

Model D160 3-phase power controller — The Digital/3

Design and Development

The all-digital Model D160 3-phase power controller was developed in direct response to the problems that manufacturers and users found with conventional analog control devices. Most of them react negatively to line noise, power fluctuations and phase rotation. In addition, the analog trigger mechanism easily becomes unbalanced over time. These conditions result in erratic voltage control and imprecise firing of SCRs, with a corresponding decline in productivity and product quality.

The engineers at IPC determined that the only way to overcome these problems was through the development of a new type of controller — one that relied entirely on the speed and precision of solid-state digital circuitry. The prototype work has been completed, and IPC units are now performing up to our high expectations in dozens of plants and shops. Manufacturing and qc procedures are now in place for volume production.

Basic Description

Three-phase digital circuitry utilizes all three phases for synchronizing the circuitry to the power line. This circuitry is not sensitive to phase rotation or line frequency, and is inherently immune to line notches and distortions. The result is precise balanced firing of all SCRs from 0° through 220° conduction, with elimination of drift and all adjustments associated with RC timing devices. The trigger is designed to hard-fire six SCRs in either a 3-phase AC configuration, or a bridge configuration through 200 amps.

Design Features

INPUT

240/480V $\pm 10\%$
3-phase 50/60 Hz

PROTECTION

DV-DT network
Subcycle I²T fuses
Voltage transient network
Overcurrent trip
Current limit

ISOLATION

2500V rms output to output and output to control potential; control circuit isolated by 2500V rms from incoming power line.

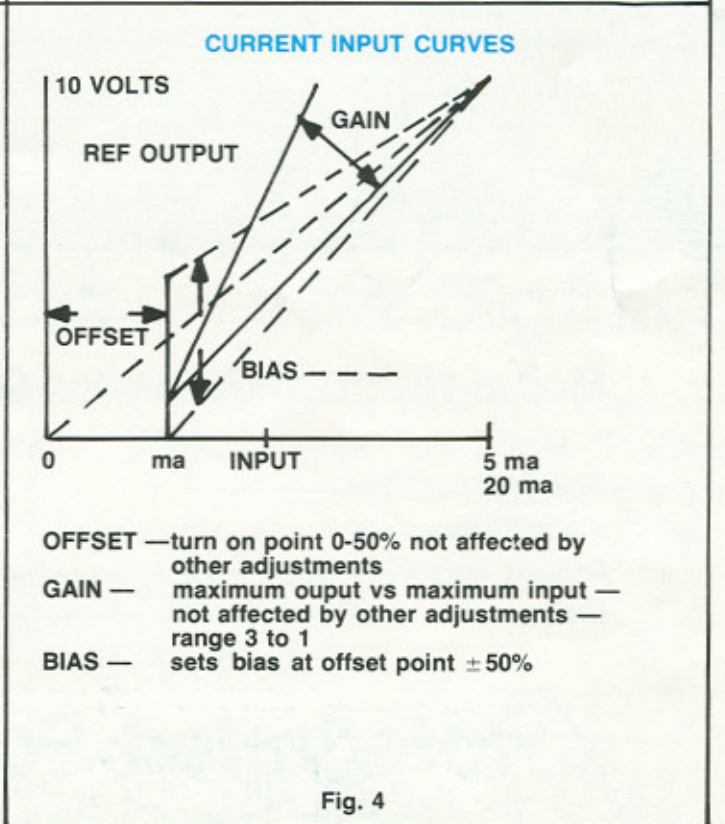
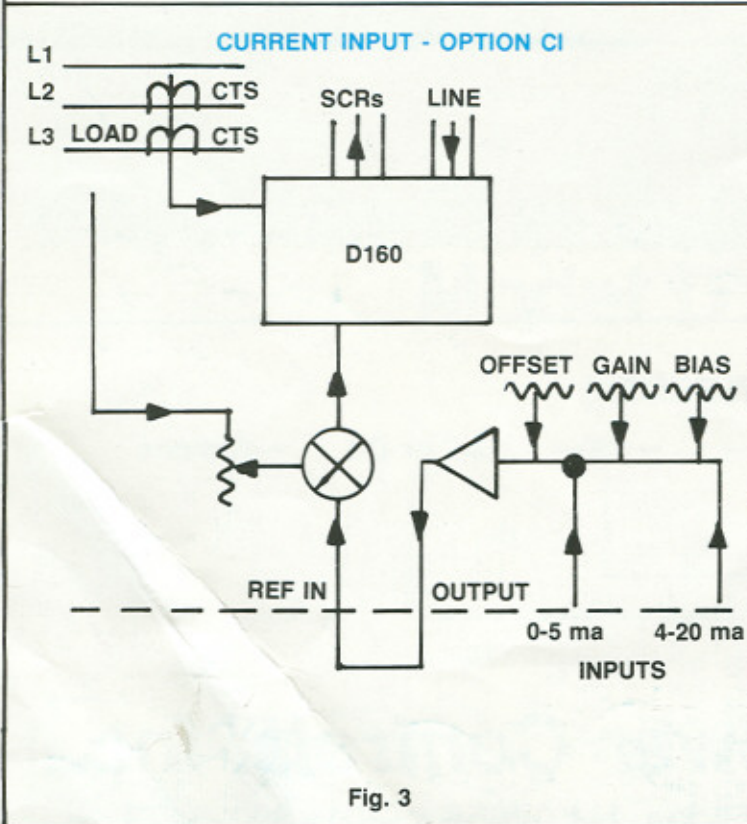
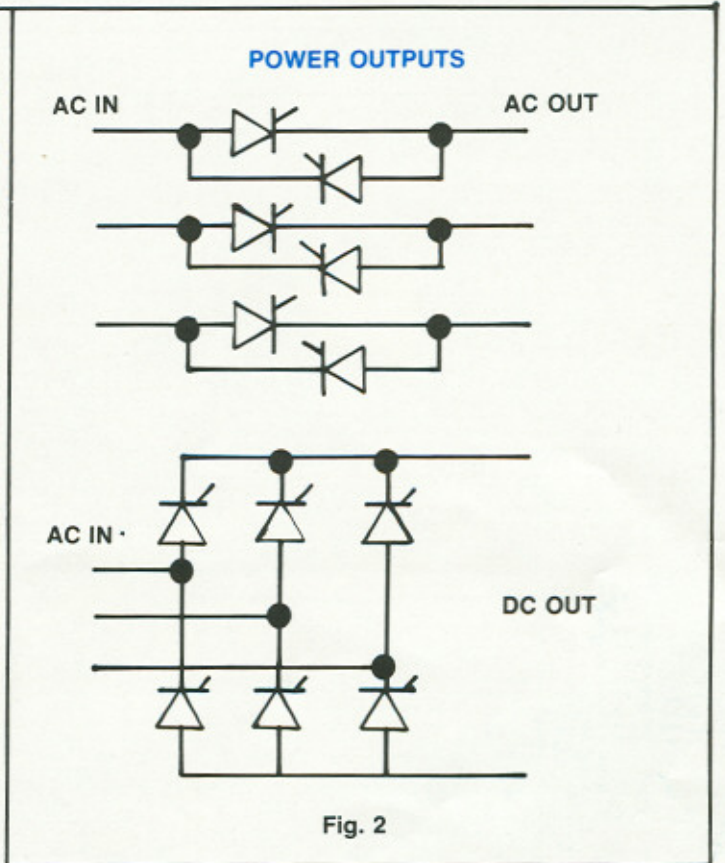
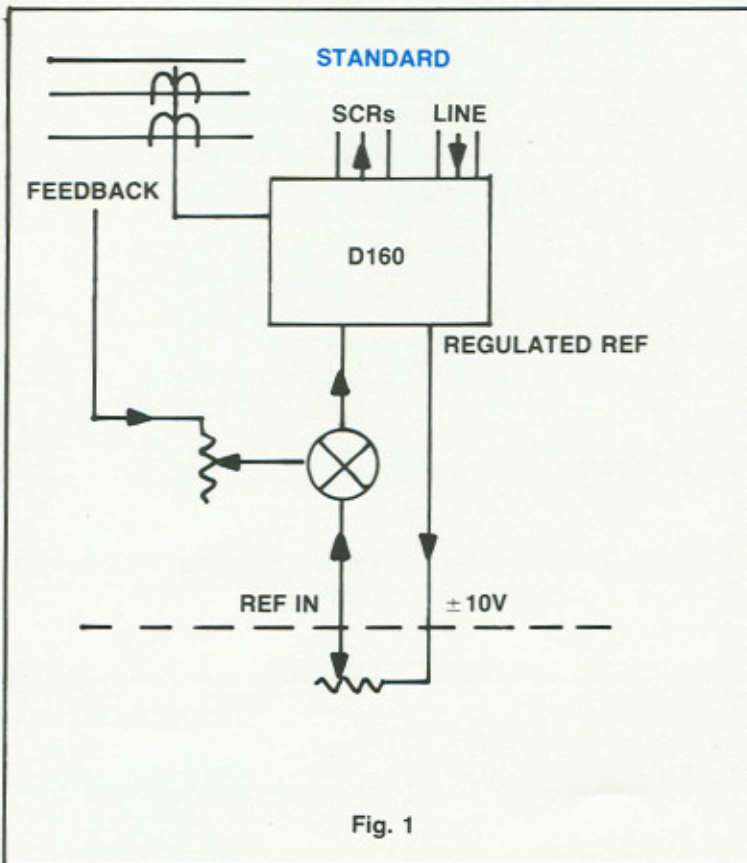
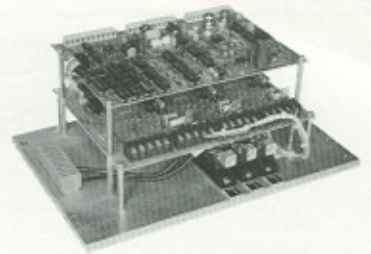
OPTIONS

Current input — Option CI 0-20 ma with offset, gain and bias
Offset relay — Option - CR2 — Trip Relay —
Option - CR1 —
Nonstandard reference input available.

Operating Features

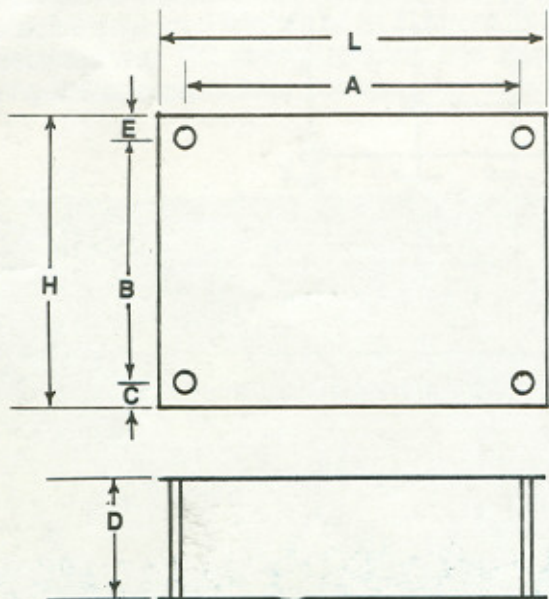
- Precision digital design
- 100% integrated circuits for better regulation and control
- Compact single control board, including all options
- Isolated firing board for all high voltage
- Regulated reference output +10.0V for 10K external potentiometer
- Reference input 0 to +10V
- Open or closed loop regulation .5% or better
- Feedback input for closed loop regulation
- Current limit and overcurrent trip circuit
- Hard SCR firing 1 amp PK with 150 ma back porch
- Full range 0 through 220° for 100% output
- Loss of phase protection

Examples of functional hook-up variations — The Digital/3



Specifications

INPUT VOLTS	240/480 (208-416) volts 3-phase 50/60 Hz $\pm 10\%$
AMBIENT TEMPERATURE RESPONSE	0° to 45°C full load
CLOSED LOOP REGULATION	16 MSC 0 to 220° conduction — damping specified for closed-loop operation.
CURRENT LIMIT REFERENCE IN	$\pm .5\%$ from ± 10 volt DC feedback signal. Drift less than .1%.
FEEDBACK INPUT	Adjustable 50 to 200%. Overcurrent trip set at 500%. 0 to ± 10 volts DC into 10K ohms input impedance. Regulated 10V 1ma output available for external 10K potentiometer.
GATE OUTPUTS	0 to 10 volts DC into 10K ohms input impedance. Input scaling potentiometer with adjustable range from 10V to 100V input.
OUTPUT RATINGS	Six isolated outputs to hard-fire up to 6 SCRs. Initial pulse rises to 1 amp in less than 500 nanoseconds with a back porch of 150 ma for the remainder of the cycle. 2500V rms isolation.
	15A, 30A, 60A, 100A, 200A/AC or DC bridge.



DIMENSIONS IN INCHES

	H	L	A	B	D	C	E
TRIGGER	9	14	13	6	5	1	2
15A Controller	9	13.6	13	6	6.75	1	2
30A Controller	9	13.6	13	6	6.75	1	2
60A Controller	16	21	20	15	12	.5	.5
100A Controller	16	21	20	15	12	.5	.5
200A Controller	16	21	20	15	12	.5	.5

MTG HOLES — $\frac{3}{8}$ " CLEAR