

## ELECTRICAL CHECKOUT OF A SOLID STATE CONTACTOR

Hook-up all the cables from the Bias Supply control unit test fixture (photo #1), to the solid state contactor control unit, except for J1 and J2. Use a separate cable to go from J2 of the control unit to the "SCR DIRECT" connector on the solid state contactor. This cable is stored in the back of the rack in which the test fixture is mounted. (See Photos #2 and #3.)

On the "Bias Supply Control Unit Test Fixture" put the POWER ON/OFF switch in the on position. The three red LED's for "480 3 PHASE ABSENT" and "PHASE ROTATION INCORRECT" will light.

On the Solid State Contactor Control Unit, the green "SOLID STATE CONTACTOR" open LED will be on, and also the red "FAULT TRIP" LED will be on. Make sure the "LOCAL/REMOTE" switch is in the "LOCAL" position on the control unit. Press the RED pushbutton for "24V/50 KHz SUPPLY", the two red LED's for "24V" and "50 KHz" will light.

Back on the Control Unit Test Fixture panel, there is a switch labeled "480 V 3 PHASE CONNECT / SIMULATED", if it is in the "SIMULATED" position, flip it up to "480 V 3 PHASE CONNECT". If the switch is in the "480 V 3 PHASE CONNECT" position toggle it down and back up again, this will light the three neon lamps for "PHASE A, B, and C" on the control unit, and the "PHASE ROTATION INCORRECT" LED on the control unit test fixture will go out.

On the Solid State Contactor Control Unit press the black "FAULT TRIP" reset button. The "FAULT TRIP" LED will go off, and the two "480 3 PHASE ABSENT" LED's will go out on the test fixture panel.

Connect up the two large cables from the "SOLID STATE CONTACTOR SCR TESTER" (See photo #4) across one of the direct SCR packages. (See photo #5 to determine which SCRs are direct or step-start). Connect the RED lead to the AC INPUT side of the SCRs. IT WILL BE THE SIDE THAT HAS THE LARGE JUMPER CONNECTED TO IT. (See photo #6). THE OTHER LEAD GOES TO THE OTHER SIDE OF THE SCRs.

Connect the BNC cable, coming from the two large cables, to a scope. Set the scope up to read an AC sine wave, 5v/div, 5ms/div, and line trigger.

On the SCR tester make sure the Variac is turned fully counter-clockwise. Flip up the switch on the tester and **slowly** turn the Variac clockwise while watching the X10 ammeter. You should have no current draw on the ammeter. If you have a shorted or a SCR breaking down you will start to draw current. **STOP** and replace any bad SCR in the package. If all is ok you will have the Variac fully clockwise and see a 35 volt sine wave on the scope. (See photo #7). Now that you are sure you have no bad SCR in this package, turn the Variac fully counter-clockwise, back down to no output. Change your scope setting to 1 volt / div. **Leave the "SCR TESTER" power switch on.**

On the solid state contactor control unit, press the red solid state contactor "CLOSED" button. The red "CLOSED" LED will light. At this point you can check to see if all 6 direct lamps, located on the boards inside the contactor, are lit. (See photo #8 for their location) Replace any bad bulbs. (They are # 2180)

Next, **SLOWLY** turn the Variac clockwise while watching the X10 ammeter. Set the current for a full scale reading of 100 amps. You should have a clipped sine wave of approximately 2 to 3 volts peak to peak on the scope. (See photo #9).

**CAUTION: DO NOT LEAVE THE CONTACTOR CLOSED VERY LONG, AS THE SCR PACKAGES ARE NOT BEING COOLED AT THIS TIME.**

Repeat this procedure for the other two direct packages.

Change the input cable on the solid state contactor from the "DIRECT" to the "STEP-START" connector, and perform the same checkout for the three pair of "STEP-START" SCRs. Don't forget to check the step-start lamps. Check all connections, hook up water and check for leaks. All done!

**BIAS SUPPLY  
TEST RACK**

**BIAS SUPPLY CONTROL UNIT TEST FIXTURE**

LOCAL INPUTS	LOCAL STATUS	REMOTE STATUS
• BERT REGULATOR OUT	•	• 24 VOLTS ON
• RECTIFIER TRANSFORMER OUT	•	• 0 VOLTS ON
• CHARGE OUT	•	• LOCAL
• BULK ON 1 10K OUT	•	• REMOTE
• DRIVER ON 10K OUT	•	• CONTACTOR CLOSED
• BERT REGULATOR ON	•	• 500 AMP OUT
• DC OUTPUT OUT	•	• 400 24 AT OUT
• DFR AT 0.1	•	
• DRIVER AC 0	•	
• CONTROL POWER AC 0	•	
• WINDING FULL	•	
• 5000 RPM	•	
• LOW LOW 95	•	
• NEW LOW TOWER	•	
• 400 24 1000/1	•	
• 4 ROTATION ACCURATE	•	

ARM 24 CONNECT  
UNLOCKED

DC FREQ  
STEP-START

POWER  
ON

REMOTE CONTROL  
DRIVE  
RESET

12A CALIBRATE  
100A  
200A  
300A  
400A  
50V

500 OUT CALIBRATE  
500V  
1000V  
2000V  
50V



500 AMP SOLID STATE CONTACTOR CONTROL UNIT

500 AMP SOLID STATE CONTACTOR CONTROL UNIT



500 AMP SOLID STATE CONTACTOR CONTROL UNIT

**PHOTO #1**





REAR OF THE SOLID STATE  
CONTACTOR CONTROL UNIT.

J1

SCR/R



J2

SCR/D



CABLE TO SOLID  
STATE CONTACTOR.

J3

SCR O/T

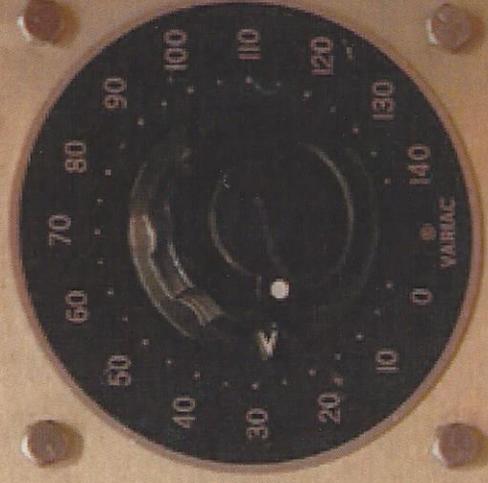


PHOTO #3

READY	STEP-START	LOCAL	30 KHZ INHIBIT	PA R.V. READY
ON	SELECT	REMOTE	AIR FLOW	CEOWMAY READY
OFF	OUTPUT CONTROL	+3 VDC	WATER FLOW	DEADMAN DROP
RESET	CONNECT	-15 VDC	EXT INTERLOCK/DOORS	480V 3Ø BEK TRIP
	A	+24 VDC	XFORMER OUT DC 0V	3Ø KHZ INHIBIT
	B	10 KHZ	CEOWMAY FIBER	AIR FLOW
	OPEN		DC 0/1	WATER FLOW
			AC 0/1	EXT INTERLOCK/DOORS
			AC 0/1	XFORMER OUT DC 0V
			POWER	CEOWMAY FIBER
			ON	DC 0/1
			OFF	AC 0/1

SOLID STATE CONTACTOR CONTROL UNIT TEST FIXTURE

SOLID STATE CONTACTOR  
SCR TESTER



Set for 100 steps with 500's grid on.

PHOTO #4

STEP-START

DIRECT

STEP-START

DIRECT

STEP-START

DIRECT

PHOTO #5

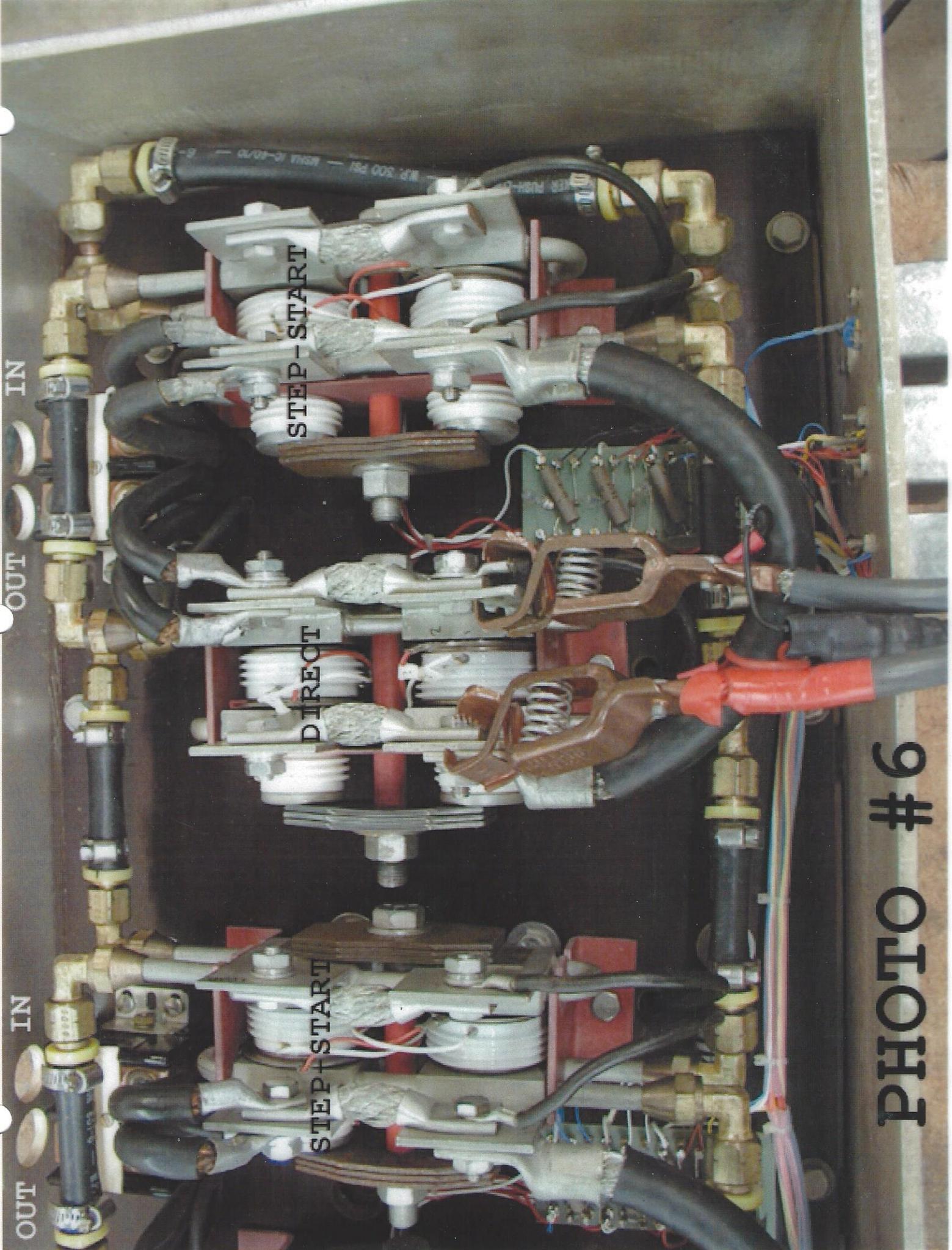
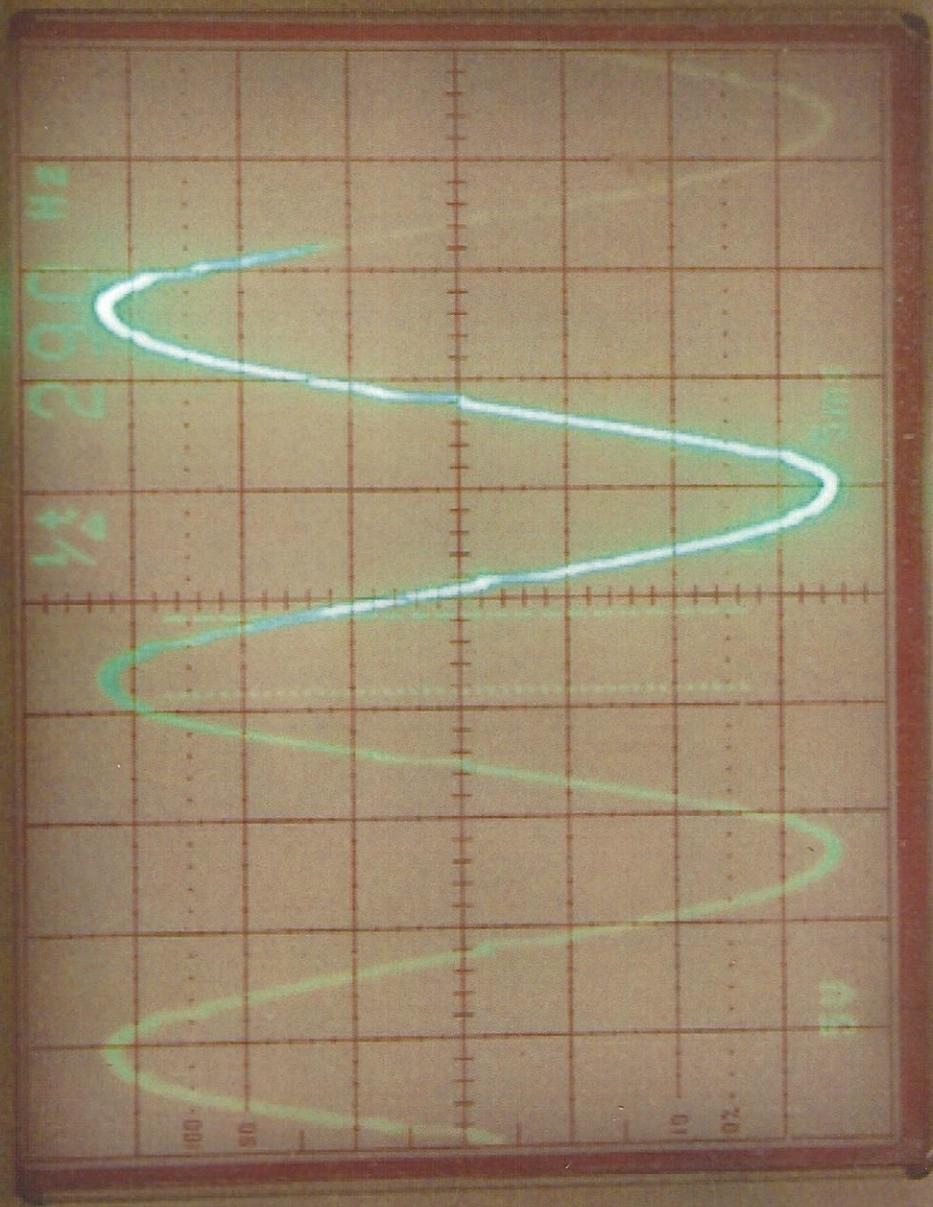


PHOTO #6

Tektronix 2465A 350MHz OSCILLOSCOPE

# VARIAC FULLY CLOCKWISE



# PHOTO #7

SETUP

STEP/ POSITION  AUTO

SAVE HELP  RECALL HELP

CH 1 CH 2

ADD INVS

VOLTS/DIV

5V

VAR V

PUSH BOT

AC GND DC GND DC

1MΩ 50Ω

CH 1 OR  1MΩ 15pF ≤ 400Vpk

INTENSITY BLANK

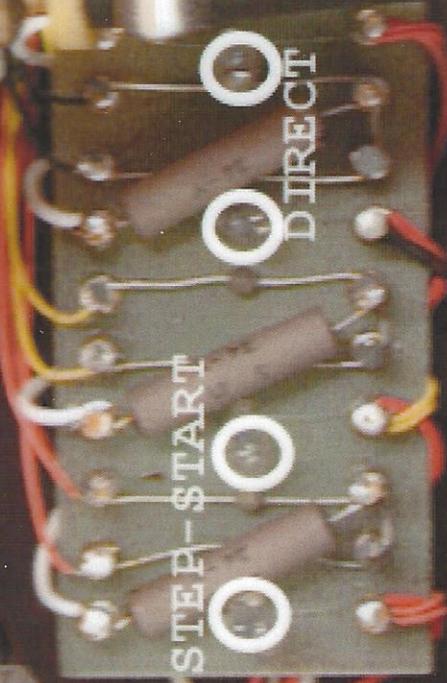
FOCUS TRACE

READOUT INTENSITY OFF

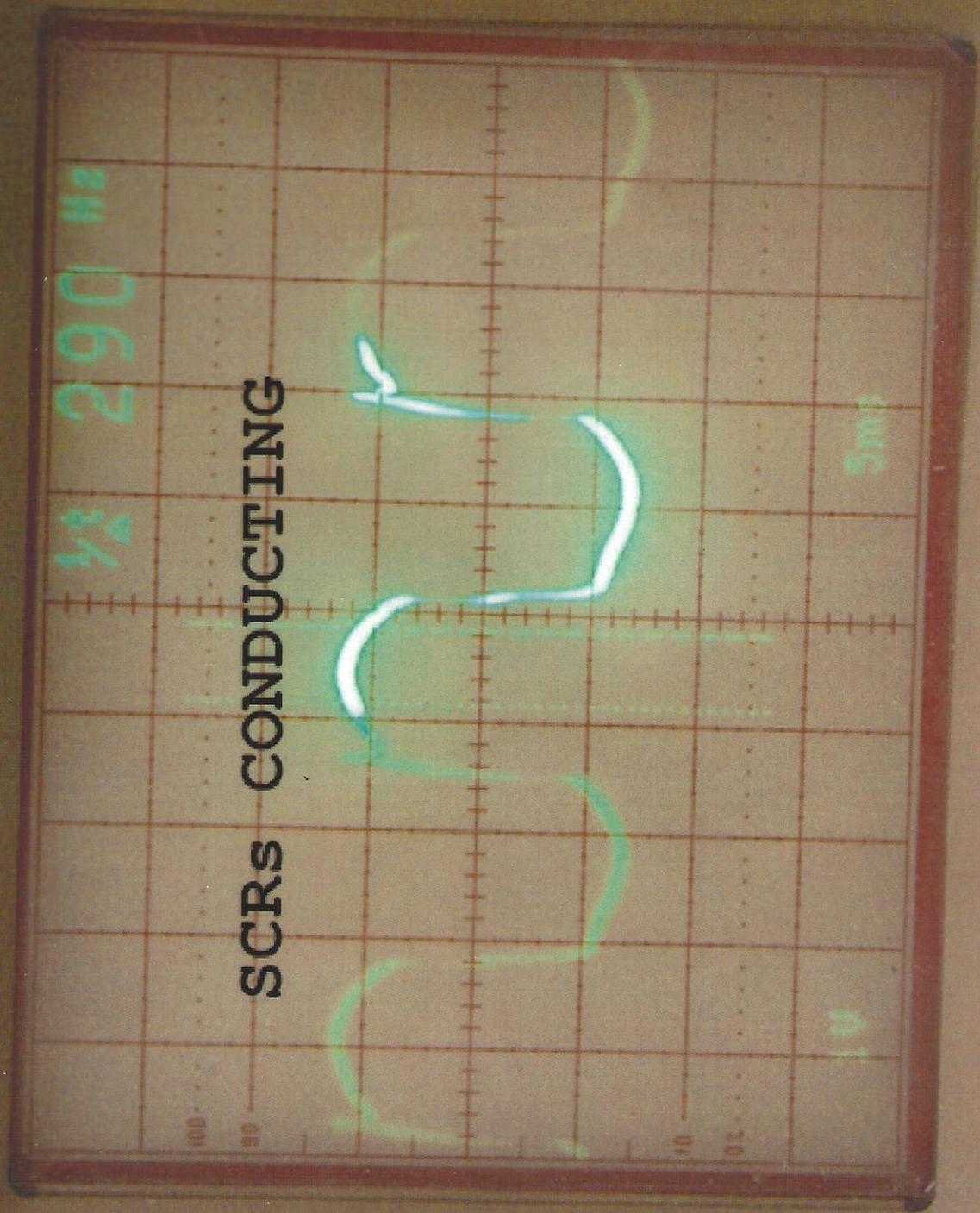
SCALE ILLUM ON

POWER ON

PHOTO #8



Tektronix 2465A 350MHz OSCILLOSCOPE

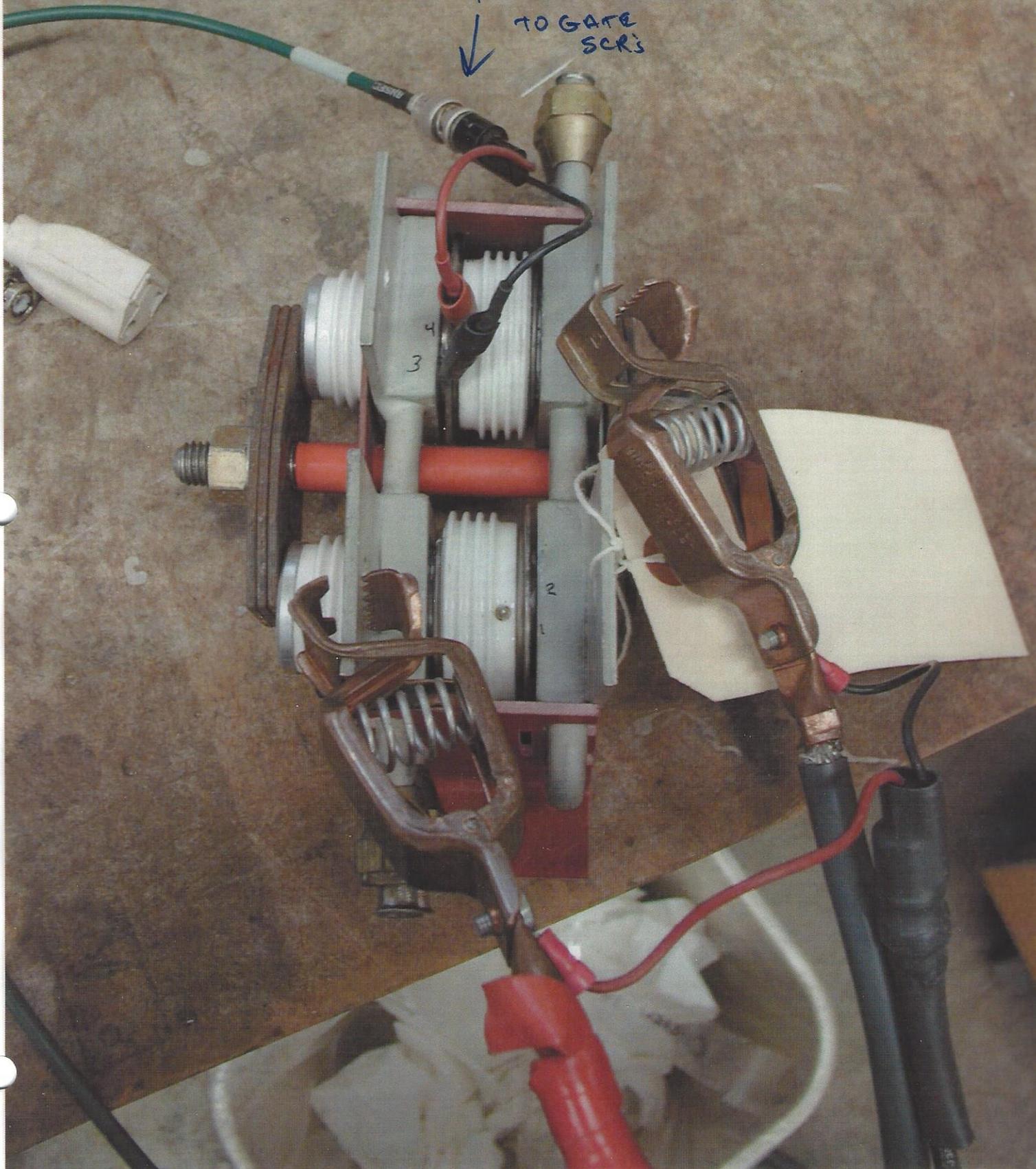


SCRS CONDUCTING

PHOTO #9

TESTING OF A  
SINGLE SCR PACKAGE.

+2V DC  
↓ TO GATE  
SCR'S



11/13/18  
R. Pfaff

### Solid State Contactor Checkout Sheet

S/N 19

Phase	No current at 100 V (Contactor OPEN)	Voltage @ 100 Amps (Contactor CLOSED)	
A		Step Start	
	✓	-	-1.8 v
	✓	+	1.5 v
		Direct	
	✓	-	-1.5 v
	✓	+	1.4 v
B		Step Start	
	✓	-	-2.0
	✓	+	2.0 v (spikes up to 3v)
		Direct	
	✓	-	-1.7 v
	✓	+	1.6 v (spikes to 2.4 v)
C		Step Start	
	✓	-	1.8 v
	✓	+	-1.9 v
		Direct	
	✓	-	-2.0 v
	✓	+	1.9 v

Leak Checked	✓
Lamps Lit	✓