

INSTRUCTION MANUAL

For

MODEL EPOCH-IV®

**TIMER/DC SOURCE
AUXILIARY UNIT**

SERIAL NO.

It is essential that this instruction book be read thoroughly before putting the equipment in service.

APPRECIATION

We are indebted to those who have given their time and advice in the preparation of this instruction manual.

It is MULTI-AMP Corporation's goal to continually improve its products and services to its customers. To that end, we welcome any suggestions or contributions our customers would care to offer.

IMPORTANT

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TABLE OF CONTENTS

SECTION

THEORY OF OPERATION	1
DIGITAL TIMER OPERATIONS	1
CONTROL FUNCTIONS.....	1
OPERATING INSTRUCTIONS.....	3
POTENTIAL SWITCHING CIRCUIT.....	3
DC OUTPUTS.....	4
VOLTAGE SELECTION	4
CURRENT SECTION	5
TEST PROCEDURES	6
COMPENSATOR DISTANCE RELAY WESTINGHOUSE TYPE KD	6
TESTING BASLER SOLID STATE OVERCURRENT RELAY BE1-51	
WITH EPOCH-I/10 AND EPOCH-IV.....	8
TYPICAL TESTS FOR DC AUXILIARY RELAYS	10

THEORY OF OPERATION

DIGITAL TIMER OPERATIONS

CONTROL FUNCTIONS

This section of the instruction manual describes functions of all the controls, switches and binding posts associated with the use of the digital timer. The operating instructions give detailed instructions on the use of the timer in the following section.

POWER ON/OFF Switch	Used to energize the input of the EPOCH-IV.
TIMER Display	Indicates elapsed time.
TIMER RESET Button	Used to reset timer display to zero.
CYCLES/SECONDS Pushbutton	Selects mode of count, either cycles or seconds. SELECT Selection can be made during or after timing operation.
START/STOP Selector	<p>Two identical independent four-function start and stop Pushbuttons gates are provided. The left pushbutton is used to select the start gate operating mode while the right pushbutton is used to select the stop gate mode. The following modes are provided for both the start gate and the stop gate:</p> <ol style="list-style-type: none">Dry Contact Closure (NO). Timer starts or stops at the closure of a normally open contact or upon conduction through a semiconductor device such as an SCR, triac or transistor.Dry Contact Open (NC). Timer starts or stops at the opening of a normally closed contact or when conduction through a semiconductor device such as an SCR, triac or transistor is interrupted.Application of AC or DC potential (AC/DC APPLIED). Timer starts or stops when an AC potential (3-200 volts rms) or DC potential (5-300 volts) is applied.Removal of AC or DC potential (AC/DC REMOVED). Timer starts or stops when an AC potential (5-300 volts rms) or DC potential (5-300 volts) is removed.

START Binding Posts

Binding posts used for applying of start signal to start operation of timer.

STOP Binding Posts

The stop signal selected by the STOP selector switch is applied to these binding posts.

LATCHED ON/OFF

This four function pushbutton is used in conjunction with Pushbutton the START/STOP Pushbuttons and the START/STOP binding posts to control the starting and stopping of the counter.

START LATCH

When the START circuit is latched ON, the start latch allows timing to be initiated by any start gate and to be stopped only by the stop gate selected with the STOP selector pushbutton and applied at the STOP binding posts. When the START circuit is latched OFF, the start latch allows timing to be initiated by any start gate and to be stopped when the start gate is reversed (such as when timing the closing and opening of a single contact as in measuring the trip-free operating time of a circuit breaker).

STOP LATCH

When the STOP circuit is latched ON, the STOP latch allows timing to be stopped at the first operation of any stop gate (thus ignoring contact bounce, for example). When the STOP circuit is latched OFF, the STOP latch allows timing to be stopped by any stop gate and then restarted if the stop gate reversed (provided a start gate is still energized) and then again stopped when the stop gate is again energized.

OPERATING INSTRUCTIONS

1. Connect the EPOCH-IV to a suitable source of power.
2. Turn POWER ON/OFF Switch ON. The TIMER display should light.
3. Press the START selector pushbutton to the desired position for the start gate to be used.
4. Adjust the START LATCH ON/OFF Switch to the desired position. If it is desired to use a separate stop gate to stop operation of the TIMER, switch to the START LATCH ON mode. If it is desired to use the reversal of the START signal to stop the TIMER (For example, when timing the closing and opening of a single contact measuring the trip-free operating time of a circuit breaker), leave it in the LATCH OFF position.
5. When it is desired to use a separate stop gate signal to stop the TIMER, press the STOP selector to the desired position. Also press the stop LATCHED ON/OFF pushbutton to the desired position. If it is desired to have the TIMER stop upon the first stop signal only, switch the STOP LATCHED ON position. If it is desired to have the TIMER restarted if the stop signal reverses (as when measuring control bounce), leave in the STOP LATCHED OFF position.
6. Press the SELECT CYCLES/SECONDS pushbutton to the desired mode. If the seconds mode is used, the TIMER will start in the 00.0001 range. As time accumulates the TIMER will autorange up.
7. Make the necessary connections to the START and STOP binding posts.
8. When the appropriate start and stop signals are applied, the display indicates the elapsed time of the test.

POTENTIAL SWITCHING CIRCUIT

This circuit eliminates the numerous voltage circuit test lead changes required when testing the three-phase and phase-to-phase elements on distance relays such as the Westinghouse KD and SKD series of compensation distance relays.

1F, 2F and 3F Binding Posts

External potential input binding posts. See TEST PROCEDURES for connection to external test sources.

7, 8, and 9 Binding Posts

These binding posts are to be connected to the corresponding KD relay terminals 7, 8, and 9. See TEST PROCEDURES for connection diagrams.

Fault Test Pushbutton and 1-2, 2-3, and 3-1 LED's

This switch properly rotates the phase rotation of the output binding posts 7, 8, and 9. It is similar in operation to the FAULT TEST Switch in Westinghouse I.L. 41-490, page 45. The LED's indicate which phases are the intended faulted pair.

DC OUTPUTS

VOLTAGE SELECTION

VOLTS Display

This four digit LED display indicates the amplitude of the voltage output.

INCREASE and DECREASE

The four digit pushbuttons can increase or decrease the Pushbuttons voltage output. When in the low range (TAP 1), 0-48 volts, the first pushbutton on the left will increase the output voltage in 10 volt increments, the second, 1 volt, the third, .1 volts and the last pushbutton from the left, .01 volts. When the output exceeds 49.99 volts, the output will autorange to the 125V range (TAP 2) and the decimal point will move to show a display of 50.0 volts. At this point the pushbuttons will change by a factor of 10, i.e., the first pushbutton will now increment 100 volts, the second, 10, the third, 1, and the last, .1 volts. When the output exceeds 149.9 volts, the output will autorange to the 300V range (TAP 3), however, there will be no movement of the decimal point and the adjustment of the output voltage would be the same as the 125V range. The voltage output can be stepped by the operator by pressing, release, and pressing again; or by pressing and holding in the pushbutton, the output will automatically increment or decrement approximately two digits per second.

ON/OFF Switch and Lamp

This switch is provided for use in controlling the voltage output. In the OFF position, the lamp is not on and the red output binding post is open circuited. In the ON position, the voltage output is energized and the indicating lamp is ON.

300 VDC Red (+) Black (-) Binding Posts

Binding posts for the DC voltage output.

Error Indication and Alarm

Circuitry is provided to indicate when the voltage source is in error. When the error is detected, the amplitude display will flash, the alarm will sound and the output

channel will be automatically de-energized.

CURRENT SECTION

AMPERES Display

This four digit LED display indicates the amplitude of the current output.

INCREASE and DECREASE

The four digit pushbuttons can increase or decrease the Pushbuttons current output. In the low range (TAP 1), 0-1 AMP, the first pushbutton on the left will increase the output current in 1 amp increments, the second, .1 amperes, the third, .01 amperes and the last, .001 amperes. When the output exceeds 0.999 amperes, the output will autorange to the 5 AMP range (TAP 2). At this point, the only change will be in the last pushbutton to the right. It will now increment current output by .005 amperes instead of .001. The operator can step change the output by pressing, releasing and pressing again; or by pressing and holding in the pushbuttons, the output will automatically increment or decrement approximately two digits per second.

ON/OFF Switch and Lamp

This switch is provided for use in controlling the current output. In the OFF position, the red output binding post is de-energized and the lamp is not ON. In the ON position, the current output is energized and the indicating lamp is ON.

5 AMP DC Red (+) Black (-) Binding Posts

Binding posts for the DC current output.

Error Indication and Alarm

Circuitry is provided to indicate when the current source is in error. See discussion under Voltage Section.

TEST PROCEDURES

COMPENSATOR DISTANCE RELAY WESTINGHOUSE TYPE KD

Refer to the manufacturer's instructional literature for values of current, voltage and phase angles applicable to the relay under test, as these values will change with relay reach and model.

EQUIPMENT REQUIRED

Two Model EPOCH-I/10 Relay Test Sets
One Model EPOCH-IV Auxiliary Unit

ALWAYS REFER TO THE MANUFACTURER'S LITERATURE BEFORE TESTING

PRELIMINARY RELAY CONNECTIONS

1. Jumper relay terminals 12 to 19
2. Jumper relay terminals 14 to 16 to 18

NOTE: The terminals will remain jumpered throughout all tests.

THREE-PHASE REACH TEST

1. Interconnect the two EPOCH-I/10's with the EPOCH-IV as per Figure 1. Connect the EPOCH-IV terminals 7, 8, and 9 to the KD relay terminals 7, 8, and 9.
2. Connect the EPOCH-I/10 current output terminals to the KD relay terminals as shown in Figure 1.
3. Refer to page 50 of the EPOCH-I/10 instruction manual for step-by-step test procedure on the KD relay. Skip steps 3, 4, and 5 as the test lead connections should have already been completed.

PHASE-TO-PHASE REACH TEST

PHASE 1-2

1. Use the same test connections as for the three-phase tests with the exception of moving the current lead from relay terminal 18 to 15.
2. Refer to page 54 of the EPOCH-I/10 instruction manual for step-by-step test procedure.

PHASE 2-3

1. Switch the FAULT TEST Switch from 1-2 to 2-3 position.
2. Move the current leads from the EPOCH-I/10 to the KD relay terminals as per Figure 1.
3. Repeat test procedure for the Phase 1-2 read test as outlined on page 55 of the EPOCH-I/10 instruction manual.

PHASE 3-1

1. Switch the FAULT TEST Switch from 2-3 to 3-1 position.
2. Move the current leads from the EPOCH-I/10 to the KD relay terminals as per Figure 1.
3. Repeat test procedure for the phase 1-2 reach test as outlined on page 55 of the EPOCH-I/10 instruction manual.

**TESTING BASLER SOLID STATE OVERCURRENT RELAY BE1-51
WITH EPOCH-I/10 AND EPOCH-IV**

The following procedures outline typical tests performed on Basler Solid State OverCurrent Relays. Other solid state overcurrent relays can be tested using this procedure, only the relay terminal connections will differ.

ALWAYS REFER TO THE MANUFACTURER'S LITERATURE BEFORE TESTING

TYPES OF TESTS

Pick-Up
Time Delay Test
Target Test

PICK-UP TEST

The pickup test is conducted to determine the minimum operating current of the relay for any given tap value.

1. Connect the EPOCH-I/10 and IV test sets to a suitable source of power as indicated on the nameplates.
2. Turn POWER ON/OFF Switches ON.
3. Connect relay as shown in Figure 2.
4. Switch EPOCH-I/10 current channel ON/OFF Switch ON. Increase EPOCH-I/10 output until the relays' TIMING Indicator begins to glow. Read and record "pick-up" current.
5. Switch EPOCH-I/10 ON/OFF Switch OFF.

TIME DELAY AND TARGET TEST

1. Repeat steps 1 through 3 of pick-up test.
2. Set in the desired test current on the AMPERES output display by pressing the appropriate INCREASE pushbuttons.

NOTE: Depending on the desired value of test current; more than one EPOCH-I may be required to conduct a timing test. If so, refer to page 13 of the EPOCH-I/10 manual for instructions on parallel operation of two or more EPOCH-I/10's.

3. Press the current channel INITIATE Switch, the INITIATE Switch lamp should light. Switch the TIMER START Switch to the CURRENT start position.
4. Reset TIMER and initiate test set by pressing the Initiate control switch.
5. Test set should initiate and TIMER start. When the relay trip circuit contacts close, the TIMER should stop and the test set de-initiate.
6. Read and record time displayed.

TYPICAL TESTS FOR DC AUXILIARY RELAYS

TYPES OF TESTS

Pickup and Dropout
Timing Pickup

ALWAYS REFER TO THE MANUFACTURER'S LITERATURE BEFORE TESTING

EQUIPMENT REQUIRED

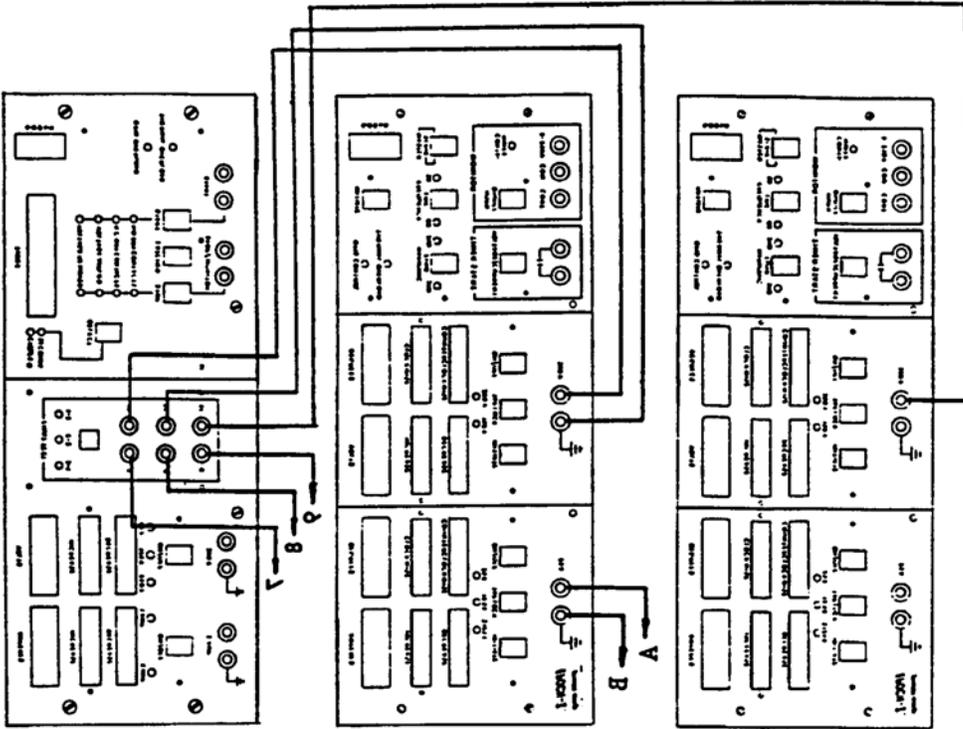
EPOCH-IV

TESTING PICKUP AND DROPOUT

1. Connect the EPOCH-IV to a suitable source of power. Make sure POWER ON/OFF Switch is OFF.
2. Connect relay operating coil terminals to the DC VOLTAGE OUTPUT binding posts.
3. Connect light leads from the relay trip circuit contact terminals to the TIMER START gate binding posts.
4. Switch POWER ON/OFF Switch ON. POWER ON light should glow. Press DC VOLTAGE Output ON/OFF Switch to ON.
5. Increase DC VOLTAGE output by pressing the appropriate pushbuttons until the relay trips and causes the digital TIMER to start.
6. Read pickup voltage on digital display. Record.
7. Decrease the DC VOLTAGE output until the relay trip contacts open and stops the digital TIMER.
8. Read and record dropout voltage shown on the DC Volts digital display.
9. Switch unit OFF.

TIMING PICKUP

- 1. Connect the EPOCH-IV to a suitable source of power. Make sure POWER ON/OFF Switch is OFF. Switch DC VOLTAGE ON/OFF Switch OFF.**
- 2. Switch the POWER ON/OFF Switch ON. POWER ON light should glow.**
- 3. Connect relay operating coil terminals to the DC VOLTAGE OUTPUT binding posts. Parallel light leads from the relay operating coil terminals to the TIMER START gate binding posts.**
- 4. Switch the digital TIMER START SELECTOR Switch to the AC/DC APPLIED position.**
- 5. Connect the normally open trip circuit terminals to the TIMER STOP gate binding posts. Switch the STOP SELECTOR Switch to the N.O. CONTACTS position.**
- 6. Switch the DC VOLTAGE ON/OFF Switch ON.**
- 7. Increase the DC VOLTAGE output until rated voltage is applied to the relay under test.**
- 8. Switch the DC VOLTAGE ON/OFF Switch OFF, and reset digital TIMER.**
- 9. Switch the DC VOLTAGE ON/OFF Switch ON. The TIMER should indicate the pickup time of the relay.**
- 10. Read and record time displayed. To retest, repeat steps 8 and 9.**



terminals 7, 8, and 9 to relay
 Connect Potential Leads from IV

1	0-0 3-1	V\11' B-13
2	0-0 5-3	V\12' B\11
3	0-0 1-5	V\13' B\12
4	30	V\13' B\18
No. 1 test lead	performed	Flow\10 connect

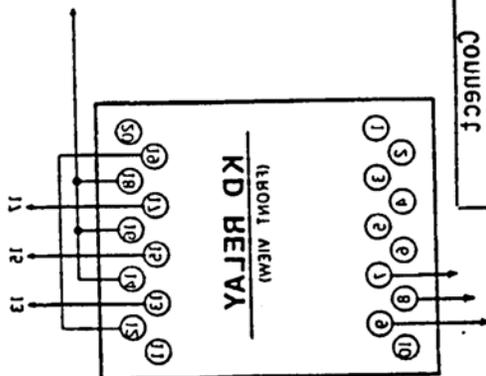
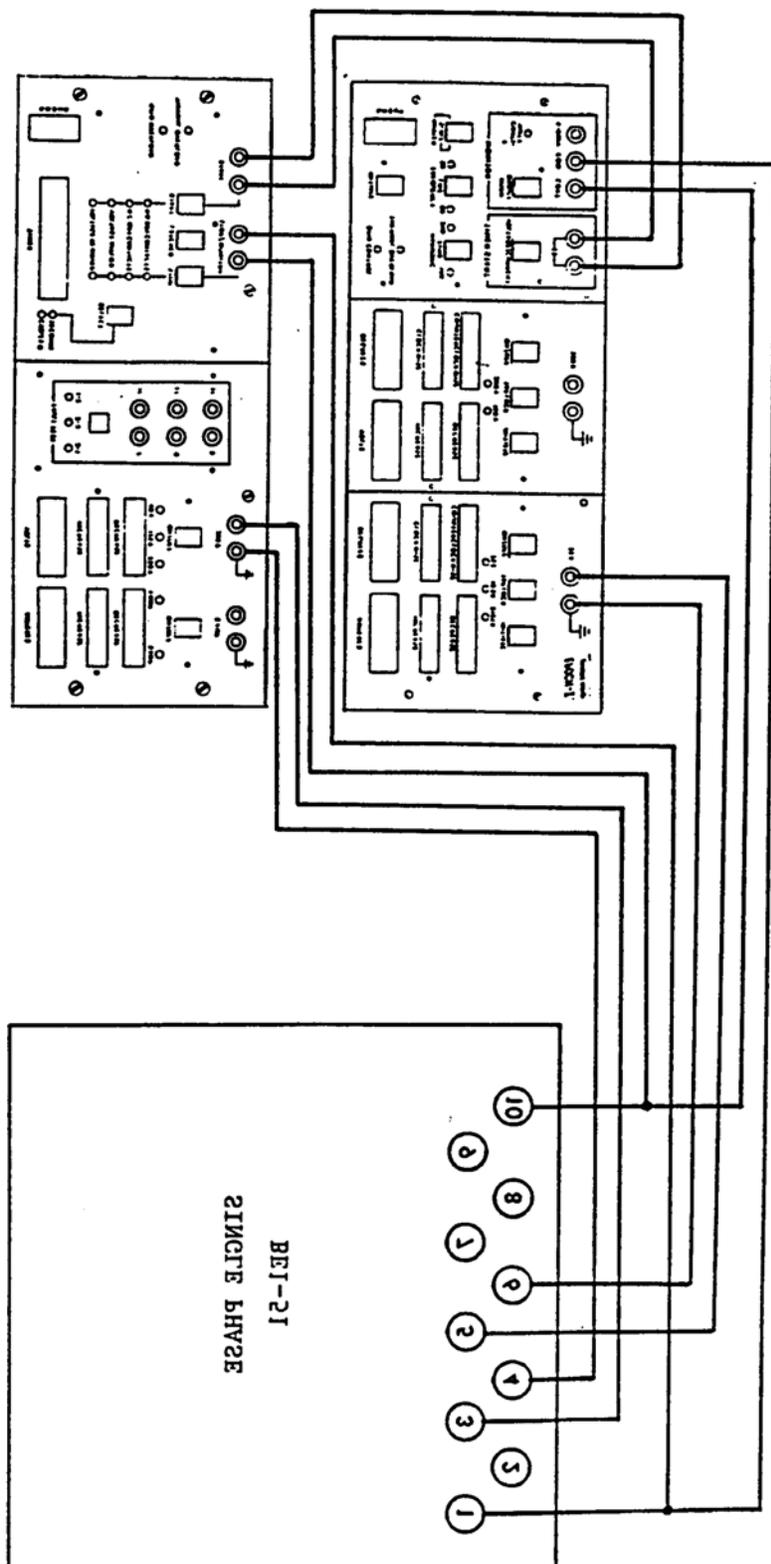
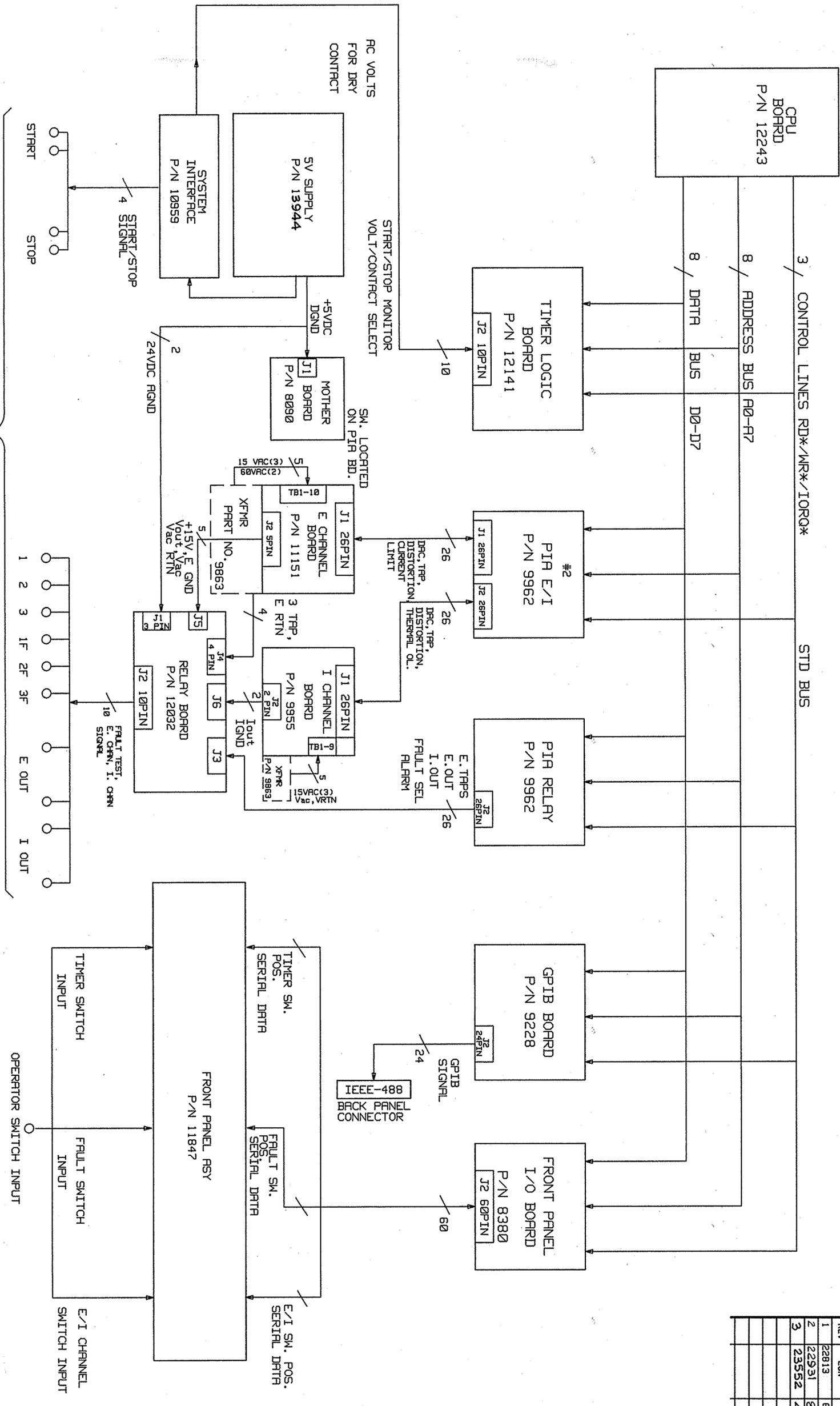


FIGURE 1



DWG. NO. 26684C			
REVISIONS			
REV	ECN	DATE	
1	22813	6/90	
2	22931	8/90	
3	23552	4/4/91	



TOLERANCE: UNLESS NOTED

2 PLACE DEC. +/-

3 PLACE DEC. +/-

FRACTIONS +/-

HOLE THRU .50 DIA. +/- .005

ANGLES +/- 0 DEG 30'

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DWG. NO. 26684C

REV. 3

TITLE: EPOCH 40 INTERCONNECT SCHEMATIC

DATE: 6-1-90

SCALE: NONE

SH. 1 OF 4

DWG. NO.		26684C	
REVISIONS			
REV	ECN	DATE	
1	22813	5/90	
2	22931	8/90	

multi-amp CORPORATION
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TOLERANCE: UNLESS NOTED

2 PLACE DEC. +/-
 3 PLACE DEC. +/-
 FRACTIONS +/-
 HOLES THRU .50 DIA. +/-
 ANGLES +/- 0 DEG 30'

DWN. TP	APPD.	SCALE NONE
CHKD.	DATE	SH. 4 OF 4
TITLE EPOCH 40 INTERCONNECT SCHEMATIC		
PART NO.	DWG. NO.	REV.
	26684C	3

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