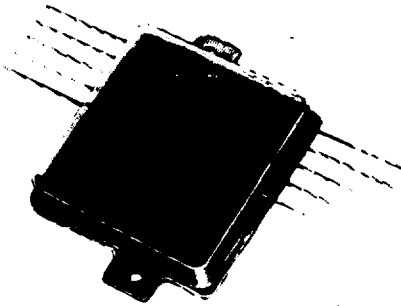


**Power Devices**



**Multi-Purpose 7-Ampere Operational Amplifier**

Linear Amplifiers for Applications in Industrial and Commercial Equipment

**Features:**

- Bandwidth: 30 kHz at 60 W
- High power output: up to 100 W(rms)
- Built-in load-line-limiting circuit
- Reactive-load fault protection
- Provision for feedback control

The RCA-HC2000H\* is a complete solid-state hybrid operational amplifier in a metal hermetic package. The HC2000H is intended for military and critical industrial applications and can be supplied in accordance with applicable portions of MIL-STD.883.

The amplifier employs a quasi-complementary-symmetry class B output circuit with built-in load-fault protection.

Type HC2000H is recommended for the following applica-

tions: servo-amplifiers (ac, dc, PWM); deflection amplifiers; power operational amplifiers; audio amplifiers; voltage regulators; and driven inverters.

Additional information on hybrid power amplifiers is contained in RCA Application Notes AN-4483 and AN-4782. Single copies of these publications are available upon request from RCA Solid State Division, Box 3200, Somerville, N.J. 08876.

**MAXIMUM RATINGS, Absolute-Maximum Values:**

$V_S$	Between leads 1 and 10 .....	75 V
$I_{OM}$	.....	7 A
$P_T$	Per Output Device .....	See Fig. 4 & 5
$T_{sig}$	.....	-55 to +125°C
$T_J$	.....	-55 to +150°C
$T_L$ (During Soldering):		
At distances $\geq 1/8$ in. (3.17 mm) from case for 10 s max. ....		235°C
$\phi L$ (Min):		
At distance $\geq 0.075$ (1.91 mm) from case .....		0.04 in. (1.02 mm)

\*HR155058\*

ELECTRICAL CHARACTERISTICS, At Case Temperature ( $T_C$ ) = 25°C

CHARACTERISTIC	TEST CONDITIONS				LIMITS			UNITS
	$V_S$ -V	f -kHz	$P_O$ -W	$R_L$ - $\Omega$	MIN.	TYP.	MAX.	
$V_{OUT}$ $V_{IN}$ Open-Loop	$\pm 37.5$	4	25	4	-	2000	-	
	$\pm 37.5$	1	1	4	26	30	-	
$Z_{IN}$ Measured between leads 7 & 8 (See Fig. 3)	-	-	-	-	16	18	-	k $\Omega$
$I_o$	$\pm 37.5$	-	-	-	15	-	30	mA
$V_{IO}$ Measured between leads 4 & 5 (See Fig. 3)	$\pm 37.5$	-	-	4	0	$\pm 30$	$\pm 250$	mV
$V_{OUT}$	$\pm 37.5$	1	100	4	28	32	-	V
$f_H$ (See Figs. 3 & 8)	$\pm 37.5$	-	1	4	43	-	-	kHz
THD (See Figs. 3 & 9)	$\pm 37.5$	1	60	4	-	0.4	0.5	%
$I_S$ (See Fig. 11)	$\pm 37.5$	1	-	0	$\pm 2$	-	$\pm 3.85$	A
S/N $Z_G = 600 \Omega$	$\pm 37.5$	-	-	-	-	78	-	dB
SR (Unity gain, $I_{OM} = 4A$ )	$\pm 37.5$	1	100	4	5	-	-	V/ $\mu s$
$R_{\theta JC}$ Per Output Device (See Figs. 4 & 5)	-	-	-	-	-	-	2	°C/W

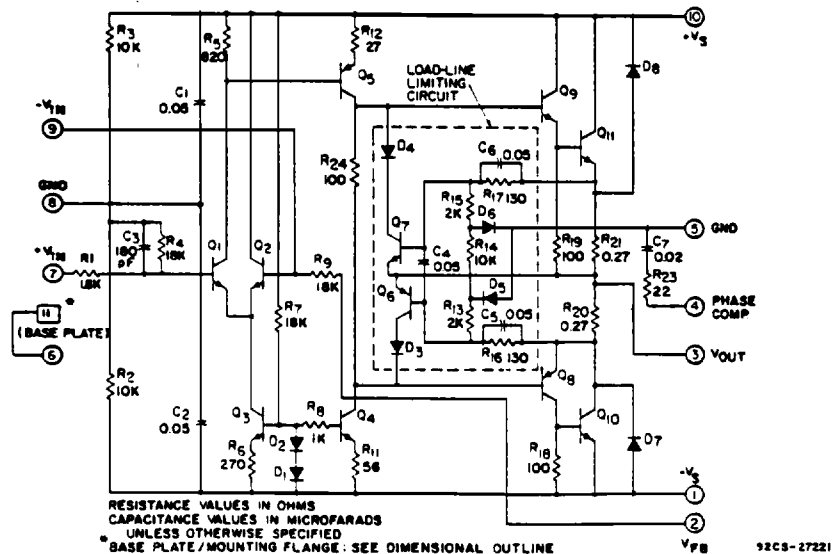
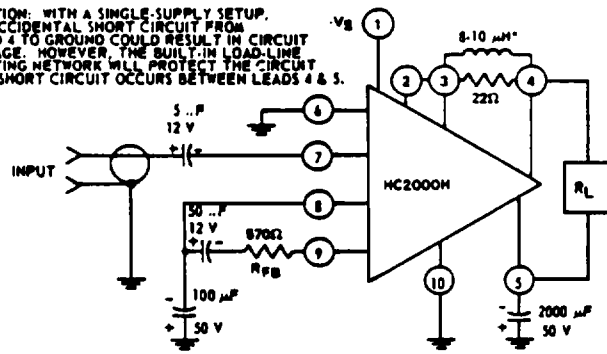


Fig. 1 - Schematic diagram of type HC2000H power hybrid circuit operational amplifier.

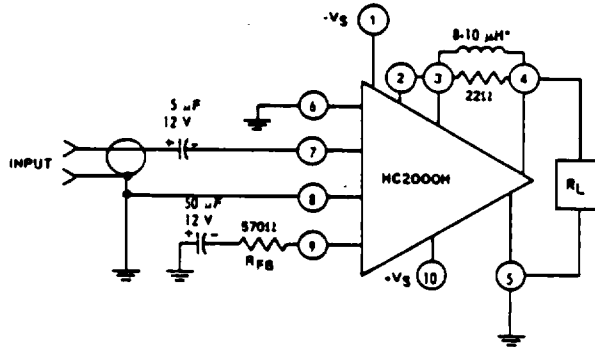
CAUTION: WITH A SINGLE-SUPPLY SETUP, AN ACCIDENTAL SHORT CIRCUIT FROM LEAD 4 TO GROUND COULD RESULT IN CIRCUIT DAMAGE. HOWEVER, THE BUILT-IN LOAD-LINE LIMITING NETWORK WILL PROTECT THE CIRCUIT IF A SHORT CIRCUIT OCCURS BETWEEN LEADS 4 & 5.



\* Miller 5220, or equivalent

92CS-19981

Fig. 2 - Type HC2000H power hybrid circuit with external connections for operation with a single power supply.



\* Miller 5220, or equivalent

92CS-19982

Fig. 3 - Type HC2000H power hybrid circuit with external connections (and split power supply) for measuring relative response and distortion; see Figs. 8 & 9.

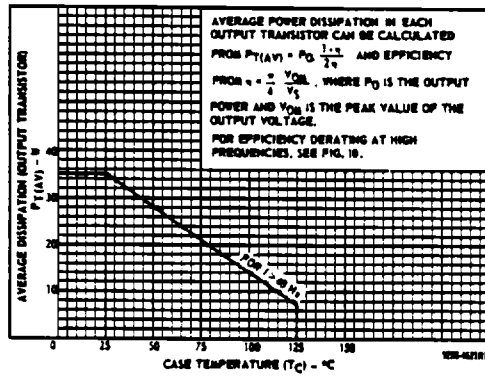


Fig. 4 - Dissipation (average) derating curve for each output transistor (for symmetrical waveforms with  $f > 40$  Hz).

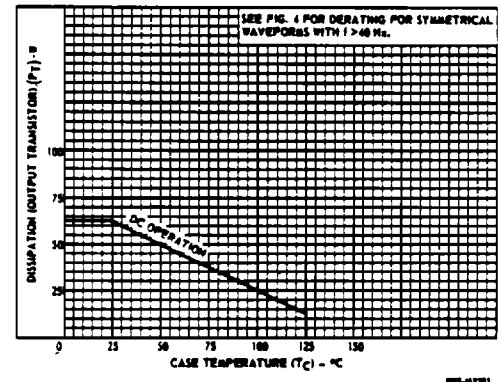


Fig. 5 - Dissipation (dc) derating curve for each output transistor.

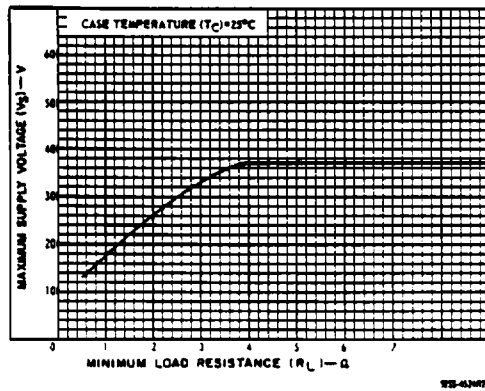


Fig. 6 - Maximum allowable supply voltage vs. load resistance.

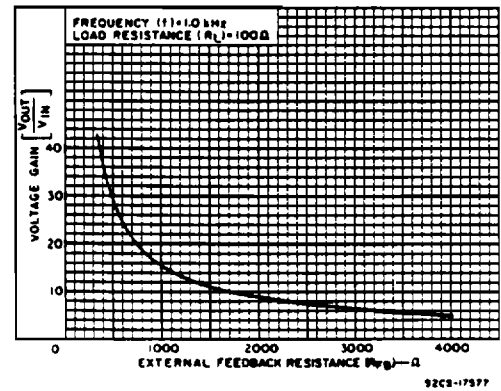


Fig. 7 - Closed-loop voltage gain vs. external feedback resistance.

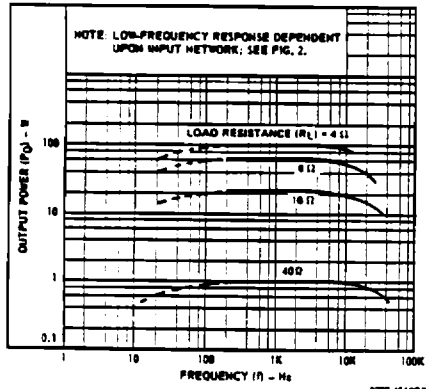


Fig. 8 - Output power vs. frequency.

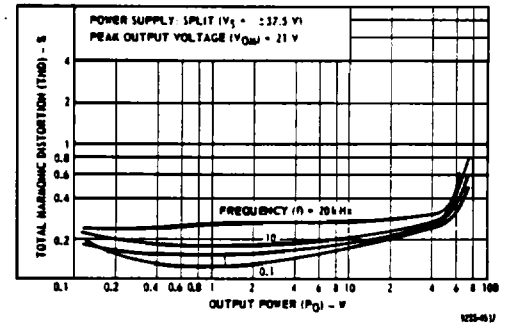


Fig. 9 - Total harmonic distortion with split power supply.

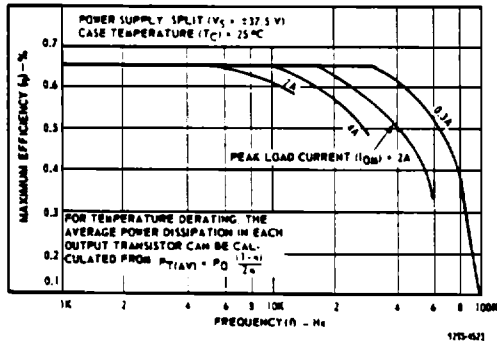


Fig. 10 - Maximum efficiency vs. frequency for several values of peak load current.

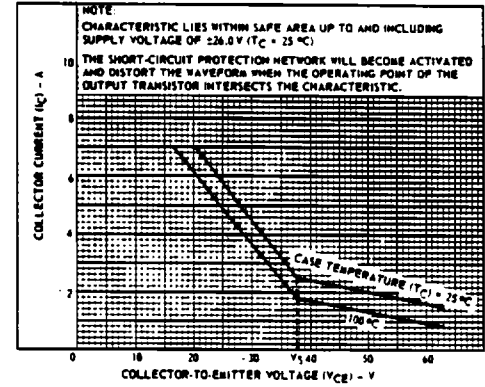


Fig. 11 - Characteristics of built-in load-line limiting circuit.

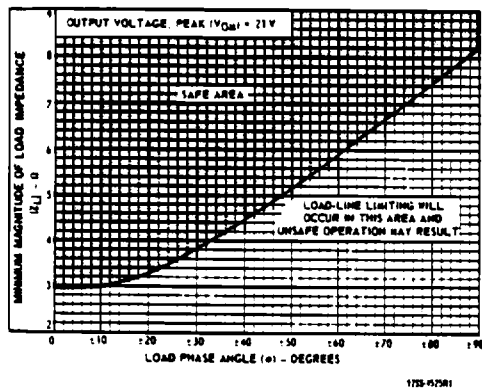


Fig. 12 - Minimum load impedance vs. load phase angle and safe area of operation.

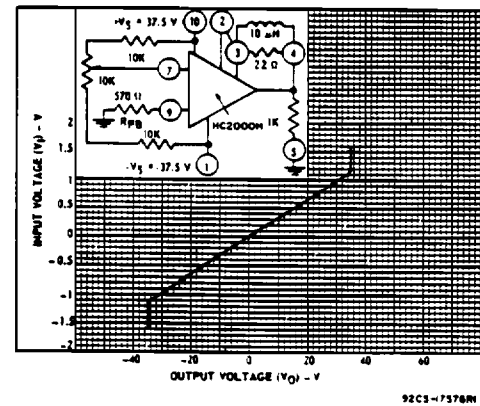


Fig. 13 - Gain linearity characteristic.

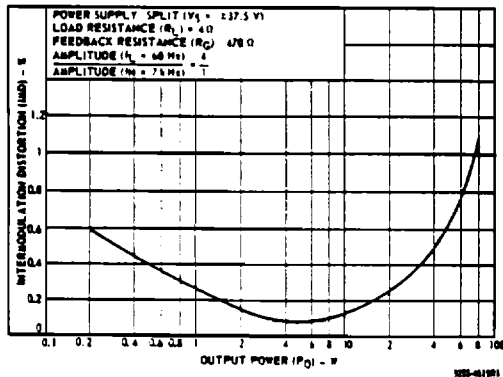


Fig. 14 - Intermodulation distortion with split supply and 4-ohm load.

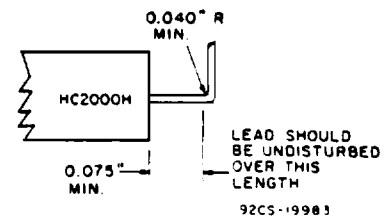
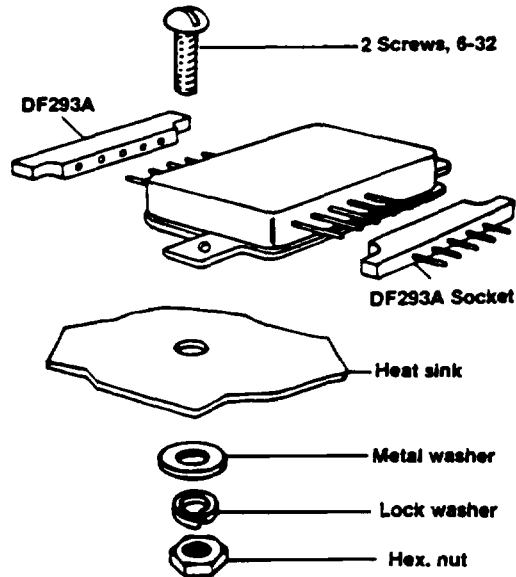


Fig. 15 - Recommended lead-bending specification.

**SYMBOLS**

$f_H$	Bandwidth
$I_C$	Transistor collector current
$I_o$	Quiescent current
$I_{OM}$	Peak output current
$I_S$	Short-circuit current
$P_O$	Output power
$P_T$	Device dissipation at specified temperature
$R_{\theta JC}$	Thermal resistance, junction-to-case
S/N	Signal-to-noise ratio
SR	Slew rate
THD	Total harmonic distortion
$T_J$	Junction temperature (transistor)

$T_L$	Lead temperature during soldering
$T_{stg}$	Storage temperature
$V_I$	Input voltage
$v_{IO}$	Initial input offset voltage
$V_{IO}$	Input offset voltage
$V_{OM}$	Peak output voltage
$V_{OUT/V_{IN}}$	Voltage gain
$V_S$	DC supply voltage
$Z_G$	Signal source impedance
$Z_{IN}$	Input impedance
$Z_L$	Load impedance
$\eta$	Efficiency
$\phi_L$	Lead radius (for bending)

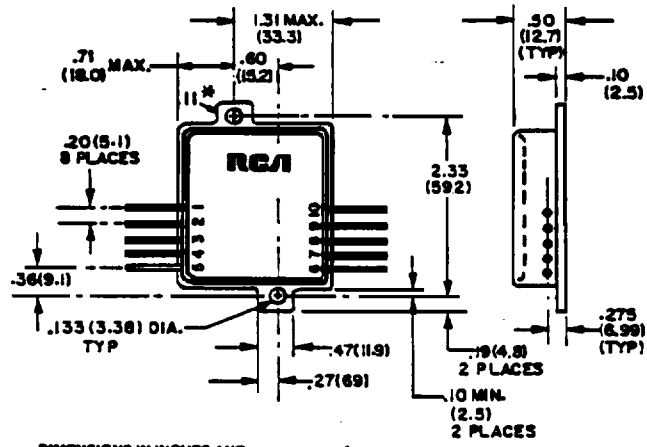


**Note:** Maximum torque applied to mounting flange is 24 in-lb (0.3 kgf-m).  
DF293A is a socket to enable simple connection of this module.

92CS-27782R1

*Suggested mounting hardware.*

**DIMENSIONAL OUTLINE  
HC2000H**



**DIMENSIONS IN INCHES AND  
MILLIMETERS (VALUES IN PARENTHESES)** 92CS-37519

Typical lead length equals 6.75 (17.0).

\*For HC2000H, Terminal 11 is internally connected to Terminal 8.  
For HC2000, Terminal 11 is electrically isolated from internal circuitry.