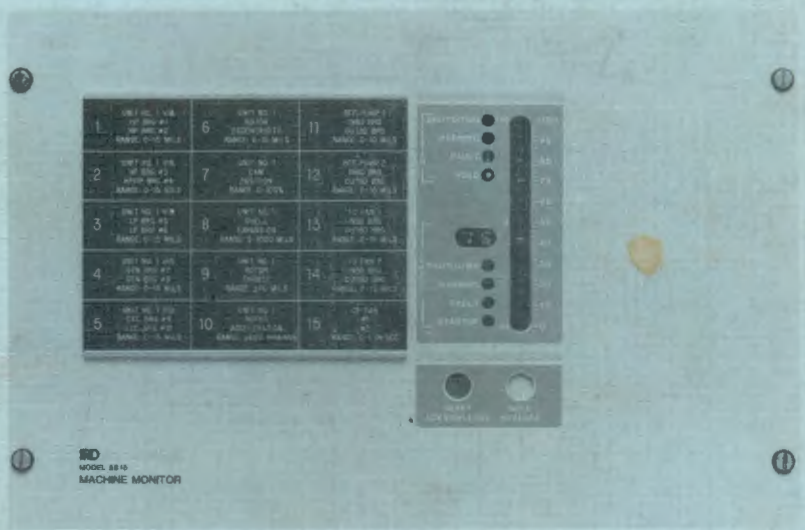
IRD Mechanalysis



INSTALLATION AND OPERATION MANUAL FOR MACHINE MONITOR MODEL 5815

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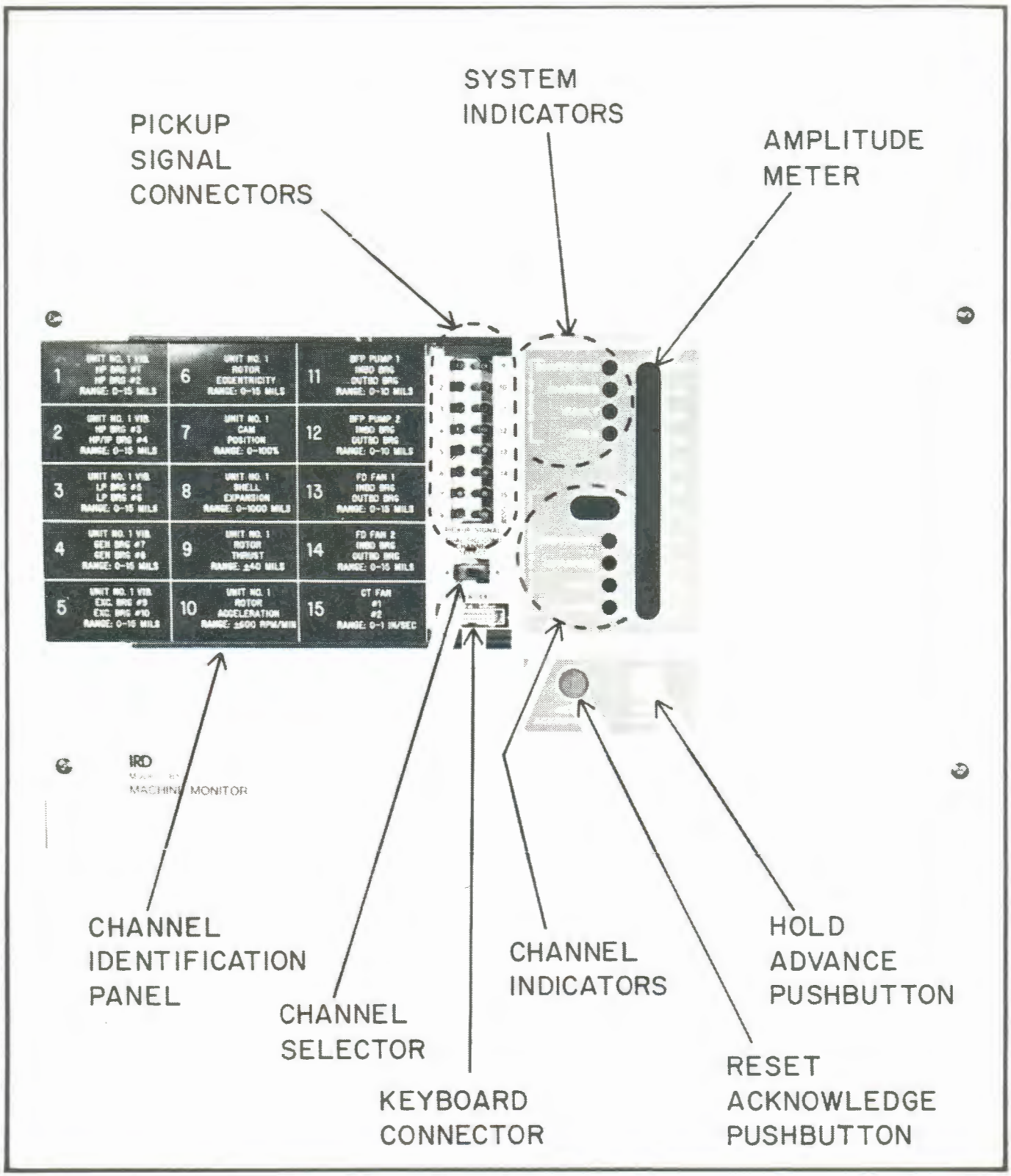


Front of Model 5815 Monitor

1 GENERAL DESCRIPTION

1.1 MONITOR

The Model 5815 Monitor unit is microprocessor controlled, and can monitor up to thirty machinery condition inputs. Readouts of machinery performance are shown on the front panel amplitude meter and indicators. Printouts of the ALARM LOG and DATA LOG are available with an external (optional) printer. Signals from up to 30 pickups can be output to an external analyzer, meter, recorder or oscilloscope.

1.2 OPERATOR CONTROLS, INDICATORS AND CONNECTORS

Operator controls, indicators, and connectors are described below and illustrated on Page ii:

- HOLD/ADVANCE PUSHBUTTON: Controls amplitude meter and channel indicators.
- RESET/ACKNOWLEDGE PUSHBUTTON: Acknowledges and resets warning and shutdown alarms.
- CHANNEL SELECTOR: When dual-channel Signal Conditioners are used, the channel selector switch selects which pickup is connected to the analyzer jack.
- AMPLITUDE METER: Indicates amplitude of the channel whose number appears in the digital channel display. Alarm setpoints are simultaneously displayed.
- SYSTEM INDICATORS: . Four lights (SHUTDOWN, WARNING, FAULT and HOLD). The SHUTDOWN or WARNING light flashes when an alarm condition exists in any channel until the alarm condition is acknowledged. The light is then ON steady until the alarm condition is corrected and the alarm reset. The FAULT light turns ON when a fault condition exists, and turns OFF when the fault condition is corrected. The HOLD light is ON whenever the display is held on a channel.
- CHANNEL INDICATORS: a digital display, and four lights SHUTDOWN, WARNING, FAULT, and STARTUP). The digital display number identifies the displayed channel. The SHUTDOWN or WARNING light flashes when an alarm condition exists in the displayed channel until the alarm condition is acknowledged. The light then turns ON steadily until the alarm condition is corrected and the alarm reset.

  The FAULT light turns ON when a fault condition exists in the displayed channel until the fault condition is corrected.

  If startup is used, vibration signals are attenuated 3:1 during machine startup. The attenuation prevents unwarranted alarms during startup. The STARTUP light is on during the startup.
- PICKUP SIGNAL CONNECTORS: fifteen jacks for connection of the pickup signal from each signal conditioner to an external analyzer. One jack is common ground.
- KEYBOARD CONNECTOR: receptacle for connection of programmer keyboard. The keyboard is used for all programming functions.

1.3 SYSTEM DESCRIPTION

The concept, machinery monitoring, is basically simple: during normal operation the machinery "vital signs" stay within a relatively narrow range. When a mechanical problem develops, it changes one or more of the "vital signs". The monitor senses the change and causes an alarm.

The outputs from up to 30 sensors connect to the Signal Conditioners inside the monitor. The Signal Conditioners amplify the input signals, and convert these into dc voltages proportional to the machinery parameter amplitudes.

The Signal Conditioner outputs are processed and measured by the monitor, which operates relay contacts when a signal exceeds an alarm setpoint. The relay contacts may be connected to annunciators or automatic machinery controls.

The Signal Conditioners also provide analog output signals (0 to 5 Vdc or 4-20 mAdc) for computers, data loggers, and printers. When equipped with an optional Data Communication module, the monitor provides RS232C or RS422 serial data channels for terminals and computers.

1.4 SENSOR SELECTION AND INSTALLATION

The effectiveness of a monitor system is largely dependent on proper selection of the sensors and their locations on the machinery.

The installation section covers mounting and wiring of the sensors. The exact placement of the sensors on the machine will not be discussed in this manual because of the great variety of machine configurations. IRD MECHANALYSIS engineers will be pleased to provide advice and recommendations relative to the selection and/or installation of the sensors, upon request.

Sensors are selected to guard against the most common failure modes of the machine. An important point to remember is that some machinery faults <u>can</u> occur that <u>will not</u> cause significant changes in the monitored parameters, and therefore will not cause an alarm.

1.5 ALARM RELAYS

Alarm relays in the monitor are used to connect to machinery controls, indicators, and annunciators.

Up to six DPDT 5-ampere plug-in relays can be installed in the monitor. Terminal strips are provided for connection of the relays to external circuits.

Up to 24 additional relays are available (as options) for use with the monitor. These relays are housed in NEMA junction boxes. Up to eight relays can be installed in each junction box. Control circuits plug into the monitor. Each junction box contains a power supply for the relays within the box.

1.6 PRINTER PORT

An RS232C serial data port is provided for an external printer. Printed reports are initiated by pressing the Reset/Acknowledge and Hold/Advance buttons simultaneously.

II INSTALLATION

2.1 SELECTING THE MONITOR LOCATION

The monitor is designed for panel mounting in a control room for ready access by operating personnel. Access to the rear of the monitor is necessary for wiring and servicing. If the control room layout does not permit such access, the monitor may be installed on optional slides so that it can be withdrawn from the front of the control panel.

When selecting the mounting location for the monitor, keep in mind that it is a complex electronic instrument. It is designed and manufactured to withstand severe environmental conditions. But, as with any electronic instrument, it will give the longest trouble-free service if treated with reasonable care. In general, a location that is comfortable for people is best.

The selected location should not subject the monitor to dripping water from above, or to heat from equipment located beneath the monitor. A 3-inch clearance above and below the monitor, and 1-1/2 inch clearance along the sides of the chassis is required for ventilation.

Installation drawings for the monitor and accessories are provided in Section 2.6.

2.2 HAZARDOUS LOCATIONS

Due to the proximity of some control rooms to process machinery, the interior of the control room may be designated as a Division 2 Hazardous Area within the definition of Article 500 of the U.S. National Electrical Code, or of similar codes in other countries.

The Model 5815 Monitor is designed to meet certain requirements for Division 2 areas. The current status of approval action by independent agencies may be obtained through your IRD MECHANALYSIS representative.

CAUTION
Before installing or operating the monitor within a hazardous location, obtain specific approval to do so from your local approving authority.

2.3 PURGING

Some airborne gases (for example, chlorine) are so corrosive that over an extended period of time, even instruments with the best protection will be damaged. When a corrosive situation exists at the location proposed for the monitor, strong consideration should be given to selecting a different location. If another location is not possible, then a purgeable enclosure should be used, and a continuous flow of clean instrument air used to exclude the corrosive gas. Flow rate must be adequate to dissipate heat generated by the equipment (approximately 200 watts per monitor).

Purging in the manner described above is not necessarily acceptable for operation in explosive-hazardous areas such as those discussed in Section 2.2.

2.4 GROUNDING, SHIELDING, AND NOISE

Electrical signals from the transducers are quite small, and are therefore susceptible to interference from electrical "noise". The noise can be generated by power cables near the sensors or wiring, by walkie-talkies, electrostatic discharge, lightning, or large electrical equipment (i.e., motors, generators, transformers, controllers, etc.), in the vicinity.

To minimize the possibility of interference which could cause erroneous monitor readings and false alarms, wiring to transducers must be shielded and isolated from other wiring (by conduit, separate cable trays, etc.).

Radio-Frequency Interference (RFI) can result from open wiring. When Walkie-Talkies are used in your plant, we strongly recommend that you run all wiring inside thin-wall conduit (metallic electrical tubing). All conduit fittings and junction boxes used should be electrically bonded to a good earth ground. These basic precautions are simply good engineering practice when low-level signals are involved.

Microprocessor circuitry used in the monitor is sensitive to high-amplitude, short-duration electrical noise "spikes", such as may be generated by switching unprotected relay coils. All wiring to the monitor should be free of such noise, which can usually be eliminated at its source by diodes, metal-oxide varistors, or similar devices.

2.5 IMPORTANT OPERATIONAL NOTES

Use of a computer grade power source or a power line conditioner is recommended.

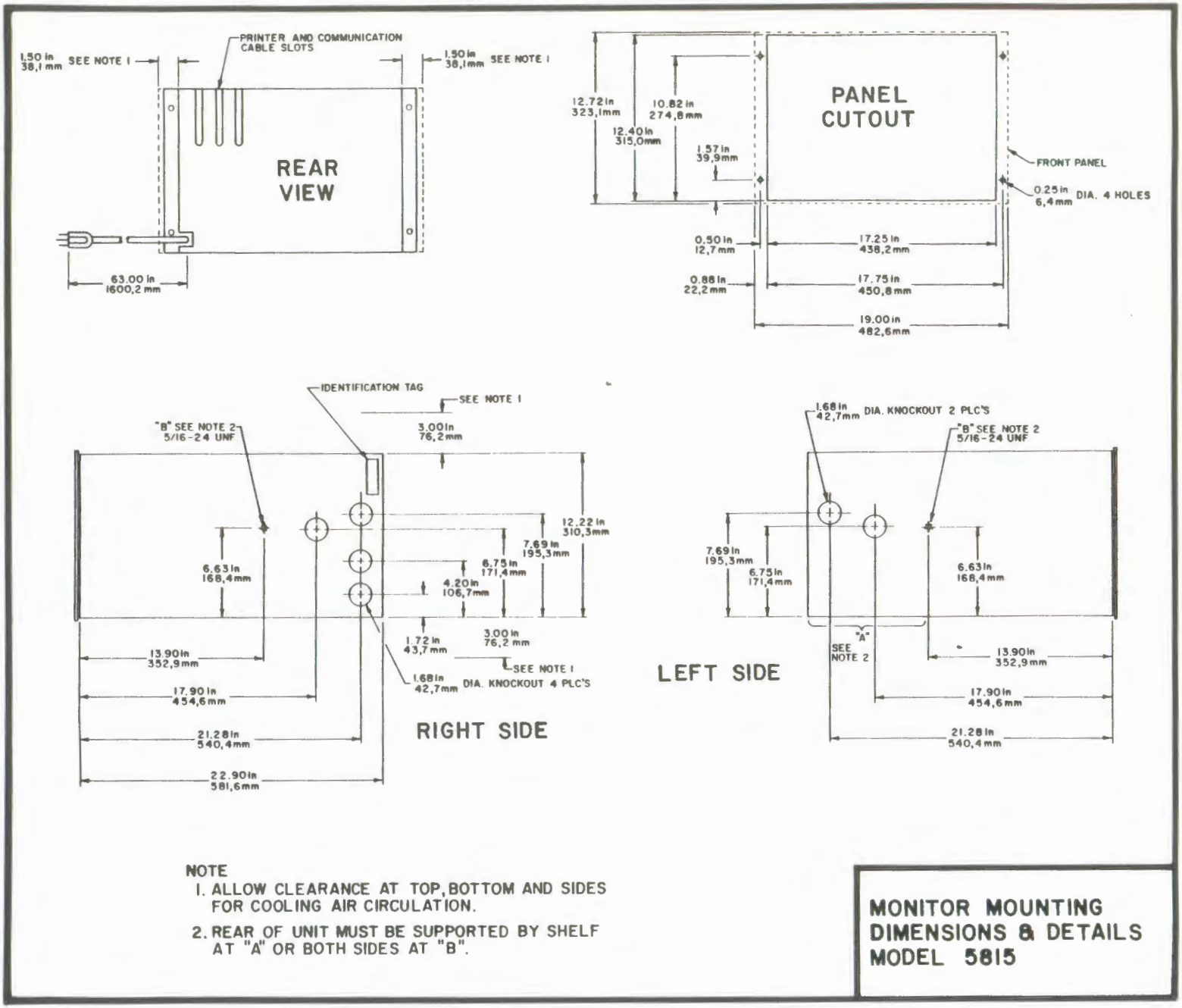
To prevent damaging the monitor components, the following precautions must be observed:

1. Do not plug or unplug the Signal Conditioners or internal PC Boards while ac power is applied to the monitor.

2. Do not apply ac power to the monitor until all wiring has been carefully checked. Do not check the wiring with a "megger" or similar tester if the wiring is connected to a sensor or to a Signal Conditioner. Otherwise damage could occur. To use a "megger", first disconnect the sensor wiring at both ends.

2.6 INSTALLATION DRAWINGS

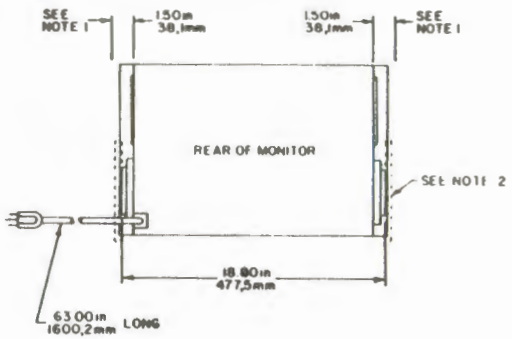
The following pages contain installation drawings for the monitor, accessories and sensors. On the Installation Drawings, the individual transducers shown will supply an input to only one channel. READ ALL NOTES AND INSTRUCTIONS INCLUDED ON THE DRAWINGS CAREFULLY BEFORE BEFORE BEGINNING INSTALLATION OF ANY EQUIPMENT.

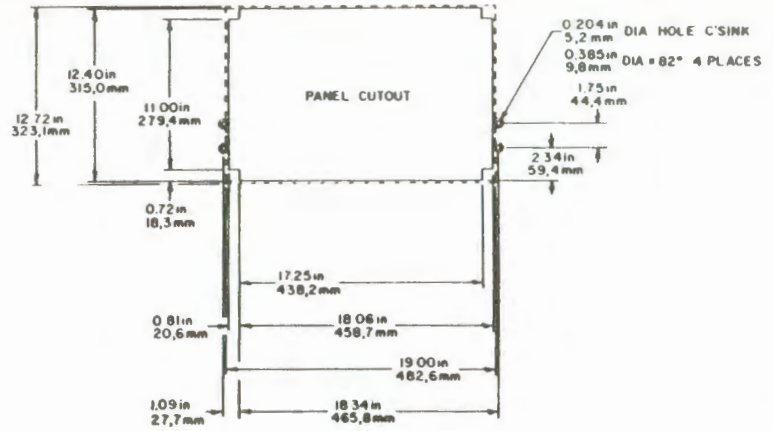


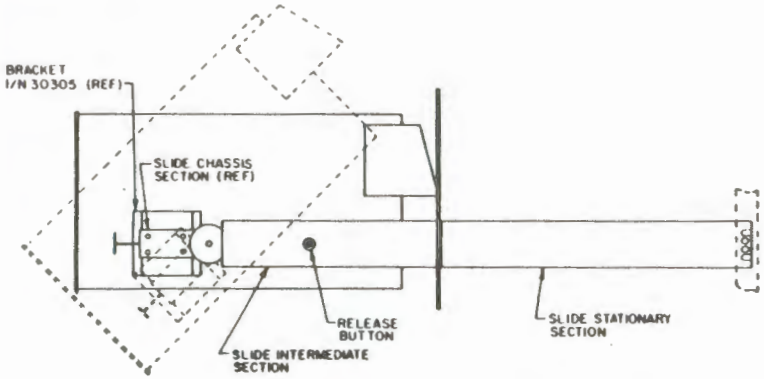
NOTE

1. ALLOW CLEARANCE AT TOP, BOTTOM AND SIDES FOR COOLING AIR CIRCULATION.
2. REAR OF UNIT MUST BE SUPPORTED BY SHELF AT "A" OR BOTH SIDES AT "B".

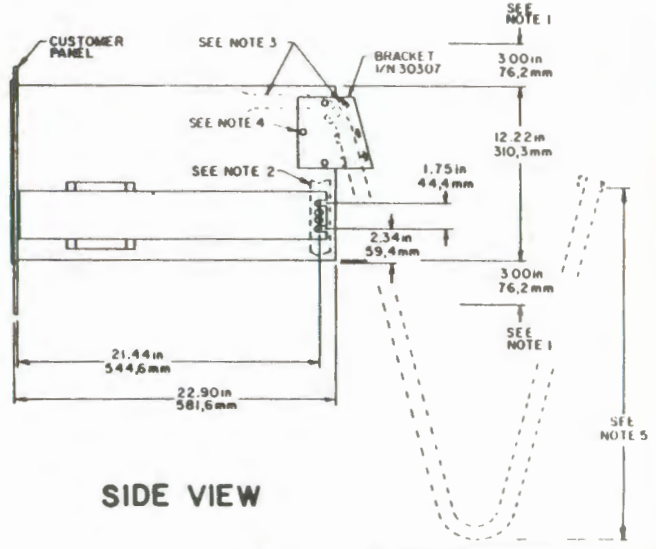
MONITOR MOUNTING DIMENSIONS & DETAILS MODEL 5815







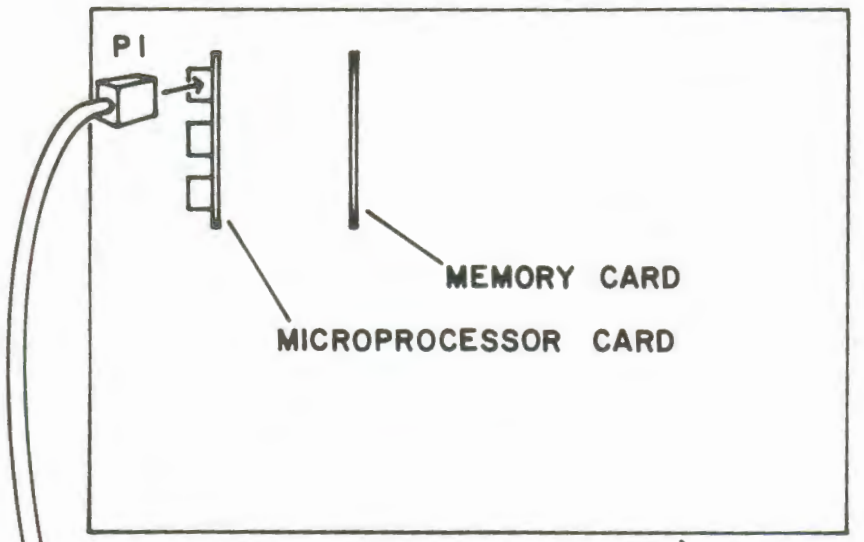
SIDE VIEW
(SLIDES EXTENDED)



SIDE VIEW

NOTE:
1. ALLOW CLEARANCE AT TOP, BOTTOM AND SIDES FOR COOLING AIR CIRCULATION.
2. CUSTOMER TO SUPPLY SUPPORTED AT REAR OF SLIDES.
3. CUSTOMER TO SUPPLY CABLE CLAMPS AS REQUIRED FOR CABLE. CLAMP CABLES IN PLACE SO CABLE DOES NOT MOVE AT ANY TIME OR DAMAGE TO MAIN PCB MAY OCCUR.
4. 1/4-20x5/8 SCREW, NUT & LOCK WASHER @ 3 PLACES PER SIDE. INSTALL NUTS AT INSIDE OF MONITOR.
5. ALLOW 36 IN. MINIMUM CABLE LOOPS. ROUTE CABLE LOOPS FREE OF OBSTRUCTIONS.

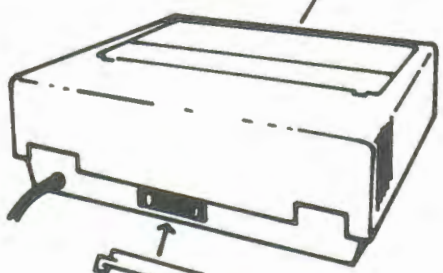
MONITOR MOUNTING DIMENSIONS & DETAILS WITH SLIDES



5815 REAR

PRINTER CABLE
IRD PART NO. 30531

PRINTER

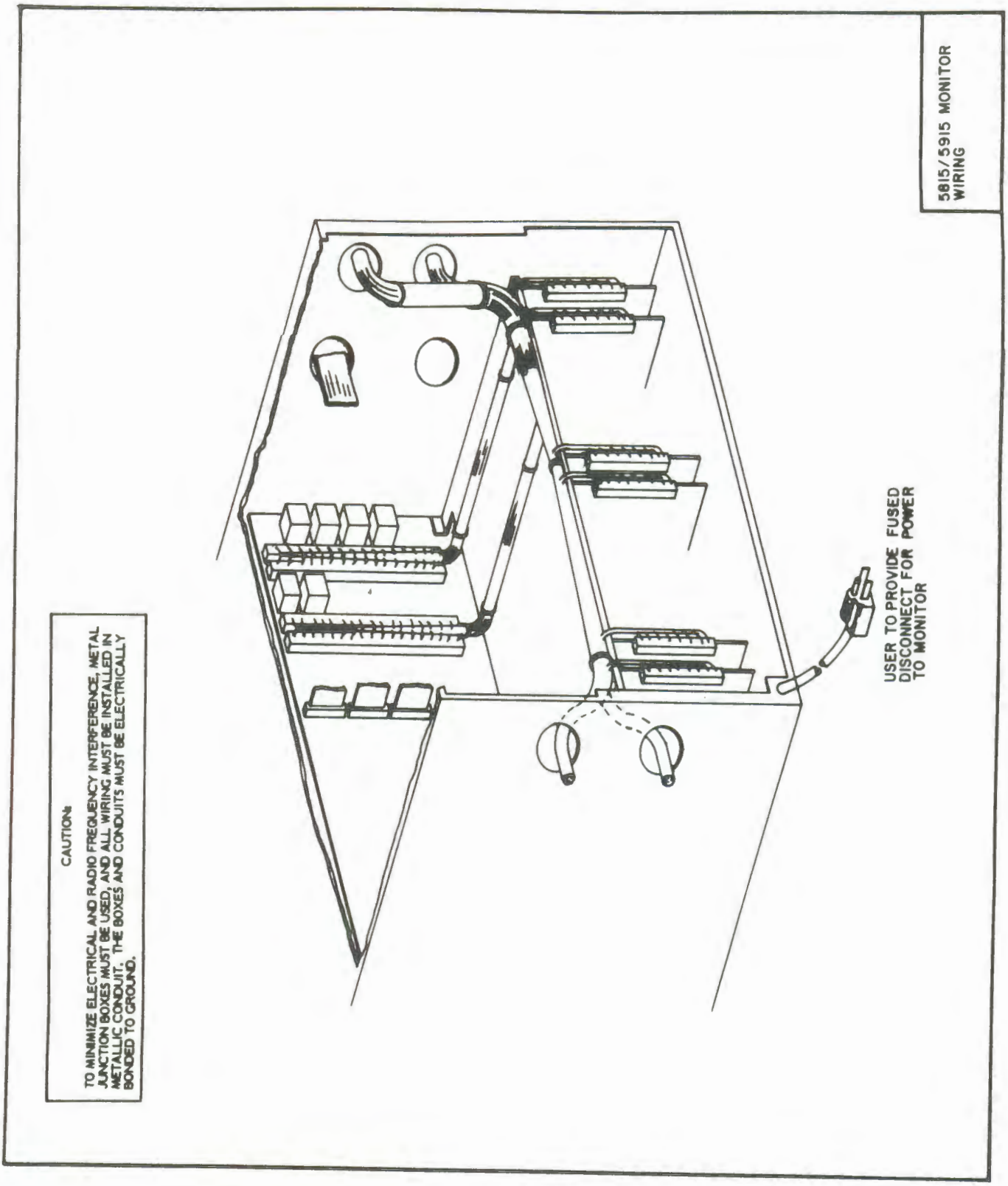


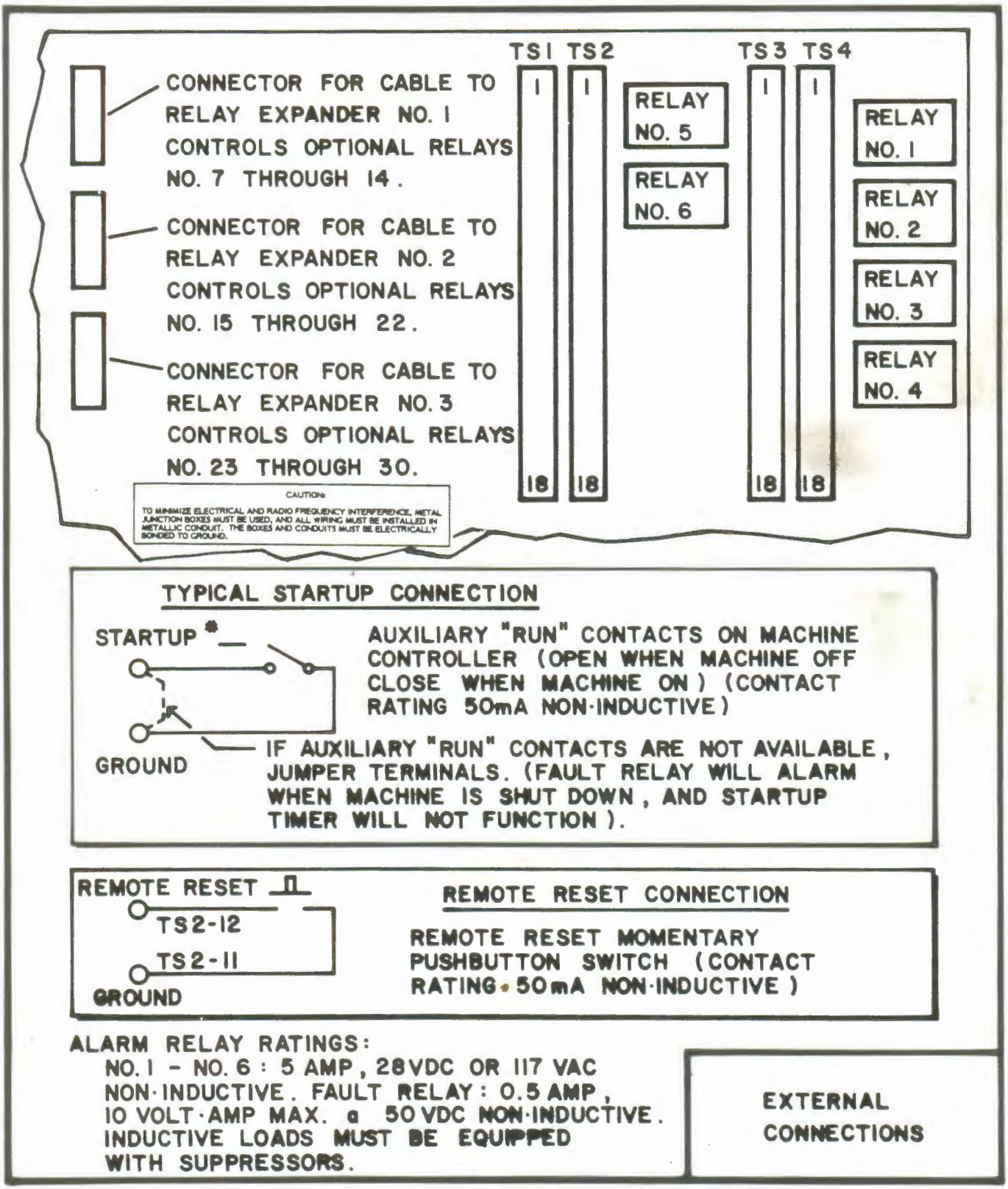
P2

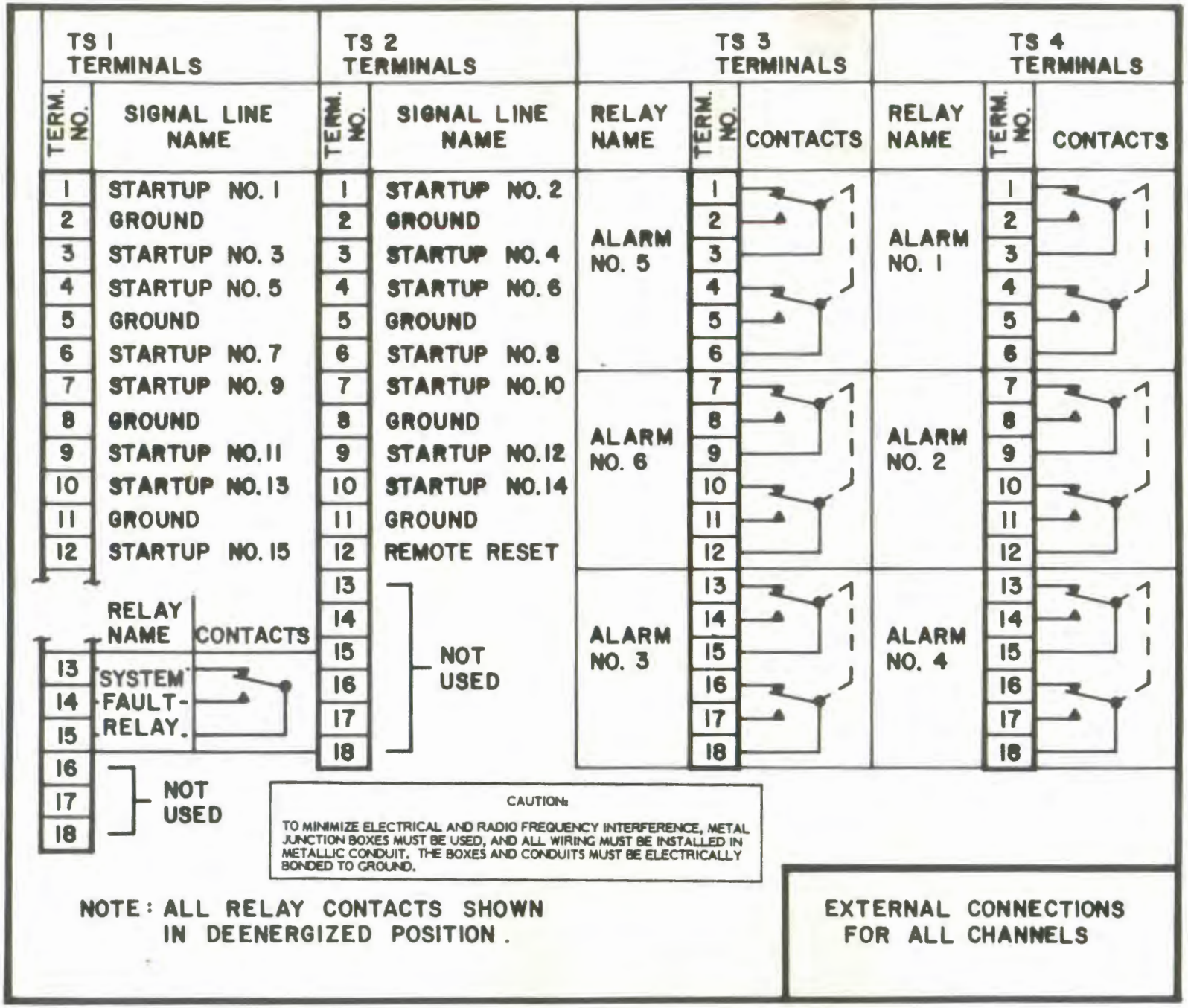
P1 PIN NO.	P2 PIN NO.
2	3
6	20,6
5	11
7	7
1	1

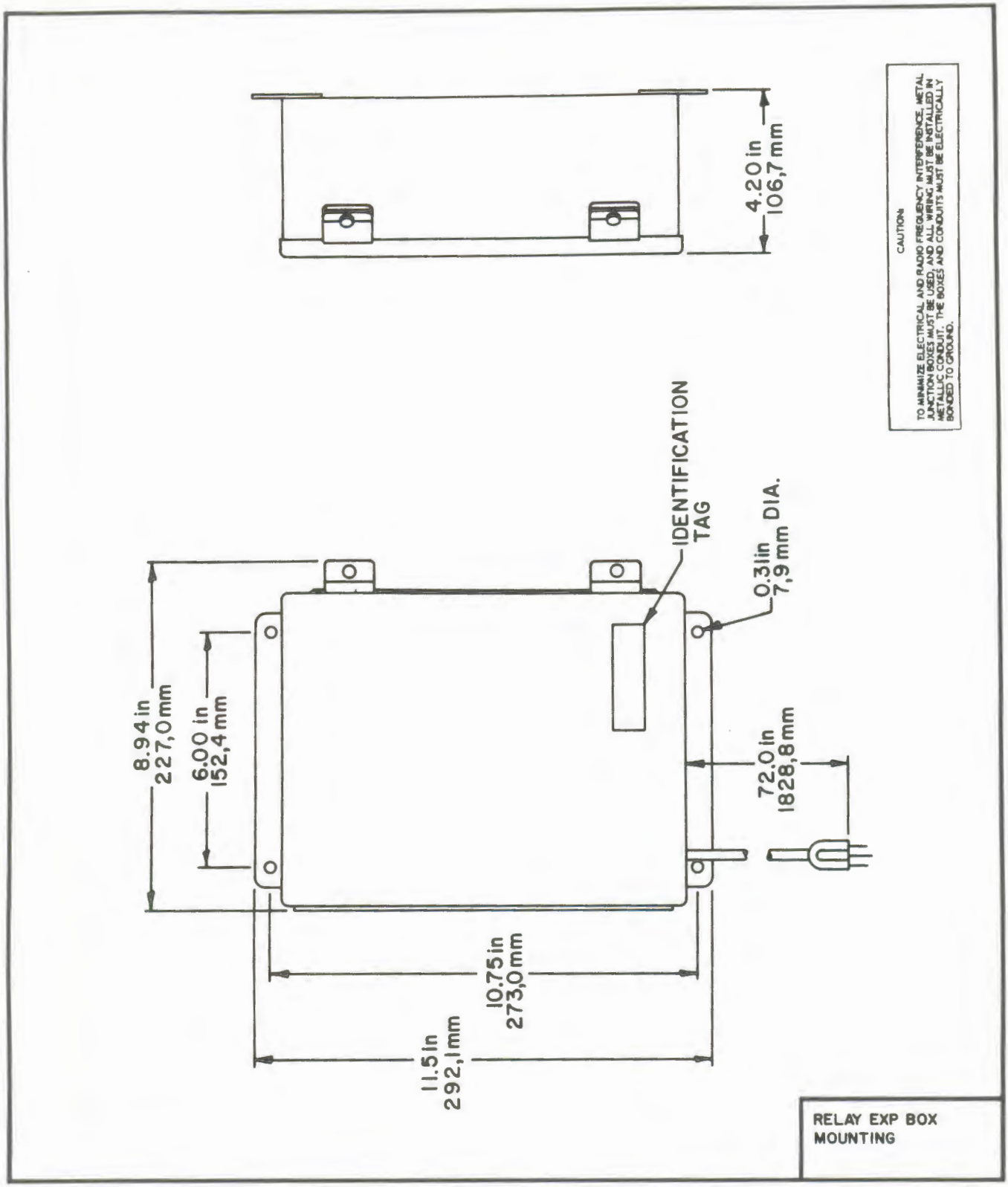
CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.

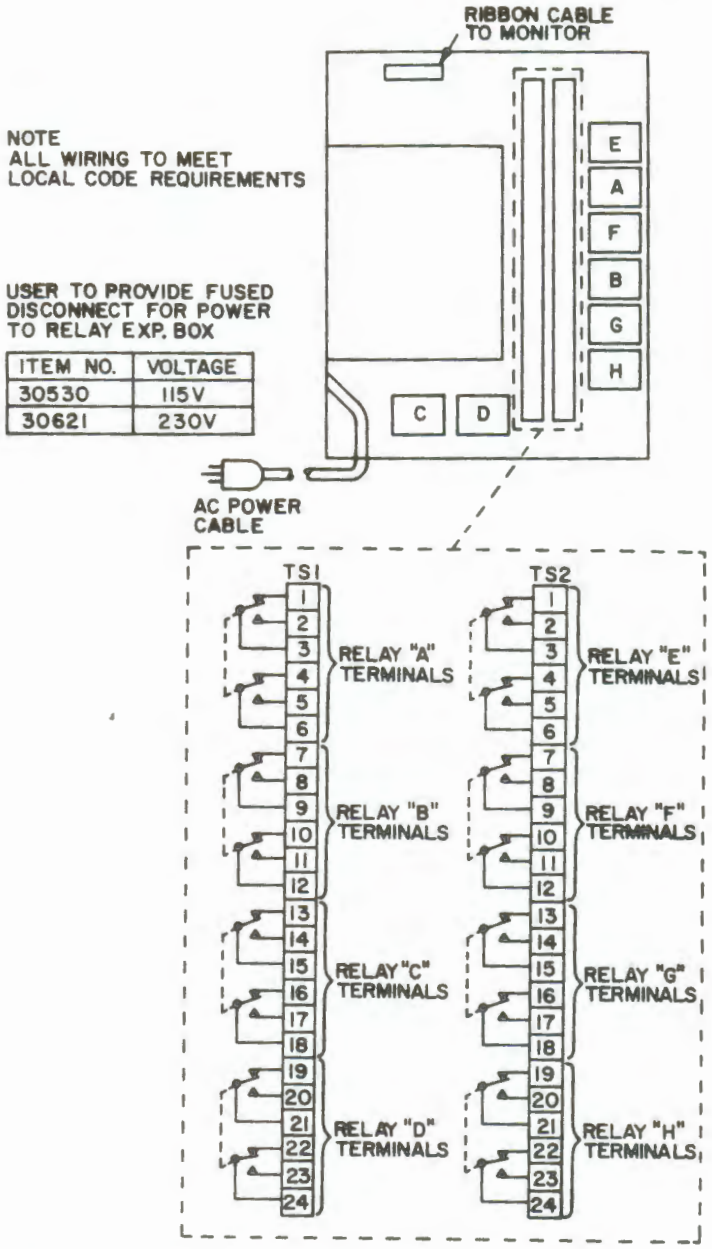
PRINTER CABLE INSTALLATION


5815/5915 MONITOR WIRING
USER TO PROVIDE FUSED DISCONNECT FOR POWER TO MONITOR
CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.


CONNECTOR FOR CABLE TO RELAY EXPANDER NO. 1 CONTROLS OPTIONAL RELAYS NO. 7 THROUGH 14.
CONNECTOR FOR CABLE TO RELAY EXPANDER NO. 2 CONTROLS OPTIONAL RELAYS NO. 15 THROUGH 22.
CONNECTOR FOR CABLE TO RELAY EXPANDER NO. 3 CONTROLS OPTIONAL RELAYS NO. 23 THROUGH 30.
CAUTION: TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.
TS1 TS2 TS3 TS4
1 18
RELAY NO. 5
RELAY NO. 6
RELAY NO. 1
RELAY NO. 2
RELAY NO. 3
RELAY NO. 4
TYPICAL STARTUP CONNECTION
STARTUP
GROUND
AUXILIARY "RUN" CONTACTS ON MACHINE CONTROLLER (OPEN WHEN MACHINE OFF CLOSE WHEN MACHINE ON) (CONTACT RATING 50mA NON-INDUCTIVE)
IF AUXILIARY "RUN" CONTACTS ARE NOT AVAILABLE, JUMPER TERMINALS. (FAULT RELAY WILL ALARM WHEN MACHINE IS SHUT DOWN, AND STARTUP TIMER WILL NOT FUNCTION).
REMOTE RESET
TS2-12
TS2-11
GROUND
REMOTE RESET CONNECTION
REMOTE RESET MOMENTARY PUSHBUTTON SWITCH (CONTACT RATING 50mA NON-INDUCTIVE)
ALARM RELAY RATINGS:
NO. 1 - NO. 6 : 5 AMP, 28VDC OR 117 VAC NON-INDUCTIVE. FAULT RELAY: 0.5 AMP, 10 VOLT-AMP MAX. @ 50 VDC NON-INDUCTIVE. INDUCTIVE LOADS MUST BE EQUIPPED WITH SUPPRESSORS.
EXTERNAL CONNECTIONS


TS 1 TERMINALS
TERM. NO.
SIGNAL LINE NAME
1 STARTUP NO. 1
2 GROUND
3 STARTUP NO. 3
4 STARTUP NO. 5
5 GROUND
6 STARTUP NO. 7
7 STARTUP NO. 9
8 GROUND
9 STARTUP NO. 11
10 STARTUP NO. 13
11 GROUND
12 STARTUP NO. 15
RELAY NAME
CONTACTS
13
14
15
SYSTEM FAULT-RELAY.
16
17
18
NOT USED
TS 2 TERMINALS
TERM. NO.
SIGNAL LINE NAME
1 STARTUP NO. 2
2 GROUND
3 STARTUP NO. 4
4 STARTUP NO. 6
5 GROUND
6 STARTUP NO. 8
7 STARTUP NO. 10
8 GROUND
9 STARTUP NO. 12
10 STARTUP NO. 14
11 GROUND
12 REMOTE RESET
13
14
15
16
17
18
NOT USED
TS 3 TERMINALS
RELAY NAME
TERM. NO.
CONTACTS
ALARM NO. 5
1
2
3
4
5
6
ALARM NO. 6
7
8
9
10
11
12
ALARM NO. 3
13
14
15
16
17
18
TS 4 TERMINALS
RELAY NAME
TERM. NO.
CONTACTS
ALARM NO. 1
1
2
3
4
5
6
ALARM NO. 2
7
8
9
10
11
12
ALARM NO. 4
13
14
15
16
17
18
CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.
NOTE: ALL RELAY CONTACTS SHOWN IN DEENERGIZED POSITION.
EXTERNAL CONNECTIONS FOR ALL CHANNELS

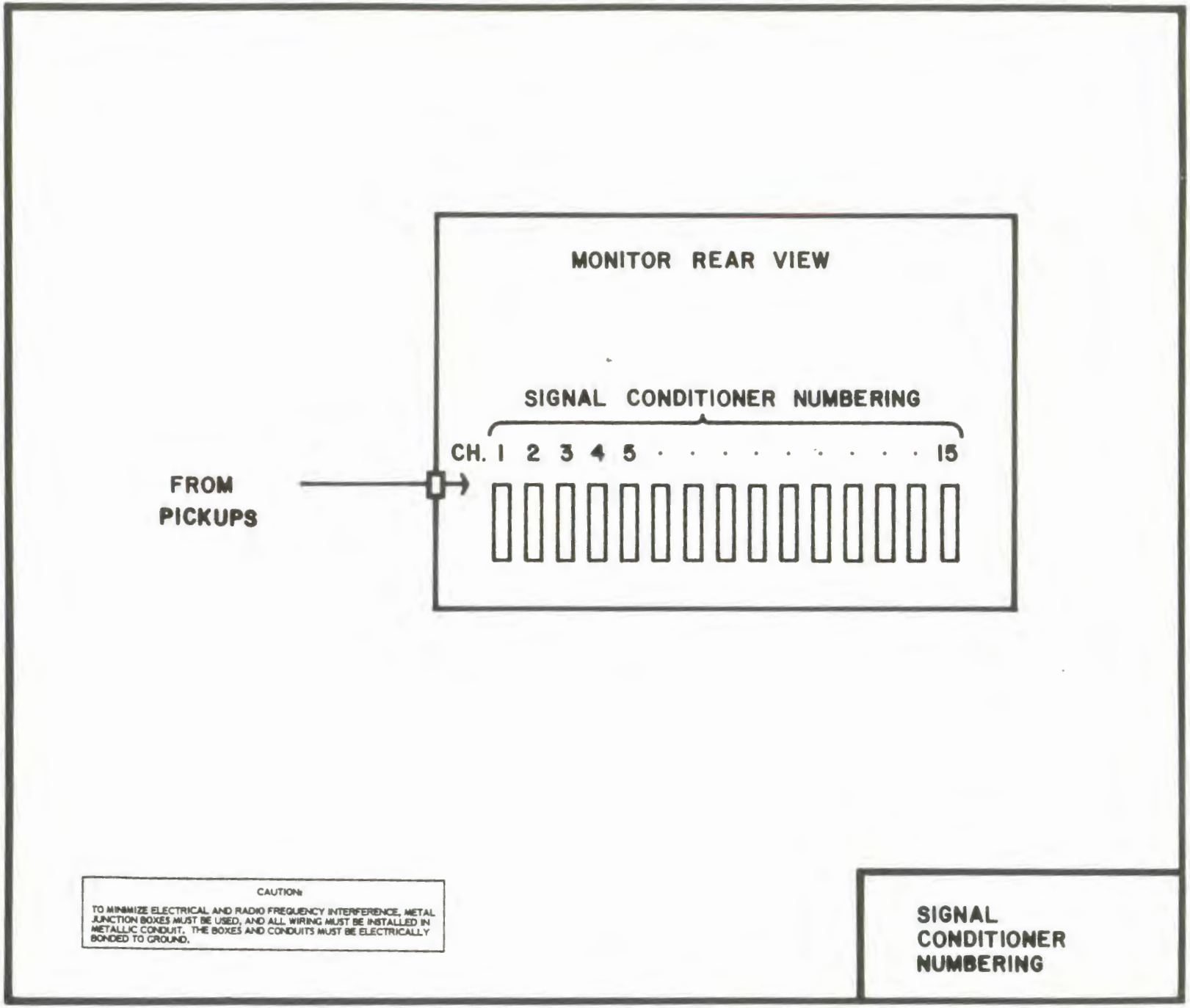

4.20 in
106,7 mm
CAUTION
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.
IDENTIFICATION TAG
0.3 in DIA.
7,9 mm
8.94 in
227,0 mm
6.00 in
152,4 mm
72.0 in
1828,8 mm
10.75 in
273,0 mm
11.5 in
292,1 mm
RELAY EXP BOX
MOUNTING

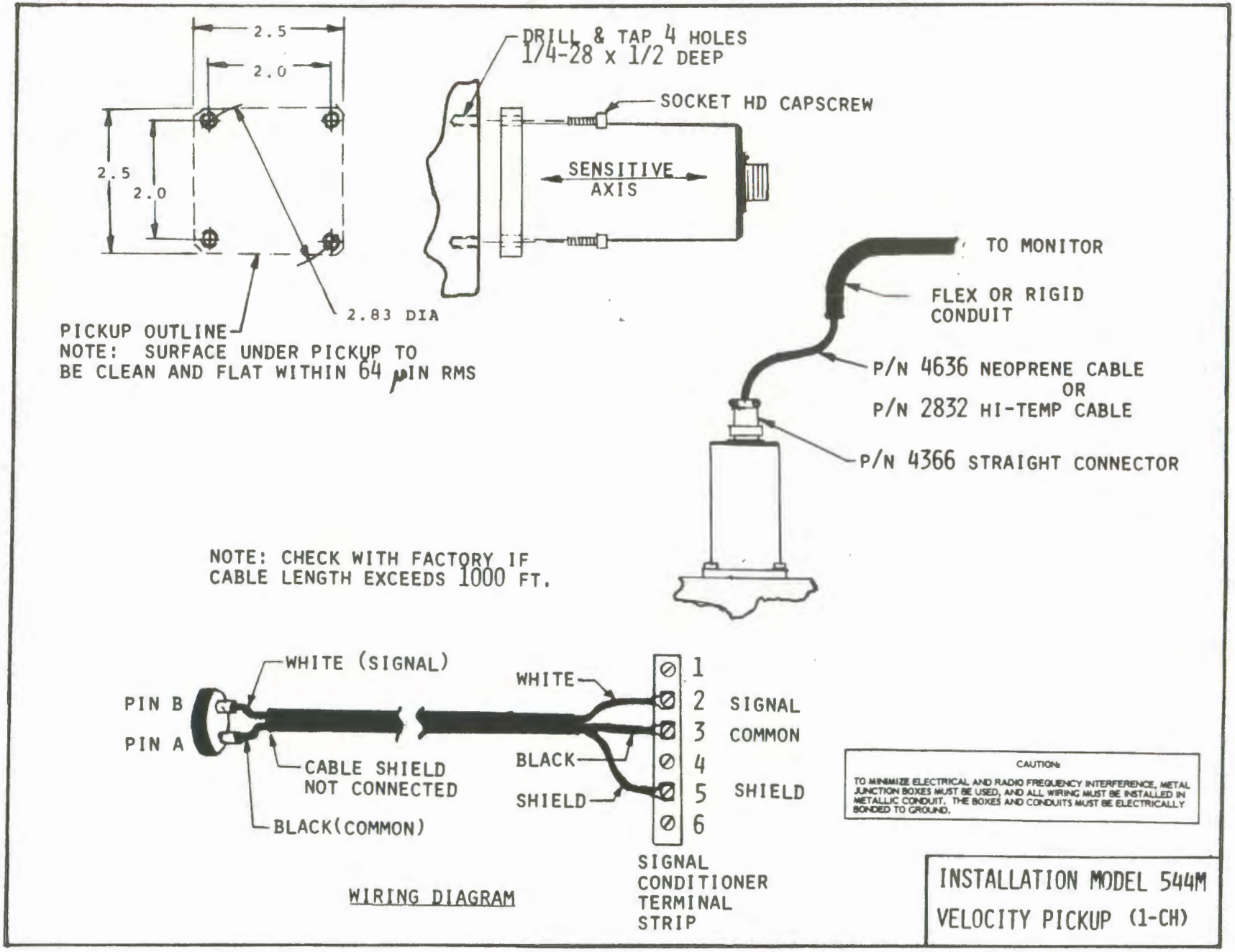


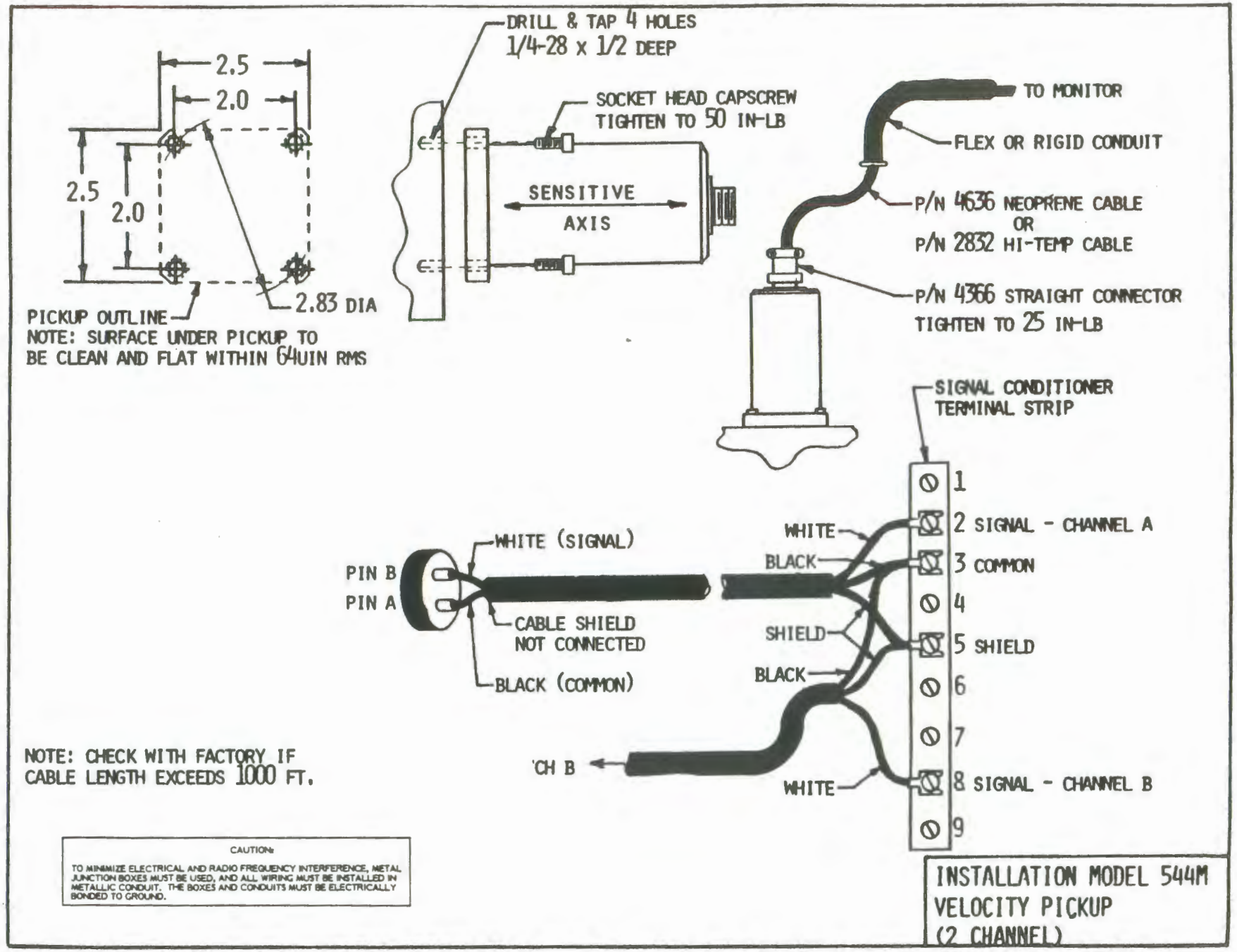
CAUTION:

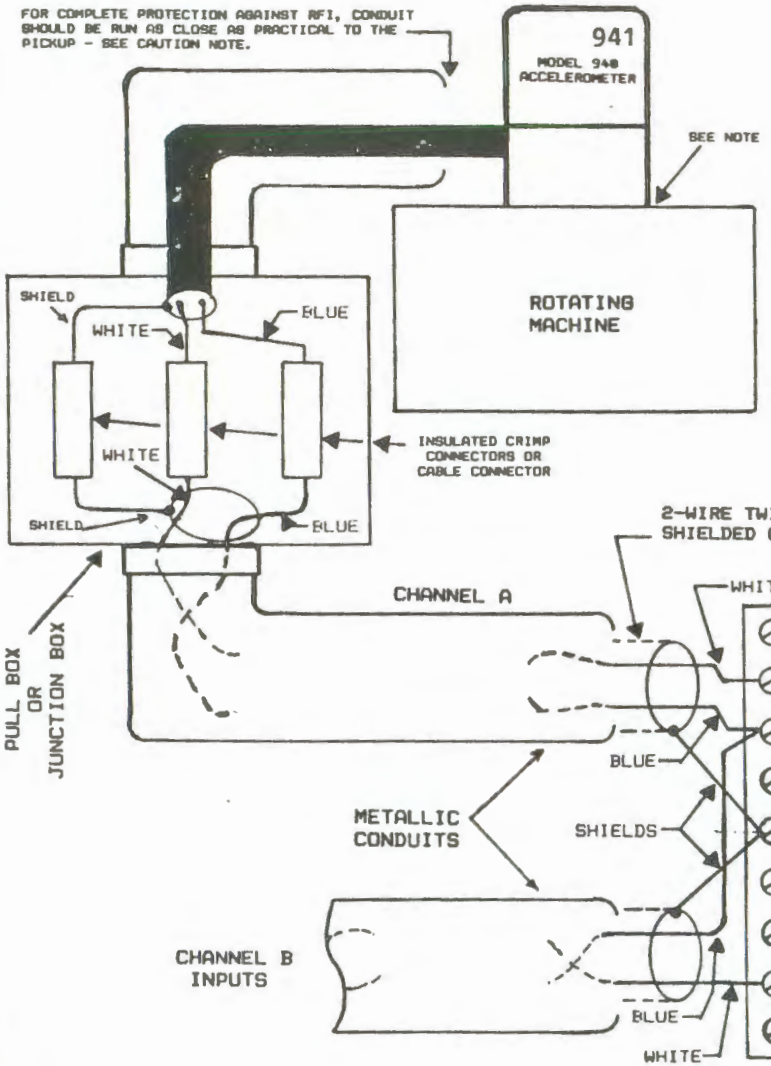
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.

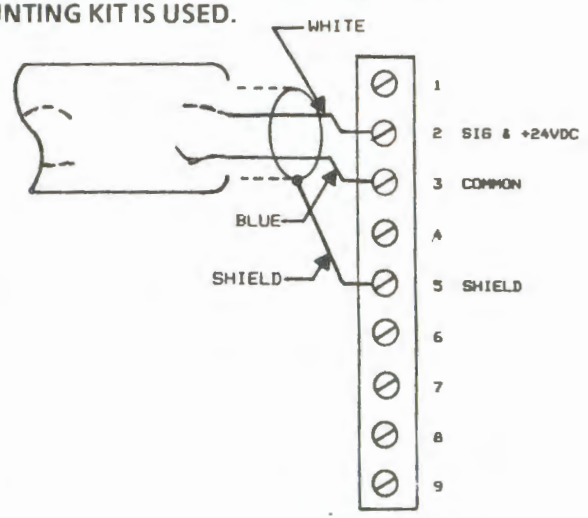
RELAY EXP BOX WIRING


MONITOR REAR VIEW
SIGNAL CONDITIONER NUMBERING
CH. 1 2 3 4 5 15
FROM PICKUPS
CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.
SIGNAL CONDITIONER NUMBERING


2.5
2.0
2.5
2.0
2.83 DIA
PICKUP OUTLINE
NOTE: SURFACE UNDER PICKUP TO BE CLEAN AND FLAT WITHIN 64 µIN RMS
DRILL & TAP 4 HOLES 1/4-28 x 1/2 DEEP
SOCKET HD CAPSCREW
SENSITIVE AXIS
TO MONITOR
FLEX OR RIGID CONDUIT
P/N 4636 NEOPRENE CABLE
OR
P/N 2832 HI-TEMP CABLE
P/N 4366 STRAIGHT CONNECTOR
NOTE: CHECK WITH FACTORY IF CABLE LENGTH EXCEEDS 1000 FT.
WHITE (SIGNAL)
PIN B
PIN A
CABLE SHIELD NOT CONNECTED
BLACK(COMMON)
WHITE
BLACK
SHIELD
1
2 SIGNAL
3 COMMON
4
5 SHIELD
6
SIGNAL CONDITIONER TERMINAL STRIP
WIRING DIAGRAM
CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.
INSTALLATION MODEL 544M
VELOCITY PICKUP (1-CH)


DRILL & TAP 4 HOLES
1/4-28 x 1/2 DEEP
2.5
2.0
2.5
2.0
2.83 DIA
PICKUP OUTLINE
NOTE: SURFACE UNDER PICKUP TO
BE CLEAN AND FLAT WITHIN 64UIN RMS
SOCKET HEAD CAPSCREW
TIGHTEN TO 50 IN-LB
SENSITIVE
AXIS
TO MONITOR
FLEX OR RIGID CONDUIT
P/N 4636 NEOPRENE CABLE
OR
P/N 2832 HI-TEMP CABLE
P/N 4366 STRAIGHT CONNECTOR
TIGHTEN TO 25 IN-LB
SIGNAL CONDITIONER
TERMINAL STRIP
PIN B
PIN A
WHITE (SIGNAL)
CABLE SHIELD
NOT CONNECTED
BLACK (COMMON)
WHITE
BLACK
SHIELD
BLACK
CH B
WHITE
1
2 SIGNAL - CHANNEL A
3 COMMON
4
5 SHIELD
6
7
8 SIGNAL - CHANNEL B
9
NOTE: CHECK WITH FACTORY IF
CABLE LENGTH EXCEEDS 1000 FT.
CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.
INSTALLATION MODEL 544M
VELOCITY PICKUP
(2 CHANNEL)





CAUTION:

TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.

WIRING INSTRUCTIONS

NOTE:

SEE INSTALLATION INSTRUCTION SHEET (IRD I/N 30025) FOR DETAILS ON MODEL 940 ACCELEROMETER INSTALLATION.

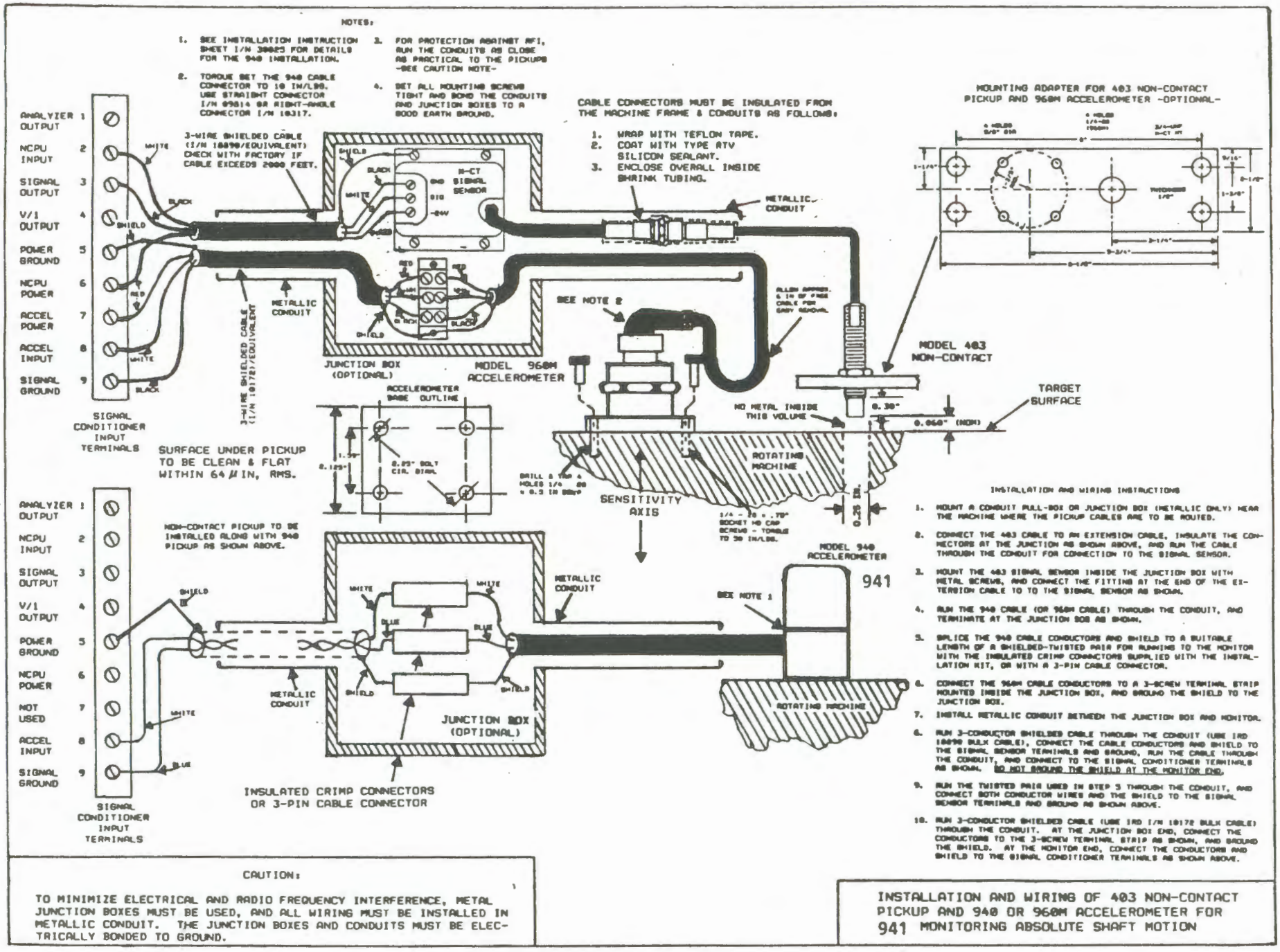
SEE INSTALLATION DETAILS ,I/N 32584, FOR MODEL 941 ACCELEROMETER.

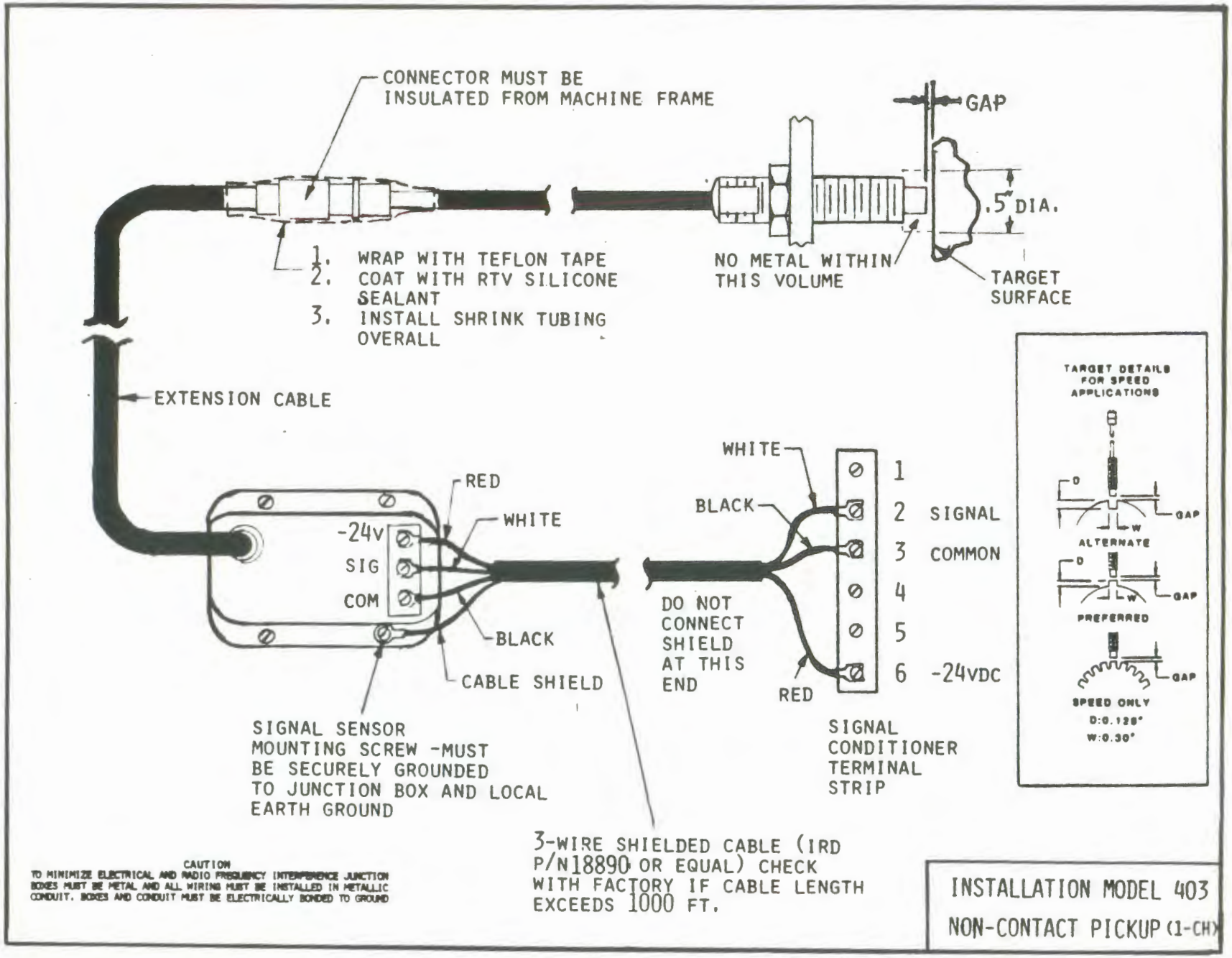
WIRING FROM THE 940 ACCELEROMETER(S) TO THE MONITOR IS INSTALLED AS FOLLOWS: 941

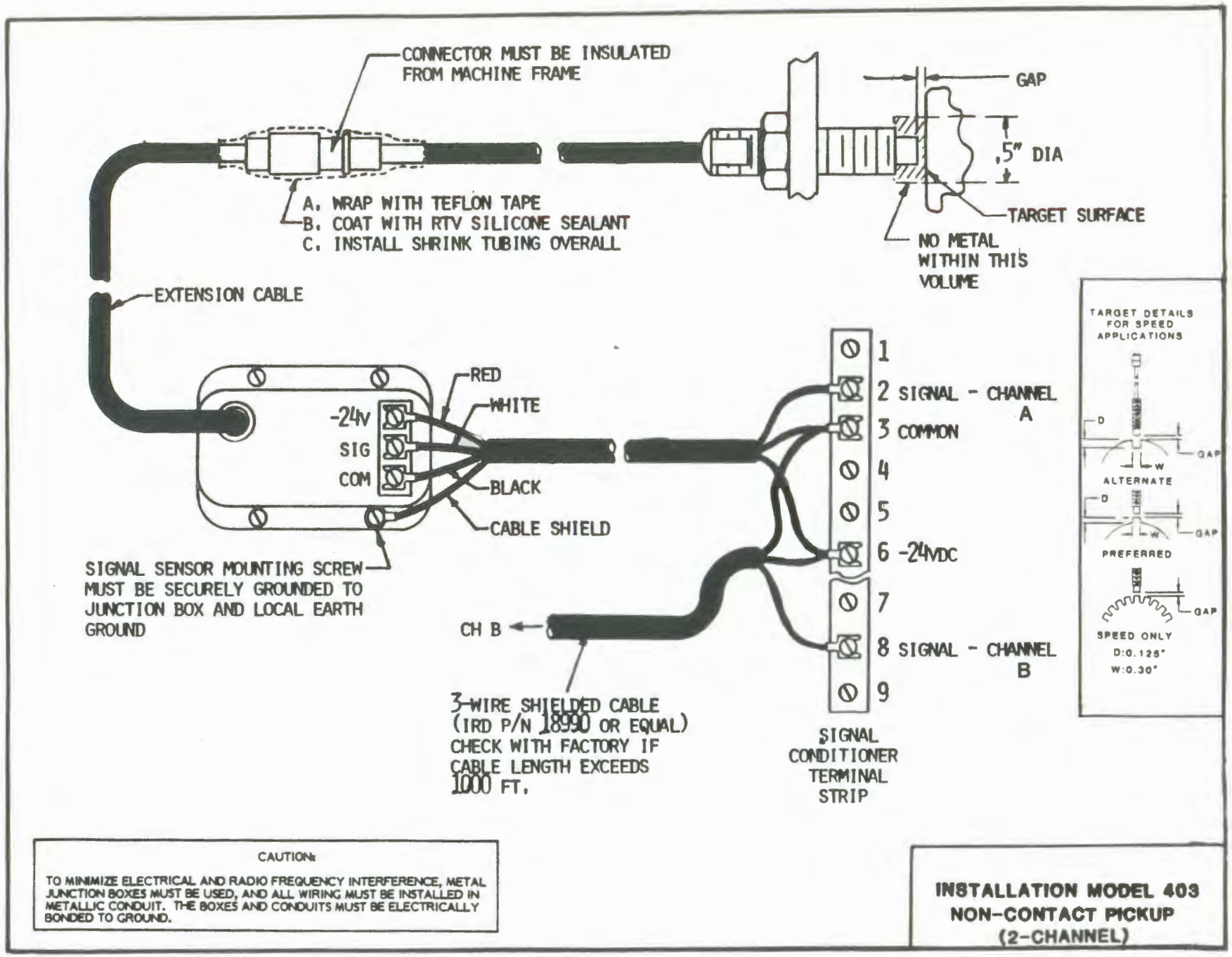
1. MOUNT A CONDUIT PULL-BOX OR JUNCTION BOX NEAR THE MACHINE WHERE THE PICKUP CABLE IS ROUTED. TERMINATE THE PICKUP CABLE INSIDE THE BOX. SPLICE THE CONDUCTORS AND SHIELD WIRE TO TWISTED-SHILDED PAIRS WITH THE INSULATED CRIMP CONNECTORS SUPPLIED IN THE INSTALLATION KIT, OR WITH AN OPTIONAL 3-PIN CABLE CONNECTOR.
2. INSTALL METALLIC CONDUIT BETWEEN THE BOX AND THE MONITOR, AND ROUTE THE TWISTED PAIRS INSIDE THE CONDUIT.
3. CONNECT THE SIGNAL-POWER, COMMON, AND SHIELD WIRES TO THE MONITOR TERMINALS AS SHOWN BELOW.

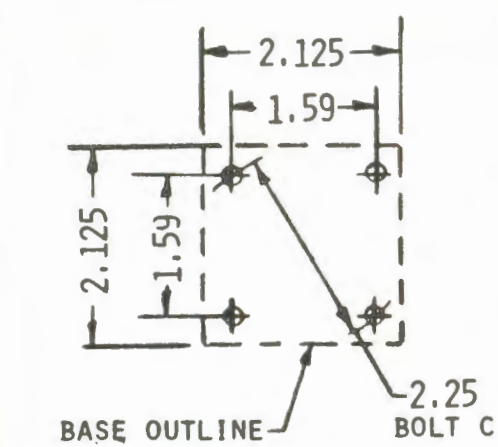
SHIELD WIRES ARE NOT TO BE CONNECTED IF THE CLAMP MOUNTING KIT IS USED.

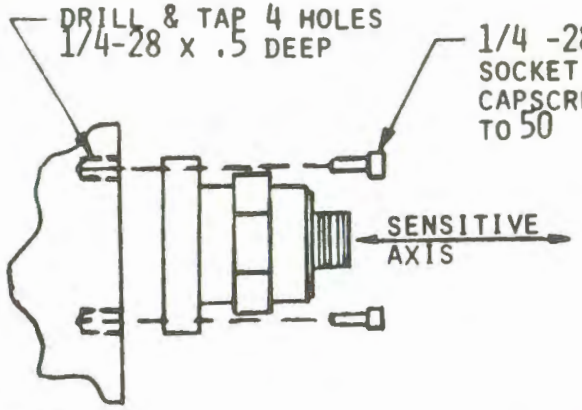
INSTALLATION GUIDE, MODEL 940 ACCELEROMETER
941
FOR ONE OR TWO CHANNELS


NOTES:
1. SEE INSTALLATION INSTRUCTION SHEET I/N 30823 FOR DETAILS FOR THE 940 INSTALLATION.
2. TORQUE SET THE 940 CABLE CONNECTOR TO 10 IN/LBS. USE STRAIGHT CONNECTOR I/N 09814 OR RIGHT-ANGLE CONNECTOR I/N 10317.
3. FOR PROTECTION AGAINST RFI, RUN THE CONDUITS AS CLOSE AS PRACTICAL TO THE PICKUPS -SEE CAUTION NOTE-
4. SET ALL MOUNTING SCREWS TIGHT AND BOND THE CONDUITS AND JUNCTION BOXES TO A GOOD EARTH GROUND.
CABLE CONNECTORS MUST BE INSULATED FROM THE MACHINE FRAME & CONDUITS AS FOLLOWS:
1. WRAP WITH TEFLON TAPE.
2. COAT WITH TYPE RTV SILICON SEALANT.
3. ENCLOSE OVERALL INSIDE SHRINK TUBING.
MOUNTING ADAPTER FOR 403 NON-CONTACT PICKUP AND 960M ACCELEROMETER -OPTIONAL-
ANALYZER OUTPUT 1
NCPU INPUT 2
SIGNAL OUTPUT 3
V/I OUTPUT 4
POWER GROUND 5
NCPU POWER 6
ACCEL POWER 7
ACCEL INPUT 8
SIGNAL GROUND 9
3-WIRE SHIELDED CABLE (I/N 18090/EQUIVALENT) CHECK WITH FACTORY IF CABLE EXCEEDS 2000 FEET.
M-CT SIGNAL SENSOR
METALLIC CONDUIT
JUNCTION BOX (OPTIONAL)
MODEL 960M ACCELEROMETER
SEE NOTE 2
MODEL 403 NON-CONTACT
TARGET SURFACE
NO METAL INSIDE THIS VOLUME
0.060" (NOM)
ACCELEROMETER BASE OUTLINE
SURFACE UNDER PICKUP TO BE CLEAN & FLAT WITHIN 64 μ IN, RMS.
SENSITIVITY AXIS
ROTATING MACHINE
0.25 IN.
SIGNAL CONDITIONER INPUT TERMINALS
NON-CONTACT PICKUP TO BE INSTALLED ALONG WITH 940 PICKUP AS SHOWN ABOVE.
MODEL 940 ACCELEROMETER
941
SEE NOTE 1
JUNCTION BOX (OPTIONAL)
INSULATED CRIMP CONNECTORS OR 3-PIN CABLE CONNECTOR
NOT USED
INSTALLATION AND WIRING INSTRUCTIONS
1. MOUNT A CONDUIT PULL-BOX OR JUNCTION BOX (METALLIC ONLY) NEAR THE MACHINE WHERE THE PICKUP CABLES ARE TO BE ROUTED.
2. CONNECT THE 403 CABLE TO AN EXTENSION CABLE, INSULATE THE CONNECTORS AT THE JUNCTION AS SHOWN ABOVE, AND RUN THE CABLE THROUGH THE CONDUIT FOR CONNECTION TO THE SIGNAL SENSOR.
3. MOUNT THE 403 SIGNAL SENSOR INSIDE THE JUNCTION BOX WITH METAL SCREWS, AND CONNECT THE FITTING AT THE END OF THE EXTENSION CABLE TO TO THE SIGNAL SENSOR AS SHOWN.
4. RUN THE 940 CABLE (OR 960M CABLE) THROUGH THE CONDUIT, AND TERMINATE AT THE JUNCTION BOX AS SHOWN.
5. SPLICE THE 940 CABLE CONDUCTORS AND SHIELD TO A SUITABLE LENGTH OF A SHIELDED-TWISTED PAIR FOR RUNNING TO THE MONITOR WITH THE INSULATED CRIMP CONNECTORS SUPPLIED WITH THE INSTALLATION KIT, OR WITH A 3-PIN CABLE CONNECTOR.
6. CONNECT THE 960M CABLE CONDUCTORS TO A 3-SCREW TERMINAL STRIP MOUNTED INSIDE THE JUNCTION BOX, AND GROUND THE SHIELD TO THE JUNCTION BOX.
7. INSTALL METALLIC CONDUIT BETWEEN THE JUNCTION BOX AND MONITOR.
8. RUN 3-CONDUCTOR SHIELDED CABLE THROUGH THE CONDUIT (USE IRD 18090 BULK CABLE), CONNECT THE CABLE CONDUCTORS AND SHIELD TO THE SIGNAL SENSOR TERMINALS AND GROUND, RUN THE CABLE THROUGH THE CONDUIT, AND CONNECT TO THE SIGNAL CONDITIONER TERMINALS AS SHOWN. DO NOT GROUND THE SHIELD AT THE MONITOR END.
9. RUN THE TWISTED PAIR USED IN STEP 5 THROUGH THE CONDUIT, AND CONNECT BOTH CONDUCTOR WIRES AND THE SHIELD TO THE SIGNAL SENSOR TERMINALS AND GROUND AS SHOWN ABOVE.
10. RUN 3-CONDUCTOR SHIELDED CABLE (USE IRD I/N 18178 BULK CABLE) THROUGH THE CONDUIT. AT THE JUNCTION BOX END, CONNECT THE CONDUCTORS TO THE 3-SCREW TERMINAL STRIP AS SHOWN, AND GROUND THE SHIELD. AT THE MONITOR END, CONNECT THE CONDUCTORS AND SHIELD TO THE SIGNAL CONDITIONER TERMINALS AS SHOWN ABOVE.
CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE JUNCTION BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.
INSTALLATION AND WIRING OF 403 NON-CONTACT PICKUP AND 940 OR 960M ACCELEROMETER FOR 941 MONITORING ABSOLUTE SHAFT MOTION

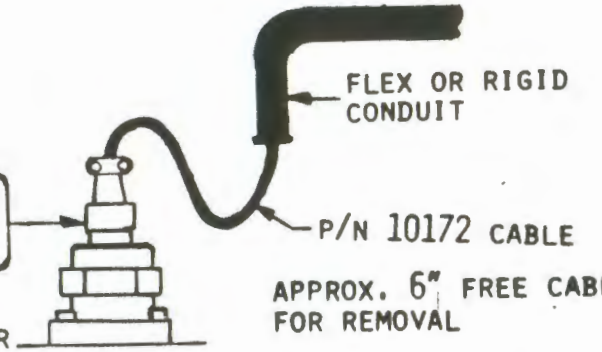

CONNECTOR MUST BE INSULATED FROM MACHINE FRAME
GAP
.5" DIA.
1. WRAP WITH TEFLON TAPE
2. COAT WITH RTV SILICONE SEALANT
3. INSTALL SHRINK TUBING OVERALL
NO METAL WITHIN THIS VOLUME
TARGET SURFACE
EXTENSION CABLE
TARGET DETAILS FOR SPEED APPLICATIONS
D
GAP
W
ALTERNATE
PREFERRED
SPEED ONLY
D:0.125"
W:0.30"
RED
WHITE
-24v
SIG
COM
BLACK
CABLE SHIELD
WHITE
BLACK
1
2 SIGNAL
3 COMMON
4
5
6 -24VDC
DO NOT CONNECT SHIELD AT THIS END
RED
SIGNAL SENSOR MOUNTING SCREW -MUST BE SECURELY GROUNDED TO JUNCTION BOX AND LOCAL EARTH GROUND
SIGNAL CONDITIONER TERMINAL STRIP
3-WIRE SHIELDED CABLE (IRD P/N18890 OR EQUAL) CHECK WITH FACTORY IF CABLE LENGTH EXCEEDS 1000 FT.
CAUTION
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE JUNCTION BOXES MUST BE METAL AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. BOXES AND CONDUIT MUST BE ELECTRICALLY BONDED TO GROUND
INSTALLATION MODEL 403
NON-CONTACT PICKUP (1-CH)


CONNECTOR MUST BE INSULATED FROM MACHINE FRAME
GAP
.5" DIA
A. WRAP WITH TEFLON TAPE
B. COAT WITH RTV SILICONE SEALANT
C. INSTALL SHRINK TUBING OVERALL
TARGET SURFACE
NO METAL WITHIN THIS VOLUME
EXTENSION CABLE
TARGET DETAILS FOR SPEED APPLICATIONS
D
W
GAP
ALTERNATE
PREFERRED
SPEED ONLY
D:0.125"
W:0.30"
RED
WHITE
-24V
SIG
COM
BLACK
CABLE SHIELD
SIGNAL SENSOR MOUNTING SCREW MUST BE SECURELY GROUNDED TO JUNCTION BOX AND LOCAL EARTH GROUND
1
2 SIGNAL - CHANNEL A
3 COMMON
4
5
6 -24VDC
7
8 SIGNAL - CHANNEL B
9
CH B
3-WIRE SHIELDED CABLE (IRD P/N 18990 OR EQUAL) CHECK WITH FACTORY IF CABLE LENGTH EXCEEDS 1000 FT.
SIGNAL CONDITIONER TERMINAL STRIP
CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.
INSTALLATION MODEL 403
NON-CONTACT PICKUP
(2-CHANNEL)





NOTE: SURFACE UNDER PICKUP TO BE CLEAN AND FLAT WITHIN 64 μIN RMS

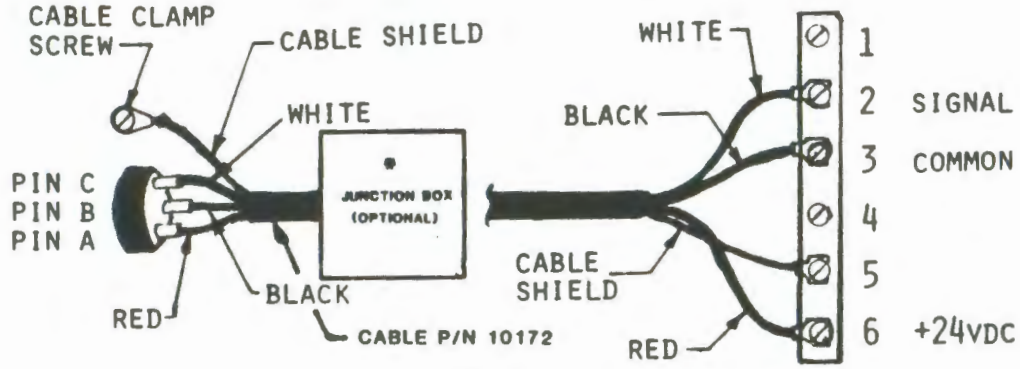


P/N 9814 STRAIGHT CONNECTOR
OR
P/N 10317 RT. ANGLE CONNECTOR

NOTE: TIGHTEN CABLE CONNECTOR TO 10 IN LB.

NOTE * OPTIONAL

USE CABLE P/N 10172 FROM PICKUP TO JUNCTION BOX, AND CABLE P/N 18890 (3-WIRE); 09374 (4-WIRE); 05626 (12- WIRE); OR 05546 (18-WIRE) TO SIGNAL CONDITIONER.



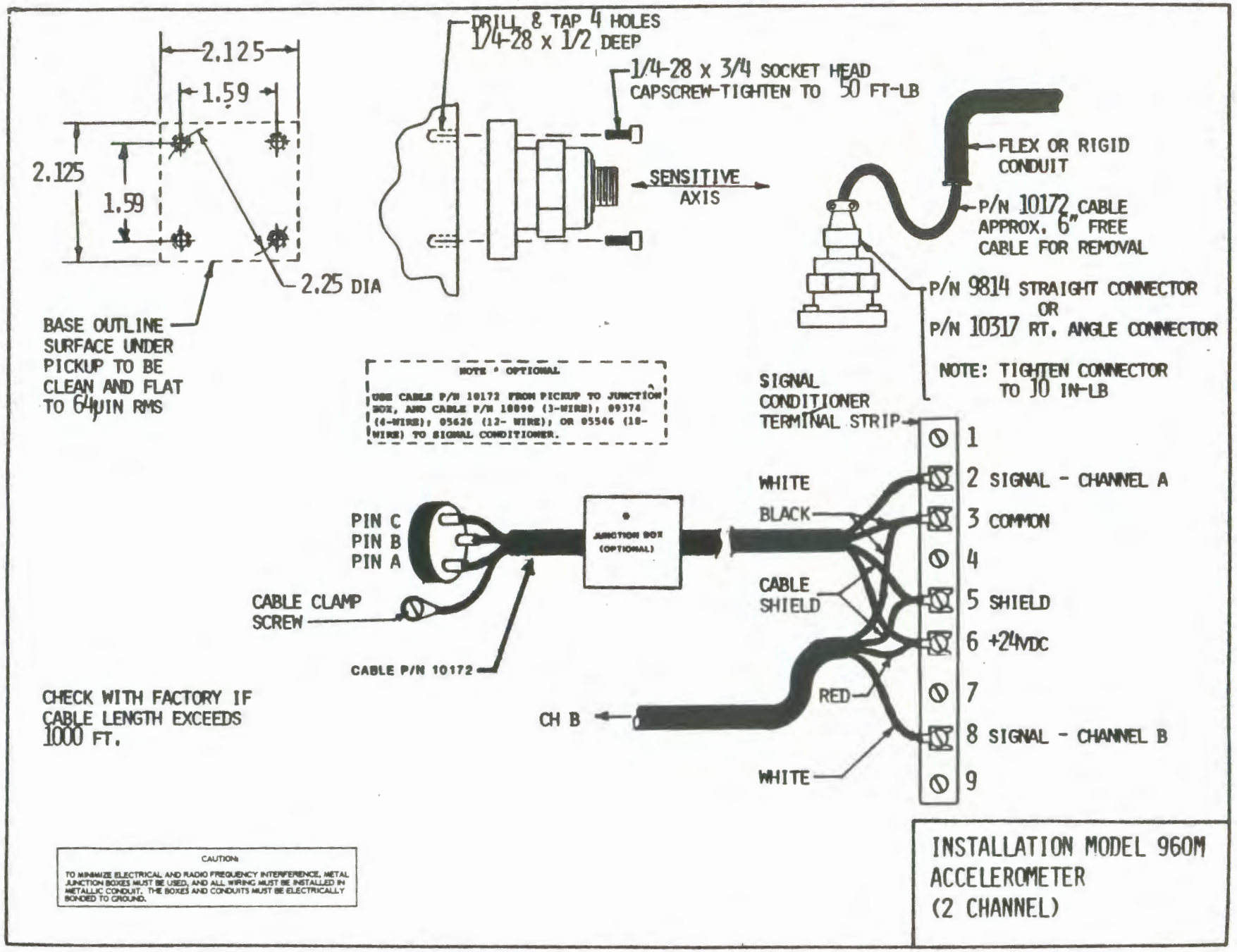
WIRING DIAGRAM

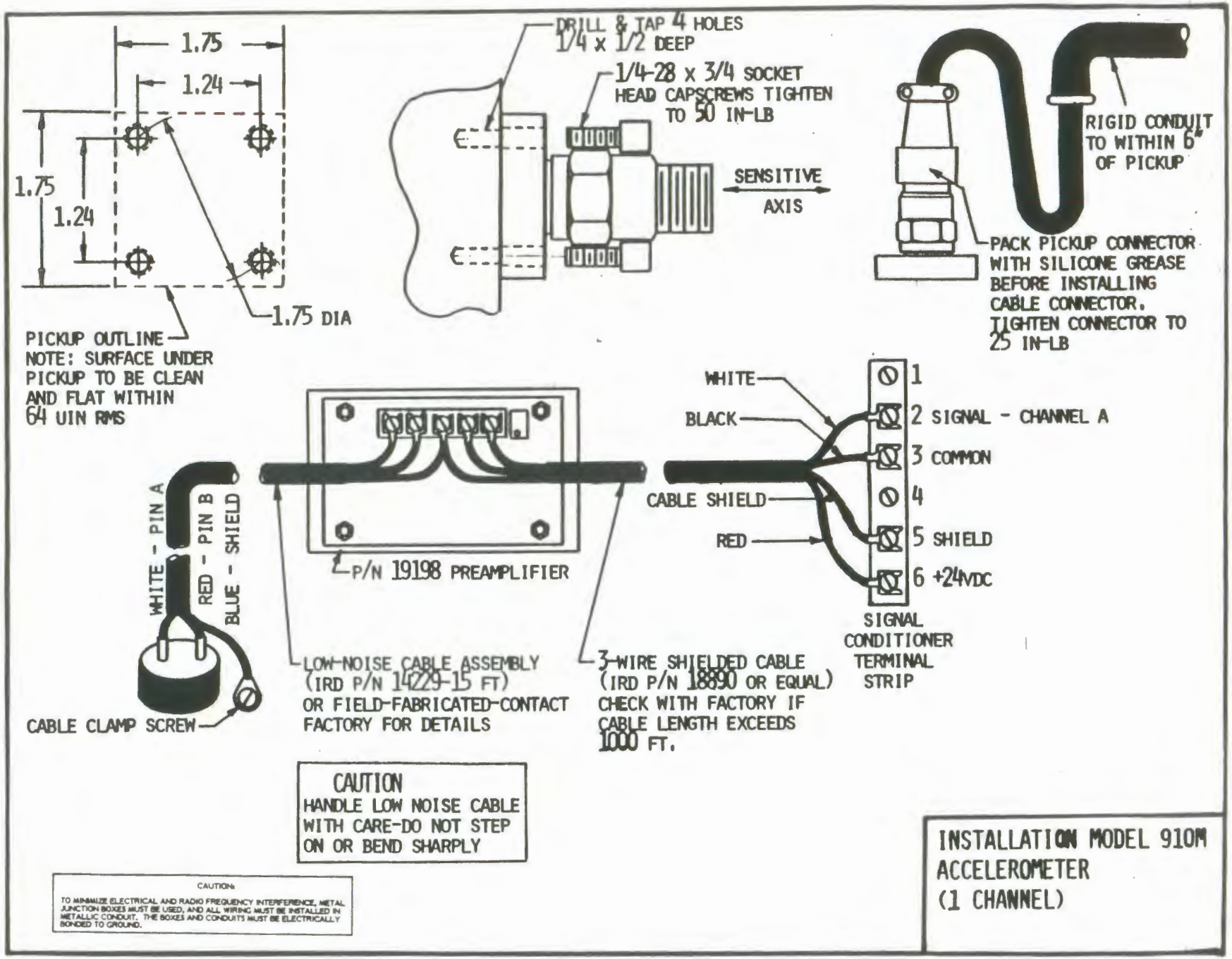
SIGNAL CONDITIONER TERMINAL STRIP

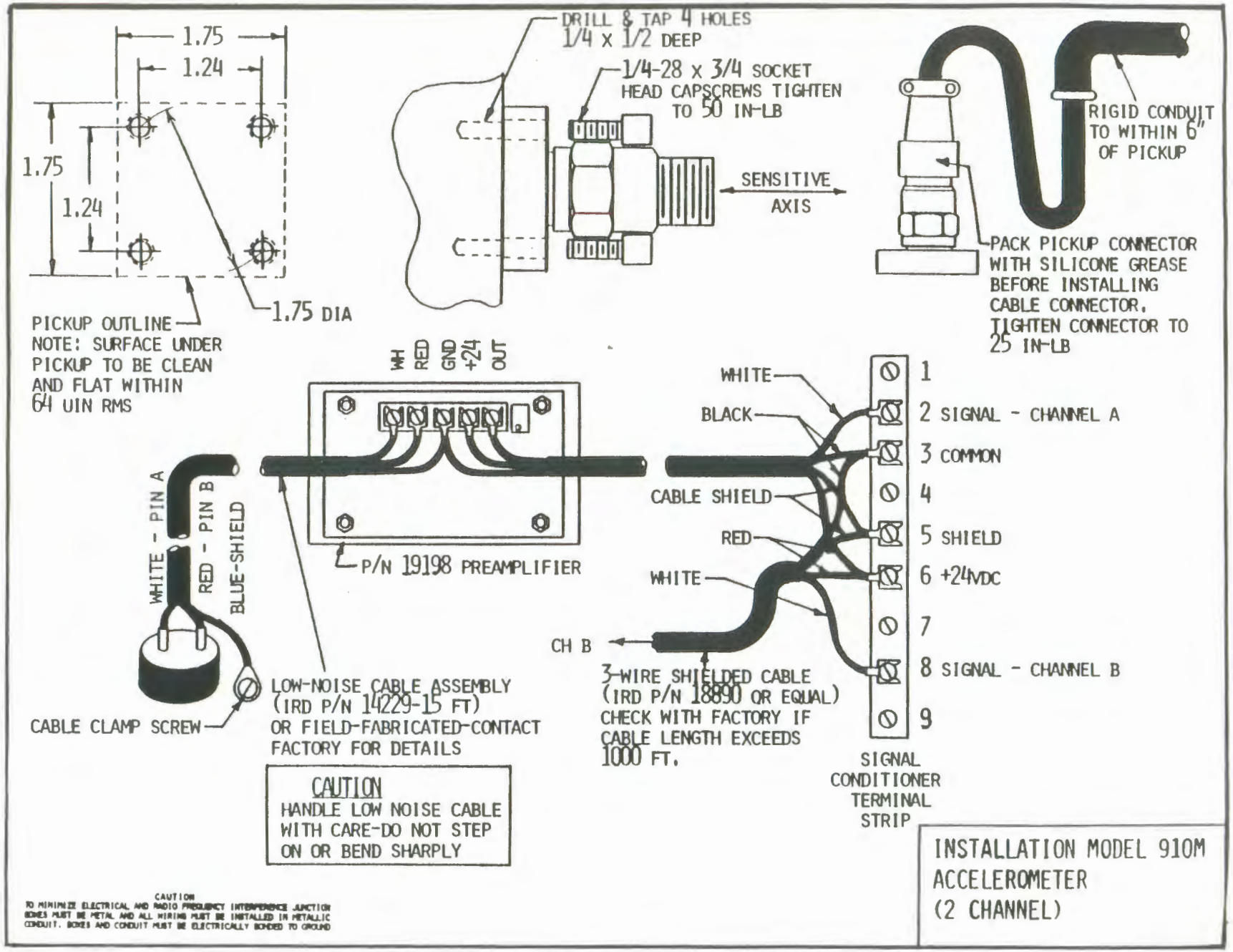
CHECK WITH FACTORY IF CABLE LENGTH EXCEEDS 1000 FT.

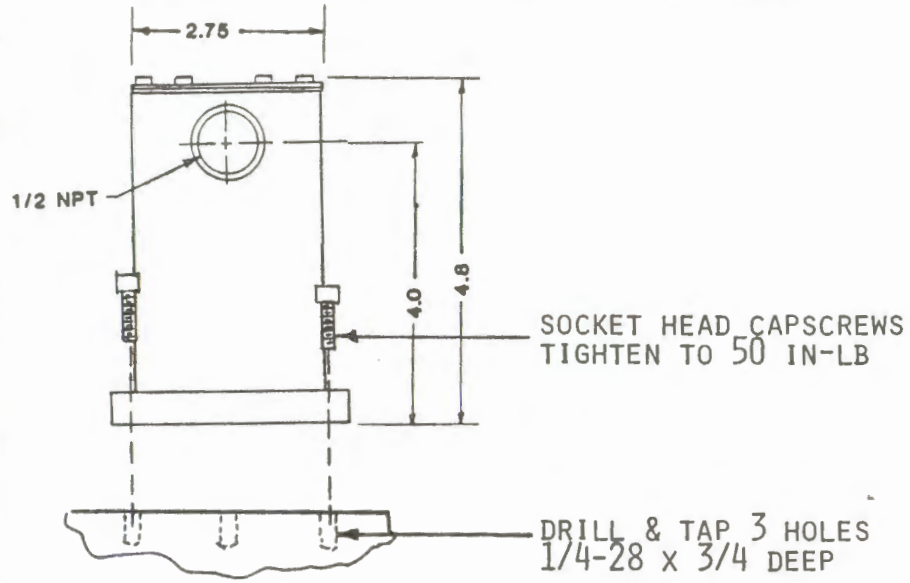
CAUTION
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE JUNCTION BOXES MUST BE METAL AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. BOXES AND CONDUIT MUST BE ELECTRICALLY BONDED TO GROUND

INSTALLATION MODEL 960M
ACCELEROMETER (1-CH)

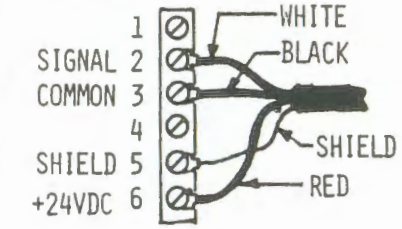

2.125
1.59
2.125
1.59
2.25 DIA
BASE OUTLINE SURFACE UNDER PICKUP TO BE CLEAN AND FLAT TO 64μIN RMS
DRILL & TAP 4 HOLES 1/4-28 x 1/2 DEEP
1/4-28 x 3/4 SOCKET HEAD CAPSCREW-TIGHTEN TO 50 FT-LB
SENSITIVE AXIS
FLEX OR RIGID CONDUIT
P/N 10172 CABLE APPROX. 6" FREE CABLE FOR REMOVAL
P/N 9814 STRAIGHT CONNECTOR OR P/N 10317 RT. ANGLE CONNECTOR
NOTE: TIGHTEN CONNECTOR TO 10 IN-LB
NOTE * OPTIONAL
USE CABLE P/N 10172 FROM PICKUP TO JUNCTION BOX, AND CABLE P/N 10890 (3-WIRE); 09376 (4-WIRE); 05626 (12- WIRE); OR 05546 (18-WIRE) TO SIGNAL CONDITIONER.
SIGNAL CONDITIONER TERMINAL STRIP
PIN C
PIN B
PIN A
CABLE CLAMP SCREW
JUNCTION BOX (OPTIONAL)
CABLE P/N 10172
CHECK WITH FACTORY IF CABLE LENGTH EXCEEDS 1000 FT.
CH B
WHITE
BLACK
CABLE SHIELD
RED
WHITE
1
2 SIGNAL - CHANNEL A
3 COMMON
4
5 SHIELD
6 +24VDC
7
8 SIGNAL - CHANNEL B
9
CAUTION
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.
INSTALLATION MODEL 960M ACCELEROMETER (2 CHANNEL)


1.75
1.24
1.75
1.24
1.75 DIA
PICKUP OUTLINE
NOTE: SURFACE UNDER PICKUP TO BE CLEAN AND FLAT WITHIN 64 UIN RMS
DRILL & TAP 4 HOLES 1/4 x 1/2 DEEP
1/4-28 x 3/4 SOCKET HEAD CAPSCREWS TIGHTEN TO 50 IN-LB
SENSITIVE AXIS
RIGID CONDUIT TO WITHIN 6" OF PICKUP
PACK PICKUP CONNECTOR WITH SILICONE GREASE BEFORE INSTALLING CABLE CONNECTOR. TIGHTEN CONNECTOR TO 25 IN-LB
WHITE - PIN A
RED - PIN B
BLUE - SHIELD
CABLE CLAMP SCREW
P/N 19198 PREAMPLIFIER
WHITE
BLACK
CABLE SHIELD
RED
1
2 SIGNAL - CHANNEL A
3 COMMON
4
5 SHIELD
6 +24VDC
SIGNAL CONDITIONER TERMINAL STRIP
LOW-NOISE CABLE ASSEMBLY (IRD P/N 14229-15 FT) OR FIELD-FABRICATED-CONTACT FACTORY FOR DETAILS
3-WIRE SHIELDED CABLE (IRD P/N 18890 OR EQUAL) CHECK WITH FACTORY IF CABLE LENGTH EXCEEDS 1000 FT.
CAUTION
HANDLE LOW NOISE CABLE WITH CARE-DO NOT STEP ON OR BEND SHARPLY
CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.
INSTALLATION MODEL 910M ACCELEROMETER (1 CHANNEL)

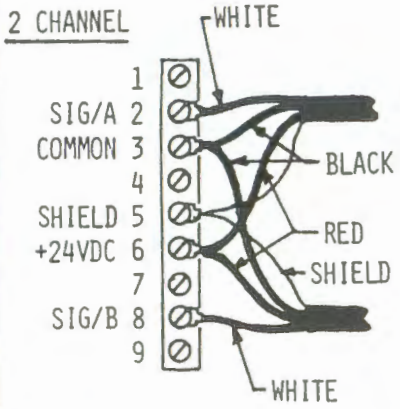

1.75
1.24
1.75
1.24
1.75 DIA
PICKUP OUTLINE
NOTE: SURFACE UNDER PICKUP TO BE CLEAN AND FLAT WITHIN 64 UIN RMS
DRILL & TAP 4 HOLES 1/4 X 1/2 DEEP
1/4-28 x 3/4 SOCKET HEAD CAPSCREWS TIGHTEN TO 50 IN-LB
SENSITIVE AXIS
RIGID CONDUIT TO WITHIN 6" OF PICKUP
PACK PICKUP CONNECTOR WITH SILICONE GREASE BEFORE INSTALLING CABLE CONNECTOR. TIGHTEN CONNECTOR TO 25 IN-LB
WHT RED GND +24 OUT
P/N 19198 PREAMPLIFIER
WHITE - PIN A
RED - PIN B
BLUE-SHIELD
CABLE CLAMP SCREW
LOW-NOISE CABLE ASSEMBLY (IRD P/N 14229-15 FT) OR FIELD-FABRICATED-CONTACT FACTORY FOR DETAILS
WHITE
BLACK
CABLE SHIELD
RED
WHITE
CH B
3-WIRE SHIELDED CABLE (IRD P/N 18890 OR EQUAL) CHECK WITH FACTORY IF CABLE LENGTH EXCEEDS 1000 FT.
1
2 SIGNAL - CHANNEL A
3 COMMON
4
5 SHIELD
6 +24VDC
7
8 SIGNAL - CHANNEL B
9
SIGNAL CONDITIONER TERMINAL STRIP
CAUTION
HANDLE LOW NOISE CABLE WITH CARE-DO NOT STEP ON OR BEND SHARPLY
CAUTION
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE JUNCTION BOXES MUST BE METAL AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. BOXES AND CONDUIT MUST BE ELECTRICALLY BONDED TO GROUND
INSTALLATION MODEL 910M ACCELEROMETER (2 CHANNEL)

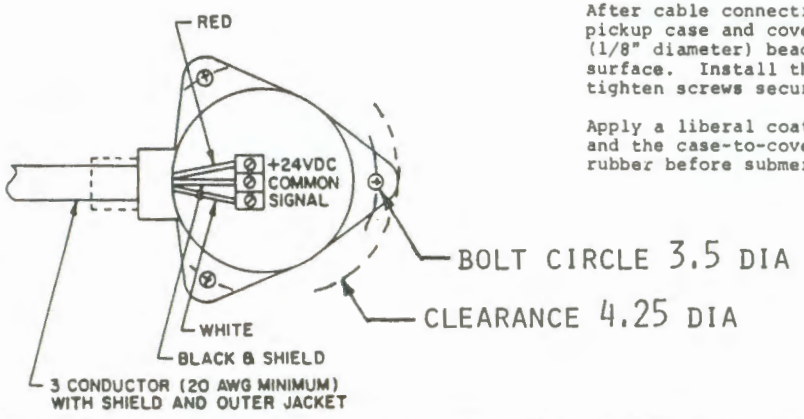


1 CHANNEL



2 CHANNEL





INSTALLATION NOTES

(1) Drill and tap machine mounting surface. See outline drawing on this sheet for hole location. Mounting bolts should be 1/4-28, stainless steel.

(2) The seal fitting supplied with the pickup will provide a dust tight and weatherproof installation when used with cable having .187-.250 inch outside diameter. The body of the seal fitting is aluminum and should not be used where corrosive liquids or vapors are present.

(3) For mechanical protection of the cable, or outdoors, or in high humidity areas, or where the pickup may be hosed down, use rigid metallic conduit, liquidtight flexible conduit, or PVC plastic pipe, with suitable fittings.

Use pipe joint sealing compound on the 1/2 NPT fitting before screwing it into the pickup body. Plastic pipe tape is not recommended.

(4) The "far" end of the conduit or pipe should be protected from water induction. If local conditions are conducive to condensation buildup in conduit systems, provide appropriate condensate drains and coat the terminal strip inside the pickup with RTV silicone rubber after cables are connected.

(5) The pickup body should always be electrically grounded through the machine frame. If the pickup body is insulated from safety ground, a separate grounding arrangement should be provided using a lug under one of the mounting bolt heads, with a #12 AWG (minimum) cable to plant electrical safety ground.

(6) After making up cable connections inside the pickup, make sure the neoprene gasket and sealing surfaces of the pickup cover and the body are clean. Then install the cover and gasket securely. Do not use sealant on the gasket surfaces.

(7) If the pickup will be continually subjected to corrosive or oxidizing conditions, such as inside a cooling tower, an overall coating of Asphalt-based material is recommended for long-term protection. This coating should be applied last, to cover all exposed surfaces.

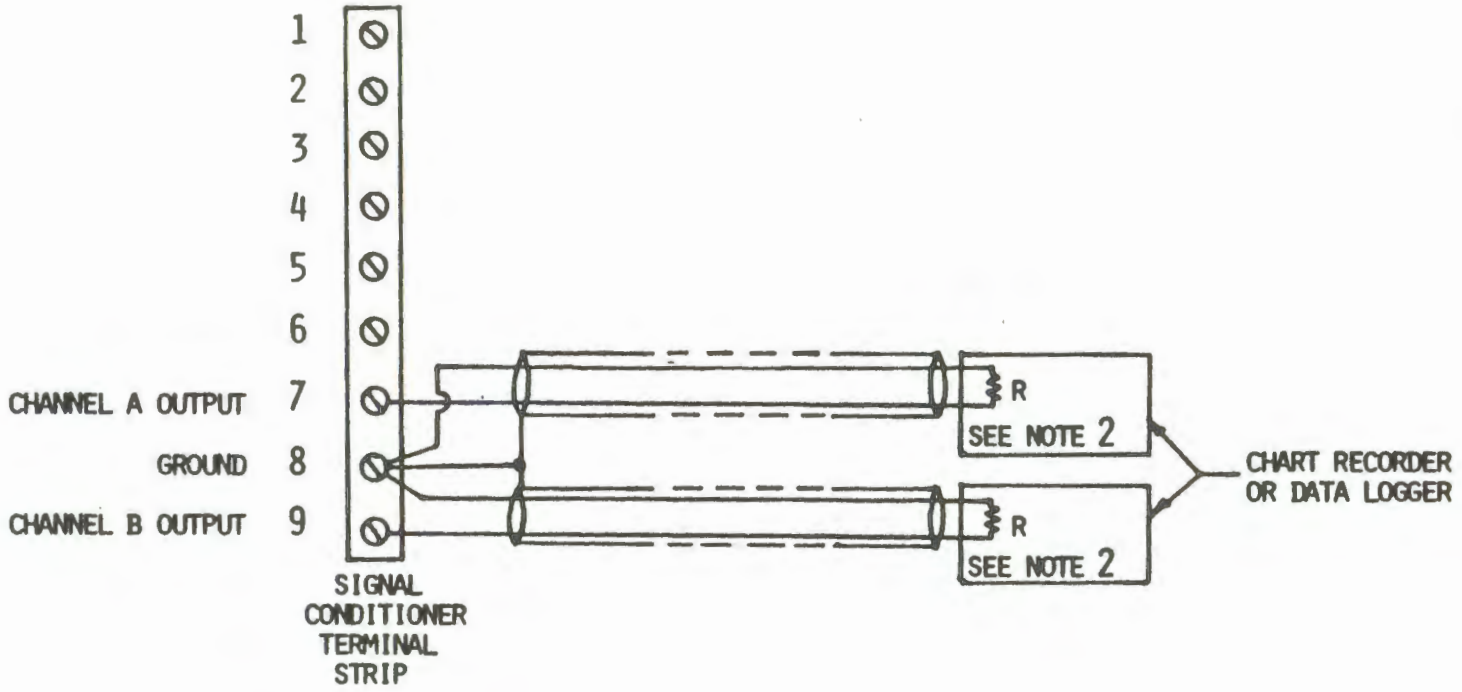
(8) If the pickup will be submerged in water, use plastic (PVC) pipe and solvent-welded fittings for the cable.

After cable connections are made, clean sealing surfaces on pickup case and cover to remove oil and grease. Apply a thin (1/8" diameter) bead of RTV silcone rubber to the case top surface. Install the cover (do not use the neoprene gasket) and tighten screws securely.

Apply a liberal coating of RTV silicone rubber over screw heads and the case-to-cover joint. Allow 24 hours to cure the silcone rubber before submerging the pickup.

CAUTION
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE JUNCTION BOXES MUST BE METAL AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. BOXES AND CONDUIT MUST BE ELECTRICALLY BONDED TO GROUND

INSTALLATION MODEL 580
VELOCITY PICKUP



NOTES: (1) WIRING AWG 16,18,20 STRANDED, SHIELDED.

(2) R = 10,000 OHM MINIMUM FOR 0-5VDC OUTPUT,
R = 300 OHM MAXIMUM FOR 4-20MADC OUTPUT.

(3) FOR WIRING TO TERMINALS 1-6, SEE THERMOCOUPLE AND RTD INSTALLATION DRAWINGS.

CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.

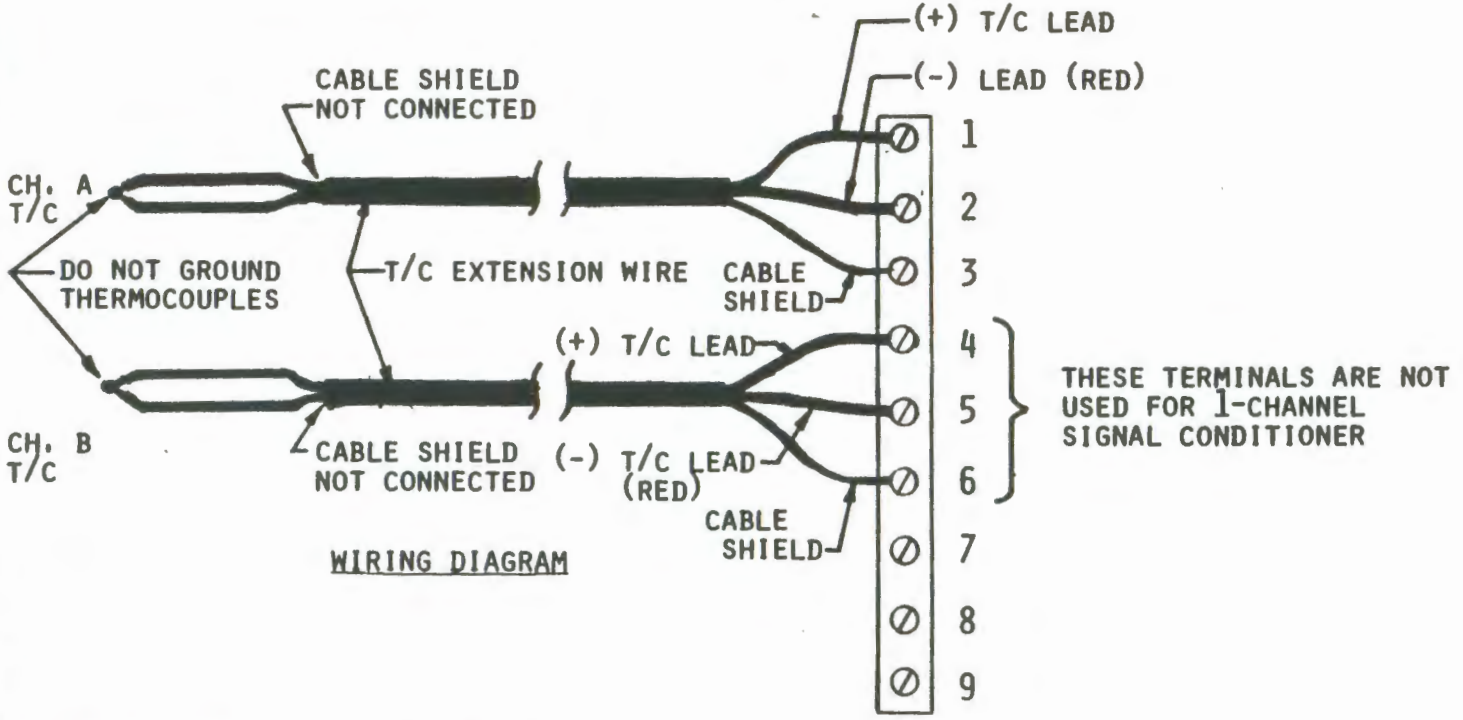
TEMPERATURE SIGNAL CONDITIONER OUTPUT WIRING (1- AND 2- CHANNEL)

INSTALLATION NOTES:

1) THE COLOR OF THE (+) POSITIVE T/C LEAD IS:

T/C TYPE	COLOR
J	WHITE
K	YELLOW
T	BLUE

2) ATTACH T/C WIRE DIRECTLY TO SCREW TERMINALS - DO NOT USE CRIMPED LUGS



WIRING DIAGRAM

CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.

SIGNAL CONDITIONER TERMINAL STRIP

INSTALLATION
TYPE J,K & T
THERMOCOUPLES

INSTALLATION NOTE

TO MINIMIZE ERROR DUE TO RESISTANCE OF FIELD WIRING, PERFORM SYSTEM ADJUSTMENT AS FOLLOWS, AFTER INSTALLATION:

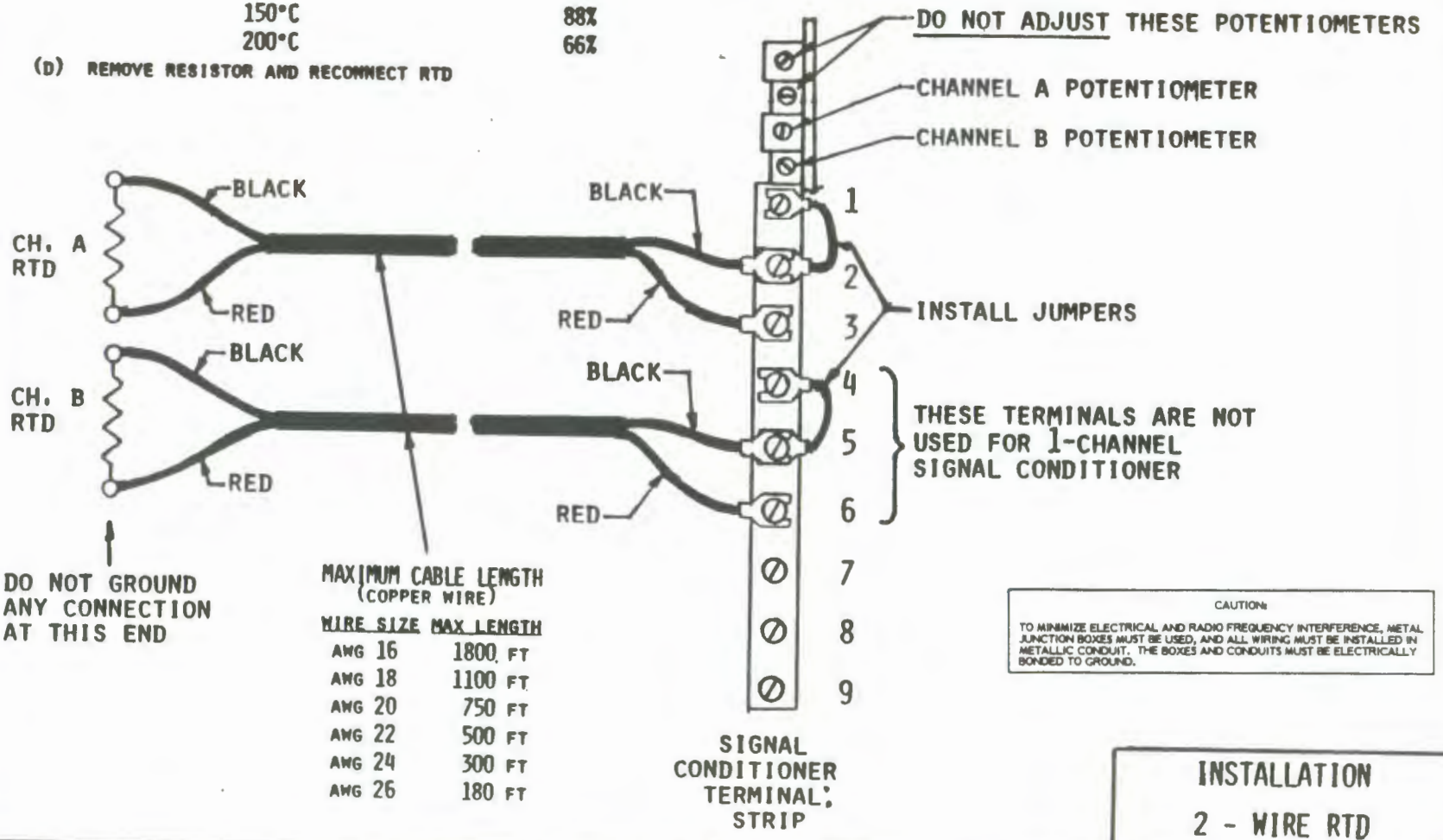
(A) DISCONNECT RTD AT SENSOR END OF CABLE

(B) TEMPORARILY CONNECT A 150 OHM ±1% 0.25 WATT RESISTOR (IRD P/N 13549 EQUAL) IN PLACE OF RTD

(C) AT REAR OF MONITOR, ADJUST POTENTIOMETER (SEE DRAWING) TO OBTAIN CORRECT READING ON THE FRONT PANEL METER SELECTED FROM THIS TABLE:

FULL SCALE RANGE OF SIGNAL CONDITIONER	PANEL METER INDICATION % OF FULL SCALE
300°F	88%
400°F	66%
150°C	88%
200°C	66%

(D) REMOVE RESISTOR AND RECONNECT RTD



MAXIMUM CABLE LENGTH (COPPER WIRE)

WIRE SIZE	MAX LENGTH
AWG 16	1800 FT
AWG 18	1100 FT
AWG 20	750 FT
AWG 22	500 FT
AWG 24	300 FT
AWG 26	180 FT

CAUTION:

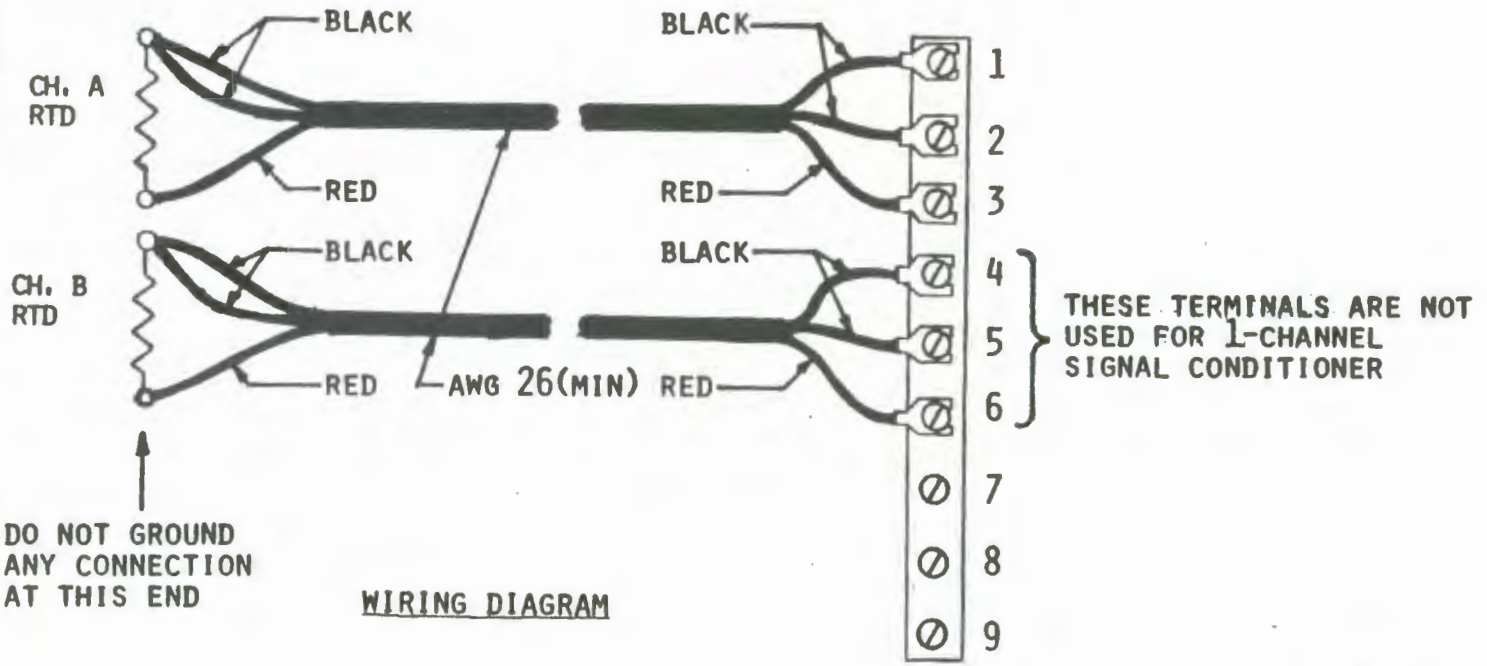
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.

INSTALLATION

2 - WIRE RTD

CAUTION:

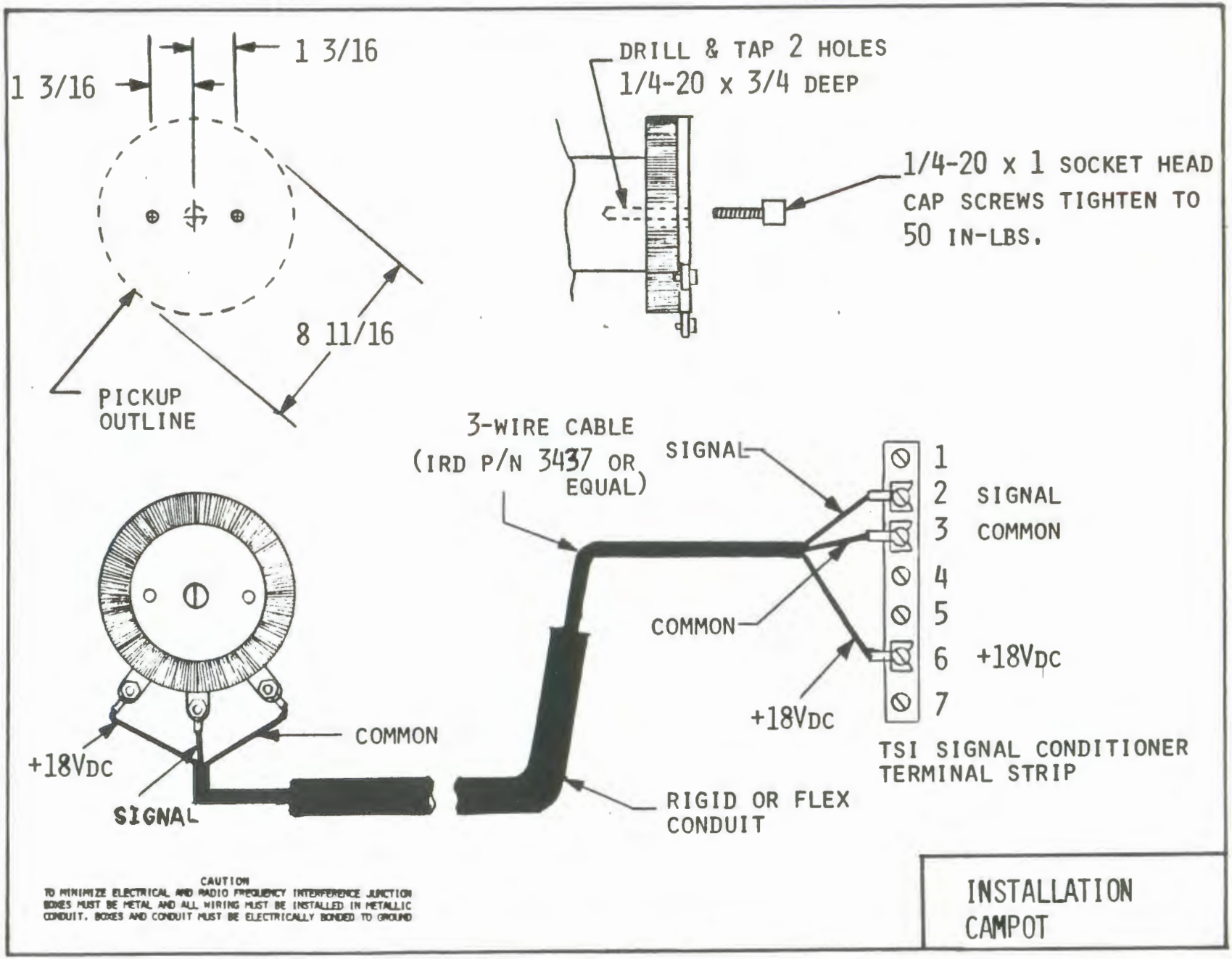
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.

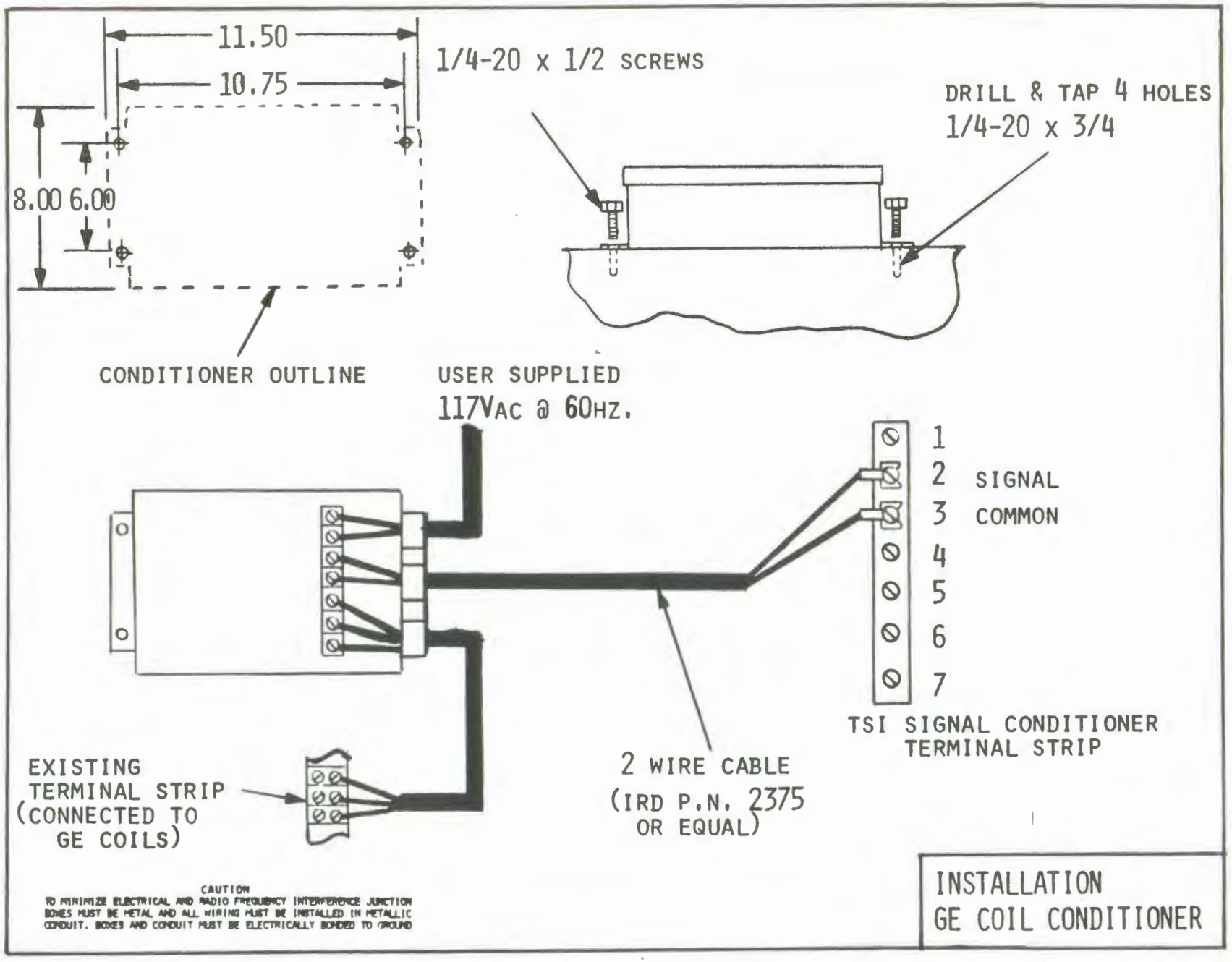


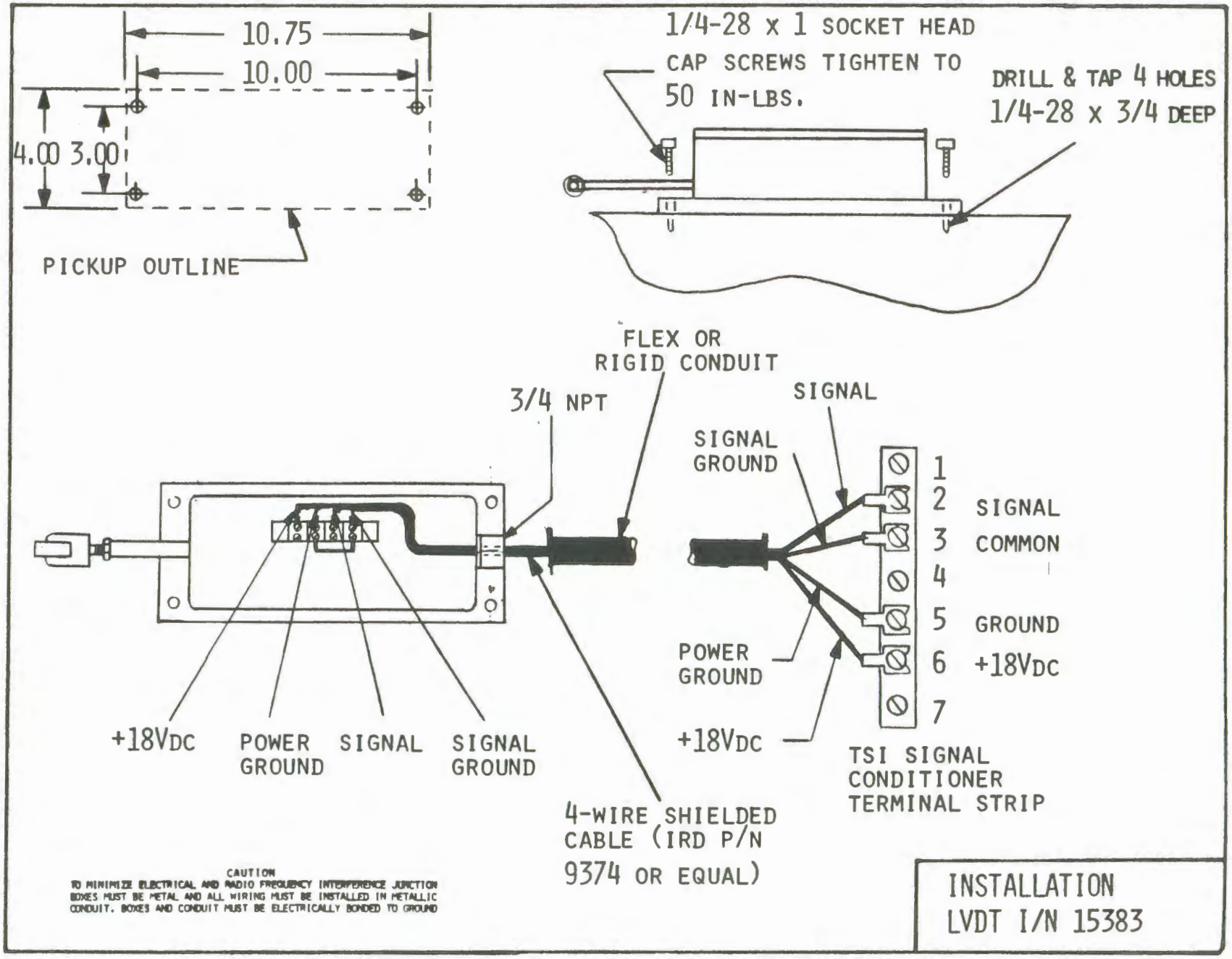
WIRING DIAGRAM

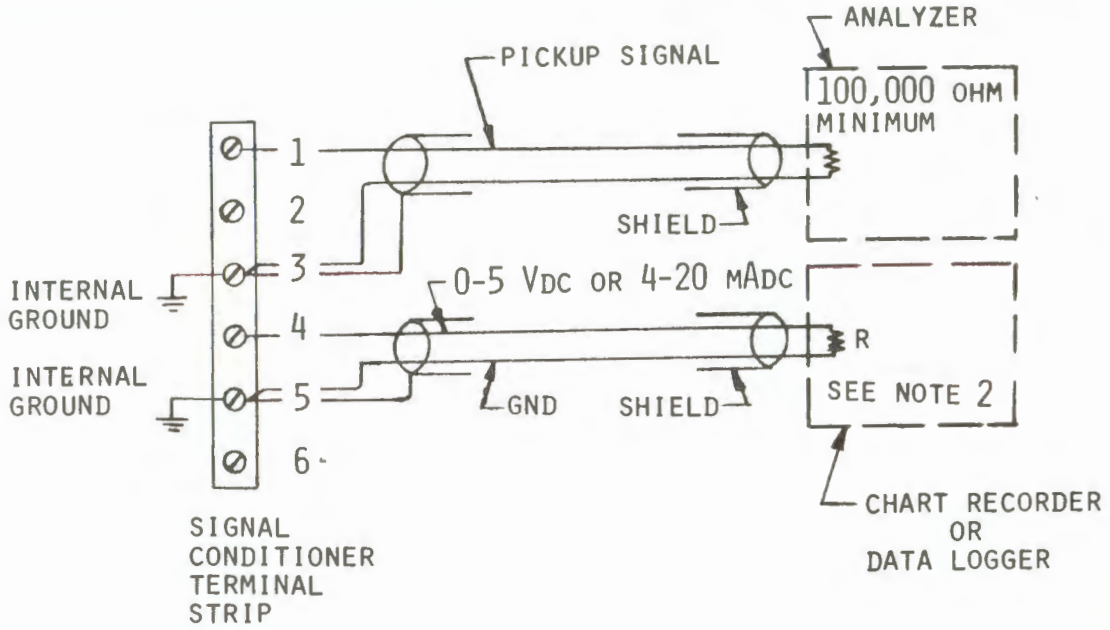
INSTALLATION

3-WIRE RTD


1 3/16
1 3/16
DRILL & TAP 2 HOLES
1/4-20 x 3/4 DEEP
1/4-20 x 1 SOCKET HEAD
CAP SCREWS TIGHTEN TO
50 IN-LBS.
8 11/16
PICKUP
OUTLINE
3-WIRE CABLE
(IRD P/N 3437 OR
EQUAL)
SIGNAL
1
2 SIGNAL
3 COMMON
4
5
6 +18VDC
7
COMMON
+18VDC
TSI SIGNAL CONDITIONER
TERMINAL STRIP
COMMON
+18VDC
SIGNAL
RIGID OR FLEX
CONDUIT
CAUTION
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE JUNCTION BOXES MUST BE METAL AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. BOXES AND CONDUIT MUST BE ELECTRICALLY BONDED TO GROUND
INSTALLATION
CAMPOT


11.50
10.75
8.00
6.00
1/4-20 x 1/2 SCREWS
DRILL & TAP 4 HOLES
1/4-20 x 3/4
CONDITIONER OUTLINE
USER SUPPLIED
117VAC @ 60HZ.
1
2
3
4
5
6
7
SIGNAL
COMMON
TSI SIGNAL CONDITIONER
TERMINAL STRIP
EXISTING
TERMINAL STRIP
(CONNECTED TO
GE COILS)
2 WIRE CABLE
(IRD P.N. 2375
OR EQUAL)
CAUTION
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE JUNCTION BOXES MUST BE METAL AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. BOXES AND CONDUIT MUST BE ELECTRICALLY BONDED TO GROUND
INSTALLATION
GE COIL CONDITIONER


10.75
10.00
4.00
3.00
PICKUP OUTLINE
1/4-28 x 1 SOCKET HEAD
CAP SCREWS TIGHTEN TO
50 IN-LBS.
DRILL & TAP 4 HOLES
1/4-28 x 3/4 DEEP
FLEX OR
RIGID CONDUIT
3/4 NPT
SIGNAL
SIGNAL
GROUND
1
2
SIGNAL
3
COMMON
4
5
GROUND
6
+18VDC
7
POWER
GROUND
+18VDC
+18VDC
POWER
GROUND
SIGNAL
SIGNAL
GROUND
TSI SIGNAL
CONDITIONER
TERMINAL STRIP
4-WIRE SHIELDED
CABLE (IRD P/N
9374 OR EQUAL)
CAUTION
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE JUNCTION BOXES MUST BE METAL AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. BOXES AND CONDUIT MUST BE ELECTRICALLY BONDED TO GROUND
INSTALLATION
LVDT I/N 15383

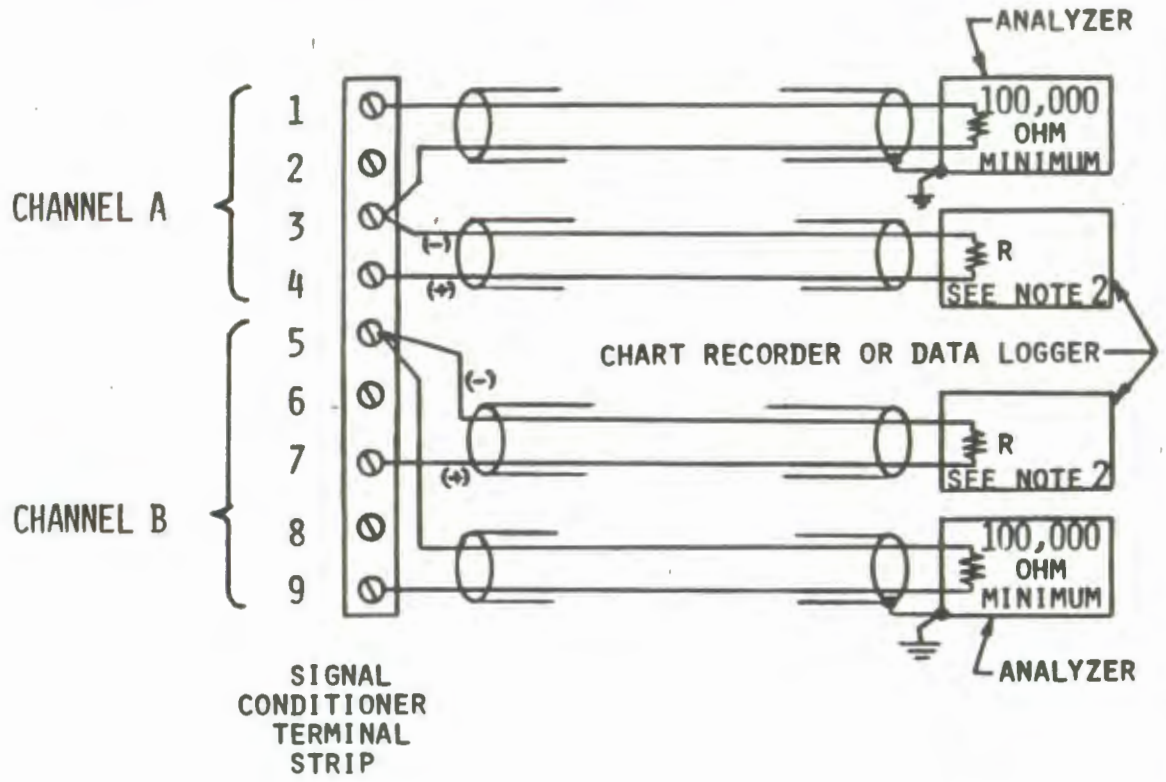


NOTES (1) WIRING AWG 16,18,20 STRANDED, SHIELDED

(2) R=10,000 OHM MINIMUM FOR 0-5 VDC OUTPUT,
R=300 OHM MAXIMUM FOR 4-20 MADC OUTPUT.

(3) FOR PICKUP WIRING TO TERMINALS 2,3,6 SEE PICKUP INSTALLATION DRAWINGS.

SIGNAL CONDITIONER OUTPUT WIRING - SINGLE CHANNEL, EXCEPT ACCELERATION CARDS



NOTES: (1) WIRING AWG 16,18,20 STRANDED, SHIELDED.
(2) R = 10,000 OHM MINIMUM FOR 0-5VDC OUTPUT,
R = 300 OHM MAXIMUM FOR 4-20MADC OUTPUT.
(3) FOR PICKUP WIRING TO TERMINALS 2,3,5,6,8.
SEE PICKUP INSTALLATION DRAWINGS.
(4) THIS DRAWING IS NOT APPLICABLE TO
TEMPERATURE SIGNAL CONDITIONERS.

CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED, AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. THE BOXES AND CONDUITS MUST BE ELECTRICALLY BONDED TO GROUND.

SIGNAL CONDITIONER OUTPUT WIRING - TWO CHANNEL, EXCEPT FOR ACCELERATION CARDS

2.7 MONITOR PROGRAMMING

The Model 5815 Monitor contains two "memories" in which all the information for its operation is stored. One, the "ROM" (Read-Only Memory) has the basic instructions common to all monitors. The second memory "RAM" (Random-Access Memory) is used to store information that is unique to your particular system. After the monitor has been installed and wired, the RAM must be loaded with this unique information, such as alarm setpoints, time delays, and alarm relay assignments for each channel.

The programming will be done in two easy steps:

(1) Fill out the chart on pages 2-40 and 2-41. The completed chart will contain all the unique information needed by the monitor's RAM.

(2) Enter the information from the chart into the monitor, using the plug-in programming keyboard.

This section describes how to fill in the chart.

TABLE 2-1 MONITOR INFORMATION CHART

CODE NO. →			14	17	Ø7	Ø6	12	2Ø
CHANNEL NUMBER	SENSOR LOCATION ● MACHINE NO. ● BEARING NO.	FULL SCALE AND UNITS	CHANNEL STATUS ON or OFF	WARNING RELAY				
				RELAY NO.	SETPOINTS LOW % F-S	SETPOINTS HIGH % F-S	TIME DELAY 100% = 10sec	RELAY POWER ON or OFF
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

TABLE 2-1 MONITOR INFORMATION CHART (continued)

18	Ø8	Ø5	11	21	Ø2	19	Ø9	Ø4	1Ø	22	13	25
SHUTDOWN RELAY						FAULT RELAY					STARTUP TIME DELAY 100= 100sec	AXIAL CHANNEL ? ON= YES
RELAY NO.	SETPOINTS LOW % F-S	SETPOINTS HIGH % F-S	TIME DELAY 100% = 10sec	RELAY POWER ON or OFF	"AND" VOTE CH. NO.	RELAY NO.	SETPOINTS LOW % F-S	SETPOINTS HIGH % F-S	TIME DELAY 100% = 10sec	RELAY POWER ON or OFF		

2.7.1 Fill in Sensor Location. This will be the machine identification and pickup position on the machine.

2.7.2 Fill in Full Scale and Units columns. Each "channel number" corresponds to one of the signal conditioner slots. They are numbered 1-15, from left to right, looking at the rear of the monitor. Wherever a signal conditioner is plugged in, fill in the full scale and units information (this can be found marked on each signal conditioner circuit board).

2.7.3 Any channel may be turned off, that is, it will be disregarded by the monitor; it will not be displayed on the front panel, and no alarms will occur. A channel should be turned off if no signal conditioner is installed, or if its sensor is not connected. Write "OFF" in the channel status column opposite those channel numbers that are not used.

2.7.4 Determine what 5-amp alarm relays are present in the monitor system. There may be up to six relays in the monitor, numbered 1-6. There may be as many as 24 more relays in external relay expander boxes; these would be numbered from 7 through 30. Refer to the sketches on pages 2-8 and 2-11 for relay numbering.

Each relay may be designated "Warning", "Shutdown", or "Circuit Fault", depending upon which alarm setpoints activate it.

2.7.5 Decide which relay is to be activated by warning setpoints. If the monitor protects only one machine, probably one warning relay will be used for all channels -- call it #1. In the chart, find the column labeled "Warning Relay -- Relay No.". For each channel, write in the relay number.

If the monitor protects two machines and you want two independent warning relays, call them #1 and #2; then write "1" in the Relay No. column opposite all the channels for one machine, and "2" in the same column opposite the second machine channels.

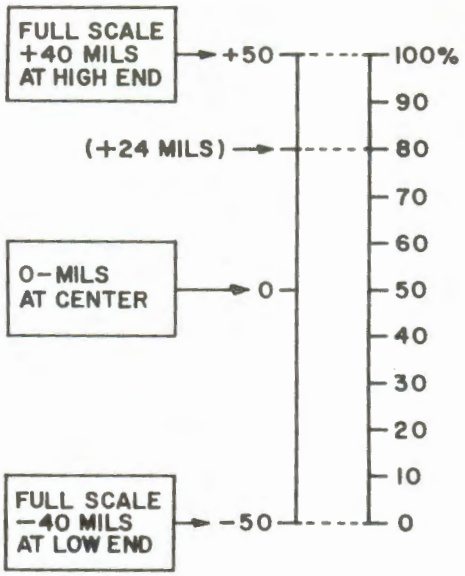
If there is any channel for which a warning relay is not required, enter "0" opposite that channel.

2.7.6 Repeat this procedure for the Shutdown relay(s) and Circuit Fault relay(s).

NOTE:
Make certain that the relay numbers correspond to actual relays plugged into sockets in the monitor, and that the relay contact wiring is properly connected for each relay's function.

2.7.7 Decide on warning Alarm Setpoints for each channel. "Low" setpoints will cause an alarm if the signal amplitude decreases (moves downscale) below the setpoint. "High" setpoints will cause an alarm if the signal amplitude increases (moves upscale) above the setpoint. Express setpoints as percent of full scale. (Example: If full scale is 10 mils and desired alarm setpoint is 4 mils, the setpoint is 40 percent.) Fill in the low and high setpoint columns. Typically, vibration channels will only use "high" setpoints; write in "100+" for the "low" setpoints (setting any setpoint above 100% deactivates it).

Axial (Thrust) Channels generally use both low and high setpoints. Again, fill in the chart with percent-of-full-scale figures for axial setpoints. (A typical axial range is ±40 mils with 0 mils at center scale or 50%.) "+40 mils" is at the top of the scale, or 100%. "-40 mils" is at the bottom of the scale, or 0%. If a warning alarm is required at +24 mils, for example, write 80% on the chart (see illustration).



2.7.8 Warning Alarm Time Delays can be selected between 0 sec. and 10 sec. This is the length of time after a warning condition occurs until the relay operates. For vibration channels, 5 to 10 seconds is typical to avoid unwarranted nuisance alarms. For axial (thrust) channels, 0 seconds is typical. Enter delays on the chart in percent of full scale -- 10 seconds = 100%; 5 seconds = 50%; 0 seconds = 0%.

2.7.9 Warning Alarm Relays may be specified to either ENERGIZE (turn "on") when an alarm occurs or DE-ENERGIZE (turn "off") when an alarm occurs (failsafe). Note that if the second choice is selected, the relay will go to an alarm state whenever monitor power is lost!

On the chart (Pages 2-31 and 2-32) write "on" or "off" opposite each relay number in the columns marked RELAY POWER. (All the entries for one RELAY No. must be the same.)

2.7.10 Repeat the procedures in 2.7.7, 2.7.8 and 2.7.9 for shutdown alarm setpoints.

2.7.11 Any pair of channels may be "AND VOTED" for shutdown. If so designated, both channels must be in a shutdown alarm state before the 5-amp relay will operate. (This function is commonly used on axial thrust channels.) If any pairs of channels are to be "AND VOTED", write in the "AND" channel number in the "AND VOTE" column.

2.7.12 Repeat the procedures in 2.7.7, 2.7.8 and 2.7.9 for Fault relay setpoints. Fault relay setpoints for vibration channels will usually be set to alarm on very low signals, which would result if a cable connection or sensor failure occurred. Enter "low" fault relay setpoints, typically 4% of full scale. "High" fault relay setpoints are deactivated by setting them above 100%. For axial channels fault setpoints will usually be set to alarm below and above the shutdown setpoints.

2.7.13 A Startup Time Delay can be specified for each vibration channel, if the appropriate startup contacts are provided from the machine control system. Closure of control contacts (indicating the machine has started) initiates the pre-set Startup Time Delay. For the duration of the delay, the vibration amplitude will be reduced by a factor of 3. This has the effect of "de-sensitizing" the alarms while the machine settles down to a stable running condition.

After the time delay has timed out, normal sensitivity is restored.

The time delay can range from zero to 100 seconds. On the chart, enter the desired startup time delay (100 seconds = 100%).

2.7.14 To obtain correctly-formatted printouts, axial (thrust) channels must be identified for the computer. In the last column on the chart write "yes" for each such channel.

This completes the chart of information. You are now ready to enter this information into the monitor's memory, in the next section of this manual.

2.7.15 A. Plug the programming keyboard into the front panel keyboard socket.

B. Apply power to the monitor. "60" will appear on the digital readout. After about 20 seconds, the "60" will disappear and the monitor will begin scanning.

(If the memory backup battery has been removed and replaced, "61" may appear before "60" -- indicating a testing routine is taking place -- disregard this.)

C. To begin programming the monitor, proceed as follows:

- Using the HOLD ADVANCE button, scan to Channel 1, and hold.
- Using the keyboard, key in the "code number" shown at the top of the chart for the first column (14). This number will appear on the digital display.
- Using the keyboard, press the "RETURN" key a few times. Note that it controls the red indicator at the bottom of the amplitude meter.
- When the red indicator is on, this corresponds to Channel Status On. If the chart shows the channel status for Channel 1 should be on, toggle the RETURN key until the indicator is on.
- Press the keyboard space bar. The digital display will now indicate Channel Number 1.

NOTE

At any time, you can use the keyboard space bar to toggle the digital indicator between channel number and code number.

- Scan to channel 2 with the HOLD ADVANCE button, and hold.
- Toggle the RETURN key until the red indicator is on or off, whichever appears opposite Channel 2 in your chart.

- Press the HOLD ADVANCE push-button to proceed to and hold on the next channel. Perform the above step for this channel. (Repeat these steps until all 15 channels are programmed for Channel Status).

2.7.16 The next column on the chart is Relay No. -- Warning Relay. This is the procedure:

- Key in the code number (17).
- Scan to Channel 1, and hold.
- Use the < and > keys to make the Relay No. (from the chart) appear on the digital display.
- Press RETURN.
- Scan to Channel 2, and hold.
- Select the Relay No. and RETURN.
- Repeat for all 15 channels.

2.7.17 The next column (warning relay - low setpoint) requires setting numbers in. The < and > symbol keys will cause the amplitude indicator to move up and down the 0-100 scale.

- Key in the code number (Ø7).
- Scan to Channel 1, and hold.
- Using < and > set the amplitude indicator to the number you wrote on the chart for warning relay low setpoint.
- Press RETURN on the keyboard (when you pressed RETURN, the amplitude indicator changed from steady to flashing; this means the computer accepted the information).
- Advance to Channel 2 and repeat, and so on.

2.7.18 Enter the next two columns (code numbers Ø6 and 12) the same way.

2.7.19 The next column (Relay Power -- Code Number 2Ø) uses the lamp at the bottom of the amplitude meter as an "On-Off" indicator. Pressing the keyboard RETURN key "toggles" it on and off. For each channel, toggle the light on or off, according to your chart. Then SCAN/HOLD to the next channel.

2.7.20 Repeat operations 2.7.16 through 2.7.19 for the next five columns under Shutdown Relay.

2.7.21 "AND" VOTE -- Code Ø2 -- is handled as follows:

- If there are no voted channels in the monitor there is no need to make any entry.
- If there <u>are</u> voted channels, scan to the first channel of the first pair, and hold.

- Enter code Ø2.
- Key the < and > until the channel number of the second channel of the pair appears in the digital display.
- Press RETURN.
- If there are other voted pairs, scan and hold on the first channel of the next pair, and repeat the procedure. Otherwise, enter Ø1 to resume normal operation.

2.7.22 Repeat operations 2.7.16 through 2.7.19 for the next five columns under Fault Relay.

2.7.23 Enter Code 13, and set startup time delay using the < and > keys, and RETURN, for each channel.

2.7.24 Enter Code 25, and identify all axial channels by toggling the bottom indicator light "ON", then RETURN for each of them; then enter Ø1 to return to normal operation.

After you've entered all the columns on your chart, the monitor is programmed. Unplug the keyboard. Keep a copy of the chart for reference.

2.8 INITIAL OPERATION

Put the monitor in SCAN mode and watch the panel displays. The meter will indicate alarm and trip setpoints for each channel, and -- if the machine is running -- signals will also appear.

A warning or trip alarm could be a sign that a machine problem exists, or that the alarm setpoint values need to be adjusted. Note which channels are in an alarm status by watching the channel warning and trip lamps as the monitor scans, and write down the meter readings for those channels. Now convert the "percent of full scale" meter readings to engineering units by referring to the ID Plate; and decide whether these values are "normal" for the machine.

NOTE

If the machine has been running satisfactorily for some time, and the meter readings seem reasonable based on experience or on information provided by the machine manufacturer, the reading may be considered "normal". If any doubt exists, a vibration analysis and careful study of other machine parameters should be made to rule out (or detect) potentially serious problems.

III NORMAL MONITOR OPERATION

Assuming any questions about setpoints have now been resolved, the monitor should be operating normally. It's best to leave the panel display in SCAN mode. An occasional glance at the monitor will tell you how close the signal amplitude of each channel is to its setpoints. If you wish to observe one channel continuously, stop the display on that channel by pressing HOLD. All monitor channels continue to operate and can alarm even if the display is held on one channel.

To read the amplitude of each input on a "higher-of-two" channel, plug in the keyboard, key in "15" to read input A and key in "16" to read input B.

3.1 WARNING ALARM

When a signal in one channel exceeds the warning alarm setpoint for that channel and remains high for a time period longer than the time delay, a WARNING ALARM will occur. The system warning indicator will flash, and the warning alarm relay will operate. When the display scans to the channel in which the warning alarm exists, its warning indicator will also flash.

Flashing alarm lights tell you that this is a new condition. Having recognized it, press the RESET/ACKNOWLEDGE button (the display must be on the alarming channel to acknowledge). The flashing lights will become steady.

If the amplitude in the alarming channel now changes to a normal level, the alarm relay will drop out, and both system and channel warning lights will go out.

If the alarm had NOT been acknowledged (lights still flashing) the relay will remain ON even if the amplitude returns to normal. Then, pressing the RESET/ACKNOWLEDGE will reset the relay and the lights will go out.

3.2 ANOTHER WARNING ALARM

A second warning alarm occurring after one has been acknowledged (and is still present) will again cause the system warning light to flash -- advising you that there is a new warning condition. To acknowledge the new alarm, scan to the channel with the flashing warning light, and press RESET/ACKNOWLEDGE.

3.3 TRIP ALARM AND FIRST OUT

Trip alarms function in a similar way to the warning alarms with one important exception: FIRST OUT. The "First Out" function memorizes which channel first exceeded its trip setpoint.

A rapidly developing machine problem could result in several trip alarms in succession -- knowledge of the first one to occur can be a valuable clue to the origin of the problem. The first out function maintains this record for the operator.

The first channel to trip causes the channel number indicator to flash on that channel only. The channel number indicator is steady on all other channels. The flashing channel number will be retained until all trip alarms have been acknowledged and reset.

The first out channel is also noted in the Alarm Log printout -- see Section 3.7.

3.4 VIBRATION ANALYSIS

The Model 5815 Monitor outputs are located on the front panel, under the ID Plate. To connect the analyzer outputs to a vibration analyzer, use an Adapter Cable pluggedinto the analyzer's 544 pickup input. Since various types of pickups have different sensitivities, it will be necessary (in some cases) to multiply the analyzer meter readings by a factor to obtain the correct vibration amplitudes. This multiplication factor is listed in the table below. Channel A or Channel B of two-channel signal conditioners can be selected by the "A-B" slide switch.

TABLE 3-1 CORRECTION MULTIPLIERS

PICKUP TYPE	POSITION OF "DISP-VEL" SWITCH	MULTIPLY READINGS BY	READ ANALYZER IN THESE UNITS
544, 580 or 540 with preamp	VEL	1	Velocity, pk
	DISP	1	Displacement, pk-pk
960M or 910M with preamp	VEL	21.6	Acceleration, pk
	DISP	4.2	Velocity, pk
403	VEL	10.8	Displacement, pk-pk

NOTE:

Do not expect to obtain comparable meter readings on the vibration analyzer and on the monitor! There are differences between the instruments in the signal processing circuitry, and it's not likely they will agree exactly. This is particularly true if the signal contains several frequency components. Portable instruments should not be used with the monitor analyzer outputs for reading SPIKE ENERGY (gSE). Use the pickup provided with the portable instrument.

Refer to the vibration analyzer manual for details about performing and interpreting the analysis.

3.5 BASELINE DATA

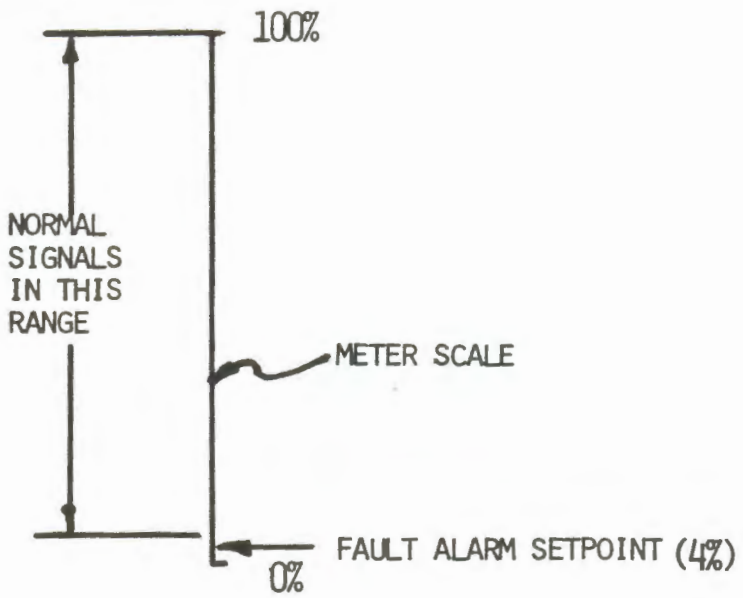
It is always good practice to take "baseline data" on the machine after the monitor has been installed and things are running normally. Baseline data consists of a set of monitor readings, and a set of vibration analysis plots for each pickup. The operating conditions of the machine should be noted also (load, speed, steam flow, etc.).

Baseline data should be kept in a permanent file for reference if a problem develops. Then a new analysis can be made and compared with the baselines to detect significant changes.

IRD Consulting Engineers are equipped to take baseline data or to assist you in doing so, if you have a vibration analyzer. Baseline data is always obtained during a monitor startup performed by IRD's Monitor Field Engineers.

3.6 FAULT ALARM

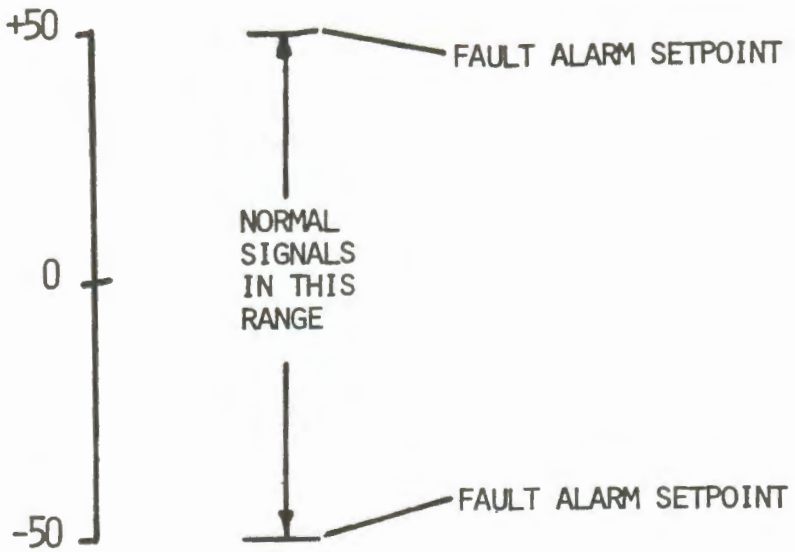
A Fault Alarm will occur if the signal amplitude of any channel moves outside the fault alarm setpoints, which are normally set like this:



For most channels (except axial thrust channels) there is normally an upscale signal whenever the machine is running. If a failure should occur in the pickup, its wiring, or in the signal conditioning circuitry, the signal will usually drop to zero, through the Fault Setpoint, causing a fault alarm.

Naturally, if the machine is not running the signals will also be zero, but fault alarms are inhibited by contacts in the machine control that "tell" the monitor when the machine isn't turned on. These are the same contacts that "tell" the monitor when the startup interval begins.

In axial (thrust) channels, fault alarm setpoints are usually set like this:



The non-contact pickup system can exhibit either an upscale movement (if the pickup is disconnected or open-circuited) or a downscale movement (if the pickup is short circuited or an electronic failure occurs). Either fault will result in a fault alarm.

Any fault alarm will activate the Fault Relay and front panel lamps. Fault alarms reset automatically when the fault condition has been corrected.

3.7 OBTAINING PRINTOUTS

Printouts of the ALARM LOG and DATA LOG are obtained by simultaneously pressing the HOLD/ADVANCE and RESET/ACKNOWLEDGE pushbuttons. Example printouts:

NOTES:

1. If Number 50 appears in the digital display following the printout request, wait until the Printer stops, then re-enter your print request.
2. If Number 51 appears in the digital display following the printout request, the Printer is disconnected, out of paper, or turned off. Fix the problem and request again.

DATALOG DATE _____ TIME _____

MONITOR I.D. _____

CHANNEL	AMPLITUDE	WARNING	SHUTDOWN	STATUS
1	50 % F.S.	60	70	
2	38 % F.S.	48	70	
3	48 % F.S.	58	70	
4	48 % F.S.	58	70	
5	38 % F.S.	58	70	
6	36 % F.S.	58	80	
7	48 % F.S.	68	78	
8	19 % F.S.	38	48	
9	-1 % F.S.	8 /-10	20 /-20	
10	37 % F.S.	58	70	
11	38 % F.S.	58	78	
12	27 % F.S.	58	78	
13	27 % F.S.	58	78	
14	30 % F.S.	58	78	
15	56 % F.S.	68	78	MACHINE OFF

IRD MECHANALYSIS, INC.

ALARM LOG

DATE _____ TIME _____

MONITOR I.D. _____

CHANNEL	STATUS	ACTION	COMMENTS
1	SHUTDOWN	ALARM	FIRST OUT
1	SHUTDOWN	ACKNOWLEDGED	
1		RESET	
1	SHUTDOWN	ALARM	FIRST OUT
1	SHUTDOWN	ACKNOWLEDGED	
1		RESET	
1	SHUTDOWN	ALARM	FIRST OUT
1	SHUTDOWN	ACKNOWLEDGED	
1		RESET	
7	WARNING	ALARM	
7	WARNING	ACKNOWLEDGED	
7		RESET	
1	SHUTDOWN	ALARM	FIRST OUT
1	SHUTDOWN	ALARM	
1	SHUTDOWN	ACKNOWLEDGED	
1		RESET	
11	WARNING	ALARM	
11	SHUTDOWN	ALARM	FIRST OUT
11	SHUTDOWN	ACKNOWLEDGED	
11		RESET	
11	WARNING	ALARM	
11	SHUTDOWN	ALARM	FIRST OUT
11	SHUTDOWN	ACKNOWLEDGED	
11		RESET	
1	SHUTDOWN	ALARM	FIRST OUT
1	SHUTDOWN	ALARM	
1	SHUTDOWN	ACKNOWLEDGED	
1		RESET	
1	SHUTDOWN	ALARM	FIRST OUT
11	WARNING	ALARM	
11	SHUTDOWN	ALARM	
1	SHUTDOWN	ALARM	
11	SHUTDOWN	ACKNOWLEDGED	
1	SHUTDOWN	ACKNOWLEDGED	
1		RESET	
11		RESET	
11	WARNING	ALARM	
1	SHUTDOWN	ALARM	FIRST OUT
1	SHUTDOWN	ALARM	
1	SHUTDOWN	ACKNOWLEDGED	
1		RESET	
11	WARNING	ACKNOWLEDGED	
11		RESET	

BOTTOM OF LIST IS MOST RECENT LOG ENTRY.

IV MAINTENANCE AND SERVICE

4.1 BATTERY REPLACEMENT -- Code 75

The Memory PC Board is equipped with a long-life battery which permits the RAM memory to remember data even when AC power is off. This battery must be replaced after approximately 8000 hours of monitor operation to ensure that ac power loss will not result in lost data. The monitor contains a built-in timer that will cause "75" to appear in the digital display when it is time to replace the battery.

The replacement battery is IRD Item No. 29659 (Electrochem Industries No. 3B50). You will also need a STD Bus Extender Card (see Specifications).

CAUTION

Do not remove the battery when the Memory PC Board is unplugged from the monitor or when AC power is disconnected from the monitor. (This would result in loss of data from the memory.)

Battery Replacement Procedure

- Disconnect AC power.
- Unplug Memory PC Board.
- Insert Extender Card into STD Bus connector.
- Insert Memory PC Board into Extender Card.
- Reconnect AC power.
- Replace the battery.
- Disconnect AC power.
- Remove Memory PC Board from Extender Card.
- Remove Extender Card from Monitor.
- Insert Memory Card into STD Bus connector.
- Reconnect AC power.

4.2 RECOMMENDED SPARE PARTS LIST

To insure continuous operation of your monitor system, the following spare parts are recommended:

1. Relay, 650-ohm coil, 4PDT . . . . . I/N 05474
2. Power Supply, 5 Volt . . . . . I/N 29668
3. Power Supply, ±15 VOLT . . . . . I/N 29670
4. Power Supply, +24 Volt . . . . . I/N 29671
5. Power Supply, -24 Volt . . . . . I/N 29672
6. CPU PC Board . . . . . I/N 33050
7. Memory PC Board. . . . . I/N 33395
8. Battery . . . . . I/N 29659

Service information is available in the 5815/5915 Service Manual, I/N 31808.

Battery Replacement Procedure

- Disconnect AC power
- Unplug main memory card
- Insert extender card (#24509) into STD bus connector
- Insert main memory card into extender card
- Reconnect AC power
- Remove old battery and replace with new (#29659)
- Disconnect AC power
- Remove the main memory card from the extender card
- Remove extender card from the 5815
- Insert the main memory card into the STD bus connector
- Reconnect AC power
- **Insert the programming keyboard**
- **Enter Ccde 24**
- **Press the return key (The LED on the bottom of the display scale will turn off, re-initiating the battery timer))**
- **Disconnect the programming keyboard**

5815 Error Codes

Code #	Description of Error
50	Printer Busy
51	Printer Not Ready
60	20 Second Power Up Inhibit
61	Performing Self Test
65	RAM Test Failure
66	ROM Test Failure
75	Replace Battery

5815 Program Codes

Code #	Description of Program Code
01	Normal Scanning Mode
02	And Vote Two Channels
03	Self Test
04	Fault Alarm High Set Point
05	Shutdown Alarm High Set Point
06	Warning Alarm High Set Point
07	Warning Alarm Low Set Point
08	Shutdown Alarm Low Set Point
09	Fault Low Alarm Set Point
10	Fault Alarm Time Delay
11	Shutdown Alarm Time Delay
12	Warning Alarm Time Delay
13	Startup Time Interval
14	Skip Channel (LED OFF = Channel Skipped)
15	Display Channel A
16	Display Channel B
17	Warning Alarm Relay Number
18	Shutdown Alarm Relay Number
19	Fault Alarm Relay Number
20	Warning Alarm Relay Energize to Alarm
21	Shutdown Alarm Relay Energize to Alarm
22	Fault Alarm Relay Energize to Alarm
23	Shutdown Alarm Inhibit (LED ON = Shutdown Inhibited)
24	Replace Battery (LED ON = Time to Change Battery)
25	+/- Range, Zero = Mid-Scale (LED ON = Enabled)

Model 5815 Machine Monitor

—Main Rack, Control and Display

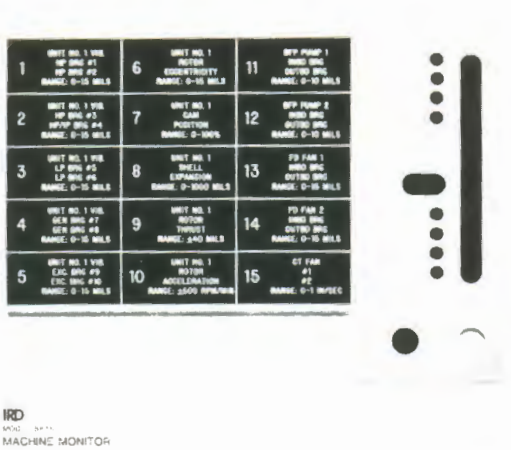
SPEC SHEET: 22-11
Effective: November, 1990

The Model 5815 Machine Monitor is a multi-point, multi-machine vibration and condition monitor. It provides continuous protection based on vibration, end thrust, temperature, and other parameters.

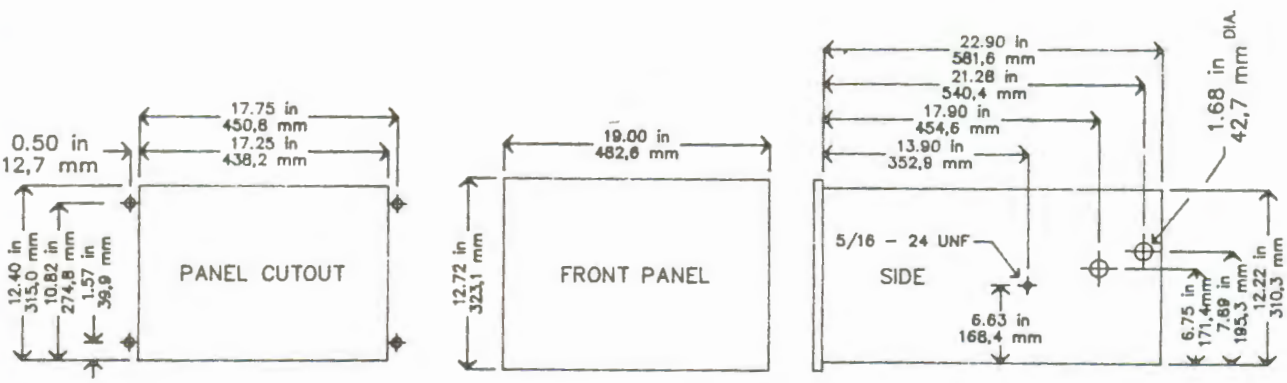
The monitor accommodates up to fifteen 5800 Series signal conditioning cards which accept signals from up to 30 external sensors. Up to 30 relays can be separately addressed to signal annunciators and automatic shutdown circuits. Four alarm setpoints, fully adjustable for each channel, provide maximum flexibility to handle all types of parameters. A printer can be added for hard copy reports.

Individual proportional outputs for each channel provide vibration values for Distributed Control Systems (DCS) and operations information.

Controls and panel indicators are simple and easy-to-use. The monitor is designed for continuous duty in industrial control room environments. An engraved nameplate identifies the points monitored.



OUTLINE DIMENSIONS



IRD Mechanalysis

USER PROGRAMMABLE FUNCTIONS

SHUTDOWN ALARM SETPOINTS
One high, one low per channel. Adjustable 0 to 100% full scale.*

WARNING ALARM SETPOINTS
One high, one low per channel. Adjustable 0 to 100% full scale.*

SENSOR FAULT SETPOINTS
One high, one low per channel. Adjustable 0 to 100% full scale.*

FIXED ALARM TIME DELAY
Adjustable from 0 to 10 seconds in 0.2 second increments for FAULT, WARNING and SHUTDOWN alarms.

STARTUP ATTENUATION TIME
Adjustable for each channel from 0 to 100 seconds in 2 second increments.

SHUTDOWN ALARM "AND" VOTING
Up to 7 pairs of channels may be programmed to "AND" vote.

SKIP CHANNEL
Causes monitor to skip unused channels.

RELAY ASSIGNMENT
Assigns specific relay to be activated by FAULT, WARNING and SHUTDOWN alarms per channel. Up to 30 relays may be specified.

RELAY LOGIC
Selects logic to energize or de-energize a relay to signal FAULT, WARNING and SHUTDOWN alarms for each channel.

SHUTDOWN ALARM INHIBIT
Causes a FAULT alarm to inhibit a SHUTDOWN alarm.

READ "A", READ "B"
Selects input to be displayed on bargraph when dual, higher-of-two, signal conditioning cards are used.

INPUTS
Up to 15 one or two input 5800 series signal conditioning cards in any combination. Dual input cards provide higher-of-two indications.

RELAY OUTPUTS
Six individually assignable for rack mounted relays plus outputs and connectors for up to 24 external relays. Relay contact connections are blade type quick connect terminals.

DC ANALOG OUTPUTS
0-5 V DC or optional 4-20 mA DC proportional to signal amplitude from each sensor is supplied by the signal conditioning cards.

AC ANALOG OUTPUTS
Buffered sensor signals provided at front panel jacks.

PRINTER OUTPUT
Serial port for standard 80 column ASCII printer. P/N 30531 printer cable assembly is optional.

WARNING AND SHUTDOWN ALARM RELAYS
Six rack-mounted, DPDT, hermetically sealed relays with contacts rated at 5 Amperes, 117 V AC or 24 V DC resistive load are supplied. One internal 0.5 - Amp SPDT normally energized hermetically sealed relay is supplied for FAULT annunciation. Additional 8-relay expansion modules are optional. Relays are assignable to any channel or group of channels, and may be designated for warning or shutdown functions. Reset is from the front panel, or remotely. (See Spec. Sheet 26-72 for external relays)

STARTUP ATTENUATION
Initiated by external (customer furnished) contact closure on a per signal conditioning card basis. Automatically reduces input signal to 1/3 on vibration channels for up to 100 seconds during machine startup. The same contact signals the monitor when the machine is off.

AMPLITUDE LINEARITY
Determined by signal conditioning card. Panel indicator is a long-life 51 element, solid state, light-emitting diode, vertical bar display. Indicator provides 2% full scale resolution.

SETPOINT ACCURACY
Same as indicator resolution.

SYSTEM STATUS
Shutdown, warning, and fault lamps turn on when any alarm occurs. The assigned relay operates. "Hold" lamp is on when the display scan has been stopped on a channel.

CHANNEL STATUS
Shutdown and warning lamps flash initially when a channel is in alarm. Acknowledgement stops the flashing. Lights stay on until the alarm is reset. Channel number is displayed next to the status lamps. In startup mode the startup lamp turns on. The fault lamp turns on when a sensor or instrument fault occurs.

DISPLAY SCAN
Normal operating mode. Bar display and channel status indicators advance from one channel to the next automatically. Operator may hold display on one channel for observation. (Display scan is independent of monitor function, which is continuous.)

ENCLOSURE - NEMA - 1
Panel mounting construction for indoor use. Front panel size is 19 in (48.2 cm) wide, 12.75 in (32.4 cm) high. Chassis behind panel is 17.25 in (43.8 cm) wide, 12.25 in (31.1 cm) high, 23.25 in (59.0 cm) deep.

TEMPERATURE LIMITS
Storage, - 20°F (-29°C) to 162°F (72°C). Operating, 32°F (0°C) to 110°F (43°C).

HUMIDITY LIMITS
0-95% Relative humidity (non-condensing).

POWER
105-126 V AC or 207-242 V AC, 50±1 Hz or 60±1 Hz, 200 Watts. Recovers automatically from power line voltage sags and dropouts after a 20 sec. power-up sequence. Resistant to 1µs 500 V peak normal mode power line spikes. Battery backup protects memory during power loss.

RF INTERFERENCE
Resistant to RF radiation from 4 Watt, 460 MHz transceivers at distances greater than 1/2 meter from monitor when properly installed and grounded.

OPTIONS

- Keyboard Configurator P/N 00608
- Relay Expander Module P/N 30530, Spec. Sheet 26-72
- Relays, 5 Amp. P/N 05474
- Chassis Slide Kit, P/N 30535
- Printer Cable, P/N 30531
- Adapter cables, P/N 15724 & 24332 to connect a standard IRD 544 Sensor cable to 5815 signal output receptacles
- Extender Board P/N 27205 (Sig. Cond.)
- Extender Board P/N 24509 (Std. Bus.)
- Printer, P/N 31740 (117 V) or P/N 31741 (234 V)

All specifications are subject to change without notice

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L 04206

FORM # 2203F

PART - 1

SIGNAL CONDITIONER PROGRAMMING

SIGNAL CONDITIONER PROGRAMMING PROCEDURE

1) Handle the signal conditioner in a static controlled environment.

2) Fill in the following table for each channel

Transducer connected to the channel _____
select from 402, 403, 544M, 910M, 941, 960
960M, CEC 4-123, 4-126, 4-131
GE Velocity, B/N Seismoprobe
Constant Current Accelerometer
B/N 7000 series non contacts

Parameter measured _____
select from mils or in/sec or g's

Fullscale Range _____
select from .5, 1, 1.5, 3, 5, 10, 15 or 20

Signal Detection _____
select from a PEAK or a RMS detector

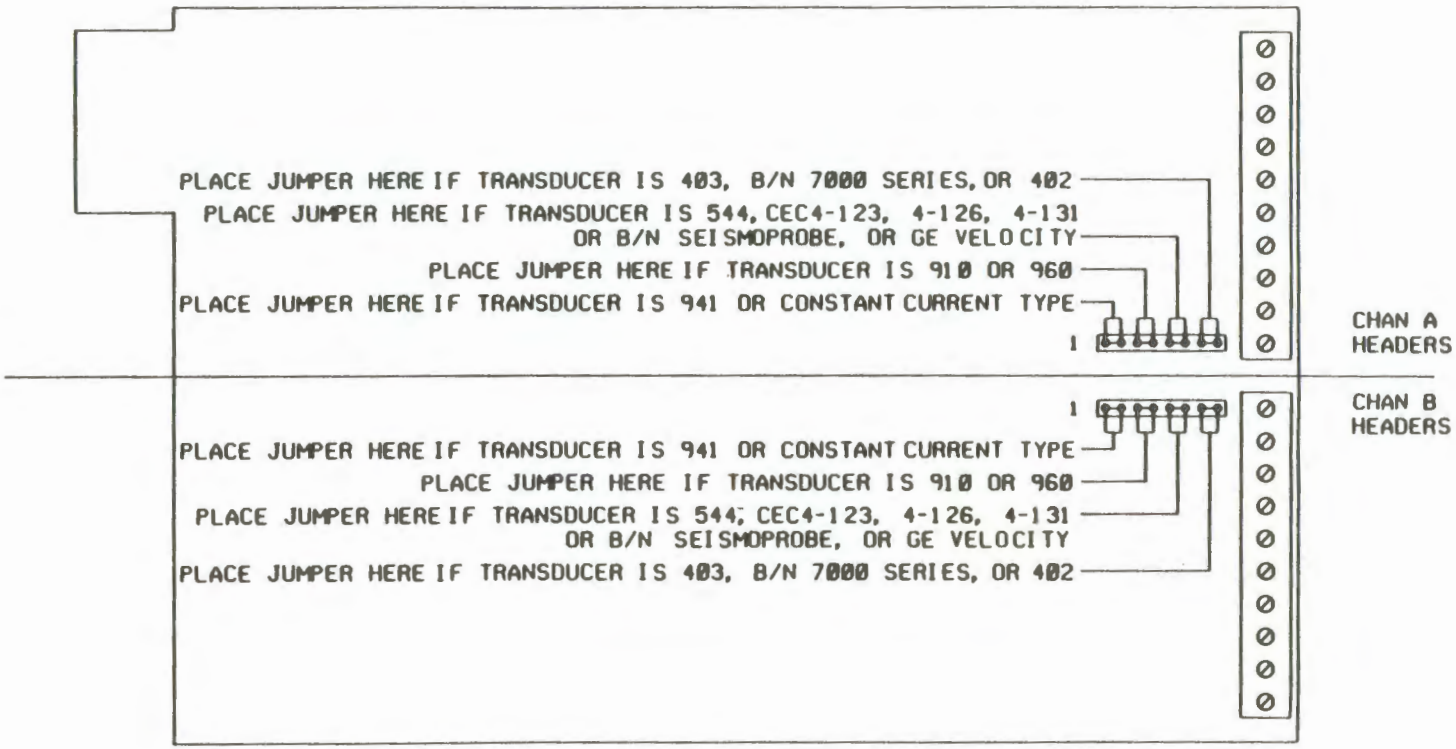
3) Referencing the above selections jumper all the headers following the instructions shown on figures 2, 3, 4, & 5

Metric Conversions

1) Program the signal conditioner following figures 2, 3, & 5.
2) Referencing figure 4 and the chart below, select the proper range jumper position.
3) Referencing the Calibration Setup figures 12, 13, 14, & 15 , connect the test equipment to the signal conditioner.
4) Apply an input sinewave at 100HZ at the amplitude shown in the chart below and adjust either R12 (Chan A) or R90 (Chan B) for 5.00 VDC at terminal strip T/S 1-6 (Chan A) or T/S 2-5 (Chan B).
5) Seal pot(s).

Transducer Type	Parameter (Metric)	Range Jumper	Input @ 100HZ
403	0-125um	5.0	347.9mVRMS
403	0-150um	5.0	417.5mVRMS
403	0-250um	10	695.9mVRMS
403	0-375um	15	1.0438VRMS
403	0-400um	15	1.1134VRMS
544	0-15mm/sec	0.5	451.0mVRMS
544	0-25mm/sec	1.0	751.7mVRMS
544	0-125um	5.0	1.1811VRMS
544	0-150um	5.0	1.4173VRMS
544	0-250um	10	2.3622VRMS
544	0-375um	15	3.5433VRMS
544	0-400um	15	3.7795VRMS

ANALYZER OUTPUT CONFIGURATION

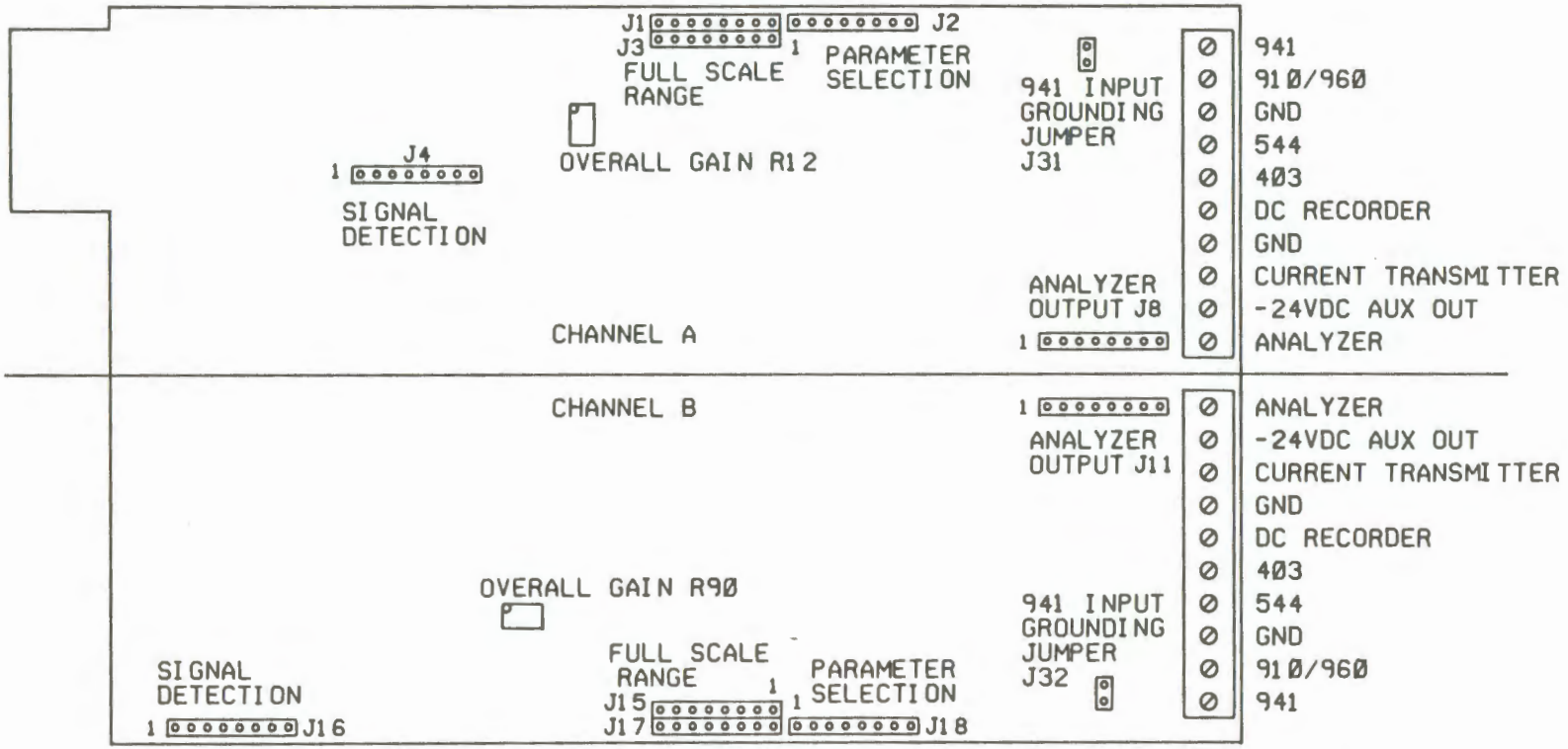


INSTRUCTIONS:

BY PROPERLY PROGRAMMING THESE HEADERS, ACTIVE BUFFERED SIGNALS ARE AVALABLE AT REAR TERMINAL STRIPS OF THE CARD AND AT THE FRONT PANEL OF THE IRD 5800 MONITOR. PROGRAM THE HEADER BY JUMPING THE TWO PINS TOGETHER THAT CORRESPOND TO THE TRANSDUCER BEING USED FOR THAT CHANNEL.

FIGURE 2

GENERAL LAYOUT



THE 5800 CARDS P/N 34177 & 34294 ARE MULTI FUNCTIONAL VIBRATION SIGNAL CONDITIONING CARDS FOR USE IN IRD'S 5800 SERIES MONITORS.
THE FOLLOWING FEATURES ARE AVAILABLE TO THE USER ON A PER CHANNEL BASIS.

A. 8 JUMPER SELECTABLE RANGES

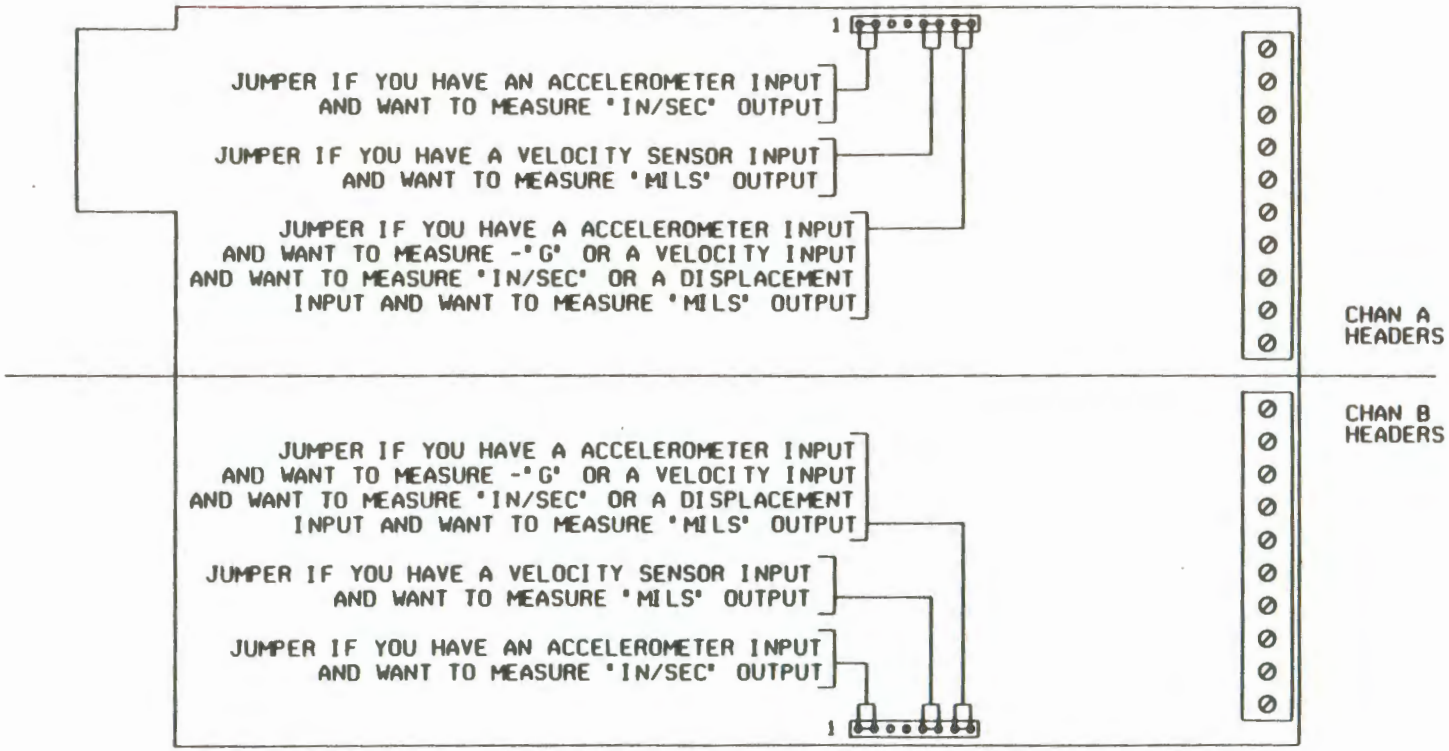
B. ACCEPTS SIGNALS FROM ACCELEROMETER OR VELOCITY OR DISPLACEMENT TRANSDUCERS.

C. QUASI RMS OR PEAK SIGNAL DETECTION IS JUMPER SELECTABLE

D. DISPLACEMENT OR VELOCITY OR ACCELERATION PARAMETER IS JUMPER SELECTABLE

FIGURE 1

PARAMETER OUTPUT SELECTION

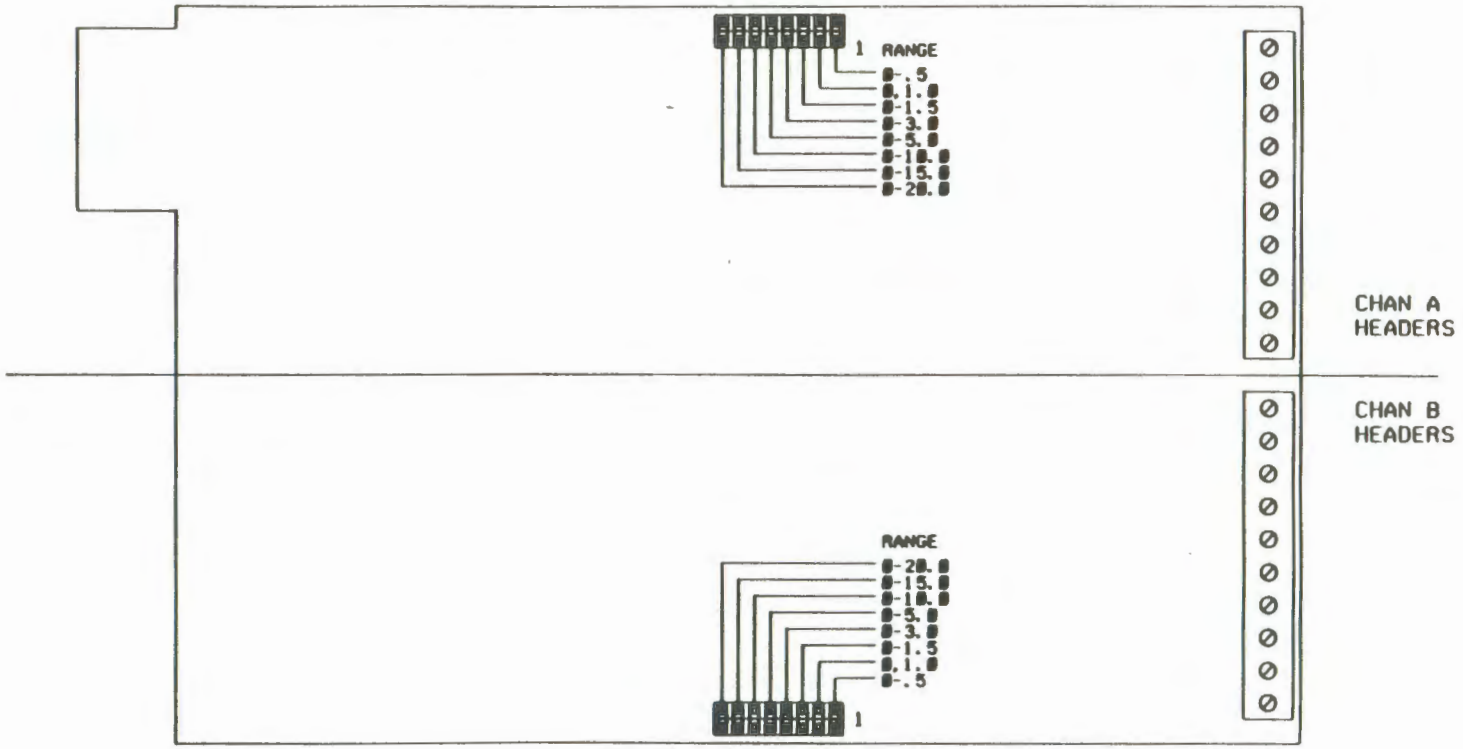


INSTRUCTIONS:
THESE HEADERS PROGRAM THE CARD FOR THE PARAMETERS (MILS, IN/SEC, OR G'S) THAT THE CARD WILL MEASURE. JUMPER TOGETHER THE TWO HEADER PINS THAT CORRESPOND TO THE INPUT TRANSDUCER TYPE AND PROVIDE THE REQUIRED MEASURED PARAMETERS.

NOTE: THIS CARD CAN NOT TAKE AN ACCELERATION INPUT 'G' AND PROVIDE A MILS OUTPUT

FIGURE 3

FULL SCALE RANGE SELECTION

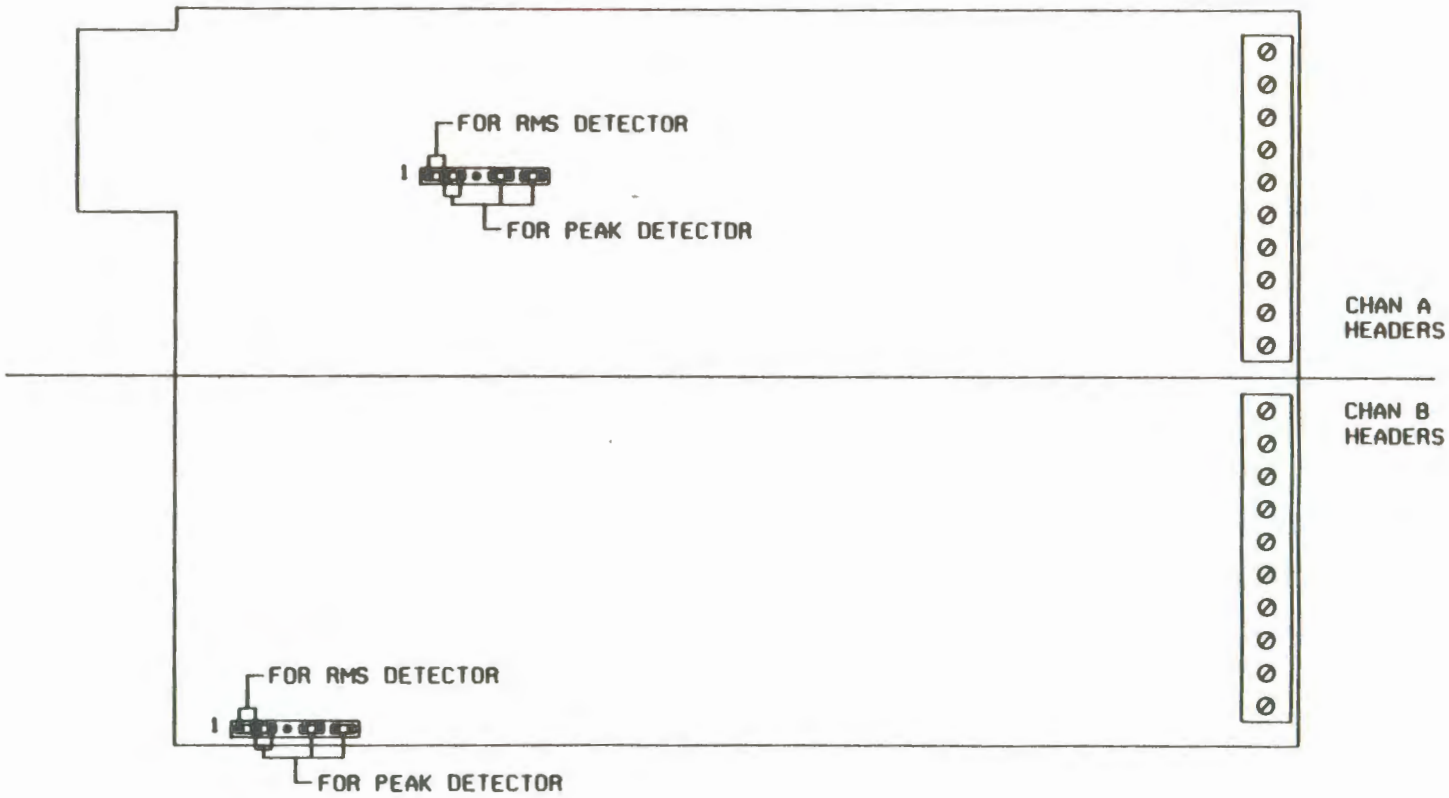


INSTRUCTIONS:

PLACE JUMPER OVER HEADERS CORRESPONDING TO THE APPROPRIATE FULLSCALE RANGE.

NOTE: RANGES FOR ALL UNITS

SIGNAL DETECTION SELECTION



INSTRUCTIONS:

PLACE JUMPERS OVER THE HEADER PINS TO SELECT THE TYPE OF SIGNAL DETECTION REQUIRED.

NOTE: WHEN CHANGING FROM ONE DETECTOR TO ANOTHER A NOMINAL 10% ERROR IN OUTPUT CAN OCCUR. RECALIBRATION IS RECOMMENDED.

FIGURE 5

PART - 2

INSTALLATION

INSTALLING THE SIGNAL CONDITIONER

1) Program the signal conditioner following the Signal Conditioner Programming Procedure.

2) Remove power from the monitor.

3) Install the signal conditioner into the monitor. Make sure the card is properly seated in the connector.

4) Based on the transducer being connected to the signal conditioner channel, select the appropriate installation figure from Figures 6, 7, 8, 9, 10 or 11.

5) Wire the signal conditioner to the transducer following the instructions shown on the installation figure.

6) Apply power to the monitor.

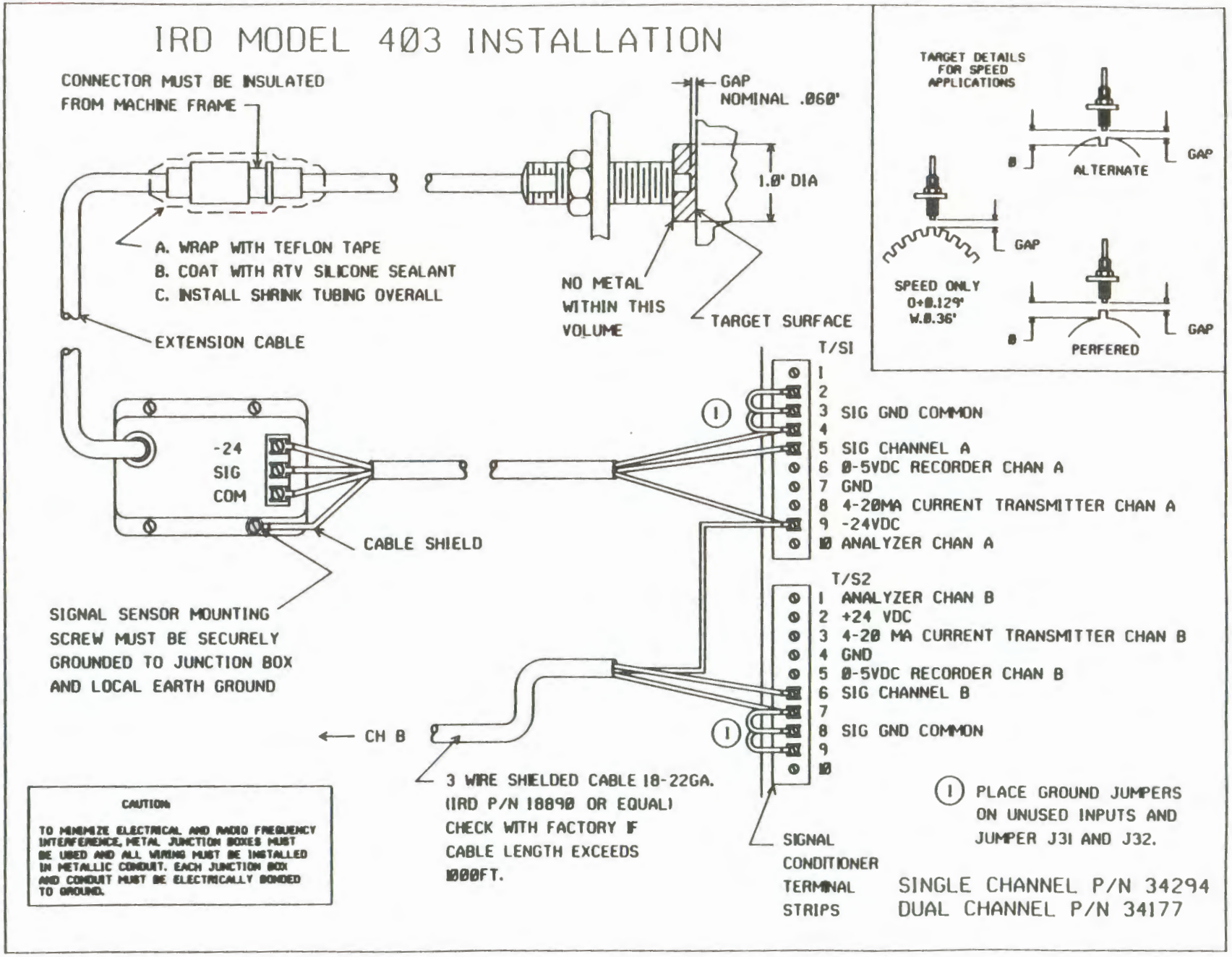

IRD MODEL 403 INSTALLATION
CONNECTOR MUST BE INSULATED FROM MACHINE FRAME
GAP NOMINAL .060"
1.0" DIA
A. WRAP WITH TEFLON TAPE
B. COAT WITH RTV SILICONE SEALANT
C. INSTALL SHRINK TUBING OVERALL
EXTENSION CABLE
NO METAL WITHIN THIS VOLUME
TARGET SURFACE
TARGET DETAILS FOR SPEED APPLICATIONS
ALTERNATE
GAP
SPEED ONLY
0+0.129"
W.0.36"
PERFERED
T/S1
1
2
3 SIG GND COMMON
4
5 SIG CHANNEL A
6 0-5VDC RECORDER CHAN A
7 GND
8 4-20MA CURRENT TRANSMITTER CHAN A
9 -24VDC
10 ANALYZER CHAN A
-24
SIG
COM
CABLE SHIELD
SIGNAL SENSOR MOUNTING SCREW MUST BE SECURELY GROUNDED TO JUNCTION BOX AND LOCAL EARTH GROUND
T/S2
1 ANALYZER CHAN B
2 +24 VDC
3 4-20 MA CURRENT TRANSMITTER CHAN B
4 GND
5 0-5VDC RECORDER CHAN B
6 SIG CHANNEL B
7
8 SIG GND COMMON
9
10
CH B
3 WIRE SHIELDED CABLE 18-22GA. (IRD P/N 18890 OR EQUAL) CHECK WITH FACTORY IF CABLE LENGTH EXCEEDS 1000FT.
CAUTION
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. EACH JUNCTION BOX AND CONDUIT MUST BE ELECTRICALLY BONDED TO GROUND.
SIGNAL CONDITIONER TERMINAL STRIPS
(1) PLACE GROUND JUMPERS ON UNUSED INPUTS AND JUMPER J31 AND J32.
SINGLE CHANNEL P/N 34294
DUAL CHANNEL P/N 34177

FIGURE 6

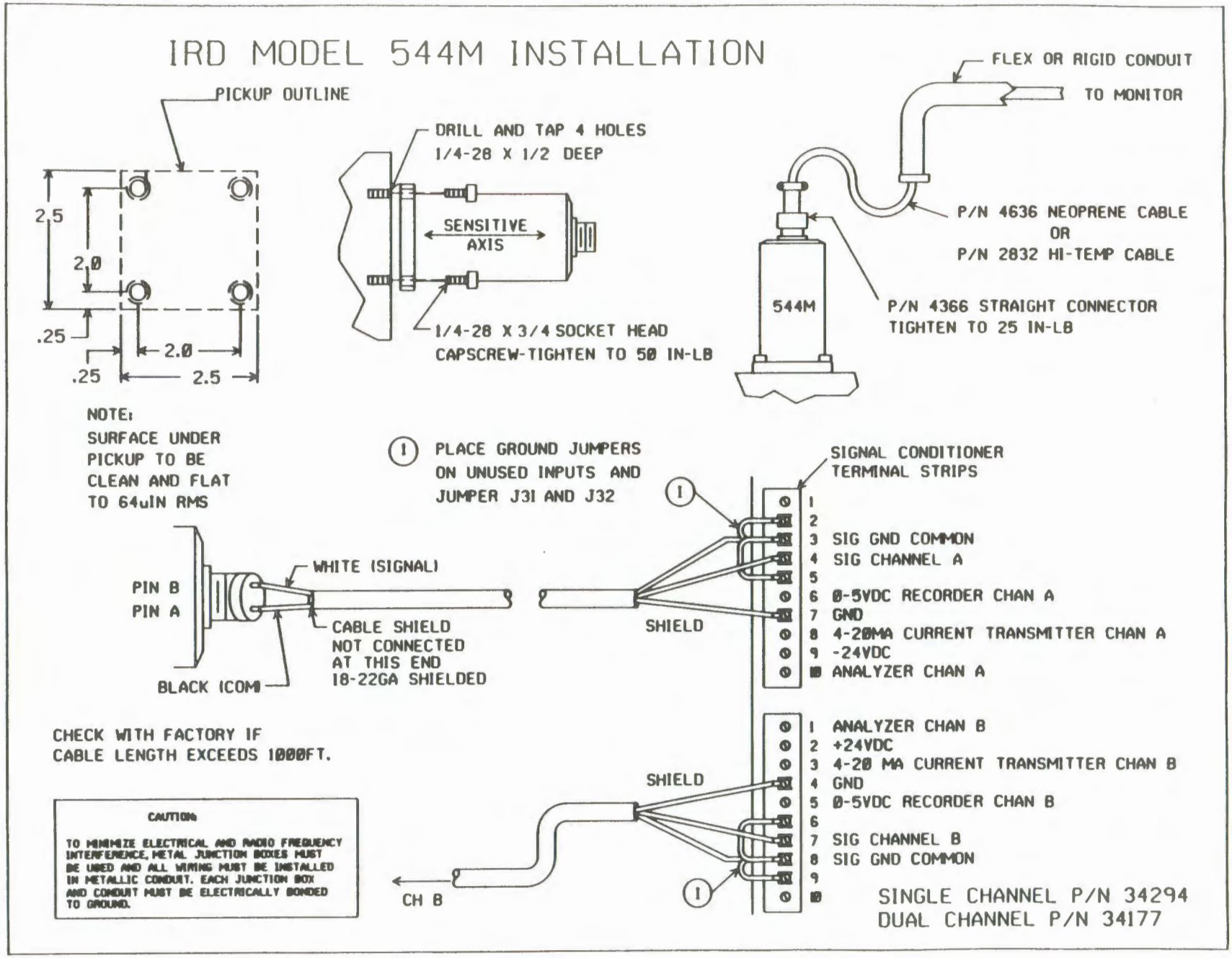

IRD MODEL 544M INSTALLATION
PICKUP OUTLINE
2.5
2.0
.25
.25
2.0
2.5
NOTE:
SURFACE UNDER
PICKUP TO BE
CLEAN AND FLAT
TO 64uIN RMS
DRILL AND TAP 4 HOLES
1/4-28 X 1/2 DEEP
SENSITIVE
AXIS
1/4-28 X 3/4 SOCKET HEAD
CAPSCREW-TIGHTEN TO 50 IN-LB
FLEX OR RIGID CONDUIT
TO MONITOR
P/N 4636 NEOPRENE CABLE
OR
P/N 2832 HI-TEMP CABLE
544M
P/N 4366 STRAIGHT CONNECTOR
TIGHTEN TO 25 IN-LB
1 PLACE GROUND JUMPERS
ON UNUSED INPUTS AND
JUMPER J31 AND J32
SIGNAL CONDITIONER
TERMINAL STRIPS
PIN B
PIN A
WHITE (SIGNAL)
CABLE SHIELD
NOT CONNECTED
AT THIS END
18-22GA SHIELDED
BLACK (COM)
SHIELD
1
2
3 SIG GND COMMON
4 SIG CHANNEL A
5
6 0-5VDC RECORDER CHAN A
7 GND
8 4-20MA CURRENT TRANSMITTER CHAN A
9 -24VDC
10 ANALYZER CHAN A
CHECK WITH FACTORY IF
CABLE LENGTH EXCEEDS 1000FT.
CAUTION
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. EACH JUNCTION BOX AND CONDUIT MUST BE ELECTRICALLY BONDED TO GROUND.
SHIELD
CH B
1 ANALYZER CHAN B
2 +24VDC
3 4-20 MA CURRENT TRANSMITTER CHAN B
4 GND
5 0-5VDC RECORDER CHAN B
6
7 SIG CHANNEL B
8 SIG GND COMMON
9
10
SINGLE CHANNEL P/N 34294
DUAL CHANNEL P/N 34177

FIGURE 7

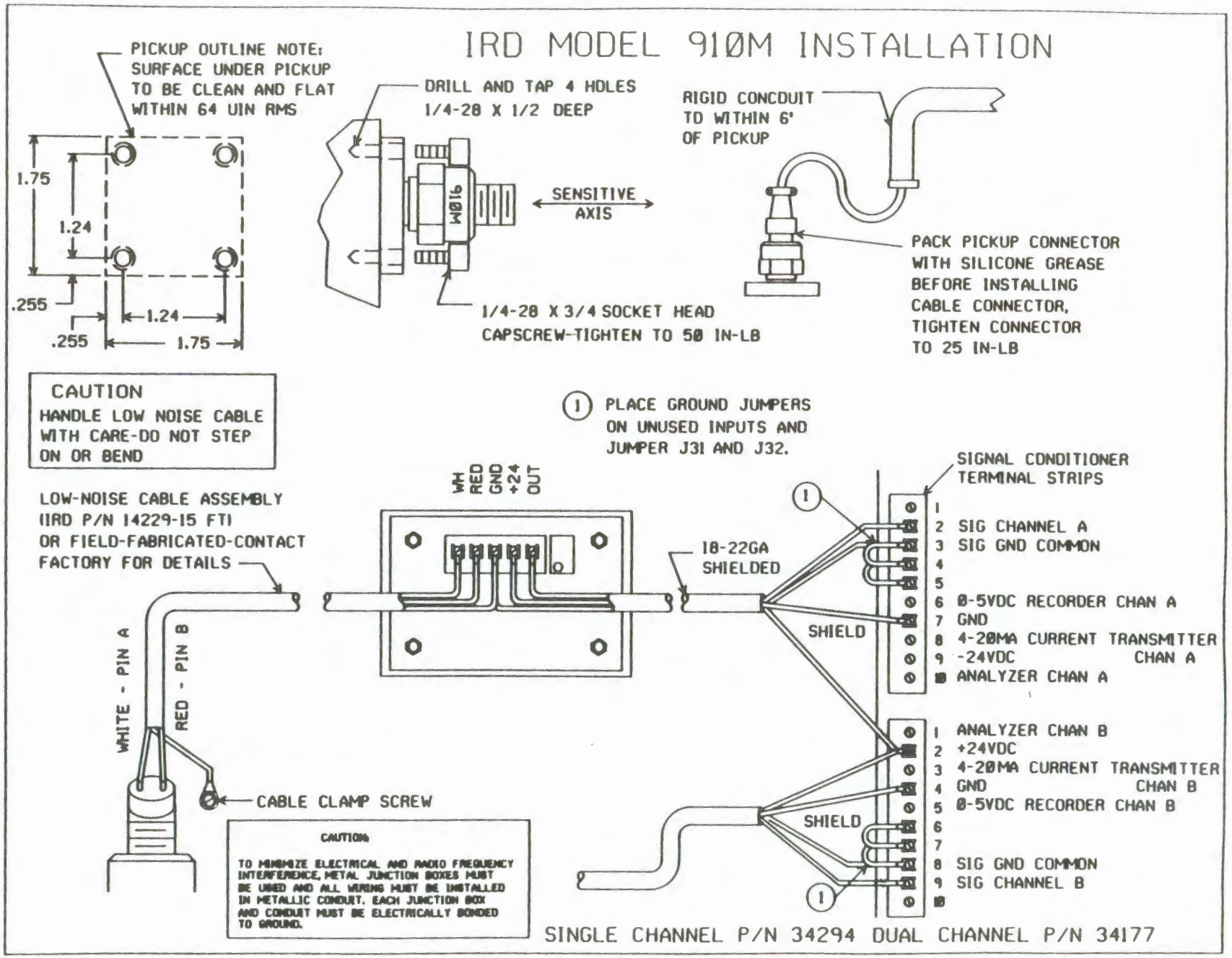

IRD MODEL 910M INSTALLATION
PICKUP OUTLINE NOTE:
SURFACE UNDER PICKUP
TO BE CLEAN AND FLAT
WITHIN 64 UIN RMS
1.75
1.24
.255
1.24
.255
1.75
DRILL AND TAP 4 HOLES
1/4-28 X 1/2 DEEP
W816
SENSITIVE
AXIS
1/4-28 X 3/4 SOCKET HEAD
CAPSCREW-TIGHTEN TO 50 IN-LB
RIGID CONDUIT
TO WITHIN 6'
OF PICKUP
PACK PICKUP CONNECTOR
WITH SILICONE GREASE
BEFORE INSTALLING
CABLE CONNECTOR,
TIGHTEN CONNECTOR
TO 25 IN-LB
CAUTION
HANDLE LOW NOISE CABLE
WITH CARE-DO NOT STEP
ON OR BEND
1 PLACE GROUND JUMPERS
ON UNUSED INPUTS AND
JUMPER J31 AND J32.
WH
RED
GND
+24
OUT
LOW-NOISE CABLE ASSEMBLY
(IRD P/N 14229-15 FTI
OR FIELD-FABRICATED-CONTACT
FACTORY FOR DETAILS
18-22GA
SHIELDED
SIGNAL CONDITIONER
TERMINAL STRIPS
1
2 SIG CHANNEL A
3 SIG GND COMMON
4
5
6 0-5VDC RECORDER CHAN A
7 GND
8 4-20MA CURRENT TRANSMITTER
9 -24VDC CHAN A
10 ANALYZER CHAN A
SHIELD
WHITE - PIN A
RED - PIN B
CABLE CLAMP SCREW
1 ANALYZER CHAN B
2 +24VDC
3 4-20MA CURRENT TRANSMITTER
4 GND CHAN B
5 0-5VDC RECORDER CHAN B
6
7
8 SIG GND COMMON
9 SIG CHANNEL B
10
SHIELD
CAUTION
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. EACH JUNCTION BOX AND CONDUIT MUST BE ELECTRICALLY BONDED TO GROUND.
SINGLE CHANNEL P/N 34294 DUAL CHANNEL P/N 34177

FIGURE 8

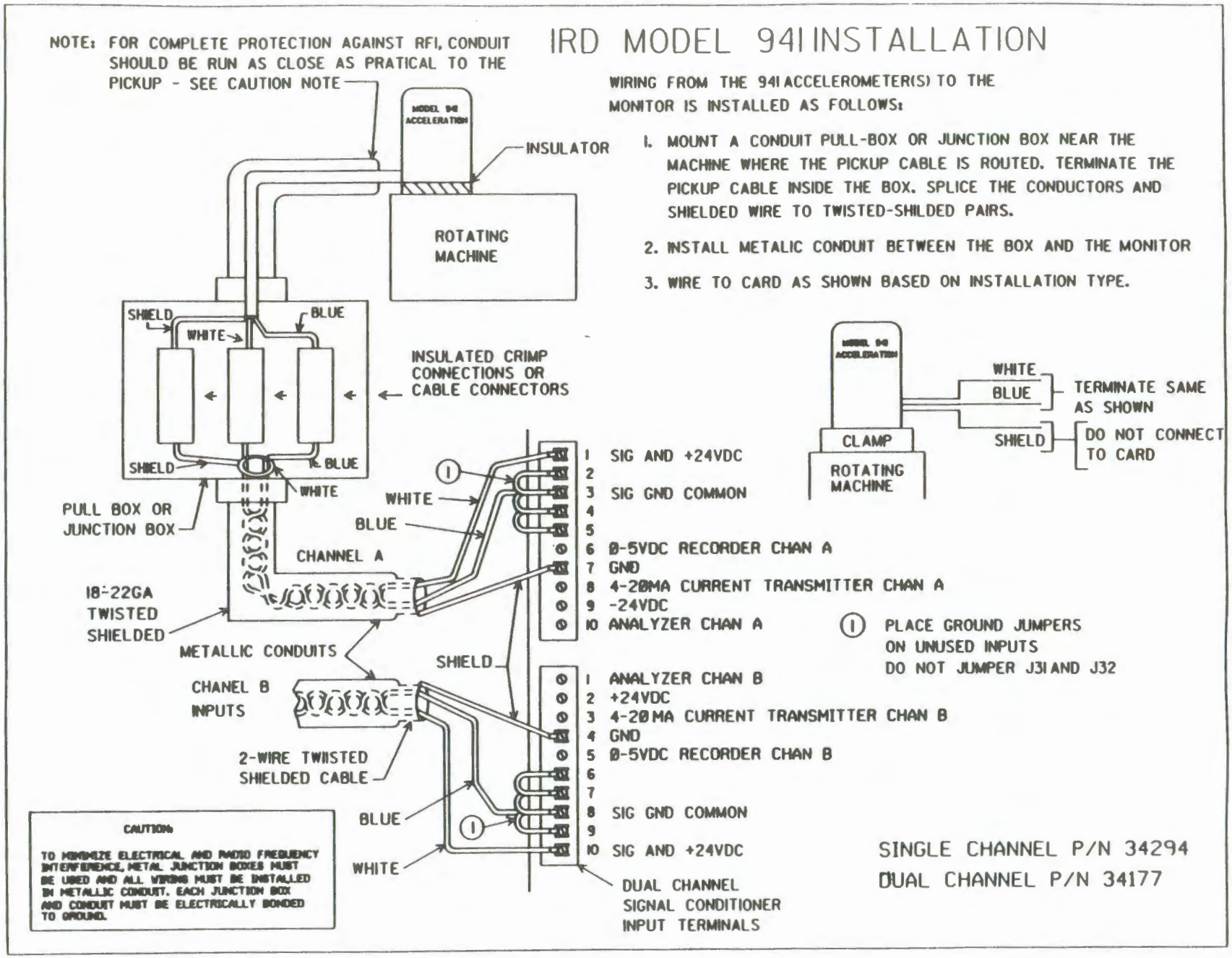

NOTE: FOR COMPLETE PROTECTION AGAINST RFI, CONDUIT SHOULD BE RUN AS CLOSE AS PRATICAL TO THE PICKUP - SEE CAUTION NOTE
IRD MODEL 941 INSTALLATION
WIRING FROM THE 941 ACCELEROMETER(S) TO THE MONITOR IS INSTALLED AS FOLLOWS:
1. MOUNT A CONDUIT PULL-BOX OR JUNCTION BOX NEAR THE MACHINE WHERE THE PICKUP CABLE IS ROUTED. TERMINATE THE PICKUP CABLE INSIDE THE BOX. SPLICE THE CONDUCTORS AND SHIELDED WIRE TO TWISTED-SHILDED PAIRS.
2. INSTALL METALIC CONDUIT BETWEEN THE BOX AND THE MONITOR
3. WIRE TO CARD AS SHOWN BASED ON INSTALLATION TYPE.
MODEL 941 ACCELERATION
INSULATOR
ROTATING MACHINE
SHIELD
WHITE
BLUE
INSULATED CRIMP CONNECTIONS OR CABLE CONNECTORS
PULL BOX OR JUNCTION BOX
CHANNEL A
18-22GA TWISTED SHIELDED
METALLIC CONDUITS
CHANEL B INPUTS
2-WIRE TWISTED SHIELDED CABLE
1 SIG AND +24VDC
2
3 SIG GND COMMON
4
5
6 0-5VDC RECORDER CHAN A
7 GND
8 4-20MA CURRENT TRANSMITTER CHAN A
9 -24VDC
10 ANALYZER CHAN A
1 ANALYZER CHAN B
2 +24VDC
3 4-20MA CURRENT TRANSMITTER CHAN B
4 GND
5 0-5VDC RECORDER CHAN B
6
7
8 SIG GND COMMON
9
10 SIG AND +24VDC
DUAL CHANNEL SIGNAL CONDITIONER INPUT TERMINALS
(1) PLACE GROUND JUMPERS ON UNUSED INPUTS DO NOT JUMPER J31 AND J32
CLAMP
TERMINATE SAME AS SHOWN
DO NOT CONNECT TO CARD
CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. EACH JUNCTION BOX AND CONDUIT MUST BE ELECTRICALLY BONDED TO GROUND.
SINGLE CHANNEL P/N 34294
DUAL CHANNEL P/N 34177

FIGURE 9

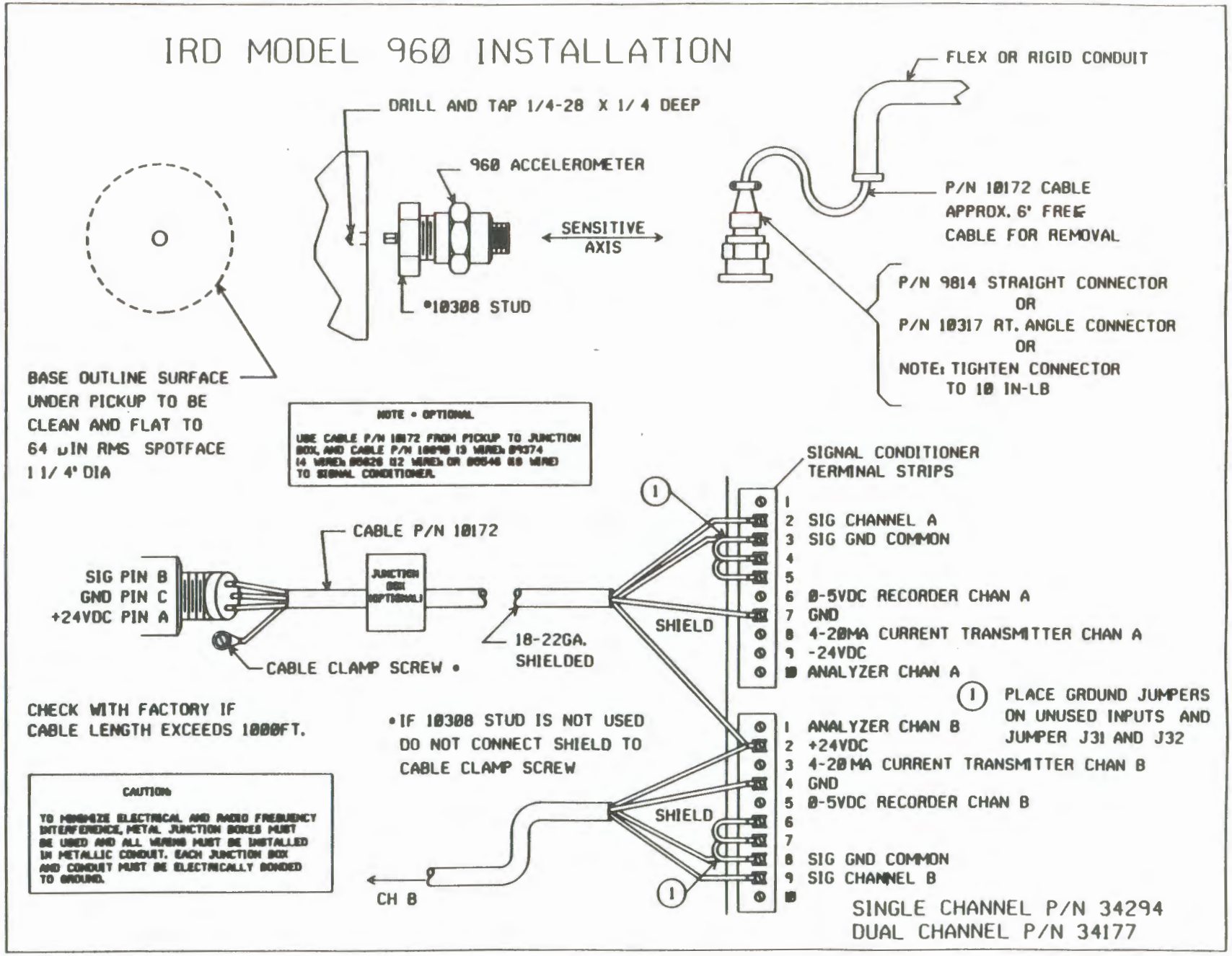

IRD MODEL 960 INSTALLATION
DRILL AND TAP 1/4-28 X 1/4 DEEP
960 ACCELEROMETER
SENSITIVE AXIS
*10308 STUD
FLEX OR RIGID CONDUIT
P/N 10172 CABLE
APPROX. 6' FREE
CABLE FOR REMOVAL
P/N 9814 STRAIGHT CONNECTOR
OR
P/N 10317 RT. ANGLE CONNECTOR
OR
NOTE: TIGHTEN CONNECTOR
TO 10 IN-LB
BASE OUTLINE SURFACE
UNDER PICKUP TO BE
CLEAN AND FLAT TO
64 µIN RMS SPOTFACE
1 1/4" DIA
NOTE * OPTIONAL
USE CABLE P/N 10172 FROM PICKUP TO JUNCTION BOX, AND CABLE P/N 10498 (3 WIRE) 89374 (4 WIRE) 89626 (12 WIRE) OR 89648 (18 WIRE) TO SIGNAL CONDITIONER.
SIGNAL CONDITIONER
TERMINAL STRIPS
CABLE P/N 10172
SIG PIN B
GND PIN C
+24VDC PIN A
JUNCTION BOX (OPTIONAL)
CABLE CLAMP SCREW *
18-22GA. SHIELDED
SHIELD
1 SIG CHANNEL A
2 SIG GND COMMON
3
4
5
6 0-5VDC RECORDER CHAN A
7 GND
8 4-20MA CURRENT TRANSMITTER CHAN A
9 -24VDC
10 ANALYZER CHAN A
(1) PLACE GROUND JUMPERS ON UNUSED INPUTS AND JUMPER J31 AND J32
CHECK WITH FACTORY IF
CABLE LENGTH EXCEEDS 1000FT.
*IF 10308 STUD IS NOT USED
DO NOT CONNECT SHIELD TO
CABLE CLAMP SCREW
1 ANALYZER CHAN B
2 +24VDC
3 4-20MA CURRENT TRANSMITTER CHAN B
4 GND
5 0-5VDC RECORDER CHAN B
6
7
8 SIG GND COMMON
9 SIG CHANNEL B
10
SHIELD
CH B
CAUTION
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. EACH JUNCTION BOX AND CONDUIT MUST BE ELECTRICALLY BONDED TO GROUND.
SINGLE CHANNEL P/N 34294
DUAL CHANNEL P/N 34177

FIGURE 10

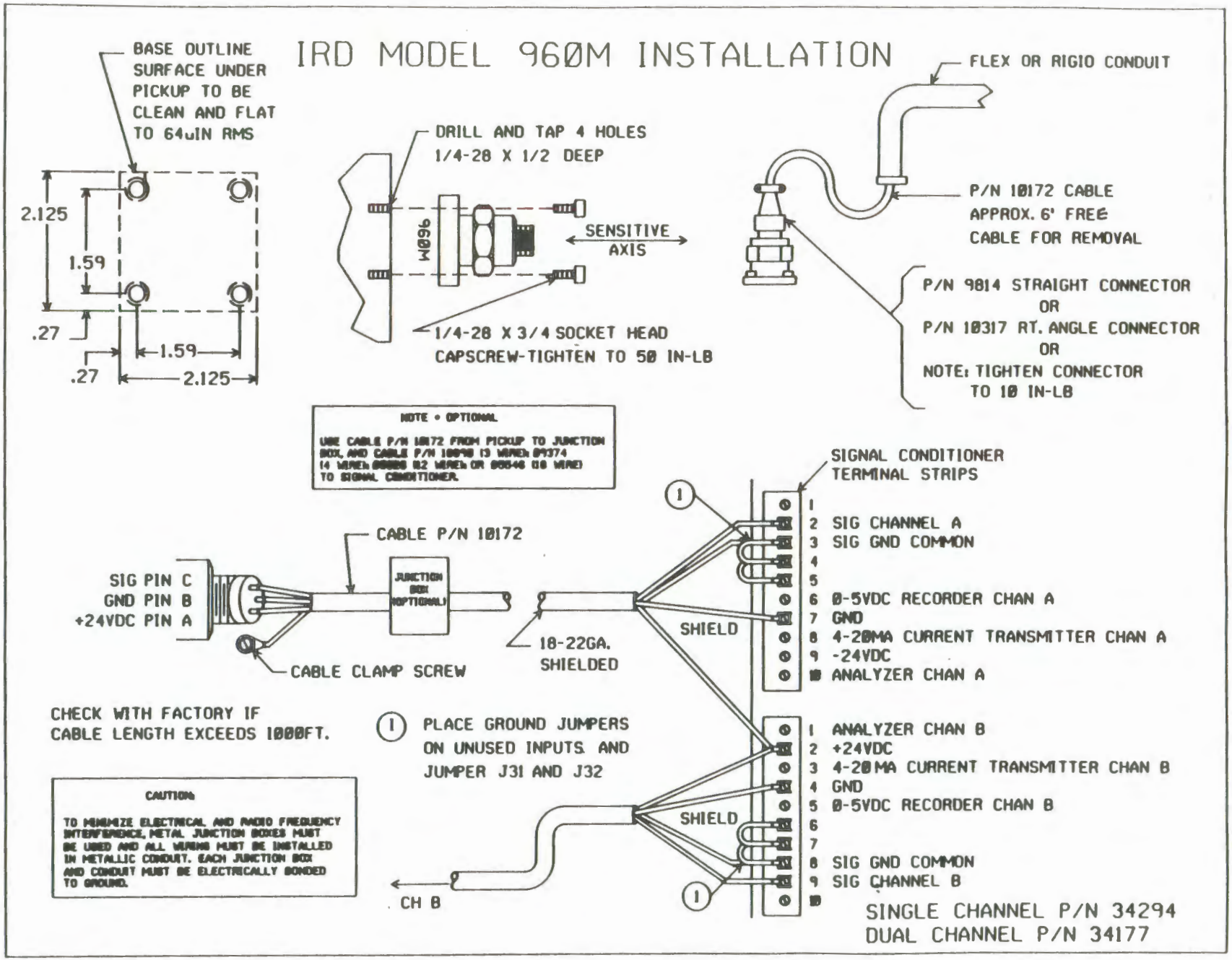

IRD MODEL 960M INSTALLATION
BASE OUTLINE SURFACE UNDER PICKUP TO BE CLEAN AND FLAT TO 64uIN RMS
2.125
1.59
.27
1.59
.27
2.125
DRILL AND TAP 4 HOLES 1/4-28 X 1/2 DEEP
960M
SENSITIVE AXIS
1/4-28 X 3/4 SOCKET HEAD CAPSCREW-TIGHTEN TO 50 IN-LB
FLEX OR RIGID CONDUIT
P/N 10172 CABLE APPROX. 6' FREE CABLE FOR REMOVAL
P/N 9814 STRAIGHT CONNECTOR
OR
P/N 10317 RT. ANGLE CONNECTOR
OR
NOTE: TIGHTEN CONNECTOR TO 10 IN-LB
NOTE • OPTIONAL
USE CABLE P/N 10172 FROM PICKUP TO JUNCTION BOX, AND CABLE P/N 10098 (3 WIRE) 09374 (4 WIRE) 09885 (2 WIRE) OR 09546 (8 WIRE) TO SIGNAL CONDITIONER.
SIGNAL CONDITIONER TERMINAL STRIPS
CABLE P/N 10172
SIG PIN C
GND PIN B
+24VDC PIN A
JUNCTION BOX (OPTIONAL)
CABLE CLAMP SCREW
18-22GA. SHIELDED
SHIELD
1 2 SIG CHANNEL A
3 SIG GND COMMON
4
5
6 0-5VDC RECORDER CHAN A
7 GND
8 4-20MA CURRENT TRANSMITTER CHAN A
9 -24VDC
10 ANALYZER CHAN A
1 ANALYZER CHAN B
2 +24VDC
3 4-20MA CURRENT TRANSMITTER CHAN B
4 GND
5 0-5VDC RECORDER CHAN B
6
7
8 SIG GND COMMON
9 SIG CHANNEL B
10
SHIELD
CH B
CHECK WITH FACTORY IF CABLE LENGTH EXCEEDS 1000FT.
1 PLACE GROUND JUMPERS ON UNUSED INPUTS AND JUMPER J31 AND J32
CAUTION:
TO MINIMIZE ELECTRICAL AND RADIO FREQUENCY INTERFERENCE, METAL JUNCTION BOXES MUST BE USED AND ALL WIRING MUST BE INSTALLED IN METALLIC CONDUIT. EACH JUNCTION BOX AND CONDUIT MUST BE ELECTRICALLY BONDED TO GROUND.
SINGLE CHANNEL P/N 34294
DUAL CHANNEL P/N 34177

FIGURE 11