HIRSCHMANN

PAT

LENGTH-ANGLE-RADIUS-LOAD INDICATING SYSTEM

EI 65/0005

INSTALLATION MANUAL

P/N 031-300-190-008, Rev. A, 6/14/00

NOTICE

The information in this document is subject to change without notice.

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PAT shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this manual.

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11. 031 300 31 0983 Wiring Diagram for 7 conductor reel with 1 force sensor
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13. 031 300 31 1211 Parts List for 14 conductor reel with 2 force sensors

1. GENERAL INFORMATION

This Installation Handbook will show the approximate location of components and wiring diagrams required for system operation. This handbook has four different system component and wiring diagrams; therefore, use the drawings that match your system, as shown below:

1. 031-300-100-431 EI65 SYSTEM WITH LINERIDER, HYDRAULIC CRANE
   - 031-300-100-233 CONSOLE KIT
   - 031-300-100-234 A2B BOOM COMPONENT KIT
2. 031-300-100-887 EI65 SYSTEM WITH FORCE TRANSDUCER, HYDRAULIC CRANE
   - 031-300-100-233 CONSOLE KIT
   - 031-300-100-366 A2B BOOM COMPONENT KIT
3. 031-300-100-983 EI65 SYSTEM; 1 FORCE SENSOR AND 7 COND. REEL, LATTICE CRANE
4. 031-300-101-211 EI65 SYSTEM; 2 FORCE SENSORS AND 14 COND. REEL, LATTICE CRANE

Prior to starting the installation, it is advised to review the drawings and define the component locations on the crane. The Length-Angle-Radius-Load Indicating System EI 65 must be calibrated after completing installation.

Reference Information to PAT Angle-Length-Radius-Load Indicator System:
EI 65 Operator's Manual: 056-065-190-005.
EI 65 Calibration Manual: 031-300-190-009.

2. WARNINGS

- Always refer to operational instructions and load charts provided by the crane manufacturer for specific crane operation and load limits.
- The Length-Angle-Radius-Load Indicating System EI 65 is not and shall not be a substitute for good operator judgment, experience, or use of acceptable safe operating procedures.
- The operator is responsible for operating the crane within the manufacturer's specified parameters.
- The crane operator shall ensure that all warnings and instructions provided by the manufacturer are fully understood, observed, and remain with the crane.
- Prior to operating the crane, the operator must carefully read and understand the information in the Operator's Handbook so that he knows the operation and limitations of the Length-Angle-Radius-Load Indicating System EI 65.

3. INSTALLATION

Select the correct EI65 system drawings in Appendix A for your component installation and wiring system, as shown below:

Hydraulic Crane

1. 031 300 02 0431 Parts List with linerider
   - 031 300 31 0233 Console wiring diagram
   - 031 300 31 0234 A2B boom component wiring diagram
2. 031 300 02 0887 Parts List with force transducer, hydraulic crane
   - 031 300 31 0233 Console wiring diagram
   - 031 300 31 0366 A2B boom component wiring diagram

Optional diagrams (System additional components available upon request)

031 300 10 0657 Parts List - A2B swingaway jib

031 300 31 0657 Wiring Diagram - A2B swingaway jib

031 300 31 0197 Wiring Diagram - Key switch lockout box

Lattice Crane

3. 031 300 02 0983 Parts List for 7 conductor reel with 1 force sensor

031 300 31 0983 Wiring Diagram for 7 conductor reel with 1 force sensor

4. 031 300 02 1211 Parts List for 14 conductor reel with 2 force sensors

031 300 31 1211 Wiring Diagram for 14 conductor reel with 2 force sensors

Optional jib kits are shown on parts list (the additional components available upon request)

⚠ WARNING

CONTACT CRANE MANUFACTURER FOR WELDING INSTRUCTION PRIOR TO WELDING ON BOOM.

Use the drawings in Appendix A to install your system. The next sections give instructions for linerider, length and angle sensors.

4. LINERIDER INSTALLATION

The line tensiometer (linerider) installation will depend on the type of boom. Follow the applicable instructions for a hydraulic (A) or lattice (B) boom.

LINERIDER GENERAL INFORMATION

The linerider is attached to the swing arm mounting bracket as shown in Figure 1. The swing arm assembly has four joints:

1. Vertical movement at the attachment point to the linerider.
2. Horizontal movement of the swing arm.
3. Vertical movement of the swing arm.
4. Swivels horizontally around the mounting bolt.

The mounting bolt secures the swing arm to the machine.

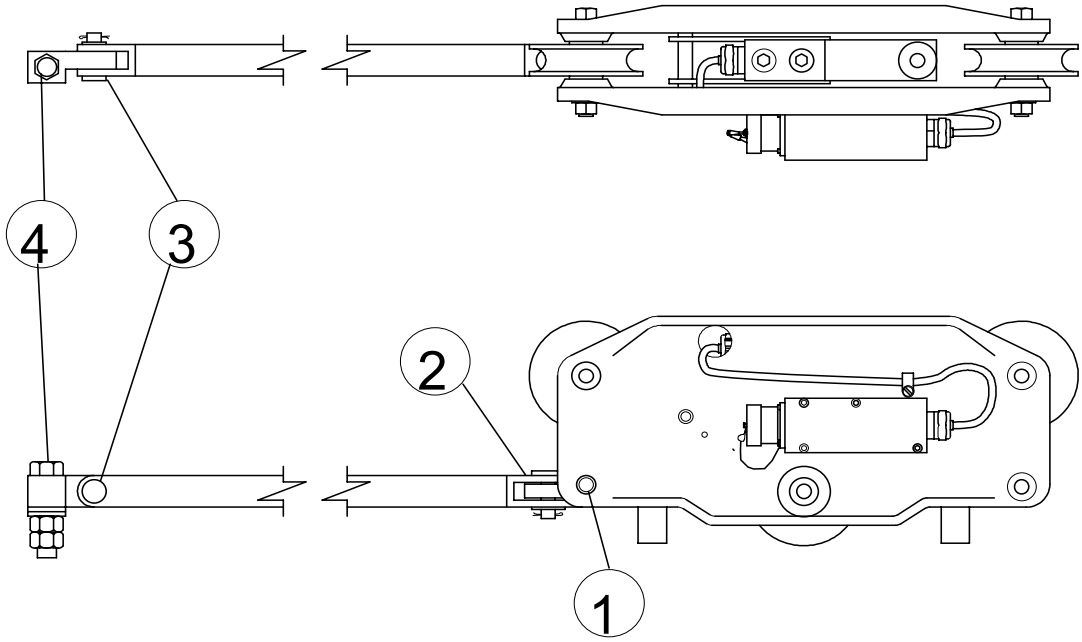

Figure 1. Linerider and Swing Arm.

A. HYDRAULIC BOOM MACHINES

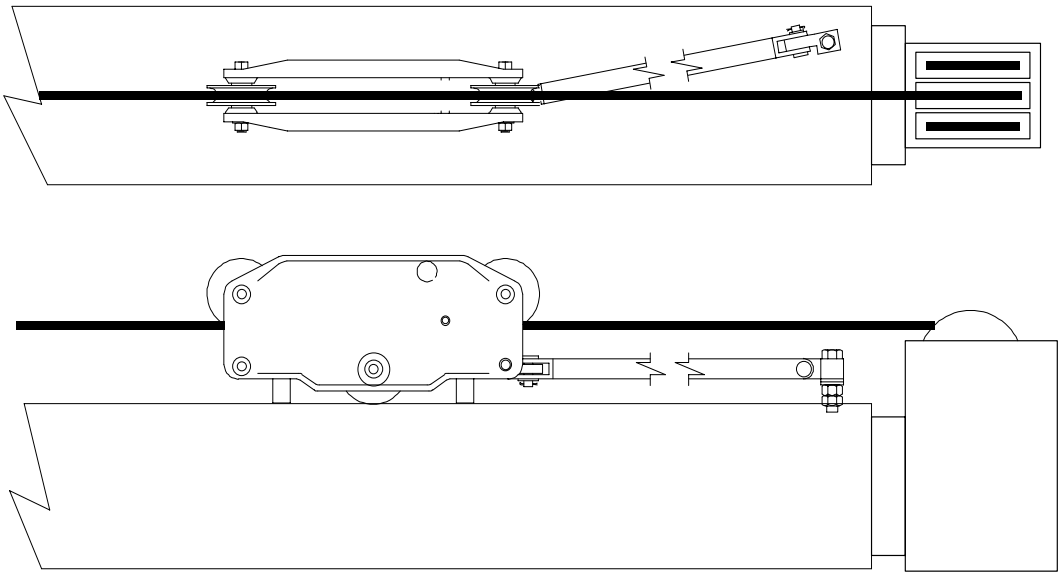

Figure 2. Hydraulic Boom Linerider Installation.

⚠ WARNING

CONTACT CRANE MANUFACTURER FOR WELDING INSTRUCTION PRIOR TO WELDING ON BOOM.

A.1. Affix the bolt at the tip of the base section on the main boom similar to Figure 2. Select a location that the swing arm angle with respect to the boom will not exceed 30°(see Figure 3). The linerider should be located as close to the boom tip as possible.

A.2 Attach the swing arm to the bolt.

A.3. Run the hoist line through the linerider.

A.4. Attach the swing arm to the linerider.

A.5. Ensure freedom of movement side to side

A.6. Connect linerider electrically with cable provided.

A.7. Connect the linerider extension to the console cable at boom base.

B. LATTICE BOOM MACHINES

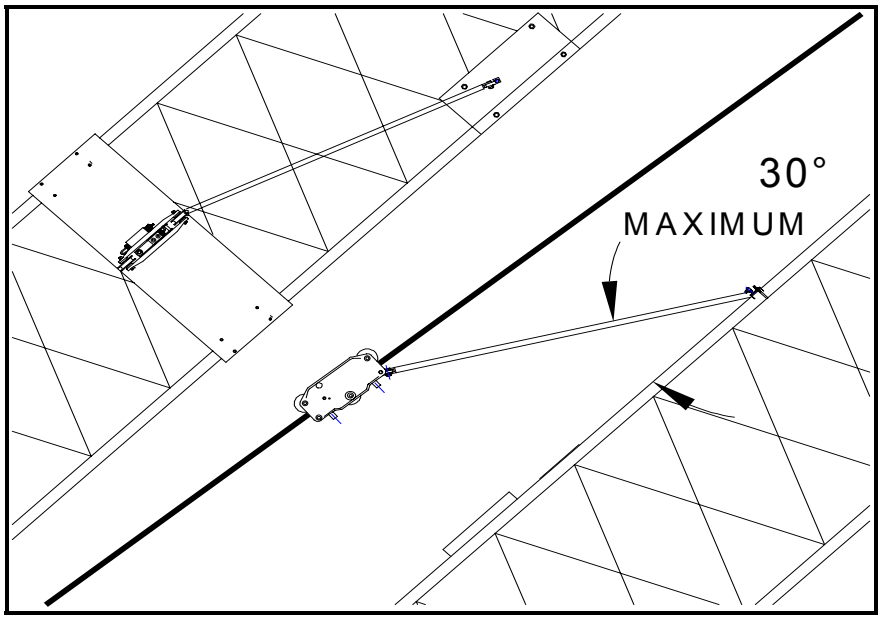

Figure 3. Lattice Boom Linerider Installation.

⚠ WARNING

CONTACT CRANE MANUFACTURER FOR WELDING INSTRUCTION PRIOR TO WELDING ON BOOM.

B.1. Select a location that the swing arm angle with respect to the boom will not exceed 30°(see Figure 3). The linerider should be located as close to the boom tip as possible.

B.2. Construct two base plates. Size of base plates will be specific to the lattice structure and your selected location.

1. The first base plate will be attached to the boom with the swing arm bolt affixed to the center of the base plate.
2. The second base plate will be attached to the boom so that it supports the linerider when not in use.

B.3. Affix the swing arm bolt to the center of the first base plate.

B.4. Affix the first base plate to the selected location on the lattice boom.

B.5. Attach the swing arm to the bolt.

B.6. Run the hoist line through the linerider.

B.7. Attach the swing arm to the linerider.

B.8. Ensure freedom of movement side to side

B.9. Attach the second base plate to the boom so the linerider rubber supports will touch the plate when there is no load.

B.10. Connect linerider electrically with cable provided.

5. MECHANICAL ADJUSTMENT OF CABLE REEL SENSORS

HYDRAULIC CRANE

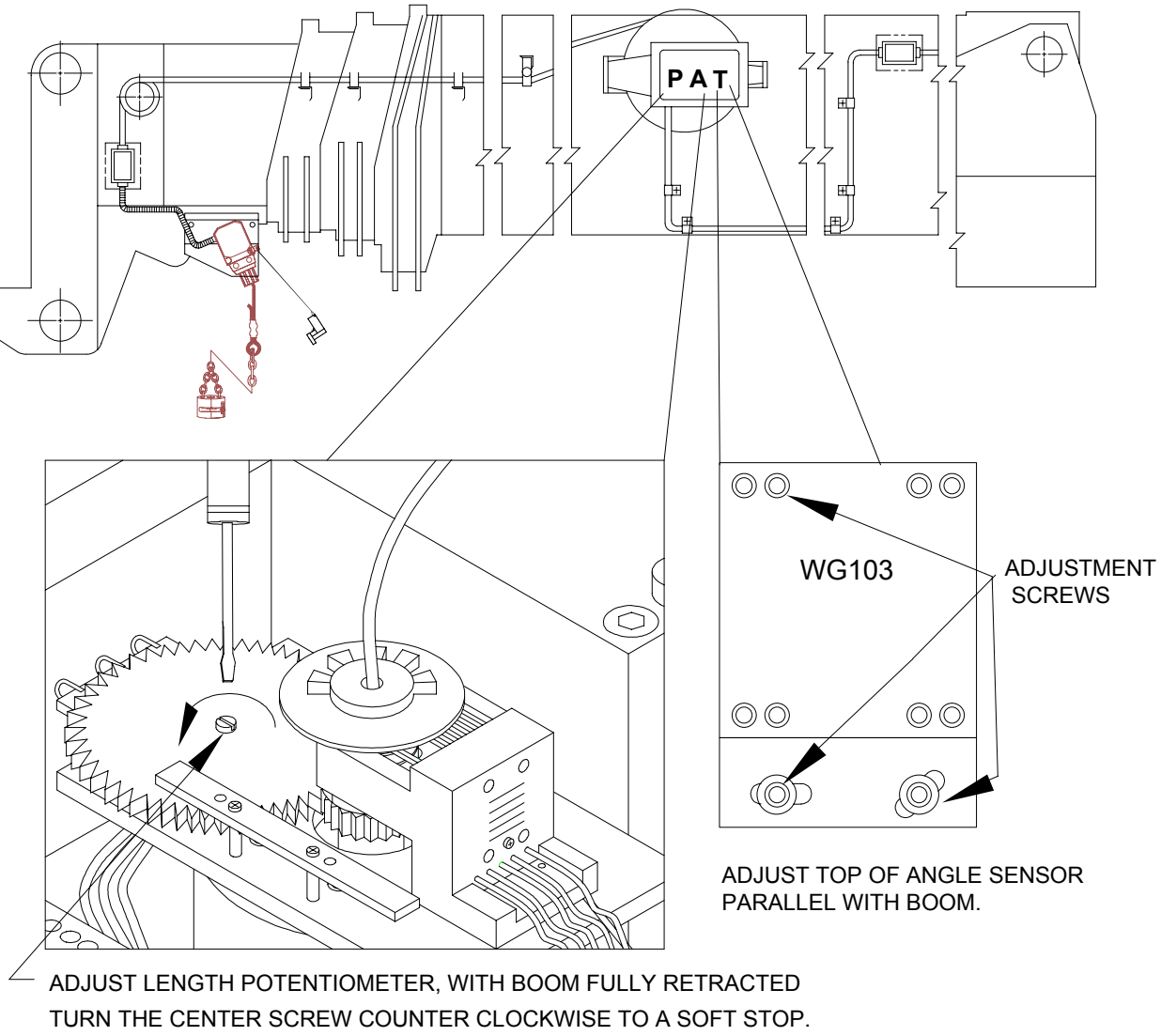

Figure 4. Hydraulic Boom Length and Angle Adjustments.

6. LATTICE CRANE ANGLE SENSOR ADJUSTMENT

The angle ϕ shown in Figure 1 needs to be within +0, -0.4 of the actual angle of the boom. Check boom angle at base/heel section only. After adjustment, compare the actual boom angle with the displayed angle at about 0°, 30° and 60°. To comply with the SAE J375 standards the displayed angle must be +0.0° to -2.0° of the actual angle.

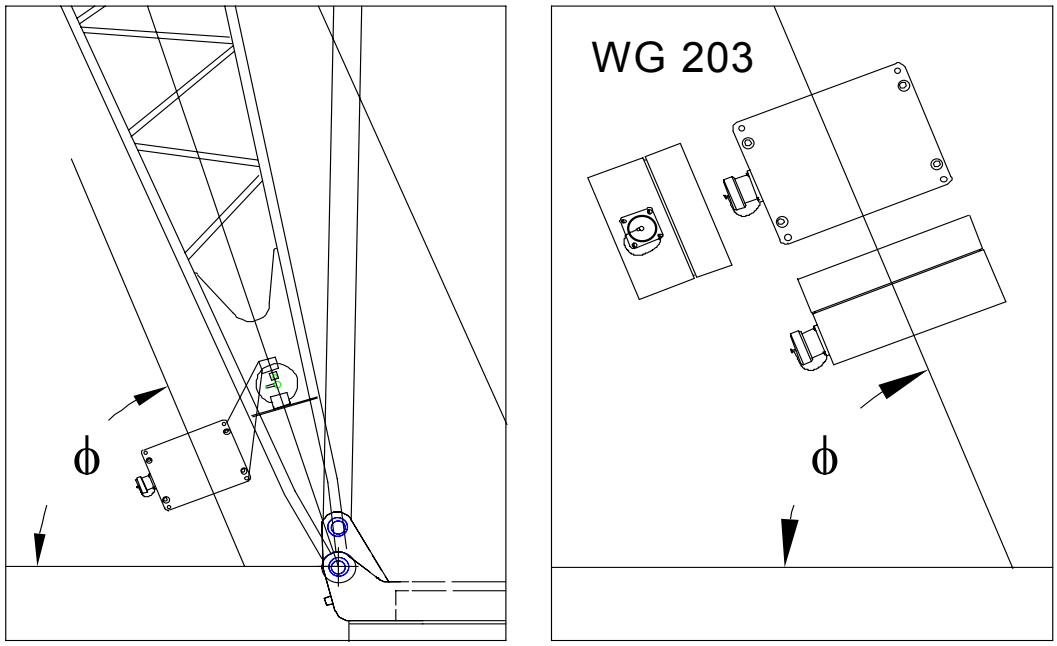

Figure. 4. Lattice Boom Angle Sensor Adjustment.

7. APPENDIX A. SYSTEM DRAWINGS

Drawing list:

1.	031 300 02 0431	Parts List with linerider
2.	031 300 31 0233	Console wiring diagram
3.	031 300 31 0234	A2B boom component wiring diagram
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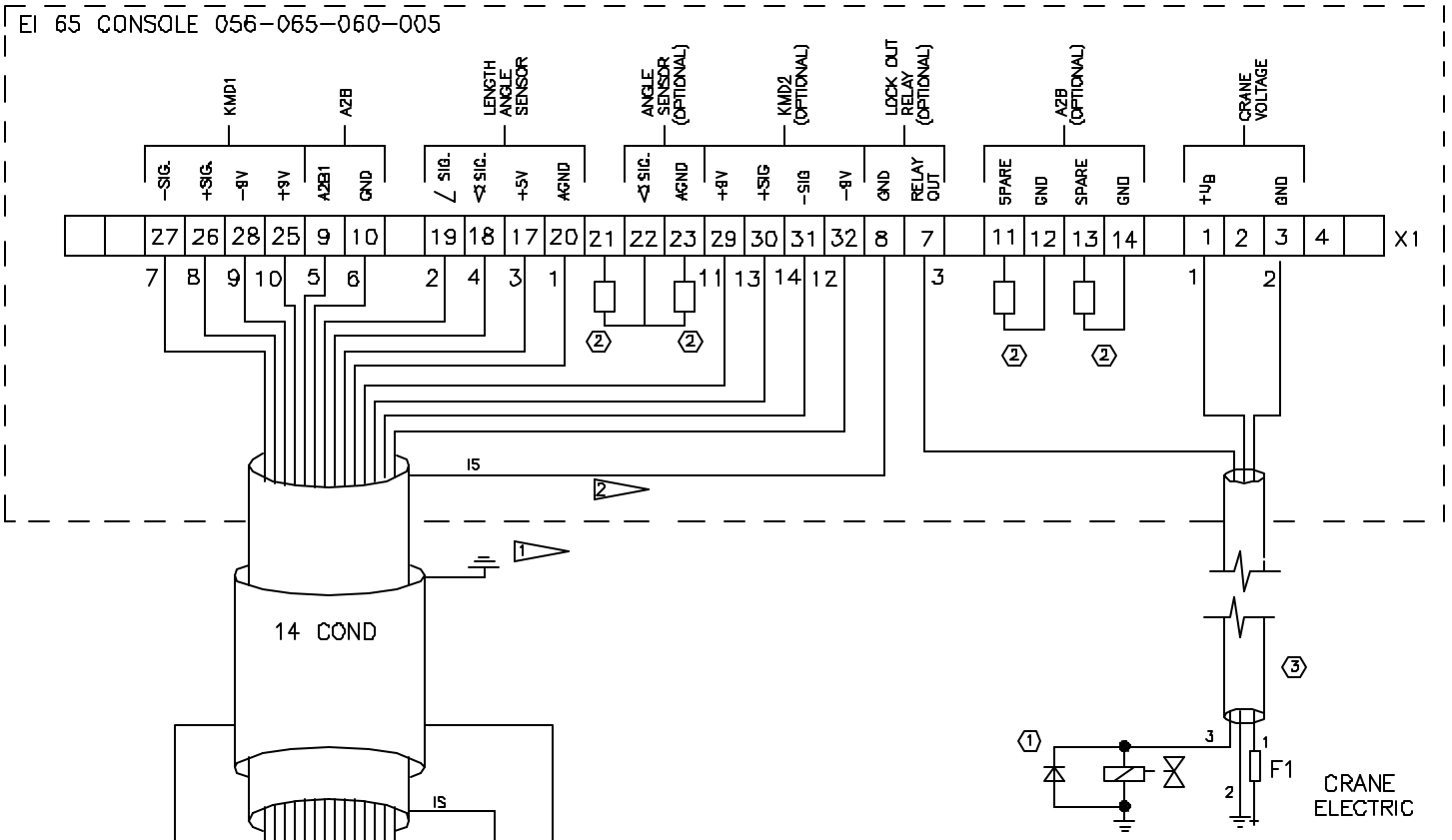
13.	031 300 31 1211	Parts List for 14 conductor reel with 2 force sensors



TERMINAL DESIGNATIONS	
1	+ Battery
2	+ Battery
3	- Battery
4	- Battery
5	A2B Relay output 1
6	A2B Relay output 2
7	Min Wrap Relay output
8	Peripheral ground
9	A2B 1 input
10	A2B Ground
11	A2B 2 input
12	A2B Ground
13	3rd Wrap Switch input
14	3rd Wrap Switch ground
15	Digital input 1
16	Digital Input 2
17	+5VDC
18	Main Boom angle Input
19	Main Boom Length Input
20	Analog Ground
21	+5VDC
22	Jib Angle Input
23	Analog Ground
24	Analog Ground
25	+9VDC
26	KMD1 +Signal Input
27	KMD1 -Signal Input
28	-9VDC
29	+9VDC
30	KMD2 +Signal Input
31	KMD2 -Signal Input
32	-9VDC

NOTES:

1. OUTER SHIELD GROUNDED AT STRAIN RELIEF CONNECTOR
2. INSULATED WIRE SOLDERED TO INNER SHIELD AND CONNECTED AS SHOWN

KMD1 = FORCE TRANSDUCER/LINE RIDER MAIN HOIST

KMD2 = FORCE TRANSDUCER/LINE RIDER AUX. HOIST (OPTIONAL)

1. EACH SOLENOID VALVE OR MAGNET DEVICE TO BE INSTALLED WITH DIODE IN4003....IN4007 AS SHOWN
2. INSTALL CARBON RESISTOR 4K7 AS SHOWN; WHEN NOT IN USE
3. REFER TO CRANE ELECTRIC SCHEMATICS
4. OPTIONAL (REFER TO DETAIL DRAWING)

SEE REFERENCES FOR SYSTEM REQUIREMENTS.
REFERENCES:
CALIBRATION HANDBOOK 031-300-190-009
OPERATION HANDBOOK 056-065-080-005

PAT EQUIPMENT CORPORATION
1665 ORCHARD DRIVE
CHAMBERSBURG, PA 17201

GENERAL TOLERANCES
X.XX = 0.01
X.XXX = 0.005

REV	ECN	DESCRIPTION	BY	APV	DATE

EI 65 CONSOLE WIRING DIAGRAM

P/N 031-300-100-233

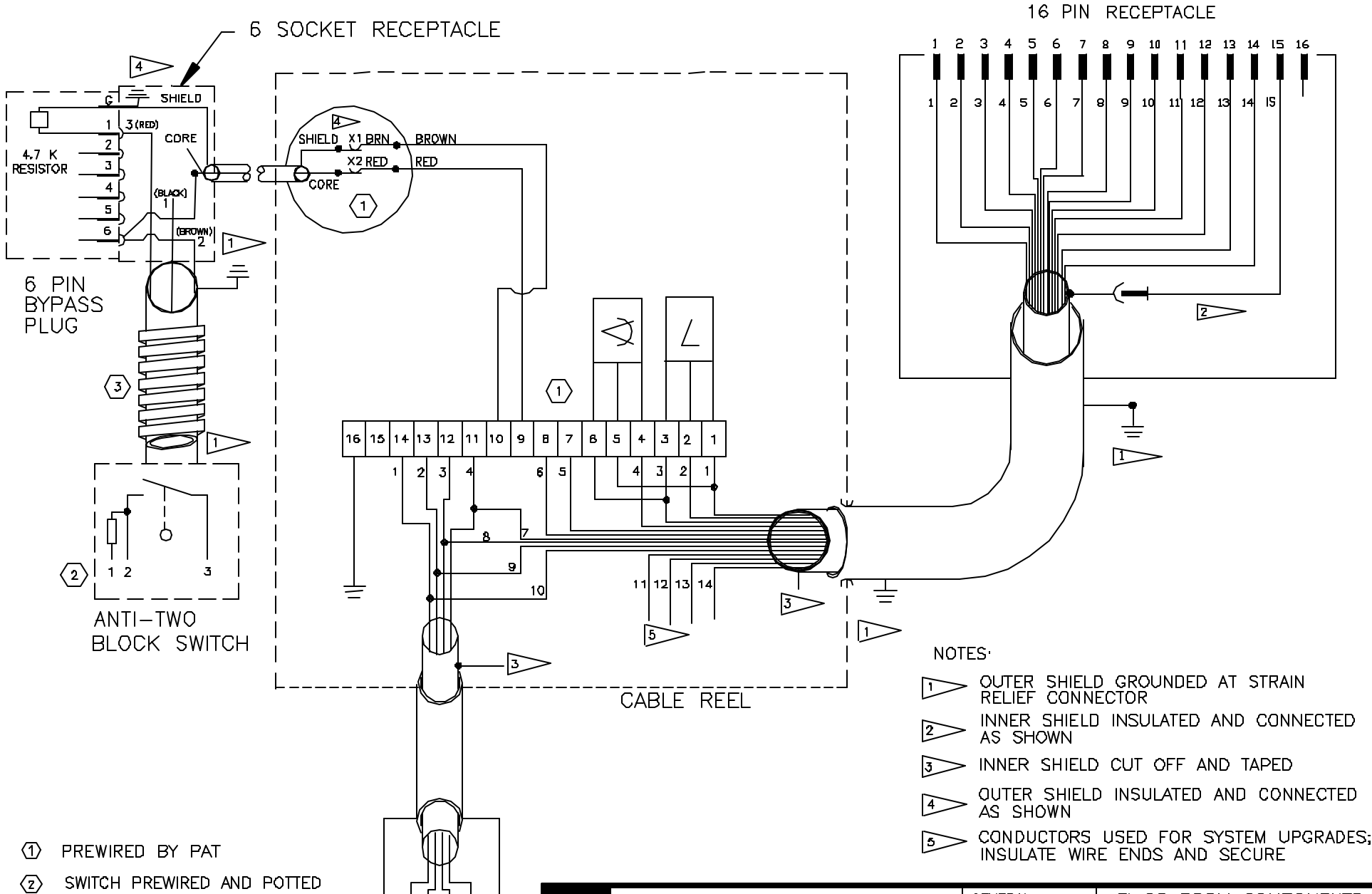
DRAWN CHRIS HERTZLER 05/28/97
APPROVED CHRIS HERTZLER 05/28/97

SCALE: NONE SHEET: 1 OF 1

SIZE A DWG NO. 031 300 31 0233 REV —

B70153

C.A.G.E 79760



NOTES:

1. OUTER SHIELD GROUNDED AT STRAIN RELIEF CONNECTOR
2. INNER SHIELD INSULATED AND CONNECTED AS SHOWN
3. INNER SHIELD CUT OFF AND TAPED
4. OUTER SHIELD INSULATED AND CONNECTED AS SHOWN
5. CONDUCTORS USED FOR SYSTEM UPGRADES; INSULATE WIRE ENDS AND SECURE

1. PREWIRED BY PAT
2. SWITCH PREWIRED AND POTTED
3. INSTALL SUPPLIED CONDUIT OVER A2B CABLE

ANGLE SENSOR

LENGTH SENSOR

PAT EQUIPMENT CORPORATION
1665 ORCHARD DRIVE
CHAMBERSBURG, PA 17201

GENERAL TOLERANCES
X.XX = 0.01
X.XXX = 0.005

REV	ECN	DESCRIPTION	BY	APV	DATE
A	990101	CHG SLIP RING WIRING	CSH	CSH	07/06/99

B70153

C.A.G.E. 79760

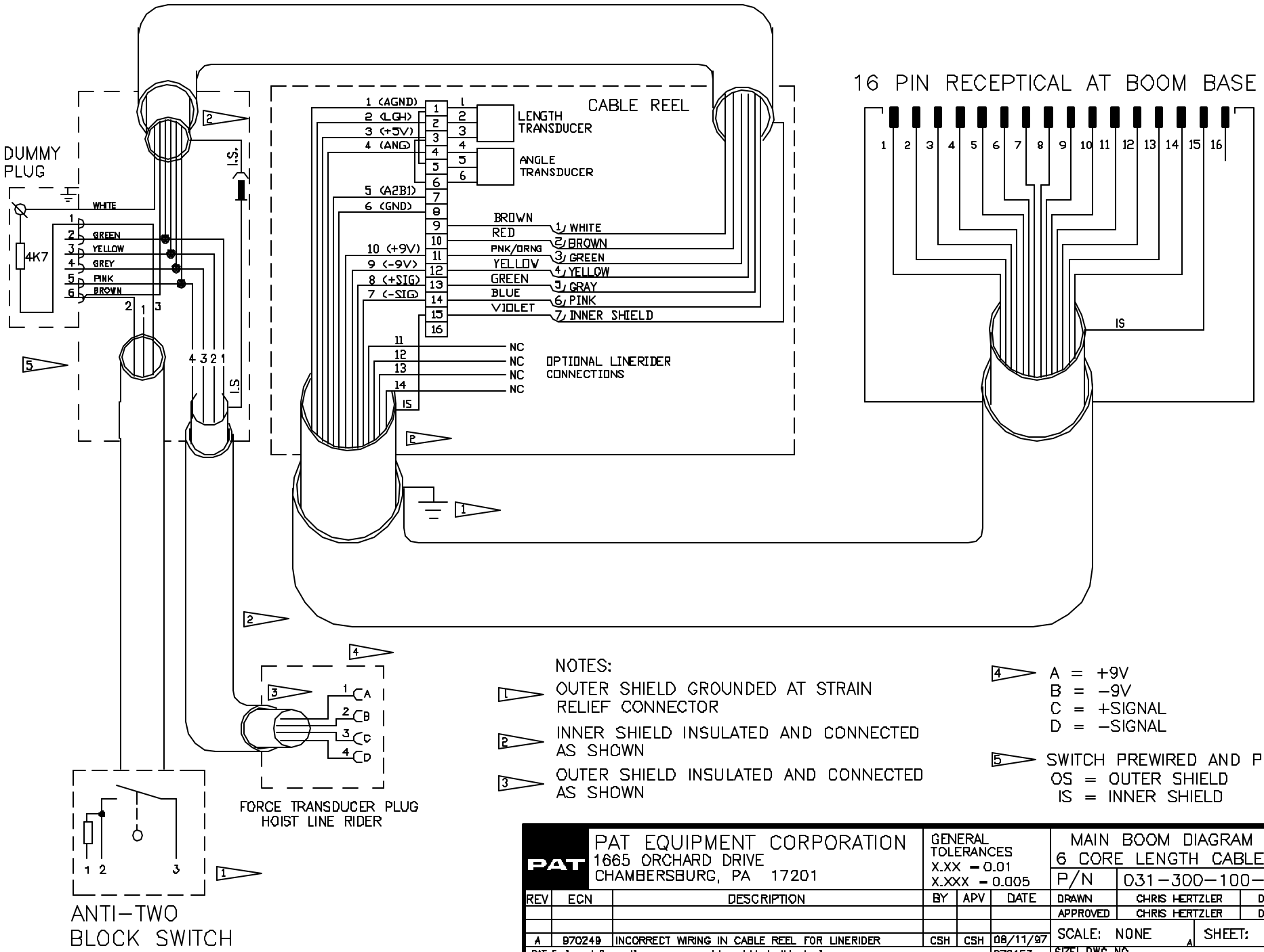
EI 65 BOOM COMPONENTS
2 CORE LENGTH CABLE REEL

P/N 031-300-100-234

DRAWN	CHRIS HERTZLER	05/28/97
APPROVED	CHRIS HERTZLER	05/28/97

SCALE: NONE A SHEET: 1 OF 1

SIZE A DWG NO. 031 300 31 0234 REV —



NOTES:

1. OUTER SHIELD GROUNDED AT STRAIN RELIEF CONNECTOR
2. INNER SHIELD INSULATED AND CONNECTED AS SHOWN
3. OUTER SHIELD INSULATED AND CONNECTED AS SHOWN
4. A = +9V
   B = −9V
   C = +SIGNAL
   D = −SIGNAL
5. SWITCH PREWIRED AND POTTED
   OS = OUTER SHIELD
   IS = INNER SHIELD

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CHAMBERSBURG, PA 17201

GENERAL TOLERANCES
X.XX = 0.01
X.XXX = 0.005

MAIN BOOM DIAGRAM WITH 6 CORE LENGTH CABLE REEL

P/N 031-300-100-366

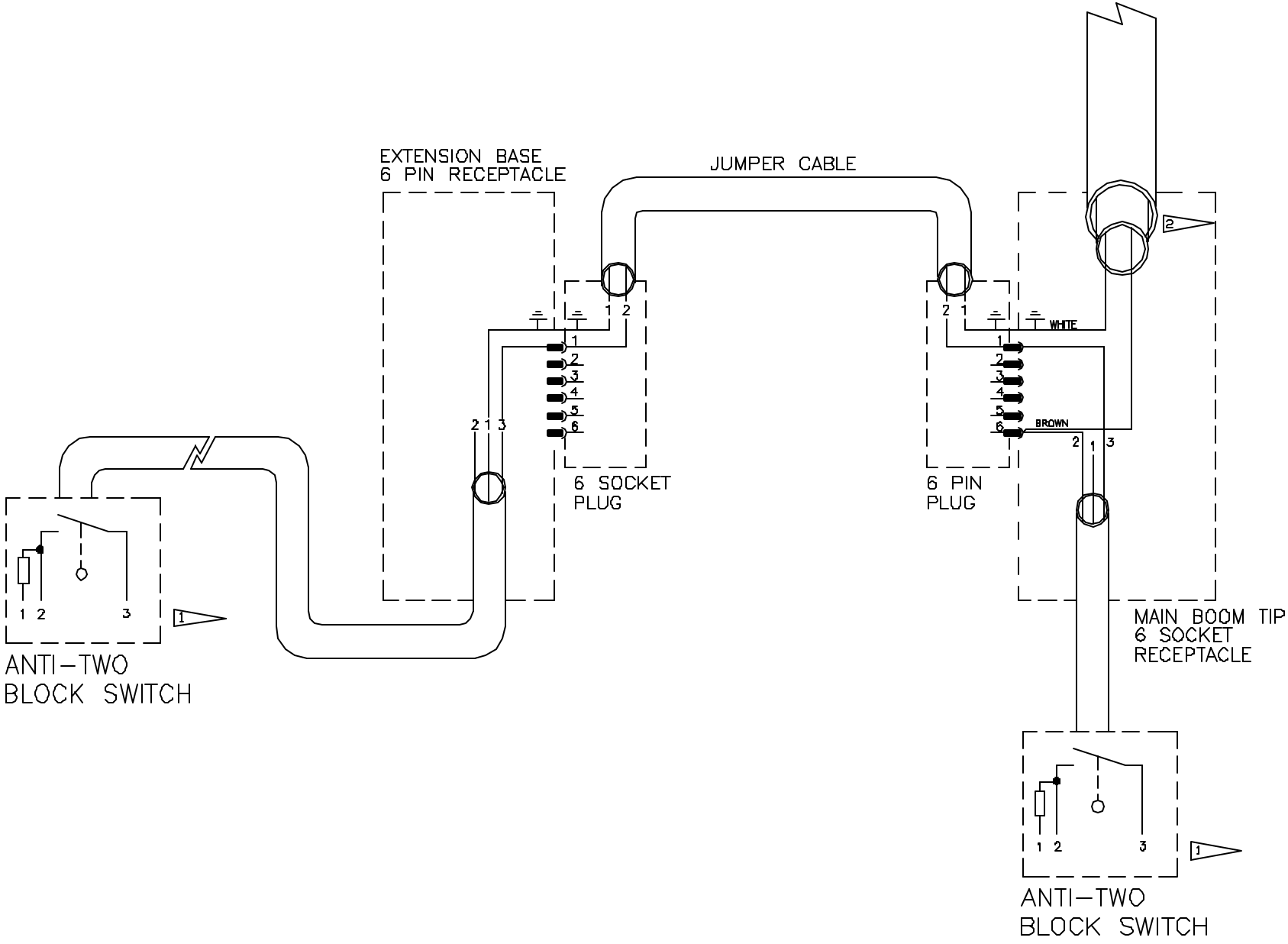
REV	ECN	DESCRIPTION	BY	APV	DATE
A	970249	INCORRECT WIRING IN CABLE REEL FOR LINERIDER	CSH	CSH	08/11/97

DRAWN CHRIS HERTZLER 05/28/97
APPROVED CHRIS HERTZLER 05/28/97
SCALE: NONE
SHEET: 1 OF 1

970153

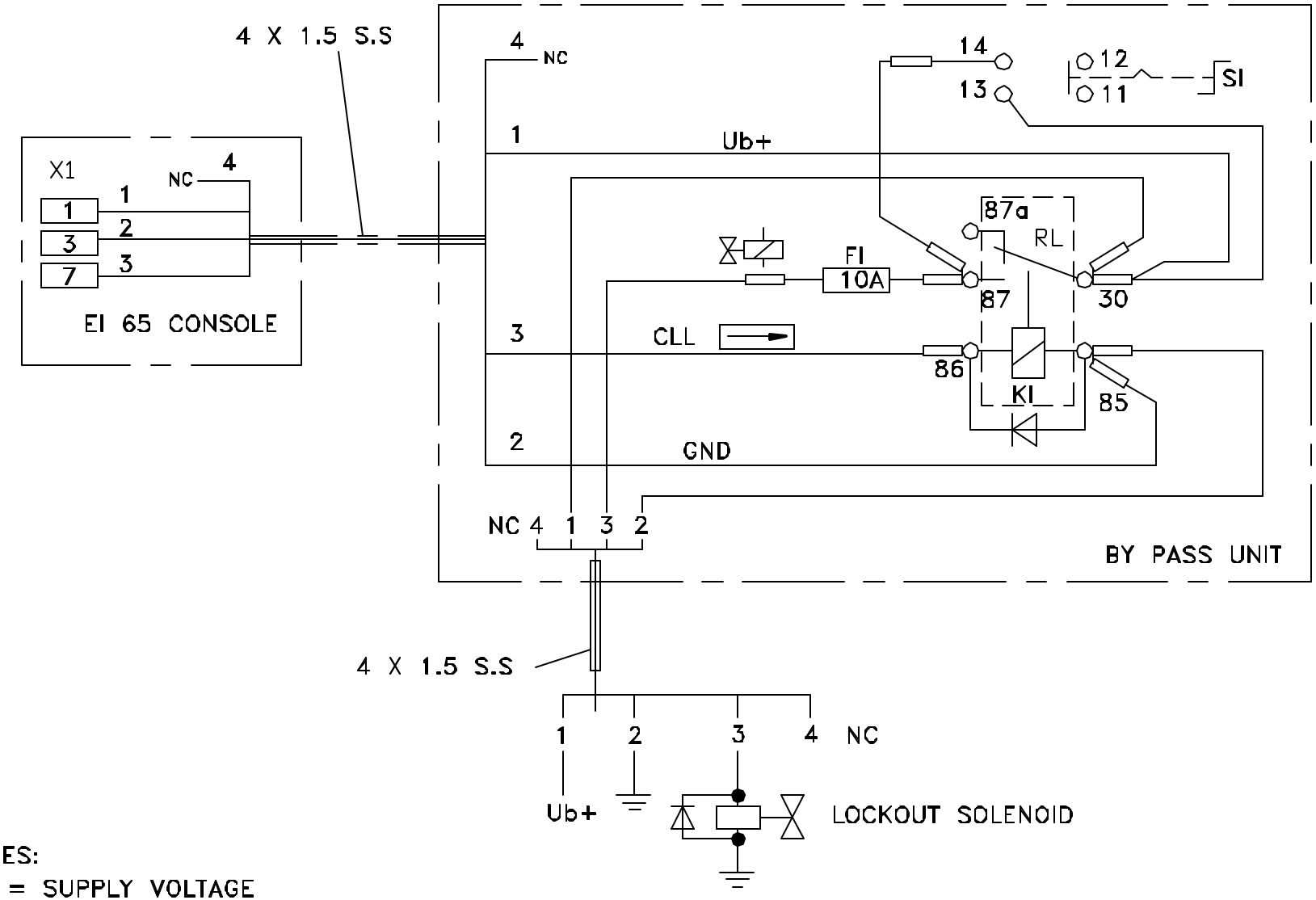
SIZE A | DWG NO. 031 300 31 0366 | REV A

C.A.G.E 79760



PAT	PAT EQUIPMENT CORPORATION 1665 ORCHARD DRIVE CHAMBERSBURG, PA 17201				GENERAL TOLERANCES X.XX = 0.01 X.XXX = 0.005		SWING AWAY EXTENSION KIT WIRING DIAGRAM	
							P/N	031-300-100-657
REV	ECN	DESCRIPTION	BY	APV	DATE		DRAWN	CHRIS HERTZLER 08/12/97
							APPROVED	CHRIS HERTZLER 08/12/97
							SCALE: NONE	SHEET: 1 OF 1
						B7025D	SIZE A	DWG NO. 031 300 31 0657 REV —

C.A.G.E. 79760



NOTES:

+UB = SUPPLY VOLTAGE
GND = GROUND
CLL = CENTRAL LEVER LOCKOUT SYSTEM
RL = RELAY
SI = BYPASS KEY SWITCH
FI = FUSE
NC = NOT CONNECTED

PAT AMERICA, Inc.
1665 ORCHARD DRIVE
CHAMBERSBURG, PA 17201

KEY SWITCH LOCKOUT BOX ASSEMBLY
WIRING DIAGRAM

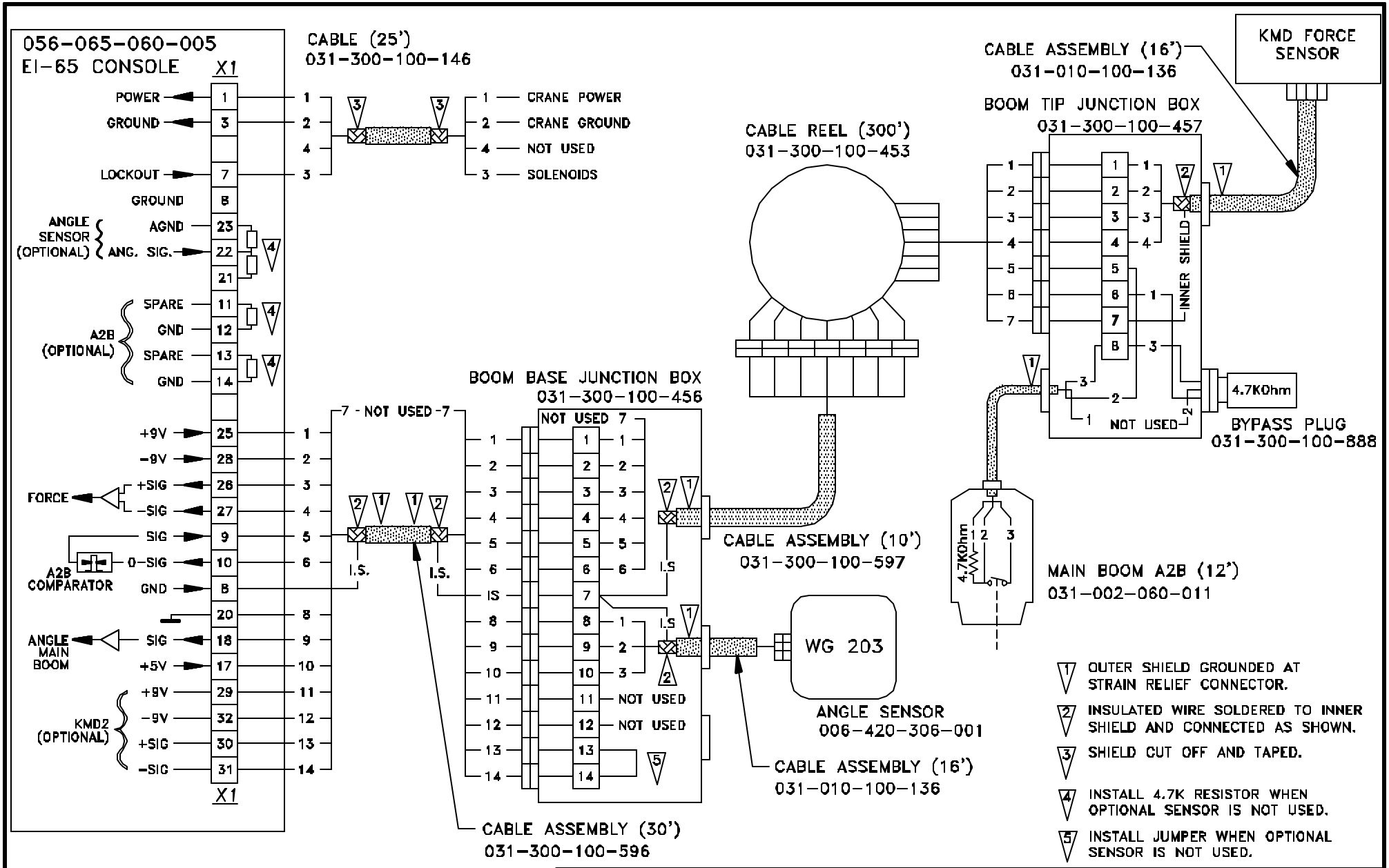
GENERAL TOLERANCES X.XX = 0.01 X.XXX = 0.005

P/N 031-300-100-197

REV	ECN	DESCRIPTION	BY	APV	DATE
C	990085	ADD NOTES & CHG FUSE TO 10A FROM 1A	CSH	CSH	06/23/99
B	990053	DEL TERMINAL STRIP, CHG TITLE BLOCK	CSH	CSH	04/15/99
A	970195	ADD RELAY, 4X1.5 SS FROM CRANE ELEC TO LOCKOUT	CSH	CSH	06/18/97

DRAWN SHEILA BOWMAN 5/22/96
APPROVED CHRIS HERTZLER 05/02/97
SCALE: NONE SHEET: 1 OF 1
SIZE A DWG NO. 031 300 31 0197 REV C

C.A.G.E. 79780



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1665 ORCHARD DRIVE
CHAMBERSBURG, PA 17201

GENERAL TOLERANCES
X.XX = 0.01
X.XXX = 0.005

EI 65 SYSTEM 7 COND REEL LATTICE BOOM WIRING

P/N 031-300-100-983

REV	ECN	DESCRIPTION	BY	APV	DATE

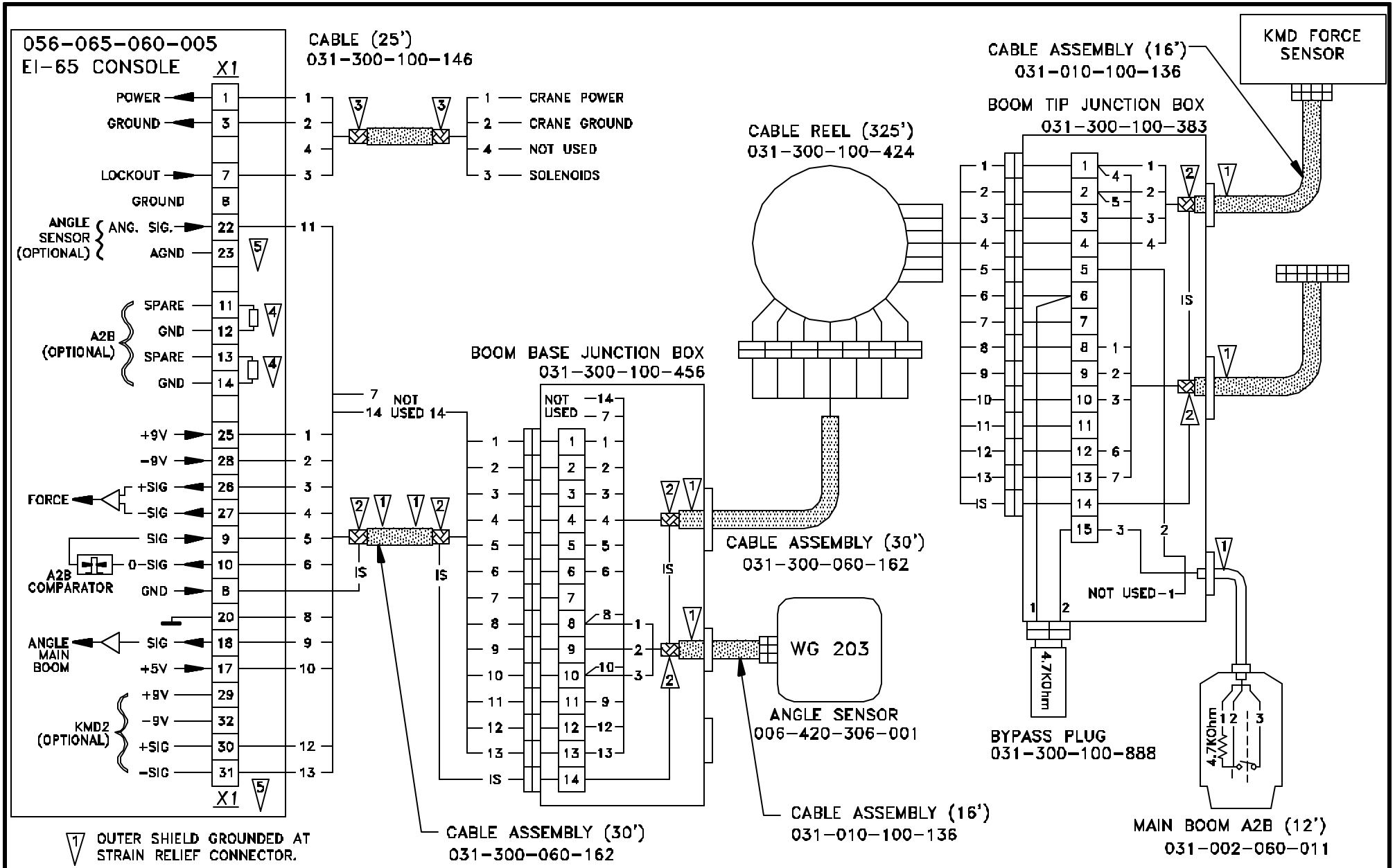
DRAWN	CHRIS HERTZLER	05/30/97
APPROVED	CHRIS HERTZLER	05/30/97

SCALE: NONE SHEET: 1 OF 1

B70174

SIZE A | DWG NO. 031 300 31 0983 | REV —

C.A.G.E 79760



1. OUTER SHIELD GROUNDED AT STRAIN RELIEF CONNECTOR.
2. INSULATED WIRE SOLDERED TO INNER SHIELD AND CONNECTED AS SHOWN.
3. SHIELD CUT OFF AND TAPED.
4. INSTALL 4.7K RESISTOR WHEN OPTIONAL SENSOR IS NOT USED.
5. INSTALL JUMPER WHEN OPTIONAL SENSOR IS NOT USED.

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1665 ORCHARD DRIVE
CHAMBERSBURG, PA 17201

GENERAL TOLERANCES
X.XX = 0.01
X.XXX = 0.005

REV	ECN	DESCRIPTION	BY	APV	DATE
A	980085	CHG WIRING FOR INSTALLATION	CSH	CSH	08/31/99

B70174

C.A.G.E 79760

EI 65 SYSTEM 14 COND REEL LATTICE BOOM WIRING

P/N	031-300-101-211	
DRAWN	CHRIS HERTZLER	08/01/97
APPROVED	CHRIS HERTZLER	08/01/97

SCALE: NONE SHEET: 1 OF 1

SIZE A | DWG NO. 031 300 31 1211 | REV A