

Report No. 10CFR21-0069
April 25, 1994

10CFR21 REPORTING OF DEFECTS
AND NON-COMPLIANCE

COMPONENT: Voltage Relay - EMD 8412411, 8282624, 8365716
Westinghouse Type SV

SYSTEM: EMD Type 999 and MP-45 Diesel Generators

CONCLUSION: Defect is Reportable in Accordance with 10CFR21

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SUMMARY

MKW Power Systems experienced contact chatter of relay 8412411 while performing shake table testing in accordance with MKW's Nuclear Parts Dedication program. The relay is a Westinghouse type SV (#292B402AXX) which is a plunger type. The plunger is not restrained vertically and therefore the relay is sensitive to seismic accelerations in the vertical direction. MKW experienced contact chatter at seismic accelerations less than 1g.

The suspect relay is designated as FFCO (field flash cut-out) in the engine generator control circuitry of EMD 999 and MP-45 diesel generator sets. It is set to energize at 90 VAC to open a contact in the field flash contactor (FFC) coil circuit to disable generator field flashing when generator output voltage reaches 75% of rated value (90 volts of 120 volt PT secondary voltage). A second contact of FFCO either opens to disable the "No Field" alarm or closes to initiate deadline closure of the EDG circuit breaker (circuitry varies depending upon site). Relay #8412411 is used in circuits requiring 2 N.C. contacts. Circuits which require 1 N.O. and 1 N.C. contact use relay #8282624 or #8365716. These relays are similar to #8412411 (Westinghouse type SV) and therefore they are also suspect.

COMPONENTS

Westinghouse type SV voltage relays. The following are known have been supplied for nuclear service.

EMD #8412411 (2 N.C. contacts)
EMD #8282624 (1 N.O., 1 N.C. contact)
EMD #8365716 (1 N.O., 1 N.C. contact)

CUSTOMERS AFFECTED

All customers with EMD type 999 and *MP-45 diesel generators in nuclear safety related service. These include:

Commonwealth Edison - Dresden
Commonwealth Edison - Quad Cities
Connecticut Yankee - Haddam Neck
Duquesne Light - Beaver Valley
Florida Power & Light - Turkey Point
*GPU Nuclear - Oyster Creek
Maine Yankee
Niagara Mohawk - Nine Mile Point 1
Northern States Power - Monticello
Omaha Public Power - Fort Calhoun
*Public Service of Colorado
Spain - Sanra Maria DeGarona
TVA - Browns Ferry
VEPCO - Surry
Wisconsin Electric - Point Beach
Wisconsin Public Service - Kewaunee

DEFECT

The relays are very sensitive to seismic accelerations in the vertical direction. Contact chatter occurs at accelerations less than 1g. This could affect the diesel generator's ability to build generator output voltage within the 10 second requirement.

The relays operated successfully before and after seismic testing. They were only affected during the seismic test.

CORRECTIVE ACTION

- 1) At the next scheduled outage, inspect control panels to identify suspect relays #8412411, #8282624, #8365716.
- 2) At the next scheduled outage, replace all identified suspect relays. MKW Power Systems recommends the following replacements:
 - a) Wilmar #WUV-1-120-HB. This relay has 2 N.C. contacts and can be used as a qualified replacement for #8412411.
 - b) Wilmar #WUV-120-H. This relay has 1 N.O. contact and 1 N.C. contact which can be used as a qualified replacement for #8282624 and #8365716.

Wiring of the replacement relays will remain the same as shown on the unit's wiring schematics, except for MP-45 machines. See Exhibit 1, MP-45 circuitry, for deletion of RE-FFCO and parallel N.O. contact.

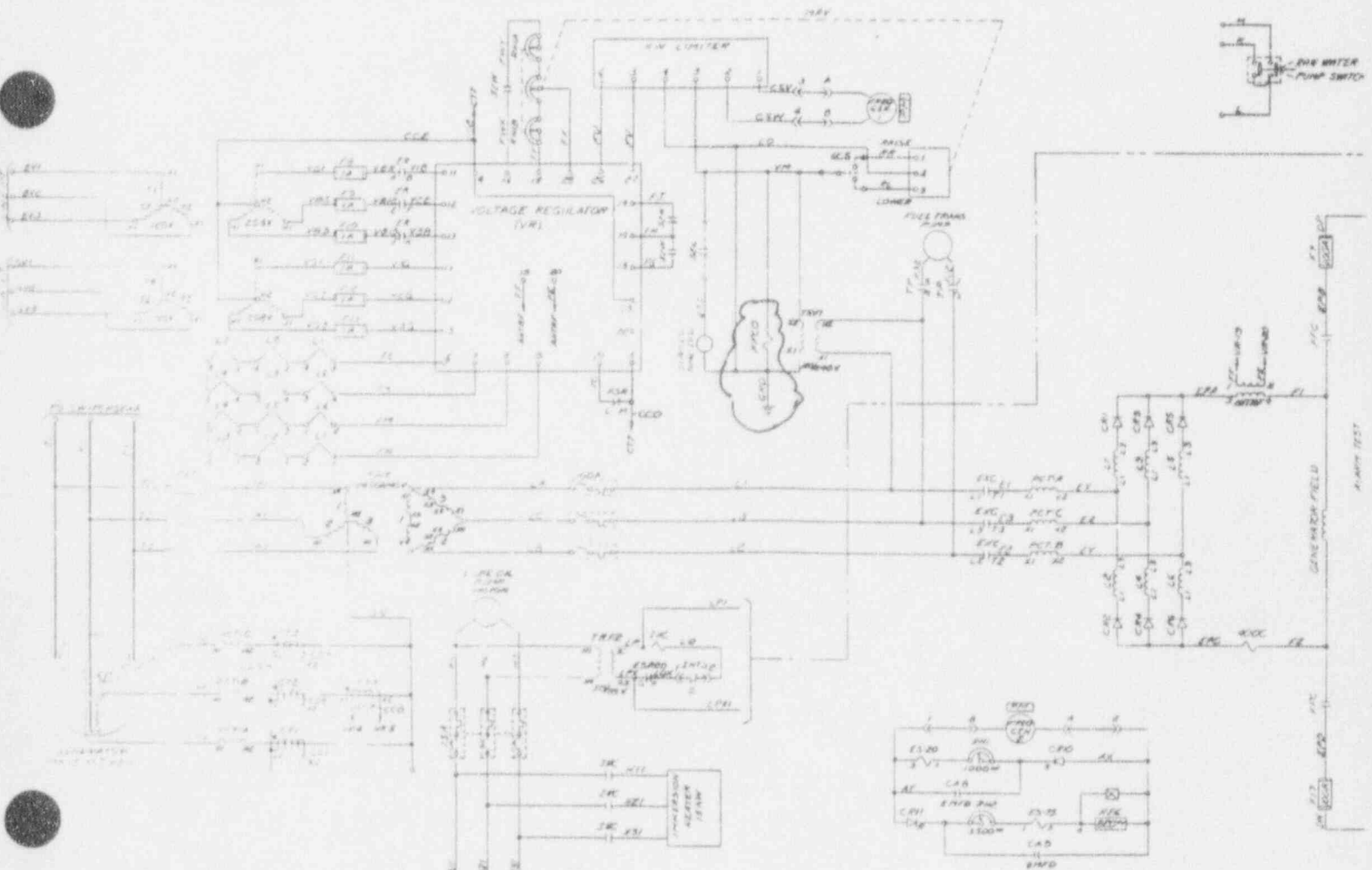
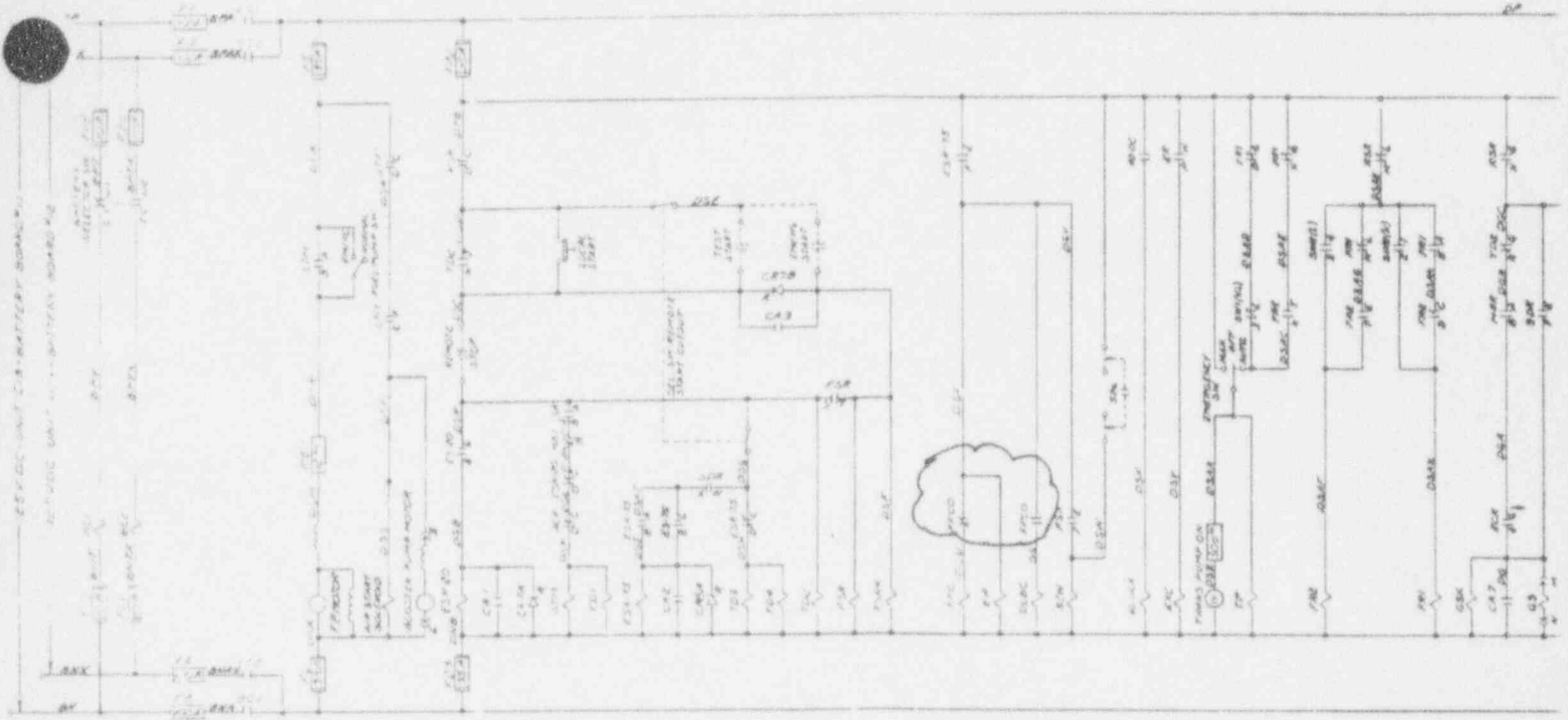
The Wilmar relays are smaller and have less weight than the suspect relays; therefore, seismic qualification of the control panels will not be impacted.

These are recommendations only. Equivalent relays by other manufacturers can also be used.

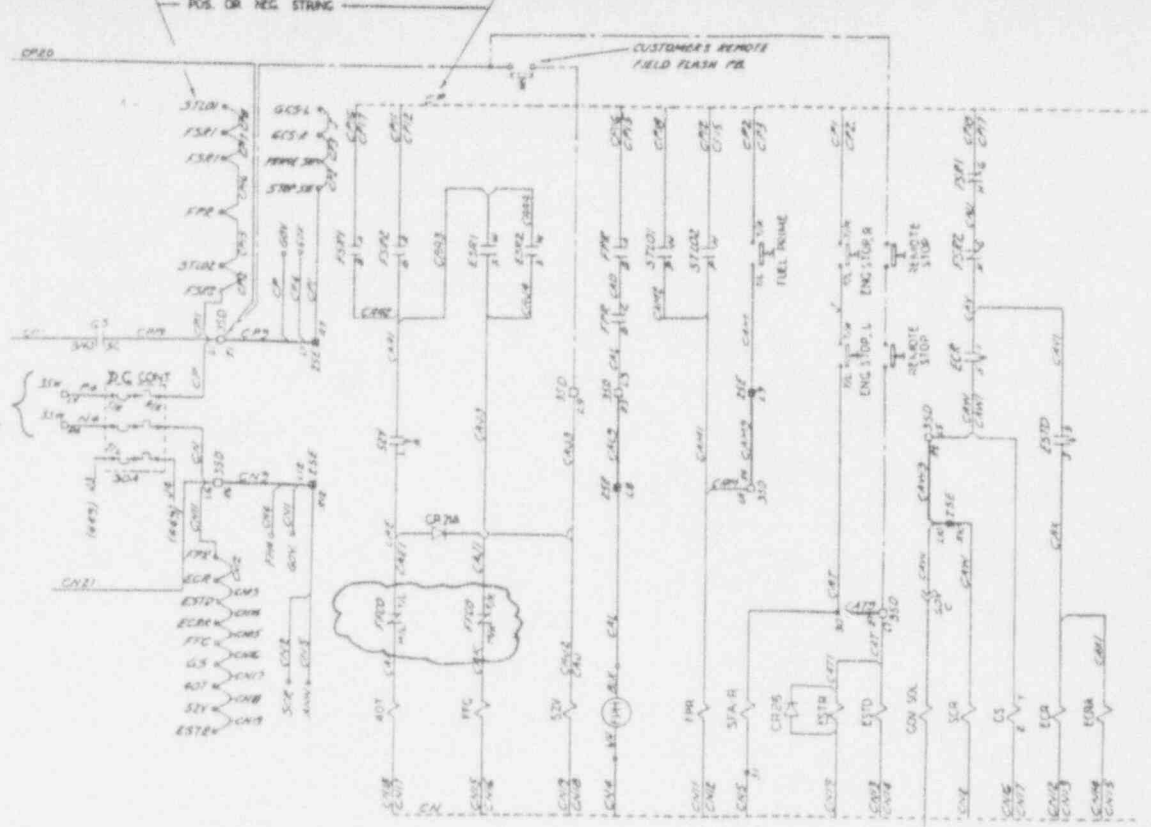
- 3) Remove all suspect relays from inventory.
- 4) Contact MKW Parts Department for return/replacement of relays.

EXHIBIT 1
(3 pages)

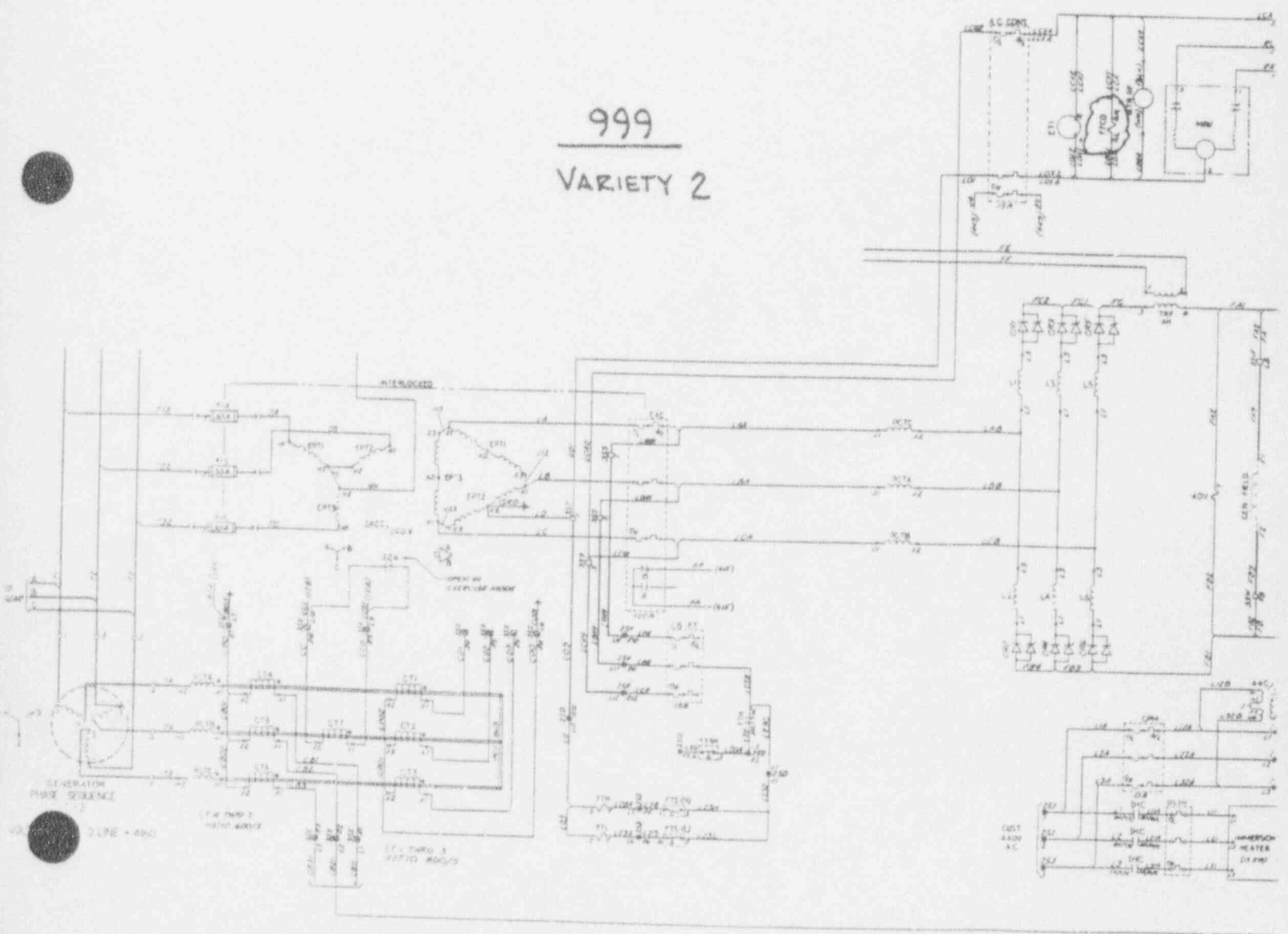
TYPICAL APPLICATIONS OF FFCO RELAY

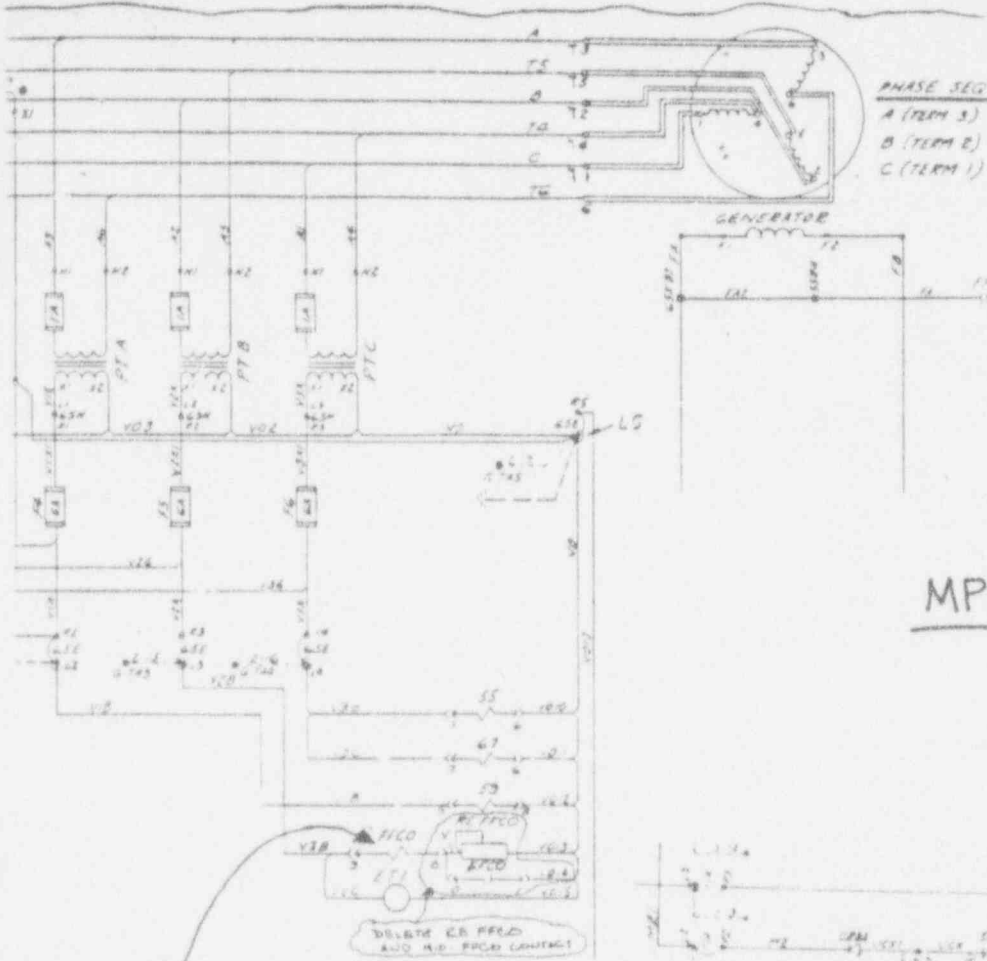


12.5 VDC



999
VARIETY 2





MP-45

NEW FFCO COILS
 WIRE DIRECTLY ACROSS
 120 VAC POTENTIAL.

V2B FFCO V013

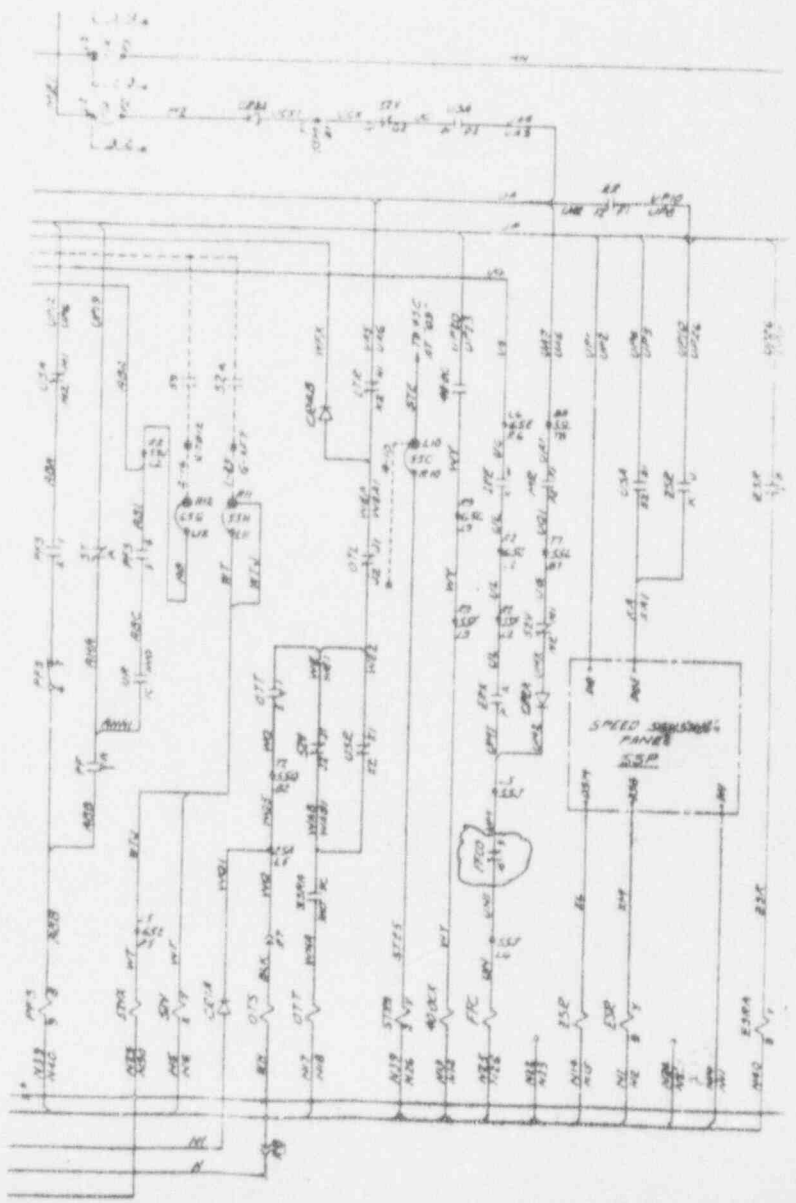


EXHIBIT 2
(2 pages)

WESTINGHOUSE LITERATURE FOR TYPE SV RELAYS

Westinghouse



General Purpose Relays

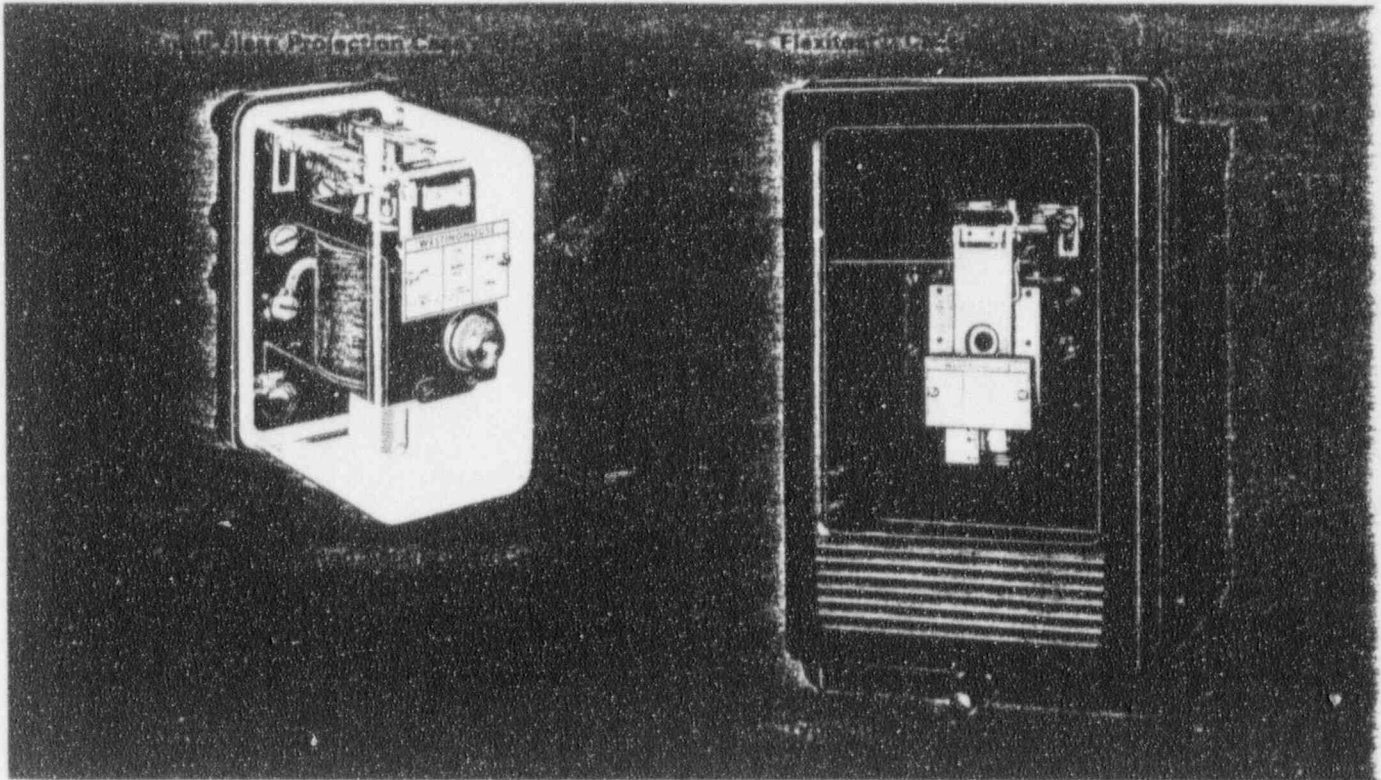
Instantaneous, Adjustable

Current: Types SC, SC-1

Voltage: Types SV, SV-1, SVF, SVF-1

EMD # 8412411
8282624

EMD # 8365716



Application

SC, SC-1 and SV, SV-1

The SC, SC-1 current relays and the SV, SV-1 voltage relays are suitable for any application where an instantaneous plunger relay of high accuracy is required. These relays are utilized for protective service, and for auxiliary service where some of their features are desired.

The SC and SV line of relays are adjustable over a wide range of current or voltage. Each relay is provided with a mechanical operation indicator and a calibrated scale to indicate the pick-up setting.

The high drop-out to pick-up ratio (90-98%) of the Type SC and SV relays make them particularly suitable for use as fault detectors to supervise main protective relays. A typical application involves an SV voltage operated relay in a generator back-up protection scheme. The SV is used to supervise an overcurrent unit, when the overcurrent unit is to operate on less than full load current if the voltage drops below a predetermined level.

The SC-1 and SV-1 have a lower ratio of drop-out to pick-up. This lower ratio makes possible a plunger pull characteristic which permits operation of a latching device.

Additional Applications

Instantaneous motor protection: To prevent high current or low voltage damage, where time-delay relays would not operate fast enough.

High-speed non-directional tripping: Where economically justified on the end of outlying feeder lines.

Ground protection: Types SC and SC-1 can be used on dc to 60 Hz service without coil changeover. SV and SV-1 are supplied for either dc or 50-60 Hz service.

SVF, SVF-1

The SVF and SVF-1 type relays are recommended for applications where drop-out is independent of frequency. Drop-out is adjustable over the range of 30-45 and 24-36 volts for the SVF and SVF-1 respectively, with a maximum drop-out variation of $\pm 5\%$ between 20 and 60 Hertz.

Where the relay is required to operate only during balanced 3-phase conditions, the single-phase SVF or SVF-1 is suitable. Where balanced conditions may not exist when relay operation is required, the 3-phase relay design is recommended.

For supervising initiation of bus transfer where the undervoltage relay is measuring the residual voltage of the motor load, the 3-phase SVF or SVF-1 is recommended since one or more phase voltages may be reduced by a fault on the supply circuit prior to transfer.

On motor transfer schemes, the three-phase SVF or SVF-1 relay senses the magnitude of residual voltage in a motor. It allows transfer of the motor to an alternate supply source when the residual voltage has decreased to a value determined by the selected drop-out voltage setting of the relay.

Device Numbers

	SC, SC-1	SV, SV-1	SVF, SVF-1
Undercurrent	37		
Ac Overcurrent	50		
Dc Overcurrent	76		
Undervoltage		27	27
Overvoltage		59	

General Purpose Relays

Instantaneous. Adjustable

Current: Types SC, SC-1

Voltage: Types SV, SV-1, SVF, SVF-1

Small Glass Projection Case

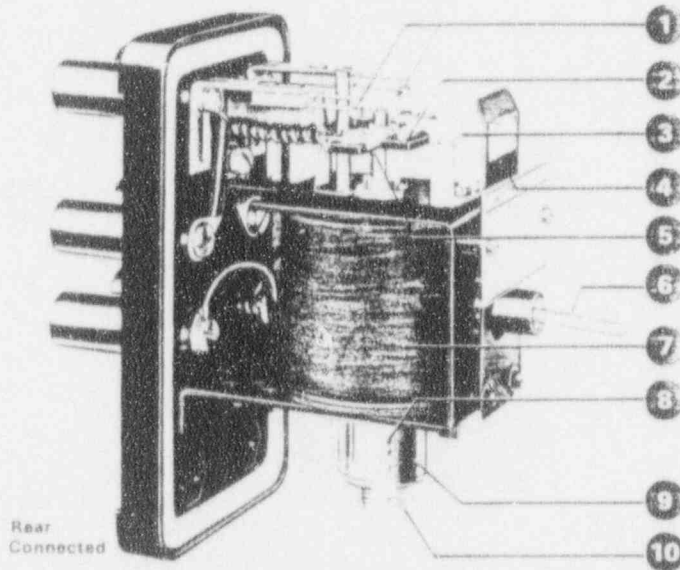


Fig. 2

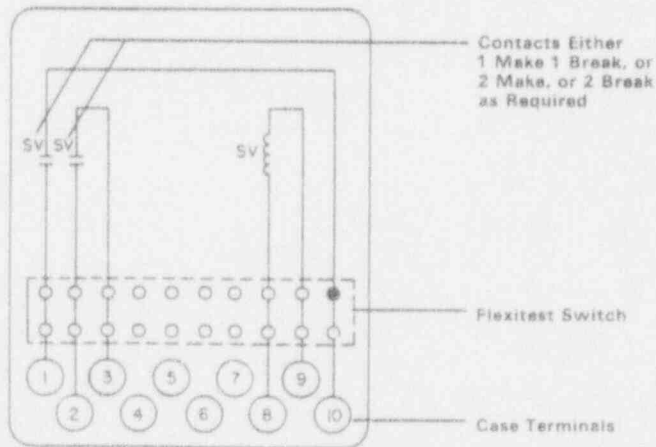


Fig. 10

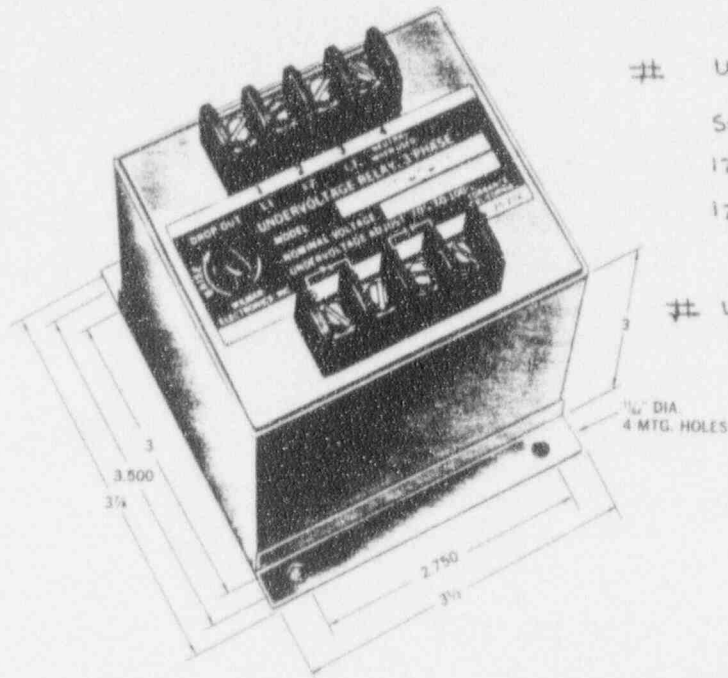
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EXHIBIT 3
(1 page)

WILMAR LITERATURE FOR WUV RELAYS

VOLTAGE SENSITIVE RELAYS

BULLETIN 001



WUV-1-120-H
 SINGLE Phase
 120 VAC Nominal
 125 VDC Rated Contacts

WUV-1-120-HB
 2 N.C. CONTACTS

UL FILE #E58048
 CSA FILE #LR61158

SPECIFICATIONS

NOMINAL VOLTAGE 120 VAC to 575 VAC, single or three phase (See Ordering Instructions).

LINE FREQUENCY 50-400 Hz.

PICK-UP TO DROP-OUT DIFFERENTIAL 2.5% maximum

DROP-OUT POINT (U/V MODELS) Screwdriver adjustable, 70% to 100% of nominal voltage.

PICK-UP POINT (O/V MODELS) Screwdriver adjustable, 100% to 125% of nominal voltage.

OUTPUT CONTACTS One set N.O., one set N.C.

CONTACT RATING 5 Amp. resistive at 120VAC
 "H" SUFFIX or 28VDC.
 3 Amp resistive at 120VDC

OPERATING TEMPERATURE RANGE -20°C to +65°C

POWER CONSUMPTION 2 VA maximum

TIME DELAY A time delay is provided to prevent nuisance tripping due to momentary dips or surges in voltage. The drop-out delay of the U/V model is 150-300 milliseconds. A Time versus Voltage curve of the O/V models is shown on the reverse side.

MINIMUM LIFE 500,000 operations

CONSTRUCTION Solid state sensor with relay output enclosed in a sealed steel can.

NOTES:

1. Remove black screw for access to the voltage trip adjustment.
2. Clockwise rotation of the adjustment potentiometer will raise the voltage trip point.

WILMAR

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