

INTERFACE CIRCUIT (RELAY AND LAMP-DRIVER)

- OPEN GROUND PROTECTION
- HIGH OUTPUT CURRENT
- ADJUSTABLE SHORT-CIRCUIT PROTECTION
- INTERNAL THERMAL PROTECTION WITH EXTERNAL RESET
- LARGE SUPPLY VOLTAGE RANGE
- ALARM OUTPUT
- INPUT VOLTAGE CAN BE HIGHER THAN V_{CC}
- OUTPUT VOLTAGE CAN BE LOWER THAN GROUND ($V_{CC} - V_O \leq V_{CC} [\text{max}]$)

DESCRIPTION

The TDE1767,A/TDE1787,A are monolithic amplifiers designed for high current and high voltage applications, specifically to drive lamps, relays, stepping motors.

These devices are essentially blow-out proof. The output is protected from short-circuits with the positive supply or ground. In addition thermal shut down is provided to keep the IC from overheating. If internal dissipation becomes too high, the driver will shut down to prevent excessive heating. The output stays null after the overheating is off, if the reset input is low. If high the output will alternatively switch-on and off until the overload is removed.

The device operates over a wide range of supply voltages from standard 15 V operational amplifier supplies to the single + 6 V or + 48 V used for industrial electronic systems. Input voltages can be higher than the V_{CC} .

An alarm output suitable for driving a LED is provided. This LED, normally on (if referred to ground), will die out or flash during an overload depending on the state of the reset input.

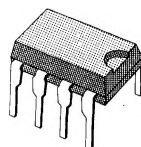
The output is low in open ground conditions.

THERMAL DATA

$R_{th(j-c)}$	Maximum Junction-case Thermal Resistance	30	$^{\circ}\text{C/W}$
$R_{th(j-a)}$	Maximum Junction-ambient Thermal Resistance*	80	$^{\circ}\text{C/W}$

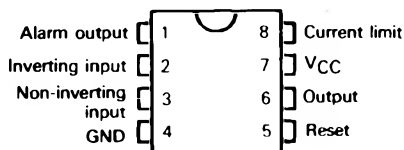
* Devices bonded on a 40 cm² glass-epoxy printed circuit 0.15 cm thick with 4 cm² of copper.

MINIDIP/2



ORDER CODES : TDE1767 DP
TDE1767 ADP
TDE1787 DP
TDE1787 ADP

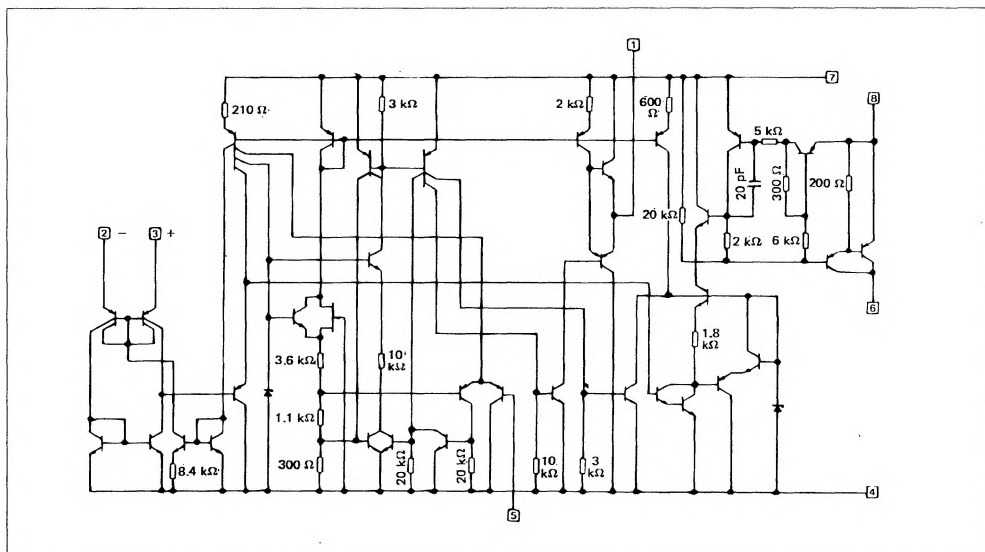
PIN CONNECTION (top view)



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	TDE1767A/TDE1787A	TDE1767/TDE1787	Unit
V _{CC}	Supply Voltage	60	50	V
V _{ID}	Input Differential Voltage	60	50	V
V _I	Input Voltage	− 10 to + 60	− 10 to + 50	V
I _O	Output Current	1.2	1.2	A
V _{l(reset)}	Reset Input Voltage	− 0.5 to + 60	− 0.5 to + 50	V
I _{OA}	Alarm Output Current	− 10 to + 20	− 10 to + 20	mA
P _{tot}	Power Dissipation	Internally Limited		mW
T _{oper}	Operating Ambient Temperature Range	− 25 to + 85	− 25 to + 85	°C
T _{stg}	Storage Temperature Range	− 65 to + 150	− 65 to + 150	°C

SCHEMATIC DIAGRAM



EQUIVALENT SCHEMATIC

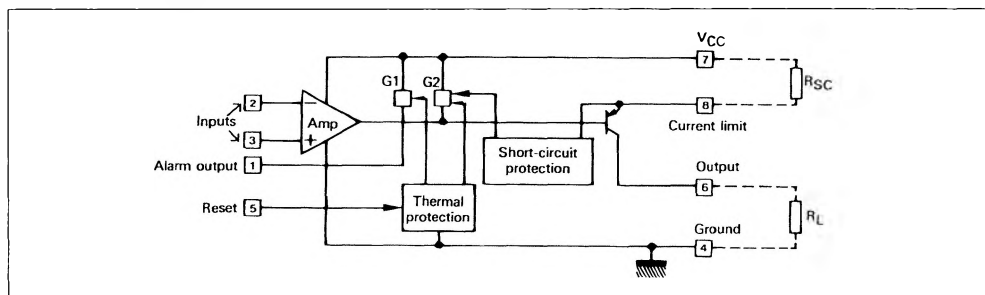
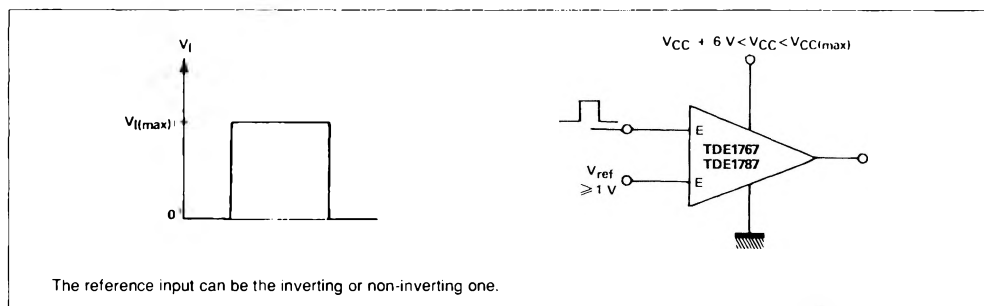


Figure 1.

**ELECTRICAL CHARACTERISTICS** (Unless otherwise specified)**TDE1767A** : $-25\text{ }^{\circ}\text{C} \leq T_{\text{amb}} \leq +85\text{ }^{\circ}\text{C}$, $+6\text{ V} \leq V_{\text{CC}} \leq +60\text{ V}$, $I_{\text{O}} \leq 500\text{ mA}$, $T_{\text{j}} \leq +150\text{ }^{\circ}\text{C}$ **TDE1767** : $-25\text{ }^{\circ}\text{C} \leq T_{\text{amb}} \leq +85\text{ }^{\circ}\text{C}$, $+6\text{ V} \leq V_{\text{CC}} \leq +45\text{ V}$, $I_{\text{O}} \leq 500\text{ mA}$, $T_{\text{j}} \leq +150\text{ }^{\circ}\text{C}$ **TDE1787A** : $-25\text{ }^{\circ}\text{C} \leq T_{\text{amb}} \leq +85\text{ }^{\circ}\text{C}$, $+6\text{ V} \leq V_{\text{CC}} \leq +60\text{ V}$, $I_{\text{O}} \leq 300\text{ mA}$, $T_{\text{j}} \leq +150\text{ }^{\circ}\text{C}$ **TDE1787A** : $-25\text{ }^{\circ}\text{C} \leq T_{\text{amb}} \leq +85\text{ }^{\circ}\text{C}$, $+6\text{ V} \leq V_{\text{CC}} \leq +45\text{ V}$, $I_{\text{O}} \leq 300\text{ mA}$, $T_{\text{j}} \leq +150\text{ }^{\circ}\text{C}$

Symbol	Parameter	Min	Typ	Max	Unit
V_{IO}	Input Offset Voltage - (note 1)	–	2	50	mV
I_{CC}	Power Supply Current (measured on pin 4) Output High ($T_{\text{amb}} = +25\text{ }^{\circ}\text{C}$) Output High ($V_{\text{CC}} = V_{\text{CC(max)}}$, $T_{\text{j}} = +150\text{ }^{\circ}\text{C}$) Output Low ($V_{\text{CC}} = V_{\text{CC(max)}}$, $T_{\text{amb}} = +25\text{ }^{\circ}\text{C}$)	– – –	5.8 5 1.5	8 7 4	mA
I_{B}	Input Bias Current	–	15	100	μA
V_{CM}	Common-mode Input Voltage Range (note 2)	1 1	– –	60 45	V
V_{I}	Input Voltage Range ($V_{\text{ref}} \geq +1\text{ V}$) (figure 1, note 2)	0 0	– –	60 45	V
I_{SC}	Short-circuit Output Current ($V_{\text{CC}} = +35\text{ V}$, $t = 10\text{ ms}$) $R_{\text{SC}} = 0.18\text{ }\Omega$ $R_{\text{SC}} = 0.33\text{ }\Omega$	– –	700 380	– –	mA
V_{sense}	Current Limit Sense Voltage: $V_{\text{O}} = V_{\text{CC}} - 2\text{ V}$, $t = 10\text{ ms}$ ($V_{\text{O}} = V_{\text{CC}} - 2\text{ V}$) : $V_{\text{O}} = 0\text{ V}$, $t = 10\text{ ms}$	140 130	150 140	175 165	mV
$V_{\text{O(sat)}}$	Output Saturation Voltage (output high $V_{\text{I}}^+ - V_{\text{I}}^- \geq 50\text{ mV}$, $R_{\text{SC}} = 0$, $V_{\text{CC}} = +30\text{ V}$) $T_{\text{j}} = +25\text{ }^{\circ}\text{C}$ $T_{\text{j}} = +150\text{ }^{\circ}\text{C}$	– – – –	1 1 1.1 1.1	1.1 1.2 1.2 1.3	V
I_{OL}	Output Leakage Current (output low)	–	–	100	μA
I_{A}	Available Alarm Output Current Output Source Current ($V_{\text{AH}} = V_{\text{CC}} - 2.5\text{ V}$) Output Sink Current (in thermal shut-down) $V_{\text{A}} = 1.4\text{ V}$	–4 5	–5 10	– –	mA
I_{reset}	Reset Input Current	–	2	40	μA
$V_{\text{th (reset)}}$	Reset Threshold	–	1.4	–	V
–	Output Leakage Current (open ground)	–	10	–	μA

- Notes :**
1. The offset voltage given is the maximum value of differential input voltage required to drive the output voltage within 2 V of the ground or the supply voltage.
 2. Input voltage range is independent of the supply voltage.

Fig. 2 – PEAK SHORT-CIRCUIT CURRENT vs LIMITING RESISTOR.

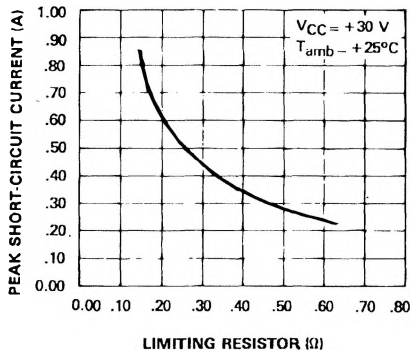


Fig. 3 – AVAILABLE OUTPUT CURRENT vs LIMITING RESISTOR.

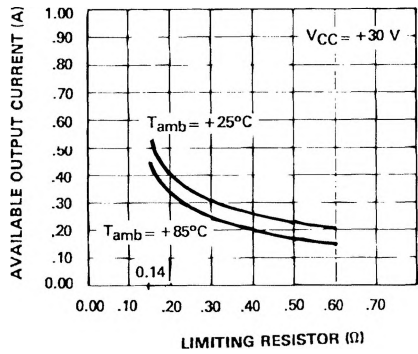


Fig. 4 – POWER SUPPLY CURRENT (pin 4).

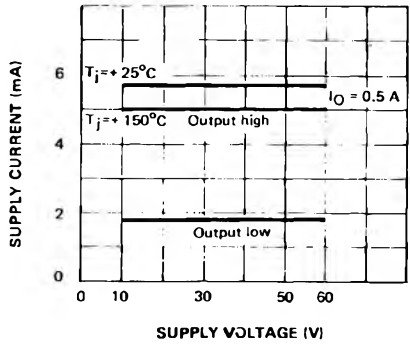


Fig. 5 – OUTPUT SATURATION VOLTAGE vs OUTPUT CURRENT.

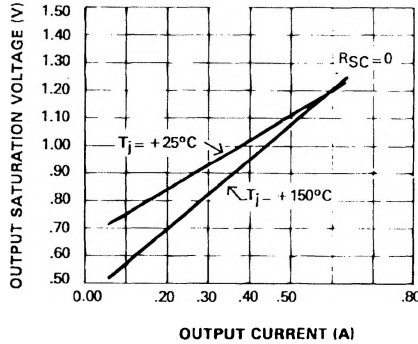


Fig. 6 – OUTPUT TRANSISTOR SAFE OPERATING AREA (pulsed).

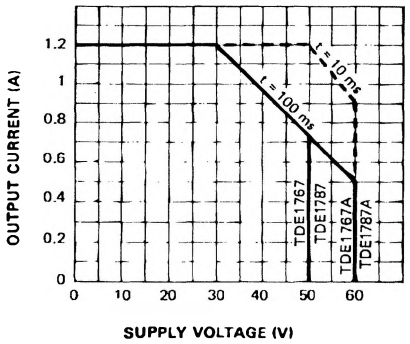
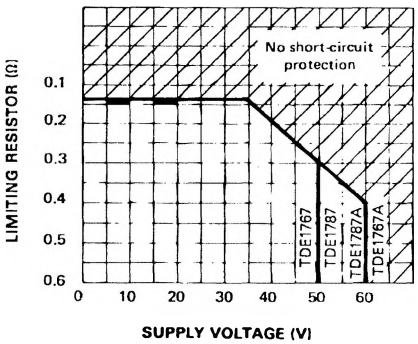


Fig. 7 – NORMAL OPERATING AREA (short-circuit protected).



ALARM OUTPUT CAPABILITY CURRENT

Fig. 8 CURRENT SINKING

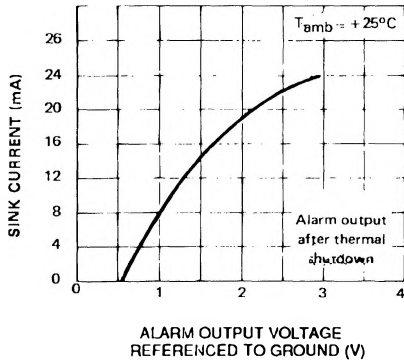


Fig. 9 - CURRENT SOURCING

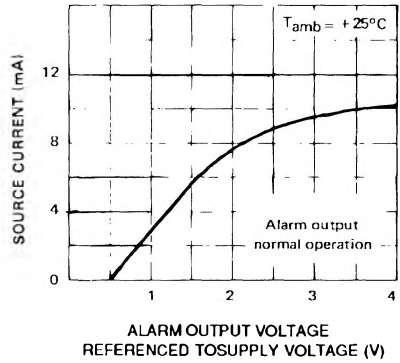


Fig. 10 - RESPONSE TIME.

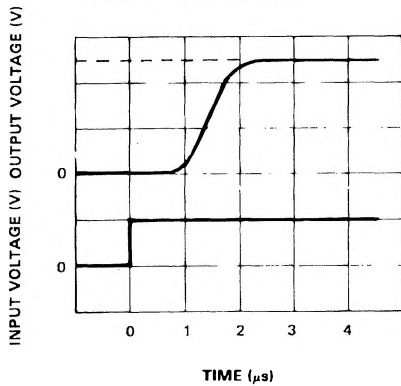


Fig. 11 - RESPONSE TIME.

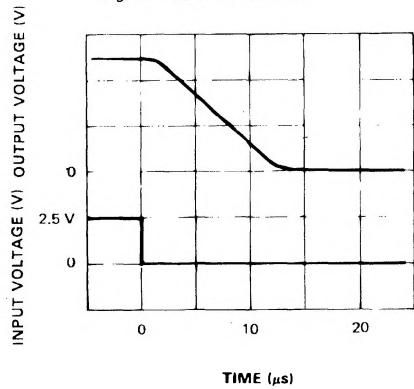
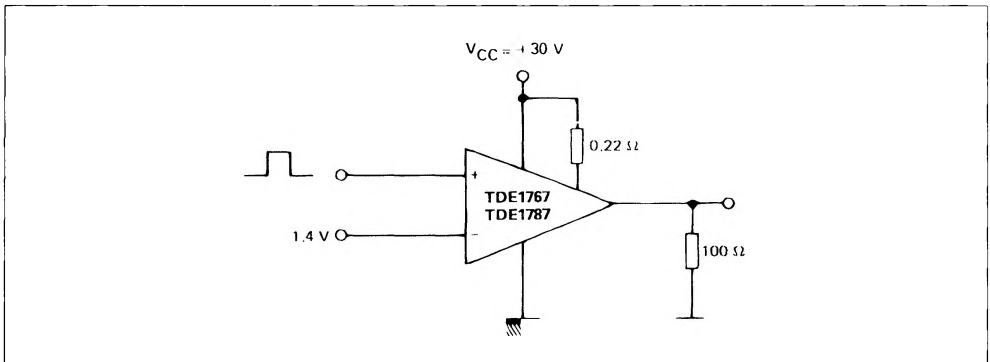


Figure 12 : Test Circuit.



TYPICAL APPLICATIONS

Figure 13 : Open Load Detection.

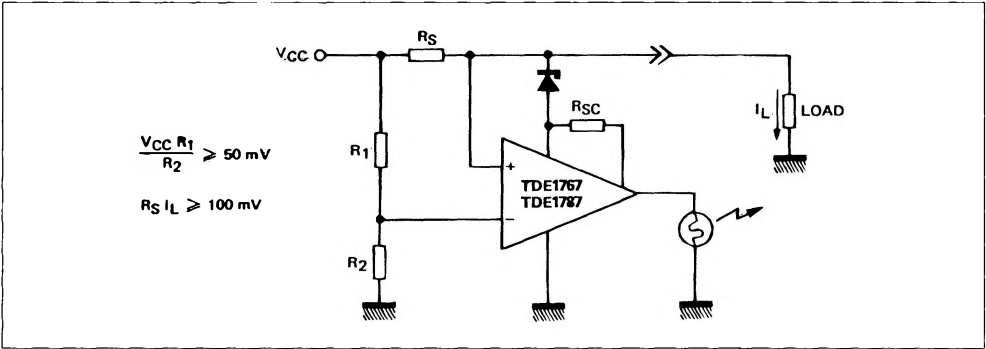


Figure 14 : Driving Lamps, Relays, Etc...

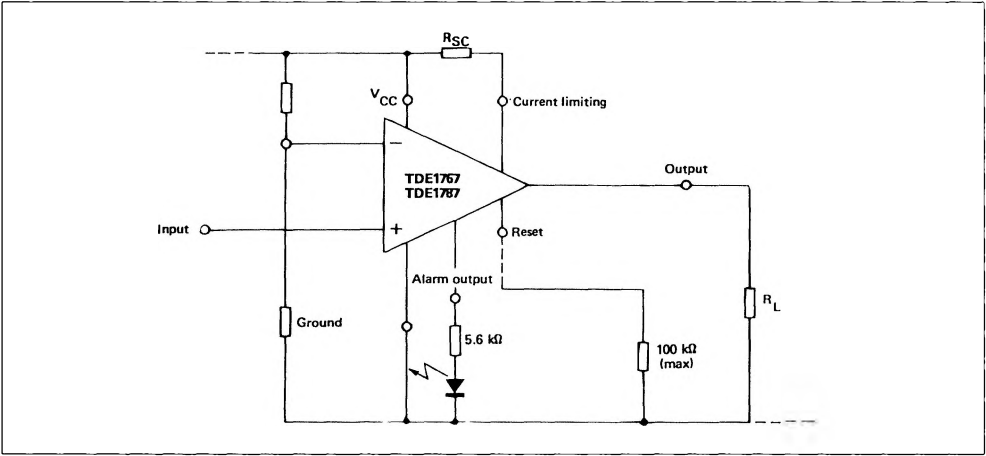


Figure 15 : Common Reset.

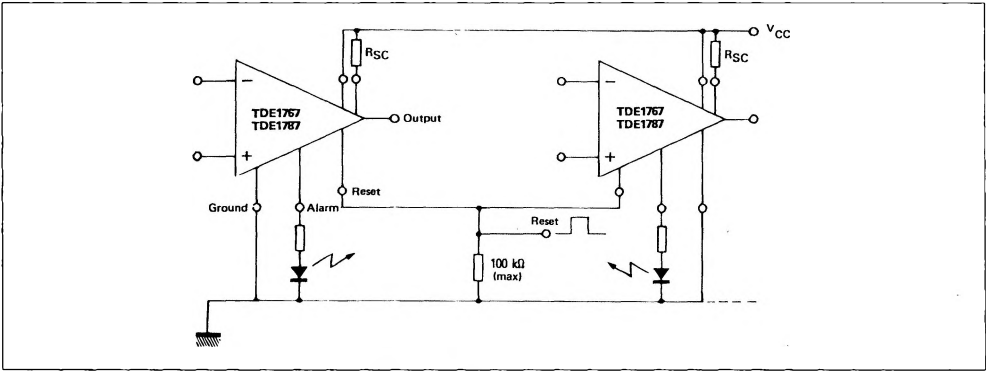


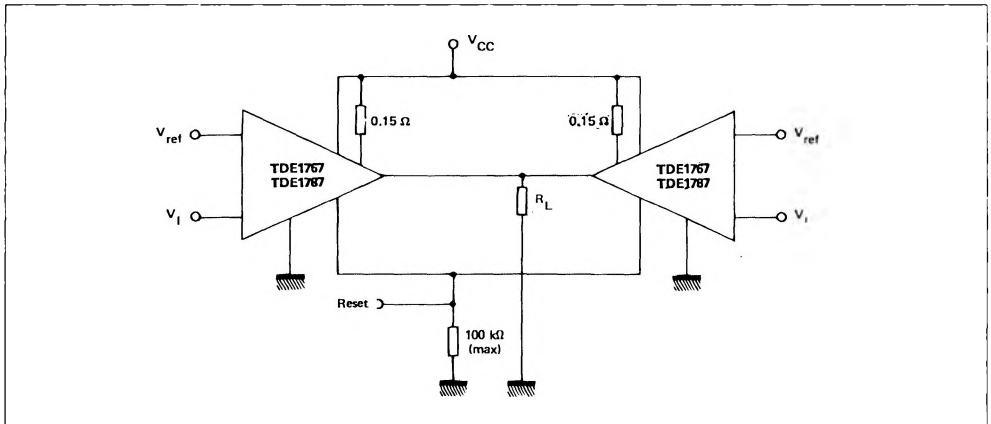
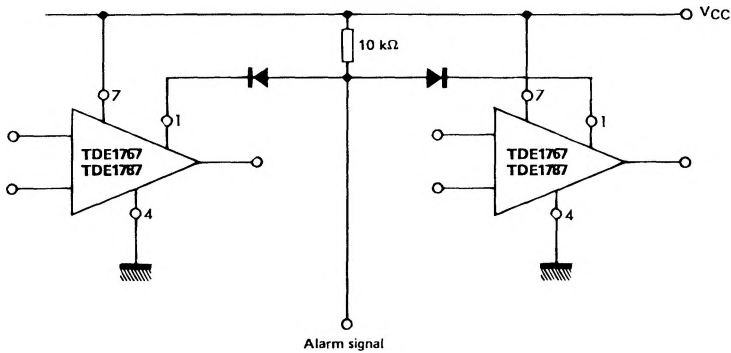
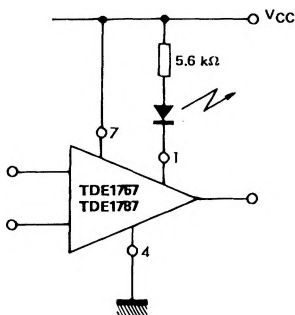
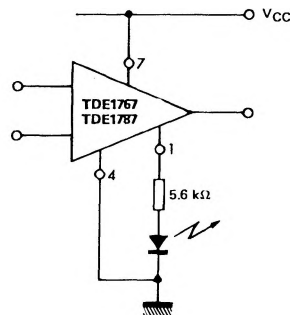
Figure 16 : Parallel Driving of Loads Up to 1 A.**USING ALARM OUTPUT****Figure 17 :** Parallel Alarm Outputs.**Figure 18 :** Led to VCC.**Figure 19 :** Led to Ground.

Figure 20 : Interface between High Voltage and Low Voltage Systems.

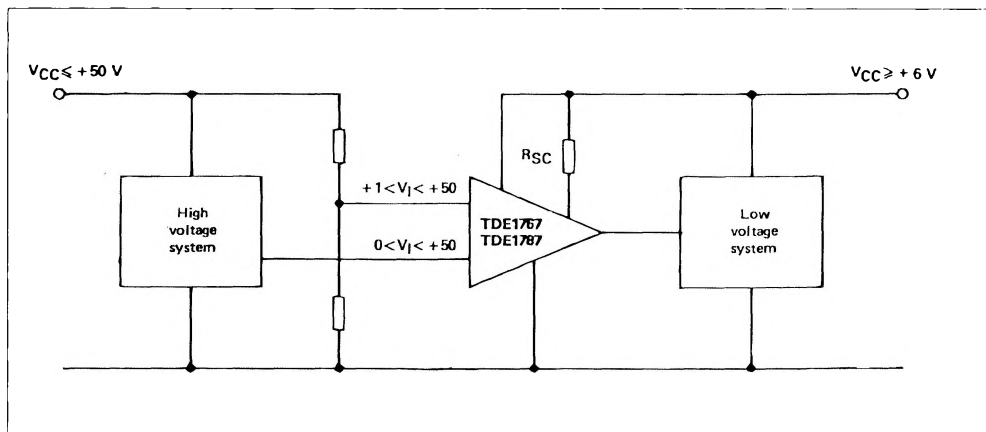


Figure 21 : Increasing Output Current Up to 10 A.

