5200 | 1000 | S-47 | 0 | |
| 2-2 | 100 TH | 250 | 7200 | 1250 | S-47 | 0 | |
| ¶ | 100 TL | 170 | 5200 | 1000 | S-47 | 90 | S-51 |
| ¶ | 100 TL | 230 | 7200 | 1250 | S-47 | 112 | S-52 |
| 2-2 | ZB-120 | 150 | 4800 | 750 | S-45 | 0 | |
| 2-2 | ZB-120 | 200 | 6900 | 1000 | S-47 | 0 | |
| 2-2 | ZB-120 | 245 | 9000 | 1250 | S-47 | 0 | |
| * | HK-154 | 200 | 7500 | 1000 | S-47 | 155 | S-52 |
| * | HK-154 | 225 | 11400 | 1250 | S-47 | 210 | S-52 |
| 1-1 | 203 A | 200 | 6900 | 1000 | S-47 | 35 | S-51 |
| 1-1 | 203 A | 250 | 9000 | 1250 | S-47 | 45 | S-51 |
| 3-3 | 203 Z | 200 | 6900 | 1000 | S-47 | 0 | |
| 2-2 | 203 Z | 250 | 6700 | 1100 | S-47 | 0 | |
| 1-1 | 211 | 200 | 6900 | 1000 | S-47 | 77 | S-51 |
| 1-1 | 211 | 250 | 9000 | 1250 | S-47 | 100 | S-51 |
| 1-1 | HK-354 | 220 | 15000 | 1500 | S-49 | 100 | S-51 |
| 2-2 | 808 | 190 | 12700 | 1250 | S-47 | 15 | S-51 |
| 2-2 | 830 B | 175 | 7600 | 1000 | S-47 | 35 | S-51 |
| 2-2 | 838 | 200 | 6900 | 1000 | S-47 | 0 | |
| 2-2 | 838 | 250 | 9000 | 1250 | S-47 | 0 | |

* Reverse S-9, using 2-2 for plates and P-P for grids.
¶ Reverse S-9, using 1-1 for plates and P-P for grids.

# CONNECTIONS OF UNIVERSAL MODULATION TRANSFORMERS

(S-18, S-19, S-20, S-21, S-22)

| PRIMARY | | SECONDARY | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P to P Imp. | P-B-B-P | Join 3 & 4 Con. to 1 & 6 | Join 3 & 4 Con. to 2 & 6 | Join 2 & 3 Con. to 1 & 6 | Join 3 & 4 Con. to 2 & 5 | Join 1 & 3 4 & 6 Con. to 1 & 4 | Join 7 & 11 8 & 12 Con. to 7 & 8 | Join 1 & 5 2 & 6 Con. to 1 & 2 | Join 9 & 10 Con. to 7 & 12 | Join 9 & 10 Con. to 8 & 12 | Join 9 & 10 Con. to 8 & 11 | Join 8 & 9 Con. to 7 & 12 | Join 7 & 9 10 & 12 Con. to 7 & 10 | Join 8 & 9 10 & 11 Con. to 8 & 10 |
| Line to RF | 500 ohms connected to 7 and 8; join 7 to 11 and 8 to 12 | 15000 | 9400 | 7800 | 5000 | 3800 | | | | | | | | |
| Line to RF | 500 ohms connected to 1 and 2, join 1 to 5 and 2 to 6 | | | | | | | | 16000 | 11000 | 8000 | 7000 | 4000 | 2000 |
| 2000 | 2-3-4-5 | | | | | | 200 | | 8500 | 6400 | 4300 | 3600 | 2150 | 1100 |
| 2000 | 1-2-5-6 | | | | | | 350 | | 16000 | 11500 | 8000 | 6500 | 4000 | 2000 |
| 3000 | 2 3 4 5 | | | | | | 300 | | 13000 | 9500 | 6500 | 5500 | 3200 | 16000 |
| 3000 | 1-2-5-6 | | | | | | 500 | | 23500 | 17000 | 12000 | 10000 | 6000 | 3000 |
| 3800 | 2-3-4-5 | | | | | | 400 | | 16400 | 12000 | 8200 | 7000 | 4000 | 2000 |
| 3800 | 1-2-5-6 | | | | | | 650 | | 30000 | 21500 | 15000 | 12500 | 7500 | 3750 |
| 4000 | 2-3-4-5 | | | | | | 400 | | 17500 | 12500 | 8600 | 7300 | 4300 | 2150 |
| 4000 | 8-9-10-11 | 5500 | 3500 | 3000 | 1850 | 1400 | | 250 | | | | | | |
| 5000 | 2-3-4-5 | | | | | | 500 | | 21500 | 16000 | 11000 | 9200 | 5400 | 2700 |
| 5000 | 8-9-10-11 | 7000 | 4300 | 3500 | 2300 | 1750 | | 300 | | | | | | |
| 6000 | 1-3-4-6 | | | | | | 200 | | .8500 | 6400 | 4300 | 3600 | 2100 | 1050 |
| 6000 | 8-9-10-11 | 8900 | 5200 | 4250 | 2750 | 2200 | | 370 | | | | | | |
| 6600 | 1-3-4-6 | | | | | | 200 | | 9500 | 7000 | 4750 | 4000 | 2400 | 1200 |
| 6600 | 8-9-10-11 | 9000 | 5600 | 4650 | 3000 | 2400 | | 400 | | | | | | |
| 7000 | 1-3-4-6 | | | | | | 225 | | 10000 | 7300 | 5000 | 4300 | 2500 | 1250 |
| 7000 | 8-9-10-11 | 9700 | 6000 | 5000 | 3200 | 2500 | | 425 | | | | | | |
| 8000 | 1-3-4-6 | | | | | | 275 | | 12000 | 8500 | 6000 | 5000 | 3000 | 1500 |
| 8000 | 8-9-10-11 | 11000 | 7000 | 5650 | 3700 | 2800 | | 500 | | | | | | |
| 9000 | 1-3-4-6 | | | | | | 300 | | 13000 | 9500 | 6500 | 5500 | 3200 | 1600 |
| 9000 | 8-9-10-11 | 12500 | 7750 | 6300 | 4200 | 3000 | | 550 | | | | | | |
| 9000 | 7-9-10-12 | 6000 | 4000 | 3200 | 2000 | 1500 | | 275 | | | | | | |
| 10000 | 1-3-4-6 | | | | | | 325 | | 14500 | 10500 | 7000 | 6000 | 3500 | 1750 |
| 10000 | 8-9-10-11 | 14000 | 8500 | 7000 | 4500 | 3500 | | 600 | | | | | | |
| 10000 | 7-9-10-12 | 7000 | 4300 | 3500 | 2300 | 1750 | | 300 | | | | | | |
| 12000 | 1-3-4-6 | | | | | | 400 | | 17500 | 12500 | 9000 | 7250 | 4300 | 2150 |
| 12000 | 7-9-10-12 | 8400 | 5200 | 4250 | 2750 | 2100 | | 375 | | | | | | |
| 14000 | 7-9-10-12 | 10000 | 6000 | 5000 | 3200 | 2450 | | 425 | | | | | | |
| 16000 | 7-9-10-12 | 11000 | 7000 | 5600 | 3700 | 2800 | | 500 | | | | | | |
| 18000 | 7-9-10-12 | 12500 | 7750 | 6300 | 4200 | 3150 | | 550 | | | | | | |
| 14000 | 13-3-4-14 | | | | | | | | 12000 | 8000 | 5500 | 4700 | 3000 | 1500 |
| 16000 | 13-3-4-14 | | | | | | | | 13000 | 9000 | 6500 | 5500 | 3200 | 1600 |
| 18000 | 13-3-4-14 | S-22 ONLY | | | | | | | 15000 | 10500 | 7000 | 6000 | 3500 | 1750 |
| 20000 | 13-3-4-14 | | | | | | | | 16500 | 11500 | 8000 | 7000 | 4000 | 2000 |
| 22000 | 13-3-4-14 | | | | | | | | 18000 | 13000 | 9000 | 7500 | 4500 | 2250 |

| | | Join 3 & 4 Con. to 13 & 14 | Join 3 & 4 Con. to 1 & 14 | Join 4 & 6 Con. to 13 & 14 | Join 3 & 4 Con. to 13 & 5 | Join 2 & 3 Con. to 13 & 14 | Join 3 & 13 4 & 14 Con. to 4 & 13 |
|---|---|---|---|---|---|---|---|
| 14000 | 7-9-10-12 | 17600 | 13500 | 7000 | 9000 | 10800 | 4400 |
| 16000 | 7-9-10-12 | 20000 | 15500 | 8000 | 10300 | 12400 | 5050 |
| 18000 | 7-9-10-12 | 22400 | 17400 | 9000 | 11500 | 13900 | 5650 |

S-22 ONLY

## S-19 — 30 WATTS MAX.

(53, 56, 6C6 triode, 6N7, may be substituted for 6C5 tubes)

| DRIVER | | | MODULATOR STAGE | | | | |
|---|---|---|---|---|---|---|---|
| Tube or Tubes | Transf. | Sec. Terms. | P.P. Tubes | Watts Outp't | P.P. Load | Plate Volts | Bias Volts |
| 6C5 | S-10 | G-G | 6V6 | 13 | 8,000 | 300 | 20 |
| 6C5 | S-2 | G-G | 6B5 | 13.5 | 10,000 | 325 | 0 |
| 6C5 | S-10 | G-G | 2A3, 6A3, 45, 6A5G, 6B4G | 15 | 3,000 | 325 | 68 |
| 6C5 | S-10 | G-G | 2A5, 42, 6F6, Pentode AB | 10 | 10,000 | 375 | 340 ohms |
| 2A5 | S-8 | G-G | 2A5, 42, 6F6, triode AB | 18 | 6,000 | 350 | 38 |
| 89 | S-8 | G'-G' | Parallel 53's, 6A6, 6N6, 6N7 | 19 | 5,000 | 300 | 0 |
| 45 | S-8 | G-G | 10, 1602 | 25 | 8,000 | 425 | 50 |
| 45 | S-8 | G'-G' | 46, 59 | 25 | 6,000 | 425 | 0 |
| 45 | S-8 | G'-G' | 841 | 28 | 7,000 | 425 | 5 |
| 6C5 | S-10 | G-G | 6L6 self bias | 30 | 6,600 | 400 | 23 |

TYPICAL MODULATOR COMBINATIONS (Cont.)

## S-20 — 55 WATTS MAX.

| DRIVER | | | MODULATOR STAGE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| P.P. Tubes | Transf. | Sec. Term. | P.P. Tubes | Watts O'tp't | P.P. Load | Plate Volts | Plate Tr'sf. | Bias Volts | Bias Trsf. |
| Single 45 | S-8 | G'-G' | 46 | 40* | 5000 | 470 | S-44 | 0 | |
| 2A3 | S-9 | 1-1 | 801 | 45 | 10000 | 600 | S-45 | 75 | S-51 |
| 2A3 | S-9 | 3-3 | 1608 | 50 | 5000 | 425 | S-44 | 15 | S-51 |
| 2A3 | S-9 | 1-1 | T-20 | 50 | 8000 | 600 | S-45 | 30 | S-51 |
| Single 45 | S-8 | G'-G' | 4-46, 59 | 56 | 3000 | 425 | S-44 | 0 | |
| 6C5 | S-10 | G-G | 6L6 AB2 | 60 | 3800 | 400 | S-39 | 25 | S-51 |
| 6C5 | S-10 | G-G | 4-6L6 | 60 | 3300 | 400 | S-40 | 23 | |
| 2A3 | S-9 | 3-3 | 809 | 60 | 5000 | 500 | S-41 | 0 | |

* Above manufacturers' rating, but frequently employed by amateurs.

Drivers—S-8, S-9, S-10

# CONNECTION CHARTS · SPECIAL SERIES TRANSFORMERS · PRIMARY CONNECTIONS

**S-5, S-6**

Connect terminals marked 'M' to mike.

**S-7**

Connect P to plate; B to plate return; 'M' to mike.

**S-8, S-9, S-10**

See modulator charts, for tube types and connections.

**S-12, S-13**

For 500 ohms, connect to 1 and 2
For 2000 ohms, connect to 2 and 3
For 4000 ohms, connect to 1 and 3

**OUTPUT TRANSFORMERS**

**S-14 Single tubes**

Always connect to 1 for plate return.

Connect plate to 2 for 2500 ohms, for 2A3, 6A3, 6A5G, 6B4G, 6L6, 6Y6, 25L6, 35L6.

Connect plate to 3 for 4000 ohms, for 2A5, 6F6 triode, 12A5, 25A6, 43, 45, 50, 71A.

Connect plate to 4 for 7000 ohms, for 2A5, 6AC5, 6F6, 6K6, 6N6, 7B5, 20, 31, 33, 47.

Connect plate to 5 for 10,000 ohms, for 37, 38, 41, 1G5, 3C5, 6A4, 6N7.

**S-15 P.P. Tubes**

Always connect to 4 for plate return.

Connect to 3 and 5 for 4000 ohms, for 25L6, 6Y6G.

Connect to 2 and 6 for 5000 ohms, for 2A3, 6A3, 6A5G, 6B4G, 45.

Connect to 1 and 7 for 10,000 ohms, for 30, 49, 89, 1H4, 6Z7G, 6AC5G, 53, 6A6, 6N6, 6N7, 6B5.

**S-16 P.P. Tubes**

Always connect to 4 for plate return.

Connect to 3 and 5 for 3000 ohms, for 2A3, 6A3, 6A5G, 6B4G, AB.

Connect to 2 and 6 for 6000-6600 ohms, for 2A5, 6F6, 42 triodes AB, 46, 59, 6L6.

Connect to 1 and 7 for 10,000 ohms, for 6B5, 6V6, 2A5, 6F6, 42 pentodes AB.

**S-17 P.P. Tubes**

Always connect to 4 for plate return.

Connect to 3 and 5 for 3300 ohms, for four 6L6's, four 46's.

Connect to 2 and 6 for 3800 ohms, for two 6L6's, AB2.

Connect to 1 and 7 for 5000 ohms, for 1608, 809.

**S-18, S-19, S-20, S-21, S-22**

See modulator charts

**SECONDARY CONNECTIONS**

**S-12, S-13, S-14, S-15, S-16, S-17**

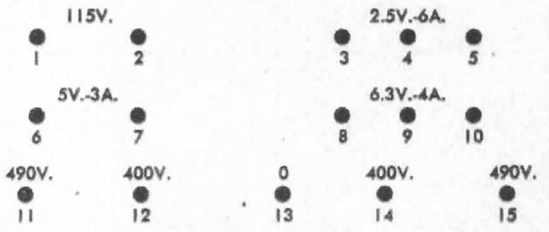
For 2 ohms, connect to 8 and 15. All other impedances as indicated.

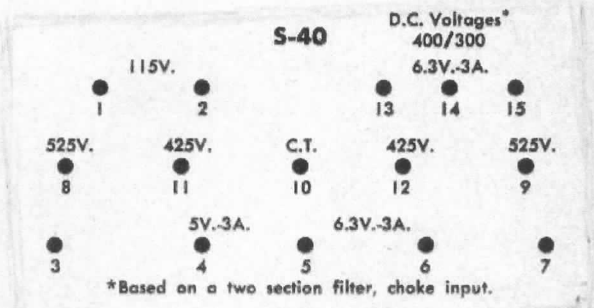
**S-73**

Sec.—for 800's, 801's, connect grids to 1-1; for 805's, 8308's, 6L6's, 46's, grids to 2-2; for 809's, 838's, 203A's, ZB120's, grids to 3-3; Grid-return always to 'F.'

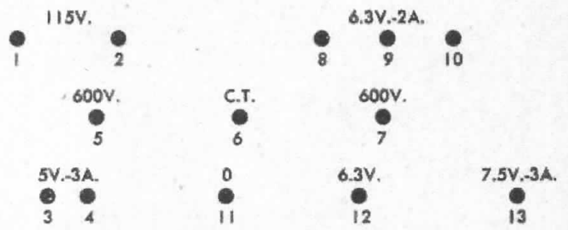
## SPECIAL SERIES PLATE AND FILAMENT TRANSFORMERS
## TERMINAL BOARD LAYOUTS

**S-39**

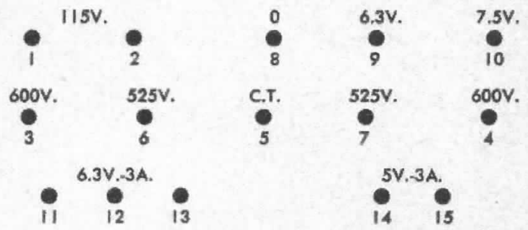



**S-41**




**S-42**




**S-74**


**Notes for S-74**

Maximum D.C. current when both windings are used, 150 MA. on each winding.

Maximum D.C. current on low voltage section 300 MA. (IF USED ALONE).
Maximum D.C. current on high voltage section 200 MA. (IF USED ALONE).

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