

**3751**

T-79-25

## POWER OPERATIONAL AMPLIFIER

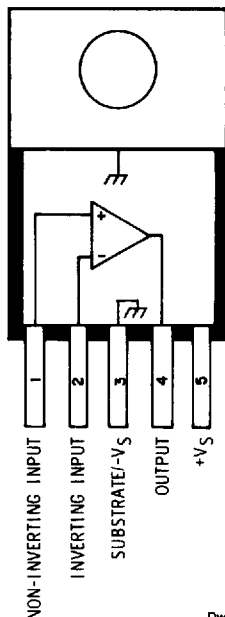
As a combination general-purpose operational amplifier and power booster, Type ULN3751Z integrated circuit simplifies circuit design, reduces component count, and enhances system reliability.

This power op amp features high-impedance differential inputs, a unity-gain stable amplifier that needs no external compensation, and a high-current power output. Typical applications include use as voice-coil motor drivers, linear servo amplifiers, power oscillators, bipolar voltage regulators, and audio power drivers.

The ULN3751Z is for applications demanding up to  $\pm 3.5$  A of output current. It is furnished in a modified 5-lead JEDEC-style TO-220 plastic package. The heat sink tab is at substrate potential and must be insulated from ground when the device is used with a split supply.

### FEATURES

- $\pm 3$  V to  $\pm 13$  V Operation
- High Output Swing
- Peak Output Current to  $\pm 3.5$  A
- Low Input Offset
- 90 dB Typical Open-Loop Gain
- Internal Thermal Shutdown
- High Common-Mode Input Range
- Unity Gain Stable
- Pin Compatible with L165, L465, SG1173



Dwg. No. PS-002

### ABSOLUTE MAXIMUM RATINGS

at  $T_A = +25^\circ\text{C}$

|                                                     |                                             |
|-----------------------------------------------------|---------------------------------------------|
| Supply Voltage Differential<br>( $+V_S$ to $-V_S$ ) | 28 V                                        |
| Peak Output Current, $I_{OUT}$                      | $\pm 3.5$ A                                 |
| Input Voltage Range,<br>$V_{IN}$                    | $+V_S$ to $-V_S - 0.3$ V                    |
| Package Power Dissipation,<br>$P_D$                 | See Graph                                   |
| Operating Temperature Range,<br>$T_A$               | $0^\circ\text{C}$ to $+70^\circ\text{C}$    |
| Storage Temperature Range,<br>$T_S$                 | $-40^\circ\text{C}$ to $+150^\circ\text{C}$ |

Always order by complete part number: **ULN3751Z**.

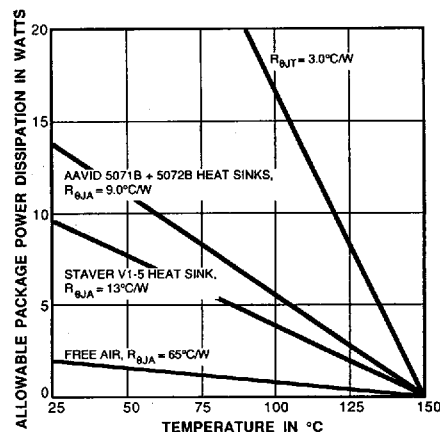
# 3751

## POWER OPERATIONAL AMPLIFIER

**ELECTRICAL CHARACTERISTICS at  $T_A = 25^\circ\text{C}$ ,  $T_J \leq +150^\circ\text{C}$ ,  $V_S = \pm 6.0\text{ V}$**   
(unless otherwise noted).

| Characteristic                       | Test Conditions                                    | Limits |                       |          | Units            |
|--------------------------------------|----------------------------------------------------|--------|-----------------------|----------|------------------|
|                                      |                                                    | Min.   | Typ.                  | Max.     |                  |
| Functional Supply Voltage Range      | $+V_S$ to $-V_S$                                   | 6.0    | —                     | 26       | V                |
| Quiescent Supply Current             |                                                    | —      | 40                    | 60       | mA               |
| Input Bias Current                   | $V_{IN} = 0$ , $I_{OUT} = 0$                       | —      | -60                   | -1000    | nA               |
| Input Offset Voltage                 | $V_{IN} = 0$ , $I_{OUT} = 0$                       | —      | $\pm 2.0$             | $\pm 10$ | mV               |
| Input Offset Current                 | $V_{IN} = 0$ , $I_{OUT} = 0$                       | —      | 10                    | 100      | nA               |
| Input Noise Voltage <sup>†</sup>     | BW = 40 Hz to 15 kHz                               | —      | 4.0                   | —        | $\mu\text{V}$    |
| Input Noise Current <sup>†</sup>     | BW = 40 Hz to 15 kHz                               | —      | 60                    | —        | pA               |
| Crossover Distortion <sup>†</sup>    | $P_{OUT} = 50\text{ mW}$ , $R_L = 4\Omega$         | —      | <0.05                 | —        | %                |
| Common Mode Rejection                | $\Delta V_{CM} = 2\text{ V}$                       | 60     | 85                    | —        | dB               |
| Input Common Mode Range <sup>†</sup> | Positive                                           | —      | $+V_S - 2\text{ V}$   | —        | V                |
|                                      | Negative                                           | —      | $-V_S - 0.3\text{ V}$ | —        | V                |
| Open-Loop Voltage Gain               | $f = 0$                                            | 80     | 90                    | —        | dB               |
| Slew Rate                            | $V_{IN} = V_{OUT} = 6\text{ Vpp}$ , $R_L = \infty$ | 1.0    | 2.3                   | —        | V/ $\mu\text{s}$ |
| Gain-Bandwidth Product <sup>†</sup>  | $A_v = 40\text{ dB}$                               | —      | 900                   | —        | kHz              |
| Output Voltage Swing                 | $I_{OUT} = 1.0\text{ A}$                           | 4.5    | 4.7                   | —        | V                |
|                                      | $I_{OUT} = -1.0\text{ A}$                          | -4.5   | -4.7                  | —        | V                |
| Supply Voltage Rejection             | $+V_S$ , $\Delta V = 1\text{ V}$                   | 60     | 85                    | —        | dB               |
|                                      | $-V_S$ , $\Delta V = 1\text{ V}$                   | 60     | 80                    | —        | dB               |
| Thermal Shutdown Temp. <sup>†</sup>  |                                                    | —      | 160                   | —        | $^\circ\text{C}$ |

<sup>†</sup> Typical values given for circuit design information only.



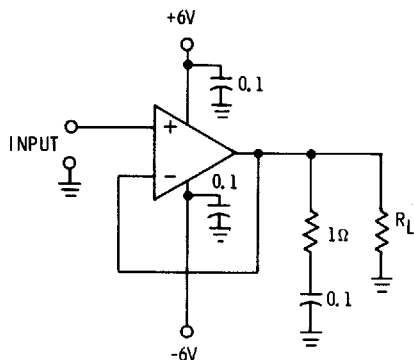
Dwg. GP-014A

# 3751

## POWER OPERATIONAL AMPLIFIER

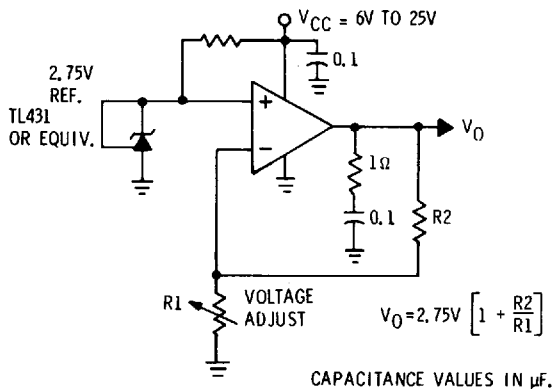
### TYPICAL APPLICATIONS

#### UNITY GAIN VOLTAGE FOLLOWER



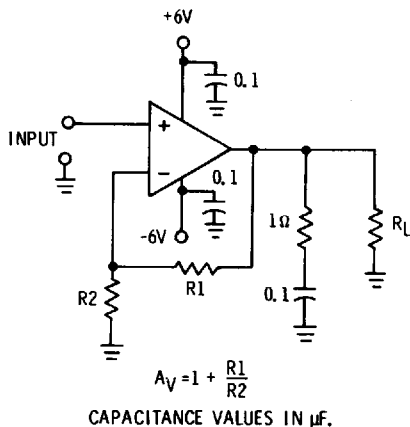
Dwg. No. A-12,551

#### LINEAR VOLTAGE REGULATOR



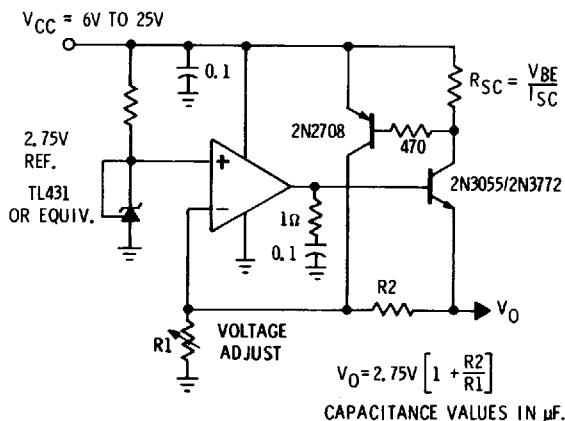
Dwg. No. A-12,553A

#### NON-INVERTING POWER AMPLIFIER



Dwg. No. A-12,552

#### HIGH-POWER LINEAR REGULATOR (Short-Circuit Protected)

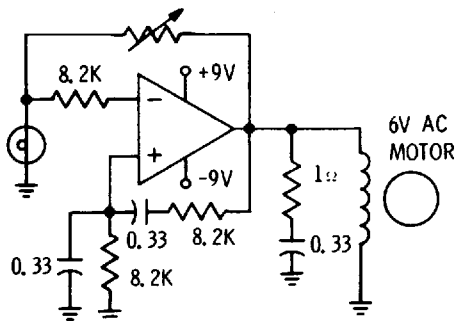


Dwg. No. A-12,554B

# 3751 POWER OPERATIONAL AMPLIFIER

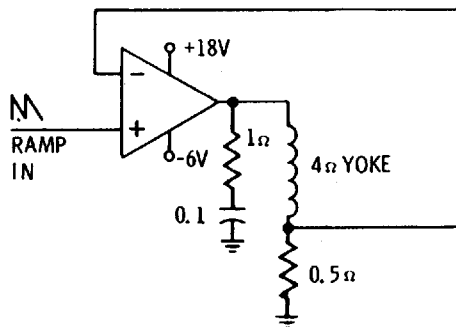
## TYPICAL APPLICATIONS

### WIEN BRIDGE OSCILLATOR/MOTOR DRIVER



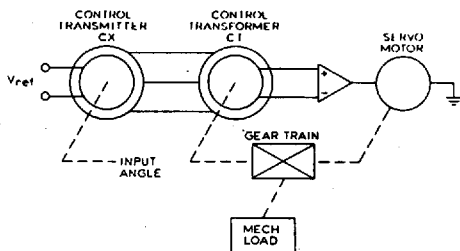
Dwg. No. A-12,376B

### VIDEO MONITOR VERTICAL DEFLECTION AMP.



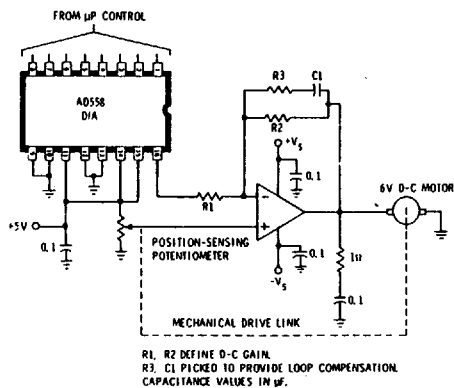
Dwg. No. A-12,375A

### SIMPLIFIED SERVO APPLICATION WITH CONTROL TRANSFORMERS



Dwg. No. A-14,250

### SINGLE-ENDED POSITION SERVO WITH SENSE POTENTIOMETER



Dwg. No. A-12,556