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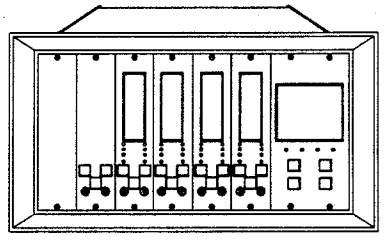
Find the *GE / Bently Nevada 3300/47-09-04-00-00* at our website: *Click HERE*

PART NO. 84415-01

3300/47 COMPLEMENTARY INPUT DIFFERENTIAL EXPANSION MONITOR

OPERATION MANUAL

BENTLY NEVADA



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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.

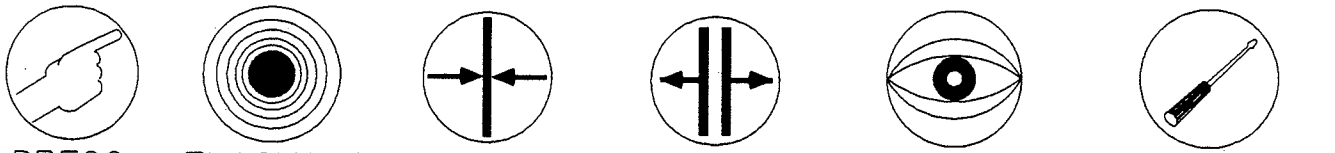
CAUTION

Machine Protection Will Be Lost

In this document procedures are given only for channel A. Procedures for channel B are similar except for the obvious substitution of corresponding switches, terminals, and indicators.

SYMBOLS

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



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FORWARD

This document is for 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

3300/47 Complementary Input Differential Expansion Maintenance, 84416-01

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CONTENTS

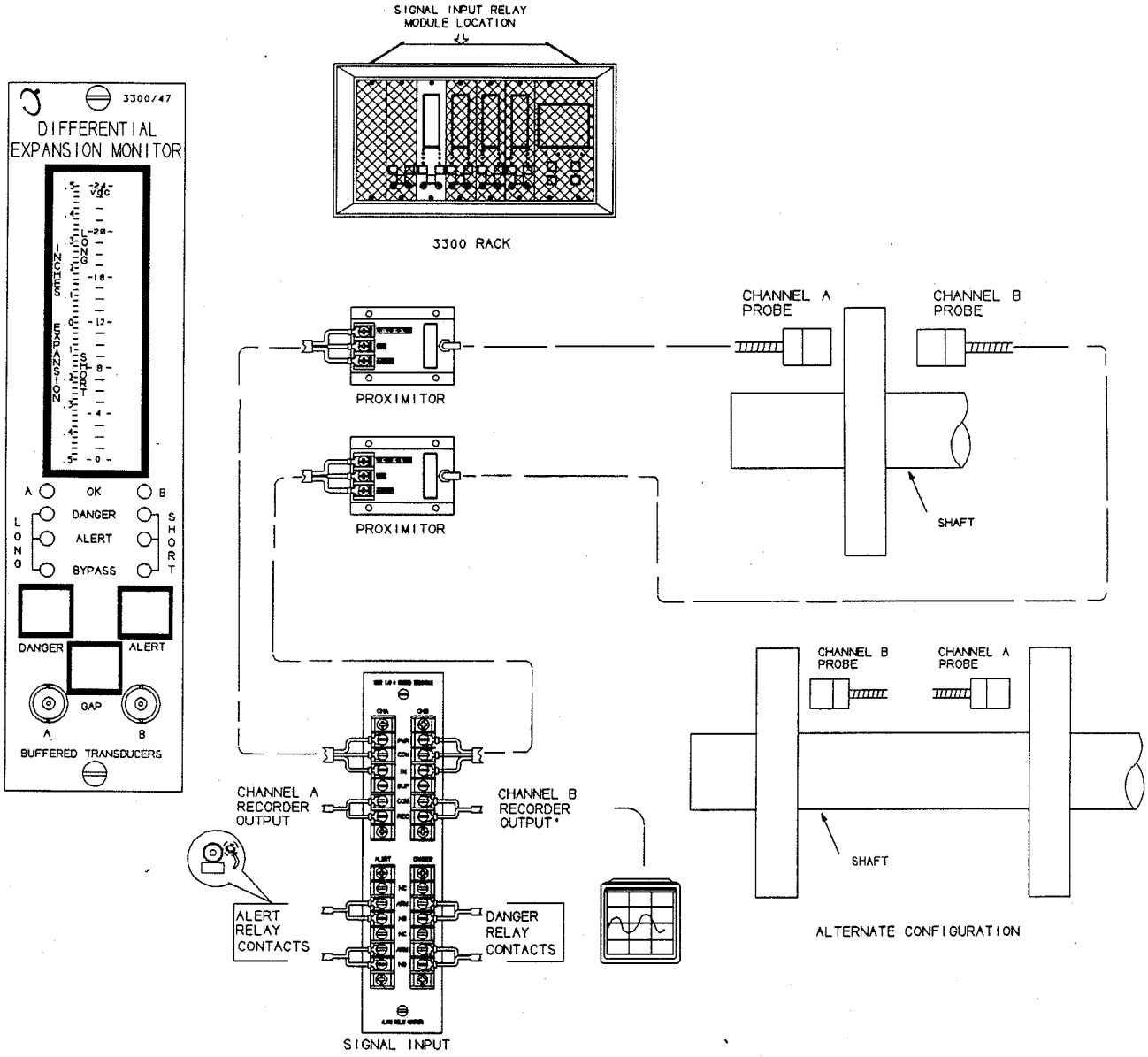
SECTION	TITLE	PAGE
1.	Differential Expansion Monitor System	1
2.	Monitor Options	2
3.	Programmable Options	3
4.	Monitor Functions	4,5
5.	OK	6
6.	Bypass	7
7.	Alert	8
8.	Danger	9
9.	Read Channel Differential Expansion	10
10.	Read Gap Voltage	11
11.	Read Setpoint Levels	12
12.	Self Test	13-15
	INDEX	16

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1 DIFFERENTIAL EXPANSION MONITOR SYSTEM



* CHANNEL B RECORDER OUTPUT IS ONLY ACTIVE DURING CALIBRATION

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2 MONITOR OPTIONS

COMPLEMENTARY INPUT DIFFERENTIAL EXPANSION MONITOR PART NUMBER

	FULL SCALE RANGE	TRANSDUCER INPUT	ALARM RELAY	AGENCY APPROVAL
3300/47	AA	BB	CC	DD
	01 = 150 - 0 - 150 MILS 02 = 0 - 300 MILS 03 = 5 - 0 - 5 mm 04 = 0 - 10 mm 05 = 0.25-0-0.25 INCHES 06 = 0 - 0.5 INCHES 07 = 10 - 0 - 10 mm 08 = 0 - 20 mm 09 = 0.5 - 0 - 0.5 INCHES 10 = 0 - 1.0 INCH 11 = 25 - 0 - 25 mm 12 = 0 - 50 mm 13 = 1.0 - 0 - 1.0 INCH 14 = 0 - 2.0 INCHES	01 = 11mm, 100 mV/mil 02 = 14mm, 100 mV/mil 03 = 25mm, 20 mV/mil 04 = 35mm, 20 mV/mil 05 = 50mm, 10 mV/mil	00 = NONE 01 = EPOXY SEALED 02 = HERMETICALLY SEALED 03 = EPOXY SEALED QUAD	00 = NOT REQUIRED 01 = CSA 02 = BASEEFA 03 = FM

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3 PROGRAMMABLE OPTIONS

MONITOR FEATURE	OPTION	MONITOR FEATURE	OPTION
FIRST OUT	ENABLED * DISABLED	DANGER MODE	LATCHING * NONLATCHING
ALARM DELAYS	0.1 SECOND 1 SECOND 3 SECOND * 6 SECOND	RECORDER OUTPUTS	+4 TO +20 mA * +1 TO +5 Vdc 0 TO -10 Vdc
NOT OK MODE	NONLATCHING * LATCHING	NOT OK MONITOR DEFEAT	ENABLED # DISABLED *
ALERT MODE	LATCHING * NONLATCHING	UPSCALE DIRECTION	TOWARD PROBE A * AWAY FROM PROBE A
METER RESPONSE TIME	FAST * SLOW	DANGER BYPASS SWITCH	ENABLED DISABLED *

* AS SHIPPED FROM FACTORY
# REQUIRES NONLATCHING NOT OK MODE

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4 MONITOR FUNCTIONS

COMPLEMENTARY INPUT DIFFERENTIAL EXPANSION - The Complementary Input Differential Expansion Monitor provides continuous monitoring of shaft growth relative to the machine case. Normal expansion direction can be toward or away from the probe A. The two probes are mounted in a complementary manner to extend the range of the transducer to twice the range of a single probe.

PROBE GAP VOLTAGE - Probe gap is measured as a negative dc voltage that is directly proportional to the gap distance between the face of a proximity probe and the surface being monitored. Probe gap voltage for each channel is displayed on the front panel meter by pressing the **GAP** switch.

OK - When the Proximitor output voltage is within its upper/lower limits, the transducer is defined as OK. The OK detection circuit controls the channel **OK** LED and the monitor relay drive to the system OK relay. Since one transducer is normally outside its linear range in the increasing gap (more negative) direction, one channel exceeding the **Upper OK Limit** will not turn off its **OK** LED. Both channels must exceed the **Upper OK Limit** before both **OK** LEDs go off. Either channel that is less than the **Lower OK Limit** will turn off its OK **LED.** If the monitor has the latching Not OK option, a System Reset is required to reset the OK function.

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.

ALARM - Pressing the **ALERT** and **DANGER** switches on the front panel of the monitor causes the Alert (first-level alarm) or Danger (second-level alarm) setpoints to be displayed on the front panel meter. **ALERT** and **DANGER** LEDs come on when the differential expansion signal level exceeds preset levels for the selected time delay, and appropriate Alert and Danger alarm relay contacts are activated.

FIRST OUT - Separate First Out circuits exist for Alert and Danger alarms. A monitor with First Out option selected flashes the **LONG** or **SHORT** alarm LED if that particular alarm was the first alarm since the last reset. Pressing the **RESET** switch acknowledges the First Out.

ALARM RELAYS - Monitor alarms can be programmed for either the latching or nonlatching mode. In the nonlatching mode, the alarm resets automatically when the alarm no longer exists. In the latching mode, the alarm condition must be reset manually by pressing the **RESET** switch on the front panel of the System Monitor (or by closing external Reset contacts). The alarm will not reset if the alarm condition still exists.

DANGER BYPASS - For maintenance functions, a Danger Bypass switch on the monitor circuit board behind the front panel can be set to inhibit the Danger relay drive. This function causes the **BYPASS** LEDs to come on. Other front panel functions are not affected. This function can be enabled by installing a jumper on the monitor.

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4 MONITOR FUNCTIONS

BUFFERED OUTPUT - The Channels A and B coaxial cable connectors on the front panel of the monitor and terminals on the Signal Input Relay Module provide buffered signals from respective channel transducers. These connectors can be used for connection of external equipment.

RECORDER OUTPUT - Depending on the option selected, the recorder output levels proportional to the measured differential expansion signal 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.

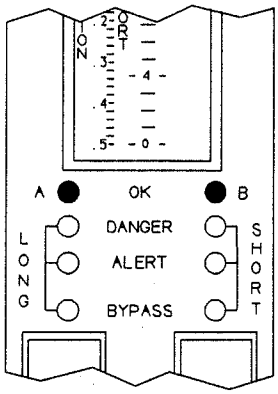
Cyclic self test is performed automatically during monitor operation. Errors encountered during cyclic tests disable the monitor and flash the error code on the LCD bargraph. If the error is intermittent, the monitor will return to operation, but the error codes are stored for retrieval during a User-invoked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

User-invoked test performs Power-up self test and allows error codes stored during cyclic 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.

Not OK Monitor Defeat - The Not OK Monitor Defeat function prevents faulty transducer wiring from causing false alarms. If a transducer is determined to be Not OK, the channel **OK** LED goes off, the Channel **BYPASS** LED comes on, the differential expansion signal is clamped to zero position, alarming is disabled, and the OK relay deenergizes. If a channel's input signal returns to an OK condition, the channel's **OK** LED will start flashing at 1Hz to indicate that the OK state is restored. After ten seconds, the **BYPASS** LED will go off, and alarming is enabled. The **RESET** switch on the System Monitor front panel must be pressed to stop the **OK** LED from flashing.

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5 OK



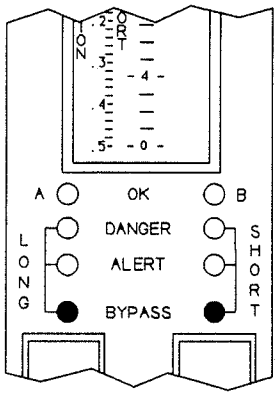
NOTE: SINCE EACH CHANNEL IN THE SYSTEM CONTROLS THE OK RELAY, EITHER CHANNEL CAN CAUSE A NOT OK RELAY CONDITION (DEENERGIZED RELAY)

LED DISPLAY A		LED DISPLAY B	CONDITION	OK RELAY DRIVE *
●	OK	●	CHANNEL A AND B IN OPERATING RANGE CHANNEL A OR B EXCEEDS UPPER OK LIMIT	ON
●	OK	○	RESPECTIVE CHANNEL A OR B LESS THAN LOWER OK LIMIT. *	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 12.	ON
◉	OK	◉	FLASHING AT 1 Hz = TRANSDUCER HAS BEEN NOT OK SINCE LAST RESET IF NOT OK MONITOR DEFEAT OPTION IS ENABLED.	ON
◉	OK	●		
●	OK	◉		

* MONITOR CAN BE BYPASSED TO RESTORE RELAY OK CONDITIONS TO THE REST OF THE RACK

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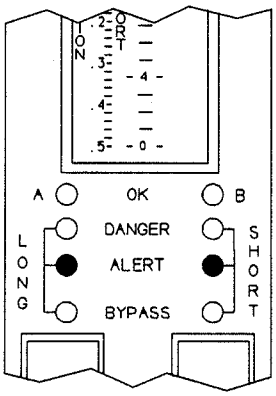
6 BYPASS



LED DISPLAY			CONDITION
LONG		SHORT	
●	BYPASS	●	MONITOR IN DANGER BYPASS MODE SYSTEM IN POWER-UP MODE USER-INVOKED SELF TEST IN PROGRESS MONITOR BYPASSED CALIBRATION MODE
◎	BYPASS	●	MONITOR OVERRANGE DURING CALIBRATION
●	BYPASS	◎	

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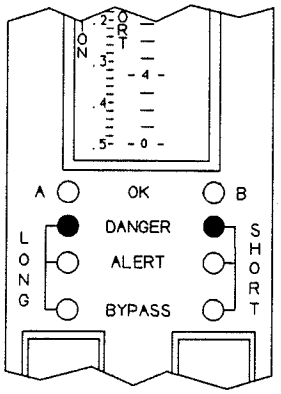
7 ALERT



LED DISPLAY			CONDITION	ALERT RELAY DRIVE
LONG		SHORT		
●	ALERT	○	DIFFERENTIAL EXPANSION SIGNAL HAS EXCEEDED THE LONG ALERT LEVEL. (SEE SECTION 11)	ON
○	ALERT	●	DIFFERENTIAL EXPANSION SIGNAL HAS EXCEEDED THE SHORT ALERT LEVEL. (SEE SECTION 11)	ON
○	ALERT	◉	FIRST OUT CONDITION FOR DIFFERENTIAL EXPANSION SIGNAL WHICH HAS EXCEEDED THE SHORT ALERT LEVEL.	ON
◉	ALERT	○	FIRST OUT CONDITION FOR DIFFERENTIAL EXPANSION SIGNAL WHICH HAS EXCEEDED THE LONG ALERT LEVEL.	ON

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8 DANGER

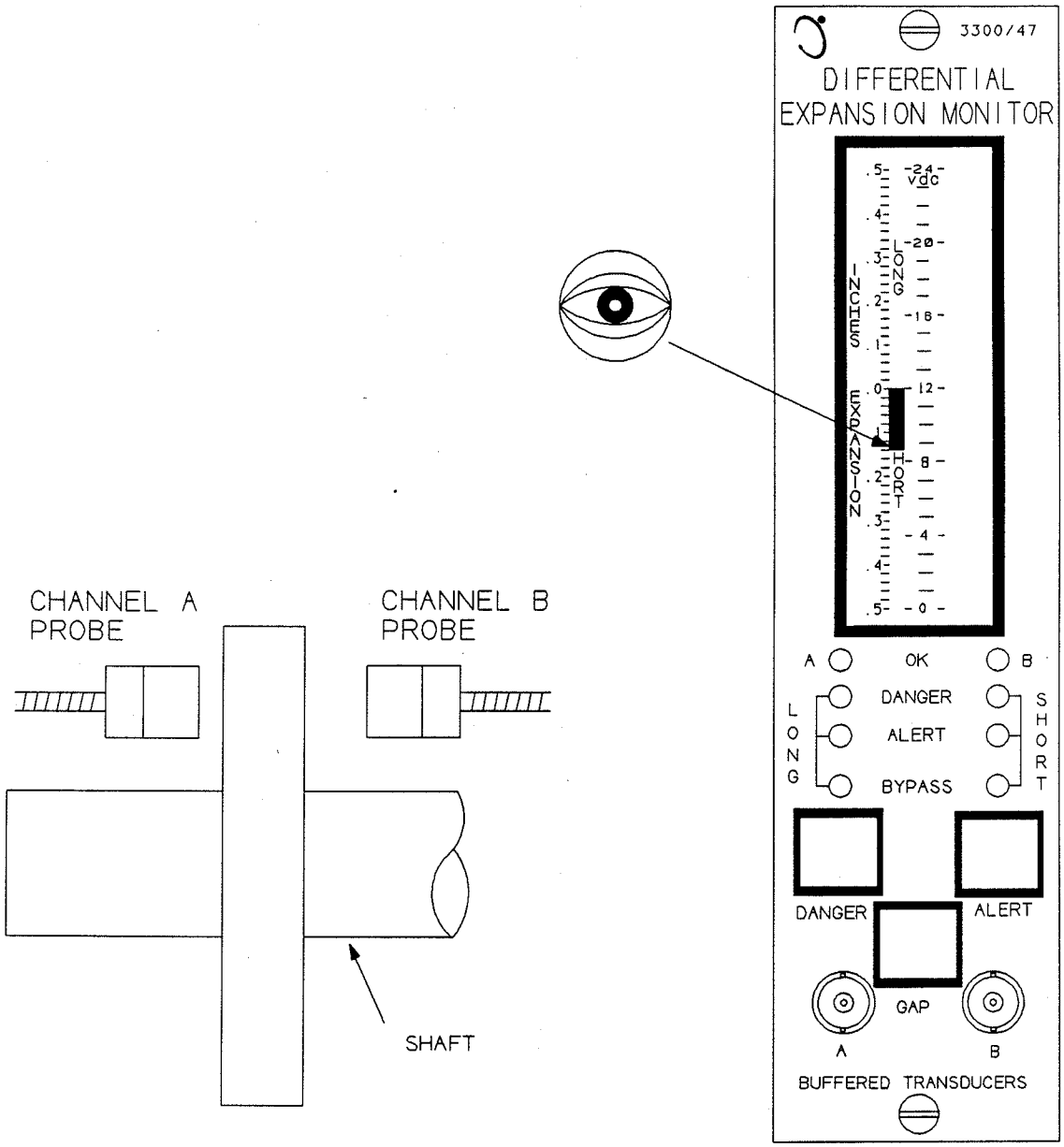


LED DISPLAY			CONDITION	DANGER RELAY DRIVE
LONG		SHORT		
●	DANGER	○	DIFFERENTIAL EXPANSION SIGNAL HAS EXCEEDED THE LONG DANGER LEVEL. (SEE SECTION 11)	ON
○	DANGER	●	DIFFERENTIAL EXPANSION SIGNAL HAS EXCEEDED THE SHORT DANGER LEVEL. (SEE SECTION 11)	ON
○	DANGER	◎	FIRST OUT CONDITION FOR DIFFERENTIAL EXPANSION SIGNAL WHICH HAS EXCEEDED THE SHORT DANGER LEVEL.	ON
◎	DANGER	○	FIRST OUT CONDITION FOR DIFFERENTIAL EXPANSION SIGNAL WHICH HAS EXCEEDED THE LONG DANGER LEVEL.	ON

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9 READ CHANNEL DIFFERENTIAL EXPANSION

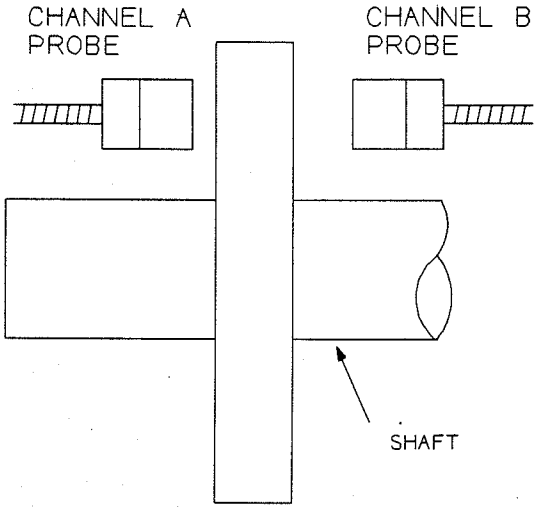
THE MONITOR CONTINUOUSLY INDICATES THE DIFFERENTIAL EXPANSION SIGNAL MEASURED FROM ZERO POSITION TO THE DIFFERENTIAL EXPANSION VALUE ON THE LEFT METER SCALE. THE DIFFERENTIAL EXPANSION SIGNAL IS A COMPOSITE SIGNAL GENERATED FROM BOTH CHANNEL A AND CHANNEL B PROBE INFORMATION.

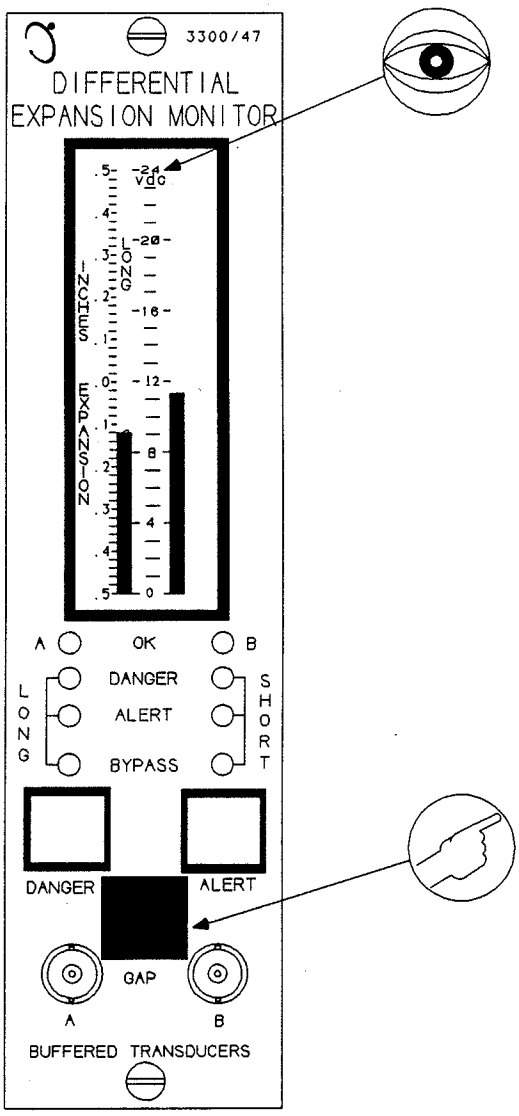


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10 READ GAP VOLTAGE

PRESS **GAP** SWITCH AND READ GAP VOLTAGE FOR BOTH CHANNEL A AND CHANNEL B ON THE METER USING THE CENTER METER SCALE.

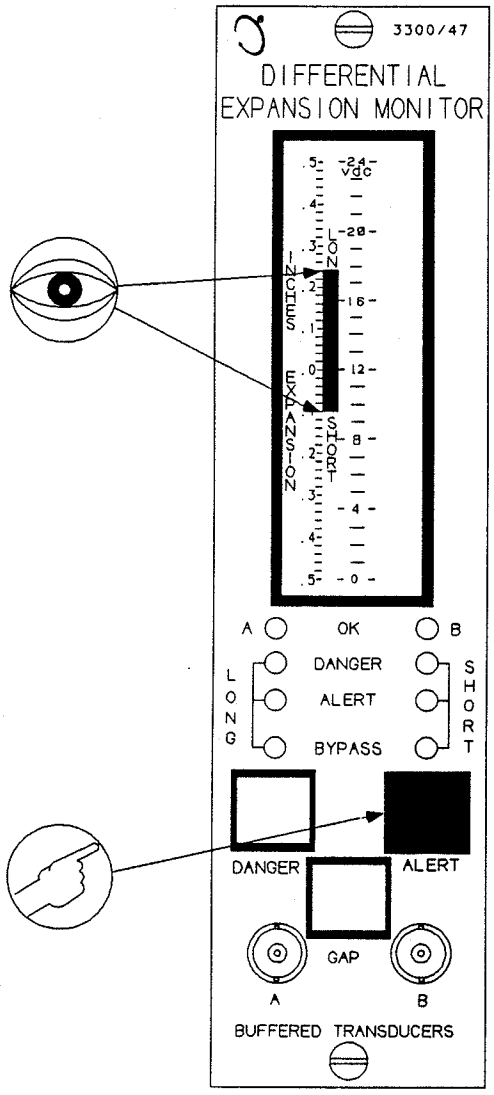




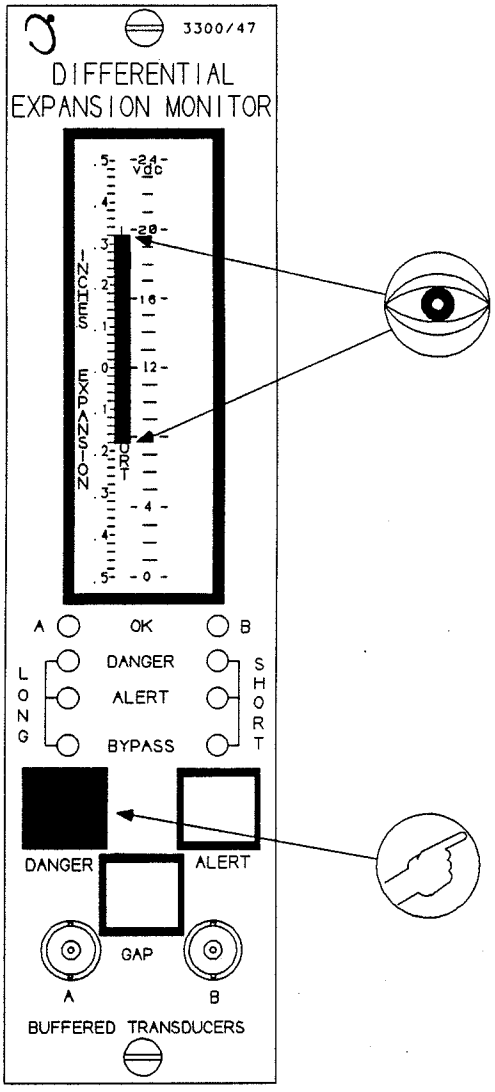
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11 READ SETPOINT LEVELS

PRESS **ALERT** SWITCH AND READ ALERT SETPOINTS ON THE METER SCALE. BOTH LONG AND SHORT ROTOR SETPOINTS ARE DISPLAYED.



PRESS **DANGER** SWITCH AND READ DANGER SETPOINTS ON THE METER SCALE. BOTH LONG AND SHORT ROTOR SETPOINTS ARE DISPLAYED.

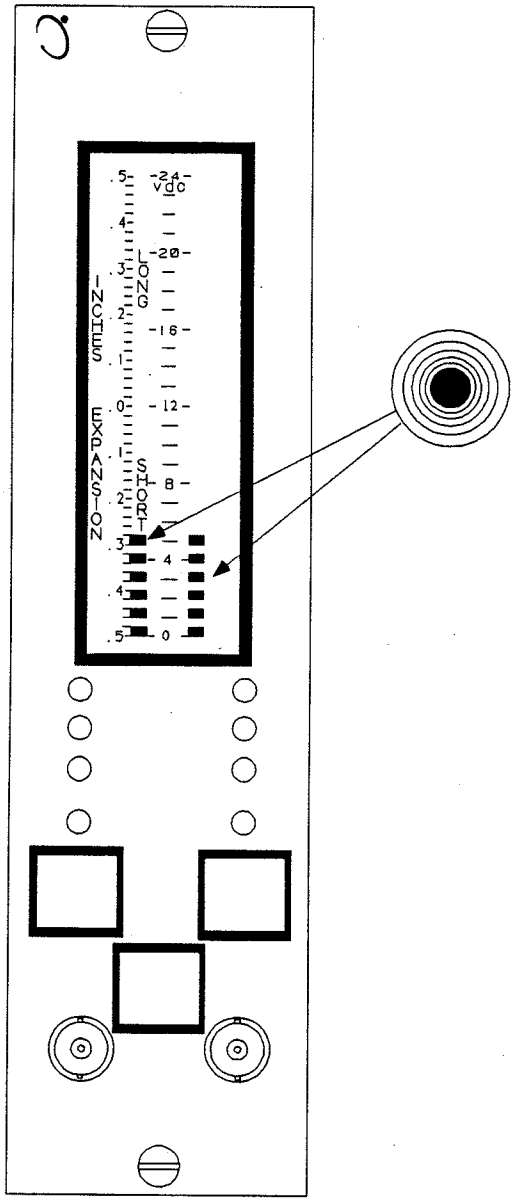


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12 SELF TEST

THE MONITOR HAS THREE LEVELS OF SELF TESTS:

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

BYPASS LEDS COME ON AND **OK** LEDS FLASHES AT 5 HZ.

IF ERROR IS INTERMITTENT AND GOES AWAY, MONITORING IS RESUMED AND **OK** LEDS FLASH 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:

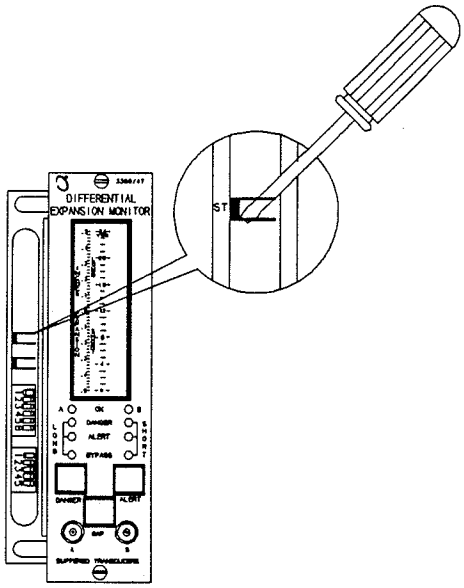
MONITORING IS ABORTED UNTIL USER ACTION RESOLVES PROBLEM.

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

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12 SELF TEST [CONT]

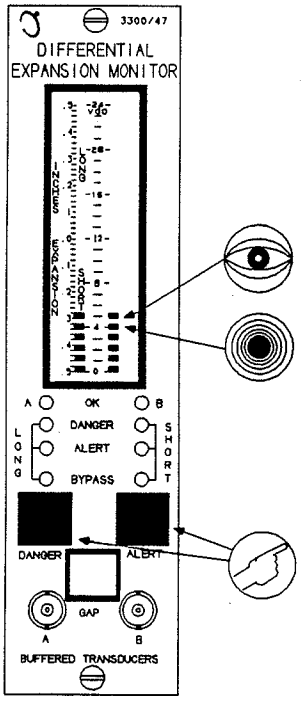
INITIATE USER-INVOKED TEST BY SHORTING ACROSS TWO SELF TEST (ST) PINS.



CAUTION

Machine Protection Will Be Lost For Duration of Test

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



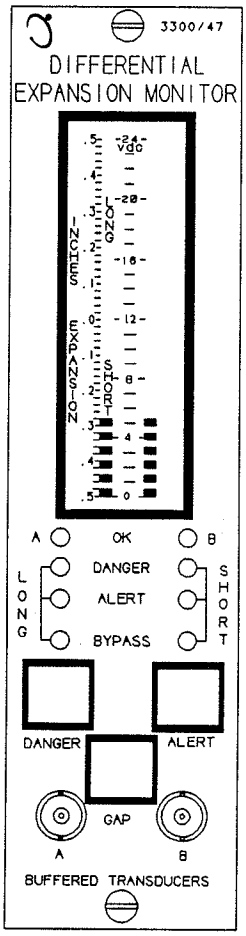
NOTE
ALTHOUGH BOTH COLUMNS ON THE BARGRAPH FLASH, THE ERROR CODE IS ONLY THE SUM OF THE BARGRAPH SEGMENTS DISPLAYED IN ONE COLUMN. EXAMPLE SHOWS ERROR CODE 6.

TO READ CODES ON THE LIST, STEP THROUGH EACH ERROR CODE BY PRESSING AND HOLDING THE **ALERT** SWITCH FOR APPROXIMATELY ONE SECOND.

AT THE END OF THE LIST, THE LCD BARGRAPH DISPLAYS ALL SEGMENTS. TO REREAD THE LIST PRESS THE **ALERT** SWITCH. TO CLEAR THE LIST FROM MEMORY, PRESS AND HOLD THE **DANGER** SWITCH FOR APPROXIMATELY ONE SECOND.

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12 SELF TEST [CONT]



ERROR CODE	DESCRIPTION
2	ROM CHECKSUM HAS FAILED. *
3	EEPROM FAILURE NO. 1. **
4	EEPROM FAILURE NO. 2. *** ADJUST SETPOINTS
5	+7.5V/-VT NODE OUT OF TOLERANCE. **
6	+VRH NODE OUT OF TOLERANCE. **
7	+5V NODE OUT OF TOLERANCE. **
8	MVREF NODE OUT OF TOLERANCE. **
9	+7.5V NODE OUT OF TOLERANCE. **
10	+VRL NODE OUT OF TOLERANCE. **
12	+5V/-7.5V NODE OUT OF TOLERANCE. **
14	RAM FAILURE. *
17	COP WATCHDOG NOT CONFIGURED
18	+5V/-5V OR +15V NODE OUT OF TOLERANCE. **
21	INCORRECT SWITCH OR SWITCH COMBINATION. ****
22	INCORRECT JUMPER CONFIGURATION. *

* TESTED ONLY AT POWER-UP OR USER-INVOKED SELF TEST. THIS ERROR IS DISPLAYED ON THE FRONT PANEL BUT IS NOT STORED IN MEMORY.

** TESTED ONLY AT CYCLIC SELF TEST. ERRORS 2, 3 AND 14 ARE NONRECOVERABLE AND ERRORS 5 THROUGH 12 AND 18 COULD BE INTERMITTENT AND RECOVERABLE.

*** ERROR 4 IS A SETPOINT FAILURE AND MAY BE CORRECTED BY ADJUSTING ALL SETPOINTS IN THE MONITOR.

**** TESTED ONLY WHEN MONITOR IS IN CALIBRATION MODE.

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INDEX

	Page
ALARM	4
ALARM DELAYS	3
ALARM RELAYS	4
ALERT	3, 8, 12
ALERT MODE	3
BUFFERED OUTPUT	4
BYPASS	7
CYCLIC TEST	13
DANGER	3, 9, 12
DANGER BYPASS	3, 4
DANGER MODE	3
ERROR CODES	14, 15
FIRST OUT	3, 4
GAP	4, 11
GAP VOLTAGE	4, 11
METER RESPONSE TIME	3
NOT OK MODE	3
NOT OK MONITOR DEFEAT	3
OK	3, 4, 6
OK RELAY	4, 6
OPTIONS	2
PART NUMBER	2
POWER-UP TEST	13
RECORDER OUTPUTS	3, 5
SELF TEST	5, 13
UPSCALE DIRECTION	3
USER-INVOKED TEST	13, 14

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