## DEVICE DISCONTINUED — CONSULT FACTORY

### 1-WATT AUDIO POWER AMPLIFIER

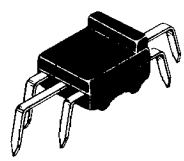
. . . designed primarily for low-cost audio amplifiers in phonograph, TV and radio applications.

- 100 mV Sensitivity for 1-Watt*
- Low Distortion — 1% @ 1-Watt typ*
- Short-Circuit Proof — Short Term (10 seconds typ)
- No Heatsink Required for 1-Watt Output at $T_A = 55^oC$**
- Excellent Hum Rejection

*Circuit Dependent
**Voltage Dependent

### 1-WATT AUDIO POWER AMPLIFIER

**Silicon Monolithic Functional Circuit**



**CASE 643A**
PLASTIC PACKAGE

**MAXIMUM RATINGS** ($T_A = +25^oC$ unless otherwise noted)

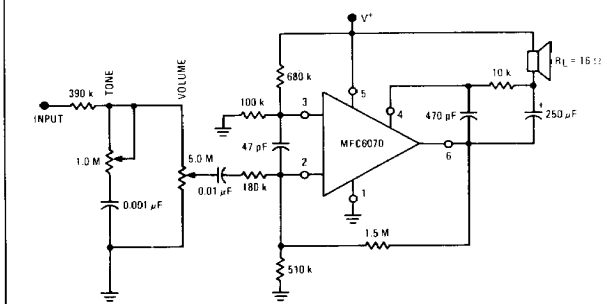
| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Power Supply Voltage | $V^+$ | 20 | Vdc |
| Power Dissipation<br>Derate above $T_A = +25^oC$ | $P_D$<br>$1/\theta_{JA}$ | 1.0<br>8.0 | Watt<br>mW/$^o$C |
| Operating Temperature Range | $T_A$ | -10 to +55 | $^o$C |
| Storage Temperature Range | $T_{stg}$ | -40 to +150 | $^o$C |

**THERMAL CHARACTERISTICS**

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Ambient | $\theta_{JA}$* | 125 | $^o$C/W |

*Thermal resistance is measured in still air with fine wires connected to the leads, representing the "worst case" situation.
For a larger power requirement, pin 1 must be soldered to at least one sq. in. of copper foil on the printed circuit board. The $\theta_{JA}$ will be no greater than +90$^o$C/W. Thus, 1.39 Watts could be dissipated at +25$^o$C, which must be linearly derated at 11.1 mW/$^o$C from +25$^o$C to +150$^o$C.

**FIGURE 1 – TYPICAL 1-WATT PHONOGRAPH AMPLIFIER**
**(Ceramic cartridge input)**




See Packaging Information Section for outline dimensions.



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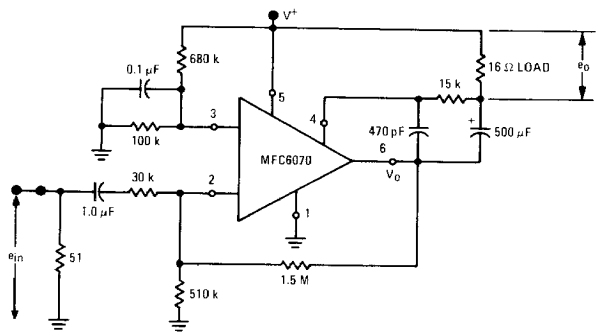
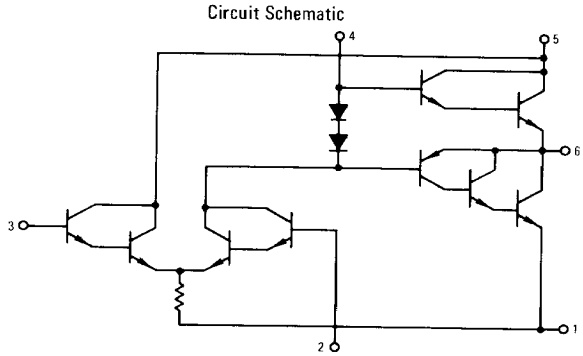
**ELECTRICAL CHARACTERISTICS** ($V^+$ = 16 Vdc, See Figure 2 for test circuit, $T_A$ = +25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Quiescent Output Voltage | $V_o$ | – | 8.0 | – | Vdc |
| Quiescent Drain Current ($e_{in}$ = 0) | $I_D$ | – | 5.0 | 18 | mA |
| Sensitivity, Input Voltage ($e_{in}$ adjusted for $e_o$ = 4.0 V(rms) @ 1.0 kHz, Power Output = 1.0 Watt) | $e_{in}$ | – | 100 | 150 | mV |
| Total Harmonic Distortion ($e_o$ = 4.0 V(rms) @ 1.0 kHz, Power Output = 1.0 Watt) | THD | – | 1.0 | 10 | % |
| ($e_{in}$ adjusted for $e_o$ = 1.26 V(rms) @ 1.0 kHz, Power Output = 100 mW) | | – | 1.0 | 3.0 | |
| Hum and Noise (IHF Standard A201, 1966) | – | – | -40 | – | dB |

**FIGURE 2 – 1-WATT AUDIO POWER AMPLIFIER TEST CIRCUIT**




Circuit Schematic

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## TYPICAL CHARACTERISTICS

($V^+$ = 16 Vdc, $T_A$ = +25°C unless otherwise noted)

**FIGURE 3 – TOTAL HARMONIC DISTORTION versus OUTPUT POWER**

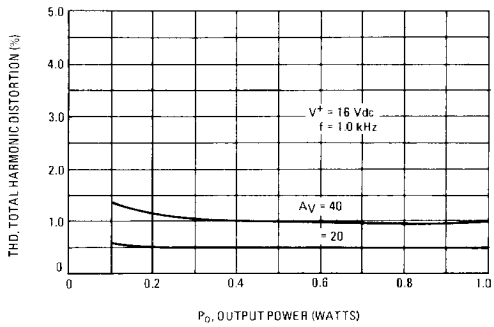



**FIGURE 4 – POWER DISSIPATION versus OUTPUT POWER**

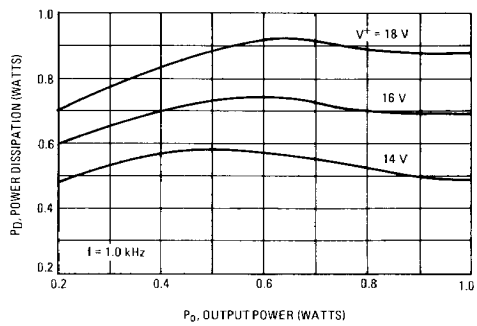
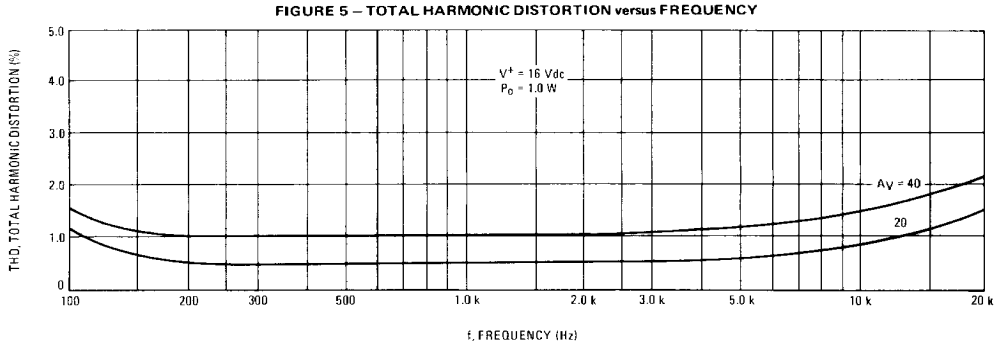



**FIGURE 5 – TOTAL HARMONIC DISTORTION versus FREQUENCY**




## APPLICATIONS INFORMATION

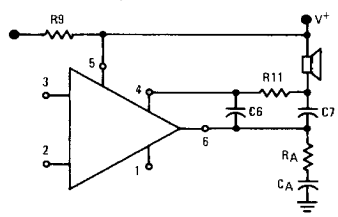
Shown in Figures 7 and 11 are low cost 1 W phono amplifiers with a sensitivity (@ 1 kHz) of approximately 450 mV. The input impedance of both amplifiers is approximately equal to R4 and the gain is determined by (R7 + R10)/R5. To change the gain of the amplifier, change the value of R5 and hold (R7 + R10) between 1 M and 2.2 M. This allows the use of a small and less expensive capacitor for C2.

The bass boost effect shown in the frequency response curves (Figures 10 and 14) is provided by the parallel combination of C4 and R10 and can be eliminated by removing C4 and replacing (R7 + R10) with a 2.2 Megohm resistor. High frequency compensation is provided by C6 and the low frequency roll-off is determined by the impedance network of C2 and R5, C3 and R4, and C8 and the speaker. The series combination of $R_A$ and $C_A$ from pin 6 to ground may be required for stability, depending on printed circuit board layout, speaker reactance, and lead lengths.

Device ac short-circuit capability was tested in both the 8-ohm and 16-ohm amplifiers by shorting pin 6 thru a 500 microfarad capacitor to ground for a period of ten seconds with the amplifier operating at full rated output.

The speaker can be connected to $V^+$ (alternate connection shown below) or ground (Figures 7 and 11). Printed circuit board art work is shown for both systems in Figures 16 and 18. A picture of the completed board for the grounded speaker system is shown in Figure 21.

**ALTERNATE CONNECTION FOR SPEAKER TO $V^+$**
**(See Figure 20 for Parts List)**

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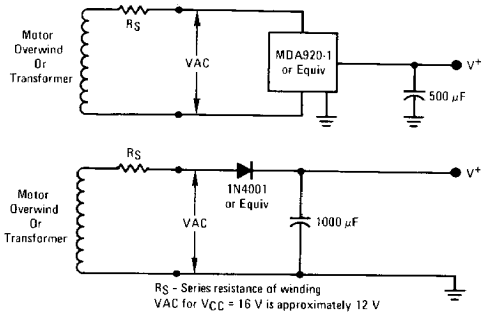
## APPLICATIONS INFORMATION (continued)

($R_L$ = 8.0 ohms, $T_A$ = +25°C unless otherwise noted)

**FIGURE 6 – POWER SUPPLY**




$R_S$ – Series resistance of winding
VAC for $V_{CC}$ = 16 V is approximately 12 V

**FIGURE 7 – PHONOGRAPH AMPLIFIER 1 WATT – 8 OHM**
**(See Figure 15 for Parts List)**

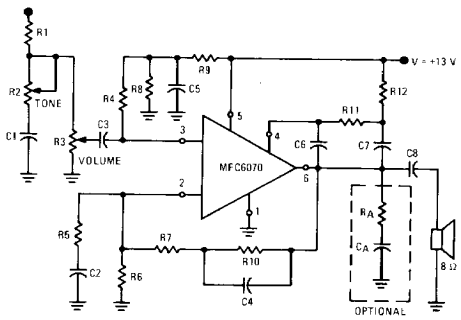



**FIGURE 8 – TOTAL HARMONIC DISTORTION versus OUTPUT POWER FOR FIGURE 7**

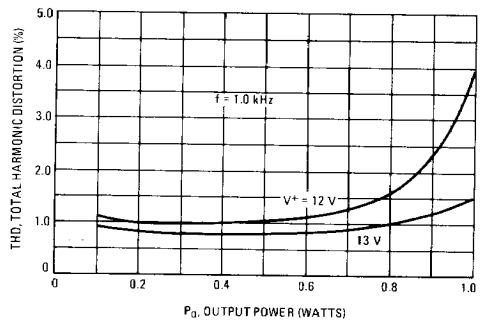



**FIGURE 9 – TOTAL HARMONIC DISTORTION versus FREQUENCY FOR FIGURE 7**

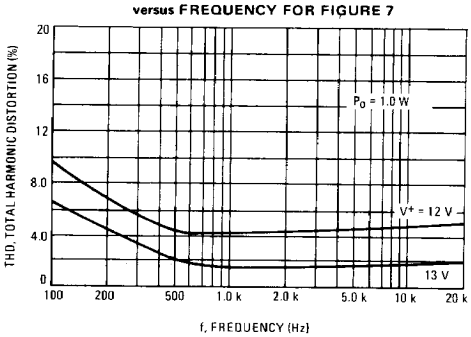
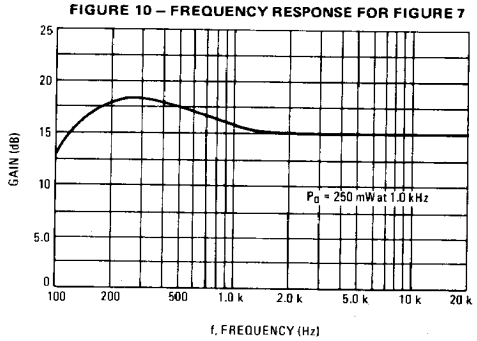



**FIGURE 10 – FREQUENCY RESPONSE FOR FIGURE 7**

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## APPLICATIONS INFORMATION (continued)

($R_L$ = 16 ohms, $T_A$ = +25°C unless otherwise noted)

**FIGURE 11 – 1.0 WATT, 16 OHM LOAD PHONOGRAPH AMPLIFIER**
**(See Figure 15 for Parts List)**

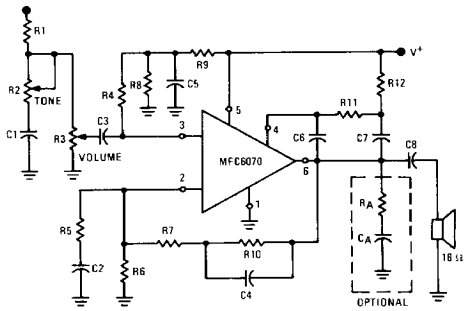



**FIGURE 12 – TOTAL HARMONIC DISTORTION versus OUTPUT POWER FOR FIGURE 11**

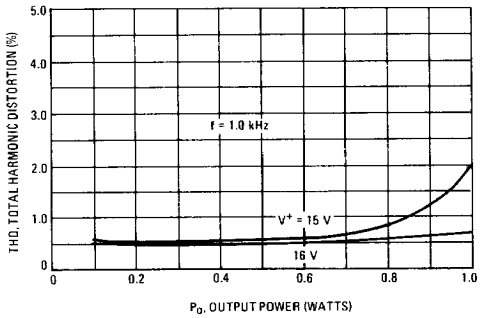



**FIGURE 13 – TOTAL HARMONIC DISTORTION versus FREQUENCY FOR FIGURE 11**

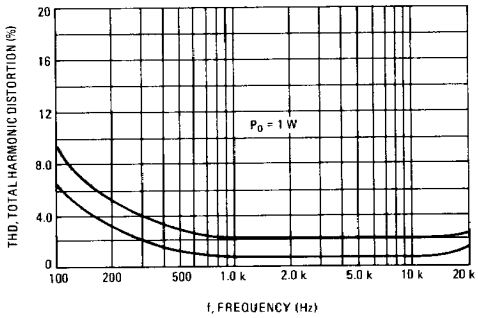



**FIGURE 14 – FREQUENCY RESPONSE FOR FIGURE 11**

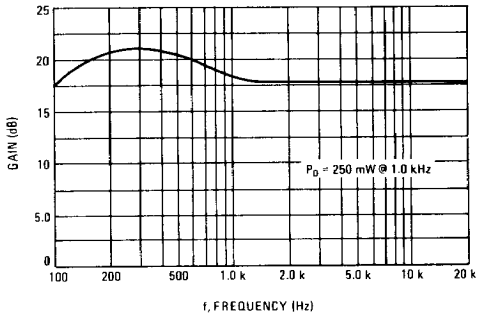



**FIGURE 15 – PARTS LIST FOR FIGURES 7 AND 11**

| | | |
|---|---|---|
| R1 = 180 k ohms | R9 = 1.0 Megohm | C3 = 0.05 μF |
| R2 = 5.0 Megohms | R10 = 1.5 Megohms | C4 = 470 pF |
| R3 = 5.0 Megohms | R11 = 6.8 k ohms | C5 = 0.1 μF |
| R4 = 1.0 Megohm | R12 = 6.8 k ohms | C6 = 470 pF |
| R5 = 150 k ohms* | $R_A$ = 10 ohms** | C7 = 0.1 μF |
| R6 = 910 k ohms* | C1 = 470 pF | C8 = 500 μF* |
| R7 = 680 k ohms | C2 = 0.1 μF | $C_A$ = 0.1 μF** |
| R8 = 180 k ohms | | |

*For Figure 11 (16-ohm load) change R5 to 100 k ohms, R6 to 820 k ohms and C8 to 250 μF.

**Optional – Not included on board. (See Applications Information Note)

## APPLICATIONS INFORMATION (continued)

FIGURE 16 – PRINTED CIRCUIT BOARD (Foil Side)
(Speaker Grounded)

FIGURE 17 – COMPONENT DIAGRAM FOR FIGURE 16

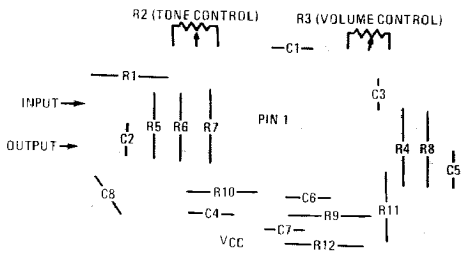



FIGURE 18 – PRINTED CIRCUIT BOARD (Foil Side)
(Speaker to V+)

FIGURE 19 – COMPONENT DIAGRAM FOR FIGURE 18

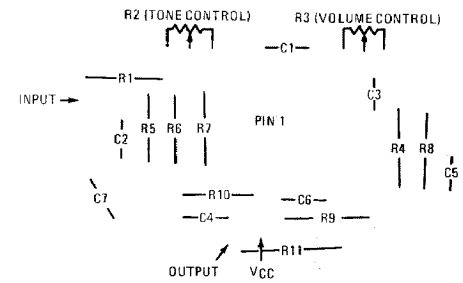
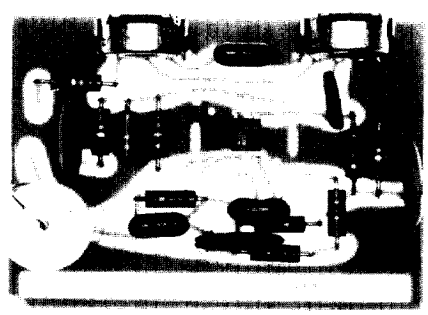



FIGURE 20 – PARTS LIST FOR FIGURE 19
(See Applications Information Note)

| | | | |
|---|---|---|---|
| R1 | = 180 k ohms | C1,C4,C6 | = 470 pF |
| R2,R3 | = 5.0 Megohms | C2,C5 | = 0.1 μF |
| R4,R9 | = 1.0 Megohm | C3 | = 0.05 μF |
| R5 | = 82 k ohms | C7 | = 250 μF |
| R6 | = 820 k ohms | $C_A$ | = 0.1 μF* |
| R7 | = 680 k ohms | | |
| R8 | = 180 k ohms | | |
| R10 | = 1.5 Megohms | | |
| R11 | = 15 k ohms | | |
| $R_A$ | = 10 ohms* | | |

*Optional - Not included on board. (See Applications Information Note)

FIGURE 21 – COMPLETED BOARD
(Speaker Grounded)



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