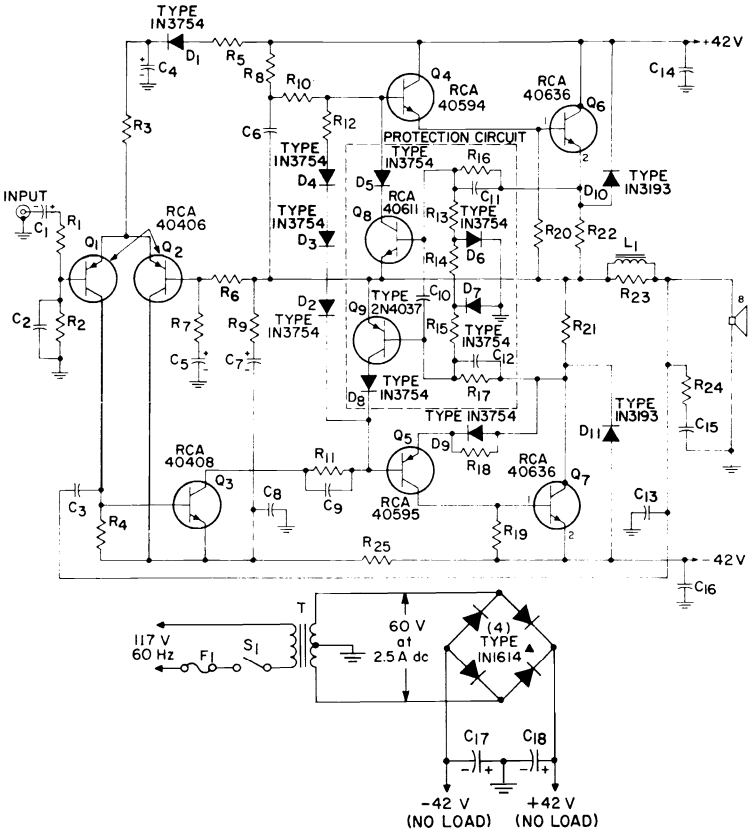
15-15 HIGH-FIDELITY 70-WATT QUASI-COMPLEMENTARY-SYMMETRY AUDIO POWER AMPLIFIER
IHFM Music Power Rating, 100 W



NOTES: (1) Output transistors Q_6 and Q_7 and diodes D_2 through D_4 should be mounted on a common heat sink (Wakefield Type NC-403K or equiv.). Diodes should be attached to under side of heat sink by use of small metal cable clamps. (2) Transistors Q_1 and Q_2 should be matched for base-to-emitter voltage within 0.04 volt and should be selected for a beta between 100 and 300 at 1 milliampere and 5 volts.

Parts List

C_1 = 5 μF, electrolytic 12 V
C_2 = 180 pF, ceramic, 50 V
C_3 = 39 pF, ceramic, 50 V
C_4, C_6, C_7 = 50 μF, electrolytic, 50 V
C_5 = 50 μF, electrolytic, 12 V
C_8, C_9, C_{15} = 0.02 μF, ceramic, 50 V
C_{10}, C_{11}, C_{12}, C_{13}, C_{14}, C_{16} = 0.05 μF, ceramic, 50 V
C_{17}, C_{18} = 3500 μF, electrolytic, 50 V
F_1 = fuse, 3 ampere, slow-blow type
L_1 = 10 μH, Miller 4622 or equiv.
R_1 = 1800 ohms, 0.5 watt
R_2, R_3, R_6 = 18000 ohms, 0.5 watt
R_4 = 680 ohms, 0.5 watt
R_5 = 180 ohms, 0.5 watt
R_7, R_{11} = 470 ohms, 0.5 watt
R_8 = 2700 ohms, 0.5 watt
R_9 = 270 ohms, 0.5 watt
R_{10} = 3300 ohms, 0.5 watt
R_{12} = 47 ohms, 0.5 watt
R_{18}, R_{19}, R_{20}, R_{25} = 100 ohms, 0.5 watt
R_{13}, R_{15} = 1000 ohms, 0.5 watt
R_{14} = 4700 ohms, 0.5 watt
R_{16}, R_{17} = 68 ohms, 0.5 watt
R_{21}, R_{22} = 0.33 ohm, 5 watts
R_{23}, R_{24} = 22 ohms, 0.5 watt
S_1 = ON-OFF switch, single-pole, single-throw
T_1 = power transformer; primary 117 volts; secondary, center-tapped, 60 volts at 2.5 amperes; Triwec Transformer Co. No. RCA 113 or equiv.

15-15 HIGH-FIDELITY 70-WATT QUASI-COMPLEMENTARY-SYMMETRY AUDIO POWER AMPLIFIER (cont'd)

Circuit Description

This high-fidelity audio power amplifier provides 70 watts of rms power output (100 watts of IHFM music power output) for an input of 1 volt rms. The frequency response of the amplifier is flat within 1 dB from 5 to 25000 Hz. Total harmonic distortion at the full rated power output of 70 watts is less than 0.25 per cent at 1000 Hz. Although component values, the transistor complement, and supply voltages differ, the basic configuration and the operation of this amplifier are essentially identical to the 25-watt amplifier in circuit 15-13. The 70-watt amplifier operates from symmetrical positive and negative dc supply voltages of 42 volts.

Performance Characteristics

(Measured at a line voltge of 120V, ambient temperature of 25°C, and a frequency of 1 kHz, unless otherwise specified)

Power Output:	
Music (at 5% THD, regulated supply, 8-ohm load)	100W
Dynamic (at 1% THD, regulated supply, 8-ohm load)	88W
Continuous (at 1% THD, unregulated supply, 8-ohm load)	70W
Sensitivity for continuous power output rating	85 dB
Hum and Noise (below continuous power output):	
Input shorted	80 dB
Input open	20,000 ohms
Input Resistance	
Intermodulation Distortion [10 dB below continuous power output at 60 Hz and 7 kHz (4:1)]	700 mV
	0.1%

15-16 SERVO AMPLIFIER

Circuit Description

This servo amplifier can supply up to 6 watts of power to the drive motor of a servo system. The amplifier is driven by a 400-Hz ac signal and is operated from a dc supply voltage of 56 volts. A pair of 2N3054 silicon power transistors are used in a class AB, push-pull, single-ended output stage to develop the required output power.

A 2N1481 common-emitter input stage amplifies the 400-Hz input to the level required to drive the 2N3054 output transistors. The amplified 400-Hz signal at the collector of the 2N1481 transistor is coupled to the base of each 2N3054 output transistor by the transformer T_1. The secondary of T_1 is split to form two identical windings which are oriented so that the inputs to the output transistors are equal in amplitude and 180 degrees out of phase, as required for push-pull drive.

If the input to the upper output transistor were applied between the base and ground, this transistor would be operated as an emitter follower and could not provide voltage gain. The input, however, is applied between the base and the emitter so that, in effect, the upper transistor is operated as a common-emitter amplifier except that there is no phase reversal between input and output. Its gain, therefore, is equal to that of the lower output transistor, which is operated in a conventional common-emitter amplifier configuration. The positive half-cycle of the output signal developed by the upper transistor and the negative half-cycle developed by the lower transistor then have equal voltage swings. This output is coupled to the control-phase winding of the drive motor by the series output capacitor C_1.