P801 VOLTAGE DIFFERENCE RELAY

I. GENERAL DESCRIPTION

The P801 voltage difference relay is a single, unmounted printed circuit panel which includes a transistorized voltage difference detecting circuit and a mercury-wetted contact output relay. It is normally mounted in a ventilated metal enclosure either alone with any necessary auxiliary circuits or in a more complex module where it is itself auxiliary to some other function such as an amplifier.

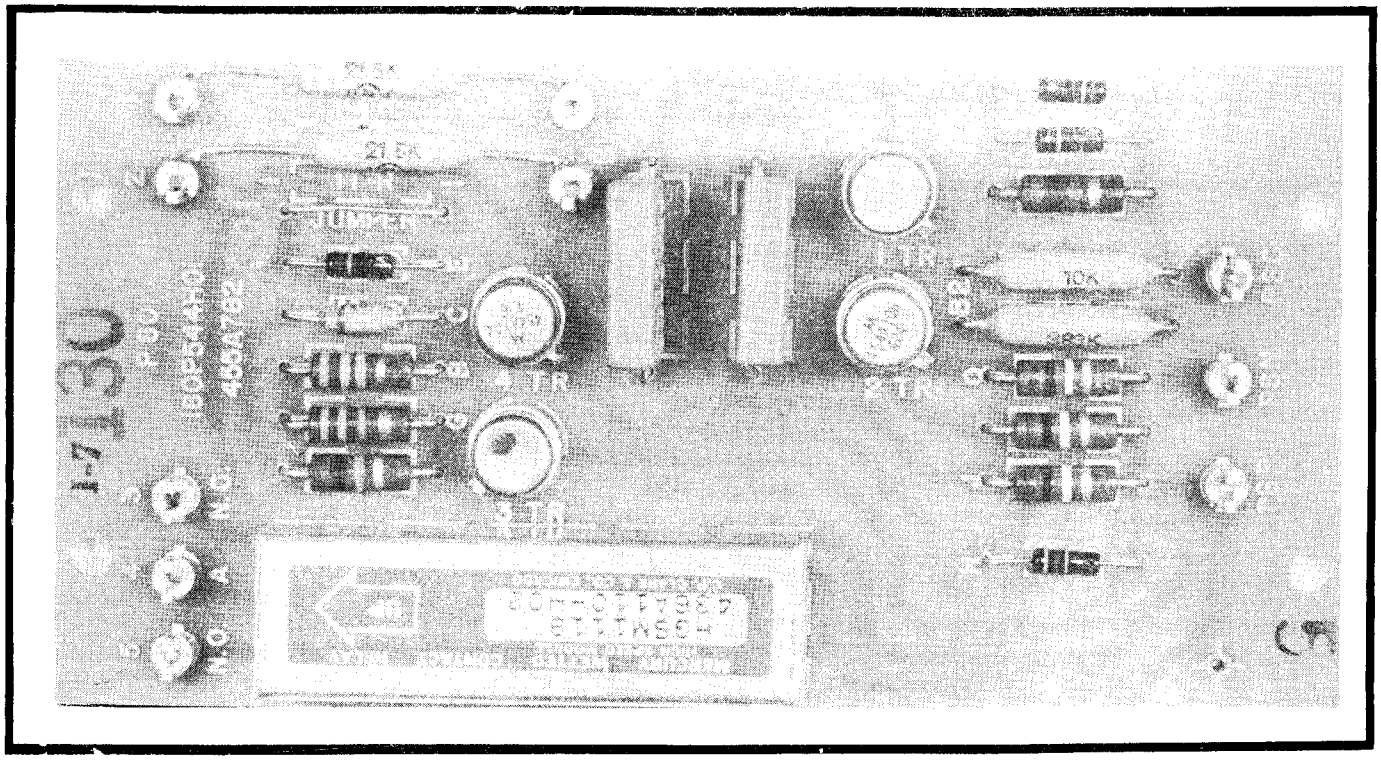

FIGURE 1 - P801 VOLTAGE DIFFERENCE RELAY

Figure 1 shows the P801 panel alone with no auxiliary apparatus.

This leaflet pertains specifically to the P801 panel alone which is standard. The schematic diagram shows only the panel circuitry. The actual complete circuit for tailored assemblies (P801 plus other components and enclosure) should, in most cases, be shown elsewhere in the instruction book for your specific order.

The P801 in this form allows Westinghouse to tailor each system to meet the application requirements.

Effective February, 1965 Supersedes I.L. 16-800-27

II. ELECTRICAL SPECIFICATIONS

External power requirements:

Volts - ±24 VDC to ±26 VDC (The values of positive and negative 24 volt supplies may differ by not more than 2%.)

Regulation - ± 1% maximum.

Ripple - 5mV maximum peak-to-peak.

III. DESCRIPTION OF OPERATION

The circuit of the P801 voltage difference relay is shown in Figure 2.

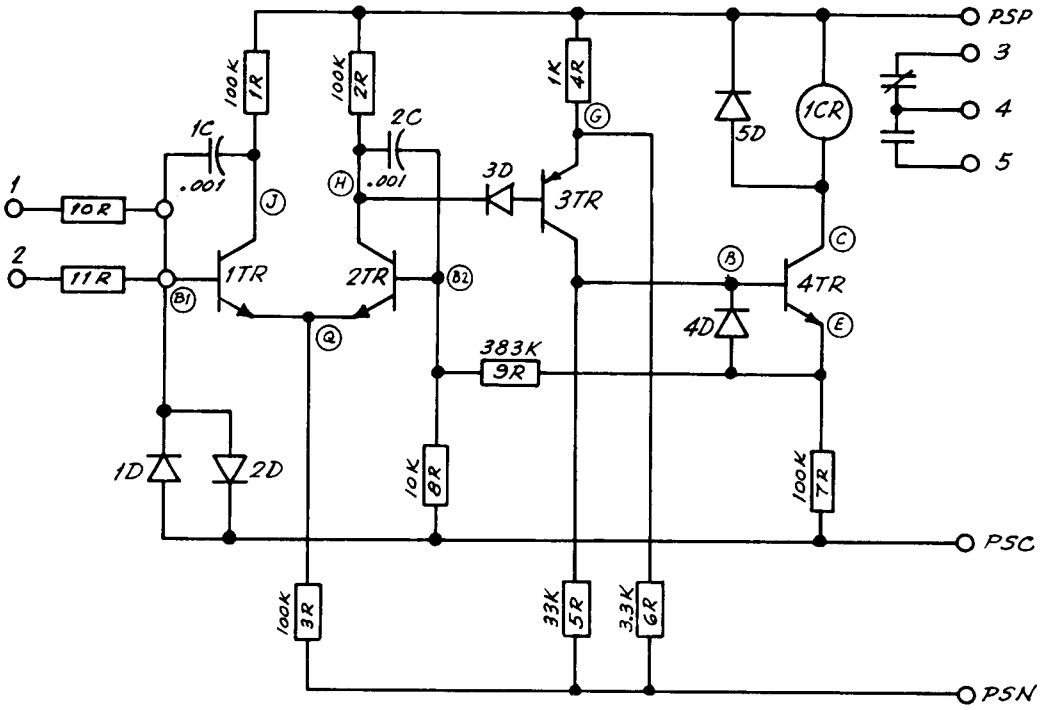

FIGURE 2 - SCHEMATIC DIAGRAM

The signals to be compared are connected between 1 and PSC and 2 and PSC respectively. The polarities of terminals 1 and 2 must be opposite. The signals are summed and the difference appears at B1.

Transistors 1TR and 2TR compose a differential first stage of a two-stage voltage amplifier, 3TR being the second stage. 4TR is a switching transistor which is always on or off and operates relay 1CR. Resistor 9R provides a feedback which insures a lock-in differential between pickup and dropout values of input. Diodes 1D, 2D, 3D, and 4D are for the purpose of limiting the input voltage to each transistor to avoid damage because of overdrive from the previous stage.

The relay tends to pickup when the difference in input voltages PSC-1 and PSC-2 is moving in the negative direction.

IV. OPERATING CHARACTERISTICS

Figure 3 shows the difference between input voltage V1 and V2 at which pickup and dropout of relay 1CR occur when V1 (voltage PSC to 1) is variable and V2 the fixed reference or when the opposite is true. These characteristics are a function of the values of resistors 10R and 11R in figure 2. The characteristics of your P801 can be determined either by the drawing and group number identification (example: 455A782G03) or by determining the values of 10R and 11R which exist on your actual P801.

Make-Before-Break Relay Dwg. 455A782		G01	G02	G03	G04	G05	G06
Break-Before-Make Relay Dwg. 455A782		G07	G08	G09	G10	G11	G12
10R		21.5K	31.6K	56.2K	68.1K	100K	100K
11R		21.5K	14.7K	12.1K	12.1K	12.1K	10K
Maximum Pickup Voltage Difference--mV							
Ref.	Variable						
V2	V1	±65	±100	±180	±220	±325	±325
V1	V2	±65	±46	±38	±38	±38	±32
Maximum Pickup Dropout Difference--mV							
Ref.	Variable						
V2	V1	65	100	180	220	325	325
V1	V2	65	46	38	38	38	32

FIGURE 3 - P801 PICKUP & DROPOUT CHARACTERISTICS

V. ADJUSTMENTS

The P801 has no built in adjustments. When unequal input voltages at 1 and 2 are to be compared, or adjustment is required, external potentiometers or voltage dividers are used in one or both input circuits.

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VI. TROUBLE SHOOTING

The P801 will be formed in an enclosure either alone or with other apparatus. It may or may not have input adjustment potentiometers. If there are, they will be mounted on the front of the enclosure.

The normal procedure for locating a defective part may be applied in servicing this module. It is assumed that persons servicing this equipment possess those basic skills. The description of operation will supplement the serviceman's basic knowledge for servicing this unit. The simplest procedure for proving whether a module (or panel) is defective or not is to substitute one known to be good. The steps below will assist the serviceman in determining if a P801 is defective or not in the event that a spare is not available.

Step No.	Procedure
1	Remove panel from control system.
2.	Make operational check of panel.
2a	Visually check all connections on printed circuit boards for tightness and continuity.
2b	Apply a signal (10 VDC suggested) from PSC to 1 and an adjustable signal 0 to 24 VDC from PSC to 2. Also apply rated DC supply voltages to PSP, PSC, and PSN being very careful of polarity. Reversed polarity will damage the unit by overloading 7R.
2c	Adjust the voltage PSC-2 from less than to more than that applied to PSC-1 and measure the pickup and dropout values of the difference between the two input voltages with a carefully calibrated vacuum tube voltmeter. Connections for this measurement may be as suggested in figure 4. The maximum pickup and dropout difference is as listed in figure 3. If they differ more than this, the panel is probably defective and step 3 should be followed.

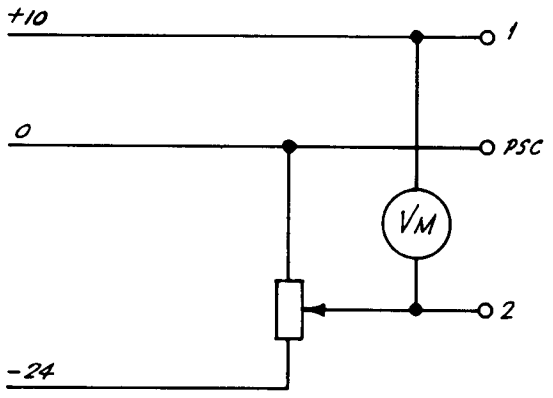

FIGURE 4 - TEST CIRCUIT

Step No.	Procedure
3	Check bias voltages using an accurately-calibrated, vacuum tube voltmeter. Measure voltages between test points marked on the printed circuit board and PSC. Test points and values are as follows where E is with relay energized and N not energized. Power supply vtg. should be ±24 volts for test.

Test Point	Typical Reading (Volts DC)	Permissible Range on Reading
G	E + 10 N + 13	±10%
B	E + 2.3 N - 0.7	
C	E + 1.6 N + 24	
E	E + 1.55 N - 0.07	
B1	E 0 to -0.7 N 0 to +0.7	
J	E + 15 to +24 N + 14 to +0.45	
H	E + 8.6 to +11.5 N + 11.5 to +24	
Q	E - 1.75 N - 1.75 to +0.12	
B2	E + 0.01 N - 0.01	

VII. SPARE PARTS RECOMMENDATIONS

The most desirable arrangement for minimizing down time in the event that trouble occurs is to have at least one spare module on hand for each unique design used on your equipment. This enables the customer to get the equipment back in service quickly and allows repair of the defective module to be handled in a more orderly manner. The ordering identification for each complete module is contained on a nameplate in a conspicuous place on the module.

For ultimate servicing of the defective individual modules, printed circuit boards with their associated components assembled are available.

The part number for these assemblies may be taken directly from the printed circuit board. A typical part number is 455A782G03; note the G. The board identification (without parts) is also shown. A typical part number for the bare board is 180P544H01; note the H.

Spare parts identifications for individual components contained within a printed circuit board assembly can be supplied on request. When ordering, please supply the identification of the assembly (see above instructions advising where it can be found).

Your nearest Westinghouse Sales or Service office can assist you with the procurement of spares.

VI. SERVICE

Your nearest Westinghouse Sales or Service office will be pleased to advise you on any service problems.

Westinghouse Electric Corporation

Systems Control Division, Buffalo, New York

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