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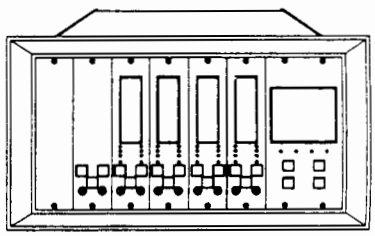
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PART NO. 84607-01

3300/70 DUAL VALVE POSITION INDICATOR

OPERATION MANUAL

BENTLY NEVADA



NOTICE

READ THE FOLLOWING BEFORE INSTALLING OR OPERATING EQUIPMENT

Bently Nevada Corporation has attempted to identify areas of risk created by improper installation and/or operation of this product. These areas of information are noted as **WARNING** or **CAUTION** for your protection and for the safe and effective operation of this equipment. Read all instructions before installing or operating this product. Pay particular attention to those areas designated by the following symbols.

WARNING

HIGH VOLTAGE PRESENT
COULD CAUSE SHOCK
BURNS OR DEATH

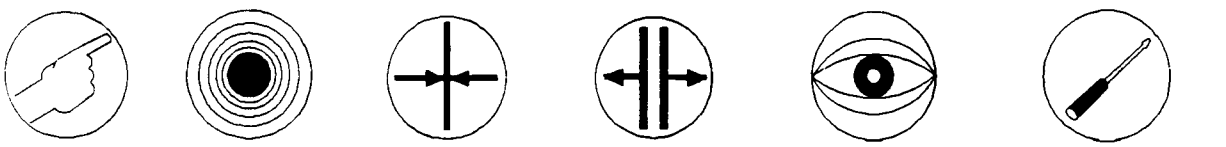
DO NOT TOUCH EXPOSED
WIRES OR TERMINALS

CAUTION

Machine Protection
Will Be Lost

SYMBOLS

Special symbols are used in the manual to illustrate specifics in the step by step processes. For example:



FORWARD

This document is for control room personnel who operate the 3300 Monitoring System. The procedures are presented in step-by-step graphic format.

RELATED DOCUMENTS

3300 System Overview, 80177

3300 System Installation Instructions, 80172

3300 System Troubleshooting, 80173

3300/10 Power Supply, 80174

3300/01 System Monitor, 80175

3300/70 Dual Valve Position Indicator Maintenance Manual, 84608-01

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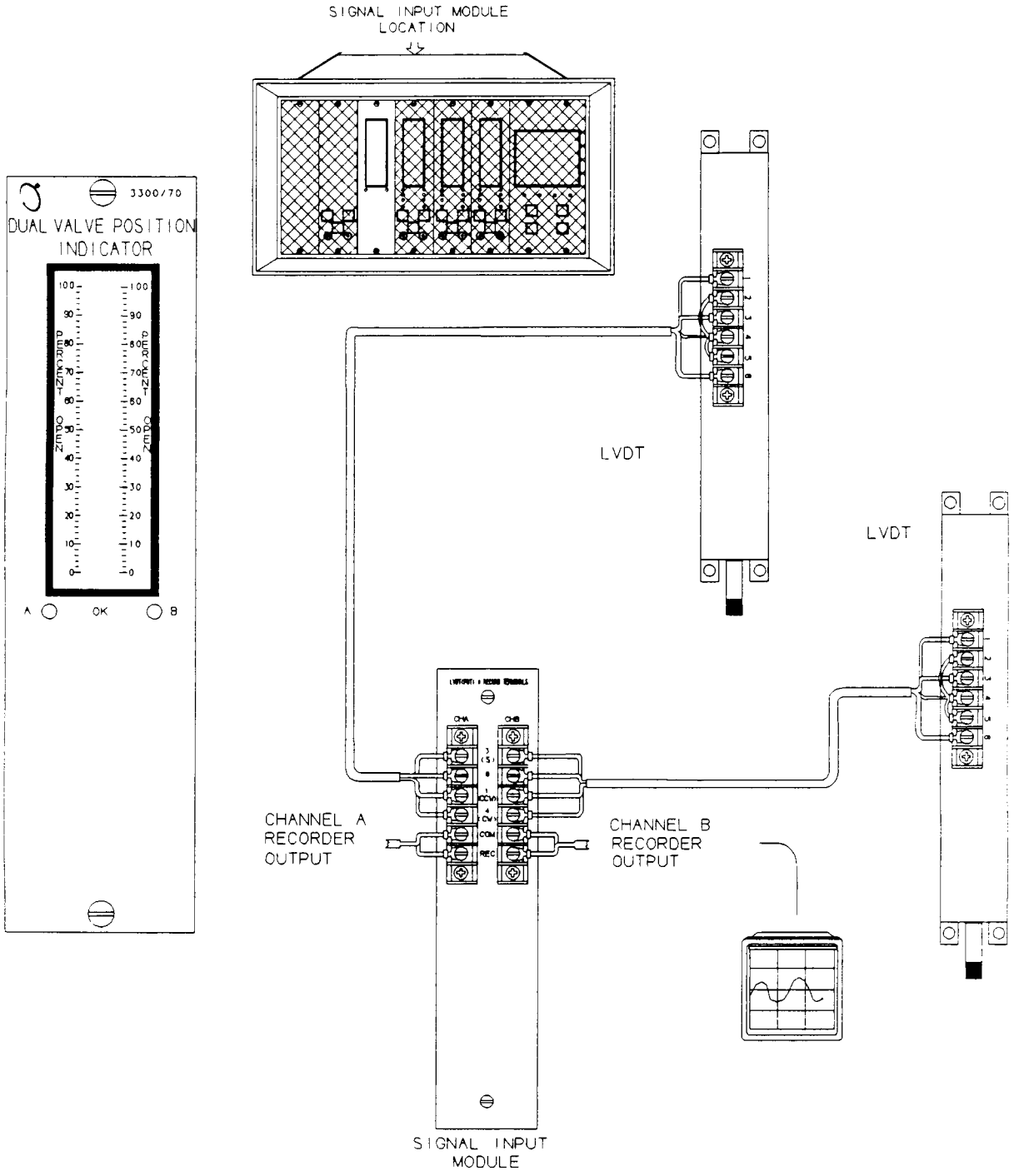
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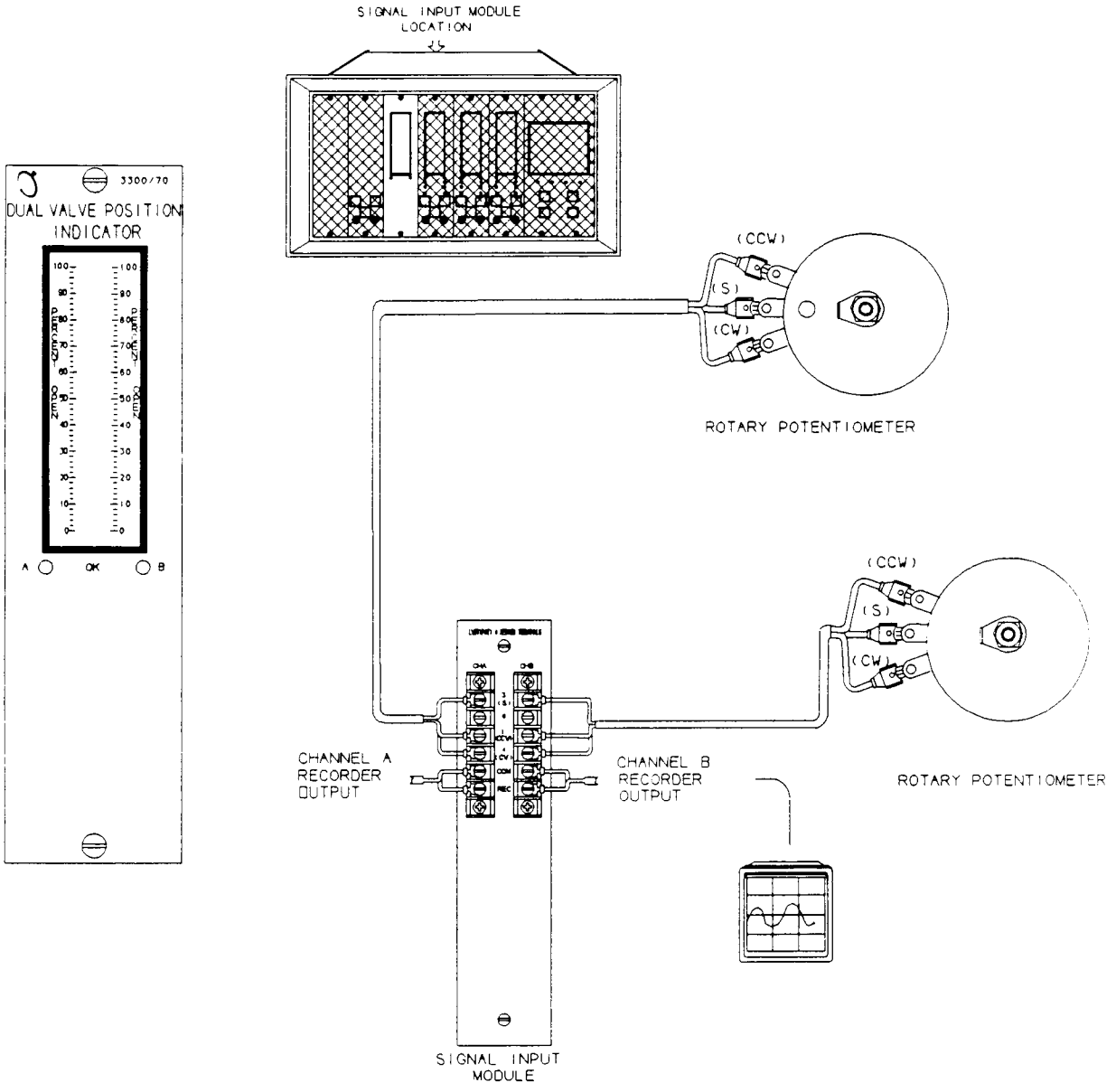
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1 VALVE POSITION INDICATOR LVDT SYSTEM



1 VALVE POSITION INDICATOR POT. SYSTEM



2 INDICATOR TRANSDUCER OPTIONS

DUAL VALVE POSITION
INDICATOR PART NUMBER

TRANSDUCER TYPE

3300/70 ——— AA

01 = 5000 OHM POTENTIOMETER 90 DEGREES TO 300 DEGREES FULL SCALE ROTATION
02 = 5000 OHM POTENTIOMETER 50 DEGREES TO 90 DEGREES FULL SCALE ROTATION
03 = +/- 1.0 INCH (+/- 25mm) A.C. LVDT -> 2 INCHES (50 mm) = FULL SCALE
04 = +/- 2.0 INCH (+/- 50mm) A.C. LVDT -> 4 INCHES (100 mm) = FULL SCALE
05 = +/- 3.0 INCH (+/- 75mm) A.C. LVDT -> 6 INCHES (150 mm) = FULL SCALE
06 = +/- 5.0 INCH (+/- 125mm) A.C. LVDT -> 10 INCHES (250 mm) = FULL SCALE

3 PROGRAMMABLE OPTIONS

OK MODE	NONLATCHING LATCHING TIMED OK / CHANNEL DEFEAT
BYPASS CHANNEL A BYPASS CHANNEL B	ENABLE / DISABLE ENABLE / DISABLE
RECORDER OUTPUT OPTIONS	+1 TO +5 Vdc 0 TO -10 Vdc +4 TO +20 mAdc

4 INDICATOR FUNCTIONS

DUAL VALVE POSITION - The Dual Valve Position Indicator provides a continuous indication of relative (0 to 100 percent) valve opening on two channels (A and B). The Valve Position Indicator can be configured to operate with either one of four types of A.C. LVDTs or a Rotary Potentiometer. The same type of transducer must be used on both channels.

The **Linear Variable Differential Transformer (LVDT)** is an electromechanical transducer whose electrical output varies with the linear displacement of its movable iron core. The iron core is connected to the valve's operation linkage.

The **Rotary Five Thousand Ohm (5 Kohm) Potentiometer** is a variable resistor whose resistance changes with the rotation of its center shaft. This center shaft is connected to the cam shaft driving the valve linkage.

OK - Both the Potentiometer Transducer Option and the A.C. LVDT Transducer Options have OK circuitry. In the case of the Rotary Potentiometer, the OK circuitry checks for an open wire to the tranducer in addition to a shorted transducer. In the case of the LVDT, the OK circuitry checks for an open or shorted primary field wire and an open secondary field wire. Detection of any of the above conditions is indicated by turning OFF the appropriate channel's green LED and deenergizing the OK Relay.

If the Indicator is configured for **Nonlatching OKs**, then once the transducer error is corrected the LED is turned back on and the OK relay is energized.

If the Indicator has the **Latching OK** option, a System Reset is required to reset the OK function when the transducers return OK.

If the Indicator has **Timed OK / Channel Defeat** configured, a 30 second time out period exists after the monitor returns OK. The System Reset is then required to restore the flashing green LED to a steady ON state.

OK RELAY - The OK Relay is located on the Power Input Module. Every channel in the rack must be OK or bypassed to energize the OK Relay.

RECORDER OUTPUT - The Indicator has a recorder output for each channel. The recorder output is proportional to valve opening. Depending on the option selected, the recorder outputs are 0 to -10Vdc, +1 to +5Vdc, or +4 to +20mA.

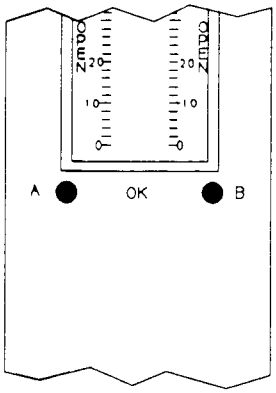
SELF TEST - The monitor has three categories of self test: Power-Up, Cyclic, and User-Invoked.

Power-up self test is performed automatically each time the monitor power is turned on. A series of basic tests and transducer OK tests are performed.

Cyclic self test is performed automatically during monitor operation. Errors encountered during cyclic tests disable the monitor, and flash an LCD bargraph error code. Should the error be intermittent, the monitor will return to operation, but the error codes are stored for retrieval during user-invoked self tests. Stored error codes are indicated by OK LEDs flashing at 5 Hz provided that the channel is OK.

User-Invoked self test performs power-up self test and allows error messages stored during Cyclic self tests to be read and cleared. Stored errors are annunciated by flashing the **OK** LEDs at 5 Hz and displaying the error codes on the front panel LCD bargraph.

5 OK



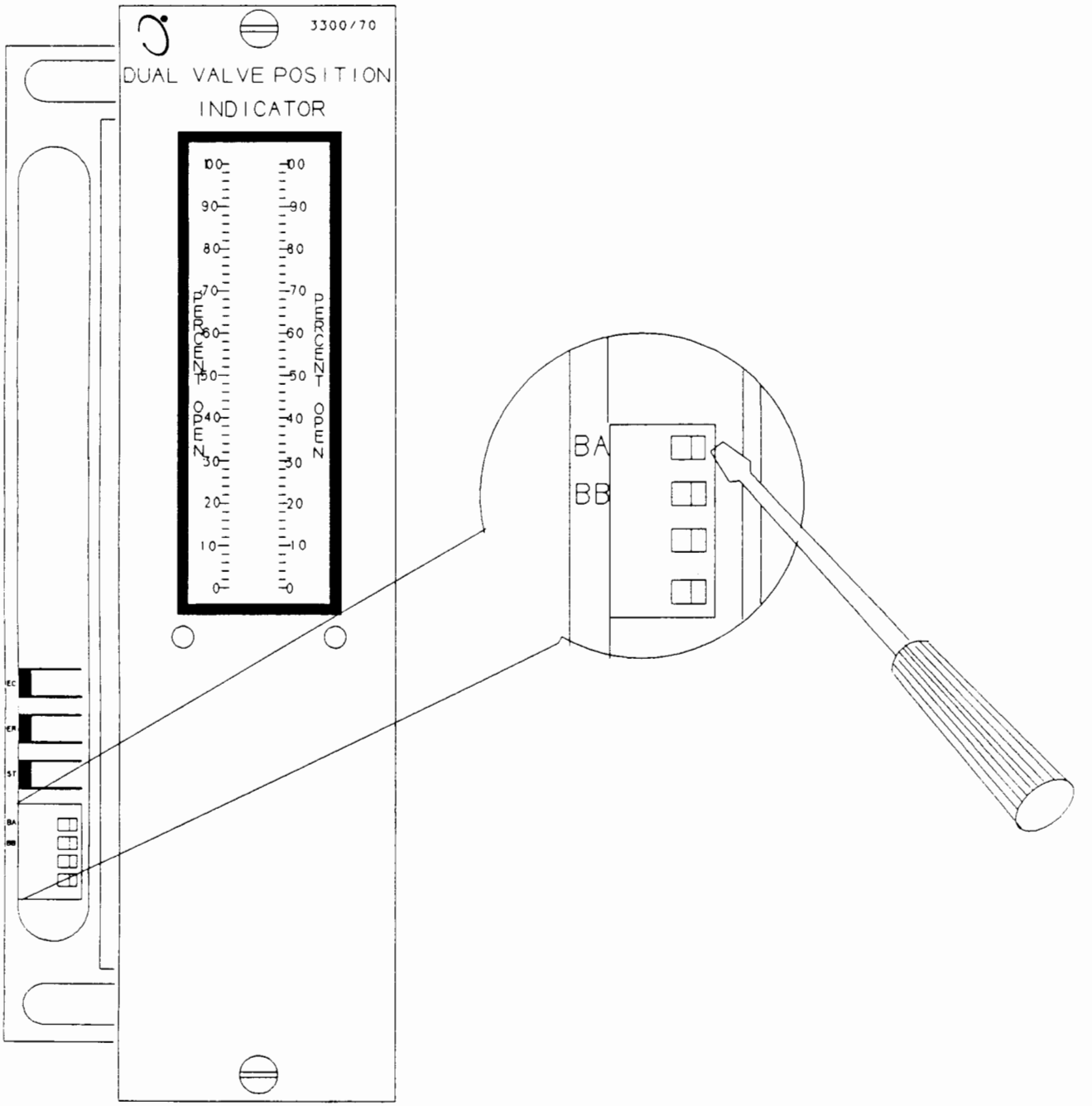
NOTE: EACH CHANNEL IN THE SYSTEM CONTROLS THE OK RELAY. THEREFORE, EITHER CHANNEL CAN CAUSE A NOT OK RELAY CONDITION (DE-ENERGIZED RELAY)

LED DISPLAY A		LED DISPLAY B	CONDITION	OK RELAY DRIVE *
●	OK	●	CHANNEL A AND B IN OPERATING RANGE	ON
●	OK	○	RESPECTIVE CHANNEL A OR B TRANSDUCER IN NOT OK CONDITION OR BYPASSED. *	OFF *
○	OK	●		
○	OK	○	MONITOR IN SELF TEST, OR BOTH TRANSDUCERS IN NOT OK CONDITION OR BYPASSED. *	OFF *
◉	OK	◉	FLASHING AT 5 Hz = ERROR ENCOUNTERED DURING CYCLIC TEST. READ ERROR MESSAGE SEE SECTION 8.	ON
◉	OK	◉	WITH TIMED OK / CHANNEL DEFEAT ENABLED, AFTER A 30 SECOND DELAY, THE OK CHANNEL'S LED WILL FLASH AT 1 HZ IF EITHER OR BOTH CHANNELS WERE NOT OK. DURING A POWER UP BOTH LEDS WILL FLASH IN THIS MODE AFTER THE 30 SEC. DELAY. SYSTEM RESET IS REQUIRED TO RESET THE FLASHING LEDS.	ON
●	OK	◉		
◉	OK	●		

* NOT OK CHANNEL CAN BE BYPASSED TO RESTORE RELAY OK CONDITION

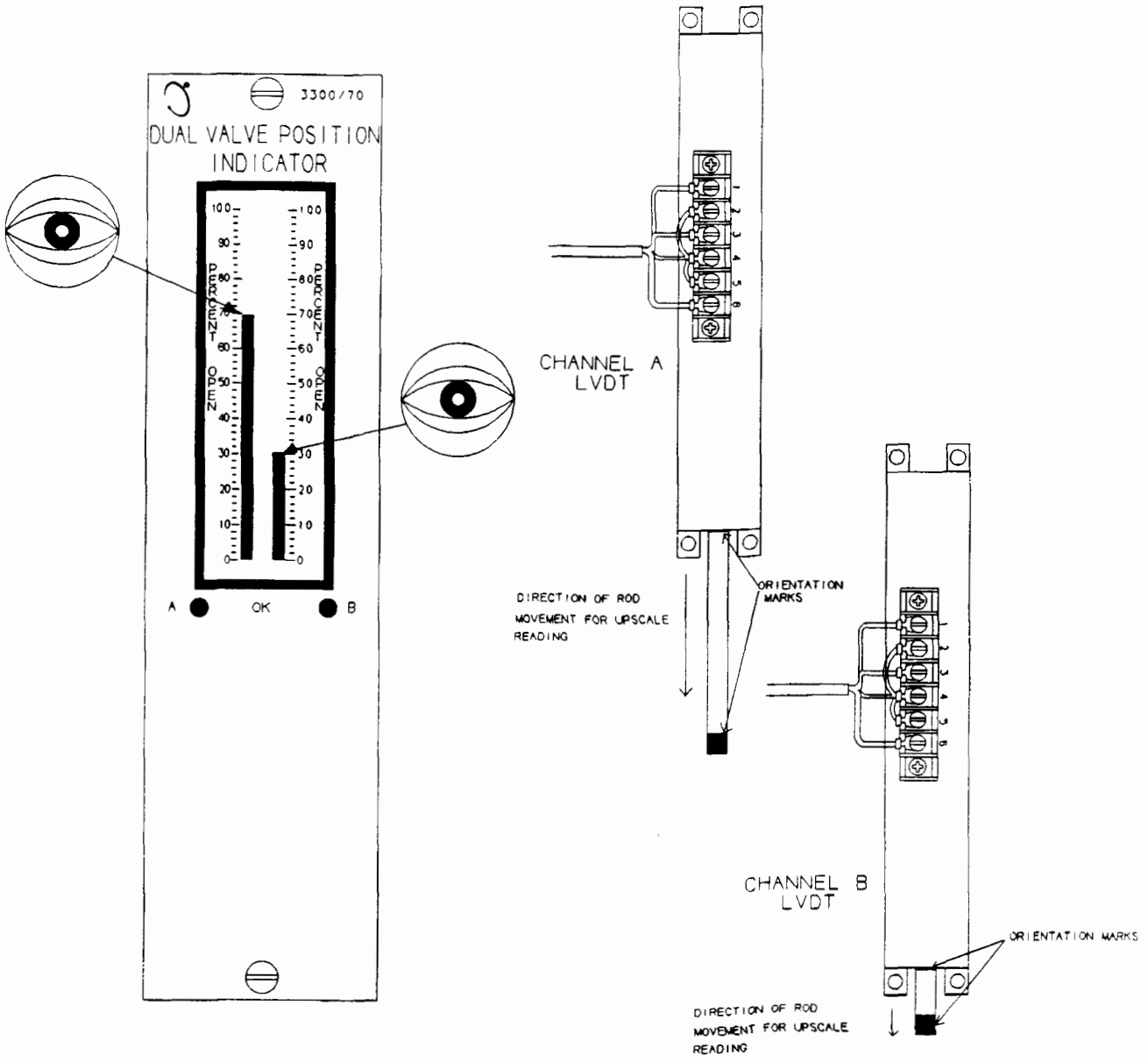
6 BYPASS

INDICATOR CHANNELS MAY BE INDIVIDUALLY BYPASSED VIA THE DIP SWITCH BEHIND THE FRONT PANEL. BYPASSING A CHANNEL THAT IS NOT OK, CLEARS THE OK RELAY. BYPASSING A CHANNEL WHICH IS OK TURNS OFF THE **OK** LED. IN EITHER CASE, BYPASSING A CHANNEL CAUSES THE BARGRAPH AND RECORDER OUTPUT FOR THAT CHANNEL TO READ ZERO.



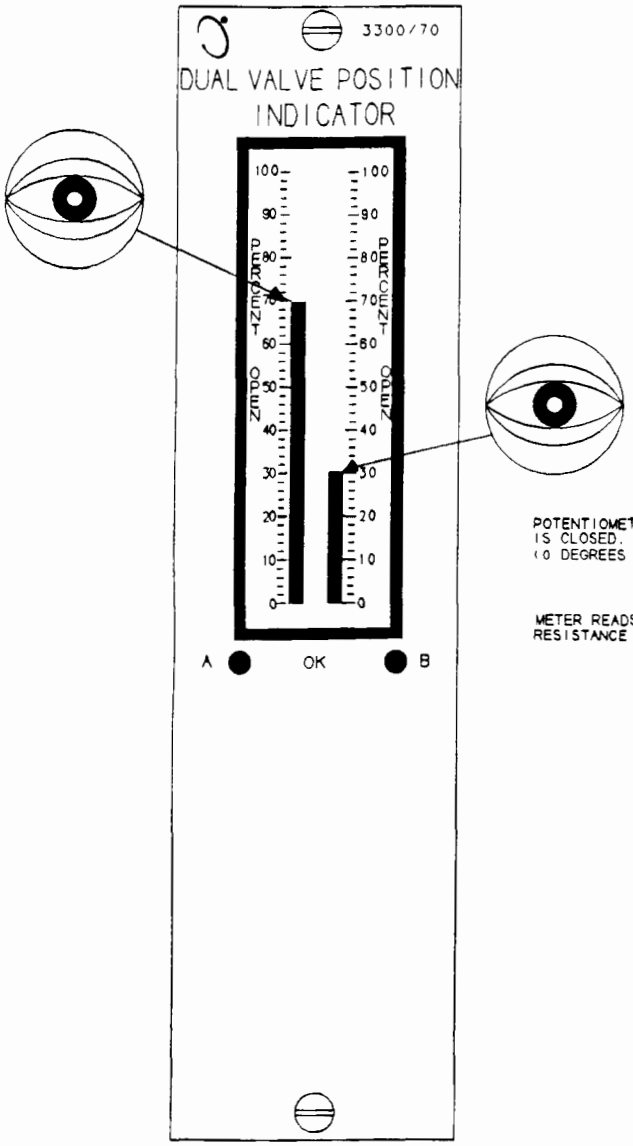
7 READ CHANNEL VALVE POSITION (POT.)

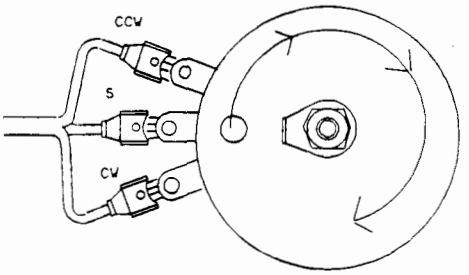
INDICATOR CONTINUOUSLY INDICATES MEASURED VALVE POSITION FOR CHANNELS A AND B.



7 READ CHANNEL VALVE POSITION (POT.)

INDICATOR CONTINOUSLY INDICATES MEASURED VALVE POSITION FOR CHANNELS A AND B.

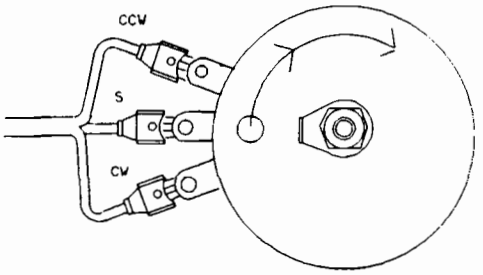




CHANNEL A POTENTIOMETER

POTENTIOMETER IS CONNECTED SO THAT WHEN THE VALVE IS CLOSED, THE POTENTIOMETER IS AT MAXIMUM RESISTANCE (0 DEGREES S REFERRED TO CW)

METER READS UPSCALE AS THE POTENTIOMETER RESISTANCE DECREASES (WITH S REFERRED TO CW)

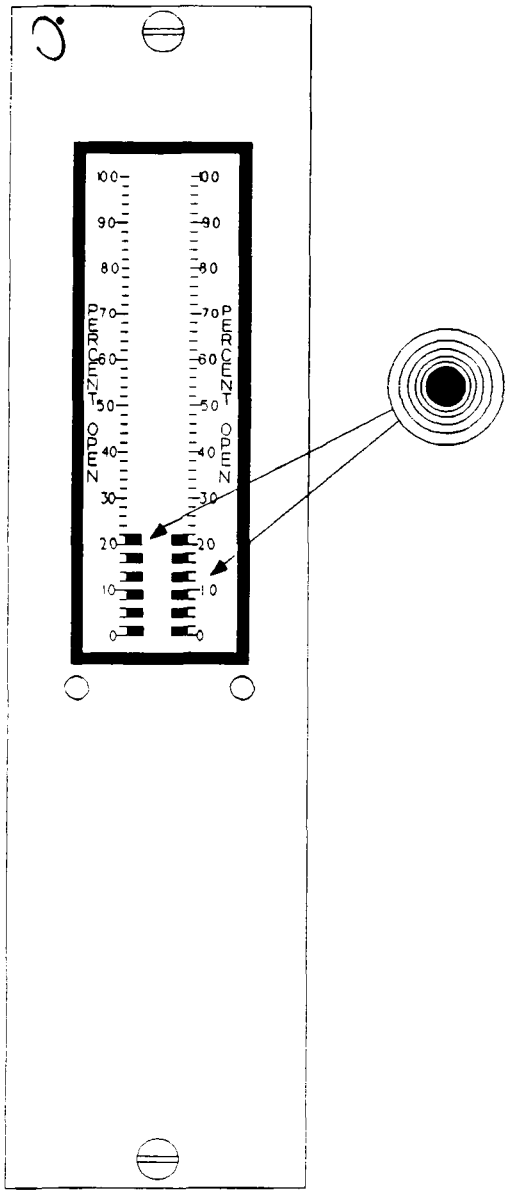


CHANNEL B POTENTIOMETER

8 SELF TEST

THE MONITOR HAS THREE LEVELS OF SELF TESTS:

POWER-UP SELF TEST: PERFORMED ONLY WHEN MONITOR IS TURNED ON.
CYCLIC SELF TEST: PERFORMED CONTINUOUSLY.
USER-INVOKED SELF TEST: PERFORMED ONLY WHEN INITIATED BY USER.



IF ERRORS ARE DETECTED DURING CYCLIC SELF TESTS:

MONITORING IS ABORTED UNTIL THE ERROR IS RESOLVED.

ERROR CODE IS STORED IN MEMORY AND FLASHED ON THE LCD BARGRAPH DISPLAY.

THE **OK** LED FLASHES AT 5 HZ.

IF ERROR IS INTERMITTENT AND GOES AWAY:

MONITORING IS RESUMED AND **OK** LED FLASHES AT 5 HZ.

ERROR CODE IS STORED. USER INVOKED TEST DISPLAYS AND CLEARS ERROR.

IF ERRORS ARE DETECTED DURING POWER-UP TEST OR USER-INVOKED SELF TEST:

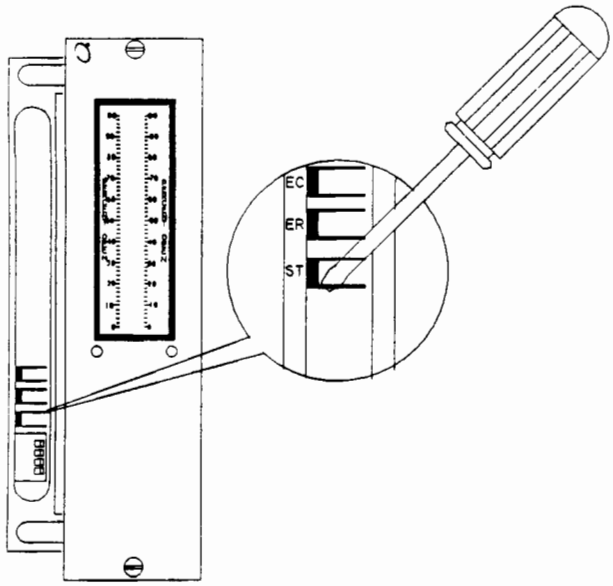
MONITORING IS ABORTED UNTIL USER ACTION RESOLVES PROBLEM.

TEST CAN BE RERUN WITH MONITOR POWER UP OR USER INVOKED TEST.

NOTE
ALTHOUGH BOTH COLUMNS ON THE BARGRAPH FLASH, THE ERROR CODE IS ONLY THE SUM OF THE BARGRAPH SEGMENTS DISPLAYED IN ONE COLUMN. EXAMPLE SHOWS ERROR CODE 6.

8 SELF TEST [CONT]

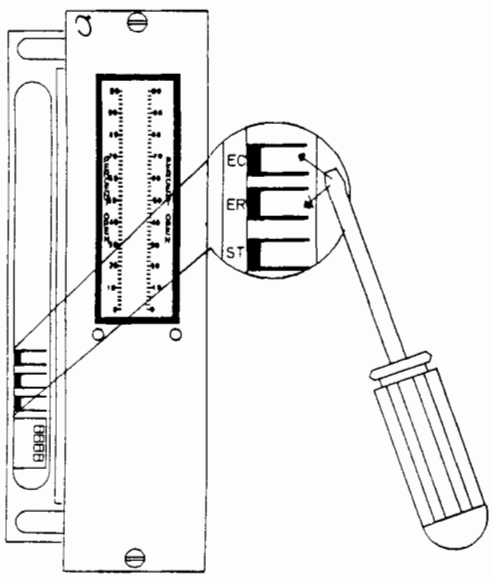
INITIATE USER-INVOKED SELF TEST BY SHORTING ACROSS TWO SELF-TEST (ST) PINS.



CAUTION

VALVE POSITION INDICATION WILL BE LOST FOR DURATION OF TEST

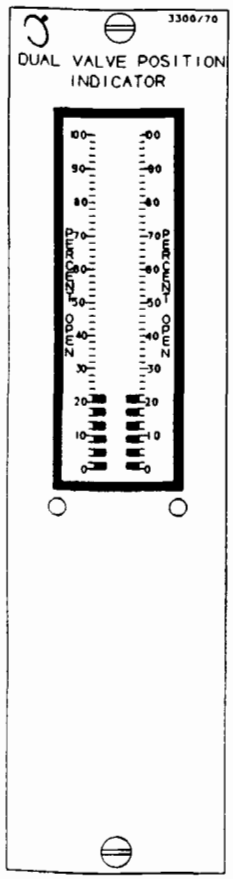
AT COMPLETION OF USER-INVOKED SELF TEST INDICATOR WILL RECALL STORED ERROR CODES, IF ANY. THESE ERROR CODES MUST BE READ AND CLEARED WITH USER INTERACTION TO ALLOW INDICATION TO CONTINUE.



READ CODES ON LIST; STEP THROUGH EACH ERROR CODE ON LIST BY SHORTING THE ERROR READ (ER) TERMINALS FOR APPROXIMATELY 1 SECOND.

AT THE END OF THE LIST, THE LCD BARGRAPH DISPLAYS ALL SEGMENTS. TO REREAD THE LIST HOLD SHORT THE ERROR READ (ER) TERMINALS. TO CLEAR THE LIST FROM MEMORY, HOLD SHORT THE ERROR CLEAR (EC) TERMINALS FOR APPROXIMATELY 1 SECOND.

8 SELF TEST [CONT]



ERROR CODE	DESCRIPTION
2	ROM CHECKSUM HAS FAILED. *
3	EEPROM FAILURE NO. 1. *
4	EEPROM FAILURE NO. 2. *
5	+7.5V&-VT NODE OUT OF TOLERANCE. **
6	+VRH NODE OUT OF TOLERANCE. **
7	+5V NODE #1 OUT OF TOLERANCE. **
8	MVREF NODE OUT OF TOLERANCE. **
9	+7.5V NODE OUT OF TOLERANCE. **
10	+VRL NODE OUT OF TOLERANCE. **
11	MVREF & -6.5V NODE OUT OF TOLERANCE. **
12	+5V&-7.5V NODE OUT OF TOLERANCE. **
13	+5V NODE #2 CHECK OUT OF TOLERANCE **
14	RAM FAILURE. *
17	COP WATCHDOG NOT CONFIGURED *

* THESE ERRORS ARE NONRECOVERABLE.

** TESTED ONLY AT CYCLIC SELF TEST. ERROR CODES 5 THROUGH 13 COULD BE INTERMITTENT AND RECOVERABLE.

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