

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8304180392 DOC. DATE: 83/04/15 NOTARIZED: NO DOCKET #  
 FACIL: 50-361 San Onofre Nuclear Station, Unit 2, Southern California 05000361  
 50-362 San Onofre Nuclear Station, Unit 3, Southern California 05000362  
 AUTH. NAME AUTHOR AFFILIATION  
 DIETCH, R. Southern California Edison Co.  
 RECIP. NAME RECIPIENT AFFILIATION  
 DENTON, H. R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards "Reactor Trip Breakers," providing technical & programmatic aspects of 830301 & 08 surveillance test failures, superseding 830413 nept. Handouts from 830412 meeting encl.

DISTRIBUTION CODE: B001S COPIES RECEIVED: LTR L ENCL 63 SIZE: 37+73  
 TITLE: Licensing Submittal: PSAR/FSAR Amdts & Related Correspondence

NOTES: J Hanchett 1cy PDR Documents, ELD Chandler 1cy. 05000361  
 NRR Scaletti 1cy.  
 J Hanchett 1cy PDR Documents, ELD Chandler 1cy. 05000362

RECIPIENT ID CODE/NAME	COPIES LTR ENCL	RECIPIENT ID CODE/NAME	COPIES LTR ENCL
NRR/DL/ADL	1 0	NRR LB3 BC	1 0
NRR LB3 LA	1 0	ROOD, H, 01	1 1
INTERNAL: ELD/HDS2	1 0	IE FILE	1 1
IE/DEPER/EPB 36	3 3	IE/DEPER/IRB 35	1 1
IE/DEQA/QAB 21	1 1	NRR/DE/AEAB	1 0
NRR/DE/CEB 11	1 1	NRR/DE/EHEB	1 1
NRR/DE/eqB 13	2 2	NRR/DE/GB 28	2 2
NRR/DE/HGEB 30	1 1	NRR/DE/MEB 18	1 1
NRR/DE/MTEB 17	1 1	NRR/DE/SAB 24	1 1
NRR/DE/SGEB 25	2 2	NRR/DHFS/HFEB40	1 1
NRR/DHFS/LQB 32	1 1	NRR/DL/SSPB	1 0
NRR/DSI/AEB 26	1 1	NRR/DSI/ASB	1 1
NRR/DSI/CPB 10	1 1	NRR/DSI/CSB 09	1 1
NRR/DSI/ICSB 16	1 1	NRR/DSI/METB 12	1 1
NRR/DSI/PSB 19	1 1	NRR/DSI/RAB 22	1 1
NRR/DSI/RSB 23	1 1	REG FILE 04	1 1
RGN5	3 3	RM/DDAMI/MIB	1 0
EXTERNAL: ACRS 41	6 6	BNL (AMDTs ONLY)	1 1
DMB/DSS (AMDTs)	1 1	FEMA-REP DIV 39	1 1
LPDR 03	1 1	NRC PDR 02	1 1
NSIC 05	1 1	NTIS	1 1

NOTES: 3 3

10 Cys Advance H. Rood

TOTAL NUMBER OF COPIES REQUIRED: LTR 57 ENCL 50

*Southern California Edison Company*



P. O. BOX 800

2244 WALNUT GROVE AVENUE

ROSEMEAD, CALIFORNIA 91770

ROBERT DIETCH

VICE PRESIDENT

TELEPHONE

213-572-4144

April 15, 1983

Mr. H. R. Denton  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Gentlemen:

Subject: Docket Nos. 50-361 and 50-362  
San Onofre Nuclear Generating Station  
Units 2 and 3

SCE met with the NRC staff on April 12, 1983 in Bethesda, Maryland to review the technical aspects of the March 1 and 8, 1983 surveillance test failures of the San Onofre Units 2 and 3 reactor trip breaker (RTB) undervoltage trip devices. By letter dated April 13, 1983, SCE transmitted a report relative to the technical aspects of the RTB discussed during the April 12, 1983 meeting and committed to provide additional information regarding the programmatic aspects of this issue.

Consistent with this commitment, enclosed please find sixty three (63) copies of the Reactor Trip Breaker report for San Onofre Units 2 and 3. This report provides information on both the technical and programmatic aspects relative to the RTB's. The comparable technical sections of this report are essentially unchanged from the information submitted on April 13, 1983; however, to the extent that these two reports differ, the report transmitted by this letter supersedes the report previously transmitted on April 13, 1983.

Also enclosed is a copy of the handouts which were used during the April 12, 1983 meeting.

Please contact me if you have any questions or comments.

Very truly yours,

*Robert Dietch*

cc: Mr. John Martin, Regional Administrator NRC Region V

*13001*  
*1/63 - Reactor Trip Breakers*  
*1 - Meeting Handout*  
*10cys Advance H. Road*

B304180392 B30415  
PDR ADDCK 05000361  
PDR

ENCLOSURE TO  
SCE TO NRC LETTER DATED APRIL 15, 1983  
FROM R. DIETCH TO H. R. DENTON

The following paragraphs of the enclosed April 15, 1983 Reactor Trip Breaker Report contain changes other than editorial changes from the technical portion of the RTB report provided by SCE's letter dated April 13, 1983:

III.B.2.d

The fourth sentence was corrected to reflect the fact that when the breaker is installed in the "test" position (not "racked out" as indicated previously), the diode is in the UV coil circuit.

IV.D.3.b.6)

Change provides clarification of the intent of the maintenance procedure.

IV.D.4

Paragraph was reworded to clarify intent.

V.A.3

The third paragraph was revised to be consistent with discussion provided in Section IV.D.3.b.6).

VI.A.4

Paragraph was reworded to clarify description of shunt coil performance.

ENCLOSURE

REACTOR TRIP BREAKERS

San Onofre Units 2 and 3

April 12, 1983 Meeting Handouts

MEETING WITH NRC  
SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3  
REACTOR TRIP CIRCUIT BREAKERS  
April 12, 1983

- I. Introduction K.P. Baskin
- II. Background R.L. Phelps
  - A. Reactor Protection System Design
  - B. Reactor Trip Breaker Design
- III. Reactor Trip Breaker Investigative Tests W.N. Rothenbuhler
  - A. Description of Testing
  - B. Conclusions from Testing
  - C. Corrective Actions
- IV. Pre-Return-To-Power Actions
  - A. Breaker Maintenance S.W. Stilwagen
  - B. Breaker Surveillance Testing M.O. Medford
- V. Conclusions K.P. Baskin

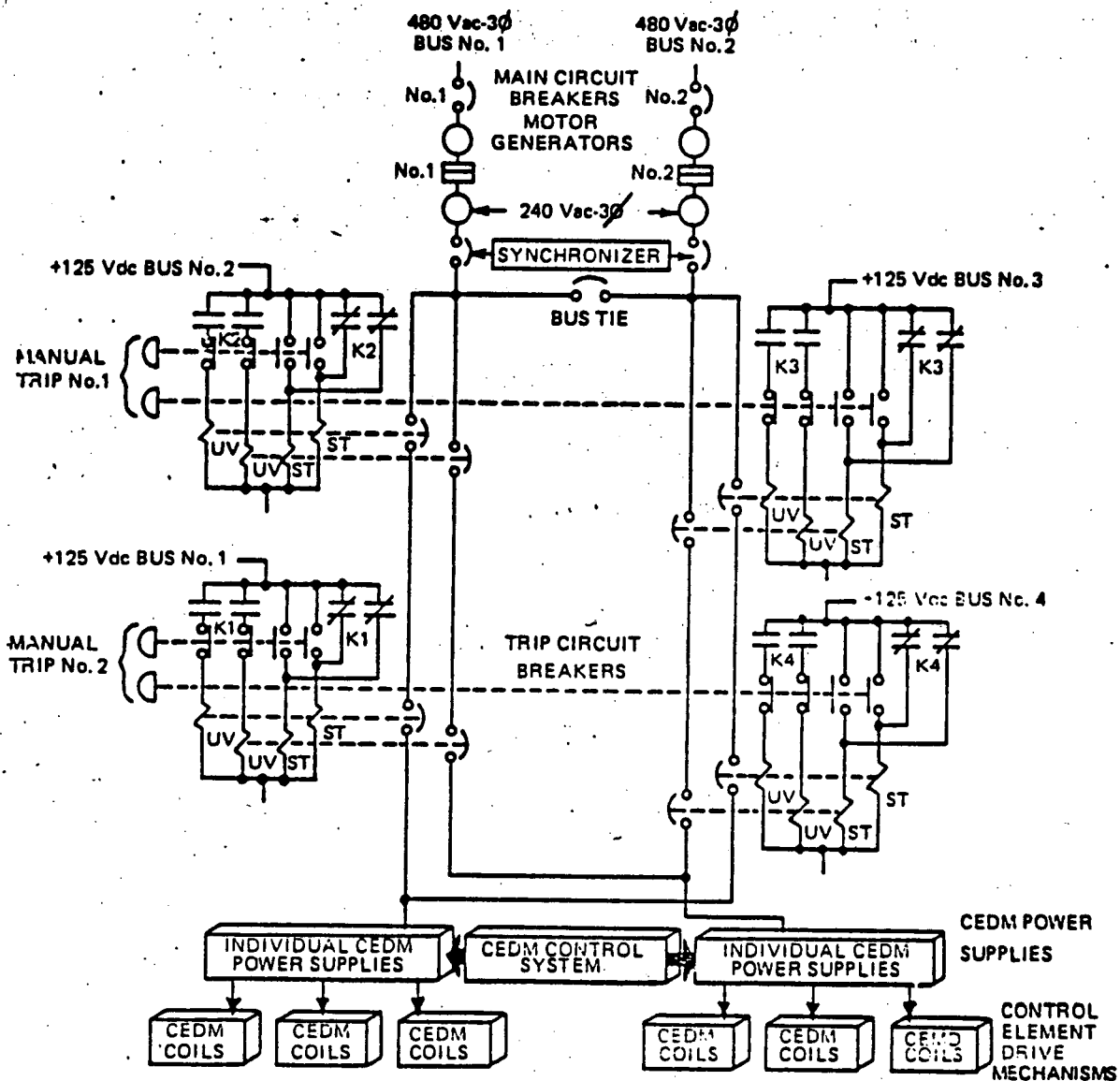
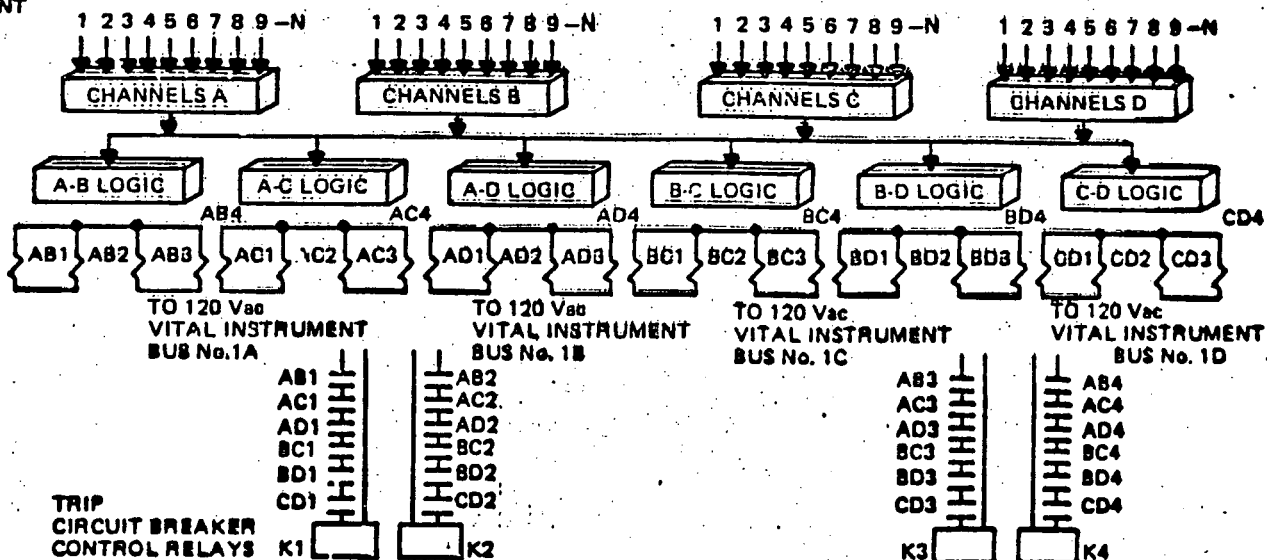
POINTS FROM NSSS  
MEASUREMENT  
CHANNELS

BISTABLES

LOGIC  
MATRICES

LOGIC  
MATRIX  
RELAYS

TRIP PATHS



SIMPLIFIED FUNCTIONAL DIAGRAM OF THE REACTOR PROTECTION SYSTEM

## REACTOR TRIP SWITCHGEAR

### A. PURPOSE

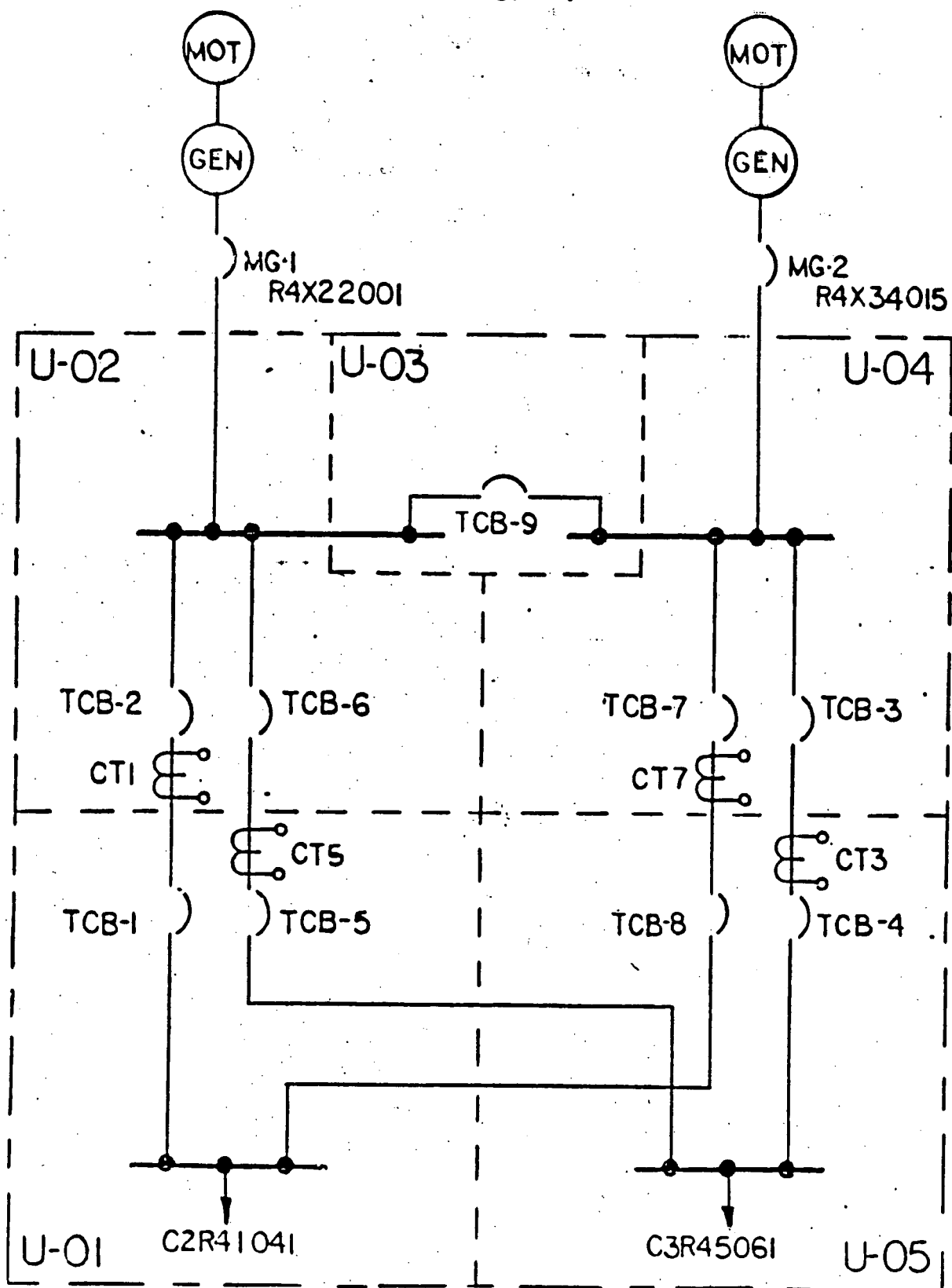
INTERRUPT POWER TO THE CONTROL ELEMENT DRIVE MECHANISMS WHEN REQUIRED BY AN AUTOMATIC TRIP SIGNAL FROM THE PPS OR WHEN A MANUAL TRIP IS INITIATED.

### B. BREAKER CONFIGURATION

THE BREAKERS ARE CONFIGURED TO ENSURE THAT WHEN A TRIP IS REQUIRED A SINGLE BREAKER FAILURE WILL NOT PREVENT A TRIP. ADDITIONALLY, A SINGLE BREAKER FAILURE WILL NOT CAUSE A REACTOR TRIP.

### C. BREAKER CONTROL CIRCUIT

1. BREAKER PAIRS RECEIVE POWER FROM FOUR INDEPENDENT CONTROL POWER SOURCES.
2. THE BREAKER TRIP CIRCUIT FUNCTION IS SAFETY GRADE. THE BREAKER CLOSING CIRCUITS IS QUALIFIED FOR STRUCTURAL INTEGRITY BUT DOES NOT HAVE A SAFETY GRADE FUNCTION.
3. THE BREAKER TRIP FUNCTION IS ACTUATED AUTOMATICALLY AND MANUALLY VIA A SHUNT TRIP DEVICE AND AN UNDERVOLTAGE DEVICE. THE SHUNT TRIP IS ENERGIZED TO ACTUATE. THE UNDERVOLTAGE DEVICE IS DEENERGIZED TO ACTUATE.





### SUMMARY

- RPS AND RTB POWERED BY 4 CHANNELIZED INDEPENDENT, BATTERY BACKED VITAL BUSES
- RPS AUTOMATIC AND MANUAL ACTUATION OPERATES BOTH UV AND SHUNT TRIP DEVICES ON RTB
- REACTOR TRIP SWITCHGEAR UTILIZES 8 RTBs
- RPS/RTB MEETS SINGLE FAILURE CRITERION
- UV TRIP DEVICE NOT REQUIRED TO FUNCTION FOR THE RPS TO ACCOMPLISH ITS PROTECTION FUNCTION.

## INVESTIGATIVE PROGRAMS

### IN PLANT INVESTIGATION

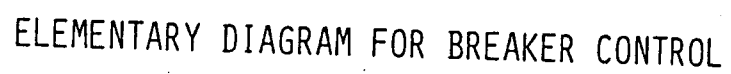
- o INVESTIGATED 3 TCB'S
- o VENDOR & NRC INVOLVED
- o PRELIMINARY RESULTS

### SCE INVESTIGATION AT SHOP AND TEST

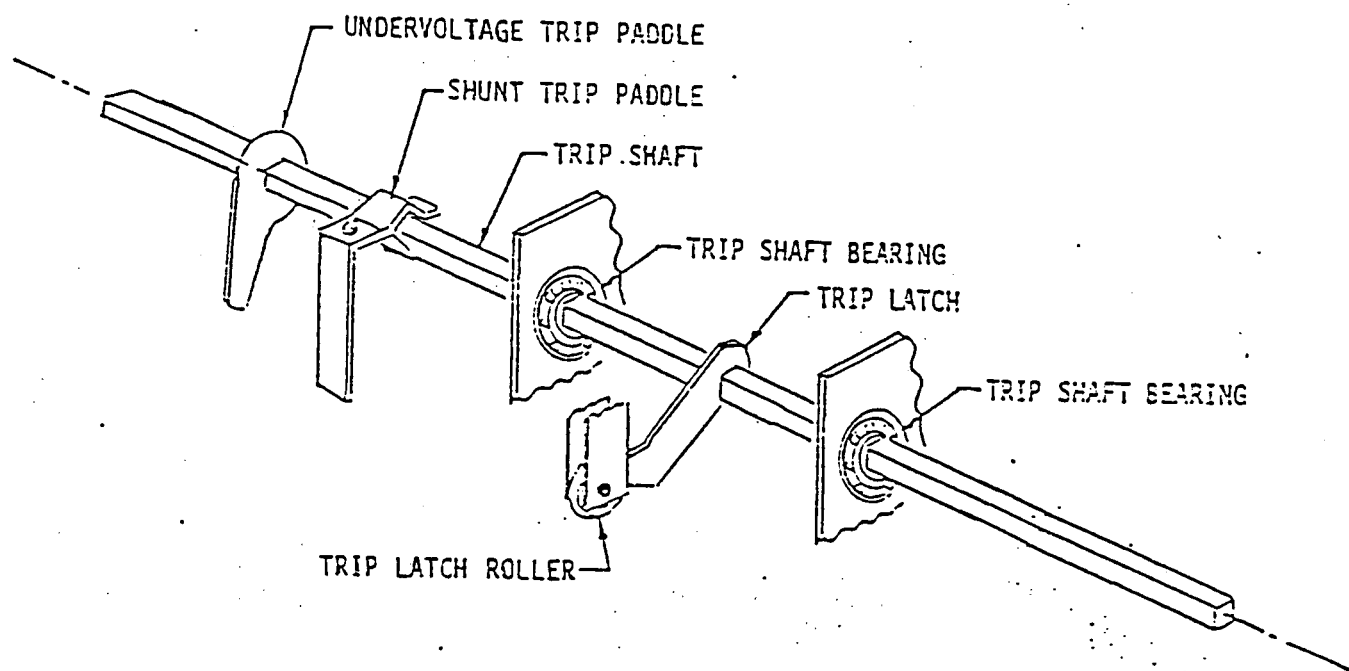
- o SCE TECHNICAL CAPABILITIES
- o GUIDELINES
- o TEST RESULTS
- o OBSERVATIONS

### CONCLUSIONS

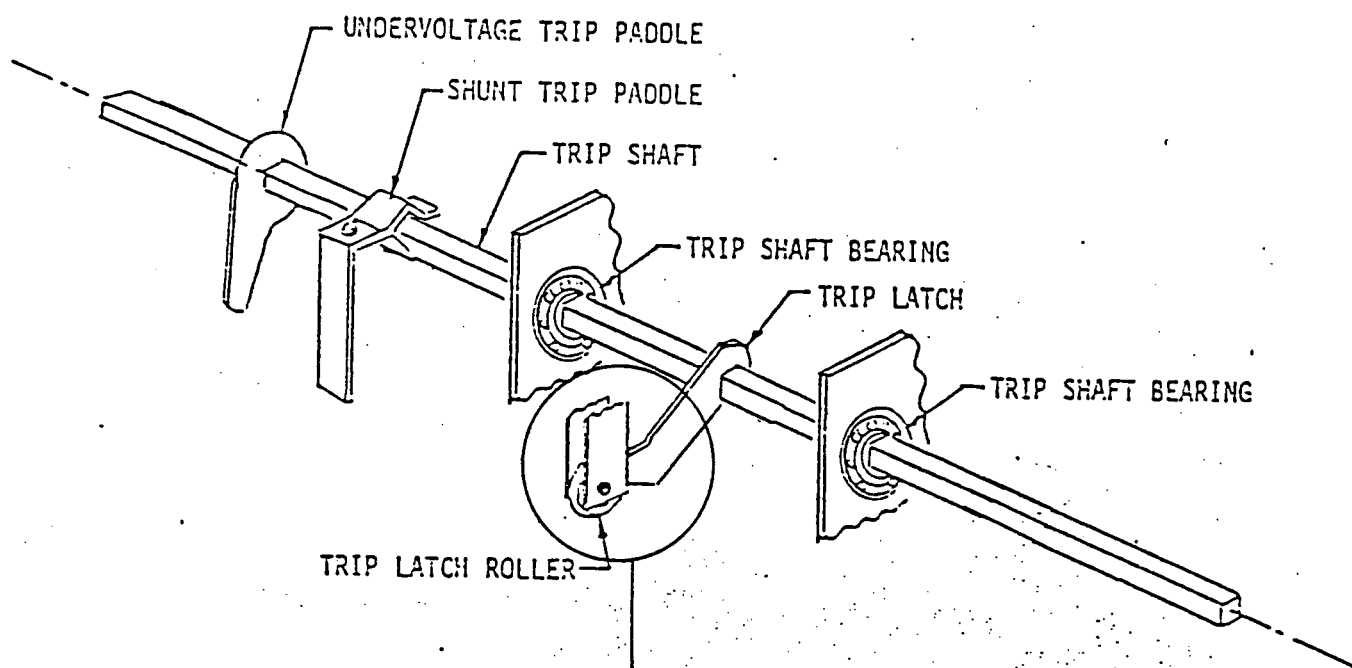
### RECOMMENDATIONS



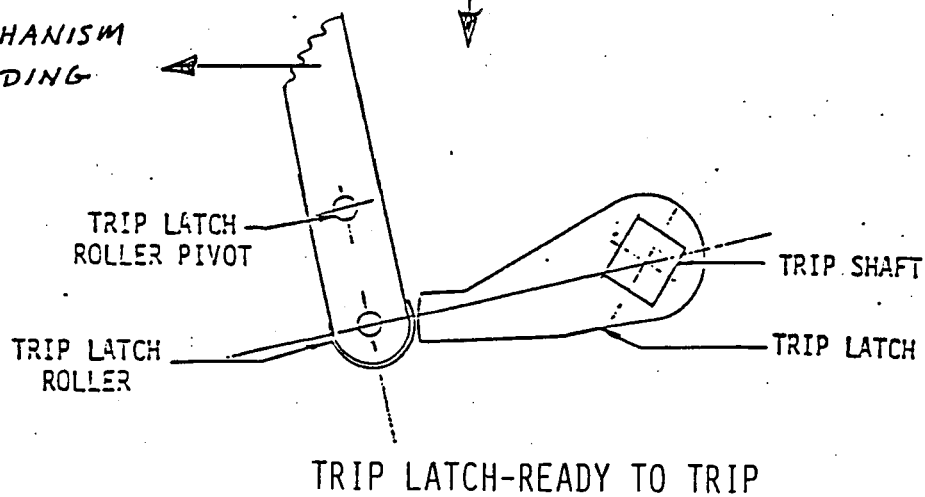
### ELEMENTARY DIAGRAM FOR BREAKER CONTROL



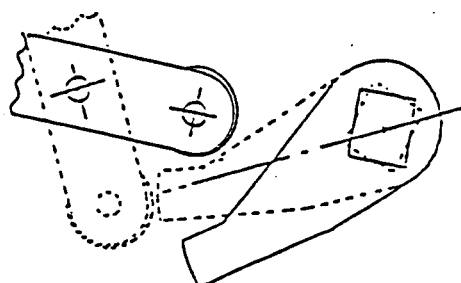
TRIP SHAFT  
(OVER-CURRENT AND MANUAL TRIP PADDLES NOT SHOWN)

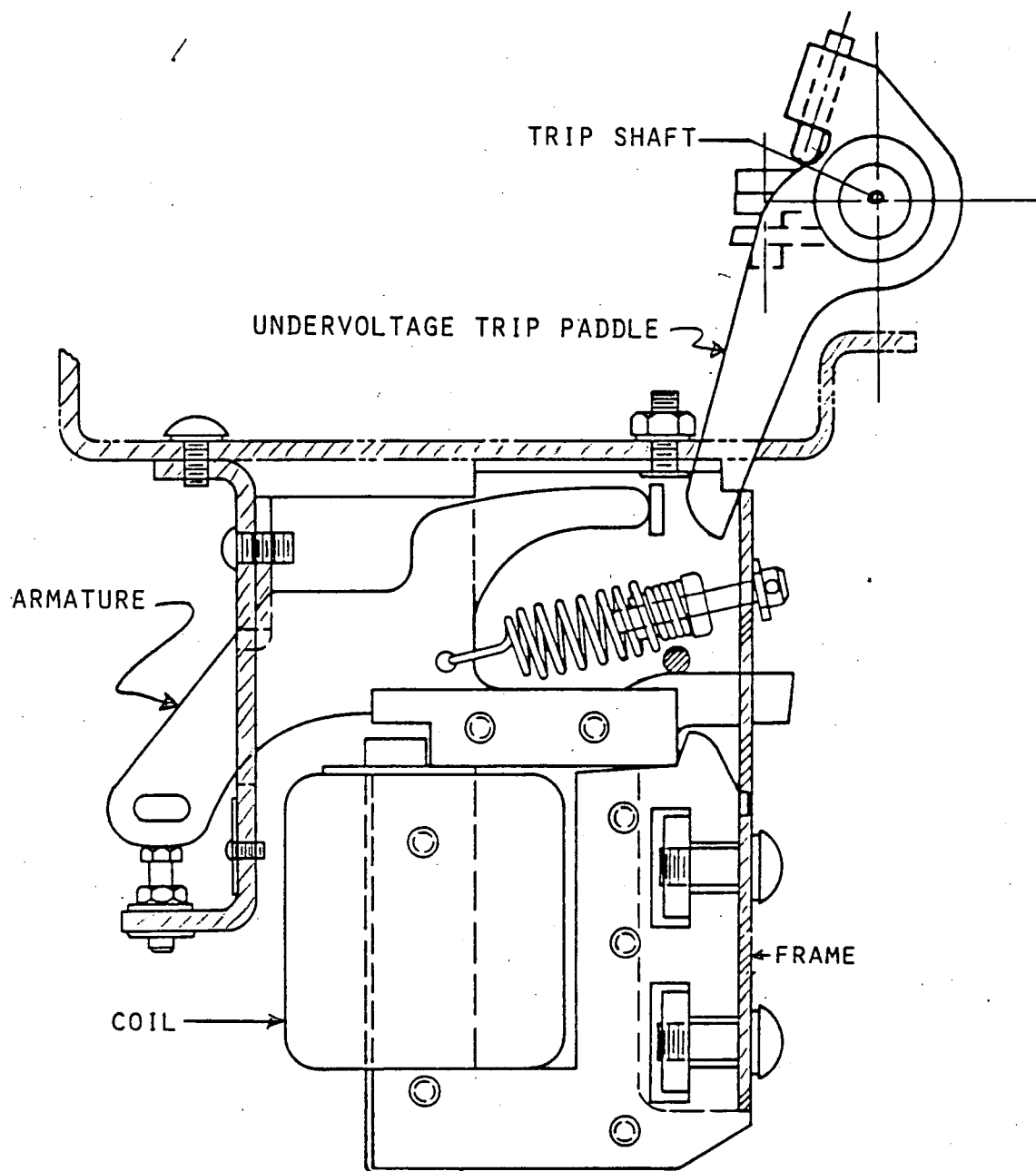


MECHANISM  
LOADING

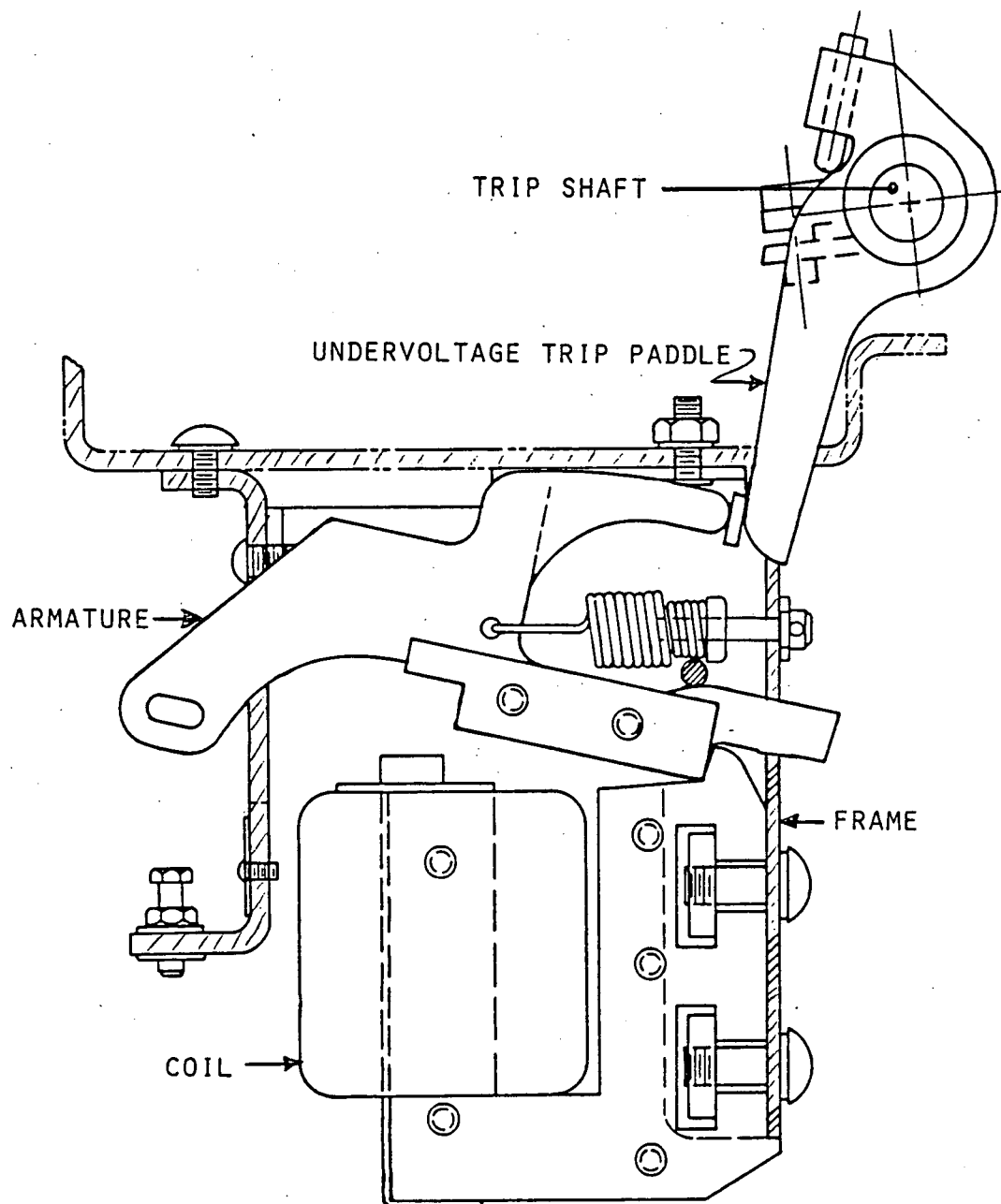


TRIP LATCH-AFTER TRIPPED





UNDervOLTAGE TRIP DEVICE  
COIL ENERGIZED POSITION



UNDervOLTAGE TRIP DEVICE  
COIL DE-ENERGIZED

## IN-PLANT INVESTIGATION

### THREE TCB'S INSPECTED

- o ONE THAT PASSED SURVEILLANCE TESTING
- o TWO THAT FAILED SURVEILLANCE TESTING
- o MARCH 13-16, 1983

### PERSONNEL INVOLVED

- o SCE-STATION AND ENGINEERING
- o GENERAL ELECTRIC
- o FRANKLIN RESEARCH CENTER
- o NRC

### INSPECTIONS AND TESTS

- o VISUAL INSPECTION
- o OPERATIONAL TESTS
- o TRIP SHAFT TORQUE MEASUREMENT
- o UV DEVICE PICKUP AND DROPOUT

### MAINTENANCE

- o CLEAN & LUBRICATE
- o CHECK & ADJUST AS REQUIRED
- o ADJUST UV PICKUP

### AS LEFT CONDITIONS

- o MEASUREMENTS
- o OPERATION



## IN-PLANT INVESTIGATION

TCB-2 PASSED SURVEILLANCE TESTING

### AS FOUND CONDITIONS

- o OPERATION - SATISFACTORY
- o TRIP SHAFT TORQUE - 1.5 TO 2.0 IN-LBS
- o UV DEVICE PICKUP - 106.0 TO 108.1

### SPECIAL INVESTIGATION

- o REDUCED UV DEVICE PICKUP TO 100 VOLTS DC
- o SLUGGISH OPERATION - DELAY TRIP

### WORK PERFORMED

- o CRC 5-56 APPLIED TO BEARINGS & LATCHES

### RESULTS

- o TRIP SHAFT TORQUES - 1.19 IN-LBS
- o OPERATION - SUCCESSFUL WITH UV DEVICE  
ADJUSTED TO 92 VOLTS DC

## IN-PLANT INVESTIGATION

### TCB-1 FAILED SURVEILLANCE TEST

#### AS FOUND CONDITIONS

- o OPERATION - INCONSISTENT/SLUGGISH
- o TRIP SHAFT TORQUE - 1.5 TO 2.0 IN-LBS
- o UV DEVICE PICKUP - 97.5 TO 103.7 VOLTS DC

#### WORK PERFORMED

- o ADJUSTED PICKUP VOLTAGE TO 106
- o CRC 5-56 APPLIED TO BEARINGS & LATCHES

#### AS LEFT

- o TRIP SHAFT TORQUE - 1.0 TO 1.3 IN-LBS
- o UV DEVICE - 95.5 TO 99.0 VOLTS DC
- o OPERATION - POSITIVE UV TRIPS

## IN-PLANT INVESTIGATION .

### TCB-6 FAILED SURVEILLANCE TESTS

#### AS FOUND CONDITIONS

- o OPERATION - SLOW AND FAILED TO TRIP
- o TRIP SHAFT TORQUE - GREATER THAN 2 IN-LBS
- o UV DEVICE PICKUP - 97.6 VOLTS DC

#### SPECIAL INVESTIGATION

- o INCREASED UV PICKUP TO 106.3 VOLTS DC
- o BREAKER TRIPPED BUT SLOW (2 SECONDS)

#### WORK PERFORMED

- o CRC 5-56 APPLIED TO BEARINGS & LATCHES

#### AS LEFT

- o TRIP SHAFT TORQUE - 1.31 TO 1.56 IN-LBS
- o UV DEVICE PICKUP - 98.6 TO 103.0 VOLTS DC
- o OPERATION - POSITIVE UV TRIPS

## SCE INVESTIGATION

### TEST PROCEDURE

- o STATION WORK PACKAGE

### PERSONNEL

- o APPARATUS ENGINEERS
- o STATION MAINTENANCE
- o STATION ENGINEERING
- o STATION QC
- o GE SERVICE ENGINEER

### TEST PROGRAM

- o GUIDELINES DEVELOPED
- o TEST RESULTS
- o OBSERVATIONS

## SCE INVESTIGATION

### TECHNICAL CAPABILITIES

- o APPARATUS ENGINEERING SECTION
  - o APPARATUS SPECIFICATIONS
  - o QUALIFICATION
    - o VENDORS
    - o EQUIPMENT
  - o TESTS
    - o FACTORY
    - o ACCEPTANCE
    - o CIRCUIT BREAKERS
  - o PRODUCT SPECIALISTS
  - o FIELD TROUBLES
  - o PRODUCTS INVOLVED
    - o ELECTRICAL
    - o MECHANICAL
    - o SUBSTATION
    - o GENERATION
    - o DISTRIBUTION
- o SHOP & TEST FACILITIES
  - o REPAIR FACILITIES
    - o TRANSFORMERS
    - o MOTORS
    - o CIRCUIT BREAKERS
  - o STANDARDS LABORATORY

## SCE INVESTIGATION

### TCB-4 FAILED SURVEILLANCE TESTS

#### AS FOUND CONDITIONS

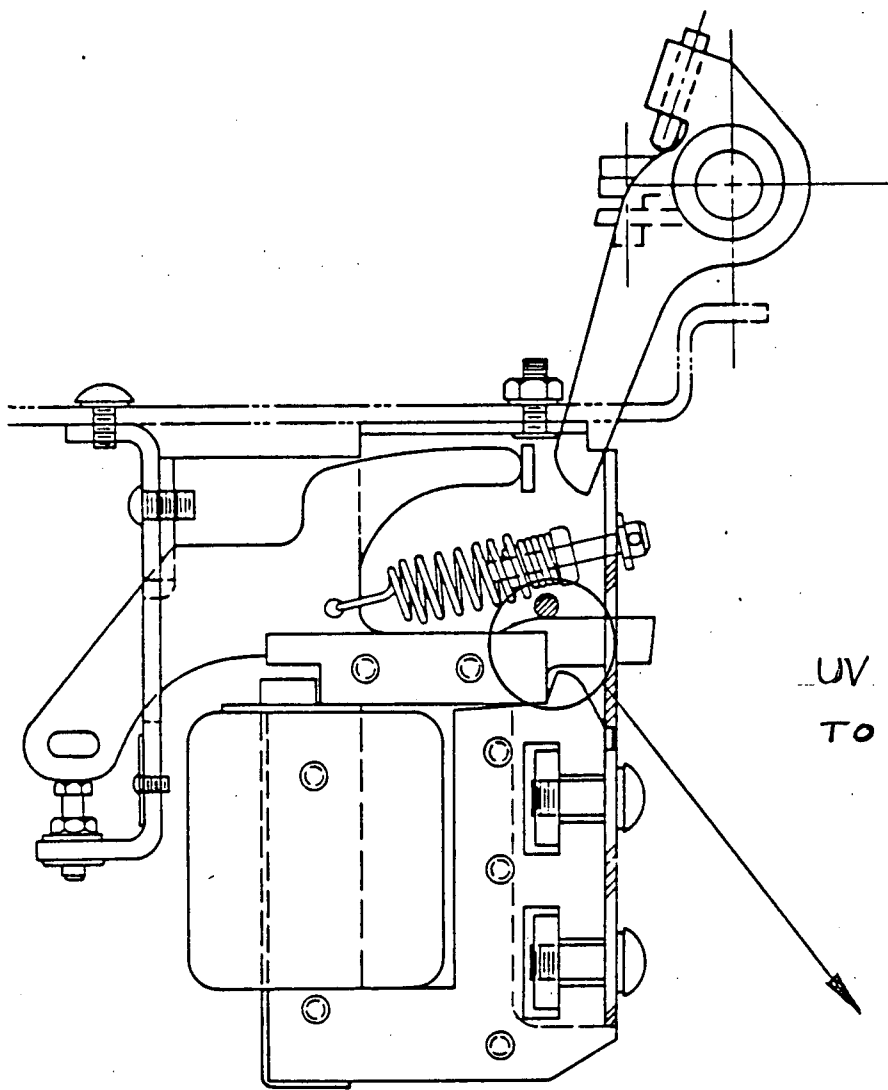
- o OPERATION
  - o INCONSISTENT - SOME FAILURES TO TRIP
- o TRIP SHAFT TORQUE - 1.56 TO 2.0 IN-LBS
- o UV DEVICE PICKUP - 93.7 TO 97.0 VOLTS DC
- o SUCCESSFUL SHUNT TRIP AT 30.2 VOLTS

#### WORK PERFORMED

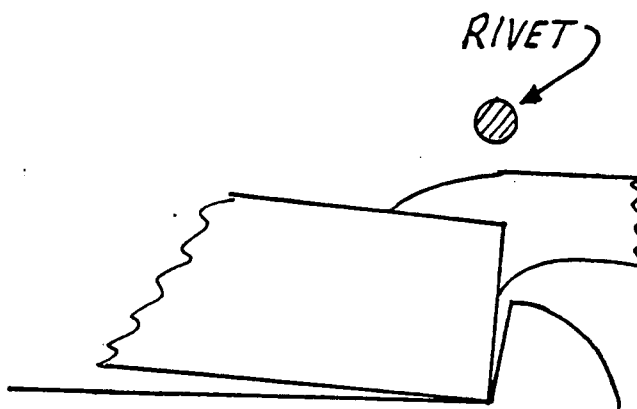
- o TRIP SHAFT & OPERATING MECHANISM
  - o REMOVED AND INSPECTED
    - o BAD LATCH ROLLER BEARING
  - o CLEANED AND LUBRICATED
- o UV DEVICE
  - o REMOVED AND INSPECTED
    - o EXCESSIVE ARMATURE TO RIVET CLEARANCE
  - o CLEANED AND ADJUSTED
- o CHECKED ADJUSTMENTS

#### AS LEFT

- o TRIP SHAFT TORQUE - 1.00 TO 1.44 IN-LBS
- o UV DEVICE PICKUP - 104.5 TO 106.5 VOLTS DC
- o OPERATION
  - o POSITIVE UV TRIP
  - o UV TRIP TIME - 60.1 TO 62.8 MSEC W/DIODE
  - o UV TRIP TIME - 28.6 TO 30.2 MSEC W/O DIODE
- o NCR PREPARED FOR BAD LATCH ROLLER



UV DEVICE - ARMATURE  
TO RIVET CLEARANCE



UV DEVICE  
EFFECT OF COIL TEMPERATURE  
ON PICKUP VOLTAGE

TEST NO.	COIL TEMPERATURE °C	UV PICKUP VOLTS DC
1	26.1	106.5
2	26.1	104.5
3	26.1	105.2
4	26.1	105.9
5	52.8*	125.7
6	52.8	124.9
7	52.8	123.8

\* THE 52.8C COIL SURFACE TEMPERATURE WAS OBTAINED  
AFTER THE COIL WAS ENERGIZED AT 130 VOLTS DC FOR  
ABOUT ONE HOUR.



## SCE INVESTIGATION

### TIMING TEST RESULTS

#### AS FOUND

- o 61.1 MSEC TO FAILURE TO TRIP

AFTER ADJUSTING UV PICKUP FROM 93.7 TO 104.9 VOLTS DC

- o 61.6 TO 75.7 MSEC

AFTER CLEANING TRIP SHAFT BEARINGS/LATCHES

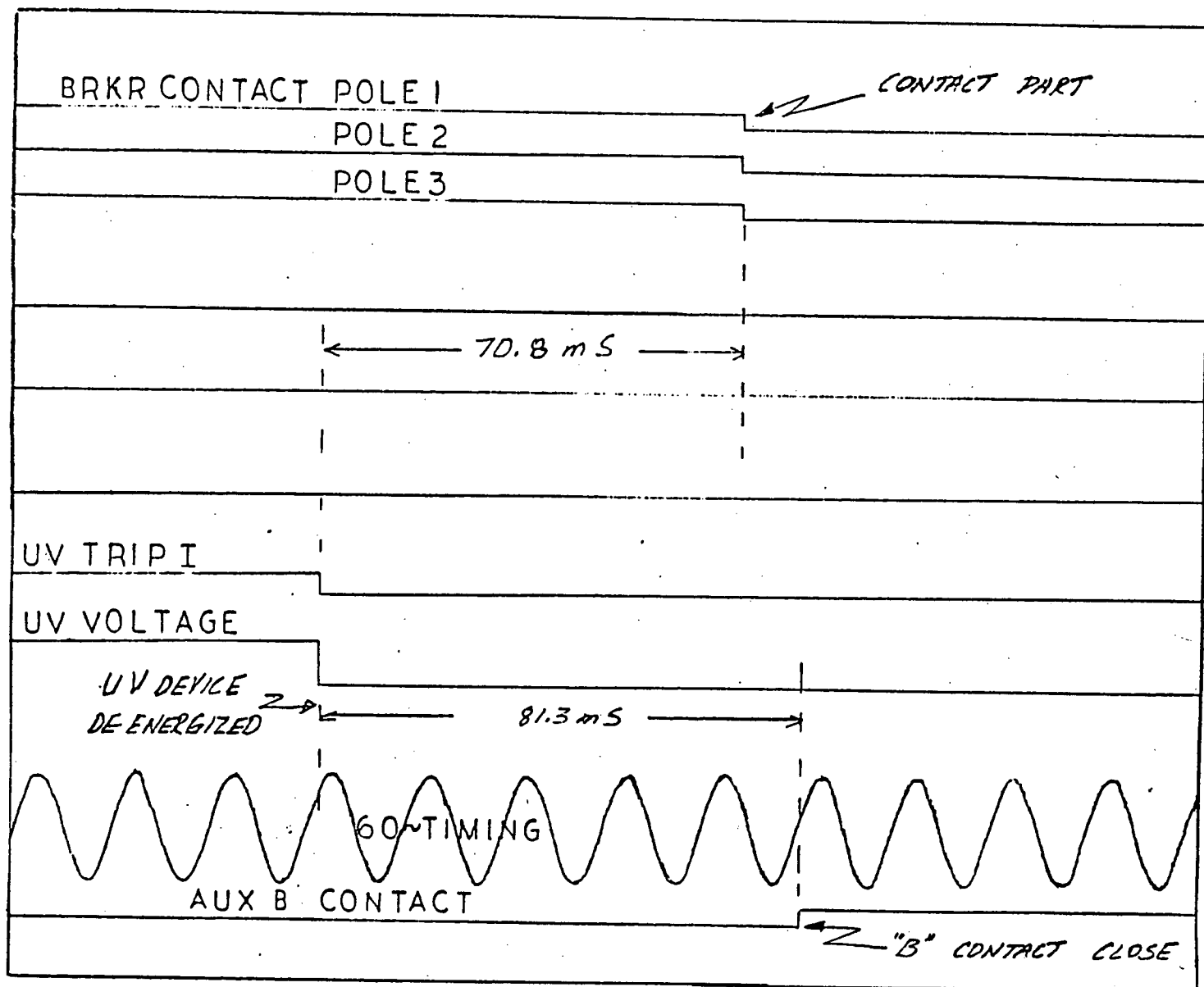
- o 65.4 TO 70.3 MSEC

AFTER CLEANING AND ADJUSTING UV DEVICE

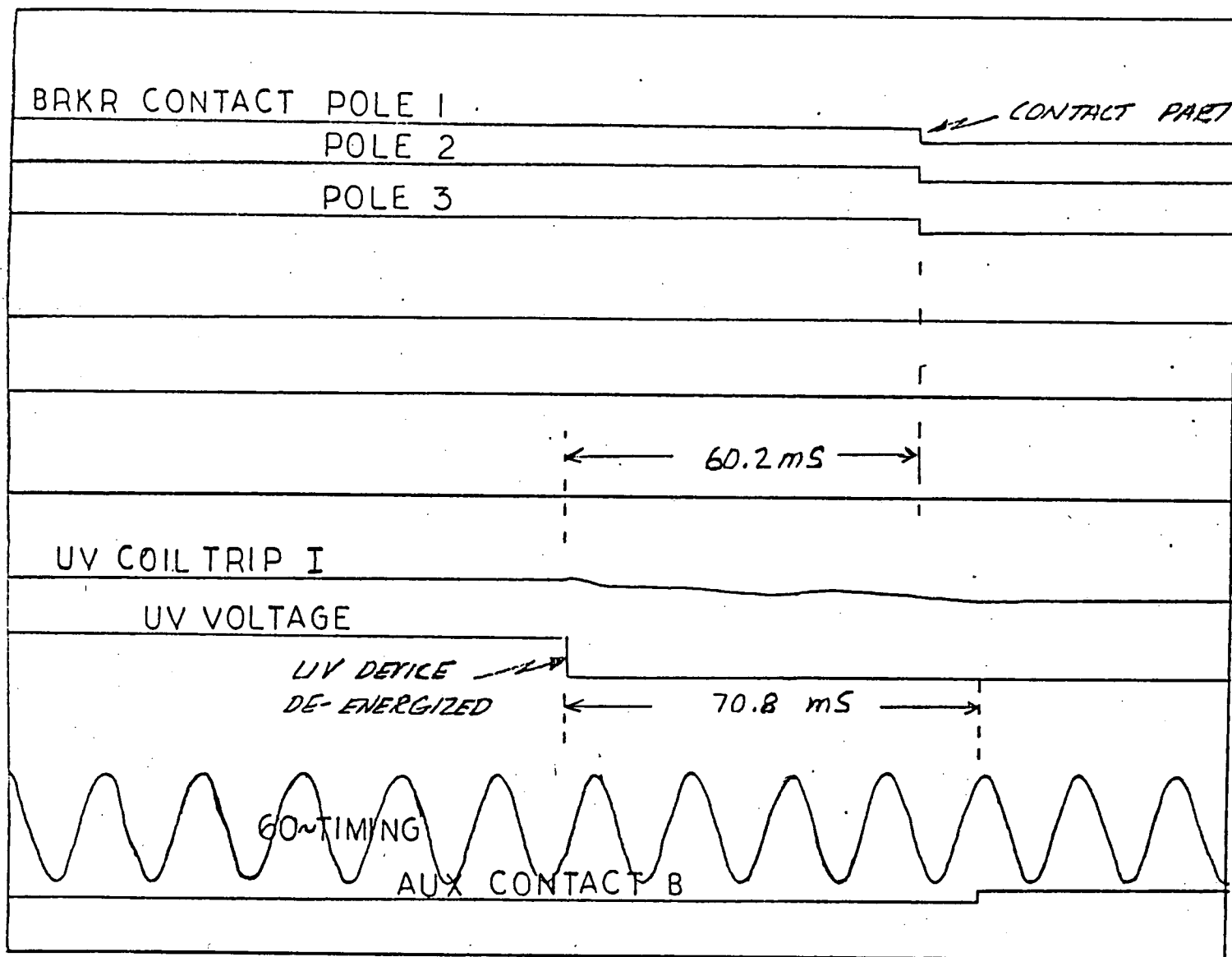
- o 60.1 TO 62.8 MSEC

#### OBSERVATION

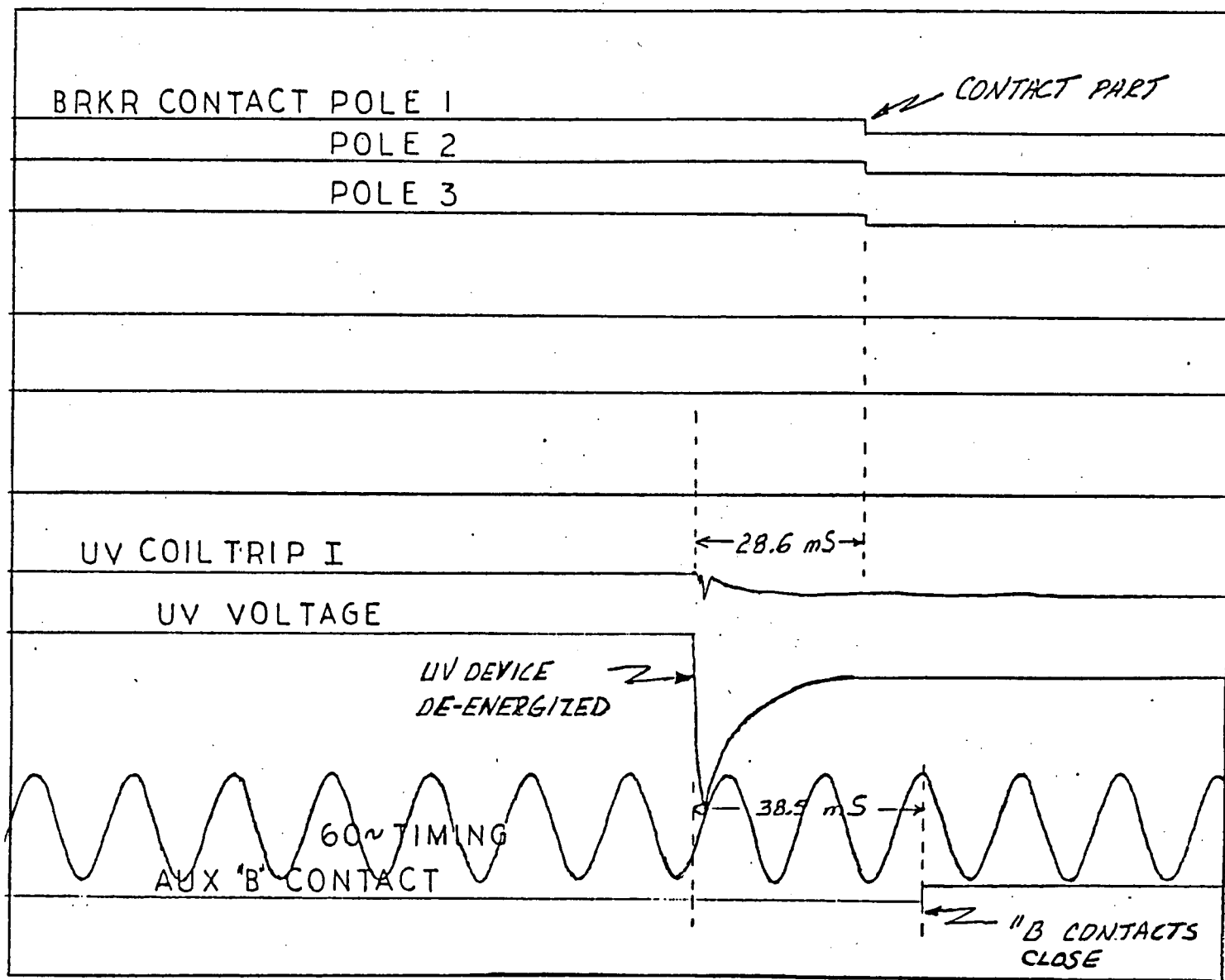
- o TIMING TESTS
  - o GOOD QUANTITATIVE MEASUREMENT
  - o NEED TO ESTABLISH LIMITS



TCB-4 AS FOUND CONDITIONS  
SUCCESSFUL UV TRIP



TCB-4 AFTER MAINTENANCE  
(WITH DIODE)



TCB-4 AFTER MAINTENANCE  
(WITHOUT DIODE)

## SUMMARY OF INVESTIGATION

- SHUNT TRIP DEVICE HAS SIGNIFICANT MARGIN AND CONSISTANTLY OPERATED SATISFACTORILY
- THE UV DEVICE PERFORMANCE CAN BE AFFECTED BY SEVERAL FACTORS

<u>ITEM</u>	<u>AFFECT</u>
● LUBRICATION OF TRIP SHAFT BEARINGS AND LINKAGE AND LATCH POINTS	MAJOR
● SETTING OF UV DEVICE PICKUP VOLTAGE AT KNOWN TEMPERATURE	MAJOR
● UV DEVICE ARMATURE TO RIVET CLEARANCE	MAJOR
● INSTALLATION OF DIODE	MINOR
● TRIP LATCH BEARING PROBLEM FOUND ON TCB-4	MINOR
● MEASURABLE PARAMETERS PROVIDE A GOOD INDICATION OF BREAKER OPERATION	
● UV TRIP TIME	
● TRIP SHAFT TORQUE	

## RECOMMENDATION

### BASE-LINE MAINTENANCE

- AS FOUND
  - TRIP SHAFT TORQUE
  - UV PICKUP VOLTAGE
  - UV TRIP TIME
- REMOVE TRIP SHAFT AND MECHANISM
  - CLEAN, INSPECT, LUBRICATE

### PREVENTATIVE MAINTENANCE

- ADJUSTMENTS
- UV DEVICE ARMATURE TO RIVET CLEARANCE
- UV DEVICE PICKUP
- UV DEVICE DROPOUT
- TRIP SHAFT TORQUE

### SURVEILLANCE TESTS

- UV TRIP TIME
- RECORD AND TRACK FOR EACH BREAKER

## CONCLUSIONS

- o FOR THE FOUR TCB'S INVESTIGATED, SUCCESSFUL OPERATION WAS OBTAINED IN ALL CASES BY ADJUSTING AND LUBRICATING
- o OPTIMIZATION OF ADJUSTMENTS WILL PROVIDE MARGIN IN OPERATIONS
- o QUANTITATIVE MEASUREMENTS CAN BE MADE TO MEASURE PERFORMANCE
  - o TRIP SHAFT TORQUE
  - o UV TRIP TIME
- o THE UNDERVOLTAGE TRIP FUNCTION OF THE TCB CIRCUIT BREAKERS CAN PROVIDE RELIABLE OPERATION WITHOUT ANY DESIGN CHANGES IF APPROPRIATE MAINTENANCE AND SURVEILLANCE TECHNIQUES ARE USED

PREVENTATIVE MAINTENANCE PROGRAM  
FOR GENERAL ELECTRIC AK2-25-2 CIRCUIT BREAKERS

- o GENERATION OF STATION PROCEDURE S023-I-4.66
  - o S023-I-4.66 APPROVED 4/5/83
- o CONDUCT TRAINING OF STATION CRAFT WITH VENDOR CERTIFICATION
  - o COMPLETED CLASS ROOM TRAINING 3/31/83
  - o COMPLETED IN PLANT PHASE 4/6/83
- o IMPLEMENT PREVENTATIVE MAINTENANCE PROCEDURE S023-I-4.66
  - o COMMENCED PROCEDURE 4/6/83
  - o ESTIMATED COMPLETION OF PROCEDURE 4/10/83
- o EVALUATION OF DATA TO ACCESS ADEQUACY OF PREVENTATIVE MAINTENANCE FREQUENCY



## PREVENTATIVE MAINTENANCE PROCEDURE

S023-1-4.66

### OBJECTIVE

- PROVIDES DETAILS FOR INSPECTION, CLEANING  
ADJUSTMENTS AND TESTING OF AK-2-25-2  
CIRCUIT BREAKERS
- SECTIONS 6.1; 6.2; 6.4; 6.6 THROUGH 6.9  
AND 6.11 WILL BE PERFORMED EVERY FOUR (4)  
MONTHS
- PROCEDURE SHALL BE PERFORMED IN ITS ENTIRETY  
AT LEAST ANNUALLY

## PROCEDURES

- 6.1 REMOVE BREAKER FROM CUBICLE
- 6.2 "AS FOUND" INSPECTION (4 MONTH INTERVAL)
  - OBTAIN PICK UP VOLTAGE OF THE UV DEVICE WHEN AT AMBIENT AND AT TEMPERATURE
  - MEASURE OPENING TIME OF CIRCUIT BREAKER - CONDUCT THREE TIMES
- 6.3 BREAKER INSPECTION AND CLEANING (ANNUAL)
- 6.4 TRIP TORQUE VERIFICATION AND CLEANING (4 MONTH INTERVAL)
  - "AS FOUND" TRIP TORQUE MEASUREMENT
  - CLEAN TRIP-LATCH SURFACES
  - FINAL TRIP TORQUE MEASUREMENTS
- 6.5 BREAKER MECHANICAL OPERATION CHECKS AND ADJUSTMENTS (ANNUAL)
  - INSPECT/ADJUST CONTACT WIPE CLEARANCE
  - MEASURE CONTACT SPRING COMPRESSION ON EACH POLE
- 6.6 CHECK UNDER-VOLTAGE DEVICE FOR ARMATURE CLEARANCE (4 MONTH INTERVAL)
  - VERIFY CLEARANCE BETWEEN ARMATURE ARM AND RIVET - VERIFY FREEDOM & MOVEMENT
  - ADJUST ARMATURE CLEARANCE TO  $\leq 0.006"$

- 6.7 CHECK INSTANTANEOUS UNDER-VOLTAGE PICKUP  
AND TRIP SETTINGS ( 4 MONTH INTERVAL )
- 6.8 POSITIVE TRIP CHECK AND ADJUSTMENTS ( 4 MONTH INTERVAL )
- 6.9 TRIP LATCH ADJUSTMENT ( 4 MONTH INTERVAL )
- 6.10 POST-MAINTENANCE TESTING ( ANNUAL )
  - PERFORM INSULATION-RESISTANCE CHECKS
  - MEASURE THE CONTACT RESISTANCE FOR EACH PHASE
  - PERFORM OVERCURRENT TRIP TEST
- 6.11 REINSTALL BREAKER
- 6.12 RESTORATION AND POST-MAINTENANCE CHECKS  
( 4 MONTH INTERVAL )

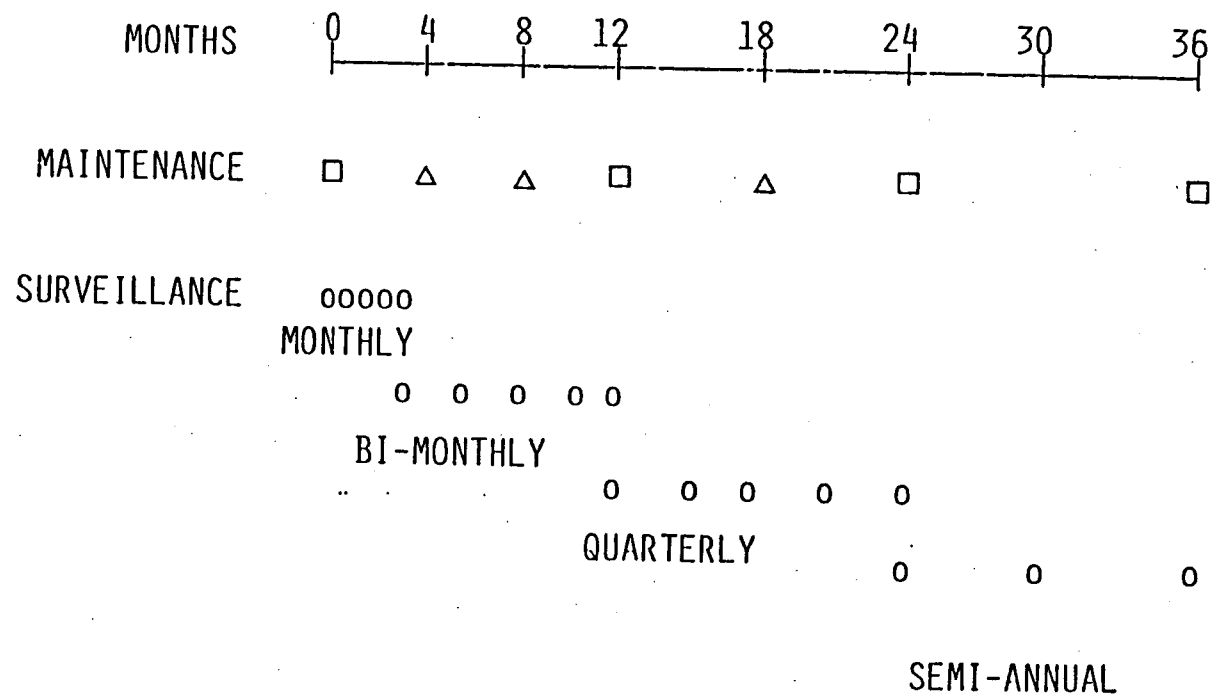
REACTOR TRIP BREAKER SURVEILLANCE  
PRE - MARCH 1983

- o PLANT PROTECTION SYSTEM TEST
  - o MONTHLY TEST REQUIREMENT
  - o TESTS SHUNT AND UV TOGETHER
  - o GO-NO-GO TEST
- o SUPPLEMENTAL TEST
  - o TESTS SHUNT AND UV SEPARATELY
  - o REQUIRED BY TECHNICAL SPECIFICATION ON EIGHTEEN MONTH CYCLE
  - o PERFORMED MORE FREQUENTLY DURING INITIAL STAGES OF STARTUP
  - o GO-NO-GO TEST

REACTOR TRIP BREAKERS  
SUPPLEMENTAL TEST

- o EXISTING TEST
  - o GO-NO-GO TEST OF UV DEVICE
  - o GO-NO-GO TEST OF SHUNT DEVICE
- o REVISED TEST
  - o RESPONSE TIME TEST OF UV DEVICE
  - o DETECTION OF ONSET OF DEGRADED PERFORMANCE
  - o INITIAL AND FINAL ACCEPTANCE CRITERIA
  - o GO-NO-GO TEST OF SHUNT DEVICE

# REACTOR TRIP BREAKERS SURVEILLANCE TEST PROGRAM



- = SURVEILLANCE TEST
- = FULL PREVENTIVE MAINTENANCE
- △ = PREVENTIVE LUBRICATION OF TRIP BAR BEARINGS

60