

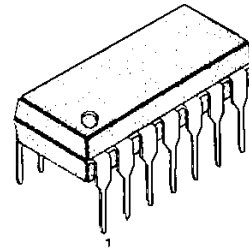
## DUAL EQUALIZER AMPLIFIER WITH ALC

The KA2224 is a monolithic integrated circuit consisting of a dual equalizer amplifier with ALC, and it is suitable for stereo radio cassettes.

### FEATURES

- Dual equalizer amplifier with a built-in ALC circuit.
- **Recording amp available because of high gain characteristic (Variable monitor possible).**
- Good channel separation (CS = 50dB Typ).
- Quick stabilization after power on.
- Capable of direct meter driving and ALC transistor.
- Good ALC response balance between channels.
- Wide operating supply voltage range:  $V_{CC} = 4V \sim 13V$

14 DIP



### ORDERING INFORMATION

| Device | Package | Operating Temperature |
|--------|---------|-----------------------|
| KA2224 | 14 DIP  | -20°C ~ +70°C         |

### BLOCK DIAGRAM

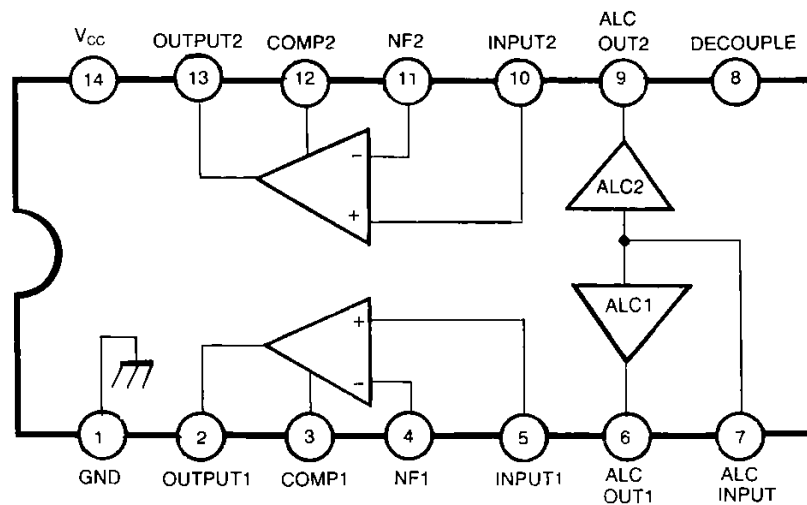


Fig. 1

**ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )**

| Characteristic         | Symbol    | Value           | Unit             |
|------------------------|-----------|-----------------|------------------|
| Supply Voltage         | $V_{CC}$  | 14              | V                |
| Power Dissipation      | $P_D$     | 600             | mW               |
| Operating Temperature  | $T_{OPR}$ | $-20 \sim +70$  | $^\circ\text{C}$ |
| Storage Temperature    | $T_{STG}$ | $-40 \sim +125$ | $^\circ\text{C}$ |
| ALC TR Maximum Current |           | 3.5             | mA               |

**ELECTRICAL CHARACTERISTICS**

( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 5\text{V}$ ,  $R_L = 10\text{K}\Omega$ ,  $f = 1\text{KHz}$ : play,  $R_L = 680\Omega$ : Recording)

| Characteristic                 | Symbol           | Test Conditions                | Min | Typ | Max | Unit             |
|--------------------------------|------------------|--------------------------------|-----|-----|-----|------------------|
| Quiescent Circuit Current      | $I_{CCQ}$        | $V_i = 0$                      |     | 4.5 | 10  | mA               |
| Open Loop Voltage Gain         | $G_{VO}$         |                                |     | 85  |     | dB               |
| Closed Loop Voltage Gain       | $G_{VC1}$        | Play                           |     | 40  |     | dB               |
|                                | $G_{VC2}$        | Record                         |     | 58  |     | dB               |
| Output Voltage                 | $V_O$            | THD=1%, Play                   | 0.9 | 1.2 |     | V                |
| Total Harmonic Distortion      | THD              | $V_O = 0.5\text{V}$ , Play     |     | 0.1 | 1.0 | %                |
| Input Resistance               | $R_i$            |                                | 21  | 30  |     | $\text{K}\Omega$ |
| Equivalent Input Noise Voltage | $V_{NI}$         | BW (-3dB)<br>=20Hz ~ 20KHz     |     | 1.0 | 2.0 | $\mu\text{V}$    |
| Cross Talk                     | CT               | $R_G = 2.2\text{K}\Omega$      | 40  | 50  |     | dB               |
| ALC Range                      | $\Delta V_{ALC}$ | $V_i = -60\text{dBm}$ , Record | 35  | 45  |     | dB               |
| ALC Balance                    | $CB_{ALC}$       | $V_i = -20\text{dBm}$ , Record |     | 0   | 2.0 | dB               |
| ALC Distortion                 | $THD_{ALC}$      | $V_i = -20\text{dBm}$ , Record |     | 0.5 | 2.0 | %                |

## TEST CIRCUIT

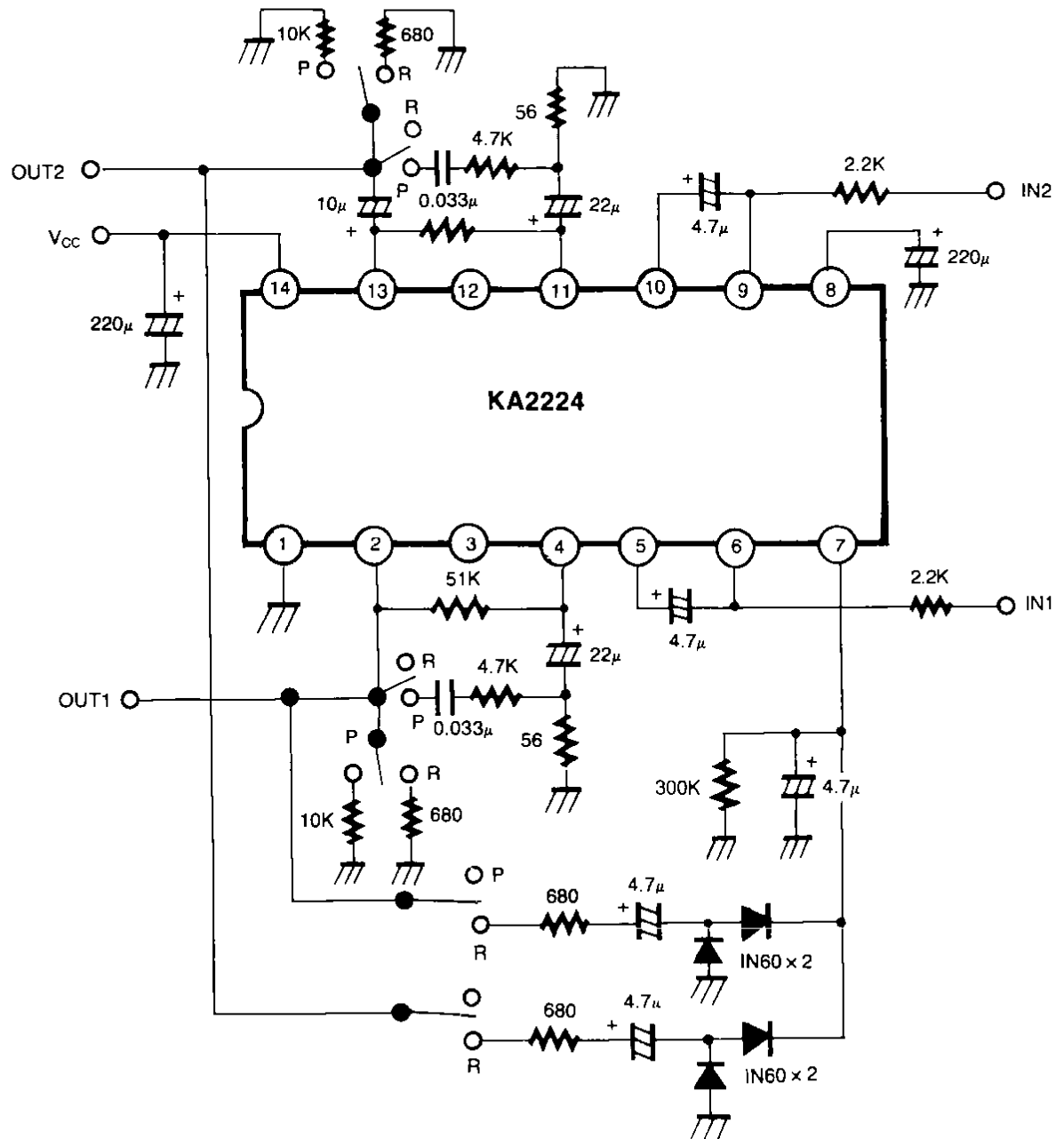
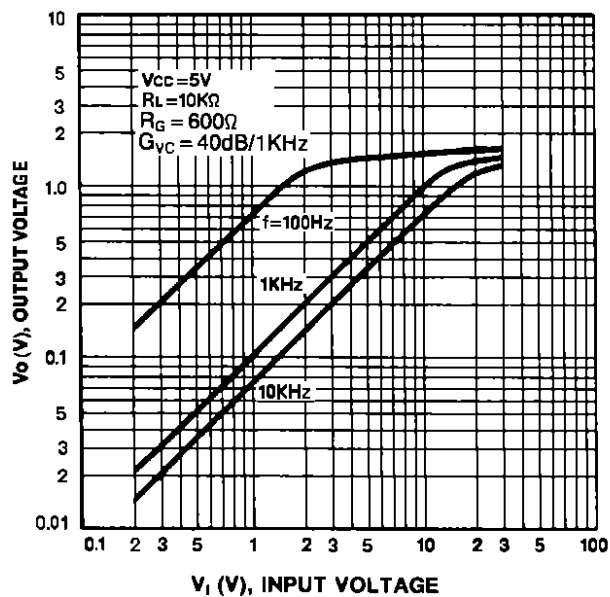
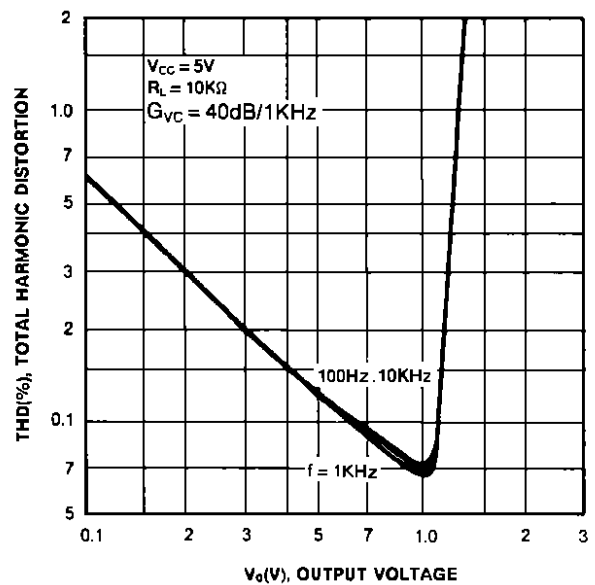


Fig. 2

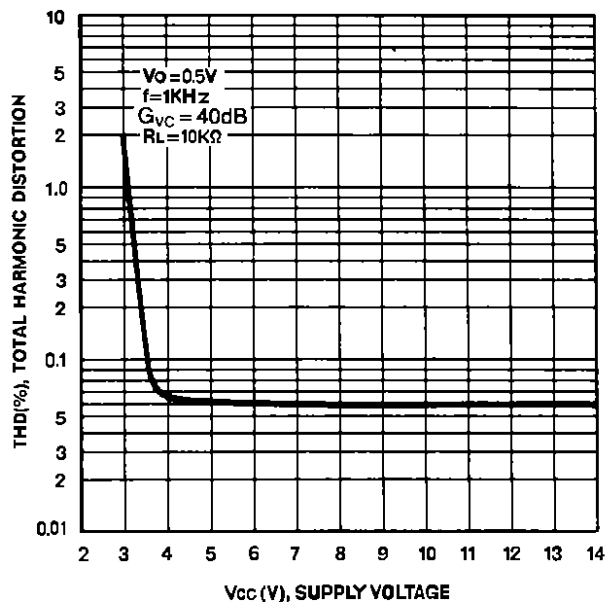
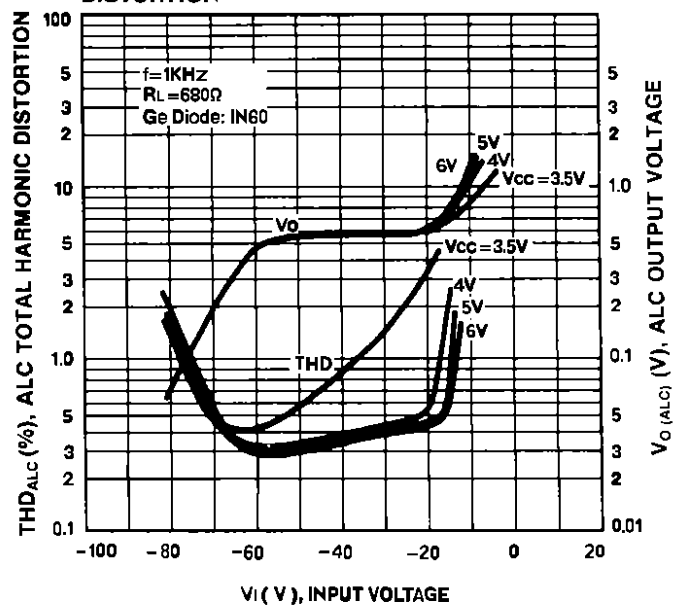
OUTPUT VOLTAGE-INPUT VOLTAGE



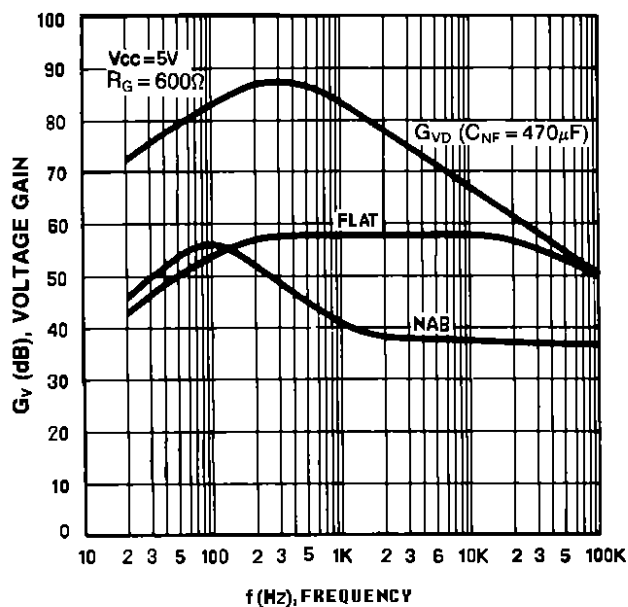
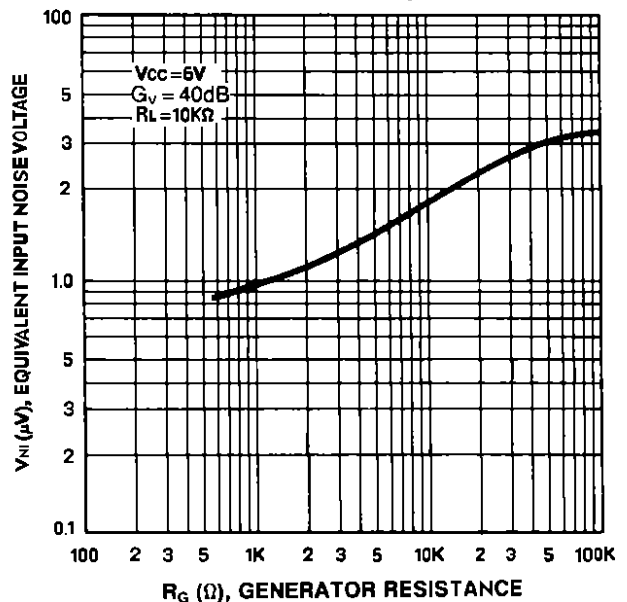
TOTAL HARMONIC DISTORTION-OUTPUT VOLTAGE



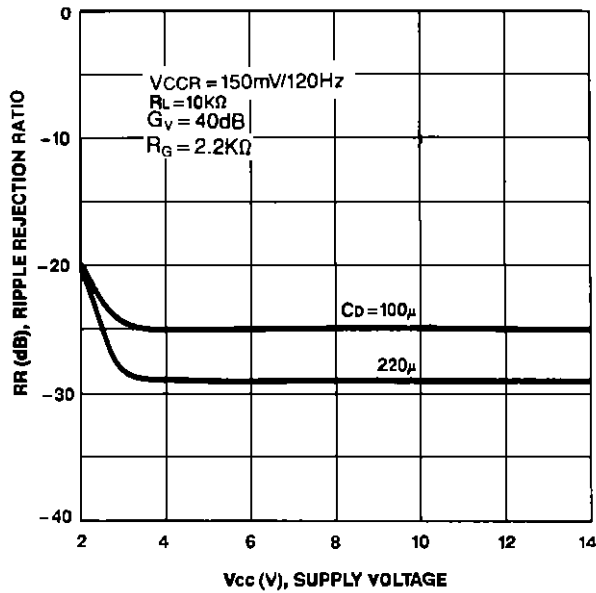
TOTAL HARMONIC DISTORTION-SUPPLY VOLTAGE

ALC OUTPUT VOLTAGE  
ALC TOTAL HARMONIC DISTORTION — INPUT VOLTAGE

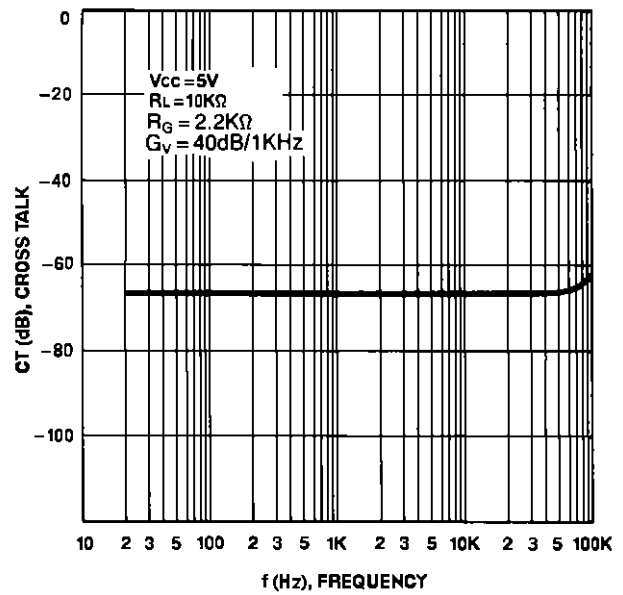
VOLTAGE GAIN-FREQUENCY

EQUIVALENT INPUT NOISE VOLTAGE  
-GENERATOR RESISTANCE

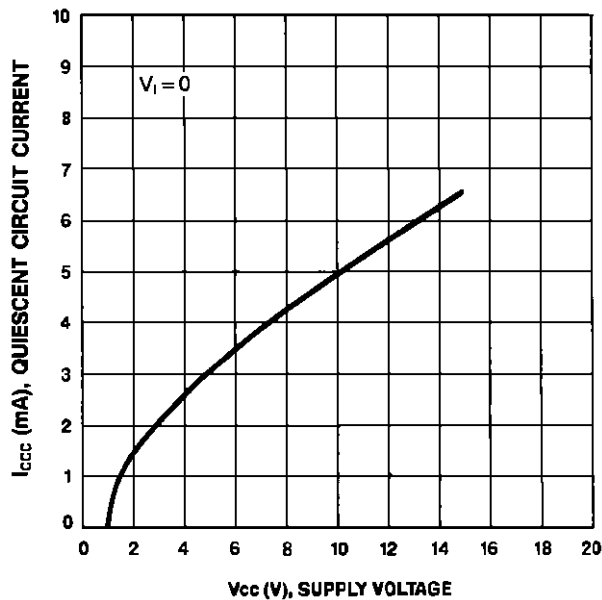
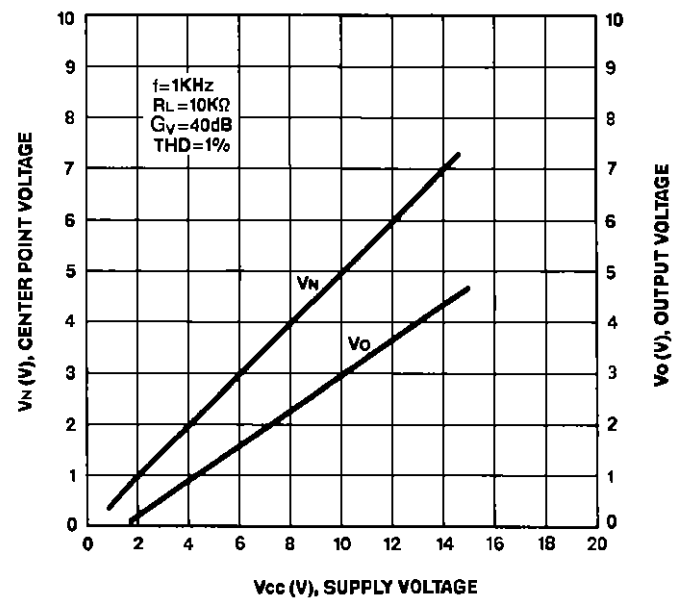
RIPPLE REJECTION RATIO-SUPPLY VOLTAGE



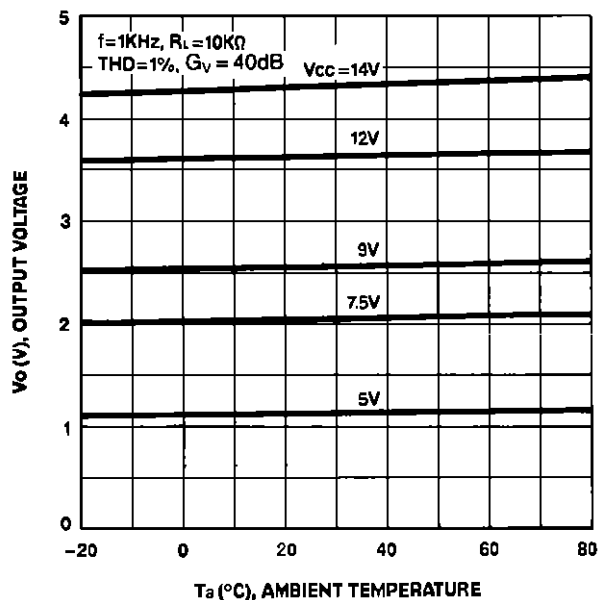
CROSS TALK-FREQUENCY



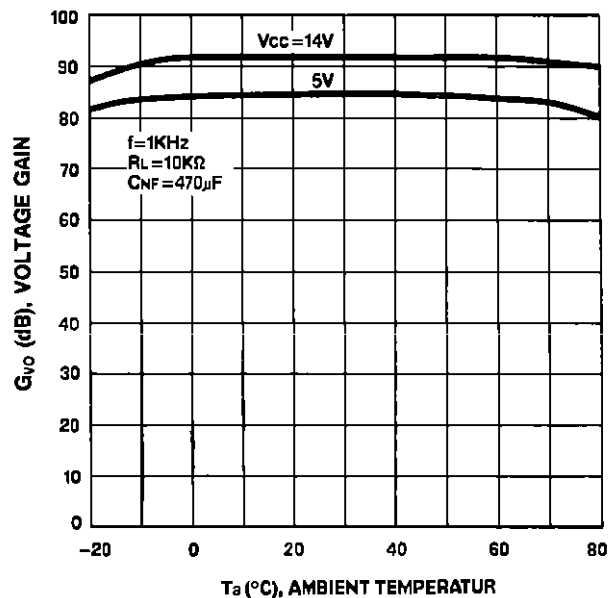
QUIESCENT CIRCUIT CURRENT-SUPPLY VOLTAGE

CENTER POINT VOLTAGE, -SUPPLY VOLTAGE  
OUTPUT VOLTAGE

OUTPUT VOLTAGE-AMBIENT TEMPERATURE



VOLTAGE GAIN-AMBIENT TEMPERATURE



## APPLICATION INFORMATION

### 1. Closed Loop Voltage Gain

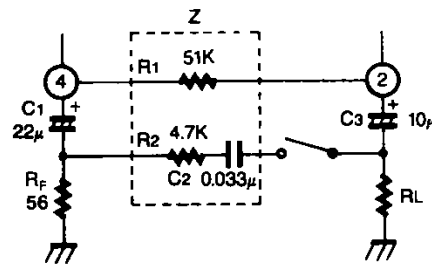


Fig. 4

SW on: play  
off: record

#### A. Playback amplifier

$$G_V = 20 \log \frac{Z}{R_F} \text{ (dB) at } f = 1\text{KHz, } G_V = 42\text{dB (Typ) } Z = R_1 // (R_2 + \frac{1}{2\pi f \cdot C_2})$$

#### B. Recording amplifier

$$G_V = 20 \log \frac{R_1}{R_F} \text{ (dB) at } f = 1\text{KHz, } G_V = 58\text{dB (Typ)}$$

### 2. ALC Circuit

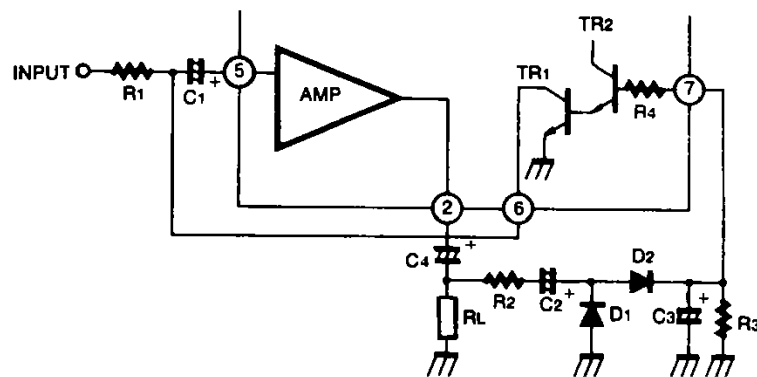


Fig. 5

The ALC circuit is consist of TR<sub>1</sub>, TR<sub>2</sub> and some external components. The output level of the amplifier is rectified by external circuits. Since this DC level is applied to the ALC input terminal (Pin 7), the impedance between the collector and emitter of TR<sub>1</sub> can change its value, therefore the pre-amplifier input level can be controlled.