μA742

ZERO-CROSSING AC TRIGGER-TRIGAC

FAIRCHILD LINEAR INTEGRATED CIRCUITS

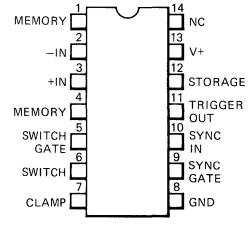
GENERAL DESCRIPTION – The μA742 is a monolithic Zero-Crossing AC Trigger (TRIGAC) utilizing the Fairchild Planar* Epitaxial Process. It is intended for use in ac power control circuits for operation directly off the ac line or with a separate ac or dc power supply. The TRIGAC functions as a threshold detector and a driver for triacs and SCR's. As a threshold detector, it senses level changes at the inputs and as a driver it supplies high energy pulses for thyristor triggering. The trigger pulses occur at the zero crossing of the load current and therefore minimize RFI generation for either resistive or inductive loads

- **DESIGNED FOR APPLICATIONS IN 60Hz TO 400 Hz AC POWER CONTROL SYSTEMS HAVING RESISTIVE OR INDUCTIVE LOADS**
- **OPERATES DIRECTLY FROM AN AC LINE OR FROM A DC SUPPLY**
- **INPUT COMPATIBLE WITH A WIDE RANGE OF SENSOR IMPEDANCES**
- **BRIDGE SENSING WITH ADJUSTABLE HYSTERESIS SET POINTS**
- **PROVISIONS FOR TIME PROPORTIONING OPERATION**
- **PROVIDES ZERO CROSSING THYRISTOR TRIGGERING FOR MINIMUM RFI**
- **EVEN NUMBER OF CONSECUTIVE HALF-CYCLE TRIGGERINGS FOR TRIACS AND INVERSE PARALLEL SCR's IN MOST APPLICATIONS**

ABSOLUTE MAXIMUM RATINGS

Peak Current into Supply Terminal (ac Operation)	±30mA
Continuous Current into Supply Terminal (dc Operation)	20mA
RMS Current into Sync Input Terminal	15mA
Current into Switch Terminal	10mA
Power Dissipation	670mW
Voltage at (+) or (–) Input Terminal	(Note 1)
Differential Voltage between (+) and (–) Input Terminals	±7V
Current into Clamp Terminal (Clamp ON)	20mA
Voltage at Clamp Terminal (Clamp OFF)	25V
Operating Temperature Range	0°C to +70°C
Storage Temperature Range	–65°C to +150°C
Pin Temperature	
Hermetic DIP (Soldering, 60 s)	300°C
Molded DIP (Soldering, 10 s)	260°C
Trigger Output Short-Circuit Duration (Note 2)	Continuous

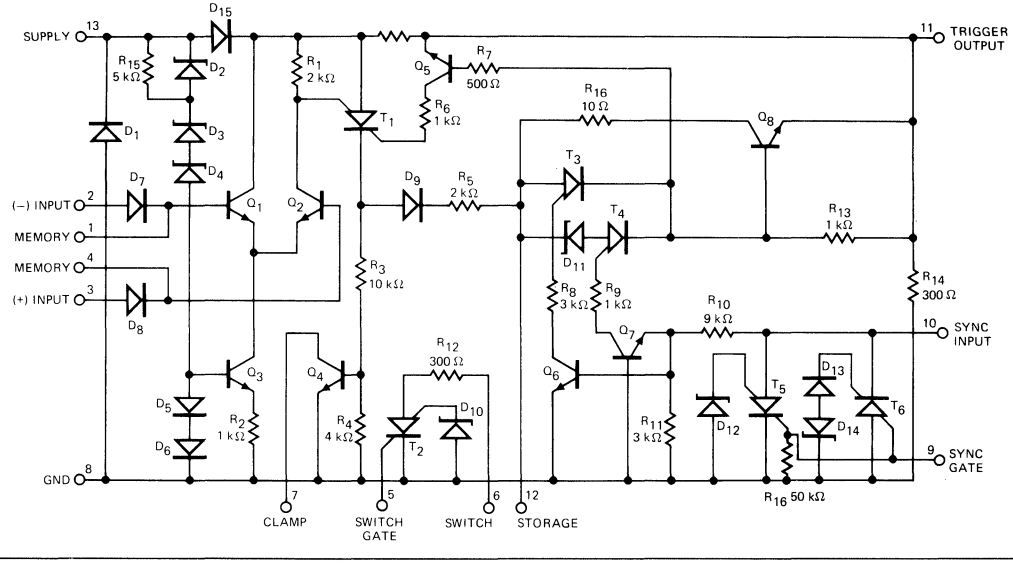
CONNECTION DIAGRAM
14-PIN DIP
(TOP VIEW)
PACKAGE OUTLINES 6A 9A
PACKAGE CODES D P



ORDER INFORMATION

TYPE	PART NO.
μA742C	μA742PC
μA742C	μA742DC

EQUIVALENT CIRCUIT



Notes on following pages.

*Planar is a patented Fairchild process.

μA742C

ELECTRICAL CHARACTERISTICS: $T_A = 25°C$, Voltage Range at the (+) and (–) Input Terminals 2.5V to 17V; $V_{(+)\ Input} - V_{(-)\ Input} \geq 50mV$, Test Circuit 1, unless otherwise specified.

CHARACTERISTICS	CONDITION	MIN	TYP	MAX	UNITS
Peak Supply Voltage	S_1 in dc position	19	21	26	V
	S_1 in ac position, positive half cycles of ac line	19	21	26	V
	S_1 in ac position, negative half cycle of ac line	-1.6	-0.95	-0.8	V
Peak Trigger Output Pulse	S_1 in ac position, beginning of positive half cycles	0.6	0.9		A
	S_1 in ac or dc position, beginning of negative half cycles	1.0	1.3		A
	S_1 in dc position beginning of positive half cycles	1.6	2.0		A
Bias Current at (+) and (–) Terminals			15	25	μA
Input Threshold Voltage for Output Pulse Enable		-50	-35	50	mV
ON Voltage at Clamp Terminal	$I_7 = 1$ mA		85	200	mV
ON Voltage at Switch Terminal	$I_6 = 5$ mA		2.6	3.0	V
Switching Voltage at Switch Terminal		6.0	7.2		V
Switching Current at Switch Terminal			15		μA
Holding Current at Switch Terminal			23	200	μA
ON Voltage at Sync Input Terminal	$I_{10} = 10$ mA		1.9	2.2	V
	$I_{10} = -10$ mA	-2.2	-1.9		V
Switching Voltage at Sync Input Terminal	$I_{10} = 2$ mA, positive half cycles, $V_{(-)\ Input} - V_{(+)\ Input} > 50$ mV	4.5	5.8		V
	$I_{10} = -2$ mA, negative half cycles, $V_{(-)\ Input} - V_{(+)\ Input} > 50$ mV		-7.0	-4.5	V
Sync Input Threshold Current for Trigger Output	Beginning of positive half cycles	180	410	500	μA
	Beginning of negative half cycles	-500	-280	-180	μA
Sync Input Threshold Voltage for Trigger Output	Beginning of positive half cycles	2.0	2.7	4.0	V
	Beginning of negative half cycles	-4.0	-3.3	-2.0	V

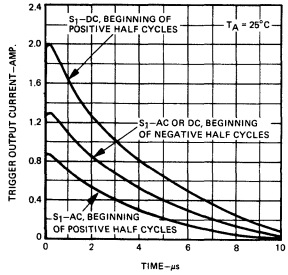
DEFINITIONS

VOLTAGE RANGE: The range of voltage on the (+) or (–) input terminals, which, if exceeded, could cause the TRIGAC to cease functioning.
BIAS CURRENT: The average of the two currents into the (+) and (–) input terminals.

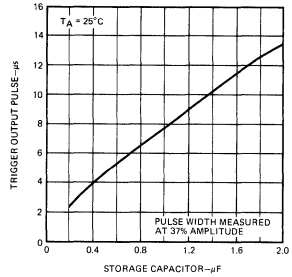
NOTES:
(1) The maximum voltage should not exceed the instantaneous supply voltage of the μA742.
(2) Rating applies for an external storage capacitor having a value of not more than 2μF.

TYPICAL PERFORMANCE CURVES FOR μA742C
(TEST CIRCUIT 1 UNLESS OTHERWISE SPECIFIED)

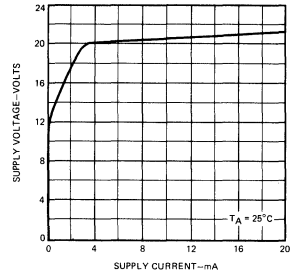
TRIGGER OUTPUT PULSE WAVE FORMS



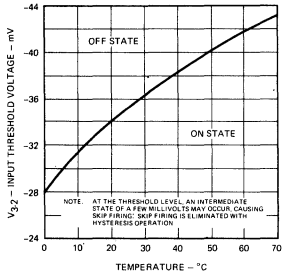
TRIGGER OUTPUT PULSE WIDTH AS A FUNCTION OF STORAGE CAPACITOR



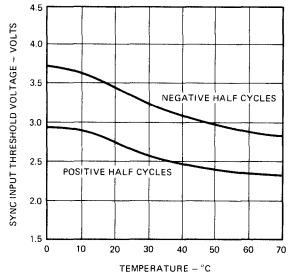
SUPPLY VOLTAGE AS A FUNCTION OF SUPPLY CURRENT



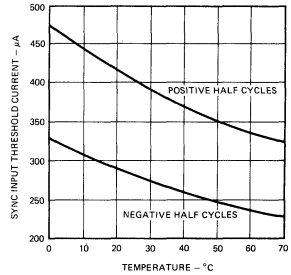
INPUT THRESHOLD VOLTAGE AS A FUNCTION OF TEMPERATURE



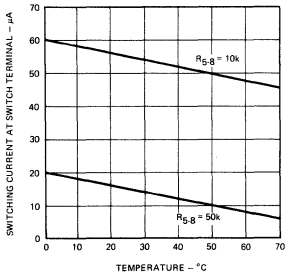
SYNC INPUT THRESHOLD VOLTAGE AS A FUNCTION OF TEMPERATURE



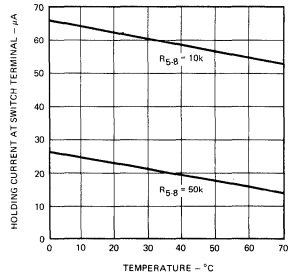
SYNC INPUT THRESHOLD CURRENT AS A FUNCTION OF TEMPERATURE



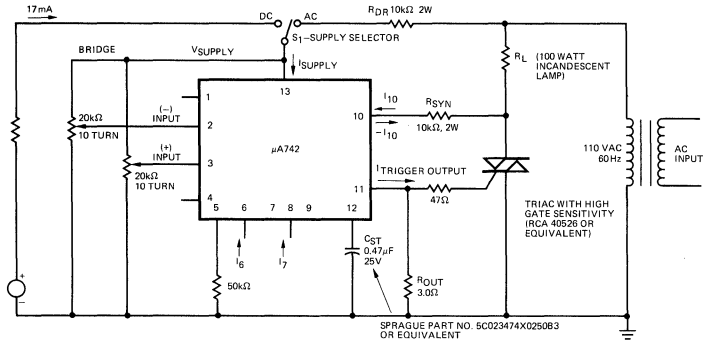
SWITCHING CURRENT AT SWITCH TERMINAL AS A FUNCTION OF TEMPERATURE



HOLDING CURRENT AT SWITCH TERMINAL AS A FUNCTION OF TEMPERATURE



TEST CIRCUIT 1



TYPICAL APPLICATIONS FOR μA742C

NOTES

*Recommended Values

AC Supply Voltage 60Hz Volts - RMS	R_{DR}	R_{SYN}	C_{ST}
24	1.0 kΩ	2.2 kΩ	0.47 μF/25V
110	10 kΩ	10 kΩ	0.47 μF/25V
220	22 kΩ	22 kΩ	0.47 μF/25V

FOR SUPPLY VOLTAGE FREQUENCY OF 400Hz REDUCE C_{ST} TO .047 μF/25 V.

**Necessary with inductive loads.

***The sensor resistance will determine the values of the bridge resistors. For the values of R_{DR} shown, the total current into the bridge should not exceed 5 mA at 20 V.

ZERO CROSSING CIRCUIT WITH DC SUPPLY

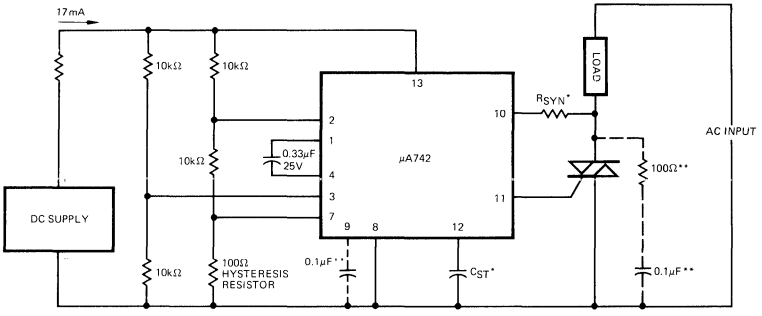


Fig. 1

ZERO CROSSING CIRCUIT

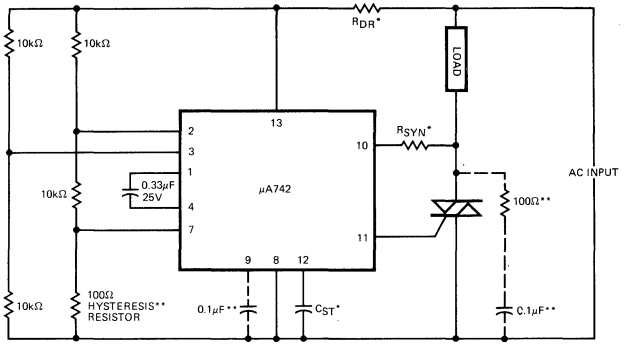


Fig. 2

TYPICAL APPLICATIONS FOR μA742 (Cont'd)

SCR – HALF WAVE

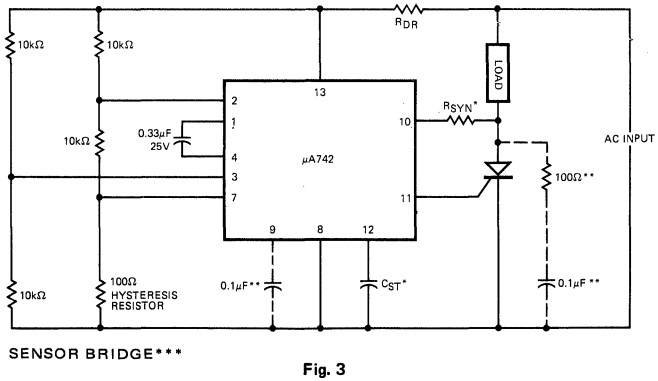


Fig. 3

INVERSE PARALLEL SCR PAIR FIRING WITH A PULSE TRANSFORMER

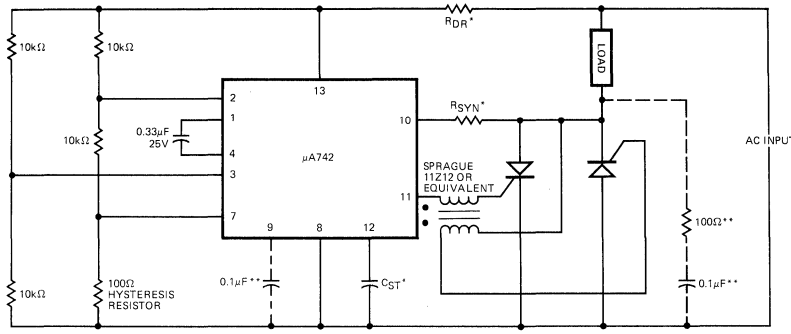


Fig. 4

INVERSE PARALLEL SCR PAIR FIRING WITH A THIRD SCR

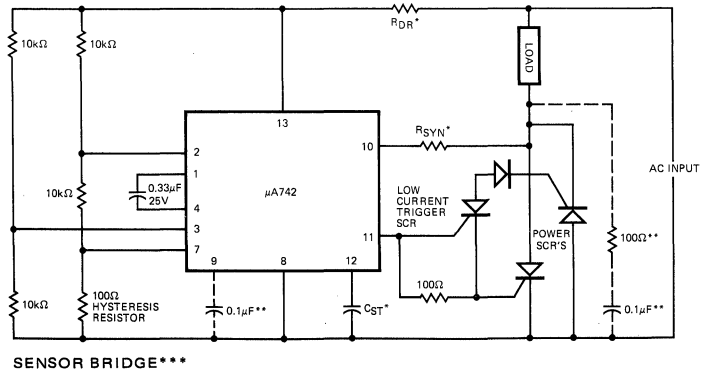


Fig. 5

TYPICAL APPLICATIONS FOR μA742 (Cont'd)

ZERO CROSSING WITH PROPORTIONAL CONTROL

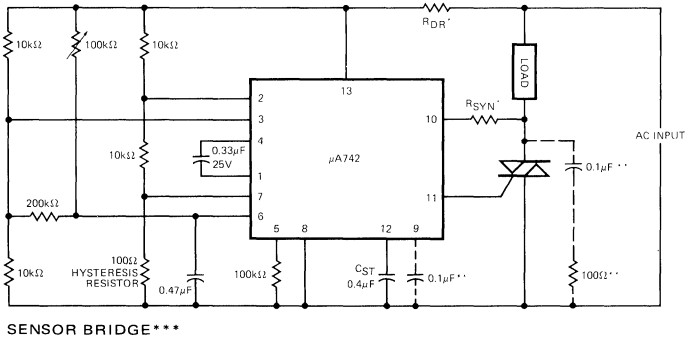


Fig. 6

ZERO CROSSING CONTROL CIRCUIT WITHOUT HYSTERESIS

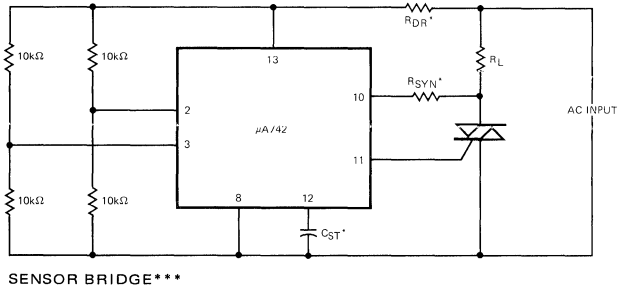


Fig. 7