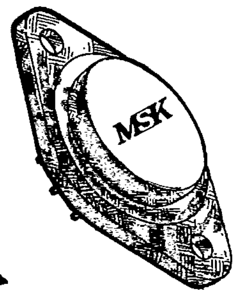
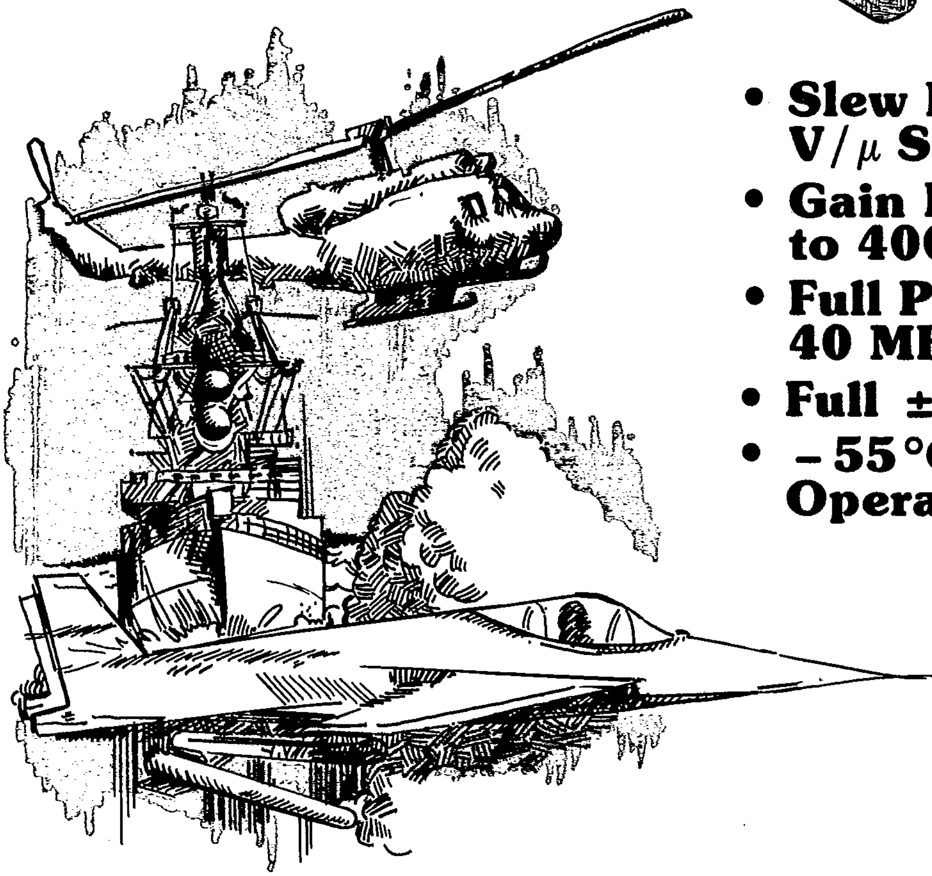
MSK



700 SERIES HYBRID AMPLIFIERS



- **Slew Rates to 3000 V/μ Sec.**
- **Gain Bandwidth Products to 400 MHz**
- **Full Power Outputs to 40 MHz**
- **Full ± 10 Volts into 50Ω**
- **−55°C to +125°C Operating Temp. Range**

785 Widest Bandwidth at Gains Greater Than 3.
786 Optimized For Settling And Pulse Applications at Gains Greater Than 3.
790 Designed Specifically for Driving 50Ω Systems at ± 10 Volts.
795 Optimized for High Bandwidth and High Slew Rate with 50Ω Systems.
796 Optimized for Settling and Pulse Applications with 50Ω Systems.

MSK
M.S. Kennedy Corp. 8170 Thompson Road, Clay, N.Y. 13041 Tel. (315) 699-9201
TWX 710-541-0465

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ELECTRICAL SPECIFICATIONS AT 25°C

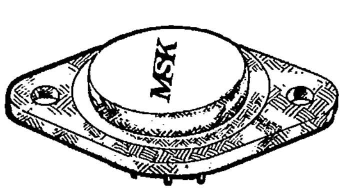
± Vcc = ± 15 VDC

PARAMETER	UNITS	785	786	790	795	796
Voltage Gain	V/V	20,000 MIN. — 50,000 TYP.				
Full Power Output Freq.	MHz	40 MIN	30 MIN	15 MIN	25 MIN	15 MIN
Settling Time To 1%	nS	—	25 MAX[3]	—	—	35 MAX[4]
Settling Time To 0.1%	nS	—	65 MAX[3]	—	—	60 MAX[4]
Bandwidth (Unity Gain Crossover)	MHz	200 MIN	—	125 MIN	—	—
Gain-Bandwidth Product	MHz	300 MIN[5]	—	—	300 MIN	—
Slew Rate	V/μS	2500 MIN	—	1000 MIN	1600 MIN	—
Slew Rate Limit	V/μS	—	3000 MIN	—	—	1300 MIN
Rated Output Voltage	Volts	± 10V MIN — ± 12V TYP				
Rated Output Current	MA	80 MIN	80 MIN	200 MIN	200 MIN	200 MIN
Input Offset Voltage Tempco	μV/°C	25 MAX — 15 TYP				
Input Bias Current	nA	200 MAX — 50 TYP				

NOTES:
1. Gain Bandwidth Product Measured at Full Power Output Frequency.
2. Full Power Output Frequency is Measured at Rated Output Voltage and Current.
3. Av = −5. Measured in False Summing Junction Circuit.
4. Av = −1. Measured in False Summing Junction Circuit.
5. Typical Gain Bandwidth Product for 785 is 500 MHz.

Operating Temp. Range (Case) .... −55°C to +125°C
Storage Temp. Range .... −65°C to +150°C
Input Current Drift Co-Efficient ....3nA/°C
DC Input Impedance 50KΩ
Input Capacitance ....785,786,795 5 Typ, 8 Max
790,796 3 Typ, 4 Max

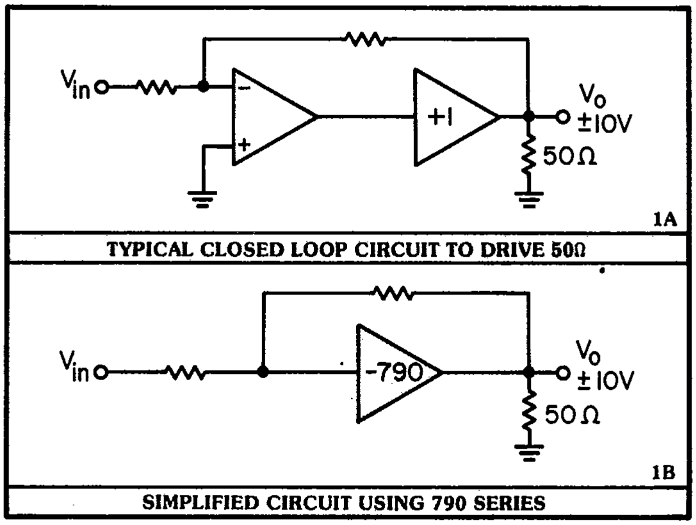
Balance Trimpot 50KΩ
Power Supplies .... ±15 Volts (±12 Volts Optional)
Quiescent Current....................................45 mA
Developed for Use in Airborne Radar and Display Systems
Manufactured in Accordance With Mil. Std. 883



POWER AT HIGH FREQUENCY

700 SERIES SELECTOR GUIDE

OPTIMIZED CHARACTERISTICS	UNITY GAIN STABLE: NORMAL OUTPUT	UNITY GAIN STABLE: HI-POWER OUTPUT	DECOMPENSATED: NORMAL OUTPUT	DECOMPENSATED: HI-POWER OUTPUT
GENERAL PURPOSE	750	790	785	795
SETTLING TIME	760	796	786	–
GAIN - BW PRODUCT	770	–	–	–
SLEW RATE	780	–	–	–



TYPICAL CLOSED LOOP CIRCUIT TO DRIVE 50Ω

SIMPLIFIED CIRCUIT USING 790 SERIES

FIG. 1

I. WHY USE A DECOMPENSATED AMPLIFIER?

Many applications for wideband amplifiers require gains greater than unity while still demanding the widest possible bandwidth. Op-amps with a −6 db/oct. roll-off characteristic, that is, amplifiers designed for unity gain stability, such as the MSK 750 series, may display inadequate bandwidth when used at higher gains. So for many circuit designers, the solution is to use a "decompensated" amp. (A "decompensated" amplifier is one that IS compensated but not down to 0 db). Since the amplifer is not intended to be unity gain stable, it can be endowed with greater bandwidth without fear of oscillation. This facet of the design affords the circuit designer a higher bandwidth device in applications requiring gains of three or greater. The MSK 785, 786, and 795 amplifiers represent the state of the art in this class, each having its own special feature. They, like the other members of the 700 family, are characteristically straightforward devices to work with, easily kept from oscillation and every bit as reliable as the MSK 750 family has proven to be over the last nine years.

II. A NEW SOLUTION TO AN OLD PROBLEM

Another popular application involves the use of a wideband amplifier followed by a fast, open loop power stage in a closed loop for the purpose of driving low impedance or reactive loads. A typical circuit configuration is shown in fig. 1A. Typically, when trying to achieve maximum bandwidth, this configuration is prone to oscillation and is extremely sensitive to printed circuit board layout, yet, until the advent of the 790 series this configuration was the best any manufacturer had to offer.

The 790 series (models 790, 795 & 796) integrates a high open loop gain wideband amplifier with a high speed, high current output stage. The output stage was designed to drive 50 ohm impedances to ± 10V at speeds up to 2500 V/μs minimum. The advantages are obvious. Interfacing the amplifier and buffer inside the hybrid not only saves space and weight, but the performance of the system is optimized.

III. DECOUPLING

It is difficult to overemphasize the need for adequate decoupling especially when one considers that the instantaneous current draw of any of the 790 series amplifiers can exceed 200 mA! Typically the power line impedance becomes too great at higher frequencies to maintain the supply voltage at the amplifier terminals when large current surges occur. Obviously it becomes necessary to supply the surge demands from a low impedance source such as a capacitor. It is best that the capacitors have a good Q and should be ceramic or mylar. Tantalum and other electrolytic capacitors tend to have too much inductance to be effective at very high frequencies. Nonetheless it is not uncommon to get acceptable decoupling through the judicious use of a parallel grouping of electrolytic and ceramic capacitors.

The value of capacitance needed can be approximated as follows:

$$I = C\frac{dV}{dt}$$

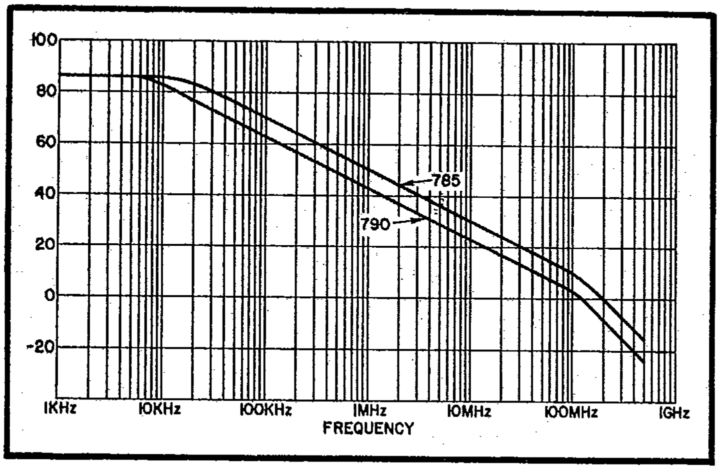
I = maximum instantaneous current into load (200 mA for 790 series)
dV = maximum ripple desired at power supply terminals (typically = 50 mV)
dt = time interval of transient state
C = to be determined

$$C = I\frac{dt}{dV} = 0.2A\frac{8nS}{50mV}$$

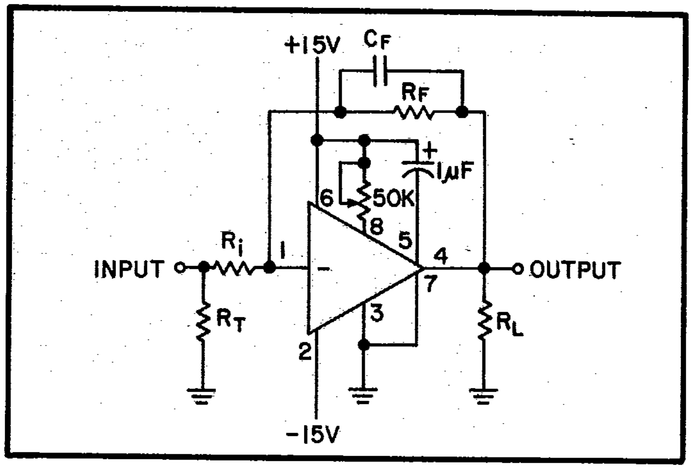
$$C = .032\mu f$$

If the maximum frequency of interest is 25 MHz, the dt ≈ 8nS

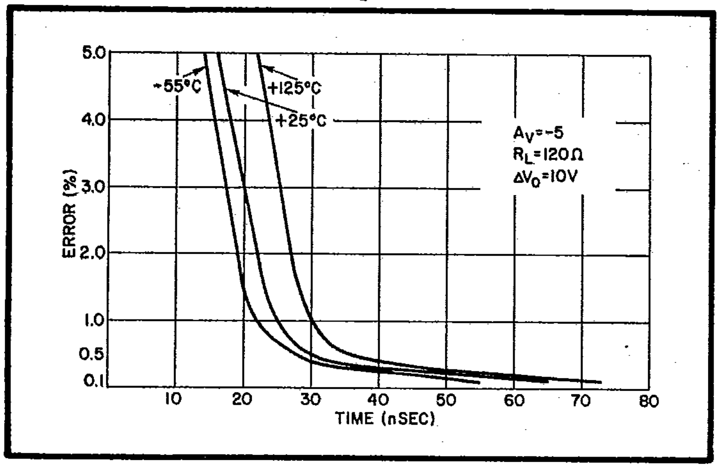
Open Loop Gain Plot



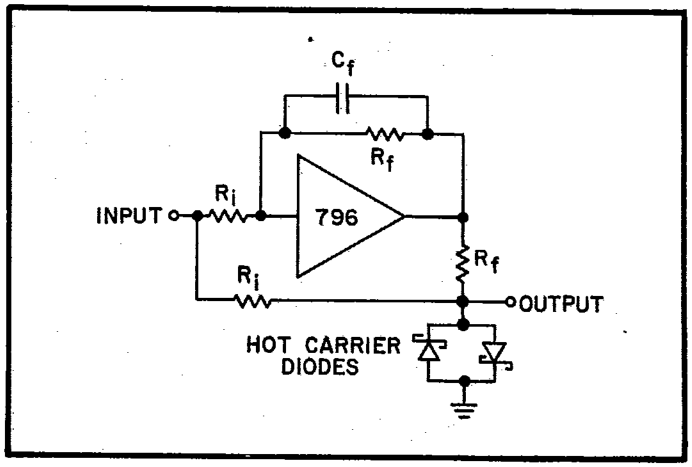
Typical Circuit



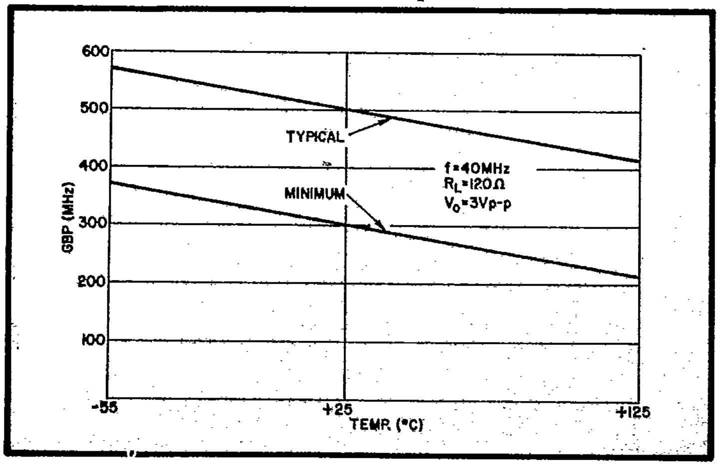
Settling Time Vs Temp



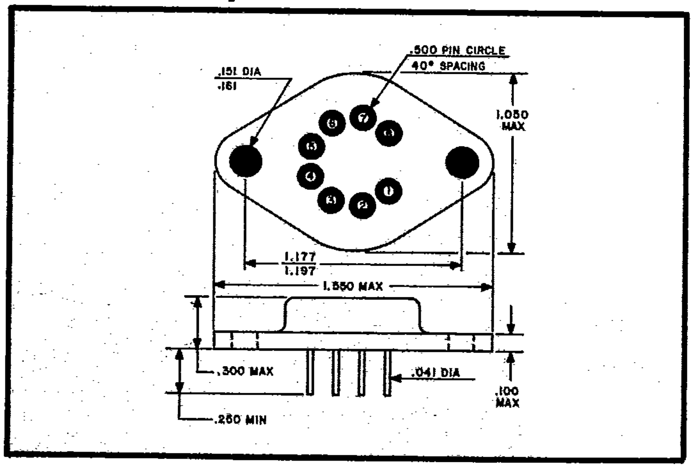
False Summing Junction Circuit



Gain-Bandwidth Vs Temp



Mechanical Specifications



BOTTOM VIEW

1. INPUT
2. −15 VOLTS
3. GROUND
4. OUTPUT
5. COMPENSATION POINT
6. +15 VOLTS
7. GROUND
8. BALANCE

Price 1-24

MSK 785, 786, 790	$125. ea.
MSK 785B, 786B, 790B	182. ea.
MSK 795, 796	150. ea.
MSK 795B, 796B	195. ea.

'B' suffix indicates MIL. STD. 883 Level 'B' Processing, Method 5008.

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