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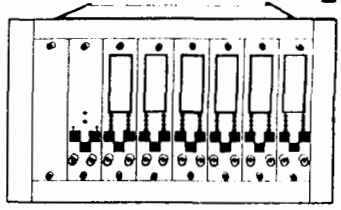
DOCUMENT NO. 80178 01

REV.	DATE
A	21154/ 8MAR89
B	8MAR89

3300/20 DUAL THRUST POSITION MONITOR

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 Could Be Discontinued

IN THIS DOCUMENT PROCEDURES ARE GIVEN ONLY FOR ONE CHANNEL. PROCEDURES FOR OTHER CHANNELS 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 process. For example:



PRESS



FLASHING



OBSERVE



SCREWDRIVER

FOREWORD

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, 80171
- 3300 System Installation Instructions, 80172
- 3300 System Troubleshooting, 80173
- 3300/10 Power Supply, 80174
- 3300/01 System Monitor, 80175
- 3300 Dual Thrust Monitor Maintenance, 80176-01
- Dynamic Data Manager System, 46390-01

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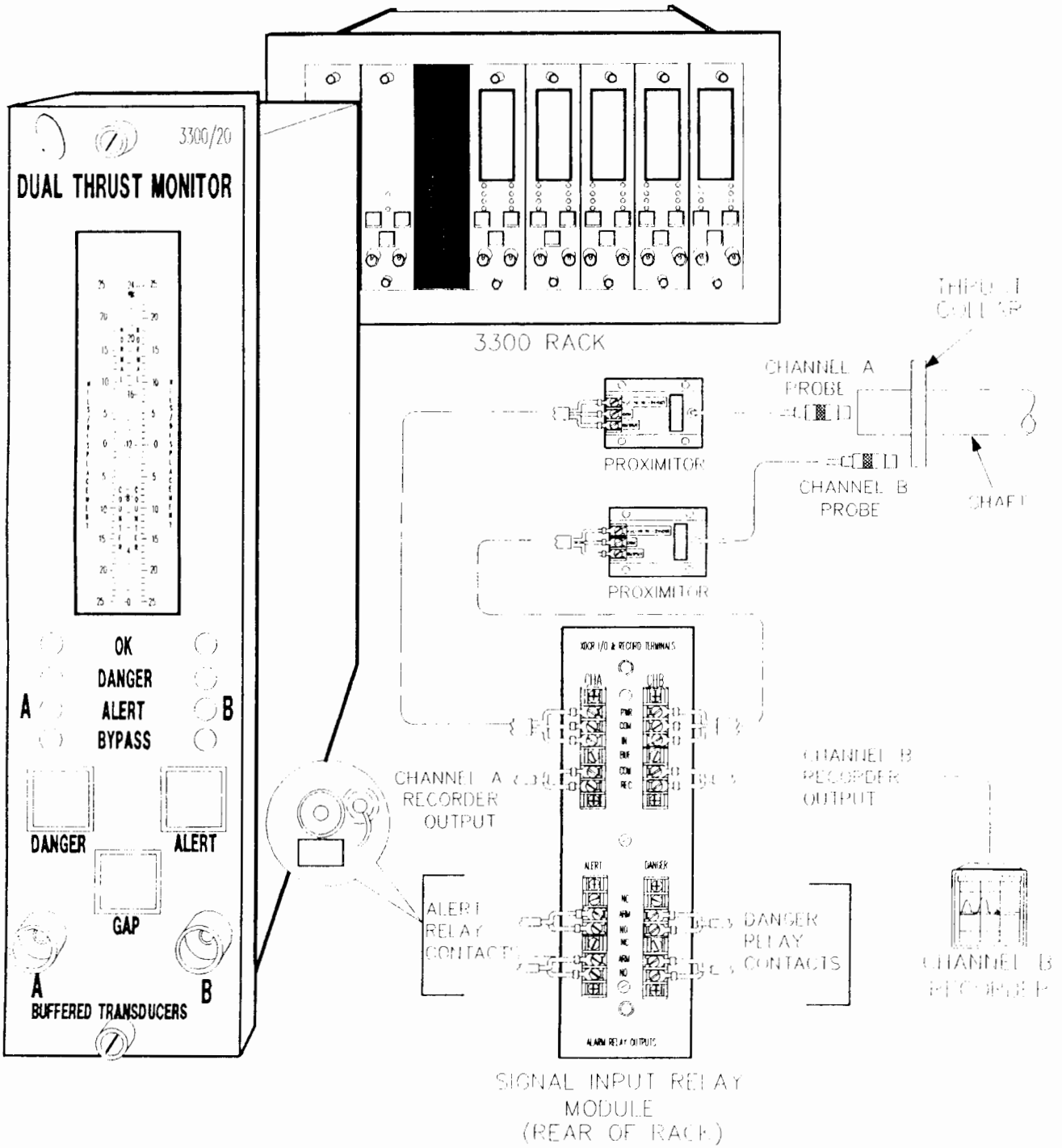
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MONITOR OPTIONS	3
PROGRAMMABLE OPTIONS	4
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READ GAP VOLTAGE	11
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1 DUAL THRUST MONITOR SYSTEM



2 MONITOR FUNCTIONS

DUAL THRUST POSITION - Thrust position is the average position, or change in position, of a rotor in the axial direction with respect to some fixed reference. The Dual Thrust Position Monitor provides continuous thrust position monitoring on 2 channels (A & B) for redundant protection. Normal thrust direction can be toward or away from the probe face. AND voting logic ensures that failure of one channel will not give a false Danger alarm. OR voting logic allows for two independent thrust channels in less critical applications.

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 OK relay. If the monitor has the latching 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 corresponding Alert (first-level alarm) or Danger (second-level alarm) setpoints on each channel to be displayed on the front panel meter. ALERT and DANGER LEDs light when the thrust position signal level exceeds preset levels for the selected time delay, and appropriate ALERT and DANGER alarm relay contacts are activated. Voting logic options determine when the Danger relay contacts are activated.

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 was the first channel in the rack to go into alarm. Pressing the RESET switch acknowledges the First Out.

ALARM RELAYS - Monitor alarms can be programmed for either latching or nonlatching mode. In the nonlatching mode, the alarm resets automatically when the alarm condition 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 is set to inhibit the Danger relay drive. This function turns on the BYPASS LEDs. Other front panel functions are not affected. This function can be disabled using a jumper within the monitor.

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 - A recorder output is provided for each channel. 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 categories of self test: cyclic, power-up, 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 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.

3 MONITOR OPTIONS

DUAL THRUST MONITOR

PART NUMBER	FULL SCALE RANGE	TRANSDUCER INPUT	ALARM RELAY	AGENCY APPROVAL	BARRIERS USED
3300/20 —	AA	BB	CC	DD	EE
	01=25-0-25 MILS 02=30-0-30 MILS 03=40-0-40 MILS 05=50-0-50 MILS 06=75-0-75 MILS 11=0.5-0-0.5 MILLIMETRES 12=1-0-1 MILLIMETRES 13=2-0-2 MILLIMETRES	01=7200 PROXIMITOR* 200 mV/MIL 02=14mm OR 11 mm PROBE 100 mV/MIL 03=3000 PROXIMITOR** 200 mV/MIL	00=NONE 01=5A EPOXY SEALED 02=5A HERMETICALLY SEALED 03=QUAD RELAYS EPOXY SEALED	00=NOT REQ'D 01=CSA 02=BASEEFA 03=CITY OF LA	00=NO 01=YES

*ONLY FOR RANGE OPTIONS 01, 02, 03, 11, AND 12
**ONLY FOR RANGE OPTIONS 01 AND 11

4 PROGRAMMABLE OPTIONS

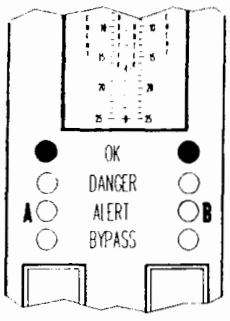
PROGRAMMABLE OPTIONS

FIRST OUT	o ENABLED* o DISABLED
ALARM DELAYS	o .1 SECONDS o 1 SECOND* o 3 SECONDS o 6 SECONDS
[illegible] MODE	o NON-LATCHING* o LATCHING
ALERT MODE	o LATCHING* o NON-LATCHING

*NORMALLY SHIPPED WITH OPTION INSTALLED

DANGER MODE	o LATCHING* o NON-LATCHING
RECORDER OUTPUTS	o +4 TO +20 mA* o +1 TO +5 Vdc o 0 TO −10 Vdc
FAN OUT VOTING	o OR VOTING FOR RELAY DRIVE o AND VOTING FOR RELAY DRIVE*
NORMAL DIRECTION	o TOWARD PROBE* o AWAY FROM PROBE
DANGER BYPASS	o ENABLED o DISABLED*

5 OK

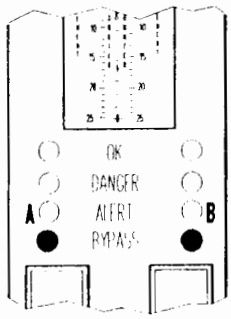


NOTE: EACH CHANNEL IN THE SYSTEM CONTROLS THE OK RELAY. THEREFORE, EITHER CHANNEL CAN CAUSE A NOT OK RELAY CONDITION (DEENERGIZED RELAY).

LED DISPLAY A B	CONDITION	OK RELAY DRIVE *
● OK ●	CHANNEL A AND B IN OPERATING RANGE.	ON
○ OK ● / ● OK ○	RESPECTIVE CHANNEL A OR B TRANSDUCER IN NOT OK CONDITION, OR BYPASSED. *	OFF *
○ OK ○	MONITOR IN SELF TEST, OR BOTH TRANSDUCERS NOT OK OR BY-PASSED. *	OFF *
◉ OK ◉	FLASHING AT 5 Hz - ERROR ENCOUNTERED DURING CYCLIC TEST READ ERROR MESSAGE. (SEE [14])	ON

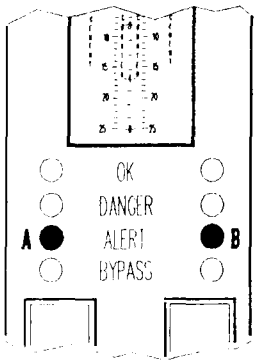
*NOT OK CHANNEL CAN BE BYPASSED TO RESTORE RELAY OK CONDITIONS

6 BYPASS



LED DISPLAY A	LED DISPLAY B	CONDITION
● BYPASS	●	o MONITOR IN DANGER BYPASS MODE o SYSTEM IN POWER UP MODE o USER INVOKED SELF TEST IN PROGRESS o BOTH CHANNEL BYPASS
○ BYPASS	●	o CHANNEL A OR B BYPASSED
● BYPASS	○	

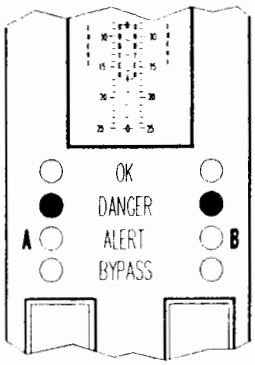
7 ALERT



LED DISPLAY A	LED DISPLAY B	CONDITION	ALERT RELAY DRIVE
● ALERT	○	EITHER CHANNEL A OR B (OR BOTH) HAS EXCEEDED ALARM LEVEL (SEE [12])	ON
○ ALERT	●		ON
● ALERT	●		ON
○ ALERT	(●)	FIRST OUT CONDITION FOR RESPECTIVE A OR B CHANNEL THAT HAS EXCEEDED ALARM LEVEL. TWO CHANNELS MAY INDICATE FIRST OUT FOLLOWING LED TEST.*	ON
(●) ALERT	○		ON

*FIRST OUT RESOLUTION IS BETTER THAN 50 MILLISECONDS. IF TWO ALARMS OCCUR WITHIN 50 MILLISECONDS OR LESS, THEY COULD CAUSE BOTH LEDS TO FLASH.

8 DANGER



LED DISPLAY A B	CONDITION	DANGER RELAY DRIVE	
		OR VOTING	AND VOTING*
● DANGER ○	EITHER CHANNEL A OR B (OR BOTH) HAS EXCEEDED ALARM LEVEL. (SEE 13)	ON	OFF
○ DANGER ●		ON	OFF
● DANGER ●		ON	ON
○ DANGER ◉	FIRST OUT CONDITION FOR RESPECTIVE A OR B CHANNEL THAT HAS EXCEEDED ALARM LEVEL. TWO CHANNELS MAY INDICATE FIRST OUT FOLLOWING SELF TEST.**	ON	OFF
◉ DANGER ○		ON	OFF

*IF EITHER CHANNEL IS BYPASSED, ALARM RELAY IS ACTIVATED IF NONBYPASSED CHANNEL IS IN ALARM.

**FIRST OUT RESOLUTION IS BETTER THAN 50 MILLISECONDS IF TWO ALARMS OCCUR WITHIN 50 MILLISECONDS OR LESS OF EACH OTHER THEY COULD CAUSE BOTH LEDS TO FLASH.

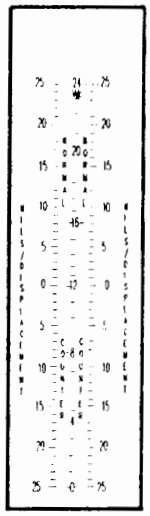
9 MONITOR RANGES

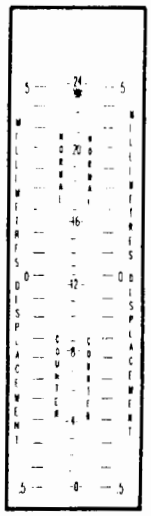
3300/20 — □□ — □□ — □□ — □□ — □□ — □□

FULL SCALE RANGE

01=25–0–25 MILS
02=30–0–30 MILS
03=40–0–40 MILS
05=50–0–50 MILS
06=75–0–75 MILS
11=0.5–0–0.5 MILLIMETRES
12=1–0–1 MILLIMETRES
13=2–0–2 MILLIMETRES

SEE 23 FOR JUMPER PROGRAMMING

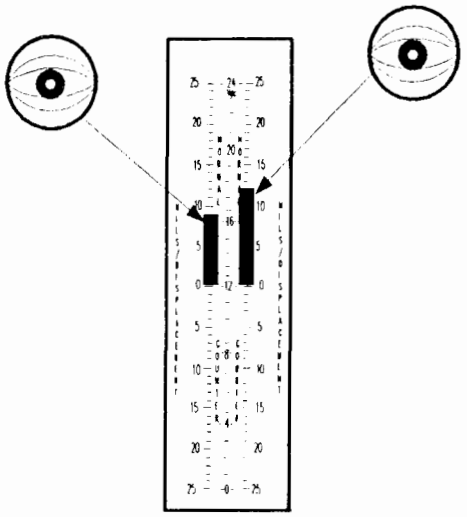


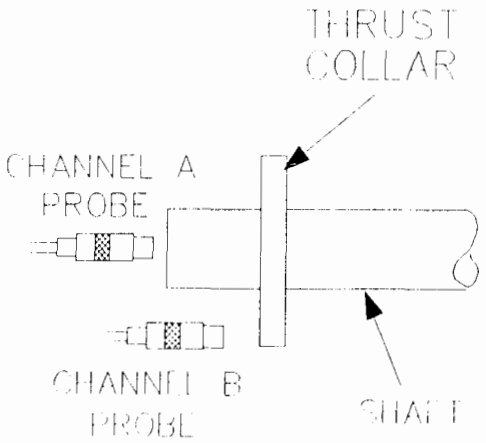


EXAMPLES OF METER SCALES

10 READ CHANNEL THRUST POSITION

MONITOR CONTINUOUSLY INDICATES MEASURED THRUST POSITION VALUES FOR CHANNELS A AND B.

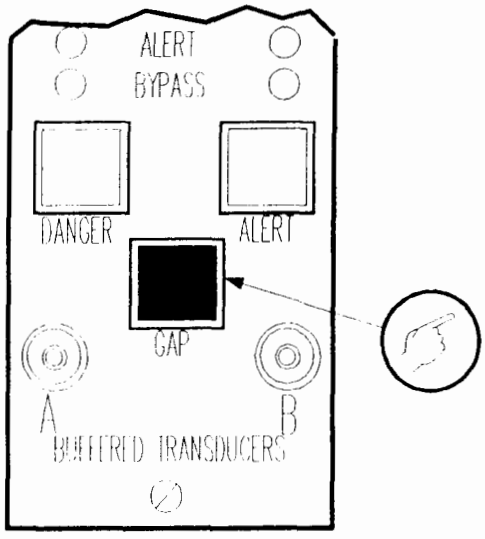


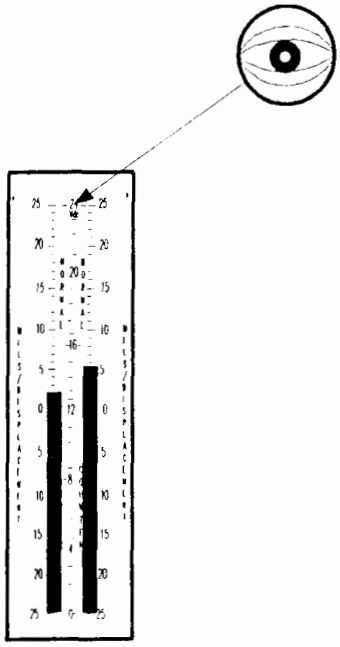


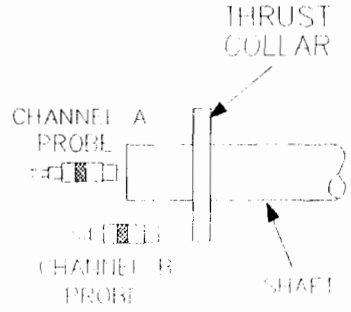
251001

11 READ GAP VOLTAGE

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

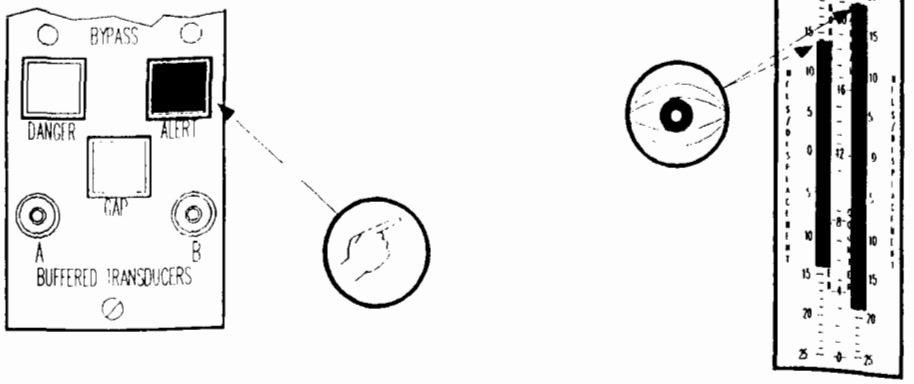






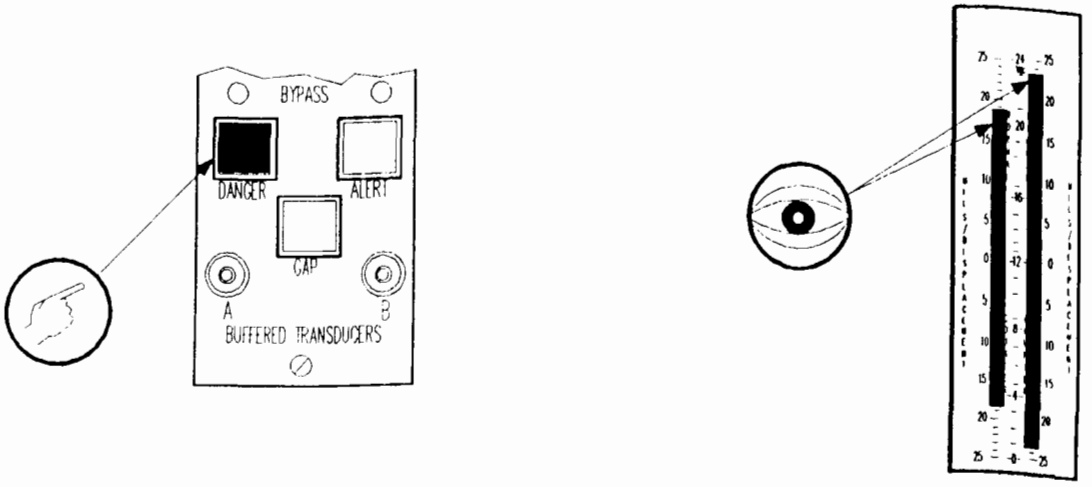
12 READ ALERT SETPOINT LEVELS

1. PRESS **ALERT** SWITCH AND READ ALERT SET POINTS (FOR BOTH CHANNEL A AND B) ON METER SCALE. BOTH NORMAL AND COUNTER SET POINTS ARE DISPLAYED



13 READ DANGER SETPOINT LEVELS

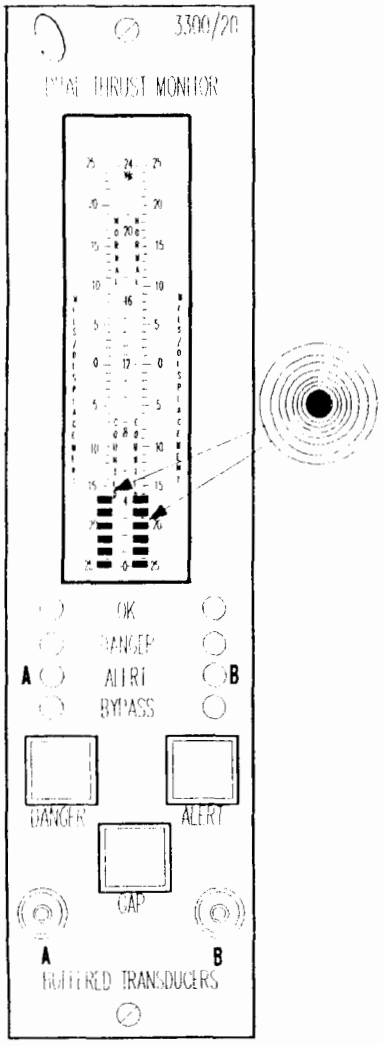
1 PRESS **DANGER** SWITCH AND READ DANGER SET POINTS (FOR BOTH CHANNEL A AND B) ON METER SCALE. BOTH NORMAL AND COUNTER SET POINTS ARE DISPLAYED



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:

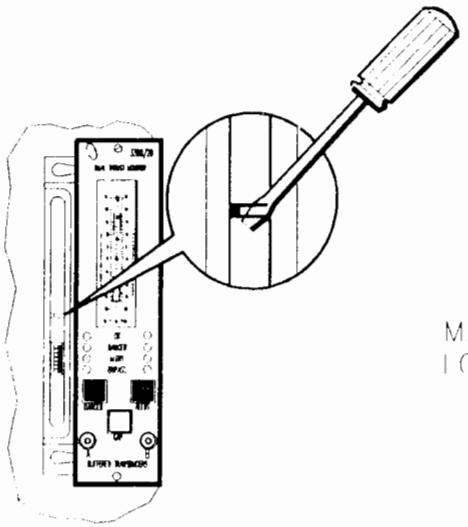
- MONITORING IS ABORTED UNTIL THE ERROR IS RESOLVED.
- ERROR CODE STORED IN MEMORY AND FLASHED ON LCD BARGRAPH DISPLAY.
- **BYPASS** LED GOES ON AND **OK** LED FLASHES AT 5 HZ.
- IF ERROR IS INTERMITTENT AND DISAPPEARS, MONITORING IS RESUMED AND **OK** LED FLASHES AT 5 HZ.
- ERROR CODE STORED. USER INVOKED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

14 SELF TEST [CONT]

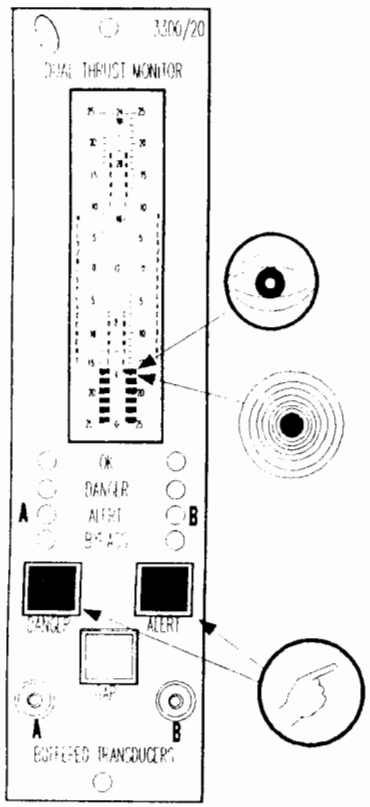
BEGIN USER INVOKED TEST BY SHORTING ACROSS TWO SELF-TEST (ST) PINS.



CAUTION

MACHINE PROTECTION WILL BE LOST FOR DURATION OF TEST

- AT COMPLETION OF USER INVOKED 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. TIMED OK CHANNEL DEFEAT IS ACTIVE FOR APPROXIMATELY 30 SECONDS FOLLOWING THIS ACTION.

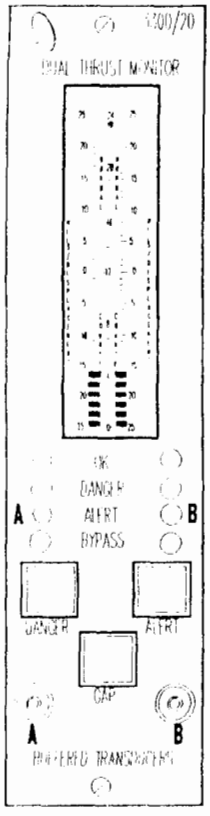


NOTE

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, LED BARGRAPH DISPLAYS ALL SEGMENTS. TO REREAD LIST PRESS **ALERT** SWITCH. TO CLEAR LIST FROM MEMORY, PRESS AND HOLD **DANGER** SWITCH FOR APPROXIMATELY 1 SECOND.

14 SELF TEST [CONT]



ERROR CODE	DESCRIPTION
2.	ROM CHECKSUM HAS FAILED. *
3.	EEPROM FAILURE NO.1. **
4.	EEPROM FAILURE NO.2; ADJUST SET POINTS. (SEE 12 AND 13) ***
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. **
13.	SCIC CLOCK FAILURE **
14.	RAM FAILURE. *
15.	IC U4 OUTPUT DISAGREES WITH GAP VOLTAGE VALUE. *

* 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, 14, AND 15 ARE NONRECOVERABLE; ERRORS 5 THROUGH 13 COULD BE INTERMITTANT AND RECOVERABLE.

*** ERROR 4 IS A SET POINT SELF TEST FAILURE. THIS MAY BE CORRECTED BY ADJUSTING ALL SET POINTS IN MONITOR.

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Monitor 3

P

Programmable Options 3

R

Read Alert Set point levels 1
Read Danger Set point levels 11
Read Channel Thrust Position 9
Read Probe Gap Voltage 10

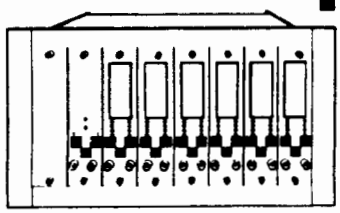
S

Self Test 12

3300/20 DUAL THRUST POSITION MONITOR

MAINTENANCE MANUAL

BENTLY NEVADA



NOTICE

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⚠ WARNING

High voltage present could cause shock burns or death

Do not touch exposed wires or terminals

CAUTION

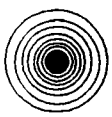
Machine Protection Could Be Discontinued

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SYMBOLS

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


PRESS


FLASHING


CONNECT

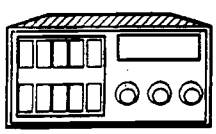

DISCONNECT


OBSERVE


SCREWDRIVER

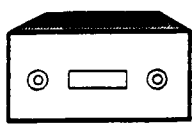
TEST EQUIPMENT (Recommended)

Digital Multimeter



4 1/2-Digit Display
0 to 1000 Vac/Vdc
0 to 10 megohms

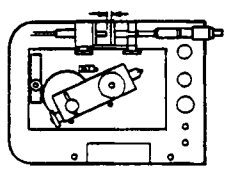
Power Supply



0 TO -50 Vdc

TK3 Calibration Instrument

Bently Nevada Corporation



TK3-2E (120/220 Vac, 50/60 Hz)
TK3-2G (40 to 90 psi @ 15 Std cfm max)

FOREWORD

This document is for maintenance personnel who install and maintain the 3300 Monitoring System. The procedures presented should aid service personnel to maintain a Dual Thrust Monitor in a typical 3300 System.

RELATED DOCUMENTS

- 3300 System Overview, 80171
- 3300 System Installation Instructions, 80172
- 3300 System Troubleshooting, 80173
- 3300 Power Supply, 80174
- 3300 System Monitor, 80175
- 3300 Dual Thrust Monitor Operation, 80178-01
- Dynamic Data Manager System, 46390-01

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Revision H, June 1990

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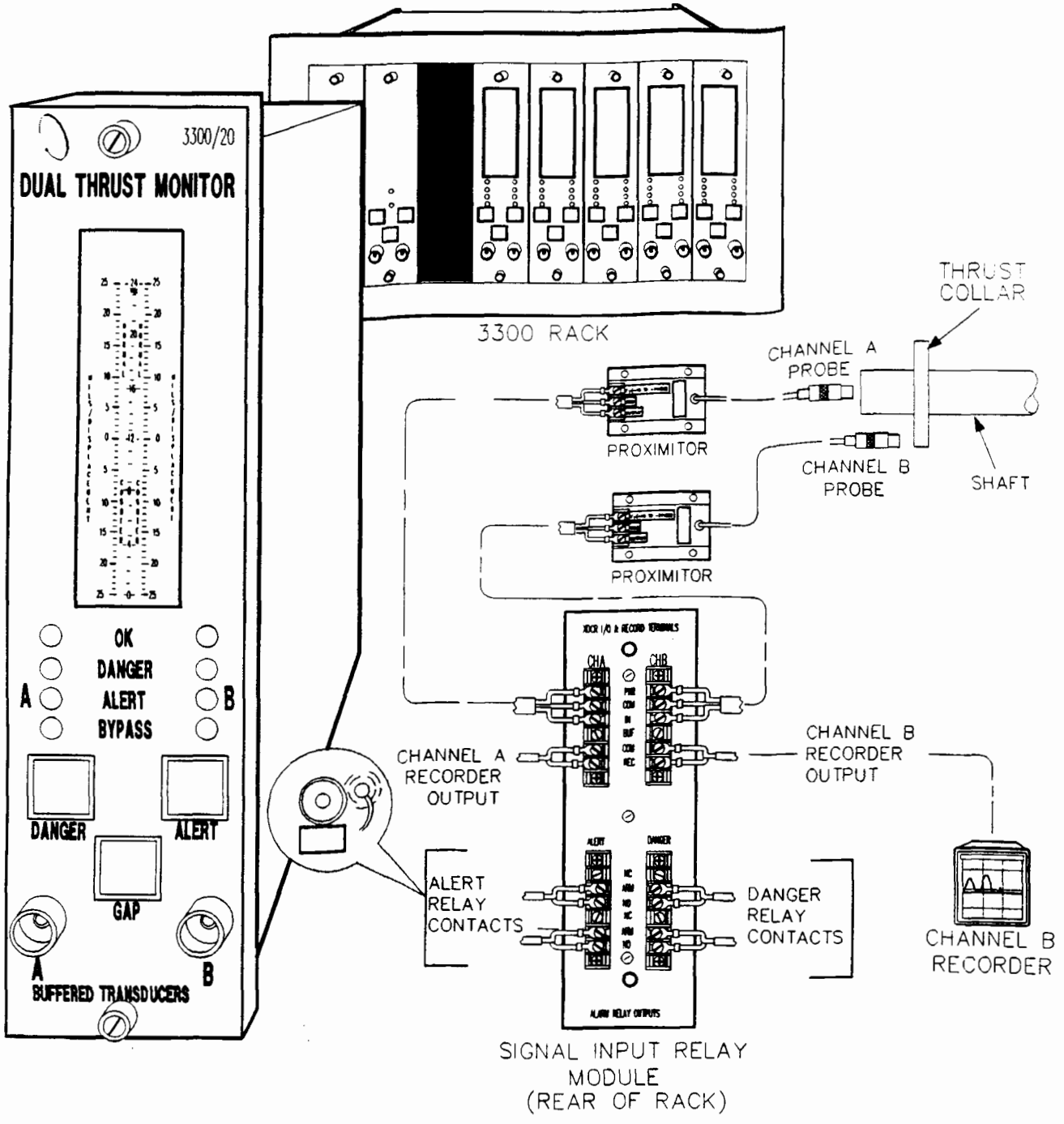
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1 DUAL THRUST MONITOR SYSTEM



1S103

2 MONITOR FUNCTIONS

DUAL THRUST POSITION - Thrust position is the average position, or change in position, of a rotor in the axial direction with respect to some fixed reference. The Dual Thrust Position Monitor provides continuous thrust position monitoring on two channels (A & B) for redundant protection. Normal thrust direction can be toward or away from the probe face. AND voting logic ensures that failure of one channel will not give a false Danger alarm. OR voting logic allows for two independent thrust channels in less critical applications.

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 OK relay. If the monitor has the latching 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 corresponding Alert (first-level alarm) or Danger (second-level alarm) setpoints on each channel to be displayed on the front panel meter. ALERT and DANGER LEDs light when the thrust position signal level exceeds preset levels for the selected time delay, and appropriate ALERT and DANGER alarm relay contacts are activated. Voting logic options determine when the Danger relay contacts are activated.

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 channel was the first channel in the rack to go into alarm. Pressing the RESET switch acknowledges the First Out.

ALARM RELAYS - Monitor alarms can be programmed for either latching or nonlatching mode. In the nonlatching mode, the alarm resets automatically when the alarm condition 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 is set to inhibit the Danger relay drive. This function turns on the BYPASS LEDs. Other front panel functions are not affected. This function can be disabled using a jumper within the monitor.

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 - A recorder output is provided for each channel. 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.

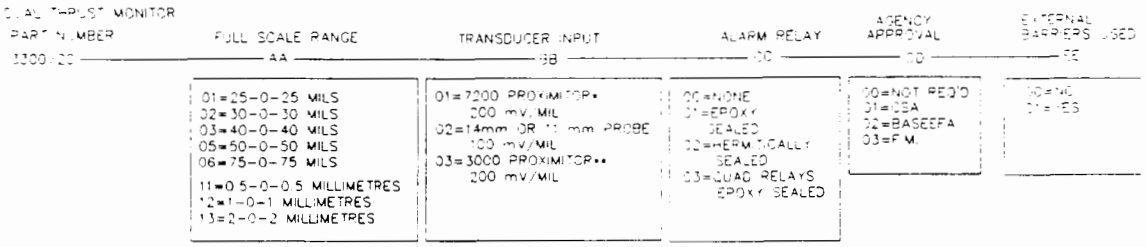
SELF TEST - The monitor has three categories of self test: cyclic, power-up, and user-invoked.

- 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 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.

3 MONITOR OPTIONS



*ONLY FOR RANGE OPTIONS 01, 02, 03, 11, AND 12
**ONLY FOR RANGE OPTIONS 01 AND 11

4 PROGRAMMABLE OPTIONS

PROGRAMMABLE OPTIONS

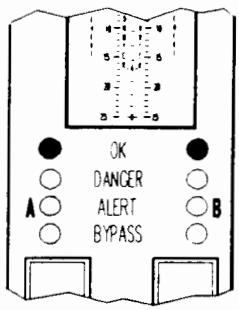
FIRST OUT	o ENABLED* o DISABLED
ALARM DELAYS	o .1 SECOND o 1 SECOND* o 3 SECONDS o 6 SECONDS
OK MODE	o NON-LATCHING * o LATCHING
ALERT MODE	o LATCHING * o NON-LATCHING

*NORMALLY SHIPPED WITH OPTION INSTALLED

DANGER MODE	o LATCHING* o NON-LATCHING
RECORDER OUTPUTS	o +4 TO +20 mA* o +1 TO +5 Vdc o 0 TO -10 Vdc
DANGER VOTING	o OR VOTING FOR RELAY DRIVE o AND VOTING FOR RELAY DRIVE *
NORMAL DIRECTION	o TOWARD PROBE* o AWAY FROM PROBE
DANGER BYPASS	o ENABLED o DISABLED *

25301

5 OK



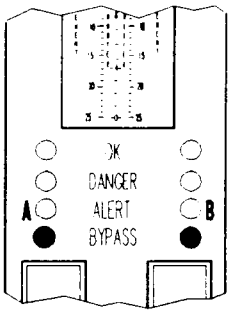
NOTE: EACH CHANNEL IN THE SYSTEM CONTROLS THE OK RELAY. THEREFORE, EITHER CHANNEL CAN CAUSE A NOT OK RELAY CONDITION (DEENERGIZED RELAY).

LED DISPLAY A	LED DISPLAY B	CONDITION	OK RELAY DRIVE*
● OK	●	CHANNEL A AND B IN OPERATING RANGE.	ON
○ OK	●	RESPECTIVE CHANNEL A OR B TRANSDUCER IN NOT OK CONDITION, OR BYPASSED. *	OFF*
● OK	○		
○ OK	○	MONITOR IN SELF TEST, OR BOTH TRANSDUCERS NOT OK OR BY-PASSED.*	OFF*
◎ OK	◎	FLASHING AT 5 Hz = ERROR ENCOUNTERED DURING CYCLIC TEST. READ ERROR MESSAGE. (SEE 14)	ON

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

2S501

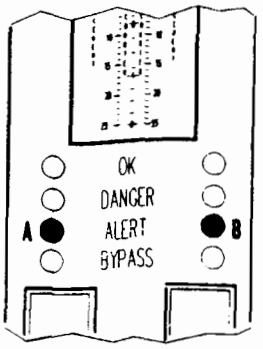
6 BYPASS



LED DISPLAY A	LED DISPLAY B	CONDITION
● BYPASS	●	o MONITOR IN DANGER BYPASS MODE o SYSTEM IN POWER UP MODE o USER INVOKED SELF TEST IN PROGRESS o BOTH CHANNEL BYPASS
○ BYPASS	●	o CHANNEL A OR B BYPASSED
● BYPASS	○	

2S6D1

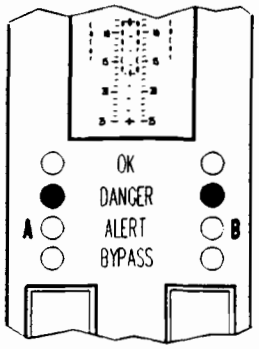
7 ALERT



LED DISPLAY A	LED DISPLAY B	CONDITION	ALERT RELAY DRIVE
● ALERT	○	EITHER CHANNEL A OR B (OR BOTH) HAS EXCEEDED ALARM LEVEL. (SEE 12)	ON
○ ALERT	●		ON
● ALERT	●		ON
○ ALERT	◎	FIRST OUT CONDITION FOR RESPECTIVE A OR B CHANNEL THAT HAS EXCEEDED ALARM LEVEL. TWO CHANNELS MAY INDICATE FIRST OUT FOLLOWING SELF TEST. *	ON
◎ ALERT	○		ON

*FIRST OUT RESOLUTION IS BETTER THAN 50 MILLISECONDS. IF TWO ALARMS OCCUR WITHIN 50 MILLISECONDS OR LESS, THEY COULD CAUSE BOTH LEDS TO FLASH.

8 DANGER



LED DISPLAY A	LED DISPLAY B	CONDITION	DANGER RELAY DRIVE OR VOTING	DANGER RELAY DRIVE AND VOTING*
● DANGER	○	EITHER CHANNEL A OR B (OR BOTH) HAS EXCEEDED ALARM LEVEL. (SEE 13)	ON	OFF
○ DANGER	●		ON	OFF
● DANGER	●		ON	ON
○ DANGER		FIRST OUT CONDITION FOR RESPECTIVE A OR B CHANNEL THAT HAS EXCEEDED ALARM LEVEL. TWO CHANNELS MAY INDICATE FIRST OUT FOLLOWING SELF TEST.**	ON	OFF
	○ DANGER		ON	OFF

*IF EITHER CHANNEL IS BYPASSED, ALARM RELAY IS ACTIVATED IF NONBYPASSED CHANNEL IS IN ALARM.

**FIRST OUT RESOLUTION IS BETTER THAN 50 MILLISECONDS IF TWO ALARMS OCCUR WITHIN 50 MILLISECONDS OR LESS OF EACH OTHER THEY COULD CAUSE BOTH LEDS TO FLASH.

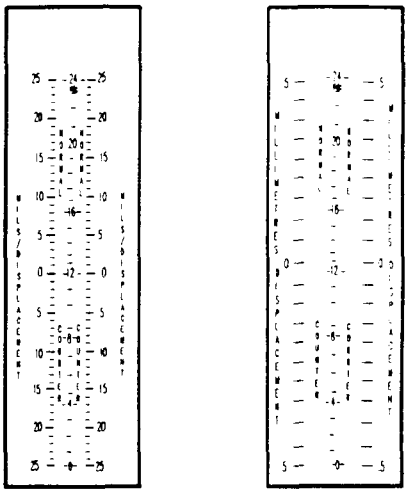
2S801

9 MONITOR RANGES

3300/20 — [ ][ ] — [ ][ ] — [ ][ ] — [ ][ ] — [ ][ ] — [ ][ ]

FULL SCALE RANGE
01=25-0-25 MILS
02=30-0-30 MILS
03=40-0-40 MILS
05=50-0-50 MILS
06=75-0-75 MILS
11=0.5-0-0.5 MILLIMETRES
12=1-0-1 MILLIMETRES
13=2-0-2 MILLIMETRES

SEE 23 FOR JUMPER PROGRAMMING

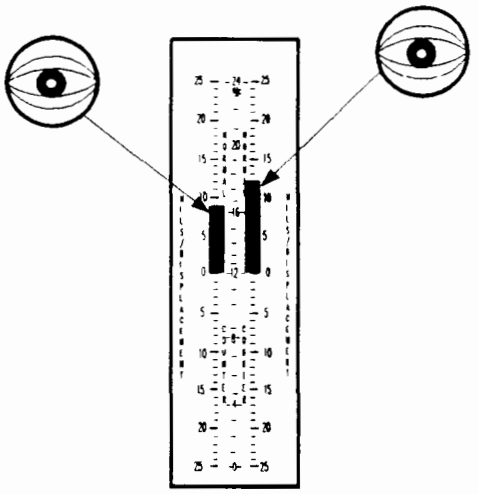


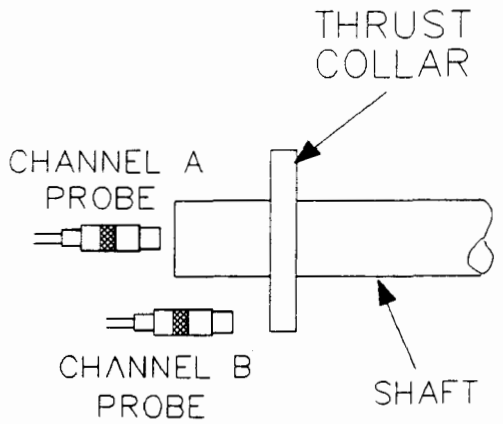
EXAMPLES OF METER SCALES

2S901

10 READ CHANNEL THRUST POSITION

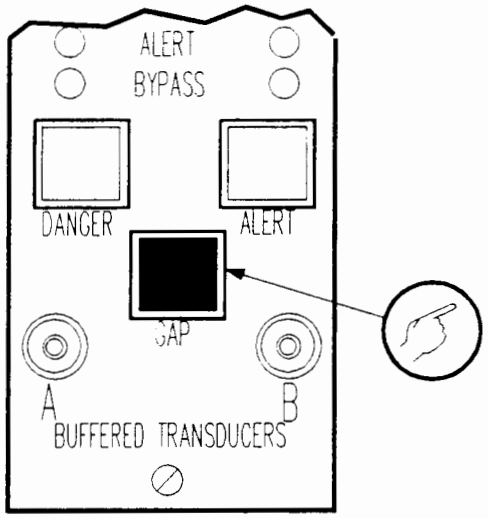
MONITOR CONTINUOUSLY INDICATES MEASURED THRUST POSITION VALUES FOR CHANNELS A AND B.

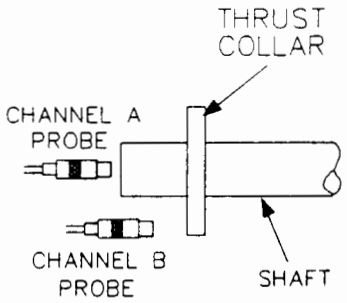


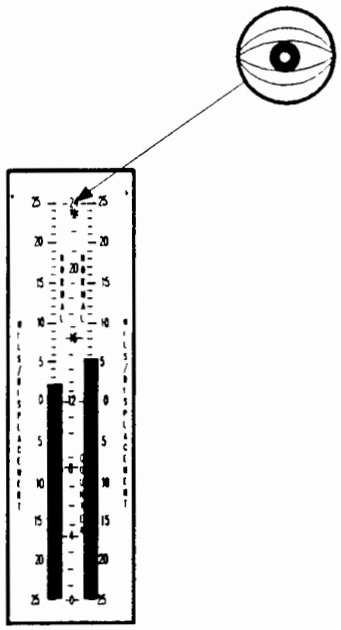


11 READ GAP VOLTAGE

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



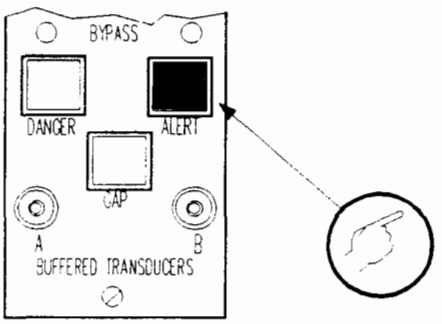


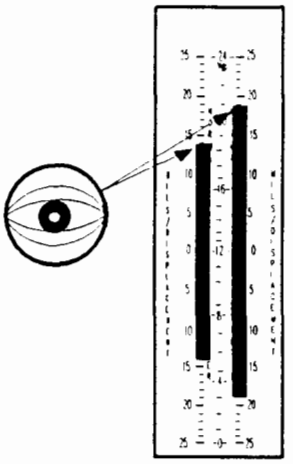


2S11D1

12 READ ALERT SETPOINT LEVELS

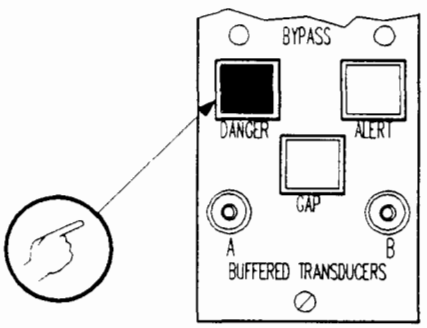
1. PRESS **ALERT** SWITCH AND READ ALERT SETPOINTS (FOR BOTH CHANNEL A AND B) ON METER SCALE. BOTH NORMAL AND COUNTER SETPOINTS ARE DISPLAYED.

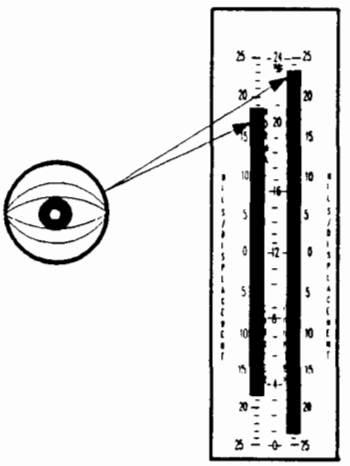




13 READ DANGER SETPOINT LEVELS

1. PRESS **DANGER** SWITCH AND READ DANGER SETPOINTS (FOR BOTH CHANNEL A AND B) ON METER SCALE. BOTH NORMAL AND COUNTER SETPOINTS ARE DISPLAYED.



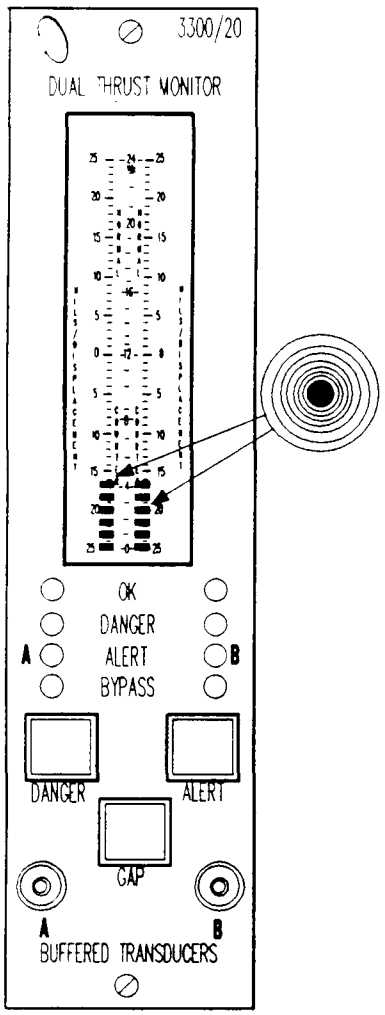


2S12D1

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.

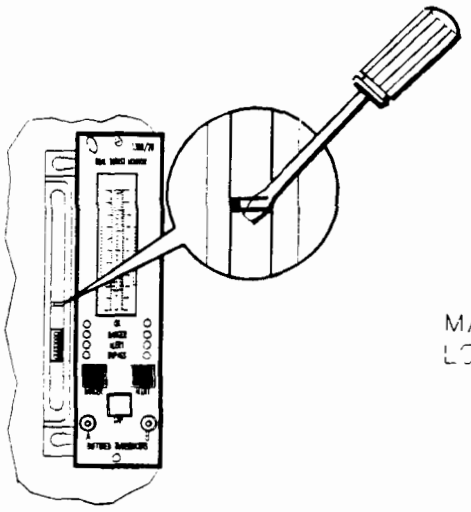
IF ERRORS ARE DETECTED DURING POWER UP TEST OR USER INVOKED TEST:

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

2S14D1

14 SELF TEST [CONT]

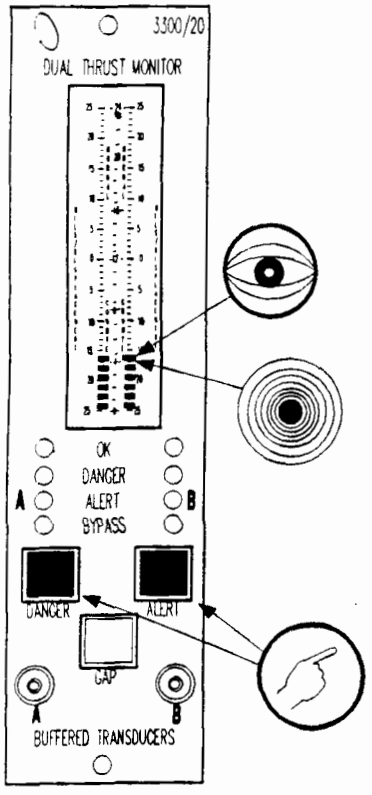
o INITIATE USER INVOKED TEST BY SHORTING ACROSS TWO SELFTEST (ST) PINS.



CAUTION

MACHINE PROTECTION WILL BE LOST FOR DURATION OF TEST

o AT COMPLETION OF USER INVOKED 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.



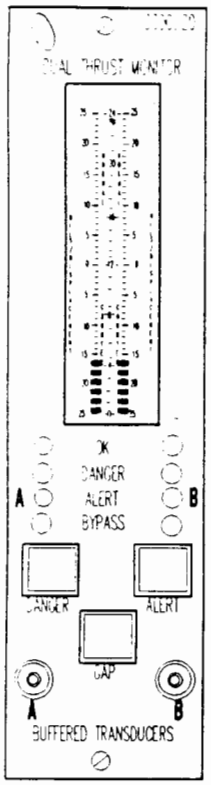
NOTE

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

o READ CODES ON LIST; STEP THROUGH EACH ERROR CODE ON LIST BY PRESSING AND HOLDING **ALERT** SWITCH FOR APPROXIMATELY 1 SECOND.
o 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.

2S1402

14 SELF TEST [CONT]



ERROR CODE	DESCRIPTION
2.	ROM CHECKSUM HAS FAILED. *
3.	EEPROM FAILURE NO.1. **
4.	EEPROM FAILURE NO.2; ADJUST SET POINTS. (SEE [2] AND [3]) ***
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. **
13.	SCIC CLOCK FAILURE **
14.	RAM FAILURE. *
15.	IC U4 OUTPUT DISAGREES WITH GAP VOLTAGE VALUE. *

* 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, 14, AND 15 ARE NONRECOVERABLE; ERRORS 5 THROUGH 13 COULD BE INTERMITTANT AND RECOVERABLE.

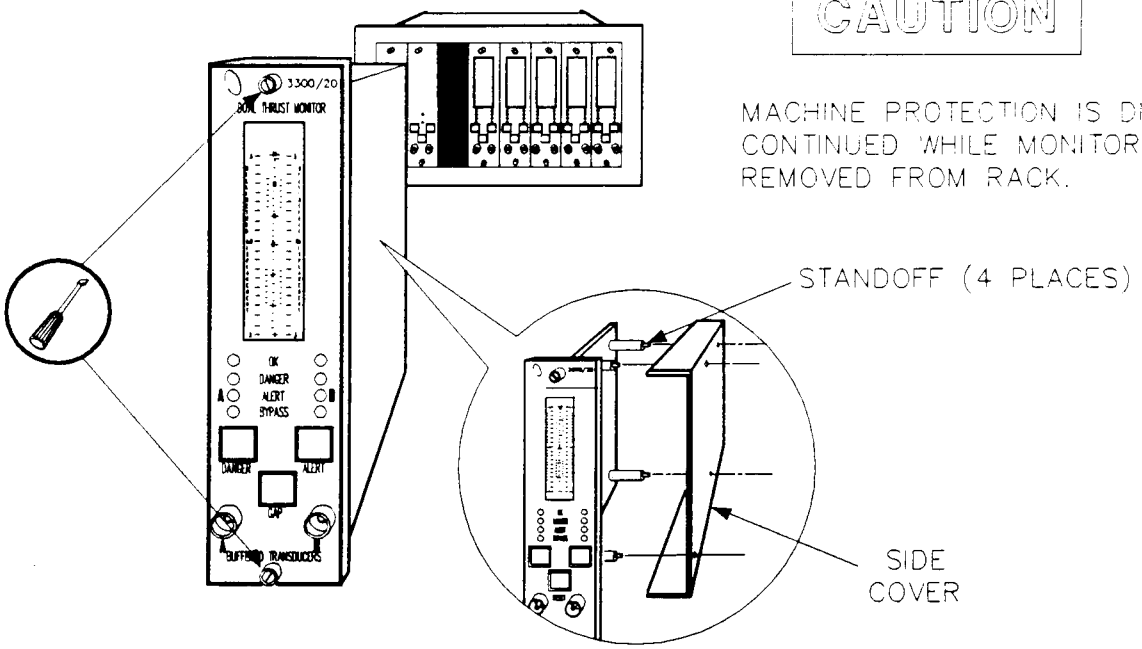
* * * ERROR 4 IS A SET POINT SELF TEST FAILURE. THIS MAY BE CORRECTED BY ADJUSTING ALL SETPOINTS IN MONITOR.

15 DISASSEMBLY PROCEDURE

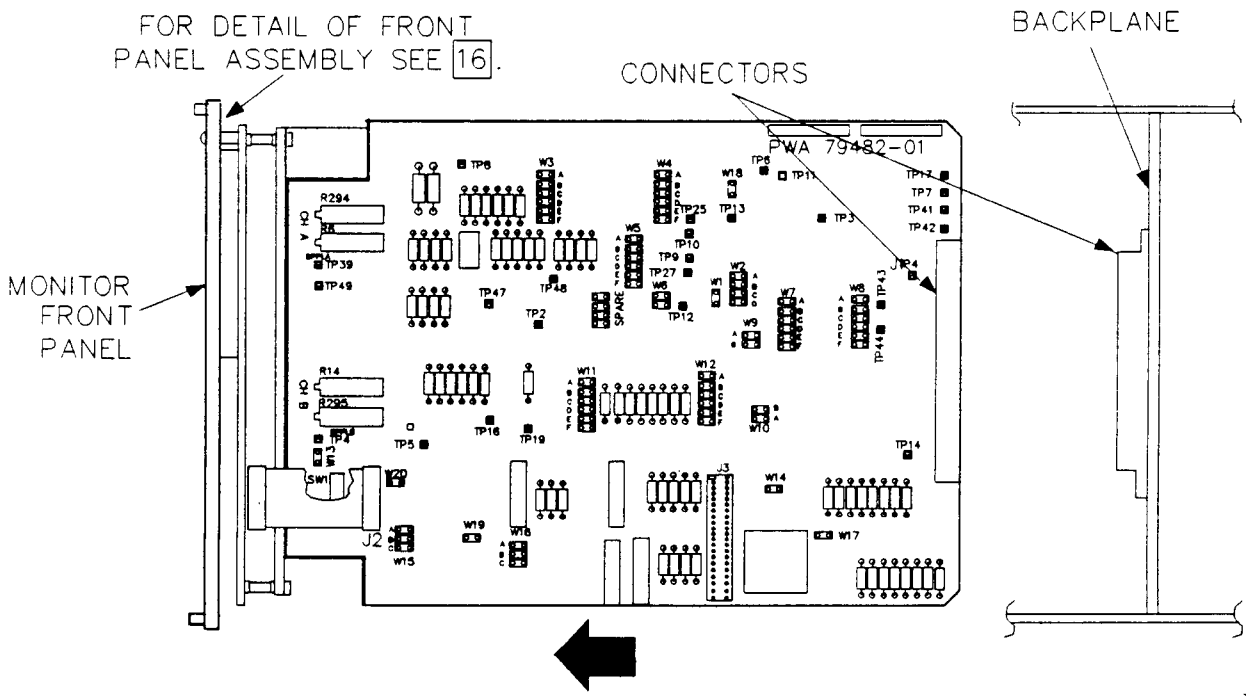
1. LOOSEN SCREWS AND PULL MONITOR FROM RACK.

CAUTION

MACHINE PROTECTION IS DISCONTINUED WHILE MONITOR IS REMOVED FROM RACK.

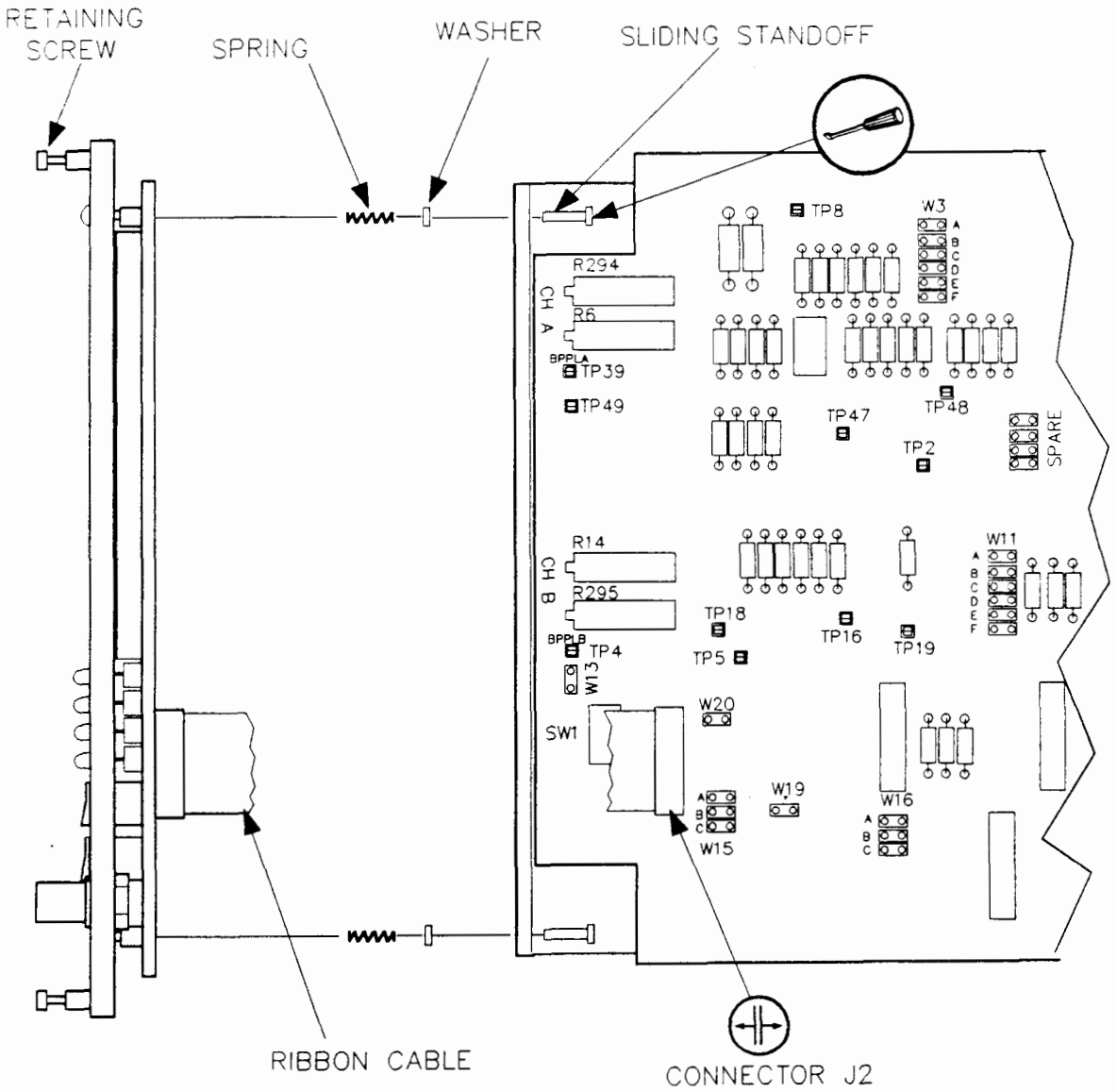


2. REMOVE SIDE COVER BY PINCHING PROTRUDING TIP ON EACH STANDOFF.



3S15D1

16 FRONT PANEL ASSEMBLY REMOVAL



JS16D1

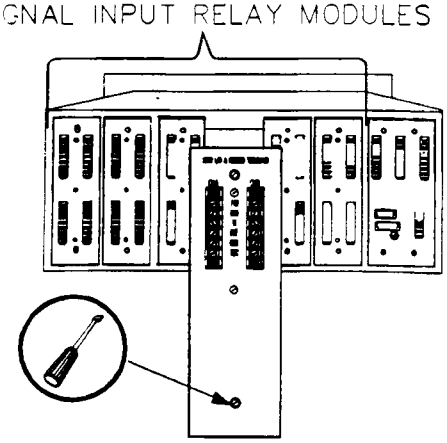
17 SIGNAL INPUT RELAY MODULES

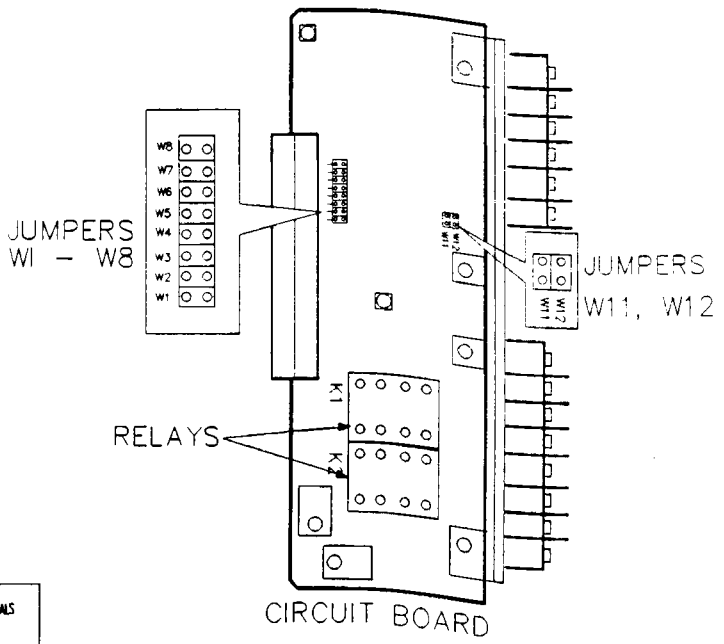
⚠ WARNING

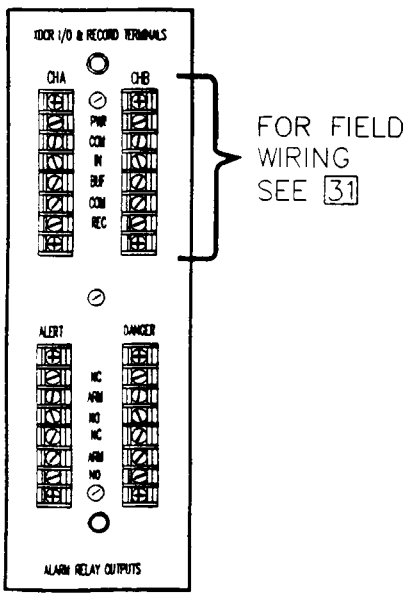
High voltage present could cause shock burns or death

Do not touch exposed wires or terminals

SIGNAL INPUT RELAY MODULES

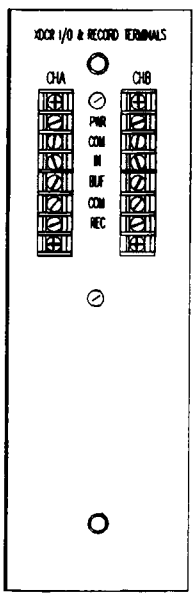






FOR FIELD WIRING SEE [31]

WITH RELAYS



WITHOUT RELAYS

ALERT RELAY	JUMPER *	
	IN	OUT
NORMALLY ENERGIZED	W3	W4, W11
NORMALLY DEENERGIZED	W4, W11	W3

DANGER RELAY	JUMPER *	
	IN	OUT
NORMALLY ENERGIZED	W2	W1, W12
NORMALLY DEENERGIZED	W1, W12	W2

* FOR CONFIGURATION OF RELAYS REFER TO INSTALLATION MANUAL

3S17D1

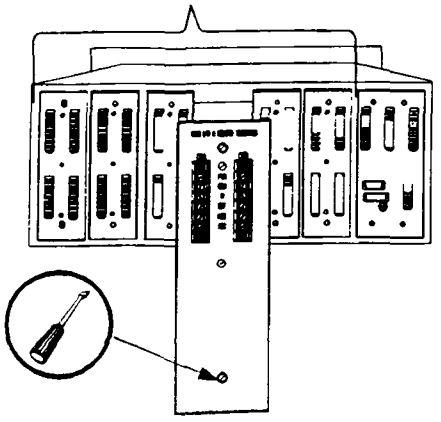
17 SIGNAL INPUT RELAY MODULES [CONT.]

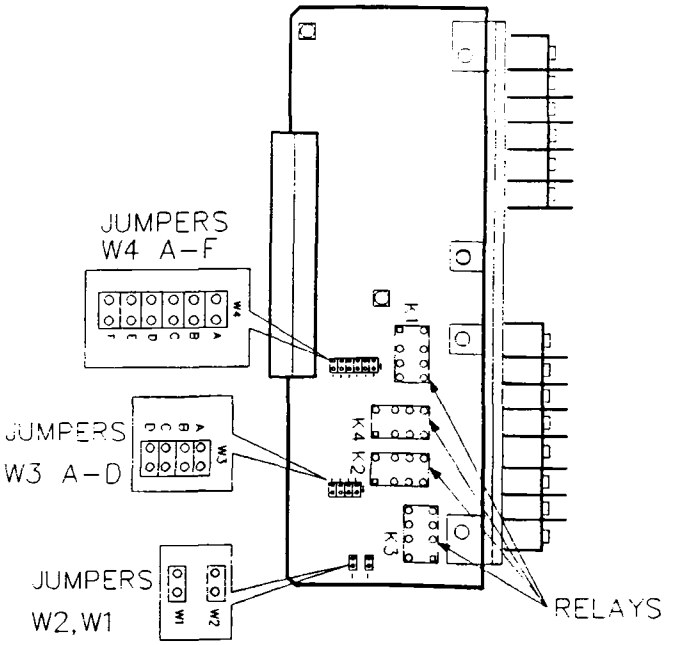
⚠ WARNING

High voltage present could cause shock burns or death

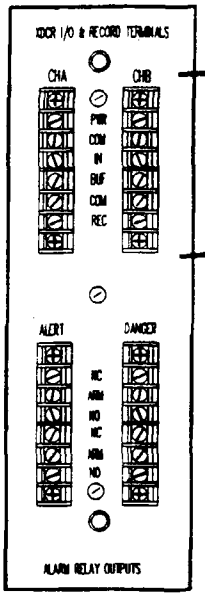
Do not touch exposed wires or terminals

SIGNAL INPUT RELAY MODULES





CIRCUIT BOARD
QUAD RELAYS



FOR FIELD WIRING REFER TO MONITOR MANUAL

*FOR INSTALLATION OF RELAY MODULES, REFER TO INSTALLATION MANUAL.

WITH QUAD RELAYS

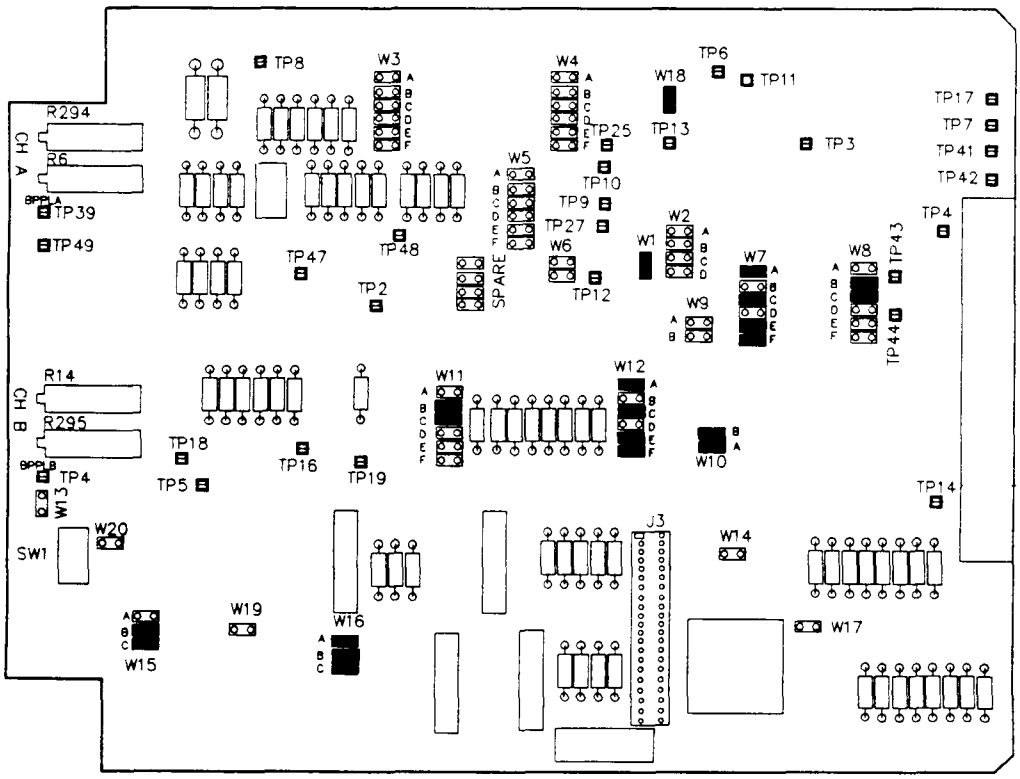
SIGNAL INPUT/QUAD RELAY CARD OPTION *		
RELAY OPTIONS	INSTALL	REMOVE
ALERT RELAYS NORMALLY DE-ENERGIZED	W2,3C W3D,4D	W3A,4C
ALERT RELAYS NORMALLY ENERGIZED	W3A,4C	W2,3C W3D,4D
DANGER RELAYS NORMALLY DE-ENERGIZED	W1,3B W4A,4E	W4B,4F
DANGER RELAYS NORMALLY ENERGIZED	W4B,4F	W1,3B W4A,4E

3S17D2

18 INSTALLED PROGRAMMABLE OPTIONS

THE THRUST MONITOR IS SHIPPED WITH THE FOLLOWING OPTIONS INSTALLED:

- FIRST OUT – ENABLED
- ALARM DELAYS – 1 SECOND
- ALERT MODE – LATCHING
- DANGER MODE – LATCHING
- RECORDER OUTPUT – +4 TO +20mA
- DANGER VOTING – AND VOTING
- FULL SCALE RANGE (AS ORDERED)
- OK MODE (AS ORDERED)
- TRANSDUCER INPUT (AS ORDERED)
- DANGER BYPASS (DISABLED)
- NORMAL DIRECTION (TOWARD PROBE)



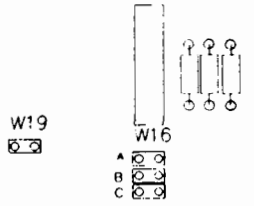
3S18D1

19 FIRST OUT, ALARM DELAYS, METER RESPONSE TIME

OPTION

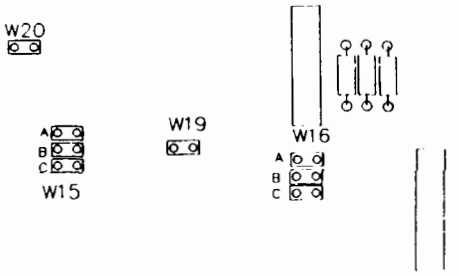
FIRST OUT

	JUMPERS	
	INSTALLED	REMOVED
o ENABLED	W16A	---
o DISABLED	---	W16A



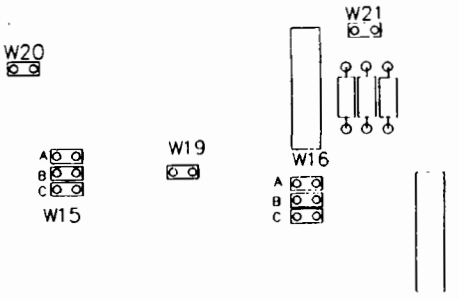
ALARM DELAYS

	JUMPERS	
	INSTALLED	REMOVED
o 0.1 SECOND	---	W15A,B
o 1 SECOND	W15B	W15A
o 3 SECONDS	W15A	W15B
o 6 SECONDS	W15A,B	---



METER RESPONSE TIME

	JUMPERS	
	INSTALLED	REMOVED
o FAST	---	W21
o SLOW	W21	---

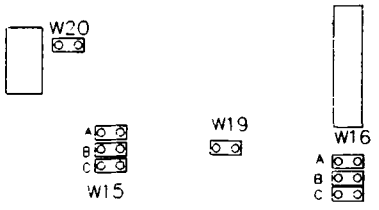


REMOVED JUMPERS CAN BE SAVED BY PLUGGING ONLY ONE PIN OF JUMPER INTO JUMPER SOCKET.

3S1901

20 ALERT MODE, DANGER MODE, DANGER VOTING, OK MODE

JUMPER LOCATIONS



OPTION

ALERT MODE

OPTION	JUMPERS INSTALLED	JUMPERS REMOVED
o LATCHING	W15C	---
o NON LATCHING	---	W15C

DANGER MODE

OPTION	JUMPERS INSTALLED	JUMPERS REMOVED
o LATCHING	W16B	---
o NON LATCHING	---	W16B

DANGER VOTING

OPTION	JUMPERS INSTALLED	JUMPERS REMOVED
o AND	W16C	---
o OR	---	W16C

OK MODE

OPTION	JUMPERS INSTALLED	JUMPERS REMOVED
o LATCHING	W19	---
o NON LATCHING	---	W19

3S20D1

21 RECORDER OUT, NORMAL DIRECTION, DANGER BYPASS SWITCH

RECORDER OUT OPTION	JUMPER LOCATIONS*

+4 TO +20 mA

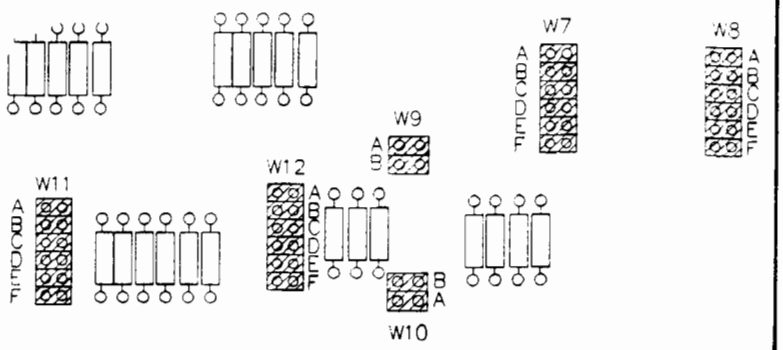
JUMPERS INSTALLED
W7A,C,E,F
W8B,C
W10A,B
W11B,C
W12A,C,E,F

+1 TO +5 Vdc

JUMPERS INSTALLED
W7B,D
W8A,E
W10A,B
W11A,E
W12B,D

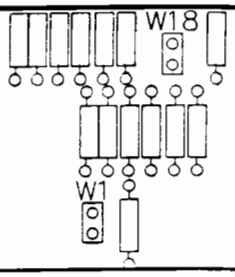
0 TO −10 Vdc

JUMPERS INSTALLED
W7B,D
W8D,F
W9A,B
W11D,F
W12B,D

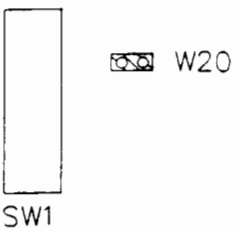


* REMOVE ALL JUMPERS FROM W7, W8, W9, W10, W11, AND W12 THEN REINSTALL ACCORDING TO TABLE

NORMAL DIRECTION	JUMPERS		
	INSTALL		REMOVE
AWAY FROM PROBE	CH A CH B	--- ---	W1 W18
TOWARDS PROBE	CH A CH B	W1 W18	--- ---



DANGER BYPASS SWITCH OPTION	JUMPERS	
	INSTALL	REMOVE
ENABLE	W20	---
DISABLE	---	W20

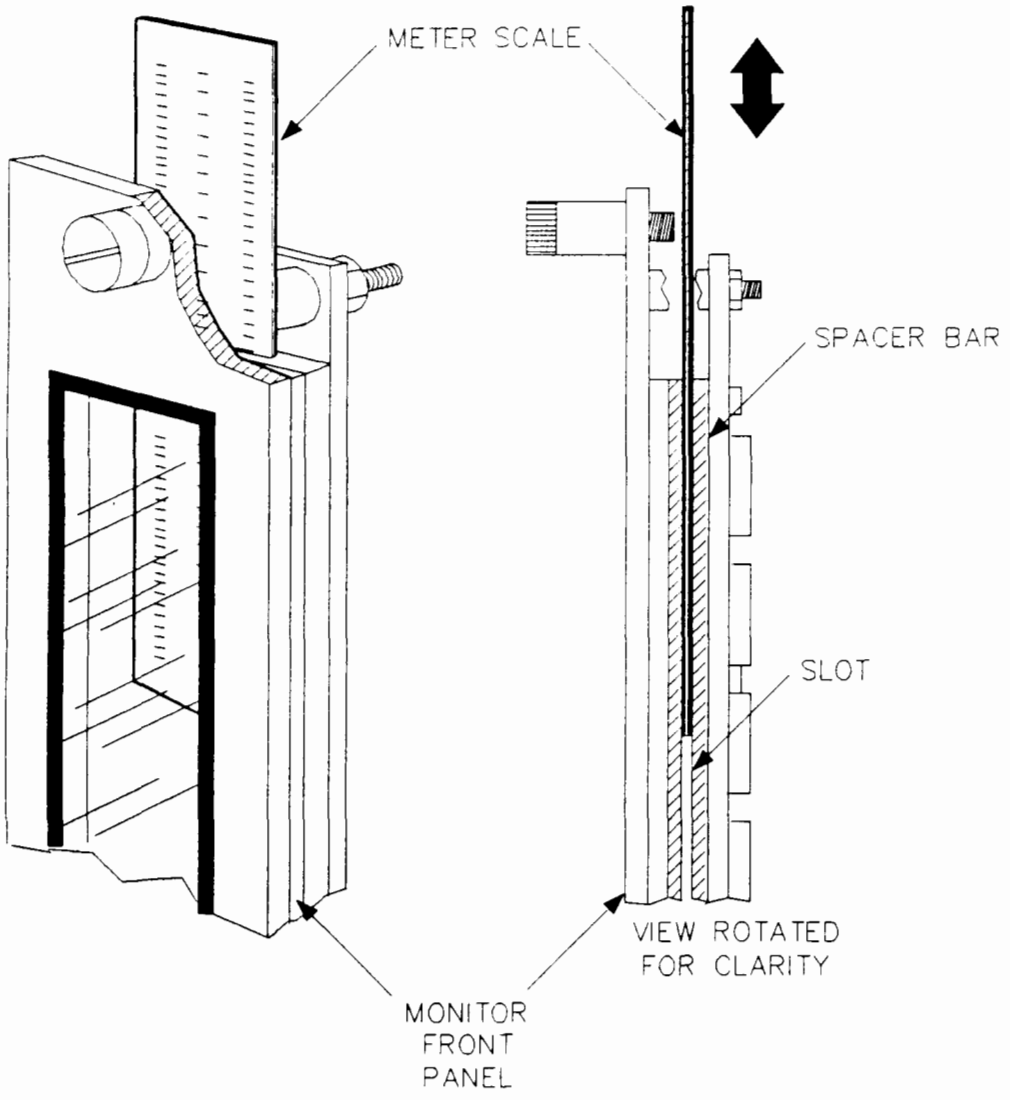


3S21D1

22 REPLACE METER SCALE

1. VERIFY MONITOR FULL SCALE OPTION (SEE 23 .)
2. OBTAIN METER SCALE FROM REAR OF MANUAL AND INSERT IN FRONT PANEL AS SHOWN.

NOTE. TO ENSURE CORRECT FITTING AND ALIGNMENT, THE METER SCALE MUST BE CUT FROM THE PLASTIC SHEET EXACTLY ALONG THE MARKED OUTLINE.



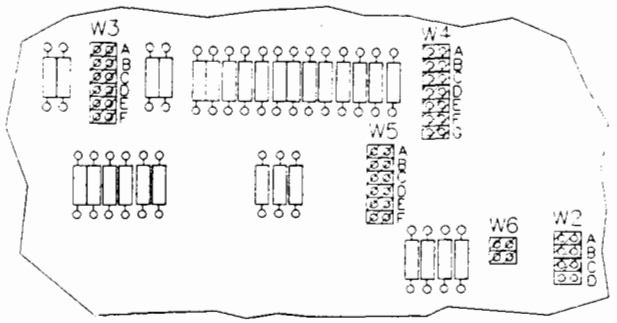
3S22D1

23 MONITOR FULL SCALE OPTIONS

JUMPER LOCATIONS

CAUTION

CHANGING FULL SCALE REQUIRES RECALIBRATION OF BOTH CHANNELS. (SEE 29)



FULL SCALE OPTIONS

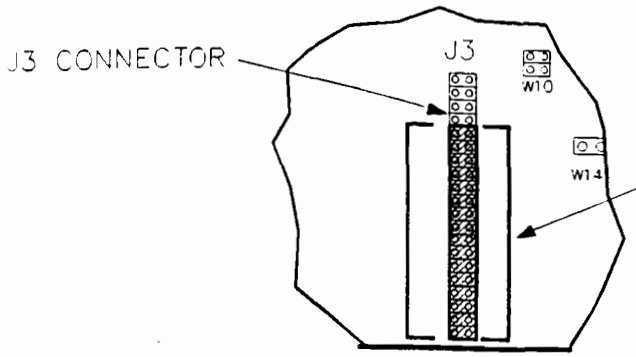
TRANSDUCERS	MILS					MILLIMETRES		
	25-0-25	30-0-30	40-0-40	50-0-50	75-0-75	0.5-0-0.5	1-0-1	2-0-2
3000 SERIES (200 mV/MIL)	W2A,B					W2C		
	W3D					W3B		
	W4C,E,G					W4C,E,G		
	.....					.....		
	W6B					W6B		
7200 SERIES WITHOUT BARRIERS (200 mV/MIL)	W2A,B	W2A	W2A			W2C	W2A	
	W3F	W3E	W3D			W3F	W3D	
	W4A,E,G	W4A,F,G	W4A,E,G			W4A,E,G	W4A,E,G	
	W5A,D	W5A,D	W5A,D			W5A,D	W5A,D	
	W6B	W6A	W6B			W6B	W6B	
7200 SERIES WITH BARRIERS (192 mV/MIL)	W2A,B	W2A	W2A			W2C	W2A	
	W3F	W3E	W3D			W3F	W3D	
	W4D,E	W4D,F	W4D,E			W4D,E	W4D,E	
	W5C,F	W5C,F	W5C,F			W5C,F	W5C,F	
	W6B	W6A	W6B			W6B	W6B	
7200 SERIES 11 mm (100 mV/MIL)	W2C	W2C	W2C	W2A,B	W2B	W2A,B	W2C	W2A
	W3A	W3E	W3B	W3B	W3D	W3B	W3B	W3C
	W4B,G	W4B,G,F	W4B,E,G	W4B,E,G	W4B,E,G	W4B,E,G	W4B,E,G	W4B,E,G
	W5B,E	W5B,E	W5B,E	W5B,E	W5B,E	W5B,E	W5B,E	W5B,E
	.....	W6A	W6B	W6B	W6B	W6B	W6B	W6B
7200 SERIES 14 mm (100 mV/MIL)	W2C	W2C	W2C	W2A,B	W2B	W2A,B	W2C	W2A
	W3A	W3E	W3B	W3B	W3D	W3B	W3B	W3C
	W4A,G	W4A,G,F	W4A,E,G	W4A,E,G	W4A,E,G	W4A,E,G	W4A,E,G	W4A,E,G
	W5B,E	W5B,E	W5B,E	W5B,E	W5B,E	W5B,E	W5B,E	W5B,E
	.....	W6A	W6B	W6B	W6B	W6B	W6B	W6B

*REMOVE JUMPERS FROM W2-A,B,C, W3-A,B,C,D,E,F, W4-A,B,C,D,E,F, W5-A,B,C,D,E,F, AND W6-A,B BEFORE CHANGING TO A DIFFERENT FULL SCALE OPTION.

3S23D1

24 EXPANDER BOARD INSTALLATION/REMOVAL

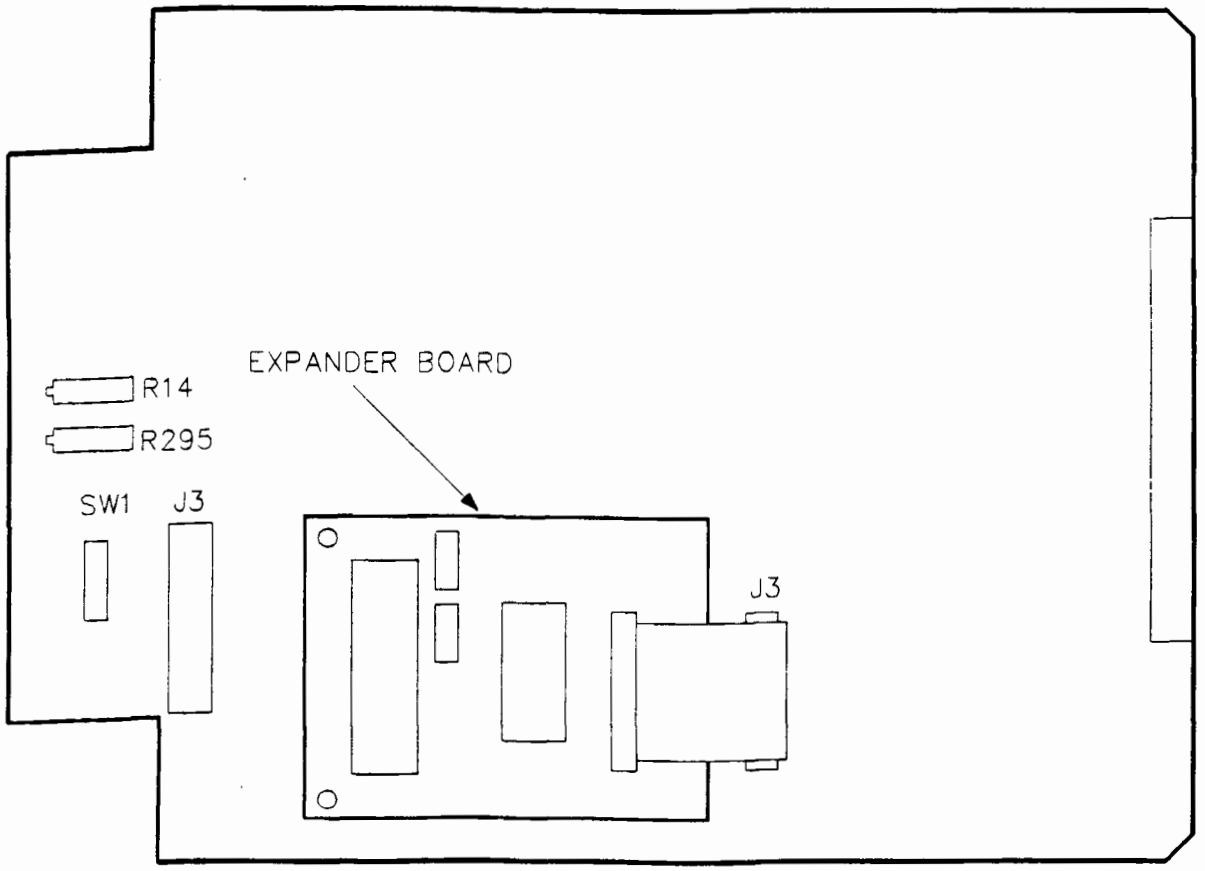
REMOVE MONITOR FROM RACK AND REMOVE SIDE COVER. (SEE 15)



CAUTION

MONITORING IS DISCONTINUED WHILE MONITOR IS REMOVED FROM RACK.

VIEW SHOWING EXPANDER BOARD REMOVED.
JUMPERS MUST BE INSTALLED AS SHOWN.



VIEW SHOWING EXPANDER BOARD INSTALLED

3S2401

25 ALARM SETPOINT ADJUST

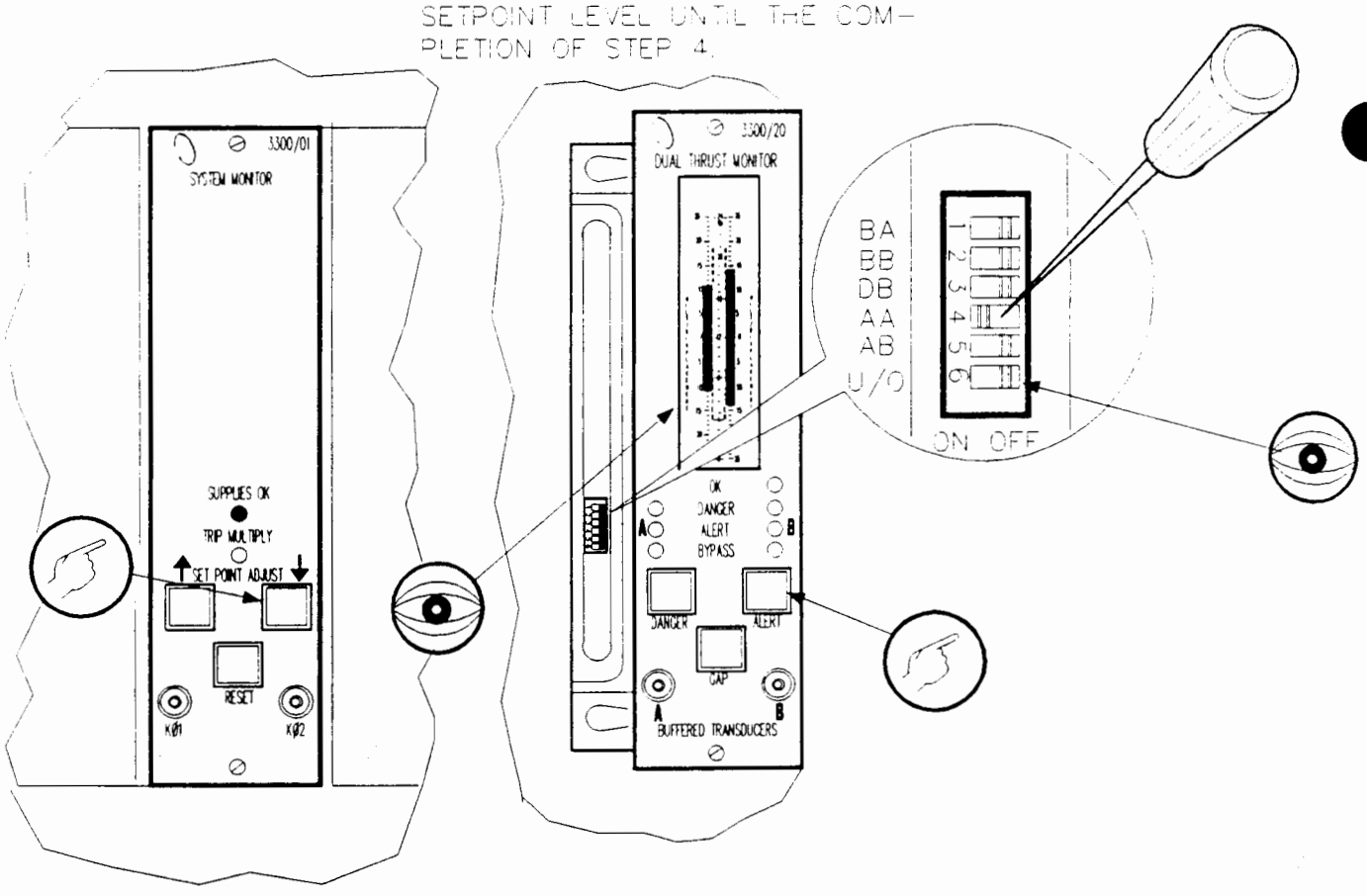
NOTE

SETPOINTS CAN NOT BE ADJUSTED WITH TRIP MULTIPLY INSTALLED AND ACTIVATED BY CONTACT CLOSURE.

1. OPEN FRONT PANEL, SET RESPECTIVE **AA** (CHANNEL A ADJUST) OR **AB** (CHANNEL B ADJUST) SWITCH TO ON; SELECT OVER OR UNDER SETPOINTS BY SETTING U/O SWITCH TO DESIRED POSITION. RESPECTIVE CHANNEL BAR-GRAPH STARTS FLASHING.
2. TO ADJUST **ALERT** OR **DANGER** SETPOINTS, PRESS AND HOLD **ALERT** OR **DANGER** SWITCH ON FRONT PANEL.
3. USE ↑ OR ↓ SWITCHES ON SYSTEM MONITOR TO ADJUST SETPOINT LEVEL UP OR DOWN.
4. RESET **AA** OR **AB** SET SWITCH; CLOSE FRONT PANEL.

NOTE

MONITOR RESPONDS TO PREVIOUS SETPOINT LEVEL UNTIL THE COMPLETION OF STEP 4.



4S25D1

26 CHANNEL BYPASS

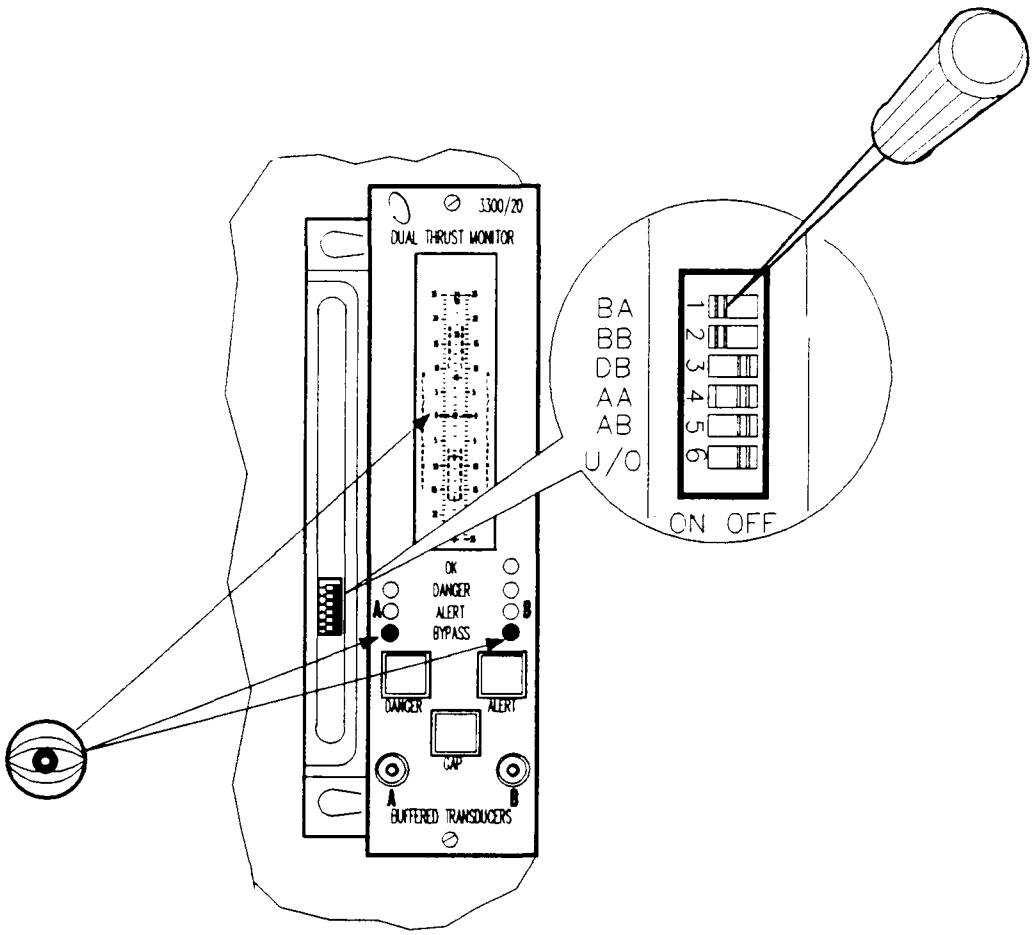
SET **BA** (CHANNEL A BYPASS) OR **BB** (CHANNEL B BYPASS) SWITCH TO ON. CORRESPONDING BYPASS LED GOES ON, **OK** LED GOES OFF, AND AMPLITUDE GOES TO 0.

CAUTION

MACHINE PROTECTION WILL BE LOST WHILE CHANNEL BYPASS IS ON.

NOTE

WHEN CHANNEL BYPASS IS SWITCHED ON, CHANNEL ALARMS ARE CLEARED.



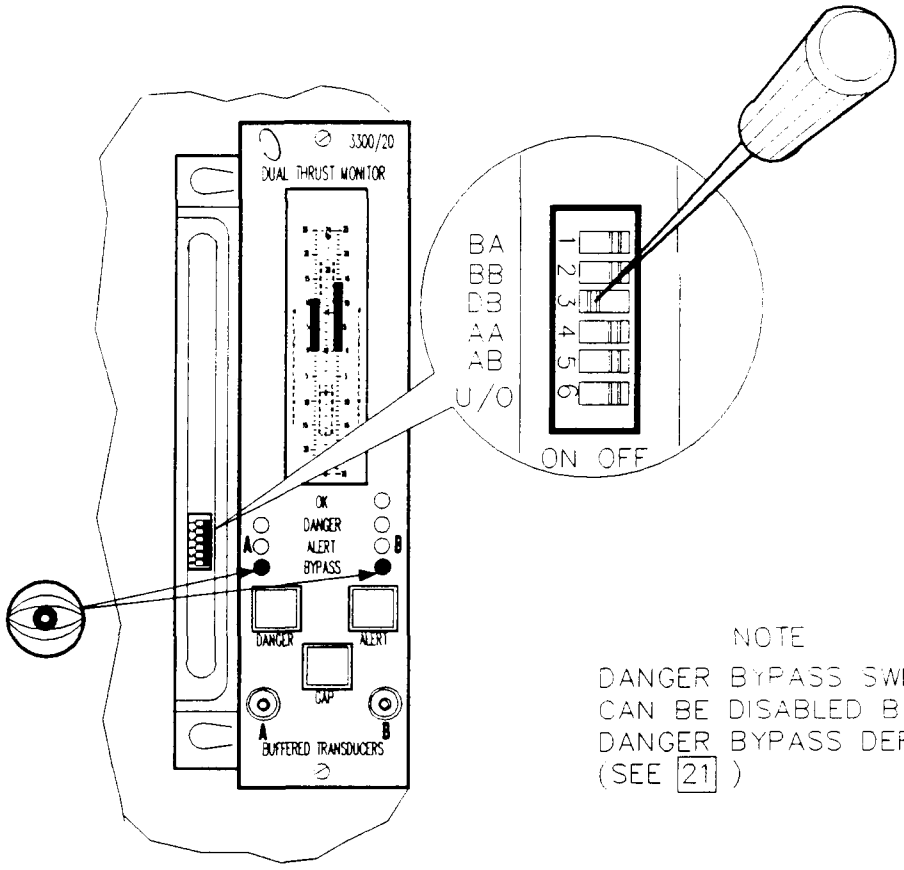
4S26D1

27 DANGER BYPASS

SET **DB** DANGER BYPASS SWITCH TO ON. BOTH CHANNEL BYPASS LEDs GO ON. DANGER ALARM LEDs ON FRONT PANEL CAN GO ON BUT DANGER RELAY OUTPUT WILL NOT BE ACTIVATED IF A DANGER SETPOINT IS EXCEEDED. SEE 13 TO READ DANGER SETPOINTS.

CAUTION

MACHINE PROTECTION WILL BE LOST WHILE DANGER BYPASS IS ON.



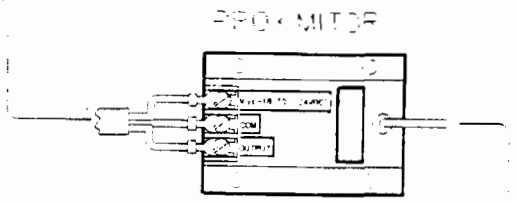
NOTE
DANGER BYPASS SWITCH CAN BE DISABLED BY DANGER BYPASS DEFEAT. (SEE 21)

4S27D1

28 TEST CHANNEL ALARMS

CAUTION

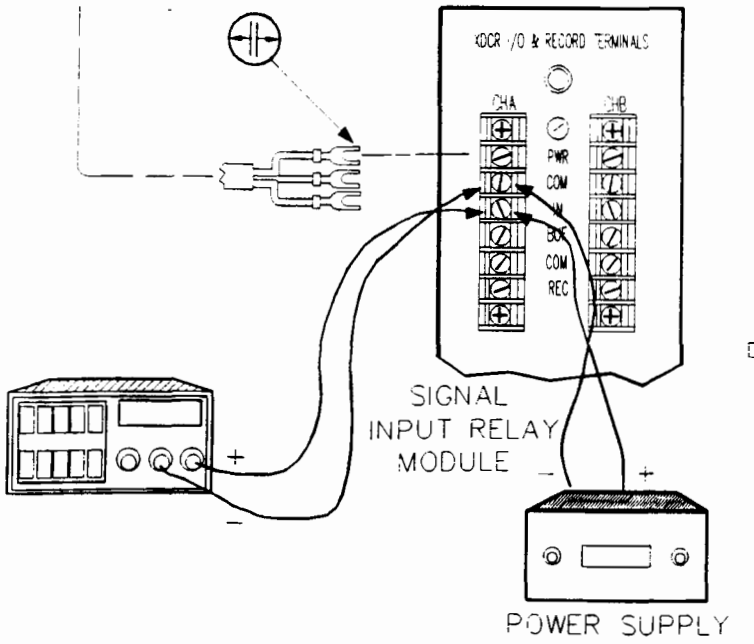
TESTS COULD EXCEED ALARM SET-POINT LEVELS CAUSING ALARMS TO ACTIVATE. THIS COULD RESULT IN RELAY CONTACT TO CHANGE STATE. SEE DANGER BYPASS 27

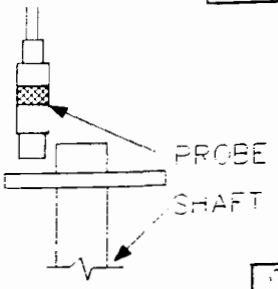


⚠ WARNING

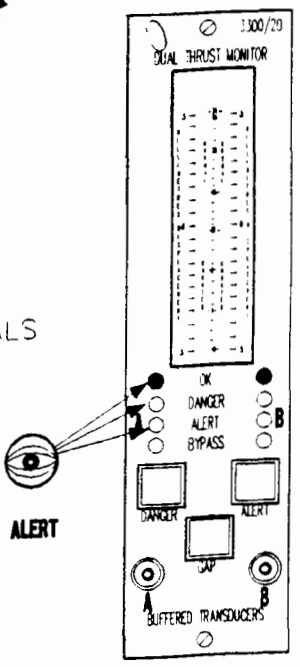
High voltage present could cause shock burns or death

Do not touch exposed wires or terminals





1. DISCONNECT **COM** AND **IN** WIRING FROM CHANNEL A TERMINALS ON SIGNAL INPUT RELAY MODULE.
2. CONNECT MULTIMETER AND POWER SUPPLY.
3. ADJUST VOLTAGE FOR 0 MIL (0mm) ON MONITOR DISPLAY.
4. PRESS **RESET** SWITCH AND VERIFY **OK** LEDs ARE ON, AND **ALERT** AND **DANGER** LEDs ARE OFF.

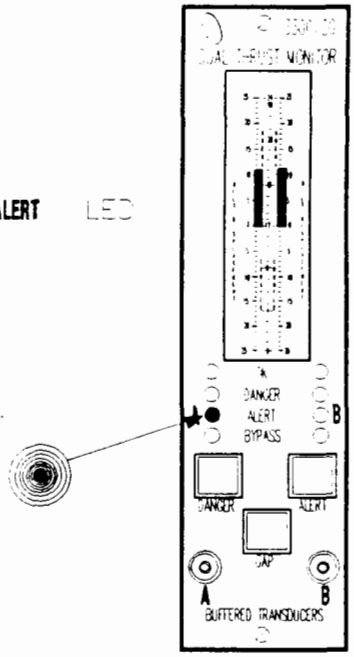


4S2801

28 TEST CHANNEL ALARMS [CONT.]

5. ADJUST POWER SUPPLY VOLTAGE PAST ALERT SETPOINT LEVEL AND VERIFY THAT **ALERT** LED GOES ON (FLASHING IF FIRST OUT OPTION).

6. VERIFY THAT ALERT RELAY CHANGED STATE.

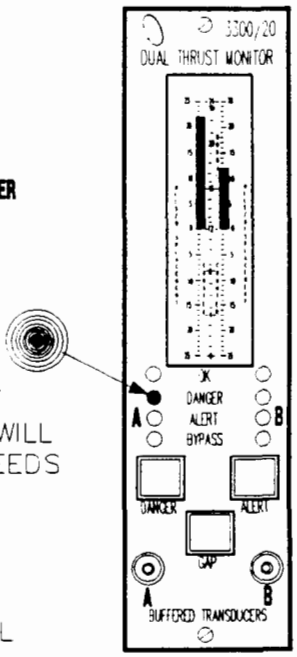


7. PRESS **RESET** SWITCH AND VERIFY THAT **ALERT** LED REMAINS ON STEADY.

8. ADJUST POWER SUPPLY VOLTAGE PAST DANGER SETPOINT LEVEL AND VERIFY THAT **DANGER** LED GOES ON (FLASHING IF FIRST OUT OPTION).

9. VERIFY THAT DANGER RELAY CHANGED STATE. IF DANGER "AND" VOTING LOGIC SELECTED, RELAY WILL NOT CHANGE STATE UNTIL OTHER CHANNEL EXCEEDS DANGER SETPOINT OR IF DANGER BYPASS IS ON.

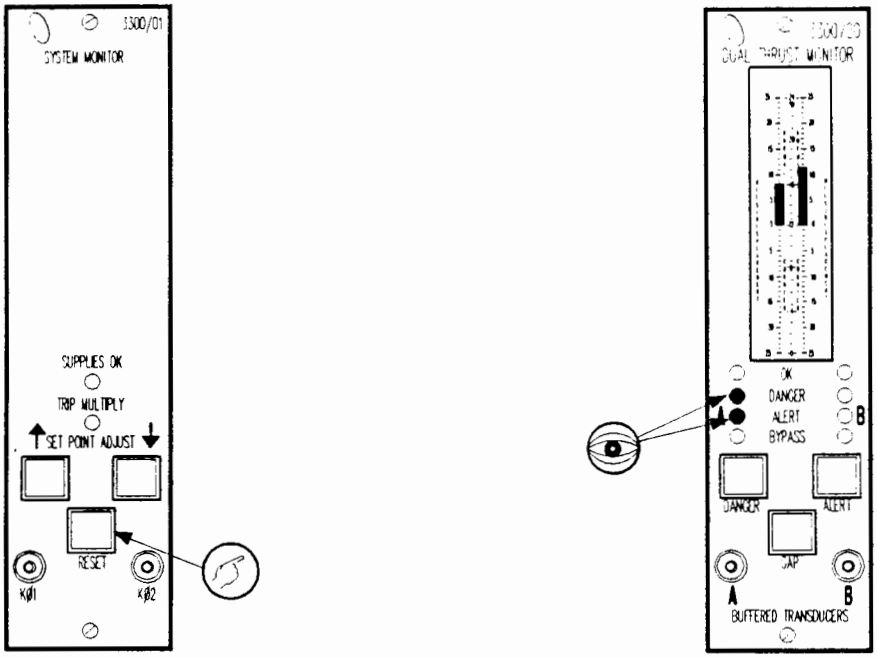
10. AND VOTING IS NOT ACTIVE IF SECOND CHANNEL IS BYPASSED.



4S28D2

28 TEST CHANNEL ALARMS [CONT.]

11. PRESS **RESET** SWITCH. VERIFY **ALERT** AND **DANGER** LEDS REMAIN ON AND STEADY.



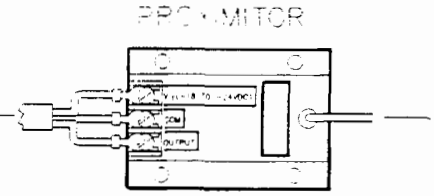
12. REDUCE AMPLITUDE TO BELOW ALARM SETPOINT LEVELS AND OBSERVE THAT **ALERT** AND **DANGER** LEDs GO OFF (IF NONLATCHING). PRESS **RESET** SWITCH TO RESET LATCHING ALARMS.

13. REPEAT STEPS 5 THROUGH 12 FOR OPPOSITE ALARM (COUNTER OR NORMAL).

29 CALIBRATE CHANNEL

CAUTION

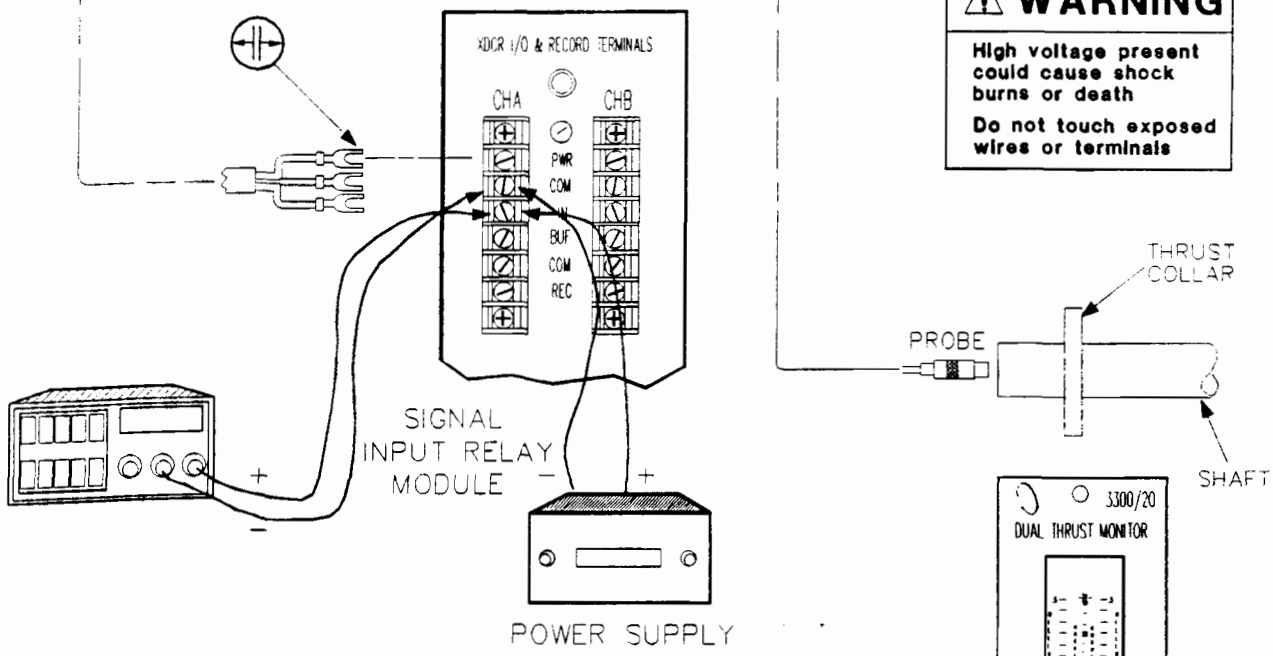
PROCEDURE COULD EXCEED ALARM SET-POINT LEVELS CAUSING ALARMS TO ACTIVATE. THIS COULD RESULT IN RELAY CONTACTS CHANGING STATE. (SEE DANGER BYPASS 27)



⚠ WARNING

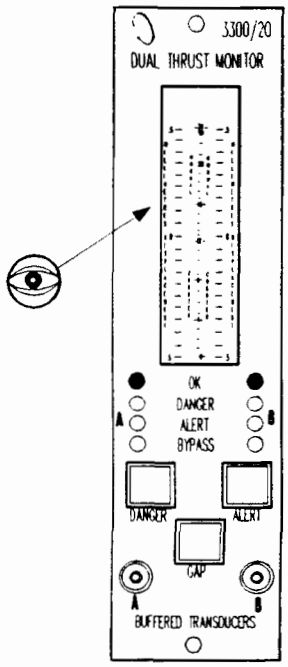
High voltage present could cause shock burns or death

Do not touch exposed wires or terminals



1. DISCONNECT **COM** AND **IN** WIRING FROM CHANNEL A TERMINALS ON SIGNAL INPUT MODULE.
2. CONNECT MULTIMETER AND POWER SUPPLY.
3. SLIDE FRONT PANEL TO RIGHT AND ADJUST POWER SUPPLY FOR VOLTAGE OF +2.5 Vdc ON CHANNEL A TEST POINT (BPPLA).
4. VERIFY MONITOR DISPLAY INDICATES 0 MIL (0 mm). CHANGE POWER SUPPLY VOLTAGE FOR FULL VALUE.

   1 MIL = 200mV
   1 mm = 7.84 Vdc

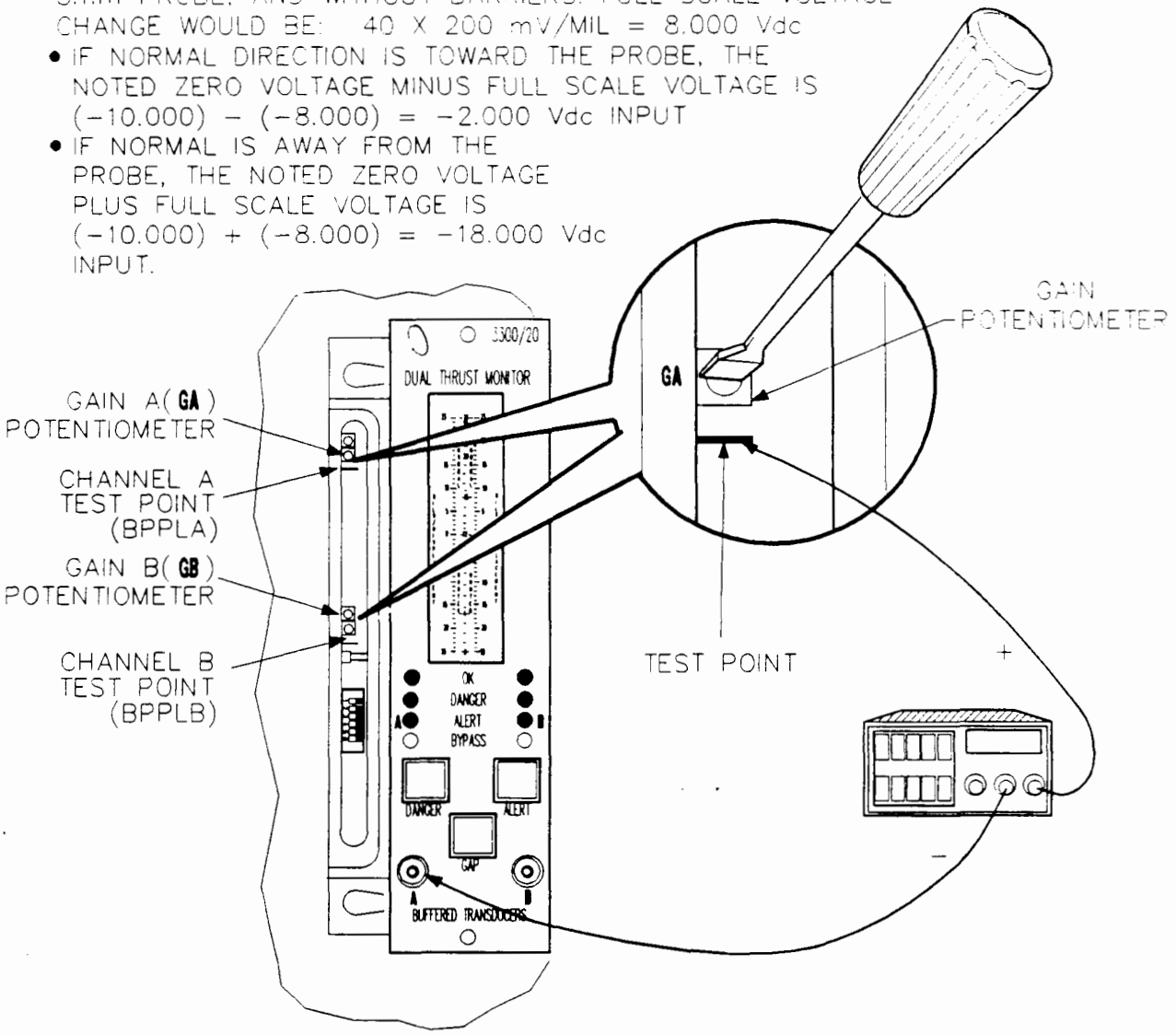


4S2901

29 CALIBRATE CHANNEL [CONT.]

5. ADJUST POTENTIOMETERS (**GA** OR **GB**) FOR 5.00 Vdc ON CHANNEL A TEST POINT IF DIRECTION IS NORMAL, 0.00 IF DIRECTION IS COUNTER.

   FOR EXAMPLE:
   THE SCALE FACTOR IS 200 mV/MIL FOR 40–0–40 RANGE, WITH 5mm PROBE, AND WITHOUT BARRIERS. FULL SCALE VOLTAGE CHANGE WOULD BE: 40 X 200 mV/MIL = 8.000 Vdc
   - IF NORMAL DIRECTION IS TOWARD THE PROBE, THE NOTED ZERO VOLTAGE MINUS FULL SCALE VOLTAGE IS (−10.000) − (−8.000) = −2.000 Vdc INPUT
   - IF NORMAL IS AWAY FROM THE PROBE, THE NOTED ZERO VOLTAGE PLUS FULL SCALE VOLTAGE IS (−10.000) + (−8.000) = −18.000 Vdc INPUT.



6. VERIFY FRONT PANEL = FULL SCALE AND VERIFY RECORDER OUTPUT TO THE OPTION SELECTED.

4S2902

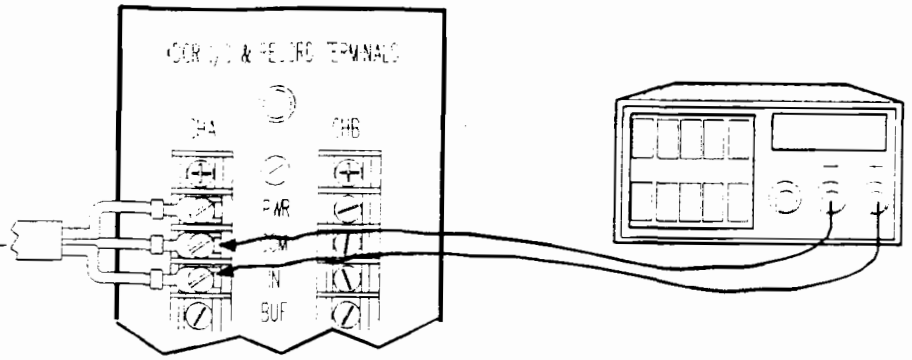
30 TEST OK LIMITS

1. DISCONNECT MULTIMETER TO CHANNEL A OF SIGNAL INPUT RELAY MODULE

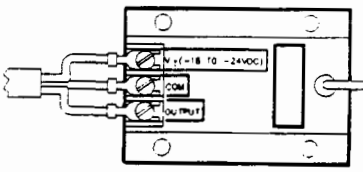
⚠ WARNING

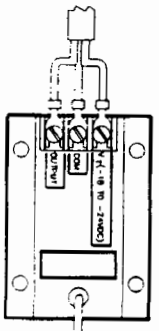
High voltage present could cause shock burns or death

Do not touch exposed wires or terminals



2. DISCONNECT EXTENSION CABLE FROM PROBE
3. RECONNECT EXTENSION CABLE TO AN IDENTICAL SUBSTITUTE PROBE IN THE CALIBRATION INSTRUMENT.

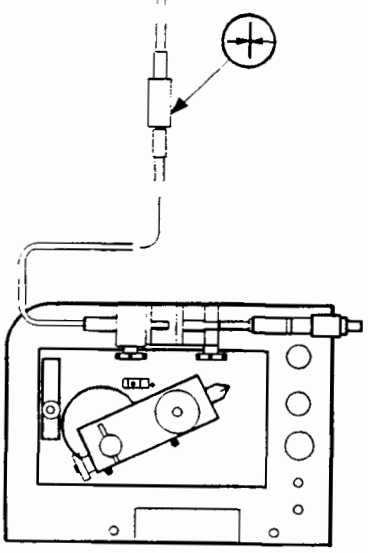


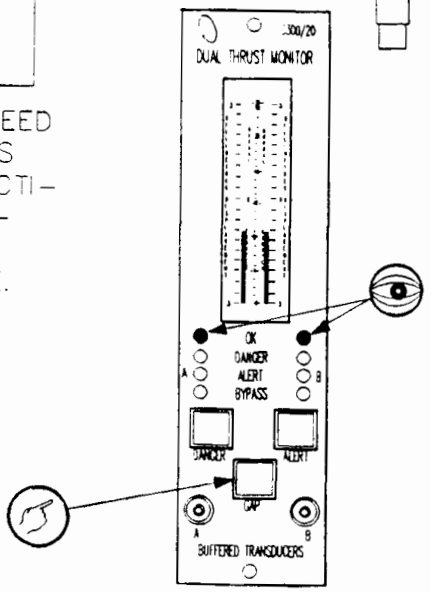


4. SET GAP VOLTAGE FOR APPROXIMATELY −9 Vdc.
5. VERIFY THAT CHANNEL B **OK** LED IS ON. PRESS **RESET** AND VERIFY BOTH **OK** LEDS ARE ON BEFORE CONTINUING.

CAUTION

PROCEDURE COULD EXCEED ALARM SETPOINT LEVELS CAUSING ALARMS TO ACTIVATE. THIS COULD RESULT IN RELAY CONTACTS CHANGING STATE. SEE [27] FOR DANGER BYPASS.





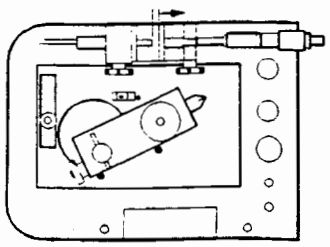
4S3001

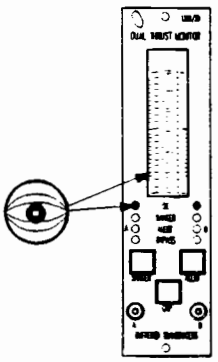
30 TEST OK LIMITS [CONT.]

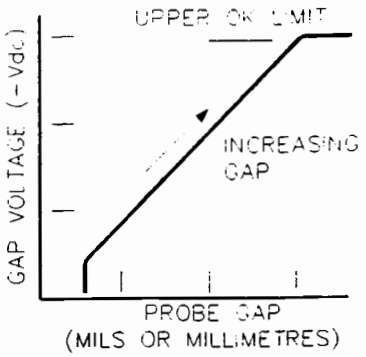
6. INCREASE GAP UNTIL **OK** LED GOES OFF (UPPER LIMIT).
7. CHECK PROBE GAP VOLTAGE ON MULTIMETER:

3000 TRANSDUCER	-12.56 Vdc to -13.07 Vdc
7200 TRANSDUCER \ WITHOUT BARRIERS	-13.51 Vdc to -13.80 Vdc
7200 TRANSDUCER \ WITH BARRIERS	-17.71 Vdc to -17.91 Vdc
7200 TRANSDUCER \ 11 mm PROBE	-19.78 Vdc to -20.14 Vdc
7200 TRANSDUCER \ 14 mm PROBE	-18.17 Vdc to -18.53 Vdc

8. VERIFY CHANGE STATE OF OK RELAY. NOTE THAT ALL CHANNELS MUST BE OK OR BYPASSED IN ORDER FOR THE **ARM** AND **NO** CONTACTS OF THE OK RELAY (NORMALLY ENERGIZED) TO BE CONNECTED.

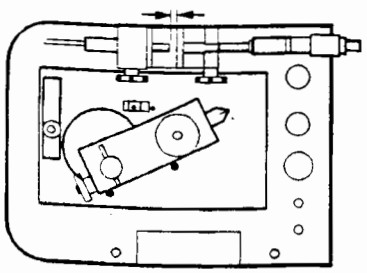


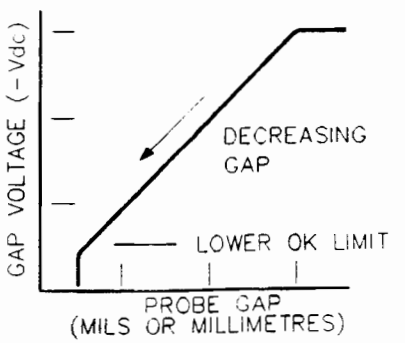




9. GRADUALLY DECREASE PROBE GAP TO -9 Vdc. PRESS **RESET** UNTIL **OK** LED GOES ON. **OK** LED SHOULD BE ON BETWEEN UPPER AND LOWER OK LIMITS.
10. DECREASE PROBE GAP UNTIL **OK** LED GOES OFF (LOWER LIMIT).
11. CHECK PROBE GAP VOLTAGE ON MULTIMETER:

3000 TRANSDUCER	-1.15 Vdc to -1.41 Vdc
7200 TRANSDUCER \ WITHOUT BARRIERS	-1.27 Vdc to -1.43 Vdc
7200 TRANSDUCER \ WITH BARRIERS	-1.27 Vdc to -1.43 Vdc
7200 TRANSDUCER \ 11 mm PROBE	-2.96 Vdc to -3.25 Vdc
7200 TRANSDUCER \ 14 mm PROBE	-1.45 Vdc to -1.45 Vdc





453002

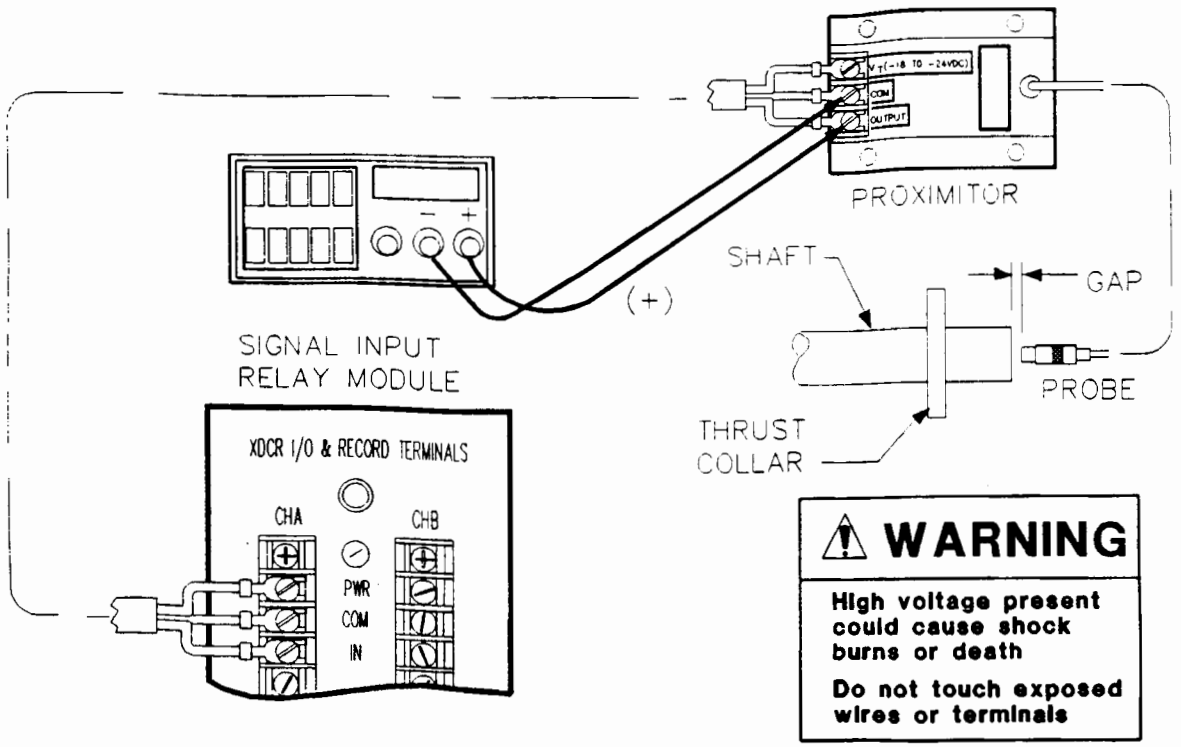
31 ZERO VOLTAGE ADJUST

NOTE

WHEN INSTALLING A PROBE IN A MACHINE THE ROTOR MUST BE AT ITS ZERO POSITION AND THE PROBE GAP IS SET ELECTRICALLY TO A ZEROING VOLTAGE DETERMINED BY THE TRANSDUCER USED.

1. ENSURE THAT ROTOR IS SET TO THE DESIRED ZERO POSITION (AGAINST ACTIVE OR INACTIVE BEARING, OR CENTER OF FLOAT ZONE).
2. CONNECT MULTIMETER TO **OUTPUT** AND **COM** TERMINALS ON PROXIMITOR
3. ADJUST PROBE GAP FOR ZEROING VOLTAGE SPECIFIED BELOW FOR THE TRANSDUCER INSTALLED.

TRANSDUCER	VOLTAGE
3300	−7.0 ±0.5 Vdc
7200 • WITHOUT EXTERNAL BARRIERS • WITH EXTERNAL BARRIERS • 11 mm • 14 mm	 −10.0 ±0.200 Vdc −9.33 ±0.200 Vdc −11.6 ±0.200 Vdc −10.0 ±0.200 Vdc



⚠ WARNING

High voltage present could cause shock burns or death

Do not touch exposed wires or terminals

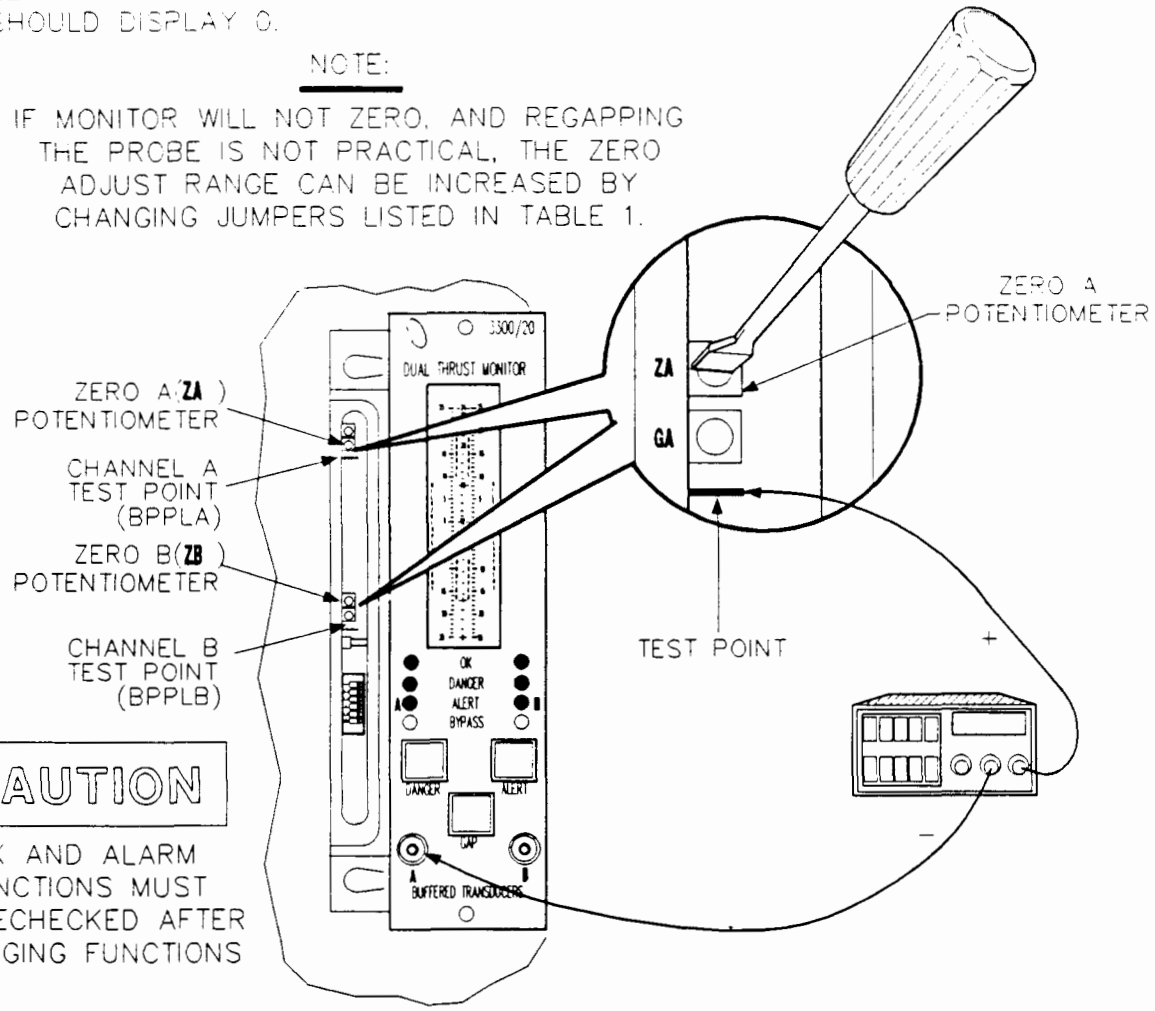
5S3101

31 ZERO VOLTAGE ADJUST [CONT]

3. ON THE MONITOR, SLIDE FRONT PANEL TO RIGHT, CONNECT MULTIMETER TO CHANNEL A TEST POINT BPPLA AND ADJUST CHANNEL A ZERO POTENTIOMETER FOR +2.500 Vdc. MONITOR BARGRAPH SHOULD DISPLAY 0.

NOTE:

IF MONITOR WILL NOT ZERO, AND REGAPPING THE PROBE IS NOT PRACTICAL, THE ZERO ADJUST RANGE CAN BE INCREASED BY CHANGING JUMPERS LISTED IN TABLE 1.



CAUTION

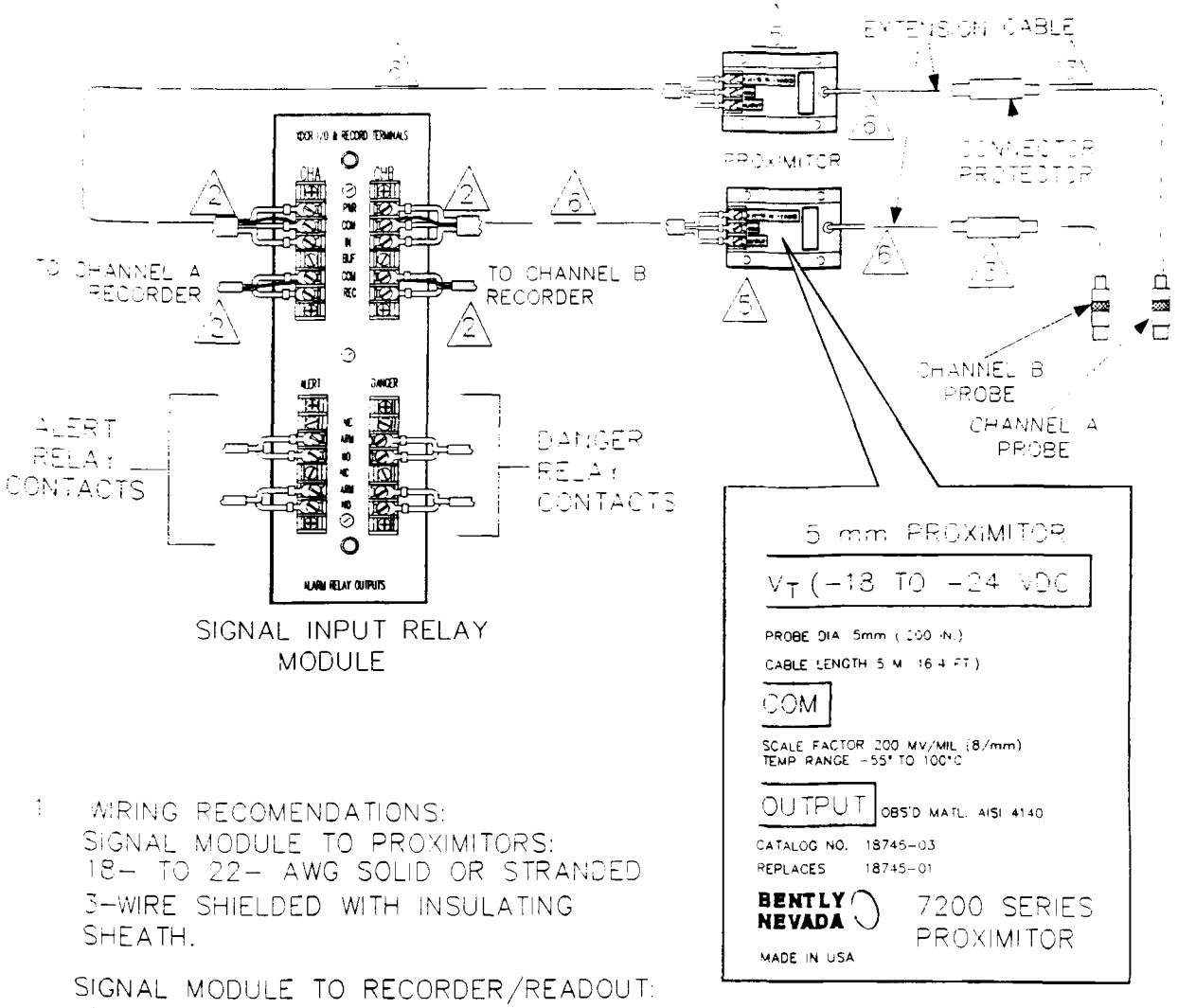
OK AND ALARM FUNCTIONS MUST BE RECHECKED AFTER CHANGING FUNCTIONS

TABLE 1

TRANSDUCER	RANGE	ZERO ADJUSTMENT RANGE	
		FROM	TO
3000	25–0–25 MILS	W3D (±2.5 MILS)	W3B (±7.5 MILS)
7200 WITH/WITHOUT BARRIERS	40–0–40 MILS 1–0–1 mm	W3D (±2.5 MILS) W3D (±0.0635 mm)	W3B (±7.5 MILS) W3B (±0.1270 mm)
7200 WITH 11 mm/ 14 mm PROBE	75–0–75 MILS 2–0–2 mm	W3D (±5.0 MILS) → W3C (±0.0635 mm)	W3B (±7.5 MILS) W3D (±0.1905 mm) OR W3B (±0.3810 mm)

5S3102

32 FIELD WIRING DIAGRAMS



SIGNAL INPUT RELAY MODULE

1. WIRING RECOMENDATIONS:
   SIGNAL MODULE TO PROXIMITORS:
   18- TO 22- AWG SOLID OR STRANDED 3-WIRE SHIELDED WITH INSULATING SHEATH.

   SIGNAL MODULE TO RECORDER/READOUT:
   18- TO 22- SOLID OR STRANDED, 2-WIRE SHIELDED WITH INSULATING SHEATH.

2. SHIELDS TERMINATED TO SIGNAL MODULE COMMON.

3. TO ELECTRICALLY ISOLATE AND PROTECT COAXIAL CONNECTIONS, USE CONNECTOR PROTECTOR KIT PART NO. 40113-02.

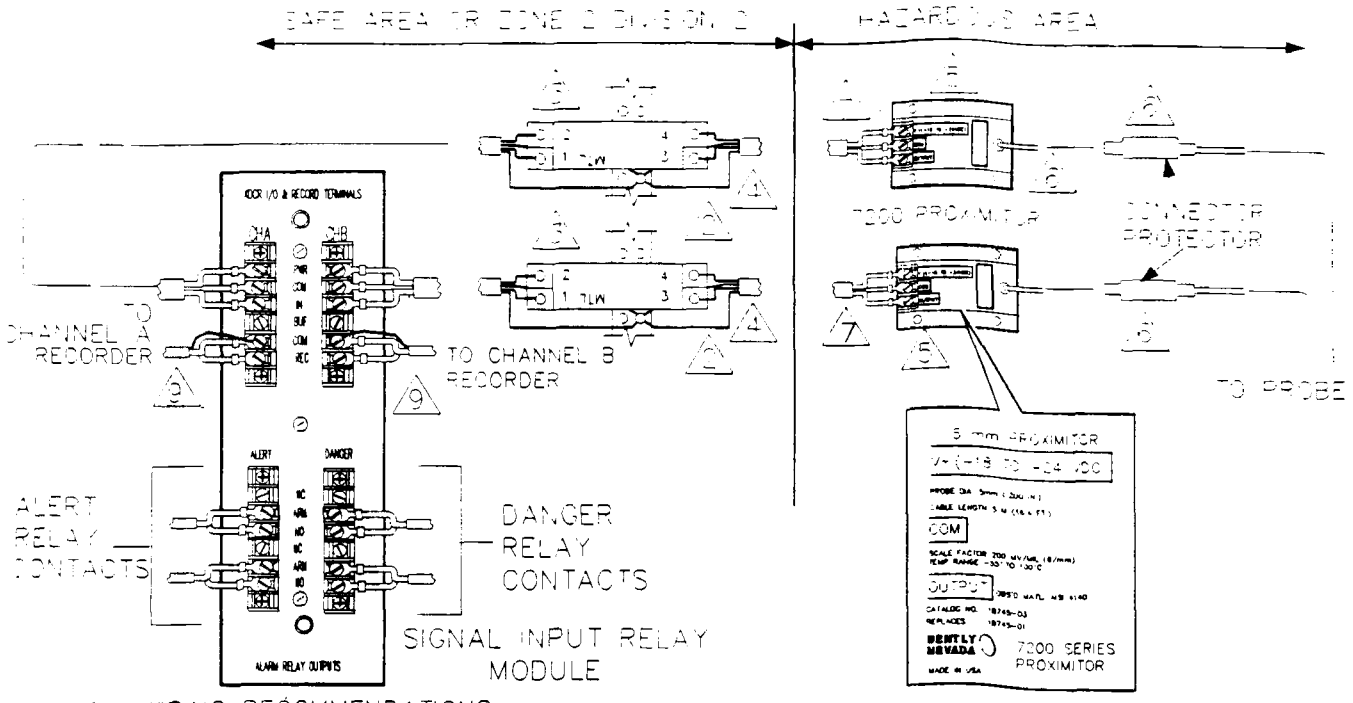
4. TO MINIMIZE GROUND LOOP NOISE PROBLEMS, A SINGLE POINT EARTH GROUND (GND) TO SYSTEM COMMON (COM) CONNECTION IS RECOMMENDED.

5. PROXIMITOR CASE MUST BE ELECTRICALLY ISOLATED FROM EARTH GROUND. ELECTRICAL ISOLATION: 500 VAC (RMS) MIN. ISOLATION KIT PN 19094-01 MAY BE USED TO SATISFY THE ISOLATION REQUIREMENT.

6. MAXIMUM CABLE LENGTH BETWEEN SIGNAL INPUT RELAY MODULE AND PROXIMITOR MUST NOT EXCEED 1000 FEET (300 METRES).

553201

32 FIELD WIRING DIAGRAMS [CONT.]



1. WIRING RECOMMENDATIONS:
   SIGNAL MODULE TO BARRIER–BARRIER TO PROXIMITOR: 14– TO 18– AWG SOLID OR STRANDED, 3 WIRE SHIELDED WITH INSULATING SHEATH
   SIGNAL MODULE TO RECORDER/READOUT: 18– TO 22– AWG SOLID OR STRANDED, 2–WIRE SHIELDED WITH INSULATING SHEATH.

2. SHIELDS ARE JOINED AS SHOWN TERMINATING AT BARRIER GROUND. SHIELDS SHOULD BE INSULATED.

3. USE MTL SAFETY BARRIER PER DWG BA22000, NOTE 17.

4. BARRIERS ARE MOUNTED TO BARRIER RAIL. BARRIER RAIL IS THE SYSTEM GROUND AND IS USED TO TERMINATE THE POTENTIAL EQUALIZATION BUS. TOTAL EARTH LOOP IMPEDANCE MUST NOT EXCEED 1 OHM.

5. PROXIMITOR CASE MUST BE ELECTRICALLY ISOLATED FROM EARTH GROUND. ELECTRICAL ISOLATION: 500 VAC (RMS) MIN. ISOLATION KIT PART NO. 19094–01 MAY BE USED TO SATISFY THE ISOLATION REQUIREMENT.

6. TO ELECTRICALLY ISOLATE AND PROTECT COAXIAL CONNECTIONS, USE CONNECTOR PROTECTOT KIT PART NO. 40113–02.

7. MAXIMUM CABLE LENGTH BETWEEN BARRIER AND PROXIMITOR MUST NOT EXCEED 1000 FEET (300 METRES).

8. TO MINIMIZE GROUND LOOP NOISE PROBLEMS, A SINGLE POINT EARTH GROUND (GND) TO SYSTEM COMMON (COM) CONNECTION IS RECOMMENDED.

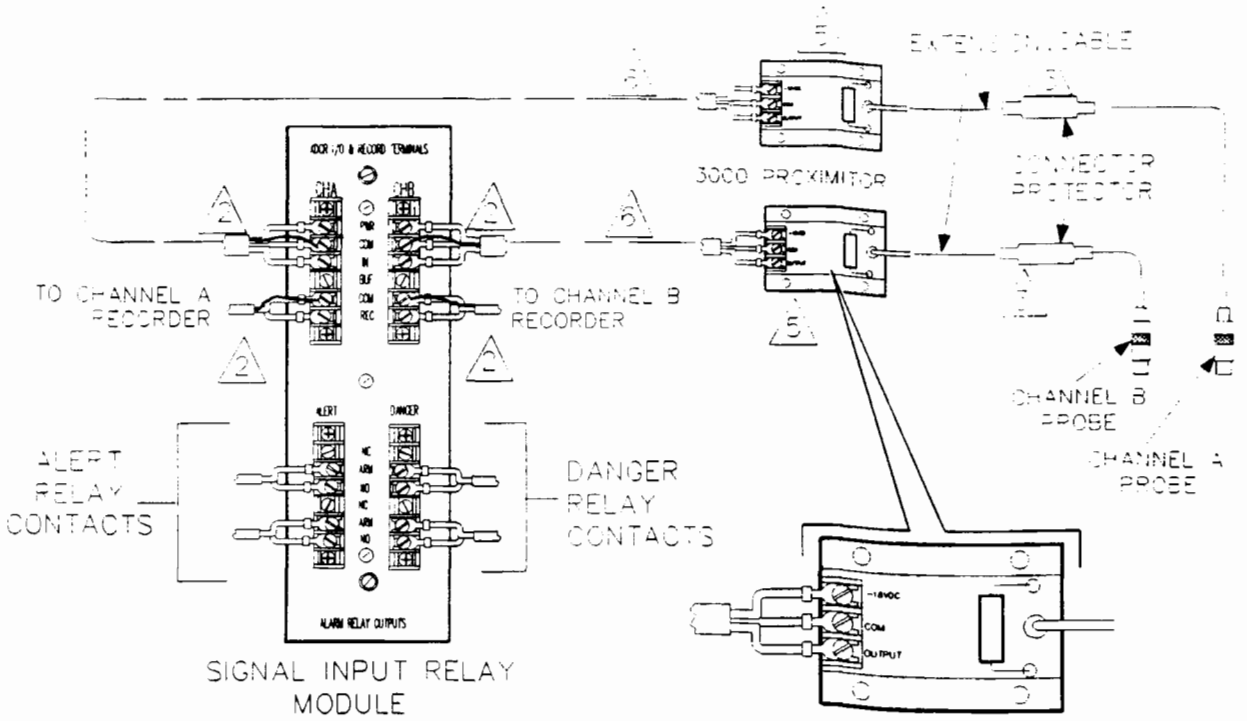
9. RECORDER SHIELDS TERMINATE AT RACK SIGNAL COMMON.

10. BARRIERS LOCATED IN DIVISION 2 OR ZONE 2 HAZARDOUS AREAS MUST BE INSTALLED IN NEMA 4 OR IP 54 OR APPROVED PROTECTIVE HOUSING.

11. MONITORS MUST BE RE–CALIBRATED WITH BARRIERS IN THE LINES.

5S32D2

32 FIELD WIRING DIAGRAMS [CONT.]



1. WIRING RECOMMENDATIONS:

   SIGNAL MODULE TO PROXIMITORS: 18– TO 22– AWG SOLID OR STRANDED, 3 WIRE SHIELDED WITH INSULATING SHEATH.
   SIGNAL MODULE TO RECORDER/READOUT: 18– TO 22– AWG SOLID OR STRANDED, 2–WIRE SHIELDED WITH INSULATING SHEATH.

2. SHIELDS TERMINATED TO SIGNAL MODULE COMMON.

3. TO ELECTRICALLY ISOLATE AND PROTECT COAXIAL CONNECTIONS, USE CONNECTOR PROTECTOR KIT PART NO. 40113–02.

4. TO MINIMIZE GROUND LOOP NOISE PROBLEMS, A SINGLE POINT EARTH GROUND (GND) TO SYSTEM COMON (COM) CONNECTION IS RECOMMENDED.

5. PROXIMITOR CASE MUST BE ELECTRICALLY ISOLATED FROM EARTH GROUND. ELECTRICAL ISOLATION: 500 VAC (RMS) MIN. ISOLATION KIT PART NO. 19094–01 MAY BE USED TO SATISFY THE ISOLATION REQUIREMENT.

6. MAXIMUM CABLE LENGTH BETWEEN SIGNAL INPUT RELAY MODULE AND PROXIMITOR MUST NOT EXCEED 1000 FEET (300 METRES).

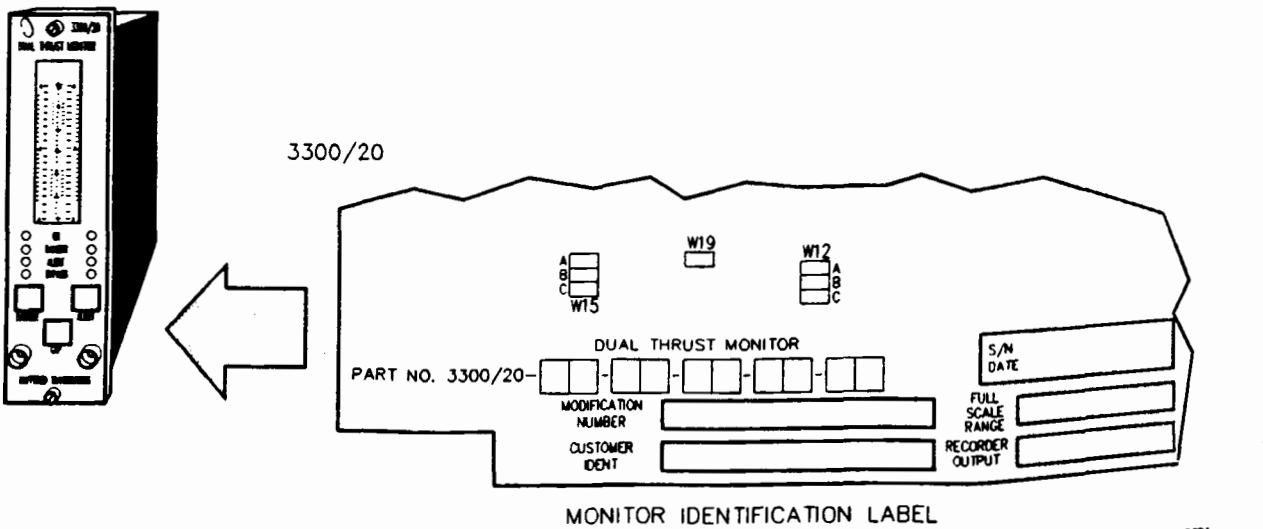
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33 RECOMMENDED SPARE PARTS

QTY PER MON	DESCRIPTION	REPLACEMENT PART NUMBER
1	FRONT PANEL ASSEMBLY	82362-01 *
1	MONITOR CIRCUIT ASSEMBLY	79482-01 *
1	SIGNAL INPUT RELAY MODULE	
	NO RELAY	81544-01 *
	EPOXY SEALED RELAY	81545-01 *
	QUAD EPOXY SEALED	84152-01 *
	HERMETICALLY SEALED RELAY	81546-01 *
	NO RELAY, WITH INTERNAL BARRIERS	84345-03 *
	EPOXY SEALED RELAY, WITH INTERNAL BARRIERS	84345-02 *
	HERMETICALLY SEALED RELAY, WITH INTERNAL BARRIERS	84345-01 *

* **TO ORDER REPLACEMENT PARTS, SPECIFY THE COMPLETE CATALOG NUMBER, 3300/20 * □□-□□-□□-□□-□□ , AND THE REPLACEMENT PART NUMBER.**

IF THE MONITOR HAS BEEN MODIFIED, SPECIFY THE MODIFICATION NUMBER ON THE PARTS ORDER. CUSTOMER MUST SET PROGRAMMABLE OPTIONS – MONITOR SHIPPED AS SHOWN IN SECTION 4 OF THIS MANUAL. IF IN DOUBT ABOUT THE PART NUMBER, CALL YOUR BENTLY NEVADA CORPORATION REPRESENTATIVE BEFORE ORDERING.



MONITOR IDENTIFICATION LABEL

553301

34 SPECIFICATIONS

INPUT

Signal Input	Two channels, proximity input, 10kΩ input impedance
Signal Scale Factor	200mV/mil (8V/mm) with 3300 or 7200 with 5mm/8mm probe 100 mV/mil (4V/mm) with 7200 with 11mm/14mm probe

SIGNAL CONDITIONING

Monitor Range	Full scale meter range selected per Option Table.
Accuracy	±0.33% of full scale error typical at 77F (25°C) ±1% of full scale error maximum at 77°F (25°C)
Response To Step Change	See Table 1 On Following Page

ALARMS

Alarm Set Points	Alert/Danger alarm levels (adjustable from 0 to 100% of full scale)
Alarm Delay	Alarm delay times are user-programmable per options, plus time delay of signal averaging

DISPLAYS

Meter	LCD bargraph, dual scale with outside scales marked per monitor full scale frequency range and center scale marked for probe gap voltage at 1.6% resolution.
LEDs	Green LEDs annunciate transducer OK condition, red LEDs annunciate DANGER , ALERT , and BYPASS conditions.
Meter Time Constant	Response time is user selectable, See Table 2 on following page

CONTROLS

Front Panel	Front panel switches (3) for reading ALERT and DANGER setpoint levels, and for reading probe Gap voltage
Internal	Switches on circuit board for setpoint adjustment, Danger Bypass, Channel Bypass and thrust direction
External	External remote controls: Reset, Inhibit, and setpoint adjust (↑ and ↓)

OUTPUT

Recorder	Output proportional to selected full scale monitor range and protected against continuous short circuit to ground: +4 to +20mA, 12 V compliance +1 to +5 Vdc, 100-ohm output impedance 0 to -10 Vdc, 100-ohm output impedance
Transducer Power	-24 Vdc or -18 Vdc determined by transducer option selected in power supply, short-ciruit protected
Alarms & OK	Relay drives for alarms (ALERT and DANGER) and monitor transducer OK
Relay Contact Rating	Dual Relays: 5A @120 VAC 50/60 Hz 5A @ 28 VDC Quad Relays: 0.6A @120 VAC 50/60 Hz 2A @ 30 VDC
Temperature	Operating: +32° F to +149 ° F (0° C to +65° C) Storage: −40° F to +185° F (0° C to +85° C)
Humidity	0 to 95%, noncondensing

5S34D1

34 SPECIFICATIONS [CONT]

SIGNAL RESPONSE TIME

TO REDUCE THE MONITOR'S SUSCEPTIBLITY TO AXIAL VIBRATION AND SHAFT RUNOUT, THE SIGNAL CONDITIONING PERFORMS A RUNNING AVERAGE OF THE SHAFT POSITION. THIS AVERAGE CAUSES STEP CHANGES IN AXIAL VIBRATION TO BE INTEGRATED OVER TIME. THE CONSTANT CHANGES ACCORDING TO THE MONITOR TIME DELAY AS SHOWN IN TABLE 1.

TABLE 1 RESPONSE TO STEP CHANGE

ALARM TIME DELAY	SIGNAL CONDITION RESPONSE TIME CONSTANT *
0.1 SEC	81 mS
1 SEC	180 mS
3 SEC	639 mS
6 SEC	1294 mS

METER RESPONSE

THE METER RESPONSE TIME CAN BE SELECTED TO BE FAST OR SLOW. WITH A FAST RESPONSE, THE METER WILL FOLLOW THE THRUST POSITION EXACTLY AS SEEN BY THE MONITOR. IN INSTALLATIONS WHERE THERE IS A LARGE AC COMPONENT OF THE THRUST SIGNAL, THIS WILL CAUSE APPARENT METER JITTER. SELECTING THE SLOW METER RESPONSE WILL REDUCE THE METERS RESPONSE TO RAPIDLY CHANGING SIGNALS BUT DOES NOT AFFECT THE MONITOR'S RECORDER OR ALARM CIRCUITS.

TABLE 2 METER TIME CONSTANT *

TIME DELAY OPTION	METER RESPONSE OPTION	
	FAST	SLOW
0.1 SEC	81 mS	639 mS
1 SEC	180 mS	967 mS
3 SEC	639 mS	1294 mS
6 SEC	1294 mS	1622 mS

* THE TIME CONSTANT APPROXIMATES A SIMPLE RC RESPONSE CURVE WHERE ONE TIME CONSTANT= 63% OF FINAL VALUE. FIVE TIME CONSTANTS= 99% OF FINAL VALUE.

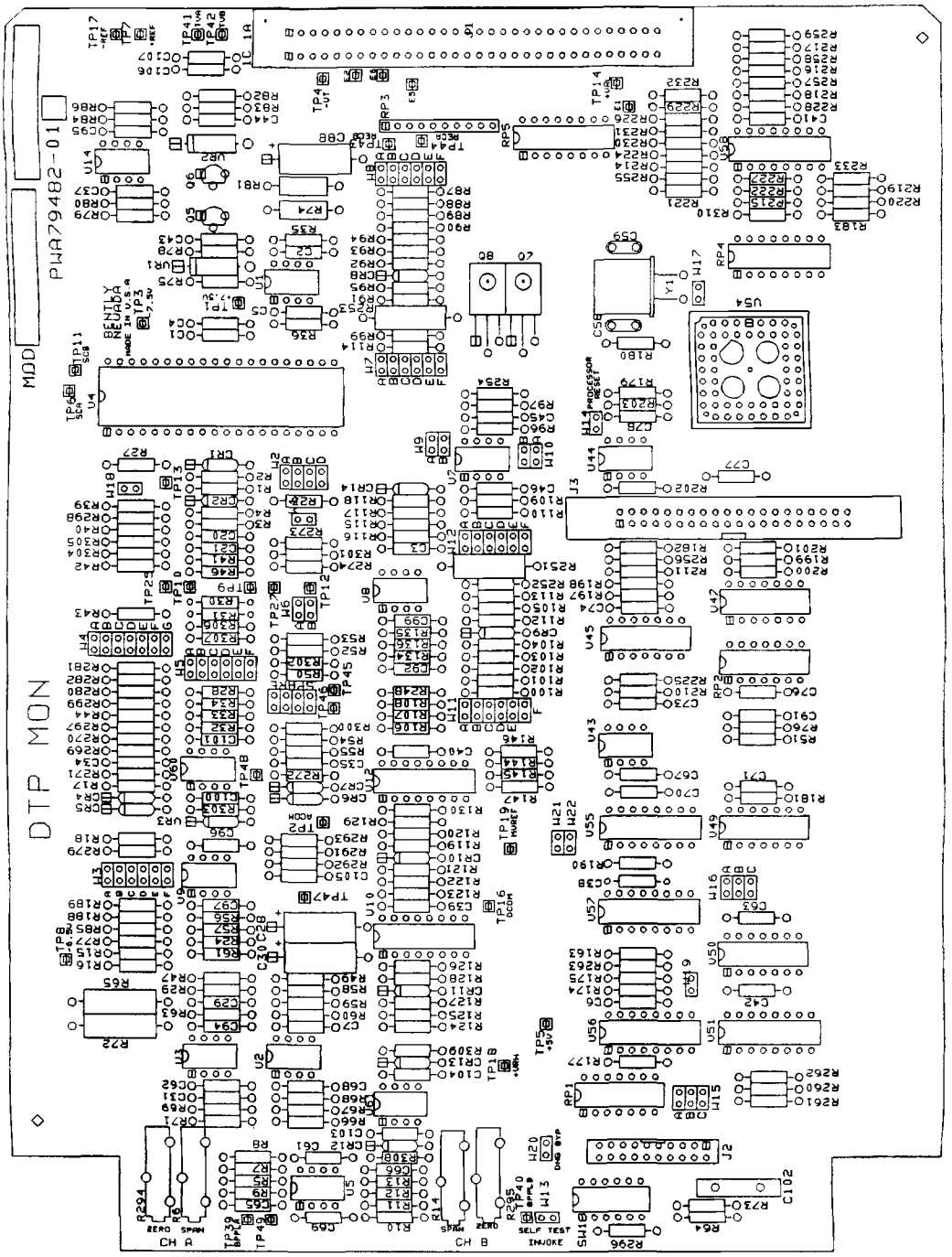
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35 SCHEMATICS & PWA DRAWINGS

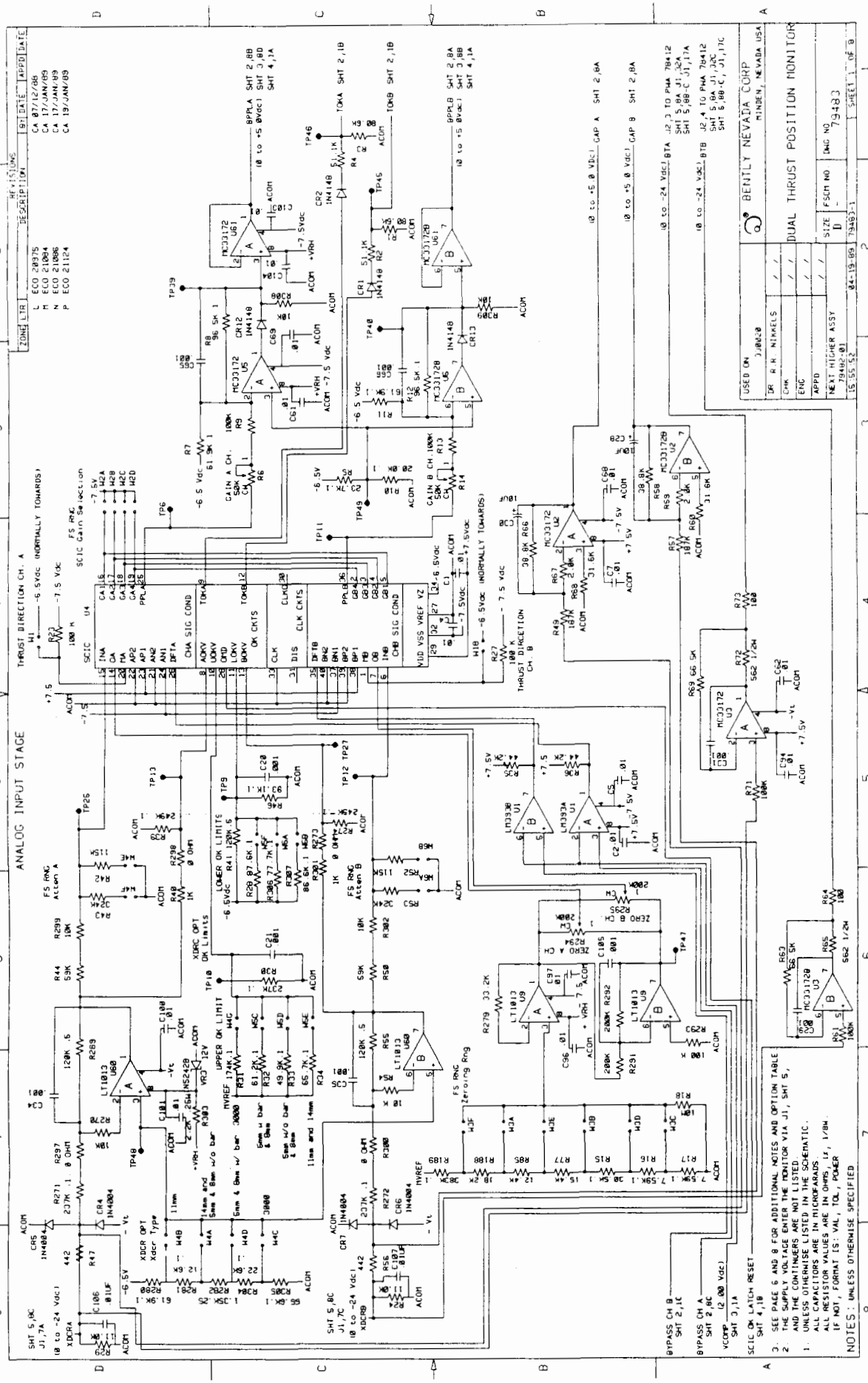
DRAWING TITLE	DRAWING NO.	NO. OF SHEETS
PWA DUAL THRUST MONITOR	79482	SHEET 1 OF 1
SCHEMATIC DIAGRAM DUAL THRUST MONITOR	79483	SHEETS 7 OF 7
3300 SIGNAL NAMES		SHEET 1 OF 1
SCHEMATIC DIAGRAM DUAL RADIAL VIBRATION FRONT PANEL	78413	SHEET 1 OF 1
ASSEMBLY SIRM EPOXY	78462	SHEET 3 ONLY
SCHEMATIC DIAGRAM SIRM EPOXY	78463	SHEETS 2 OF 2
SCHEMATIC DIAGRAM QUAD RELAY	83730	SHEETS 2 OF 2

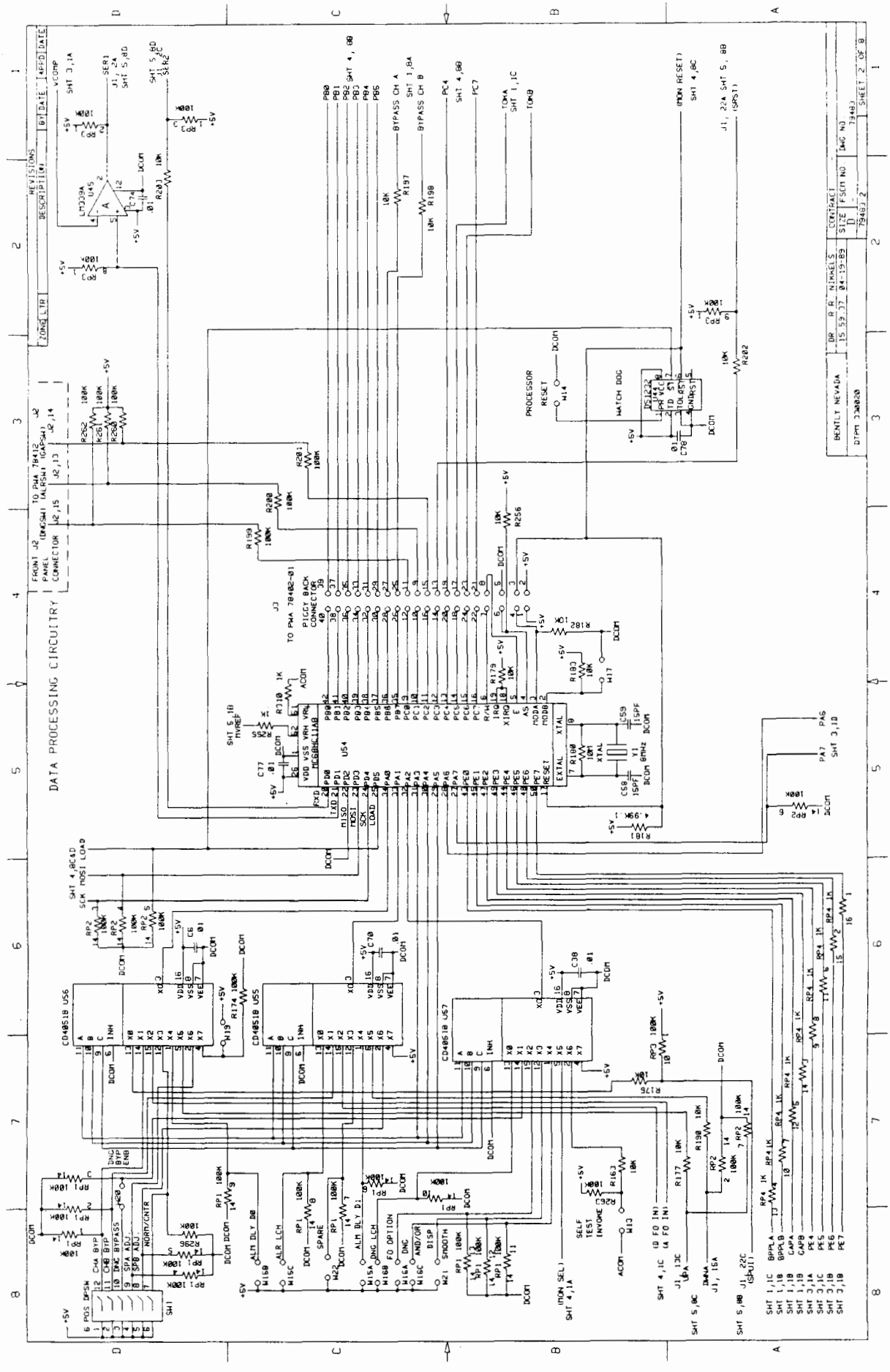
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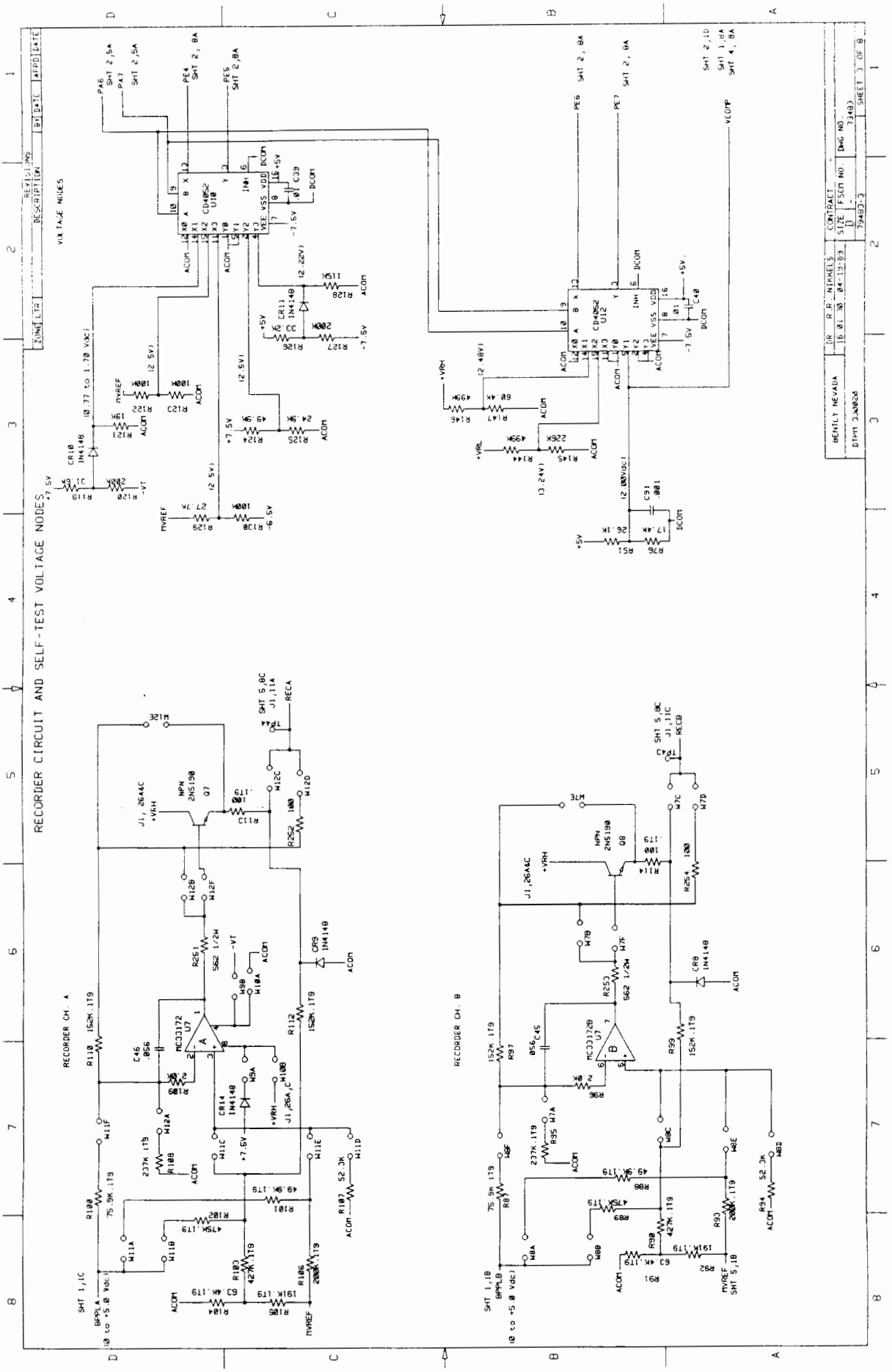


PWA DUAL THRUST MONITOR 79482 SH 1 OF 1

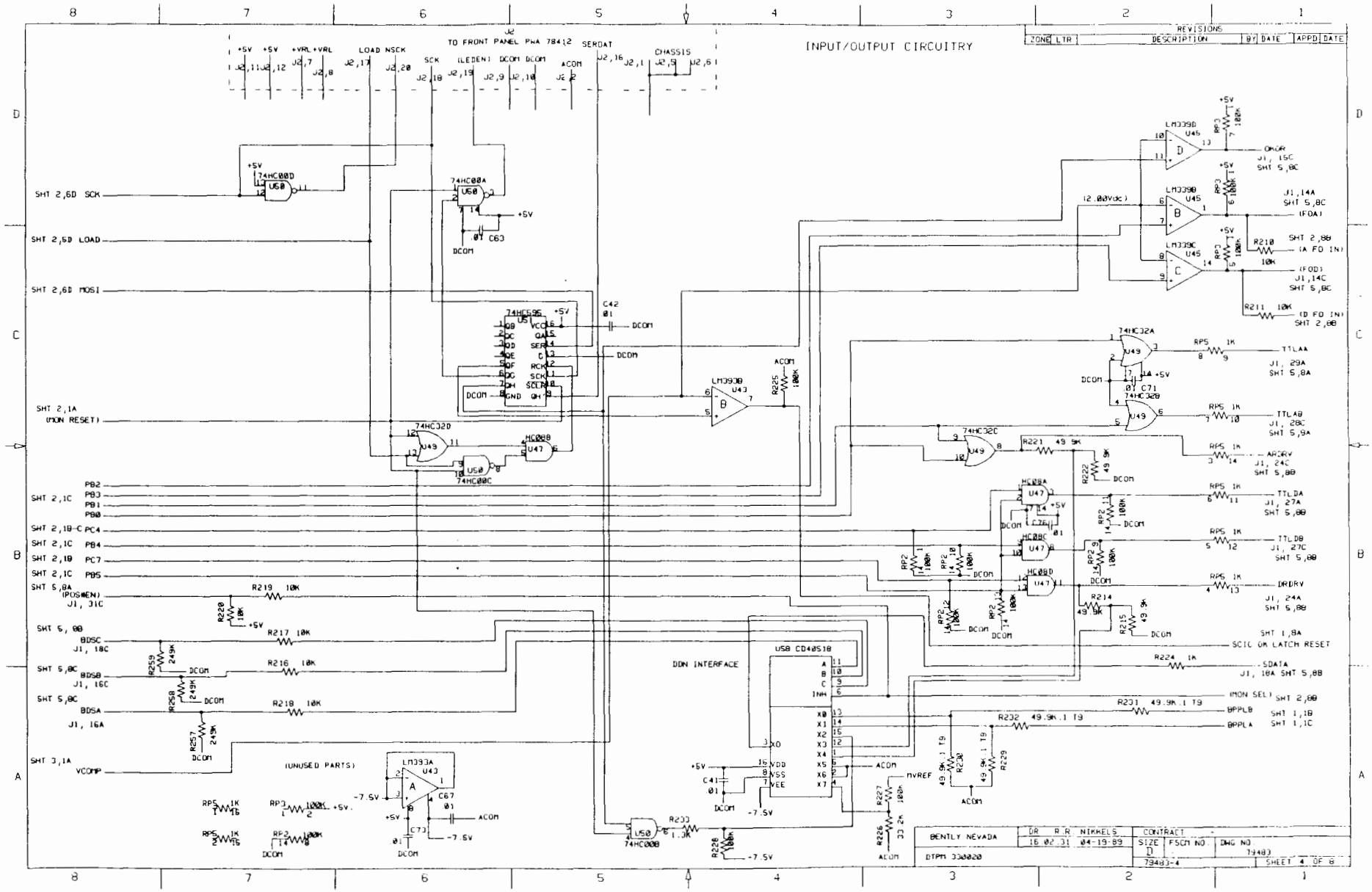

ANALOG INPUT STAGE
DUAL THRUST POSITION MONITOR
BENTLY NEVADA CORP
MINDEN, NEVADA USA
79483
SCHEMATIC DIAGRAM DUAL THRUST 79483 SH 1 OF 8

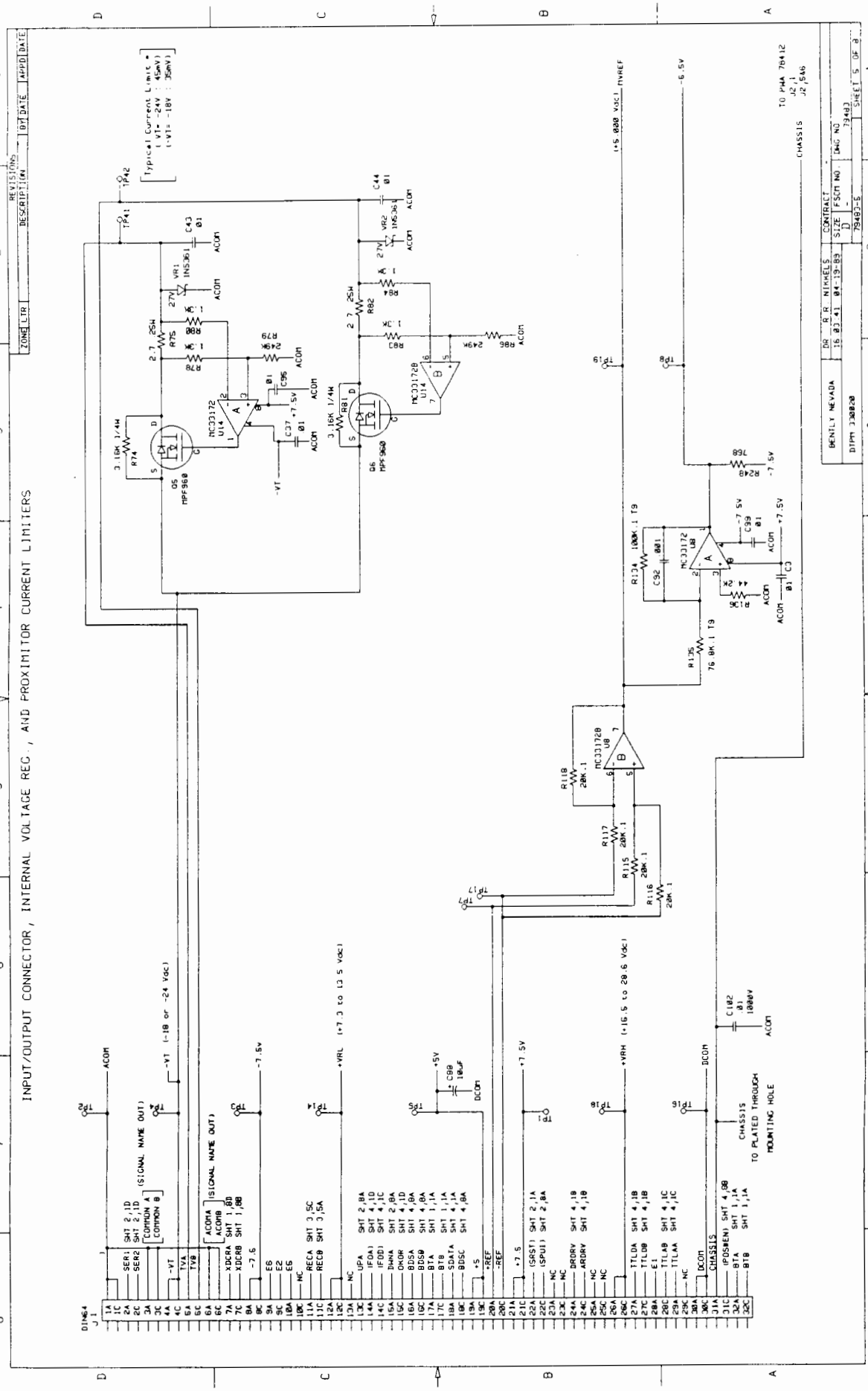


SCHEMATIC DIAGRAM DUAL THRUST 79483 SH 2 0F 8



SCHEMATIC DIAGRAM DUAL THRUST 79483 SH 3 OF 8


INPUT/OUTPUT CIRCUITRY
REVISIONS
ZONE LTR DESCRIPTION BY DATE APPD DATE
TO FRONT PANEL PWA 78412
SERDAT
CHASSIS
LOAD NSCK
SCK
DCOM
ACOM
+5V
SHT 2,6D SCK
SHT 2,6D LOAD
SHT 2,6D MOSI
SHT 2,1A (MON RESET)
SHT 2,1C PB2
PB3
PB1
PB0
SHT 2,1B-C PC4
SHT 2,1C PB4
SHT 2,1B PC7
SHT 2,1C PB5
SHT 5,8A (POS#EN) J1, 31C
SHT 5, 8B BDSC J1, 18C
SHT 5,8C BDSB J1, 16C
SHT 5,8C BDSA J1, 16A
SHT 3,1A VCOMP
(UNUSED PARTS)
DDN INTERFACE
(2.00Vdc)
OHOR J1, 15C SHT 5,8C
J1,14A SHT 5,8C (FOA)
SHT 2,8B (A FO IN)
(FOB) J1,14C SHT 5,8C
(B FO IN) SHT 2,8B
TTLAA J1, 29A SHT 5,8A
TTLAB J1, 28C SHT 5,9A
ARDRV J1, 24C SHT 5,8B
TTLBA J1, 27A SHT 5,8B
TTLBB J1, 27C SHT 5,8B
DRDRV J1, 24A SHT 5,8B
SHT 1,8A SCIC OK LATCH RESET
SDATA J1, 18A SHT 5,8B
(MON SEL) SHT 2,8B
BPPLB SHT 1,1B
BPPLA SHT 1,1C
BENTLY NEVADA
DTPM 330020
DR R.R. NIKKELS 16.02.31 04-19-89
CONTRACT
SIZE D FSCM NO DWG NO 79483
79483-4 SHEET 4 OF 8



SCHEMATIC DIAGRAM DUAL THRUST 79483 SH 5 OF 8

SCHEMATIC DIAGRAM DUAL THRUST 79483 SH 6 OF 8

REVISIONS				
ZONE	LTR	DESCRIPTION	BY	DATE	APPD	DATE

3300/20 DUAL THRUST POSITION MONITOR

PROGRAMMABLE OPTIONS

3300/20 — A A — B B — C C — D D — E E

FULL SCALE RANGE

OPT	RANGE	JUMPER: 11mm & 14mm 100MV/MIL	5mm & 8mm 200MV/MIL	3000 200MV/MIL
01	25-0-25 MILS	W2C, W3A W4X, W5X: NJ	W2A, W2B, W3F W4E, W5B	W2A, W2B, W3D W4E, W5B
02	30-0-30 MILS	W2C, W3E W4F, W5A	W2A, W3E W4F, W5A	⚠5
03	40-0-40 MILS	W2C, W3B W4E, W5B	W2A, W3D W4E, W5B	⚠5
05	50-0-50 MILS	W2A, W2B, W3B W4E, W5B	⚠5	⚠5
06	75-0-75 MILS	W2B, W3D W4E, W5B	⚠5	⚠5
11	0.5-0-0.5 mm	W2A, W2B, W3B W4E, W5B	W2C, W3F W4E, W5B	W2C, W3B W4E, W5B
12	1.0-0-1.0 mm	W2C, W3B W4E, W5B	W2A, W3D W4E, W5B	⚠5
13	2.0-0-2.0 mm	W2A, W3C W4E, W5B	⚠5	⚠5

JUMPER FUNCTION: W2A - W2D : SCIC GAIN SELECTION
W3A - W3F : ZEROING ADJUSTMENT RANGE
W4E, W4F, W5A, W5B : ATTENUATOR SELECTION

TRANSDUCER OPTION

OPT	RANGE	JUMPER
01	7200 - 5mm and 8mm (200 mV/mil)	WITHOUT BARRIERS W4A, W5A, W5D, W4G
		WITH BARRIERS W4D, W5C, W5F
02	7200 - 11mm PROX (100 mV/mil)	W4B, W5B, W5E, W4G
03	7200 - 14mm PROX (100mV/mil)	W4A, W5B, W5E, W4G
04	3000 PROX (200 mV/mil)	W4C, W4G

JUMPER FUNCTION: W4A - W4D : TRANSDUCERS SELECTION
W5A-W5F, W4G : OK LIMIT SELECTION

ALARM RELAY OPTIONS

00	NONE
01	SAMP, EPOXY RELAY
02	SAMP, HERMETIC RELAY

APPROVALS OPTION

00	NONE
01	CSA
02	BASEEFA
03	CITY OF LA

BARRIER OPTIONS

00	NONE	ALL TRANSDUCER OPTIONS
01	WITH BARRIER	5mm & 8mm ONLY

SEE OPTION BLOCK 00 FOR JUMPER SELECTION

LAST USED	NOT USED
C107	RP2 PINS 8 & 14
CR13	RP3 PINS 4 & 1
E6	RP5 PINS 1 & 16
J3	RP5 PINS 2 & 15
Q8	U43 A
R318	
RP5	
SW1	
TP49	
U61	
W22	
Y1	

PROGRAMMABLE OPTIONS

	FIRST OUT	ALARM DELAY	NOT-OK MODE	ALERT MODE	DANGER MODE	DANGER BYPASS
SHIPPED AS:	ENABLED	1 SEC	NON-LATCHING	LATCHING MODE	LATCHING MODE	DISABLED
	ENABLED W16A	0.1 SEC. NJ	LATCHING W19	LATCHING MODE W15C	LATCHING MODE W16B	ENABLED W20
	DISABLED NJ	1 SEC. W15B	NON-LATCHING NJ	NON-LATCHING MODE NJ	NON-LATCHING MODE NJ	DISABLED NJ
		3 SEC W15A				
		6 SEC. W15A,W15B				

	RECORDER OUTPUTS		THRUST DIRECTION		DANGER VOTING	
SHIPPED AS:	+4 TO +20 mA		NORMAL TOWARDS		OR RELAY DRIVE	
	+4 TO +20 mA	W7A,W7C,W7E,W7F W8B,W8C,W10A,W10B W11B,W11C,W12A,W12C W12E,W12F	NORMAL AWAY	NJ	AND RELAY DRIVE	W16C
			NORMAL TOWARDS	W1 - CHA W1B - CH B	AND RELAY DRIVE	NJ
	0 TO -10 Vdc	W7B,W7D,W8D,W8F W9A,W9B,W11D,W11F W12B,W12D				
	+1 TO +5 Vdc	W7B,W7D,W8A,W8E W10A,W10B,W11A,W11E W12B,W12D				

SHIPPED AS:	DISPLAY SMOOTHING
	FAST
	FAST NJ
	SLOW W21

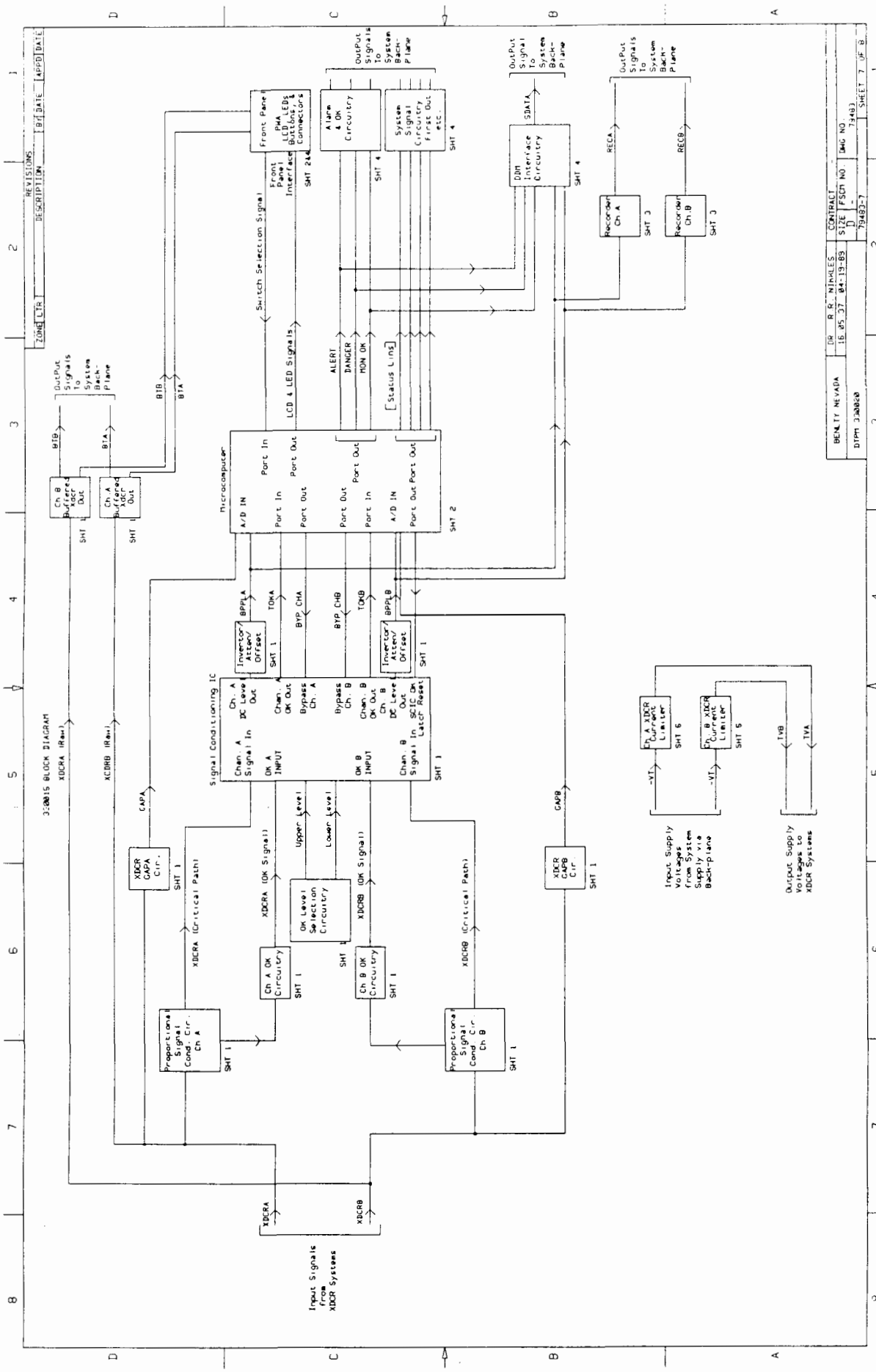
VOLTAGE TABLE

DEVICE NAME	PIN NUMBER	VOLTAGE LEVEL	DEVICE NAME	PIN NUMBER	VOLTAGE LEVEL
U1,U2,U8	8	+7.5 V.	U4	28	+7.5 V.
	4	-7.5 V.		27	ACOM
U3,U14	8	+7.5 V.		32	-7.5 V.
	4	-Vt	U10, U12, U58	16	+5 V.
U44	8	+5 V.		8	DCOM
	4	DCOM		7	-7.5 V.
U45	3	+5 V.	U5, U9, U61	8	+VRH
	12	DCOM		4	-7.5 V.
U47, U49, U50	14	+5 V.	U43	8	+5 V.
	7	DCOM		4	-7.5 V.
U51	16	+5 V.	U60	8	+VRH (+12 ZENER)
	8	DCOM		4	-Vt
U54	26	+5 V.			
	1	DCOM			
U55, U56, U57	16	+5 V			
	7 AND 8	DCOM			
U7	8	+7.5V OR +VRH	JUMPER PROGRAMMABLE		
	4	-Vt OR ACOM			

15. ( ) WITH SIGNAL NAME DENOTES ACTIVE LOW.
14. DELETED
12. FRONT PANEL DWG #78413
13. BACK-PLANE DWG #78473
11. THERE'S AN OPTION TABLE IN THE P&T SPEC. AND DWG 330020.
10. THIS SCHEMATIC REPRESENTS PHA 79482-01.
9. SCHEMATIC DISK #79489
8. P AND T SPEC. #154532
7. TYPICAL VOLTAGE VALUES ARE LISTED IN " ( )". REF TO P AND T SPEC FOR THE CORRECT VALUES AND TOLERANCES.
6. "NJ" INDICATES THAT NO JUMPER IS INSTALLED.
⚠5 THE ILLEGAL OPTIONS HAVE BEEN CROSSED-OUT.
4. EACH BLOCK IS A SET OF JUMPERS AND ALL OF THE JUMPERS SHOULD BE REMOVED FOR THAT OPTION BEFORE THE CONFIGURATION IS SELECTED.

NOTES: UNLESS OTHERWISE SPECIFIED

BENTLY NEVADA	DR A.R. NIKKELS 16:04:45 04-19-89	CONTRACT -		
DTPM 330020		SIZE D	FSCM NO. -	DWG NO. 79483
		79483-6		SHEET 6 OF 8



SCHEMATIC DIAGRAM DUAL THRUST 79483 SH 7 OF 8

SCHEMATIC DIAGRAM DUAL THRUST 79483 SH OF 8

REVISIONS				
ZONE	LTR	DESCRIPTION	BY	DATE	APPD	DATE

3300/20 SIGNAL NAMES

ABBREVIATIONS OF THE SIGNALS USED IN THE SCHEMATIC

SIGNALS ON THE SCHEMATIC	COMPLETE SIGNAL NAME	SIGNALS ON SCHEMATIC	COMPLETE SIGNAL NAME
ACOM	Analog Common	(POS#EN)	Rack Slot Position Enable
ACOMA	Transducer Common Channel A	RECA	Recorder Channel A
ACOMB	Transducer Common Channel B	RECB	Recorder Channel B
ALM DLY D0	Alarm Delay Digit 0	SPA ADJ	Set-Point Channel A Adjustment
ALM DLY D1	Alarm Delay Digit 1	SPB ADJ	Set-Point Channel B Adjustment
ALR LCH	Alert Latching	SCIC OK LATCH RESET	Signal Conditioning IC OK Latch Reset Command
ARDRV	Alert Relay Drive		
(A FO IN)	Alert First Out Input	SCK	Serial Clock
(ALRSW)	Alert Switch	SDATA	DDM Static Data
BDSA	Buffered DDM Static Data Select Line A	SER1	Serial Communications Transmit
BDSB	Buffered DDM Static Data Select Line B	SER2	Serial Communications Receive
BDSC	Buffered DDM Static Data Select Line C	(SPUI)	System Power Up Inhibit
BPPLA	Buffered Proportional Channel A	(SRST)	System Reset
BPPLB	Buffered Proportional Channel B	TOKA	Transducer OK Channel A
BTA	Buffered Transducer Signal Channel A	TOKB	Transducer OK Channel B
BTB	Buffered Transducer Signal Channel B	TTLAA	TTL Alert Drive Channel A
BYPASS CH A or BYP CHA	Channel A Bypass	TTLAB	TTL Alert Drive Channel B
BYPASS CH B or BYP CHB	Channel B Bypass	TTLDA	TTL Danger Drive Channel A
CH A BYPASS or CHA BYP	Channel A Bypass	TTLDB	TTL Danger Drive Channel B
CH A BYPASS or CHB BYP	Channel B Bypass	VCOMP	Comparator Threshold Voltage (+2 Volts)
CHASSIS	Chassis Common	UPA	UP Arrow
COMMONA	Transducer Common Channel A	XDCRA	Transducer Signal Channel A
COMMONB	Transducer Common Channel B	XDCRB	Transducer Signal Channel B
DCOM	Digital Common		
DNG AND/OR	Danger And/Or Option	+5V or +5Vdc	+5 Volts Digital Supply
DNG BYPASS or DNG BYP	Danger Bypass	+7.5V or +7.5Vdc	+7.5 Volts Analog Supply
DNG BYP BYP	Danger Bypass Bypass	+VRH	High Rough Supply Voltage
DNG LCH	Danger Latching	+VRL	Low Rough Supply Voltage
(DNGSW)	Danger Switch	+REF	+5 Volts Reference from System Supply
DRDRV	Danger Relay Drive	-REF	Common for +REF
DRNA	Danger Arrow	-Vt or -Vt	Transducer/Analog Supply
(D FO IN)	Danger First Out Input	-6.5V or -6.5Vdc	-6.5 Volts Reference
(FOA)	Alert First Out Drive	-7.5V or -7.5Vdc	-7.5 Volts Analog Supply
(FOD)	Danger First Out Drive		
FO OPTION	First Out Option		
GAPA	Transducer Gap Signal Channel A		
GAPB	Transducer Gap Signal Channel B		
(GAPSW)	Gap Switch		
LOAD	Shift Register Latches Load Command		
(LEDEN)	LED Drive Enable		
(MON RESET)	Monitor Reset		
(MON SEL)	Monitor Select		
MOSI	Master Out/ Slave In		
MVREF	+5 Volts Voltage Reference		
NORM/CNTR	Normal/Counter Set-Point Adjustment Selection		
NSCK	Inverted Serial Clock		
OKOR	Monitor OK Bus Drive		
PA_	Port A_		
PB_	Port B_		
PC_	Port C_		
PD_	Port D_		
PE_	Port E_		

14. A SIMILAR ABBR. TABLE IS THE P AND T SPEC.

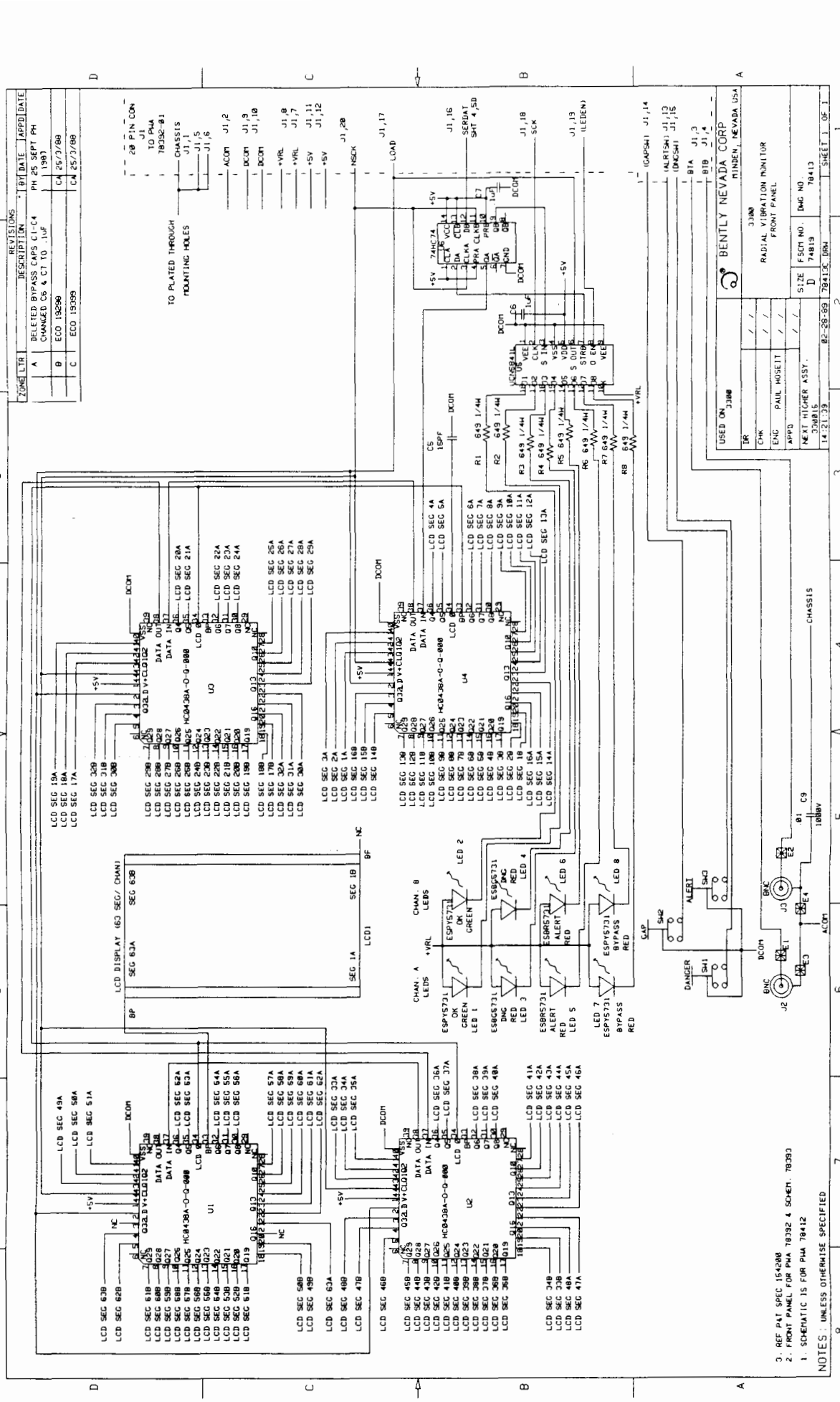
NOTES: UNLESS OTHERWISE SPECIFIED

BENTLY NEVADA	DR R.R. NIKKELS 16:06:57 04-19-89	CONTRACT -	
330020 DTPM		SIZE D	FSCM NO. -	DWG NO. 79483
		79483-8	SHEET 8 OF 8

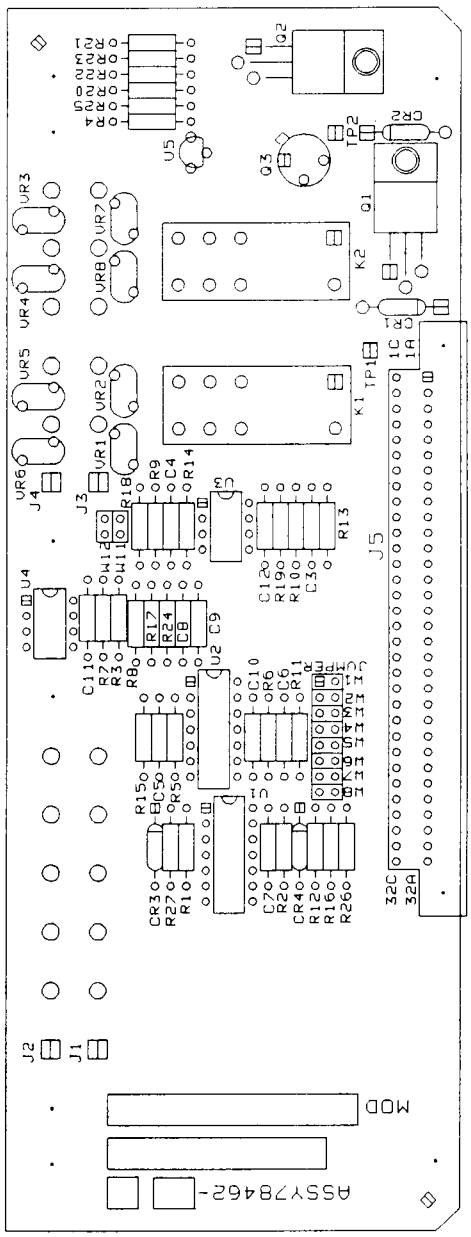
3300/20 SCHEMATIC SIGNAL NAMES
ABBREVIATIONS OF THE SIGNALS USED IN THE SCHEMATIC

SIGNALS ON THE SCHEMATIC	COMPLETE SIGNAL NAME
ACOM	ANALOG COMMON
ACOMA	TRANSDUCER COMMON CHANNEL A
ACOMB	TRANSDUCER COMMON CHANNEL B
ALM DLY D0	ALARM DELAY DIGIT 0
ALM DLY D1	ALARM DELAY DIGIT 1
ALR LCH	ALERT LATCHING
ARDRV	ALERT RELAY DRIVE
(A FO IN)	ALERT FIRST OUT INPUT
(ALRSW)	ALERT SWITCH
BDSA	BUFFERED DDM STATIC DATA SELECT LINE A
BDSB	BUFFERED DDM STATIC DATA SELECT LINE B
BDSC	BUFFERED DDM STATIC DATA SELECT LINE C
BPPLA	BUFFERED PROPORTIONAL CHANNEL A
BPPLB	BUFFERED PROPORTIONAL CHANNEL B
BTA	BUFFERED TRANSDUCER SIGNAL CHANNEL A
BTB	BUFFERED TRANSDUCER SIGNAL CHANNEL B
BYPASS CH A OR BYP CHA	CHANNEL A BYPASS
BYPASS CH B OR BYP CHB	CHANNEL B BYPASS
CH A BYPASS OR CHA BYP	CHANNEL A BYPASS
CH B BYPASS OR CHB BYP	CHANNEL B BYPASS
CHASSIS	CHASSIS COMMON
COMMONA	TRANSDUCER COMMON CHANNEL A
COMMONB	TRANSDUCER COMMON CHANNEL B
DCOM	DIGITAL COMMON
DNG AND/OR	DANGER AND/OR OPTION
DNG BYPASS OR DNG BYP	DANGER BYPASS
DNG BYP BYP	DANGER BYPASS BYPASS
DNG LCH	DANGER LATCHING
(DNGSW)	DANGER SWITCH
DRDRV	DANGER RELAY DRIVE
DMNA	DANGER ARROW
(D FO IN)	DANGER FIRST OUT INPUT
(FOA)	ALERT FIRST OUT DRIVE
(FOD)	DANGER FIRST OUT DRIVE
FO OPTION	FIRST OUT OPTION
GAPA	TRANSDUCER GAP SIGNAL CHANNEL A
GAPB	TRANSDUCER GAP SIGNAL CHANNEL B
(GAPSW)	GAP SWITCH
LOAD	SHIFT REGISTER LATCHES LOAD COMMAND
(LEDEN)	LED DRIVE ENABLE
OVER/UND	OVER/UNDER SETPOINT ADJUSTMENT
(NORMAL COUNTER)	SELECTION
(MON RESET)	MONITOR RESET
(MON SEL)	MONITOR SELECT
MOSI	MASTER OUT/SLAVE IN

SIGNALS ON THE SCHEMATIC	COMPLETE SIGNAL NAME
MVREF	+5VOLTS VOLTAGE REFERENCE
NSCK	INVERTED SERIAL CLOCK
OKOR	MONITOR OK BUS DRIVE
(POSWEN)	RACK SLOT POSITION ENABLE
RECA	RECORDER CHANNEL A
RECB	RECORDER CHANNEL B
SPA ADJ	SETPOINT CHANNEL A ADJUSTMENT
SPB ADJ	SETPOINT CHANNEL B ADJUSTMENT
SCIC OK LATCH RESET	SIGNAL CONDITIONING IC OK LATCH RESET COMMAND
SCK	SERIAL CLOCK
SDATA	DDM STATIC DATA
SER1	SERIAL COMMUNICATIONS TRANSMIT
SER2	SERIAL COMMUNICATIONS RECEIVE
(SPUI)	SYSTEM POWER UP INHIBIT
(SRST)	SYSTEM RESET
TOKA	TRANSDUCER OK CHANNEL A
TOKB	TRANSDUCER OK CHANNEL B
TTLAA	TTL ALERT DRIVE CHANNEL A
TTLAB	TTL ALERT DRIVE CHANNEL B
TTLDA	TTL DANGER DRIVE CHANNEL A
TTLDB	TTL DANGER DRIVE CHANNEL B
VCOMP	COMPARATOR THRESHOLD VOLTAGE (+2VOLTS)
UPA	UP ARROW
XDCRA	TRANSDUCER SIGNAL CHANNEL A
XDCRB	TRANSDUCER SIGNAL CHANNEL B
+5V OR +5VDC	+5VOLTS DIGITAL SUPPLY
+7.5V OR +7.5 VDC	+7.5VOLTS ANALOG SUPPLY
+VRH	HIGH ROUGH SUPPLY VOLTAGE
+VRL	LOW ROUGH SUPPLY VOLTAGE
+REF	+5VOLTS REFERENCE FROM SYSTEM SUPPLY
-REF	COMMON FOR +REF
-VT OR -Vt	TRANSDUCER/ANALOG SUPPLY
-6.5V OR -6.5VDC	-6.5 VOLTS REFERENCE
-7.5 OR -7.5VDC	-7.5 VOLTS ANALOG SUPPLY
PA_	PORT A_
PB_	PORT B_
PC_	PORT C_
PD_	PORT D_
PE_	PORT E_

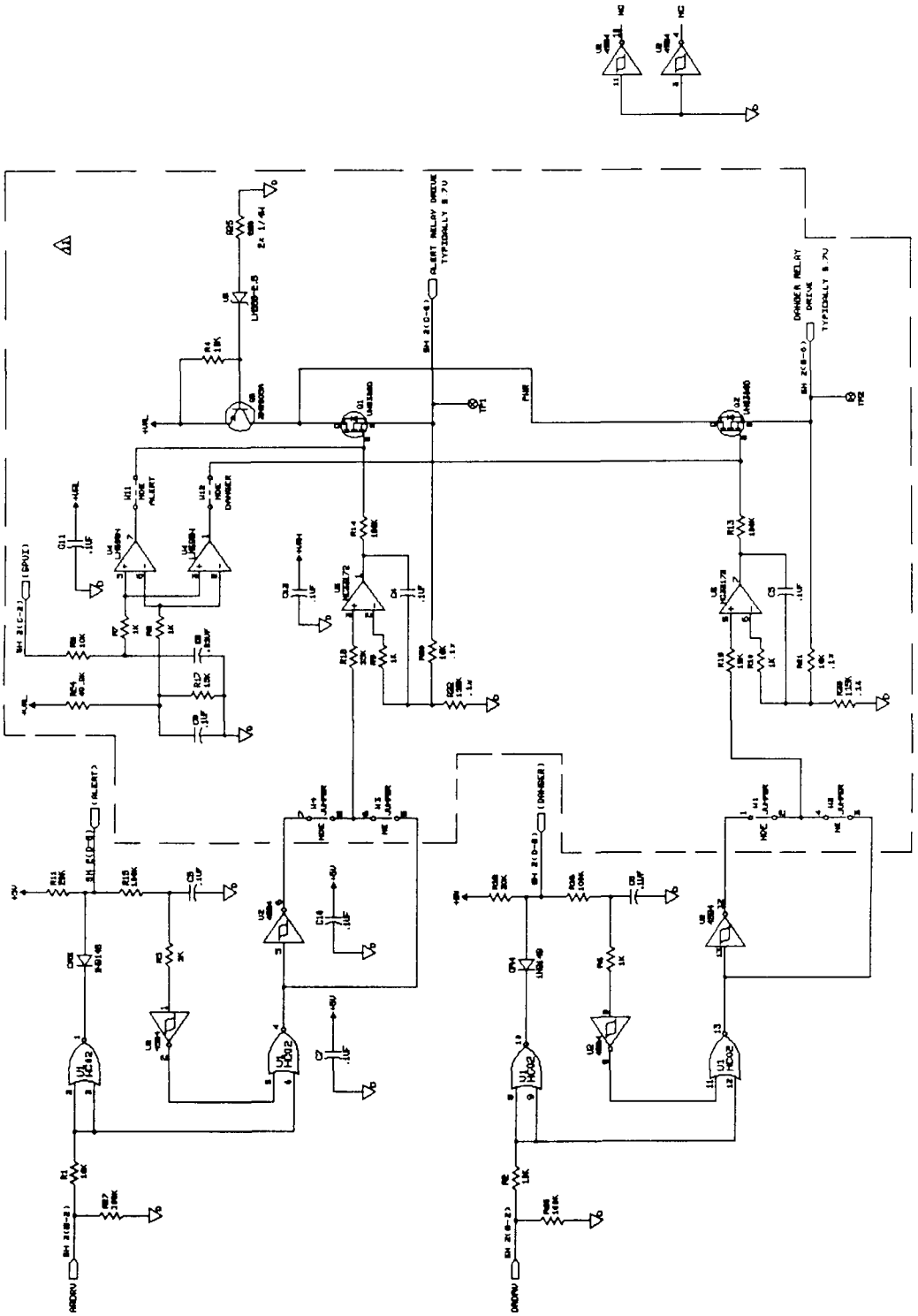


SCHEMATIC DIAGRAM FRONT PANEL 78413 SH 1 OF 1



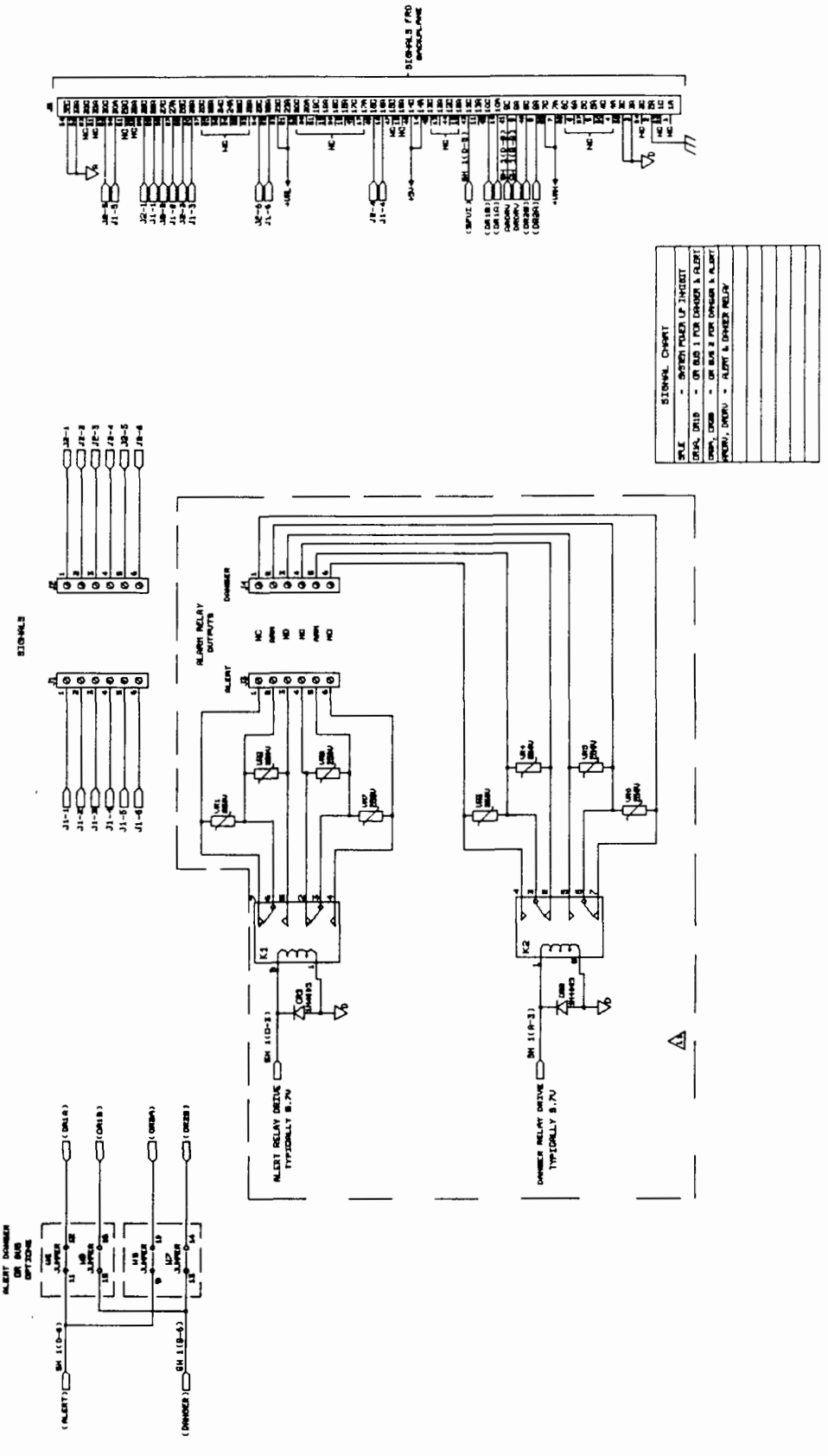
ASSEMBLY 78462

S I R M EPOXY/ S I M



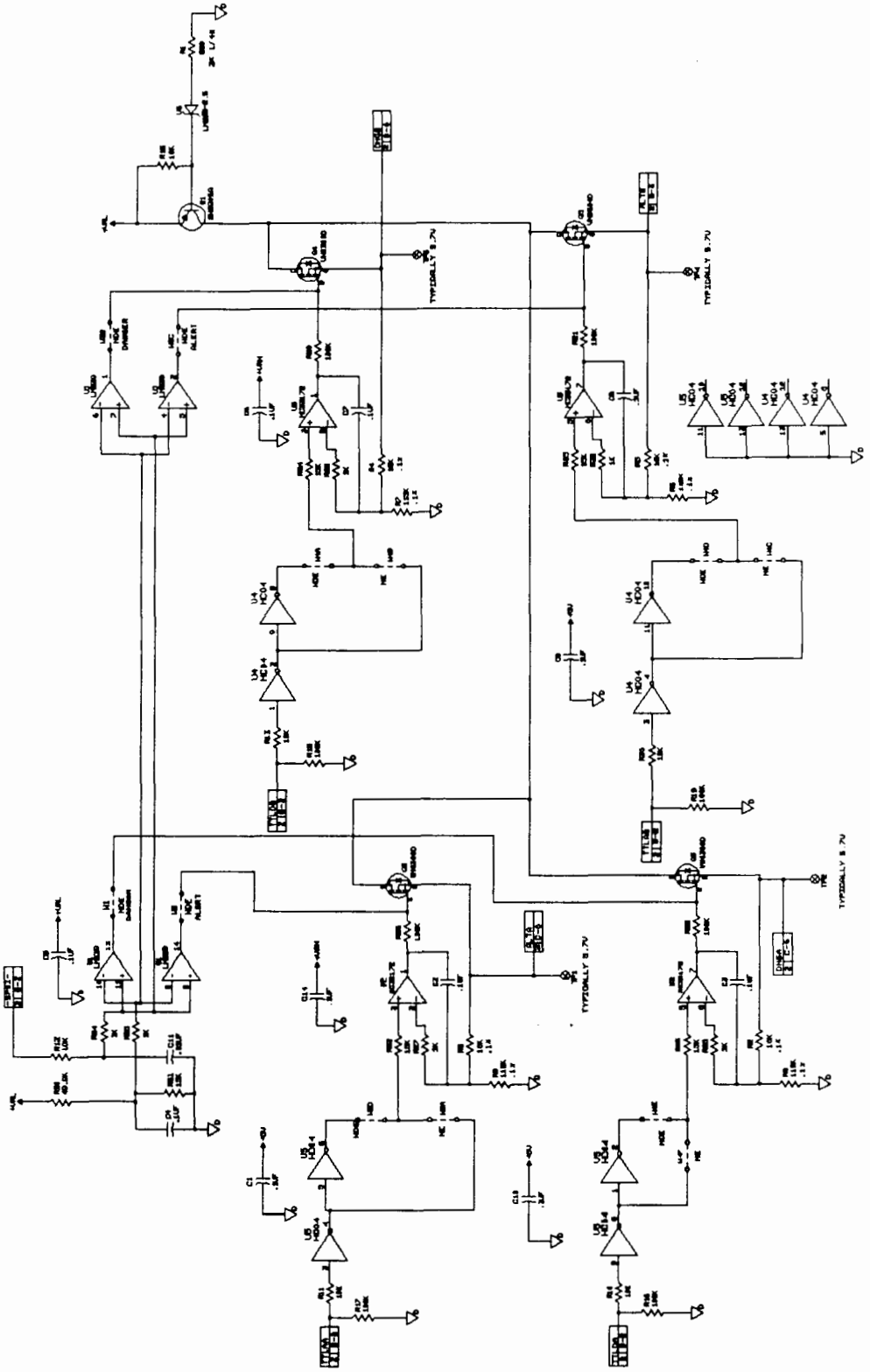
SCHEMATIC DIAGRAM
SIRM EPOXY

78463
SHEET 1 OF 2



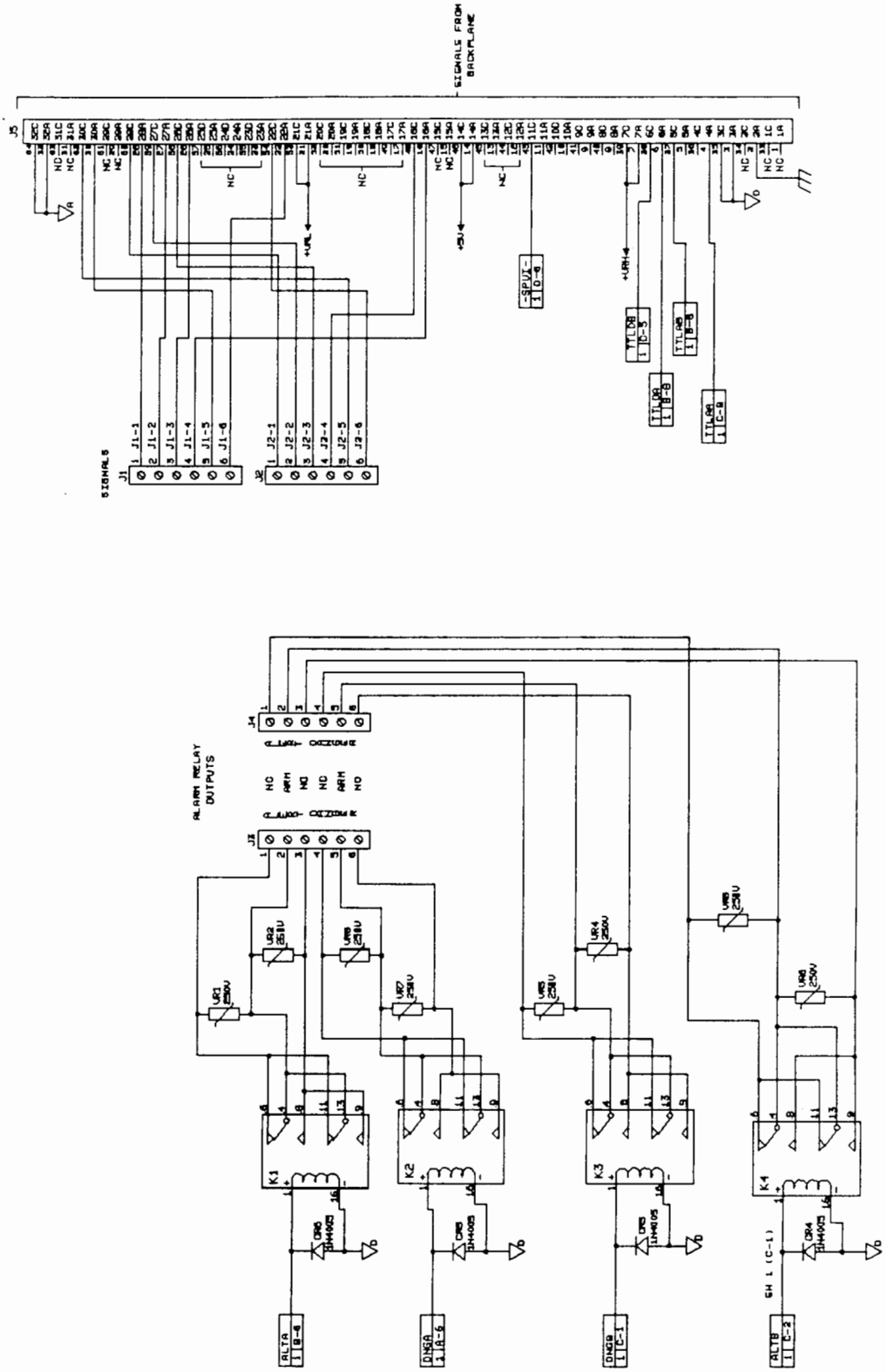
SCHEMATIC DIAGRAM
SIRM EPOXY

78463
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SCHEMATIC DIAGRAM
QUAD RELAY

83730
SHEET 1 OF 2



SCHEMATIC DIAGRAM
QUAD RELAY

83730
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