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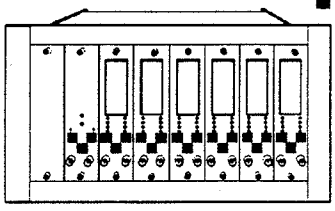
Find the *GE / Bently Nevada 3300/40-03-01-00-00-00* at our website: *Click HERE*

DOCUMENT NO. 82344-01

3300/40 ECCENTRICITY 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

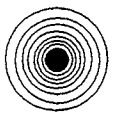
Machine Protection Could Be Discontinued

SYMBOLS

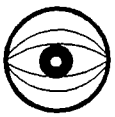
Special symbols are used in the manual to illustrate specifics in the step-by-step process. For example:



PRESS



FLASHING



OBSERVE



SCREWDRIVER

2344A17

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FOREWORD

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, 80171
- 3300 System Installation Instructions, 80172
- 3300 System Troubleshooting, 80173
- 3300 Power Supply, 80174
- 3300 System Monitor, 80175
- 3300/40 Eccentricity Monitor Maintenance, 82345-01
- Dynamic Data Manager System, 46390-01

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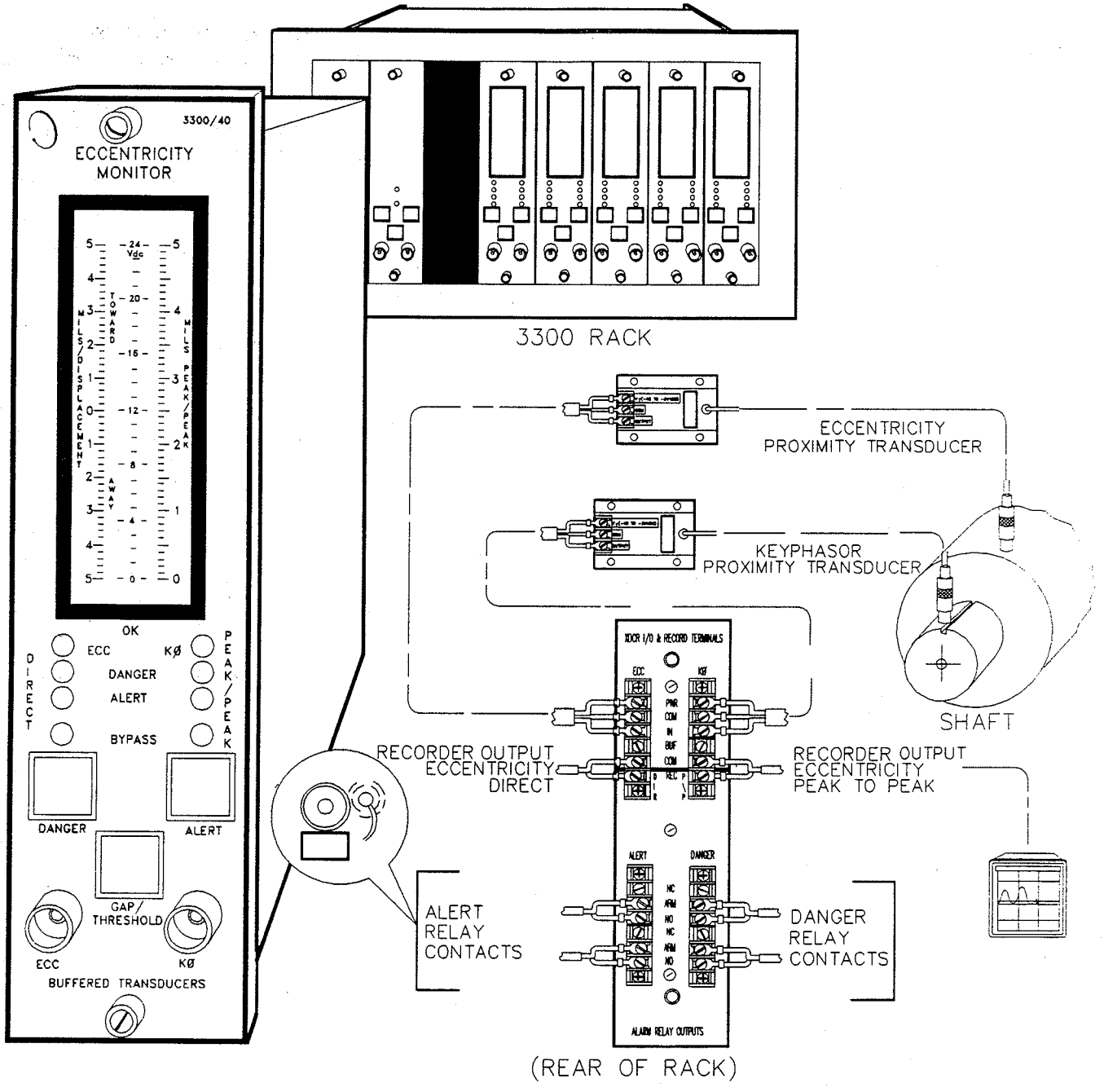
TITLE	SECTION
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MONITOR FUNCTIONS	2
MONITOR OPTIONS	3
PROGRAMMABLE OPTIONS	4
OK	5
BYPASS	6
ALERT	7
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1 ECCENTRICITY MONITOR SYSTEM



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2 MONITOR FUNCTIONS

ECCENTRICITY - Eccentricity (ECC) is defined as the variation between the outer diameter of a shaft surface and the true geometric center line of the shaft. This variation, called shaft bow, can be a fixed mechanical bow, a temporary thermal or gravity bow, or some combination of each. The Eccentricity Monitor measures shaft bow using the input from an eccentricity transducer and a Keyphasor source.

DIRECT AND PEAK TO PEAK - The input signal to the monitor from the eccentricity transducer is split into two channels designated as Direct and Peak to Peak channels.

KEYPHASOR - The Keyphasor (KØ) input is defined as a once-per-shaft-revolution event indicator. The monitor can be programmed to accept the input from a Keyphasor signal routed directly to the monitor through the Signal Input Module, or from either one of two Keyphasor input signals routed to the monitor through the System Monitor and a Keyphasor bus on the system backplane. If these external Keyphasor signals are not available, the monitor can be programmed to use an internal, simulated Keyphasor signal.

KEYPHASOR THRESHOLD VOLTAGE AND HYSTERESIS - The Keyphasor threshold voltage can be programmed for automatic or manual mode, and the Keyphasor hysteresis is jumper selected. For a description of Keyphasor threshold voltage and hysteresis refer to Eccentricity Monitor Maintenance Manual, Part No. 82345-01.

ECCENTRICITY OK - When the eccentricity transducer signal is within its upper and lower OK limits, the transducer is defined as OK. The eccentricity OK detection circuit controls the ECC OK LED and the monitor relay drive to the OK Relay.

KEYPHASOR OK - The Keyphasor (KØ OK) LED goes on if the Keyphasor input is within 1 to 600 RPM, and if the change in rpm between consecutive cycles is not greater or less than 50%. If the Keyphasor input goes NOT OK, the peak to peak channel is clamped to zero.

TIMED OK/MONITOR DEFEAT - Timed OK/Monitor Defeat prevents faulty transducer wiring from causing false alarms. If the eccentricity input signal level is not within the upper and lower OK limits, the ECC OK LED goes off, the BYPASS LEDs go on, the Direct and Peak to Peak channels are disabled, and the OK Relay deenergizes. If the eccentricity input signal level is restored within the upper and lower OK limits for 60 seconds, the ECC OK LED starts flashing at 1 Hz to indicate the OK state is restored, the BYPASS LEDs go off, and monitoring is enabled. The RESET switch on the front panel of the System Monitor must be pressed to stop the ECC OK LED from flashing (it remains on). If the eccentricity channel remains in the NOT-OK state, the MONITOR BYPASS switch on the monitor circuit board can be set to put the monitor out of service. Without this feature, the OK Relay could not be reactivated. When Timed OK/Monitor Defeat Mode is selected, the NOT-OK Nonlatching Mode must be selected. The recorders and communication processor output signals are clamped to zero scale, and the LCD display registers zero if the transducer is NOT OK.

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.

DIRECT ALARM ENABLED/DISABLED - Direct Eccentricity can be programmed for alarm enabled or disabled. If the disabled option is selected, Direct Eccentricity is still displayed on the LCD display, but the alarm setpoints are not used.

FIRST OUT - Separate First Out circuits exist for Alert and Danger alarms. A monitor with First Out option selected flashes a channel alarm LED if that monitor channel is the first in the rack to go into alarm. Pressing the RESET switch acknowledges the First Out.

MONITOR BYPASS AND DANGER BYPASS - The monitor can be bypassed by setting the Monitor Bypass switch on the monitor circuit board. When the switch is set, the OK LEDs go off and the BYPASS LEDs come on. Bypassing the monitor in the NOT-OK state will clear the OK relay drive signal. For maintenance functions, a Danger Bypass switch on the monitor circuit board is set to inhibit the Danger relay drive. This also turns on the BYPASS LEDs. Other front panel functions are not affected. The Danger Bypass function can be enabled with a programming jumper.

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2 MONITOR FUNCTIONS

ALARM RELAYS - Monitor alarms can be programmed for both latching and nonlatching mode. In the nonlatching mode, the alarm resets automatically when the alarm condition no longer exists. In the latching mode, the alarm 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.

BUFFERED OUTPUT - The ECC and KØ coaxial cable connectors on the front panel of the monitor, and terminals on the Signal Input Relay Module, provide buffered signals from respective transducers that can be used for connection of external equipment.

RECORDER OUTPUT - A recorder output is provided for each channel of eccentricity (Direct and Peak to Peak). Depending on the option selected, the recorder output levels, proportional to full scale, are either 0 to -10 Vdc, +1 to +5 Vdc, or +4 to +20 mA.

SELF TEST - The monitor has three catagories 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 annunciated by the OK LEDs flashing at 5 Hz provided that the channel is OK.
- User-invoked test performs power-up self test and allows error messages stored during cyclic tests to be read and cleared. Stored errors are annunciated by the OK LEDs flashing at 5 Hz and the error codes displayed on the front panel LCD bargraph.

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3 MONITOR OPTIONS

ECCENTRICITY MONITOR

PART NUMBER 3300/40	FULL-SCALE RANGE AA		TRANSDUCER OPTION BB	ALARM RELAY CC	AGENCY APPROVAL DD	BARRIERS USED EE
	DIRECT	PEAK TO PEAK	01 = 7200, 5mm OR 8mm TRANSDUCER 200 mV/MIL (8 V/mm)	00=NONE	00= NOT REQUIRED	00=NO
	01 = 5-0-5 MILS	0-5 MILS	02 = 7200, 11mm TRANSDUCER 100 mV/MIL (4 V/mm)	01=5A EPOXY SEALED	01= CSA	01=YES **
	02 = 10-0-10 MILS	0-10 MILS	03 = 7200, 14mm TRANSDUCER 100 mV/MIL (4 V/mm)	02=5A HERMETICALLY SEALED	02= BASEEFA	
	03 = 20-0-20 MILS	0-20 MILS		03=QUAD RELAYS EPOXY SEALED	03= FACTORY MUTUAL	
	04 = 30-0-30 MILS	0-30 MILS				
	05 = 50-0-50 MILS *	0-50 MILS *				
	11 = 100-0-100 MICROMETERS	0-100 MICROMETERS				
	12 = 200-0-200 MICROMETERS	0-200 MICROMETERS				
	13 = 500-0-500 MICROMETERS	0-500 MICROMETERS				
	14 = 1000-0-1000 MICROMETERS *	0-1000 MICROMETERS *				

* USED ONLY WITH 11mm OR 14mm TRANSDUCERS
** USED ONLY WITH 5mm OR 8mm TRANSDUCERS

4 PROGRAMMABLE OPTIONS

PROGRAMMABLE OPTIONS

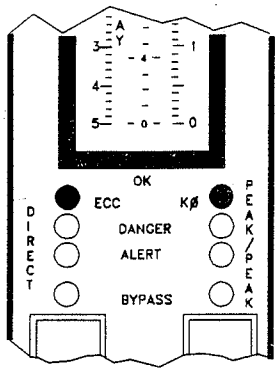
FIRST OUT	o ENABLED* o DISABLED
ALARM DELAYS	o 0.1 SECOND o 1 SECOND o 3 SECONDS* o 6 SECONDS
ALERT MODE	o LATCHING* o NONLATCHING
DANGER MODE	o LATCHING* o NONLATCHING
DIRECT ALARM	o ENABLED* o DISABLED
RECORDER OUTPUTS	o +4 TO +20 mA* o +1 TO +5 Vdc o 0 TO -10 Vdc

KEYPHASOR THRESHOLD	o MANUAL * o AUTOMATIC
DANGER BYPASS SWITCH	o ENABLE o DISABLED *
KEYPHASOR SOURCE	o EXTERNAL * o INTERNAL 1 o INTERNAL 2 o SIMULATED
KEYPHASOR HYSTERESIS	o 0.2 Vdc o 0.5 Vdc * o 1.25 Vdc o 2.0 Vdc

*SHIPPED WITH OPTION INSTALLED

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5 OK



NOTE: THE OPERATING RANGES FOR THE ECCENTRICITY AND KEYPHASOR TRANSDUCERS ARE MONITORED. THEREFORE, THE PERFORMANCE OF EITHER TRANSDUCER CAN CAUSE A NOT-OK CONDITION (DEENERGIZED RELAY) AND **OK** LED TO GO OFF.

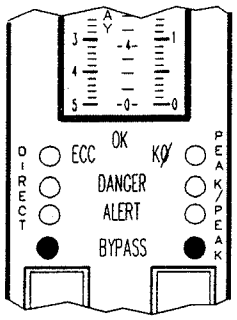
OK LED DISPLAY ECC	**OK**	KØ	CONDITION	OK RELAY DRIVE*
●	OK	●	**ECC** AND **KØ** TRANSDUCERS IN OPERATING RANGE.	ON
○	OK	●	RESPECTIVE **ECC** OR **KØ** TRANSDUCER IN NOT-OK CONDITION.	OFF*
●	OK	○		
○	OK	○	MONITOR IN SELF TEST, OR BOTH TRANSDUCERS NOT OK OR MONITOR BYPASSED.*	OFF*
◎	OK	◎	FLASHING AT 5 Hz = ERROR ENCOUNTERED DURING CYCLIC TEST. READ ERROR MESSAGE. (SEE 14)	ON**
◎	OK	●	FLASHING AT 1 Hz = ECCENTRICITY TRANSDUCER HAS BEEN NOT OK SINCE LAST RESET. (ONLY IF TIMED OK/MONITOR DEFEAT IS SELECTED.)	ON

*THE MONITOR CAN BE BYPASSED TO RESTORE RELAY OK CONDITIONS.
**RELAY DRIVE IS OFF WHILE ERROR IS PRESENT.

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6 BYPASS



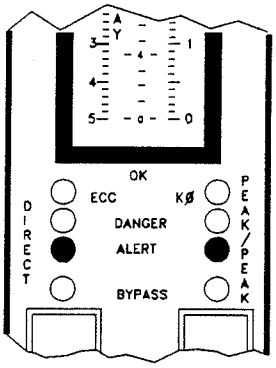
LED DISPLAY		CONDITION
DIRECT	**PEAK/PEAK**	
● BYPASS	●	o MONITOR IN DANGER BYPASS MODE o SYSTEM IN POWER-UP MODE o USER-INVOKED SELF TEST IN PROGRESS o TIMED OK/MONITOR DEFEAT o MONITOR BYPASSED o NOT OK KEYPHASOR *

* The PEAK TO PEAK BYPASS LED does not come on when the Keyphasor is above 600 RPM. This prevents the monitor from having a Red LED on when the machine is running above 600 RPM.

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7 ALERT

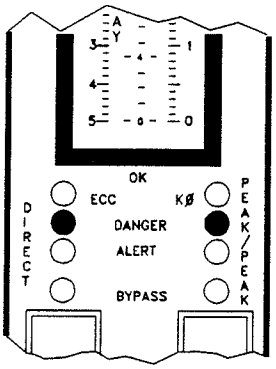


LED DISPLAY DIRECT	LED DISPLAY PEAK/PEAK	CONDITION	ALERT RELAY DRIVE: DIRECT ALARM ENABLED	ALERT RELAY DRIVE: DIRECT ALARM DISABLED
● ALERT	○	DIRECT OR PEAK/PEAK CHANNEL (OR BOTH) HAS EXCEEDED ALERT LEVEL.	ON	OFF
○ ALERT	●		ON	ON
● ALERT	●		ON	ON
◎ ALERT	○	FIRST OUT CONDITION FOR RESPECTIVE DIRECT OR PEAK/PEAK CHANNEL THAT HAS EXCEEDED ALERT LEVEL. TWO CHANNELS COULD INDICATE FIRST OUT FOLLOWING SELF TEST. *	ON	OFF
○ ALERT	◎		ON	ON

* IF TWO ALARMS OCCUR WITHIN 50 MILLISECONDS, BOTH LEDs COULD FLASH.

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8 DANGER



LED DISPLAY			CONDITION	DANGER RELAY DRIVE	
DIRECT		PEAK/PEAK		DIRECT ALARM ENABLED	DIRECT ALARM DISABLED
●	DANGER	○	**DIRECT** OR **PEAK/PEAK** CHANNEL (OR BOTH) HAS EXCEEDED ALERT LEVEL.	ON	OFF
○	DANGER	●		ON	ON
●	DANGER	●		ON	ON
◎	DANGER	○	FIRST OUT CONDITION FOR RESPECTIVE **DIRECT** OR **PEAK/PEAK** CHANNEL THAT HAS EXCEEDED ALERT LEVEL. TWO CHANNELS COULD INDICATE FIRST OUT FOLLOWING SELF TEST. *	ON	OFF
○	DANGER	◎		ON	ON

* IF TWO ALARMS OCCUR WITHIN 50 MILLISECONDS, BOTH LEDs COULD FLASH.

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9 MONITOR RANGES

ECCENTRICITY MONITOR

PART NUMBER 3300/40

FULL-SCALE RANGE — AA

DIRECT	PEAK TO PEAK
01 = 5-0-5 MILS	0-5 MILS
02 = 10-0-10 MILS	0-10 MILS
03 = 20-0-20 MILS	0-20 MILS
04 = 30-0-30 MILS	0-30 MILS
05 = 50-0-50 MILS*	0-50 MILS*
11 = 100-0-100 MICROMETRES	0-100 MICROMETRES
12 = 200-0-200 MICROMETRES	0-200 MICROMETRES
13 = 500-0-500 MICROMETRES	0-500 MICROMETRES
14 = 1000-0-1000 MICROMETRES*	0-1000 MICROMETRES*

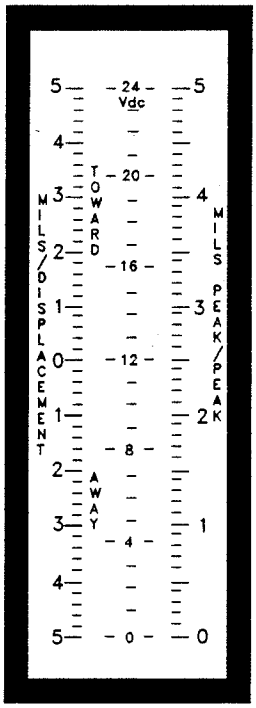
*USED ONLY WITH 11mm OR 14mm TRANSDUCERS.

TRANSDUCER OPTION — BB

01 =	7200, 5mm OR 8mm TRANSDUCER 200 mV/MIL (8 V/mm)
02 =	7200, 11mm TRANSDUCER 100 mV/MIL (4 V/mm)
03 =	7200, 14mm TRANSDUCER 100 mV/MIL (4 V/mm)

NOTE

UNITS ON METER SCALE MUST BE COMPATIBLE WITH TRANSDUCER INPUT SELECTED, SEE OPTION AA.

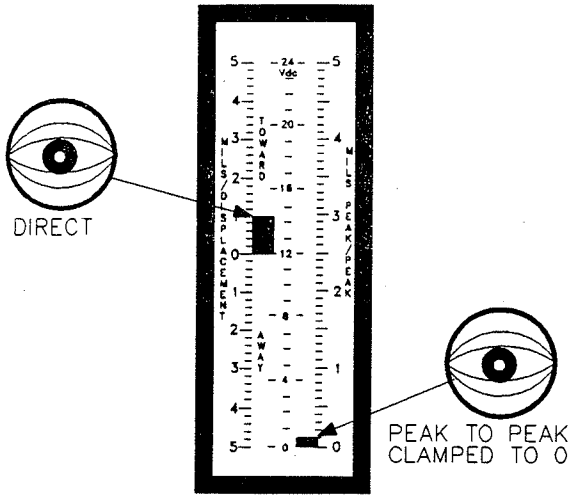


EXAMPLE OF METER SCALE

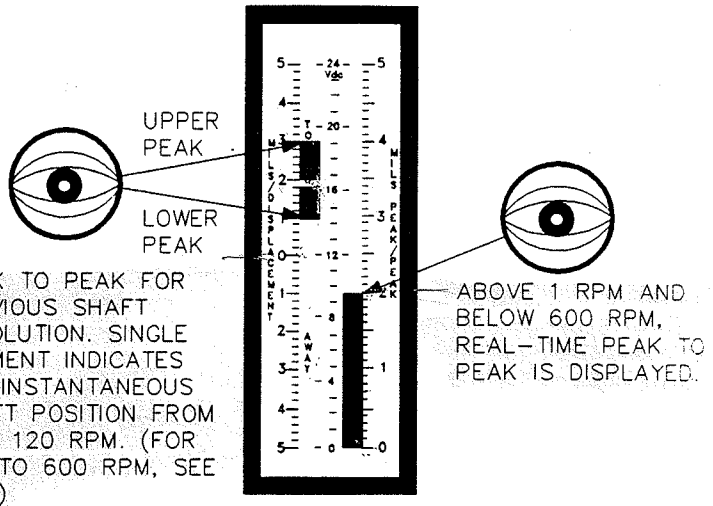
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10 READ DIRECT AND PEAK TO PEAK VALUES

MONITOR CONTINUOUSLY INDICATES MEASURED DIRECT AND PEAK TO PEAK VALUES.

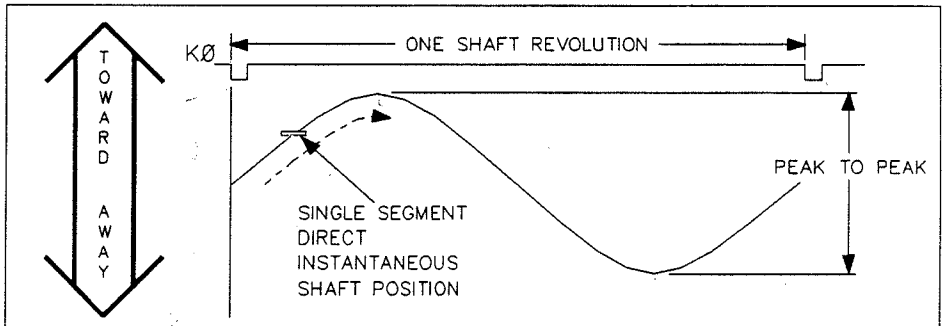


FOR ACTUAL KEYPHASOR INPUT, 0 TO 1 RPM, OR WHEN KEYPHASOR SIGNAL IS LOST

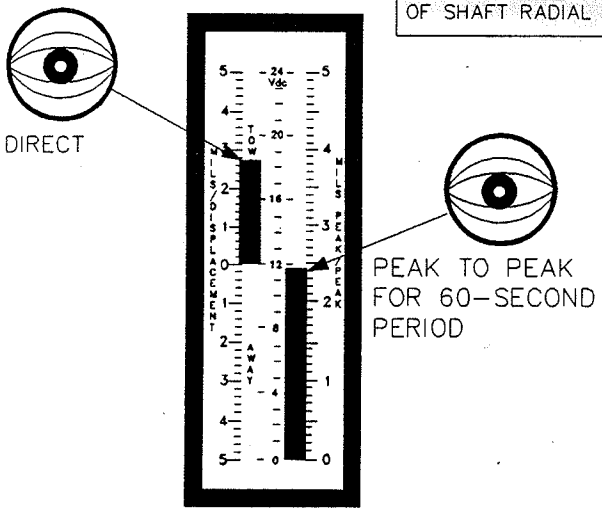


PEAK TO PEAK FOR PREVIOUS SHAFT REVOLUTION. SINGLE SEGMENT INDICATES THE INSTANTANEOUS SHAFT POSITION FROM 1 TO 120 RPM. (FOR 120 TO 600 RPM, SEE VIEW A.)

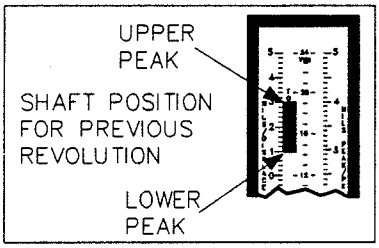
FOR ACTUAL KEYPHASOR INPUT, 1 TO 600 RPM



DIRECT MEASUREMENT IS THE GAP BETWEEN PROBE TIP AND ROTATING SURFACE.
PEAK TO PEAK MEASUREMENT IS THE SUMMATION OF THE UPPER AND LOWER PEAKS OF SHAFT RADIAL MOTION DURING A COMPLETE SHAFT REVOLUTION.



FOR SIMULATED KEYPHASOR INPUT, 0 TO 600 RPM



VIEW A

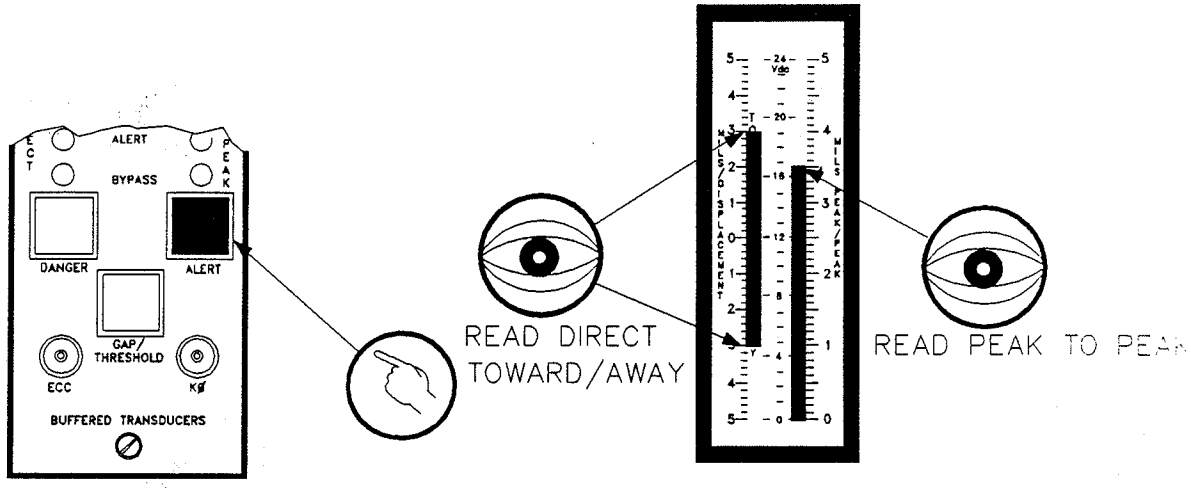
FROM 120 RPM TO 600 RPM, THE SINGLE SEGMENT IS NOT VISIBLE AND ONLY UPPER AND LOWER SHAFT POSITIONS ARE READABLE ON THE BARGRAPH.

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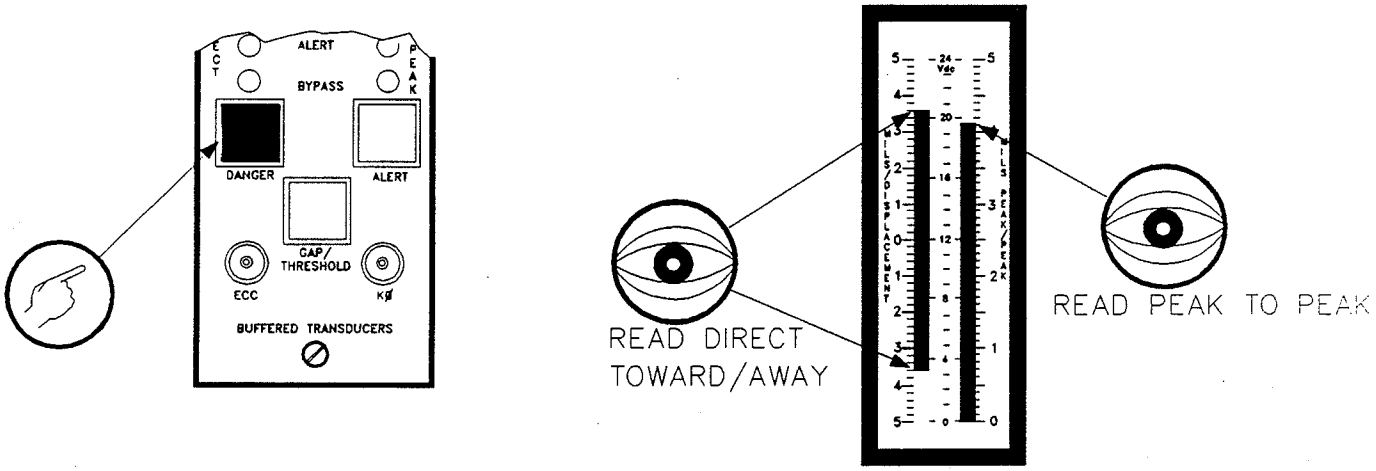
11 READ ALERT SETPOINT LEVELS

1. PRESS **ALERT** SWITCH AND READ ALERT SETPOINTS (FOR BOTH **DIRECT** AND **PEAK/PEAK**) ON METER SCALE.



12 READ DANGER SETPOINT LEVELS

1 PRESS **DANGER** SWITCH AND READ DANGER SETPOINTS (FOR BOTH **DIRECT** AND **PEAK/PEAK**) ON METER SCALE.

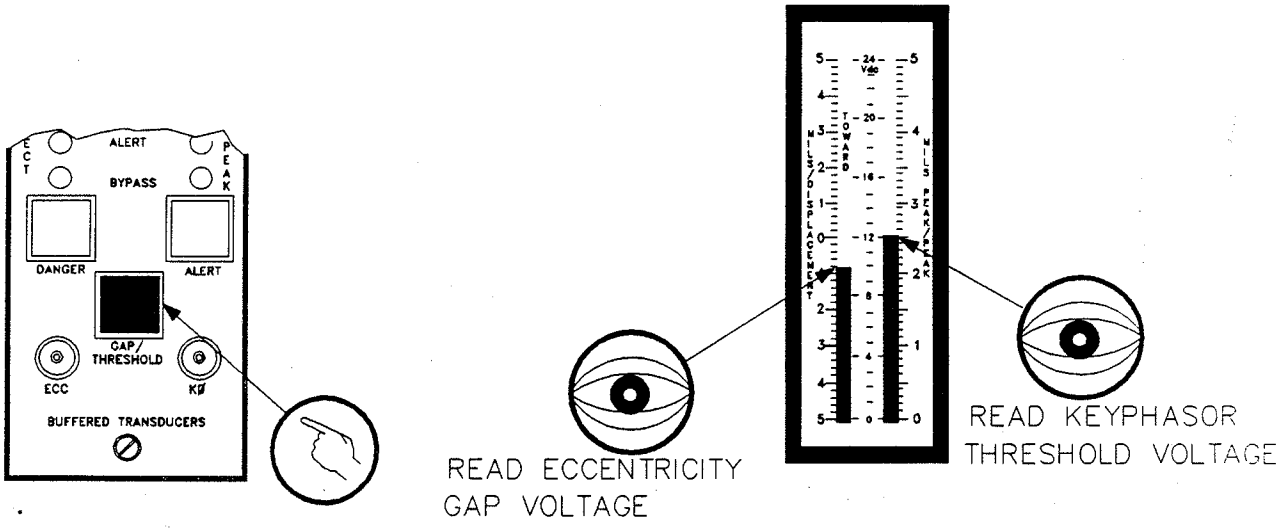


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13 READ GAP AND THRESHOLD VOLTAGE LEVELS

1. PRESS **GAP/THRESHOLD** SWITCH AND READ VOLTAGE LEVELS (FOR ECCENTRICITY GAP AND KEYPHASOR THRESHOLD) USING CENTER SCALE ON METER.

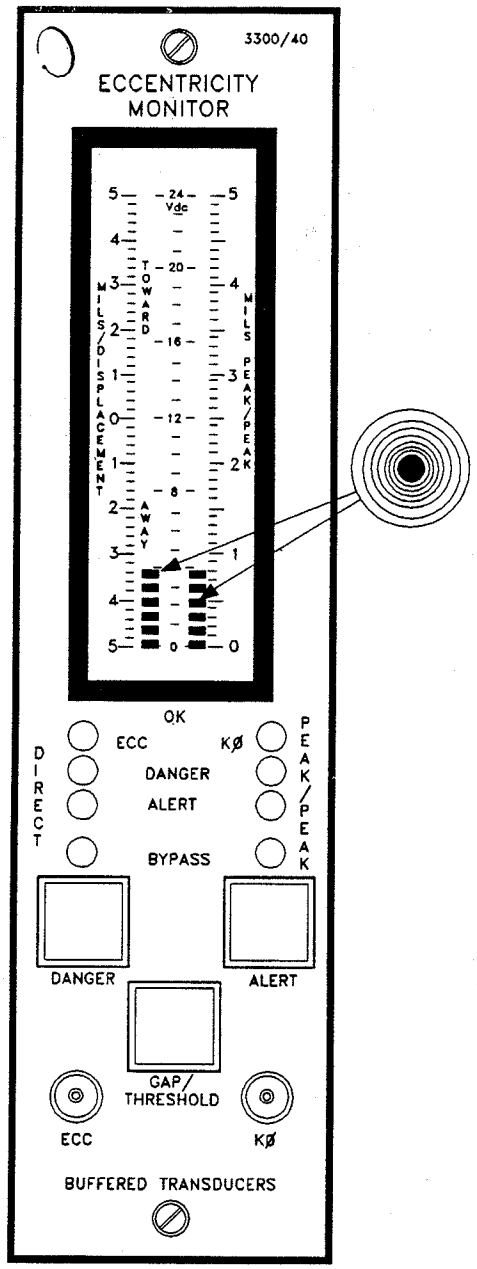


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14 SELF TEST

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 STORED IN MEMORY AND FLASHED ON LCD BARGRAPH DISPLAY.
- **BYPASS** LED GOES ON AND **OK** LED FLASHES AT 5 HZ.
- IF ERROR IS INTERMITTENT AND DISAPPEARS, MONITORING IS RESUMED AND **OK** LED FLASHES AT 5 HZ.
- ERROR CODE STORED. USER-INVOKED TEST DISPLAYS AND CLEARS ERROR.

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

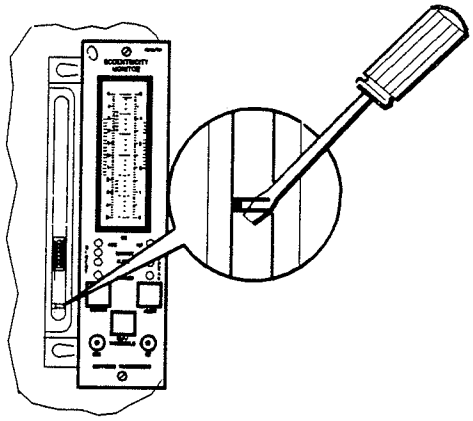
- MONITORING IS ABORTED UNTIL USER ACTION RESOLVES PROBLEM.
- TEST CAN BE RERUN WITH MONITOR POWER-UP OR USER-INVOKED TEST.

2344C12

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14 SELF TEST

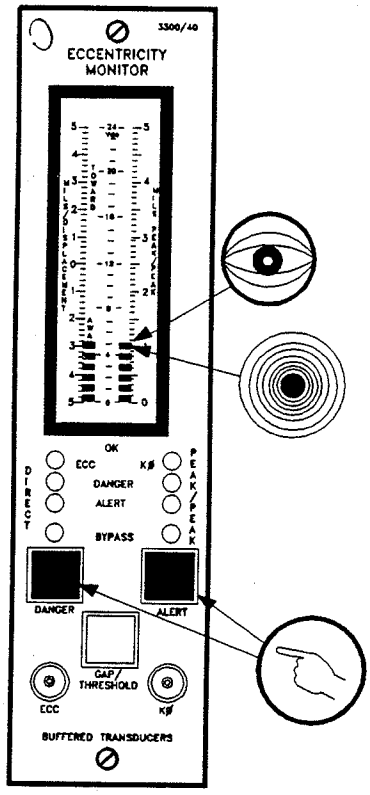
- INITIATE USER–INVOKED TEST BY MOMENTARILY SHORTING ACROSS TWO SELF TEST (ST) PINS.



CAUTION

MACHINE PROTECTION WILL BE DISCONTINUED FOR DURATION OF TEST

- AT COMPLETION OF USER–INVOKED TEST, MONITOR WILL RECALL ANY STORED ERROR CODES. THESE ERROR CODES MUST BE READ AND CLEARED WITH USER INTERACTION TO ALLOW MONITORING TO CONTINUE. TIMED OK/MONITOR DEFEAT IS ACTIVE FOR APPROXIMATELY 60 SECONDS FOLLOWING THIS ACTION.



NOTE

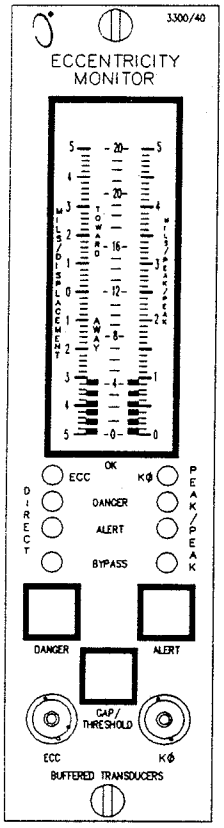
ALTHOUGH BOTH COLUMNS ON BARGRAPH FLASH, ERROR CODE IS ONLY THE SUM OF BARGRAPH SEGMENTS DISPLAYED IN ONE COLUMN. EXAMPLE SHOWS ERROR CODE 6.

- READ CODES ON LIST; STEP THROUGH EACH ERROR CODE ON LIST BY PRESSING AND HOLDING **ALERT** SWITCH FOR APPROXIMATELY 1 SECOND.
- AT THE END OF LIST, LCD BARGRAPH DISPLAYS ALL SEGMENTS. TO REREAD LIST, PRESS **ALERT** SWITCH. TO CLEAR LIST FROM MEMORY, PRESS AND HOLD **DANGER** SWITCH FOR APPROXIMATELY 1 SECOND.

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14 SELF TEST



ERROR CODE	DESCRIPTION
2.	ROM CHECKSUM HAS FAILED. *
3.	EEPROM FAILURE NO.1. **
4.	EEPROM FAILURE NO.2; ADJUST SETPOINTS.***
5.	+7.5/−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. **
11.	MVREF/−6.5V NODE OUT OF TOLERANCE. **
12.	+5V/−7.5V NODE OUT OF TOLERANCE. **
14.	RAM FAILURE. *
17.	COP WATCHDOG IS NOT ENABLED. *
15.	DIRECT CHANNEL SATURATION ****

* TESTED ONLY AT POWER−UP OR USER−INVOKED SELF TEST. ERRORS NOT RECORDED, BUT ERROR CODES DISPLAYED ON FRONT PANEL METER.

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

*** ERROR 4 IS A SETPOINT SELF TEST FAILURE. THIS MAY BE CORRECTED BY ADJUSTING ALL SETPOINTS IN MONITOR.

**** THIS ERROR CODE INDICATES THAT THE MONITOR HAS SATURATED ITS DIRECT CHANNEL AND MAY BE READING IMPROPER PEAK TO PEAK READINGS. THIS ERROR CODE CAN BE CLEARED WITH USER INVOKED SELFTEST AFTER THE MONITOR HAS BEEN ZEROED SO THAT THE DIRECT CHANNEL IS NOT SATURATING. SEE ECCENTRICITY MONITOR MAINTENANCE MANUAL 82345−01 SECTION 8, FOR MORE INFORMATION TO CLEAR THIS ERROR.

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