

BOOM HOIST REEVING DIAGRAM FOR 16 PART LINE FOR REFERENCE ONLY

86.0 M (282.2 FT)
#685/680 BOOM SHOWN

BILL OF MATERIAL		ASSEMBLY	
NO.	DESCRIPTION	QTY	REF. LIT.
BOOM RIGGING B65:685-680			
1	BUTT ASSY #680, 6.0M	2	81020303
2	INSERT ASSY #680, 4.00M	3	81020306
3			
4	TOP ASSY #680, 10.00M	5	81022496
5	INSERT ASSY #685 12M W/SHV	28	84034000
6	INSERT ASSY #685/680 12M	31	84034010
NO. REQ'D FOR THE FOLLOWING ITEMS ARE IN THE BOOM LENGTH TABLE			
100	INSERT ASSY #680, 12.00M HEAVY	6	81020424
101	INSERT ASSY #680, 6.00M HEAVY	7	81020427
102	INSERT ASSY #680, 12.00M MEDIUM	8	81021299
103	INSERT ASSY #680, 12M W/SHV	4	81021996
104	INSERT ASSY #680, 12.00M X-HEAVY	11	81034977
105	INSERT ASSY #680, 12M W/SUSP	9	81035136
106	INSERT ASSY #680, 12M HV W/EQ	10	81022604
107	INSERT ASSY #685 12M	29	84034004
108	INSERT ASSY #685 12M W/EQ	30	84034007
109	SUSPENDER WIRE ROPE	13	84040952
OPTION 1: HOOK BLOCKS			
200	BLOCK HOOK 135MT 32WR 3SH	1	81023461
201	BLOCK HOOK 450MT 32WR 10SH	1	81029960
202	BLOCK HOOK 625MT 32WR 14SH	1	81029961
203	BLOCK HOOK 325MT 32WR 7SH	17	81033345
204	BLOCK HOOK 225MT 32WR 5SH	18	81033346
205	BLOCK HOOK 100MT 28WR 3SH	19	81031987
206	WEIGHT BALL SHIVEL 22.2MT, 28MM & 32MM WR	1	81033344
207	HOOK BLOCK 160MT 3SH 32WR	1	84039500
208	BLOCK 700MT 32WR 17SH	1	A10698
OPTION 2: UPPER BOOM POINT			
300	UPPER POINT ASSY FRAME	20	81029769
BASIC REFERENCE ITEMS			
R1	PIN COTTER 3/16 DIA X 2.00 LG	4	562087
R2	BOOM POINT LOWER ASSY 8 SHEAVE	1	81023433
R3	BOOM POINT LOWER ASSY 4 SHEAVE RT	1	81023436
R4	LINK #680 BOOM STRAP	4	81025609
R5	LINK #680 BOOM STRAP	4	81025610
R6	STRAP 10M #680 TOP	2	81025639
R7			
R8			
R9			
R10			
R11	EQUALIZER ASSY	1	81027149
R12			
R13			
R14	PIN 1 HOLE W/HD 127.3 DIA X 122.5 LG	2	81027653
R15	MAST RIGGING M1:684	1	84050187
R16	PIN 1 HOLE W/HD 105.0 DIA X 121.1 LG	4	81028258
R17	PIN 1 HOLE W/HD 127.0 DIA X 121.1 LG	1	81028259
R18	COLLAR 106.5 MM I.D.	4	81028260
R19	PIN 2 HOLE 19.05 DIA X 142.0 LG	4	81028262
R20	COLLAR 128.2 MM I.D.	2	81028264
R21	PIN 2 HOLE 19.05 DIA X 167.8 LG	2	81028265
R22	BOOM POINT LOWER ASSY 4 SHEAVE LEFT	1	81028637
R23			
R24	LINK ASSY LOAD	2	84047535
R25	LINK ASSY DEAD END	1	81042356
R26	LINK #680 EQ TO STRAP	4	81042617
R27			
R28			
R29	PIN 2 HOLE 22.2 DIA X 152.0 LG	2	A15390
R30	COLLAR 128.0 I.D.	2	A15391
NO. REQ'D FOR THE FOLLOWING REFERENCE ITEMS ARE IN THE BOOM LENGTH TABLE (SHEET 2)			
R100	PIN COTTER 1/4 DIA X 1.50 LG	562105	
R101	STRAP 12M #680, 681, 682	8	81020475
R102	LINK #680 BOOM	1	81020476
R103	PIN 1 HOLE W/HD 79.3 DIA X 121.1 LG	1	81020477
R104	COLLAR 80.2MM I.D.	4	81020478
R105	STRAP 6M #680	1	81021271
R106	PIN SAFETY .250 DIA X 5.20 LG	1	81027802
R107	STRAP 12M #680 W/EQUALIZER	1	81027608
R108	STRAP 12M #680 W/EQUALIZER	1	81027609
R109	LINK #680 BOOM	1	81027655
R110	LINK CONNECTING #680 12.00M W/STRUT	1	81028261
R111	STRAP 12M #680 W/STRUT	1	81028322
R112	STRAP 12M #680 W/STRUT	1	81028323
R113	PIN 2 HOLE 110.3 DIA X 242.9 LG	1	84036353
R114	LINK SUSPENSION	1	84040955
R115	PIN 2 HOLE 19.05 DIA X 117.0 LG	1	A16804
REFERENCE ITEMS FOR ASSEMBLY AND RIGGING PURPOSE ONLY			
R200			
R201			
R202			
R203	PIN PULLER BOOM BUTT CAGE WELD	2	81030540
R204	PIN PULLER ASSY HAND HELD	1	81030756
R205	SLING LIFTING 100,000 LBSX10.83 FT	1	81038731
R206			
R207			
R208	SLING LIFTING 25,000(LBS)X12.5(FT)	4	81040162
R209	SLING 70,000 LBS 16.4 FT	4	81042116
REFERENCE OPTION 3: BOOM TOP DEAD END			
R300	LINK ASSY DEAD END	1	81042356
REFERENCE OPTION 4: UPPER POINT DEAD END			
R400	LINK ASSY DEAD END	1	81042356

- 1 REQ'D FOR LUFFING JIB. LUFFING JIB WIRE ROPE GUIDES CALLED FOR ON #680 12M XH INSERT (ITEM 103) CAN BE LOCATED IN EITHER #685 12M INSERT (ITEM 5) OR #680 12M XH INSERT (ITEM 103) AND MAY REMAIN IN PLACE WITH BOOM ONLY MAKEUP. ROPE GUIDE ON BOOM TOP AND LUFFING DRUM IN BOOM BUTT MAY REMAIN IN PLACE WITH BOOM ONLY MAKEUP. ITEMS MAY BE IN OPERATING OR SHIPPING POSITION.
- 2 BUTT 6.00M I.D. TAG #81020304
- 3 INSERT 4.00M X-HEAVY I.D. TAG #81020307. SEE DELTA NOTE 36 ON SHEET 2.
- 4 INSERT 12.00M X-HEAVY W/SHEAVES I.D. TAG #81021997
- 5 TOP 10.00M I.D. TAG #81022497. SEE DELTA NOTE 36 & 37 ON SHEET 2.
- 6 INSERT 12.00M HEAVY I.D. TAG #81020425. SEE DELTA NOTE 36 ON SHEET 2.
- 7 INSERT 6.00M HEAVY I.D. TAG #81020428. SEE DELTA NOTE 36 ON SHEET 2.
- 8 INSERT 12.00 MEDIUM I.D. TAG #81021300. SEE DELTA NOTE 36 ON SHEET 2.
- 9 INSERT 12.00M MEDIUM W/SUSPENSION I.D. TAG #81035137. SEE DELTA NOTE 36 ON SHEET 2.
- 10 INSERT 12.00M HEAVY W/EQUALIZER I.D. TAG #81022605. SEE DELTA NOTES 36 & 37 ON SHEET 2.
- 11 INSERT 12.00M X-HEAVY I.D. TAG #81034978. SEE DELTA NOTE 36 ON SHEET 2.
- 12 STOWS IN STORAGE BOX 81028467.
- 13 116.0M (380.6 FT) THRU 146.0M (479.0 FT) BOOM REQUIRES DROP-DOWN INTERMEDIATE SUSPENSION ITEM 109. REFER TO BOOM LENGTH TABLE (SHEET 2) FOR SUSPENSION PENDANT BUTTON NUMBER. SEE SHEET 10 FOR OPERATIONAL INSTRUCTIONS.
- 14 REFER TO CAPACITY CHART IF JIB BACKSTAY STRAPS AND LINKS REMAIN ON BOOM ASSY. (SEE VIEW F-F ON SHEET 3)
- 15 ITEM R2 I.D. TAG #81023432 CALLED FOR ON TOP ASSY ITEM 4 AS STANDARD EQUIPPED. FOR SHEAVE CONFIGURATION REFER TO SHEET 9.
- 16 ITEM R3 I.D. TAG #81023435 ITEM R22 I.D. TAG #81028636 CALLED FOR ON TOP ASSY ITEM 4 AS OPTION #3 EQUIPPED. FOR SHEAVE CONFIGURATION REFER TO SHEET 9.
- 17 MAY BE MADE FROM ITEM 202.
- 18 MAY BE MADE FROM ITEM 201.
- 19 USE FOR 2 PART LINE ON UPPER BOOM POINT. CAN BE USED WITH 28MM ROPE ONLY.
- 20 UPPER POINT ASSY I.D. TAG #81029770. MAY BE EQUIPPED WITH ROLLER ASSY 81036286 (CALLED FOR ON UPPER POINT ASSY FRAME ITEM 300 AS OPTION 8).
- 21 EQUALIZER SPACER LINKS TO BE IN STOWAGE POSITION WHEN INSERT USED W/EQUALIZER FOR BOOM LENGTHS 58M & 62M (SEE VIEW C-C ON SHEET 3)
- 22 FOR BOOM STRAP COMPONENTS ON OPTIONAL INSERT REFER TO BOOM LENGTH TABLE ON SHEET 2.
- 23 BOOM STRAPS/LINKS MUST BE REMOVED FROM INSERT PRIOR TO OPERATION.
- 24 BOOM STRAPS/LINKS MAY REMAIN ON INSERT DURING OPERATION.
- 25 REFER TO SHEET 9 FOR COMPONENT CONFIGURATION. STOWS IN PARTS BOX 81028467.
- 26 SEE BLOCK REEVING DRAWING 81033357 FOR SINGLE DRUM RIGGING CONFIGURATION OPTIONS AND INSTRUCTIONS. SEE RIGGING WINCH ASSY 81026267 FOR BLOCK AND WIRE ROPE ASSEMBLY.
- 27 SEE BLOCK REEVING DRAWING 81033352 FOR TANDEM DRUM RIGGING CONFIGURATION OPTIONS AND INSTRUCTIONS. SEE RIGGING WINCH ASSY 81026267 FOR BLOCK AND WIRE ROPE ASSEMBLY.
- 28 INSERT 12.00M X-HEAVY W/SHEAVES I.D. TAG #84034001. SEE DELTA NOTE 36 ON SHEET 2.
- 29 INSERT 12.00M X-HEAVY I.D. TAG #84034005. SEE DELTA NOTE 36 ON SHEET 2.
- 30 INSERT 12.00M X-HEAVY W/EQUALIZER I.D. TAG #84034008. SEE DELTA NOTE 36 ON SHEET 2.
- 31 INSERT 12.00M X-HEAVY I.D. TAG #84034011

(DELTA NOTES CONTINUE ON SHEET 2)

ITEMS REQ'D FOR VARIOUS BOOM LENGTHS - SEE SHEETS 3, 4, 5, & 6 FOR BOOM MAKE-UP

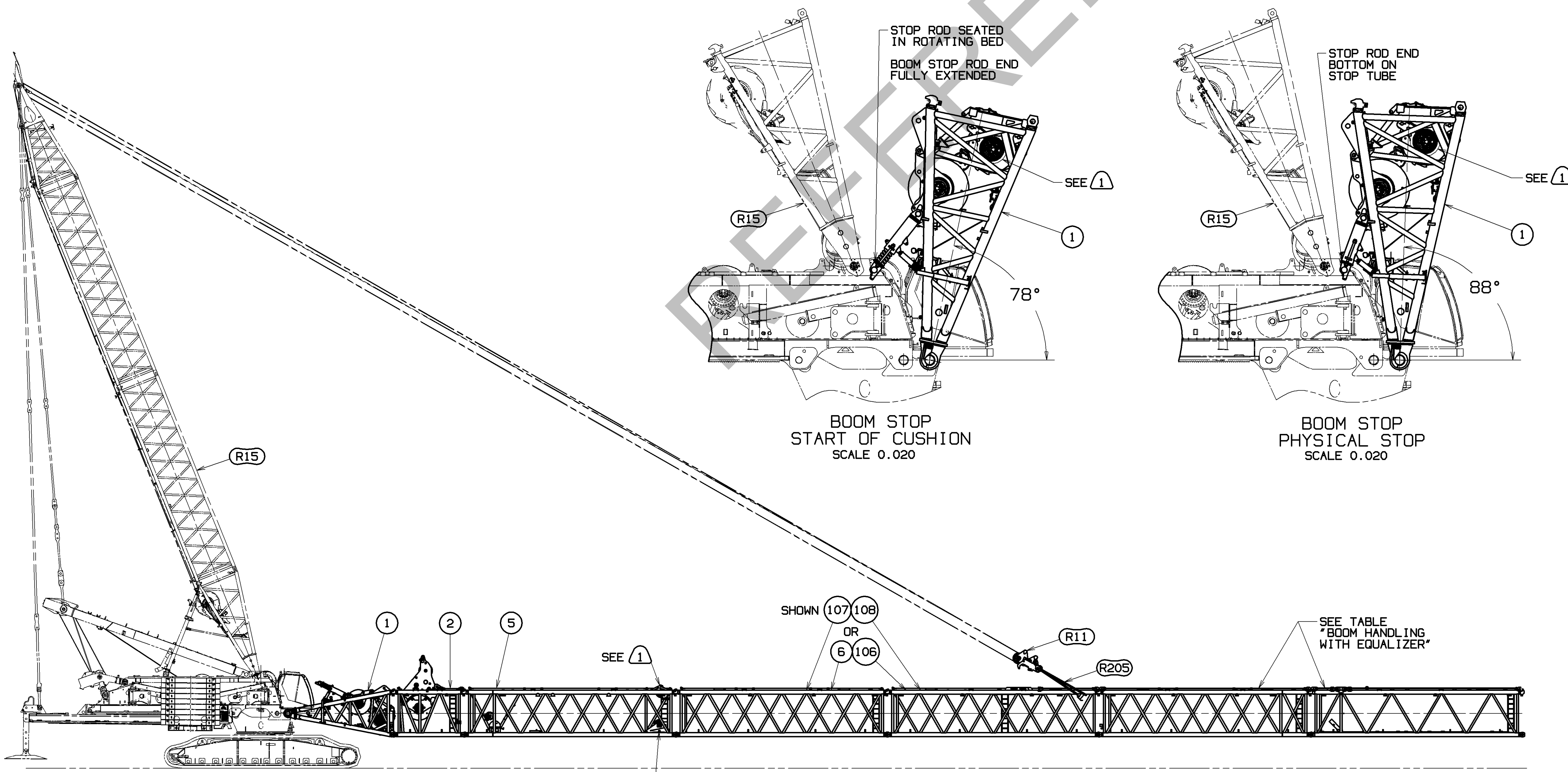
BILL OF MATERIAL				ASSEMBLY USED ON
QTY	DESCRIPTION	MATERIAL	QTY	NO.

ITEM NO.	#685 INSERTS				#680 INSERTS						STRAP						LINK				PIN		COTTER	COLLAR	SUSPENSION	LOWER CONNECTOR	
	X-HEAVY		X-HEAVY		HEAVY		MEDIUM		R101	R105	R107	R108	R111	R112	R102	R109	R110	R114	R103	R115	R100	R104	109 (34)	R113	R106		
	107	108	103	104	100	101	106	102																		105	
BOOM LENGTH	INSERT 12M (39.4FT) ASSY	INSERT 12M (39.4FT) ED ASSY	INSERT 12M (39.4FT) SHV ASSY	INSERT 12M (39.4FT) ASSY	INSERT 12M (39.4FT) ASSY	INSERT 6M (19.7FT) ASSY	INSERT 12M (39.4FT) ED ASSY	INSERT 12M (39.4FT) ED ASSY	INSERT 12M (39.4FT) SUSP ASSY	STRAP 12M (39.4FT)	STRAP 6M (19.7FT)	STRAP SHORT W/EQUAL	STRAP LONG W/EQUAL	STRAP SHORT W/SUSP	STRAP LONG W/SUSP	LINK SEE (33)	LINK W/EQUAL	LINK CONNECT W/SUSP	LINK CONNECT W/SUSP	PIN	PIN	COTTER	COLLAR	PENDANT BUTTON NUMBER SEE (13)	CONN PIN SEE (36)	SAFETY PIN SEE (36)	
METERS	FEET																										
56	183.7	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	8	8	28	8	-	4	8	
62	203.4	0	0	0	0	0	1	1	0	0	0	0	0	0	0	8	0	0	0	12	12	36	12	-	4	8	
68	223.1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	12	12	36	12	-	2	4	
74	242.8	1	1	0	0	0	1	0	0	0	0	0	0	0	0	12	0	0	0	16	16	44	16	-	2	4	
80	262.5	1	1	0	0	OR 0	0	1	0	0	0	0	0	0	0	12	0	0	0	20	20	52	20	-	2	4	
86	282.2	1	1	0	0	OR 0	1	1	0	0	0	0	0	0	0	16	0	0	0	24	24	60	24	-	2	4	
92	301.8	1	1	1	0	OR 0	0	1	0	0	0	0	0	0	0	16	0	0	0	24	24	60	24	-	4	8	
98	321.5	1	1	1	0	OR 0	1	1	0	0	0	0	0	0	0	20	0	0	0	28	28	68	28	-	4	8	
104	341.2	1	1	1	1	OR 0	0	1	0	0	0	0	0	0	0	20	0	0	0	28	28	68	28	-	4	8	
110	360.9	1	1	1	1	OR 0	1	1	0	0	0	0	0	0	0	24	0	0	0	32	32	76	32	-	4	8	
116	380.6	1	1	1	1	OR 0	0	1	0	0	0	0	0	0	0	28	0	0	0	40	40	92	40	9	4	8	
122	400.3	1	1	1	1	OR 0	1	1	0	0	0	0	0	0	0	32	0	0	0	44	44	100	44	9	4	8	
128	419.9	1	1	1	1	OR 0	0	1	0	0	0	0	0	0	0	36	0	0	0	48	48	108	48	8	4	8	
134	439.6	1	1	1	1	OR 0	1	1	0	0	0	0	0	0	0	40	0	0	0	48	48	108	48	5	4	8	
140	459.3	1	1	1	1	OR 0	0	1	0	0	0	0	0	0	0	44	0	0	0	48	48	108	48	8	4	8	
146	479.0	1	1	1	1	OR 0	1	1	0	0	0	0	0	0	0	48	0	0	0	52	52	116	52	6	4	8	

(DELTA NOTES CONTINUED FROM SHEET 1)

- (32) REPLACE (4) EXISTING STRAP LINKS ITEM R102 WITH (4) SUSPENSION LINKS R114 ON SUSPENDER WIRE ROPE ITEM 109. (SEE SUSPENSION ASSEMBLY SEQUENCE ON SHEET 10).
- (33) QUANTITIES OF LINK (ITEM R102) IN BOOM LENGTH TABLE (SHEET 2) REFLECT REMOVAL OF LINKS ITEM R102 PER DELTA NOTE 32.
- (34) SUSPENSION PENDANT MAY APPEAR SLACK DURING RAISING AND OPERATION. CHECK SUSPENSION LOCATION AND PENDANT BUTTON NUMBER AND CONTINUE OPERATION.
- (35) INTERMEDIATE BLOCKING IS REQUIRED FOR BOOM LENGTHS 134.0 M (439.6 FT) THRU 146.0 M (479.0 FT). DISTANCE BETWEEN BOOM SUPPORT LOCATIONS IS NOT TO EXCEED 60.0 M (196.9 FT). (SEE INTERMEDIATE BLOCKING VIEW ON SHEET 7).
- (36) IF EQUIPPED WITH LOWER BOOM CONNECTOR PIN COMPONENTS USED WITH HAND HELD CYLINDER (R204) 81030756. SEE DETAIL J ON SHEET 7.
- (37) IF EQUIPPED WITH MANUAL LOWER BOOM CONNECTOR PINS (R113). SEE DETAIL M ON SHEET 8.
- (37) MANUAL LOWER CONNECTOR PIN (R113) INSTALLATION REQUIRED FOR APPROVED ASSEMBLY ON BOOM LENGTHS 56M & 62M AT JOINT INDICATED WHEN INSERT ITEM 106 IS USED WITH EQUALIZER. SEE DETAIL Q ON SHEET 3.

84038307
SHT 2 OF 10



LENGTH	6M (19.7FT) INSERT 81020427	12M (39.4FT) INSERT 81020424	12M (39.4FT) INSERT 81035136	12M (39.4FT) INSERT 81021299
6M (19.7FT)	1	0	0	0
12M (39.4FT)	0	OR 1 OR 0	0 1 0	0 0 1
18M (59.1FT)	1	OR 0 OR 0	0 1 0	0 0 1
24M (78.7FT)	0	OR 2 OR 1 OR 0 OR 0	0 1 0 1	0 0 1 2

LENGTH	12M (39.4FT) INSERT 84034010	6M (19.7FT) INSERT 81020427	12M (39.4FT) INSERT 81021996	12M (39.4FT) INSERT 81034977	12M (39.4FT) INSERT 81020424	12M (39.4FT) INSERT 81022804	12M (39.4FT) INSERT 81035136	12M (39.4FT) INSERT 81021299
12M (39.4FT)	1	0	0	0	0	0	0	0
18M (59.1FT)	1	1	0	0	0	0	0	0
24M (78.7FT)	1	0	OR 1 OR 0 OR 0 OR 0 OR 0	0 1 0 0 0	0 0 1 0 0	0 0 1 0 0	0 0 0 1 0	0 0 0 1 1

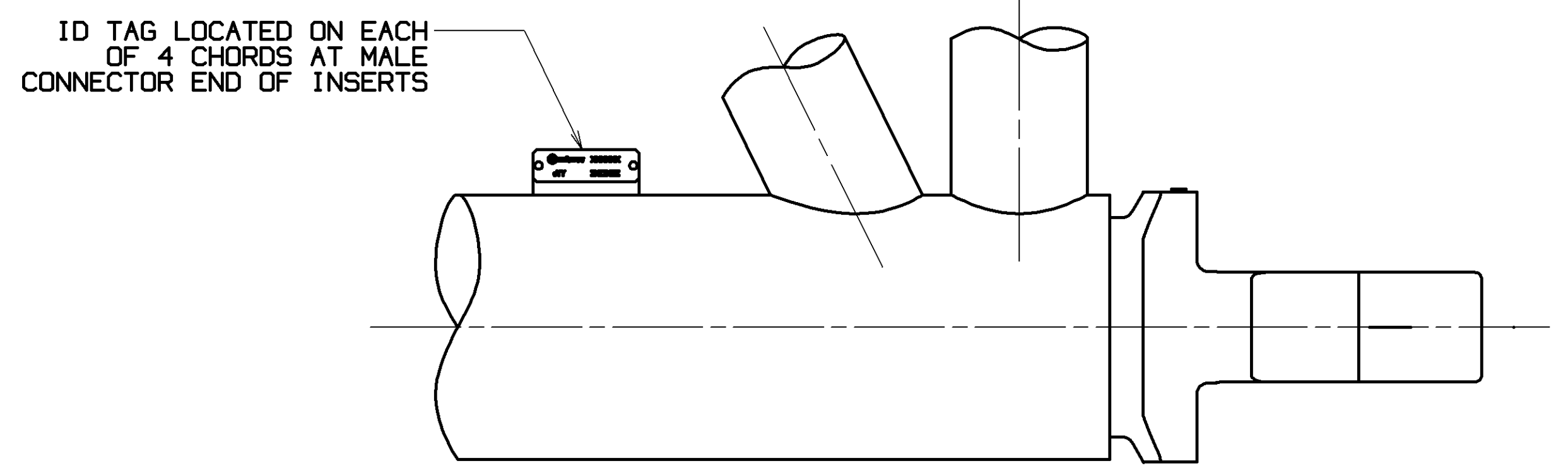
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TOLERANCE UNLESS OTHERWISE SPECIFIED:
DECIMAL PLACES FRACTION MACHINING
(1) PLACE 0.0 ±.12 ±.18 ±.05
(2) PLACE 0.00 ±.06 ±.12 ±.015
(3) PLACE 0.000 ±.006 ±.008 ±.002

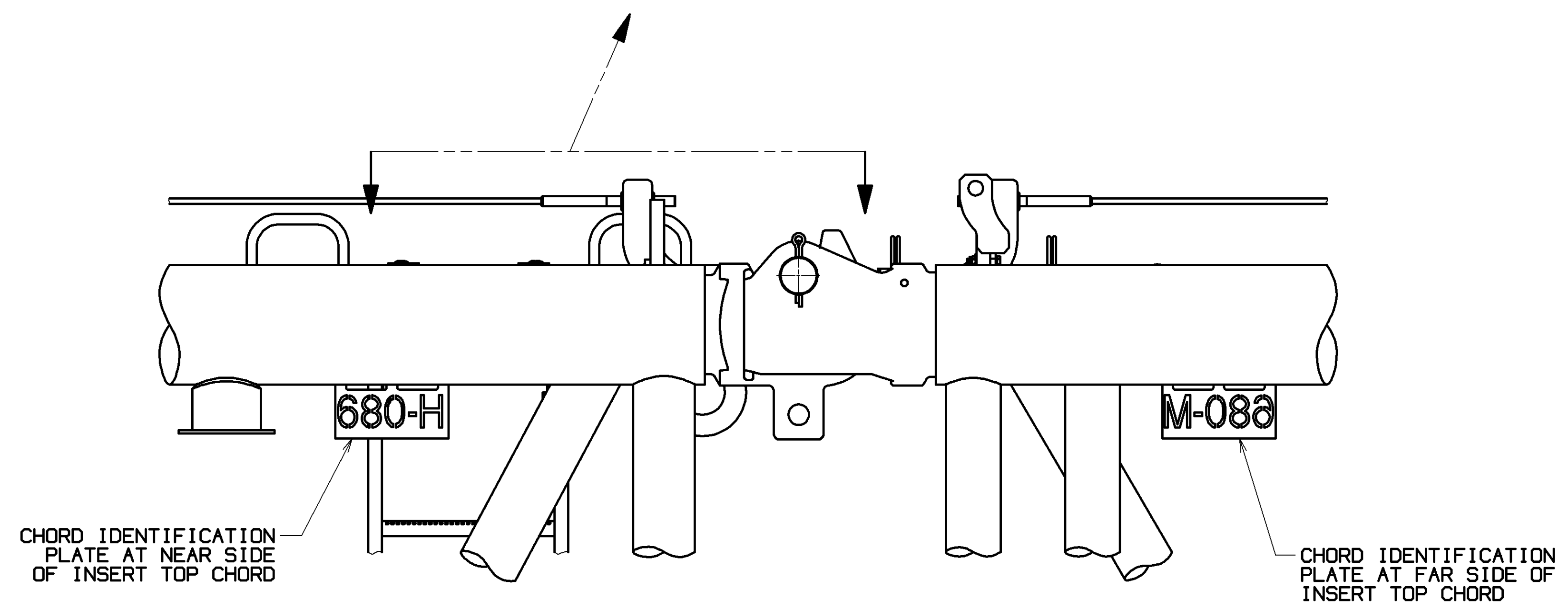
MANUFACTURED BY: **Maritowo Cranes, Inc.**
Maritowo, Wisconsin
MODEL: MLC650
APP: JRR

BOOM RIGGING
B65:685-680

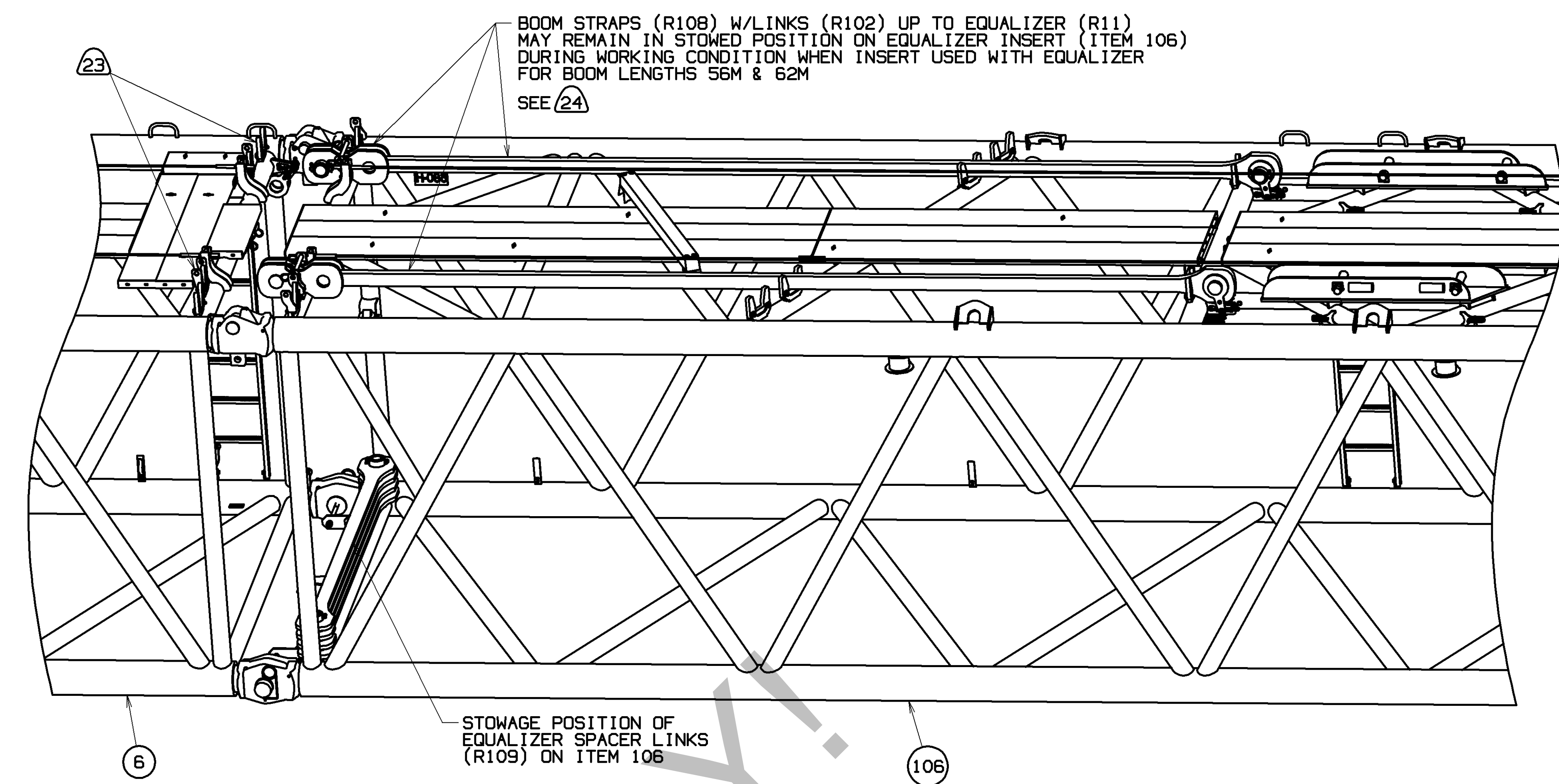
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REV: 1



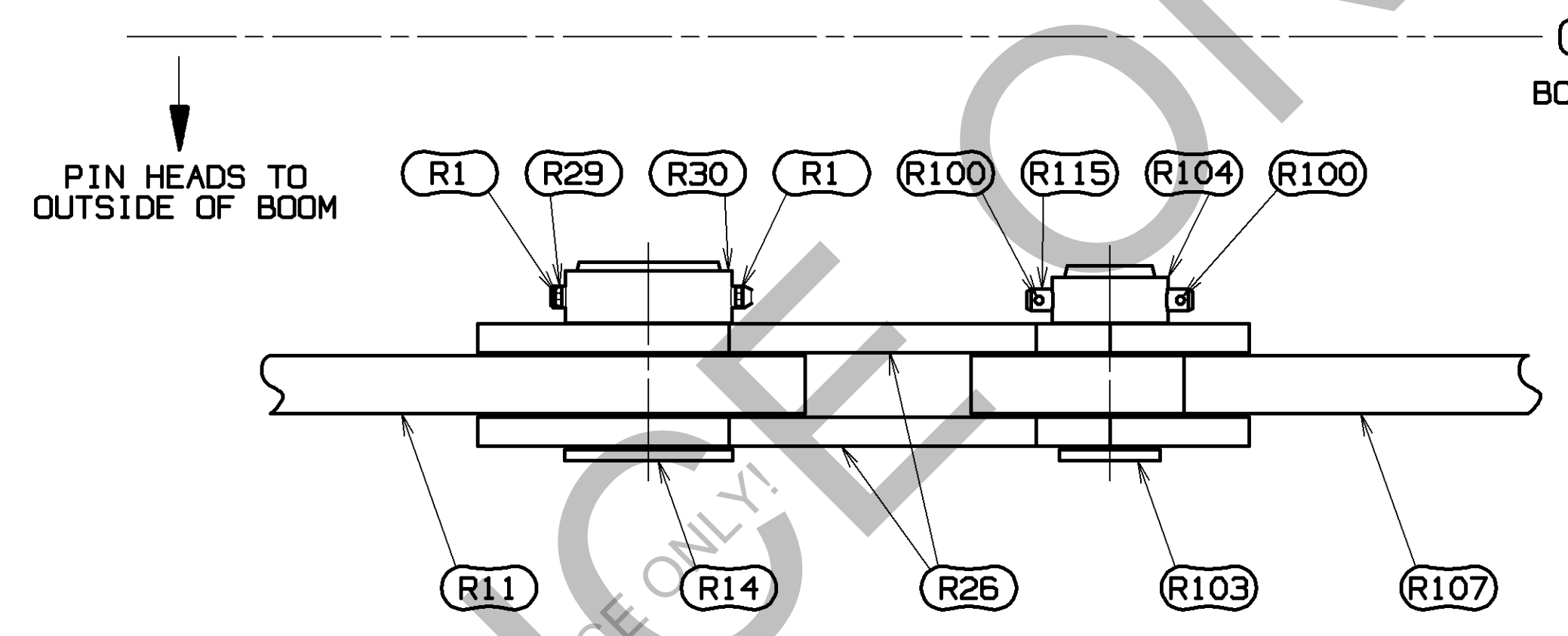
TYPICAL LOCATION OF INSERT ID TAGS
SCALE 0.250



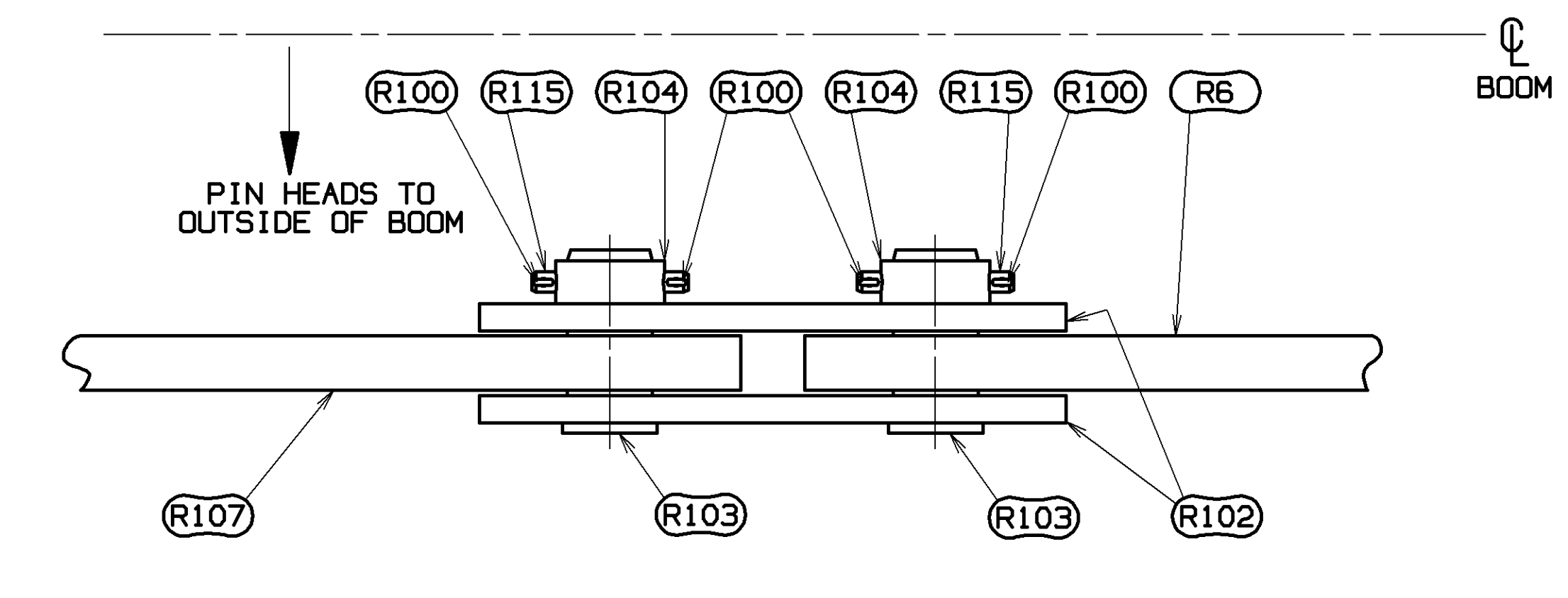
TYPICAL LOCATION OF BOOM CHORD IDENTIFICATION PLATE
SCALE 0.150



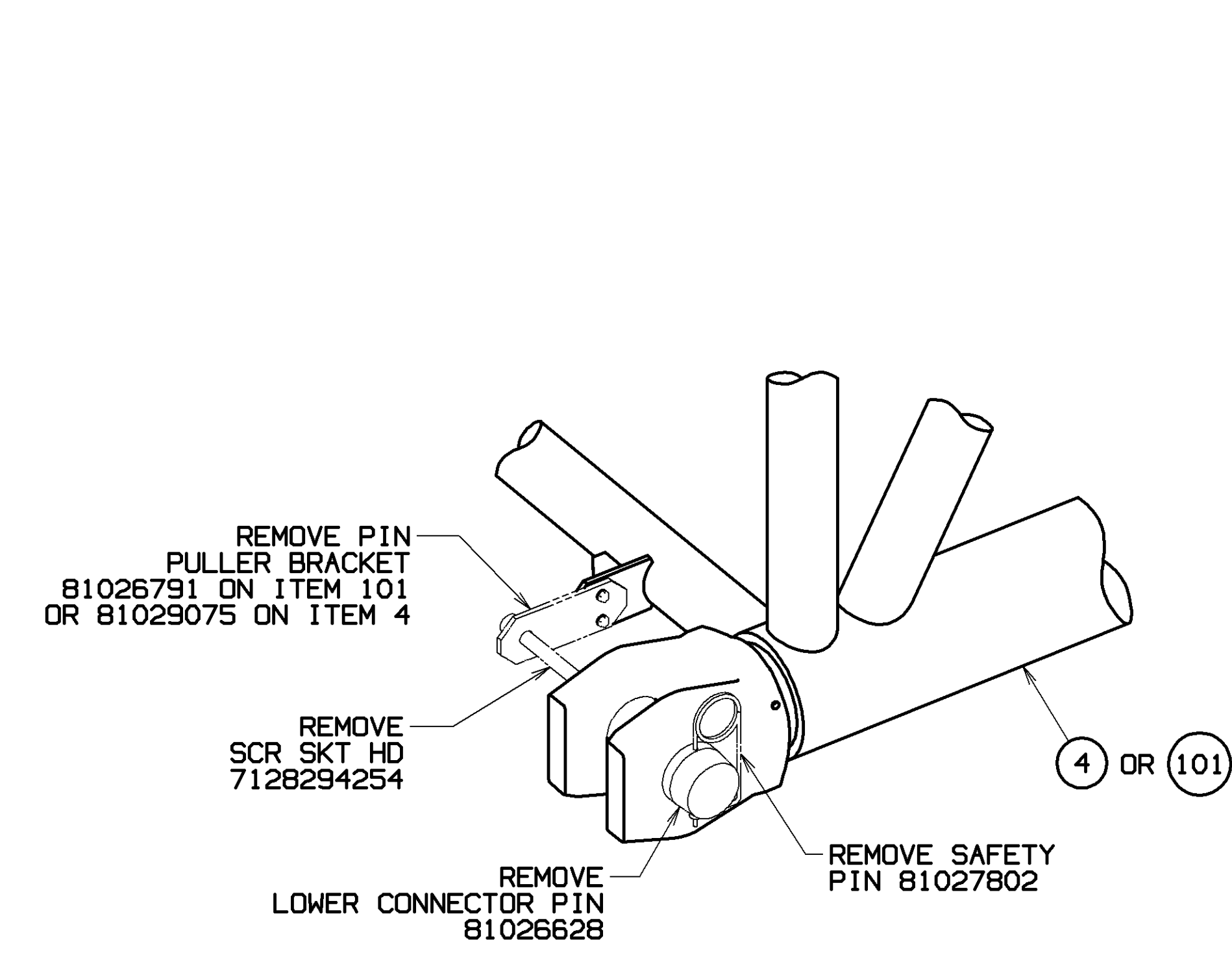
VIEW C-C
SEE DELTA NOTES 21, 23 & 24
(BACKSTAYS NOT SHOWN)
SCALE 0.050



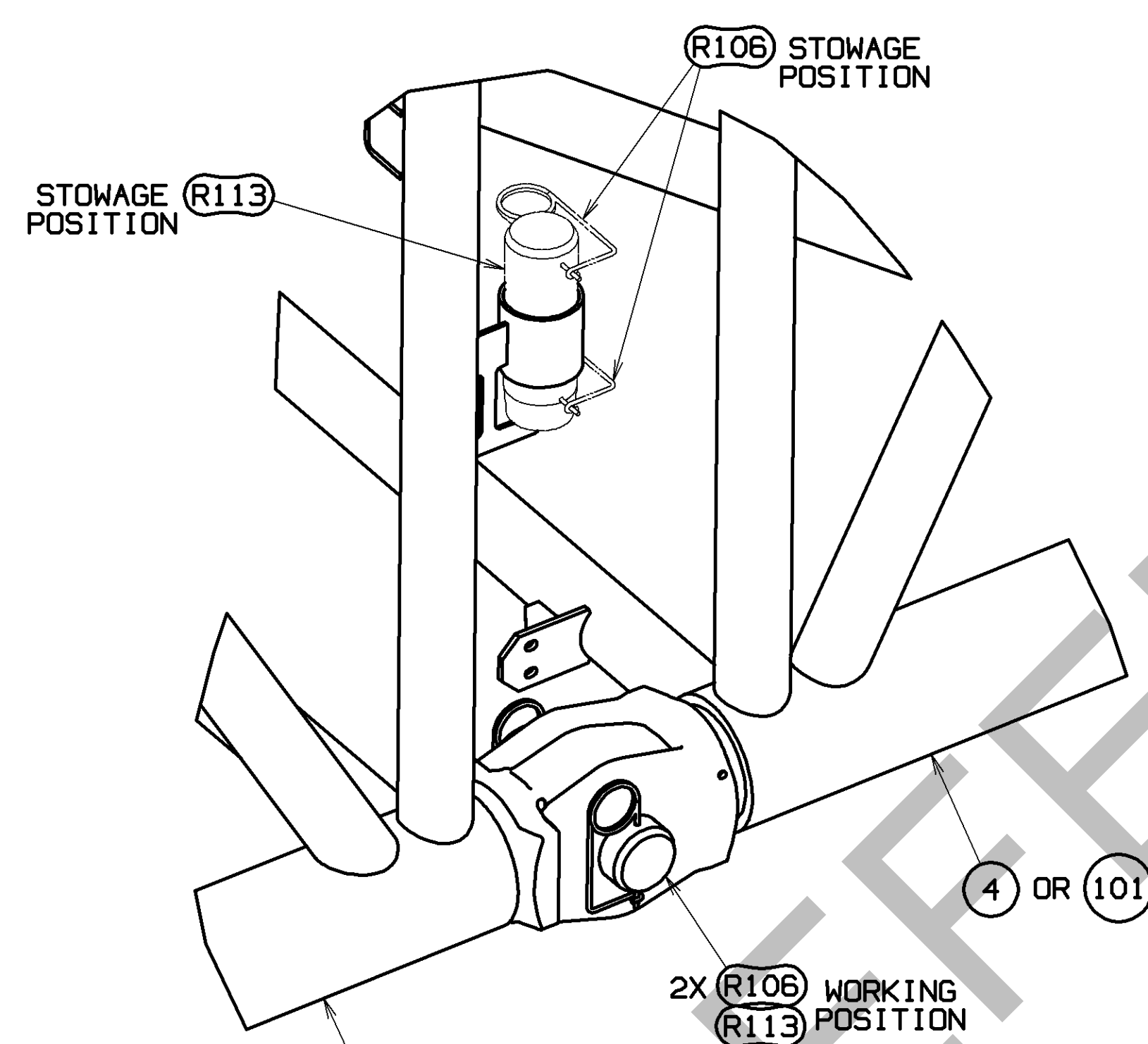
DETAIL D
SCALE 0.200



DETAIL E
SCALE 0.200



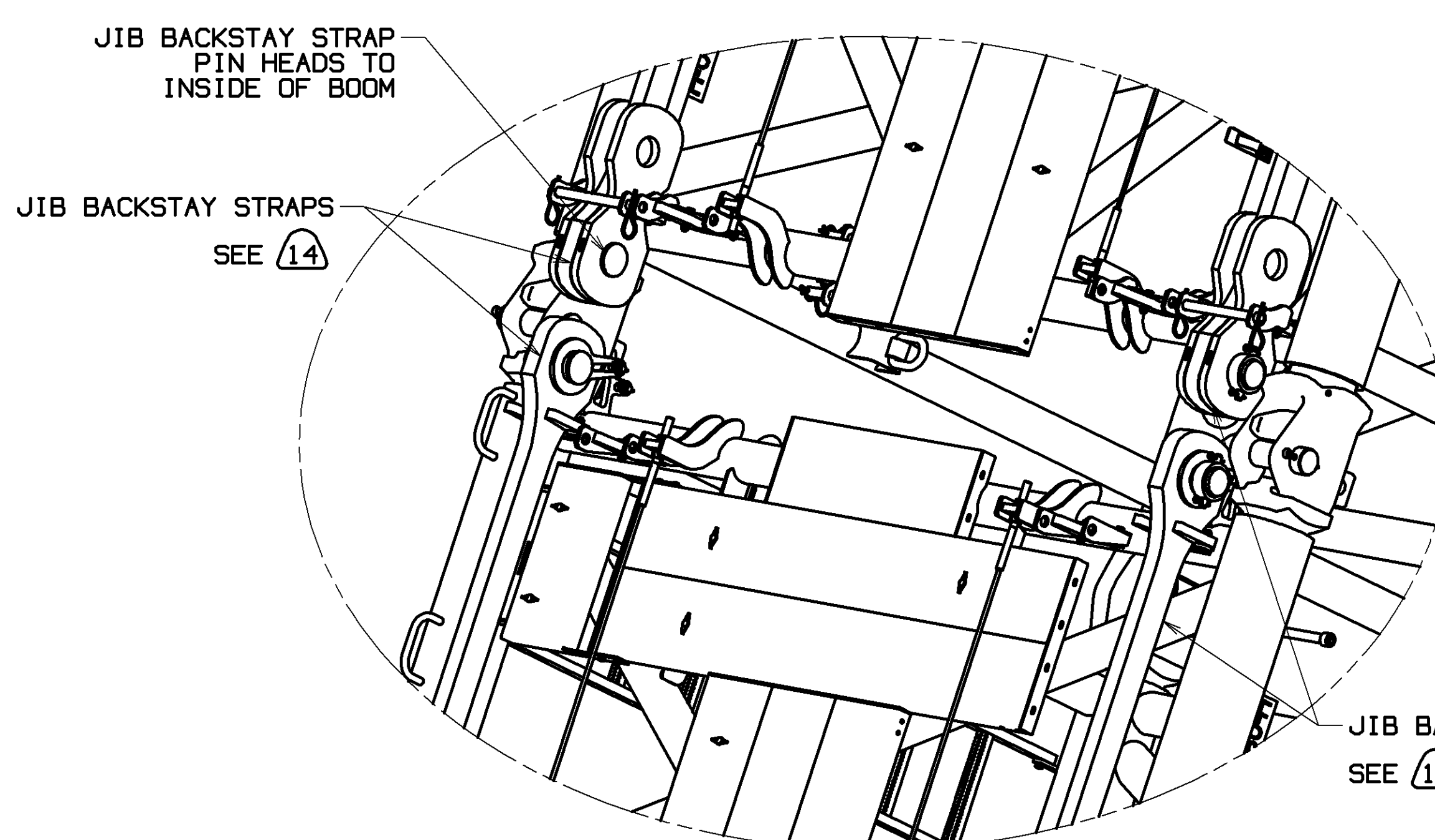
DETAIL Q - PREP
(FROM SHEETS 3 & 4)
SCALE 0.125



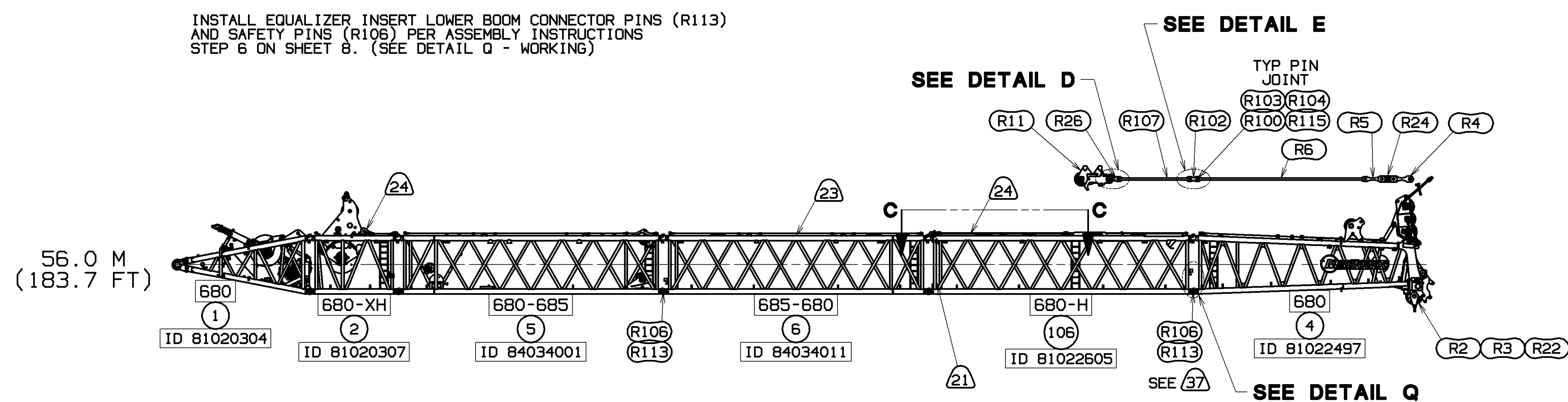
DETAIL Q - WORKING
(FROM SHEETS 2 & 3)
SCALE 0.125

ON BOOM LENGTHS 56M & 62M WHEN INSERT ITEM 106 IS USED WITH EQUALIZER, REMOVE LOWER BOOM HAND HELD CYLINDER PIN COMPONENTS FROM MATING INSERT ITEM 101 OR BOOM TOP ITEM 4 IF SO EQUIPPED. (SEE DETAIL Q - PREP). STOW IN PARTS BOX 81028467.

INSTALL EQUALIZER INSERT LOWER BOOM CONNECTOR PINS (R113) AND SAFETY PINS (R106) PER ASSEMBLY INSTRUCTIONS STEP 6 ON SHEET 8. (SEE DETAIL Q - WORKING)



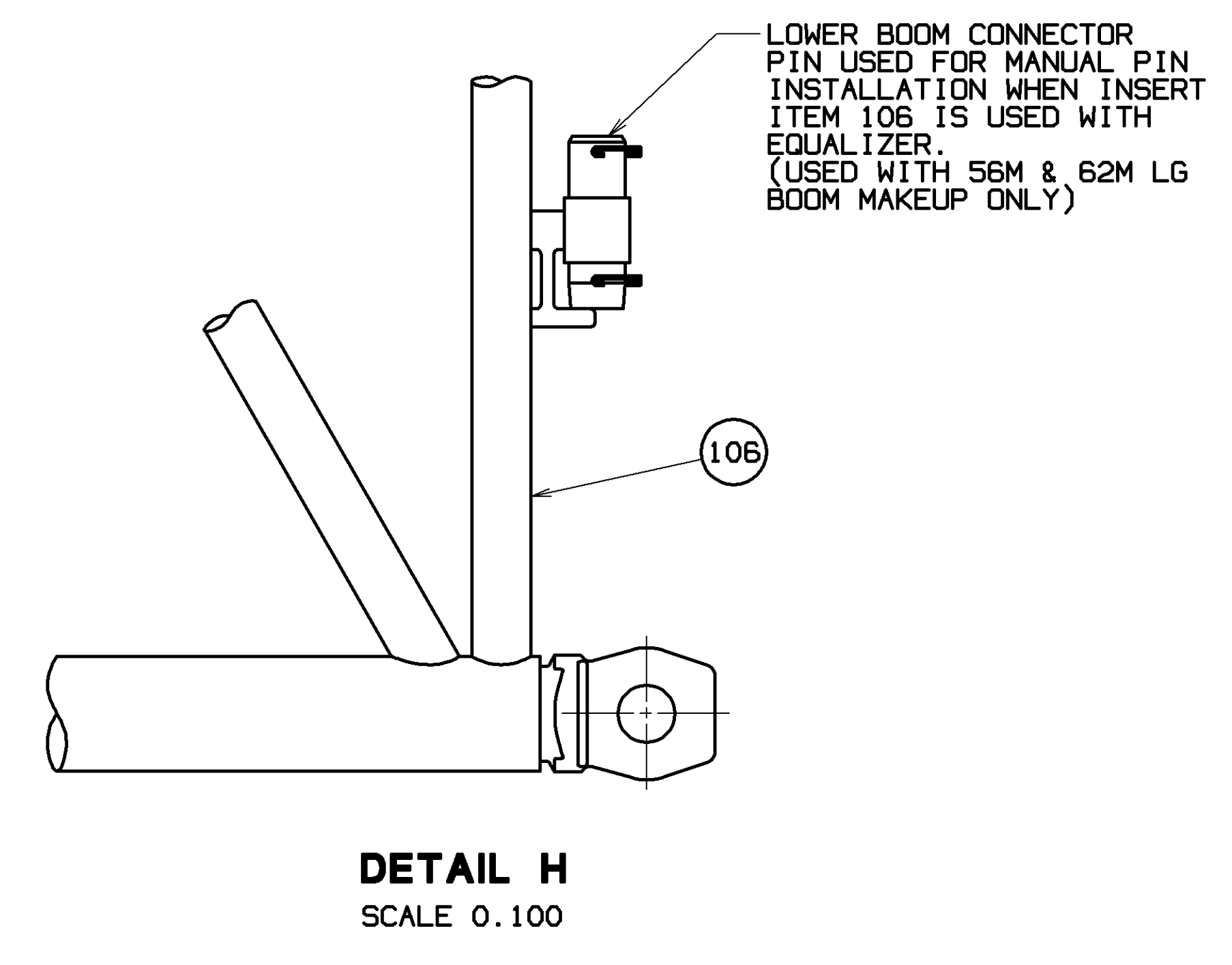
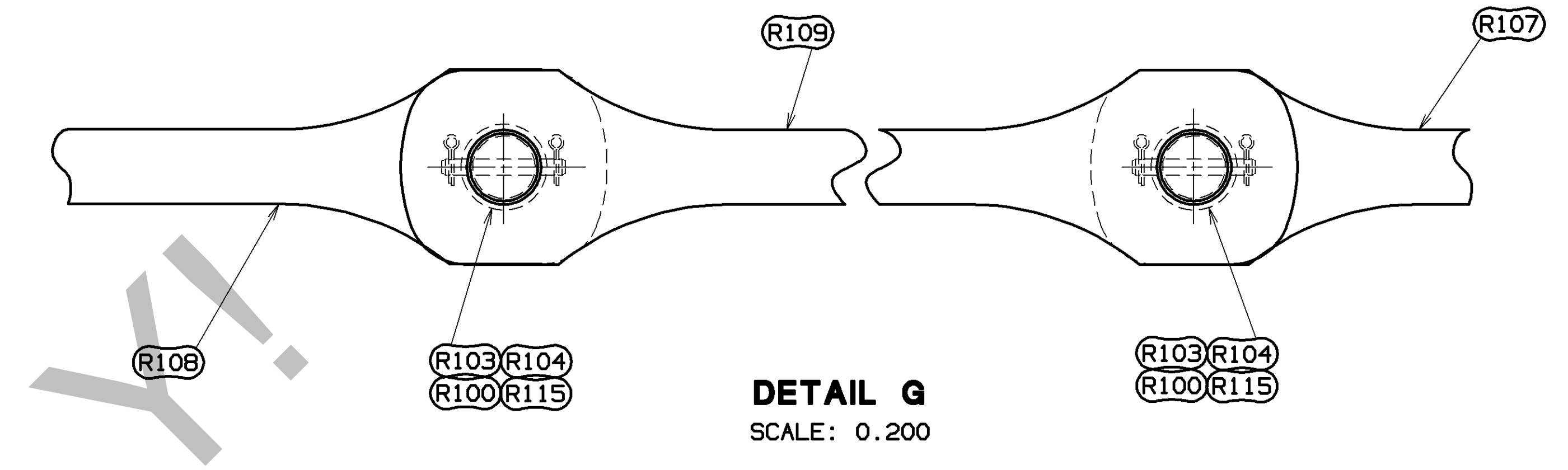
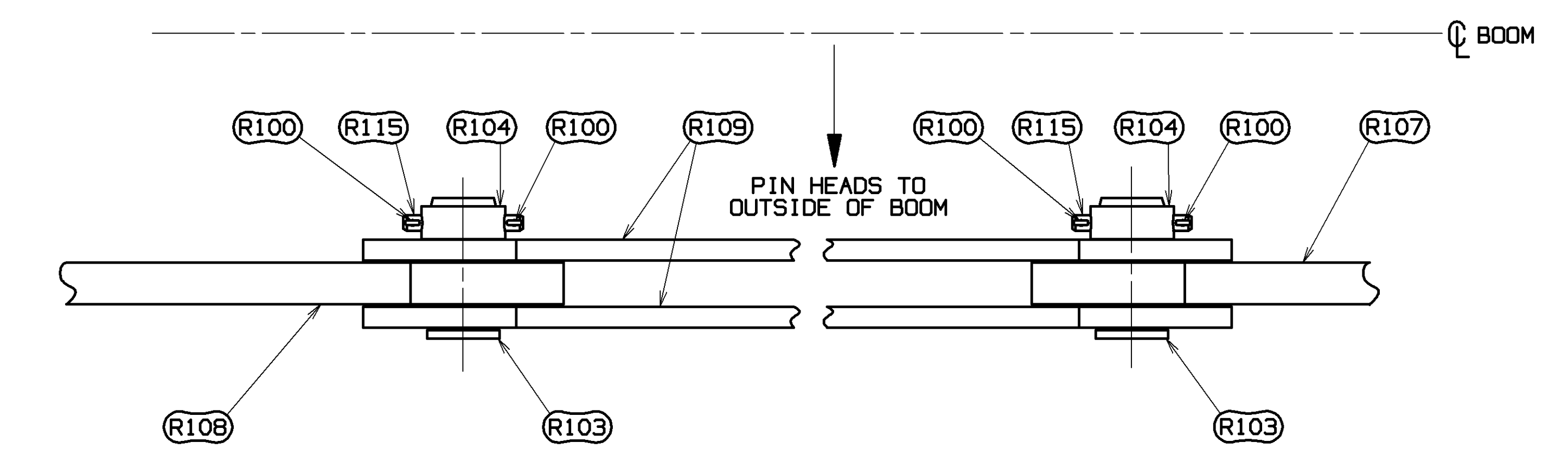
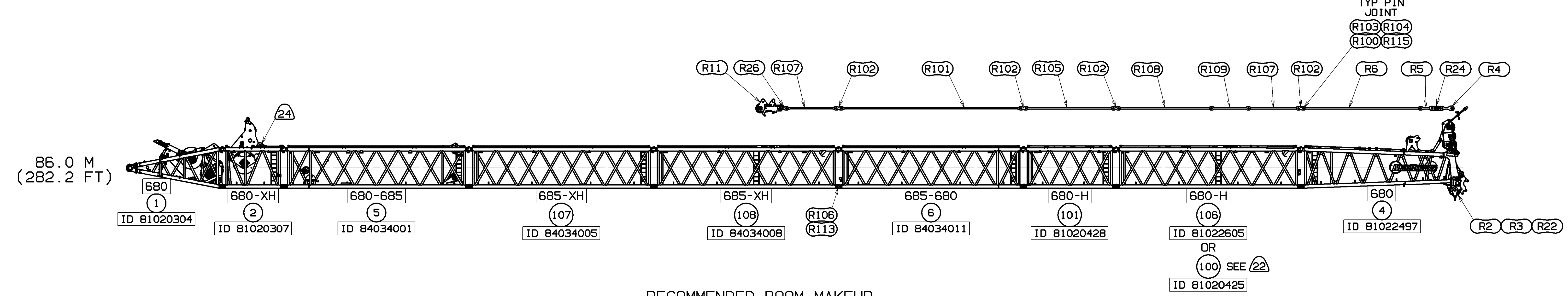
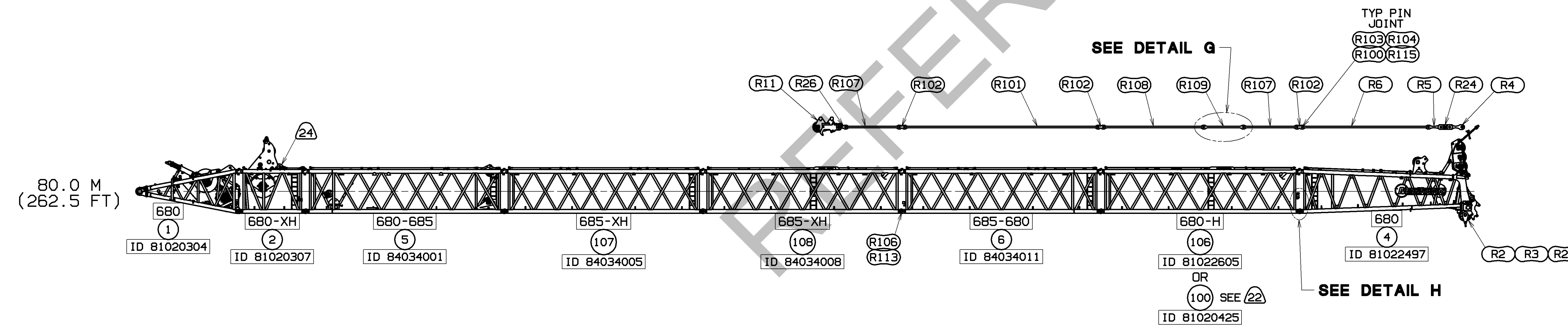
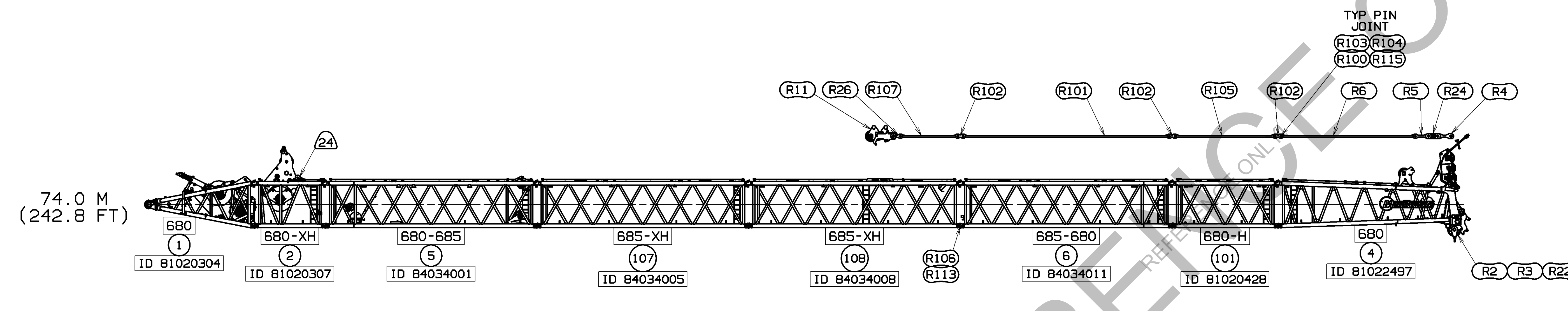
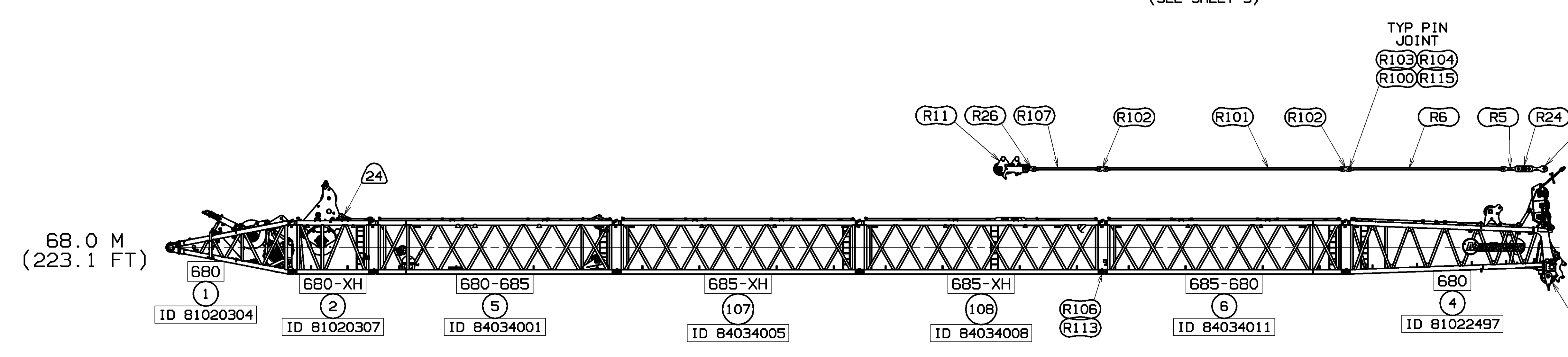
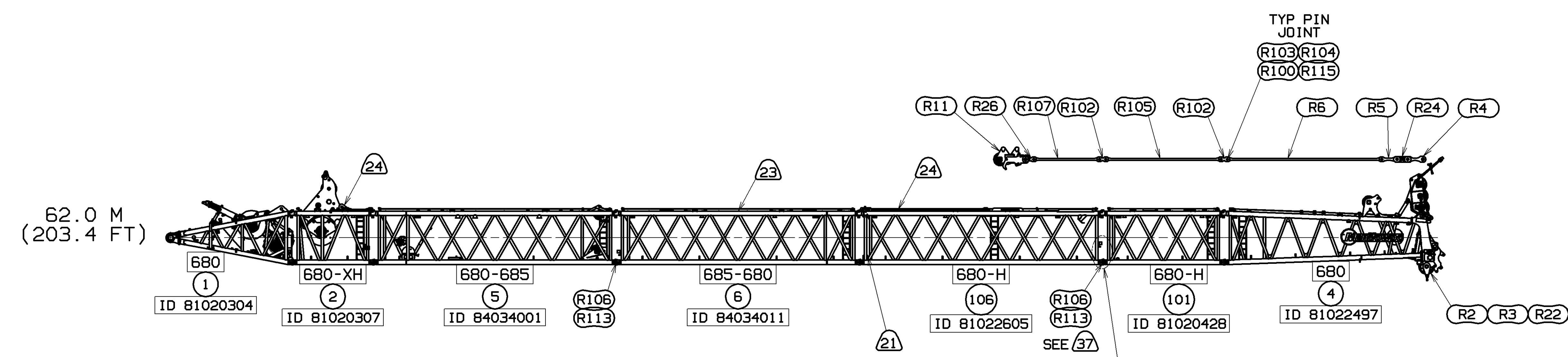
VIEW F-F
BOOM ASSY WITH BOOM STRAPS WORKING AND JIB BACKSTAY STRAPS STOWED
REFER TO CAPACITY CHART IF JIB BACKSTAY LINKS AND STRAPS MAY REMAIN ON BOOM ASSY.
(FROM SHEET 1)
SCALE 0.080



RECOMMENDED BOOM MAKEUP
FOR TYP PIN JOINT SEE SECTION B-B AND DETAILS D & E

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	<small>DECIMAL PLACES</small>	<small>FRACTIONS</small>					<small>DR. RHY CK. PUJH APP. JRR</small>
	<small>(1) PLACE 0.5</small> <small>(2) PLACE 0.00</small> <small>(3) PLACE 0.000</small>	<small>1/16</small> <small>1/32</small> <small>1/64</small>					

BILL OF MATERIAL		ASSEMBLIES USED ON
QTY	DESCRIPTION	MATERIAL



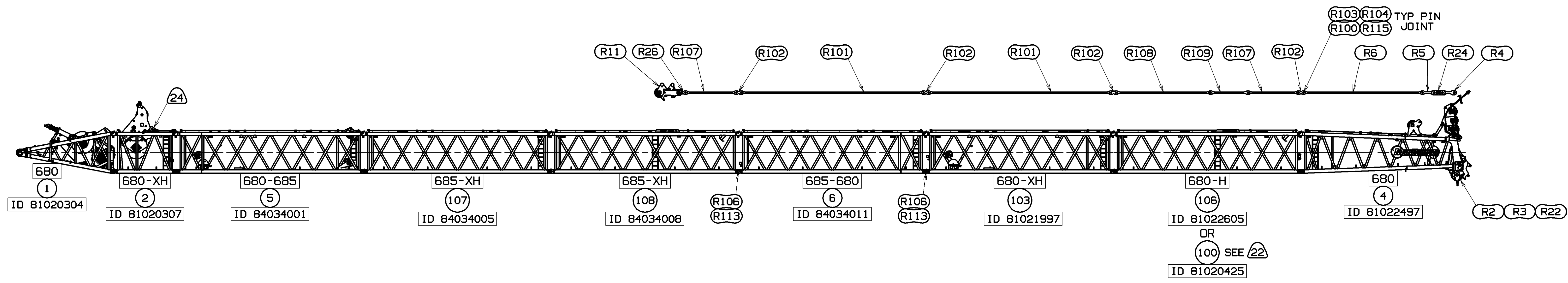
RECOMMENDED BOOM MAKEUP
FOR TYP PIN JOINT SEE SECTION B-B
AND DETAILS D,E & G

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	DECIMAL PLACES	FABRICATION	
	<small>(1) PLACE 0.5 0.12 0.18 0.05 (2) PLACE 0.00 0.08 0.12 0.015 (3) PLACE 0.000 0.008 0.008 0.008</small>	<small>MACHINING TO THE FINISH UNLESS OTHERWISE SPECIFIED</small>	
	<small>ANGLES 1:20</small>	<small>APP JRR</small>	
<small>MOORE OOB</small>		Manitowoc Cranes, Inc. <small>Manitowoc, Wisconsin</small>	BOOM RIGGING B65:685-680

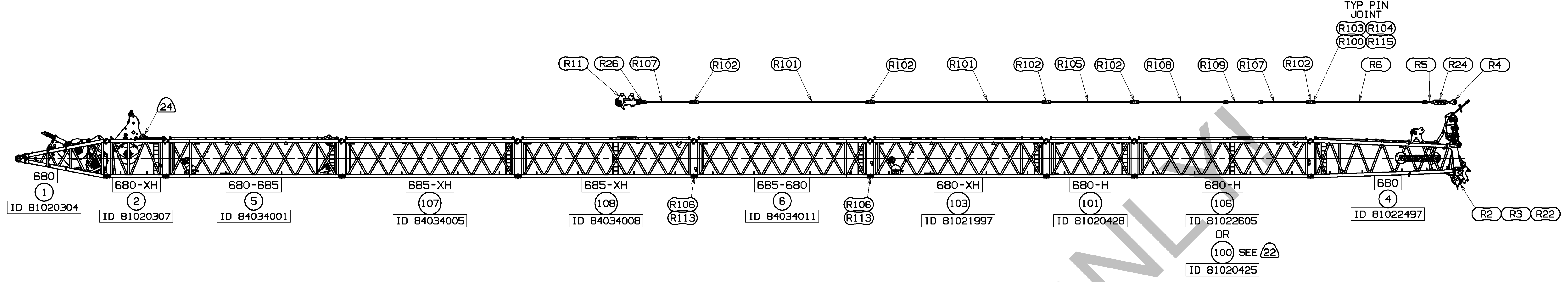
84038307
SHT 4 OF 10

PRIVATE LABELING
REQUIREMENT TO
CONFORM TO
ENGINEERING
SPECIFICATION
8629103794 FOR
COMPONENTS LISTED
IN SECTION 05-026
DATE
03-21-17
REV. LTR.
A
84038307
SHT 4 OF 10

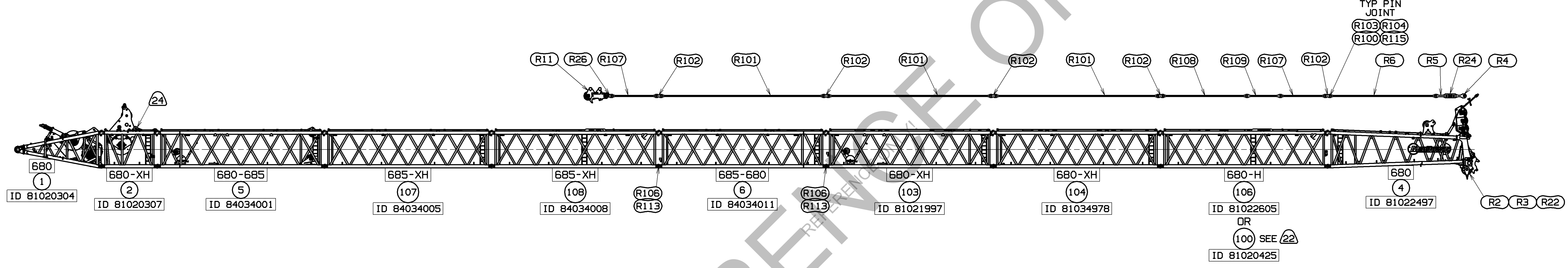
92.0 M
(301.8 FT)



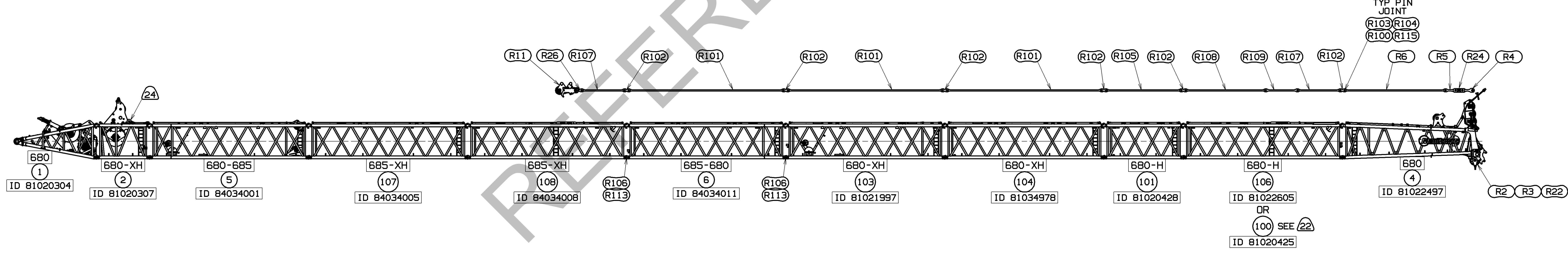
98.0 M
(321.5 FT)



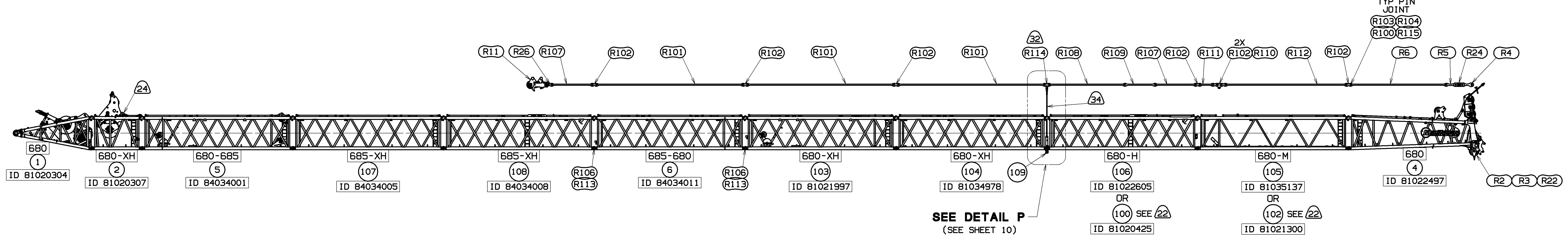
104.0 M
(341.2 FT)



110.0 M
(360.9 FT)



116.0 M
(380.6 FT)



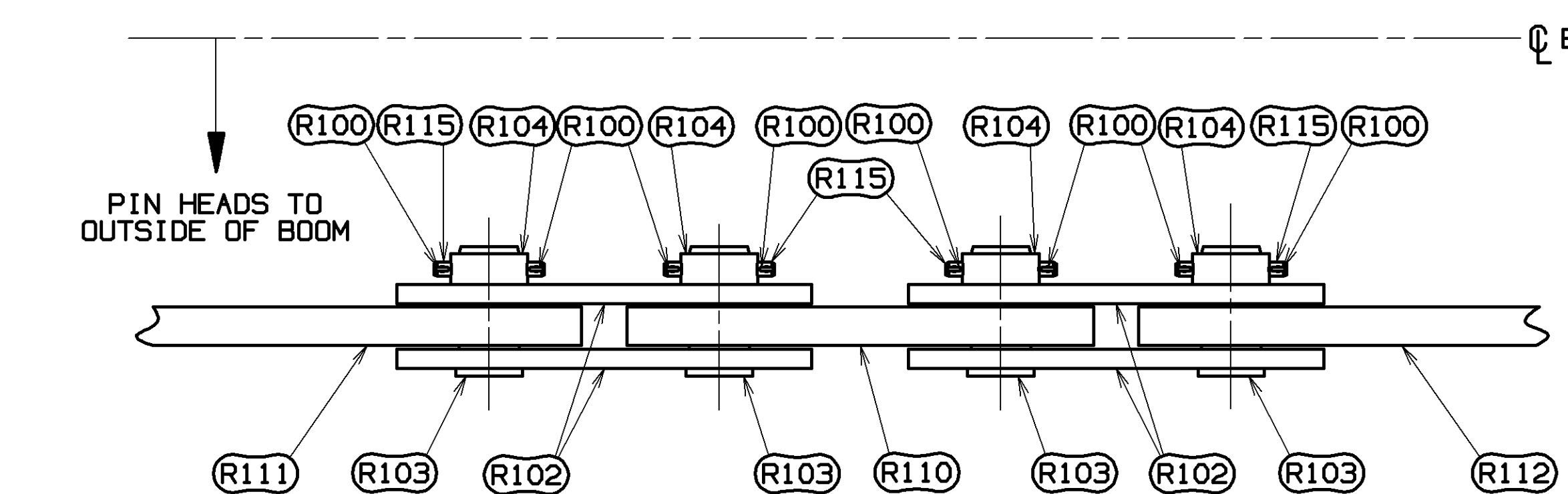
SEE DETAIL P
(SEE SHEET 10)

RECOMMENDED BOOM MAKEUP
FOR TYP PIN JOINT SEE SECTION B-B
AND DETAILS D,E,G,P & W

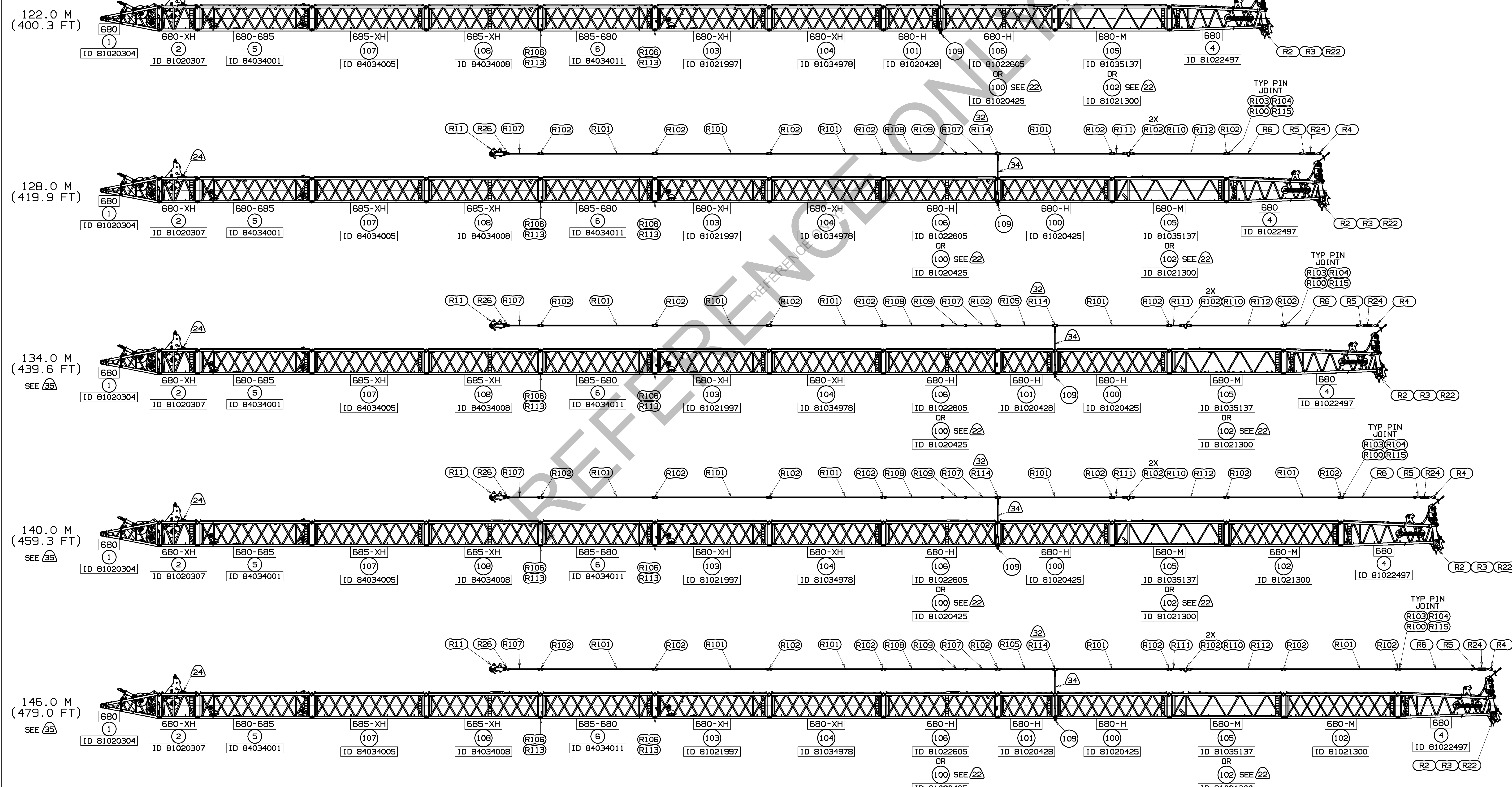
DECIMAL PLACES	FABRICATION	MACHINING	WELDING	DR. RHY	CK. P.J.H	APP. J.R.R
(1) PLACE 0.5	+0.12	+0.18	+0.05			
(2) PLACE 0.00	+0.08	+0.12	+0.015			
(3) PLACE 0.000	+0.005	+0.008	+0.002			

PRIVATE LABELING
REQUIREMENT TO
CONFORM TO
ENGINEERING
SPECIFICATION
6829103794 FOR
COMPONENTS LISTED
IN 68500-05-026
DATE
03-21-17
REV. LTN.
(A)
84038307
SHT 5 OF 10

BILL OF MATERIAL			
QTY	DESCRIPTION	MATERIAL	ASSEMBLY USED IN



DETAIL W
SCALE: 0.200

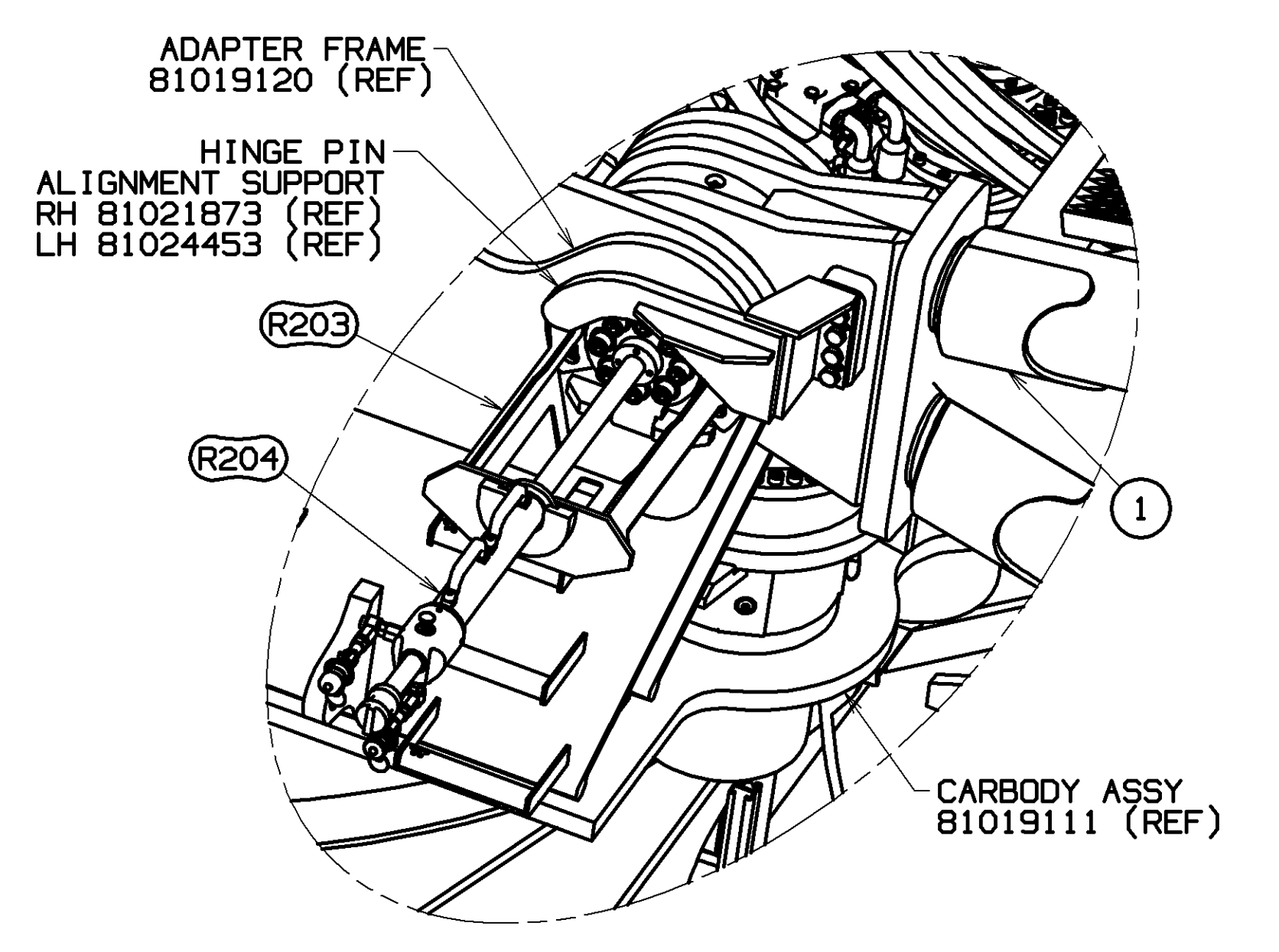
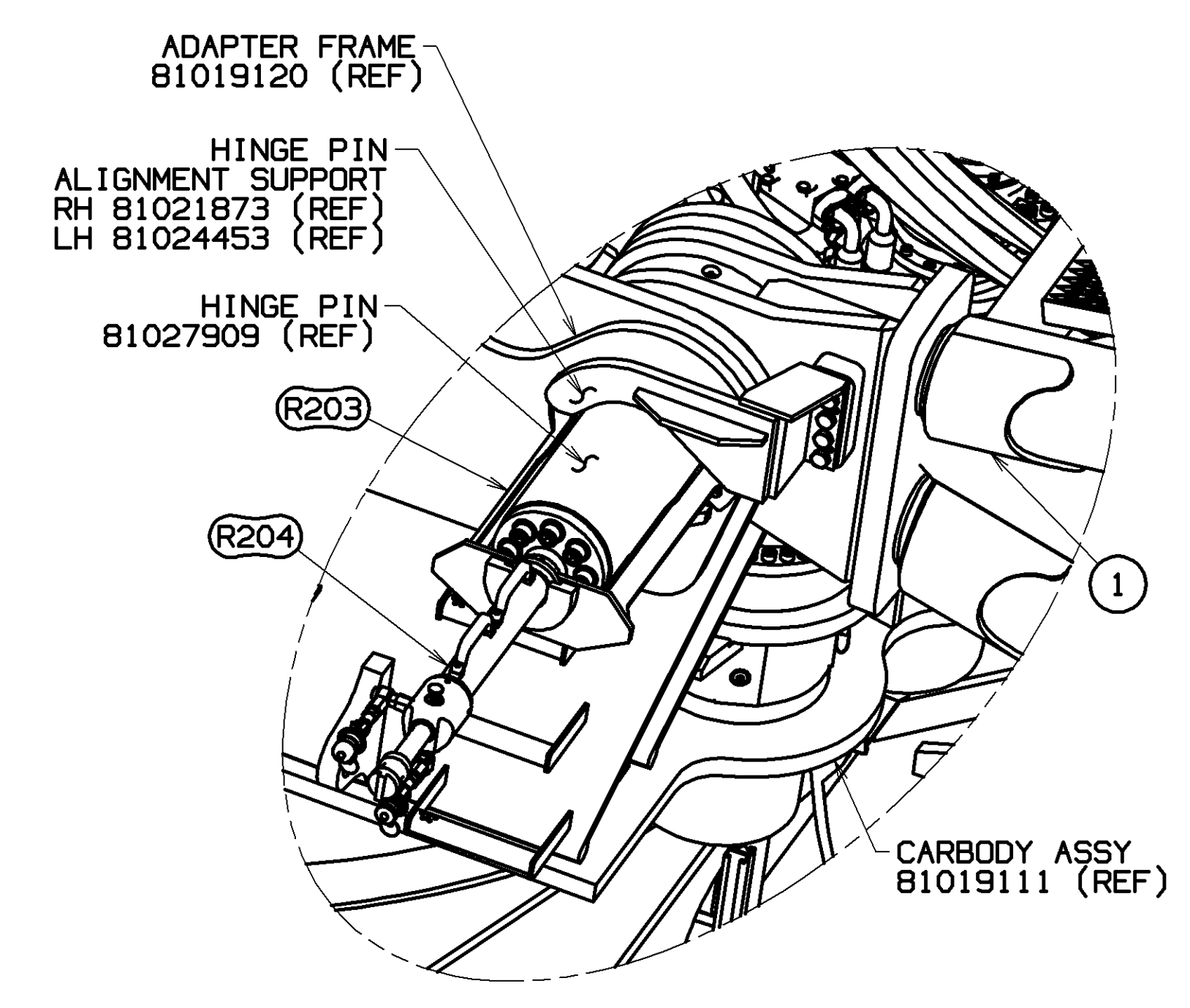
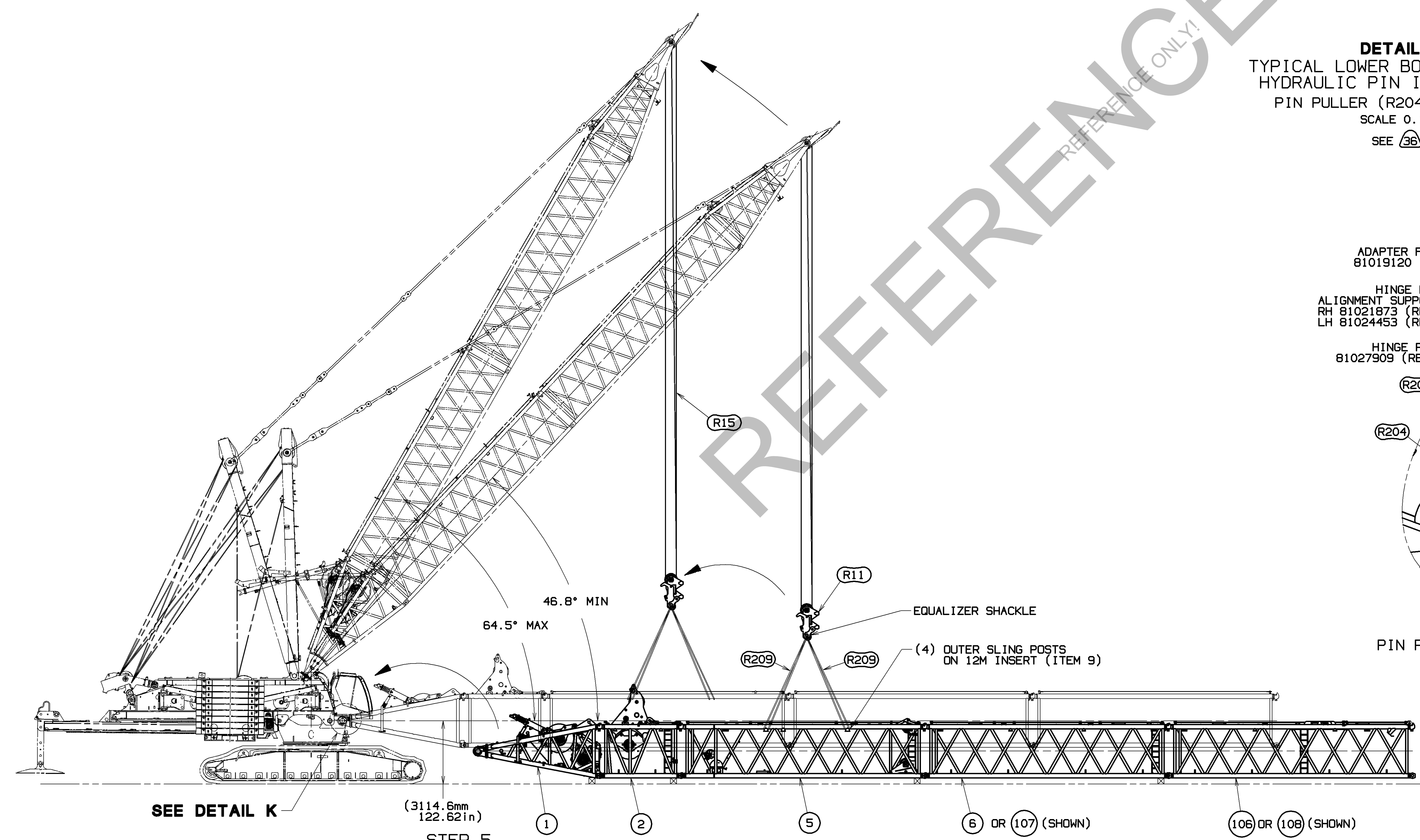
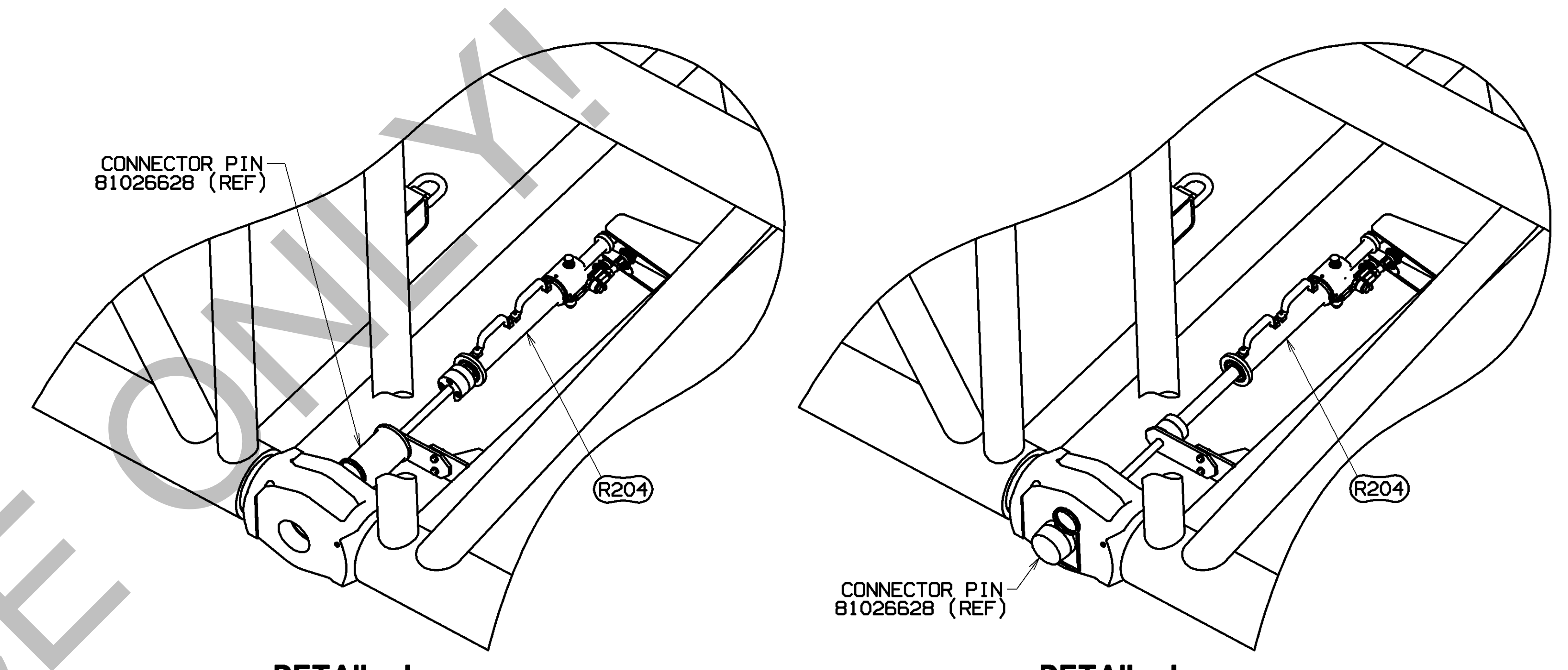
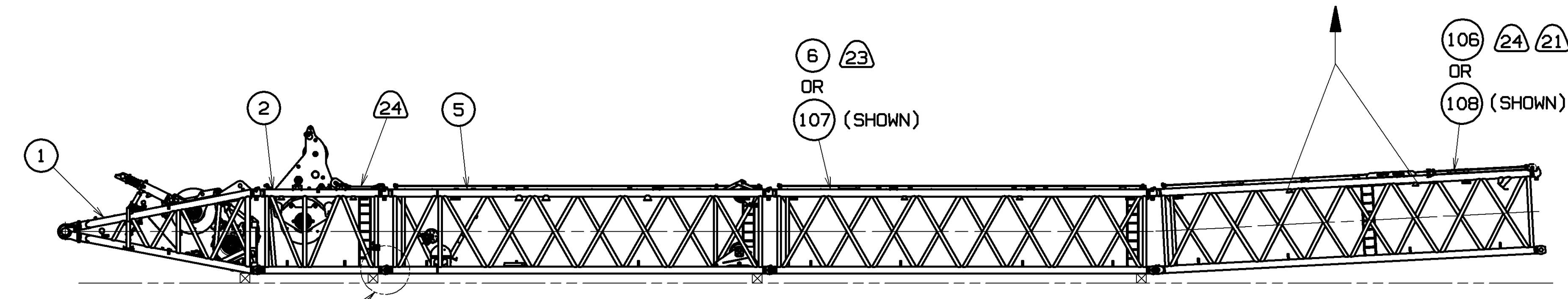
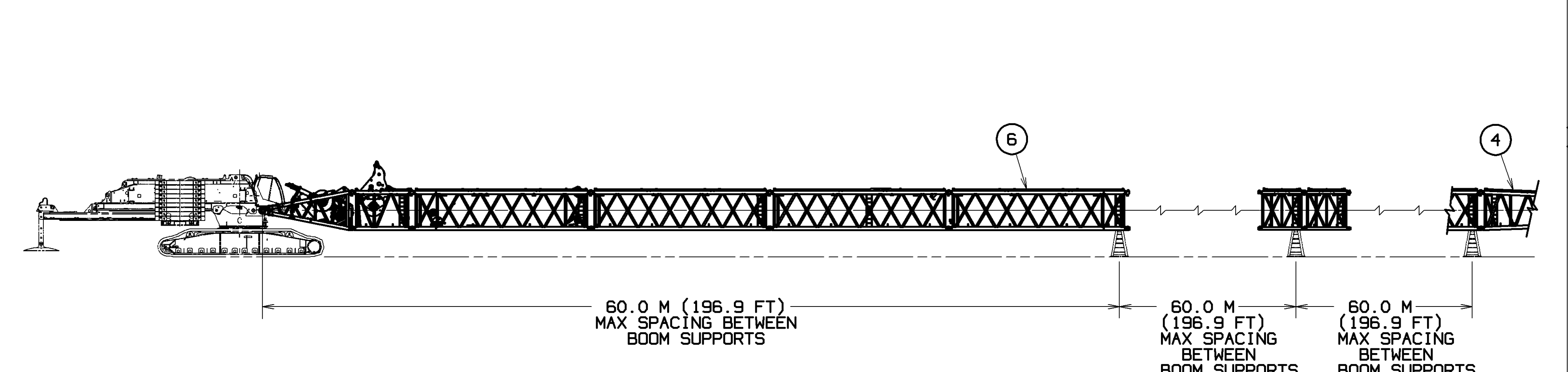
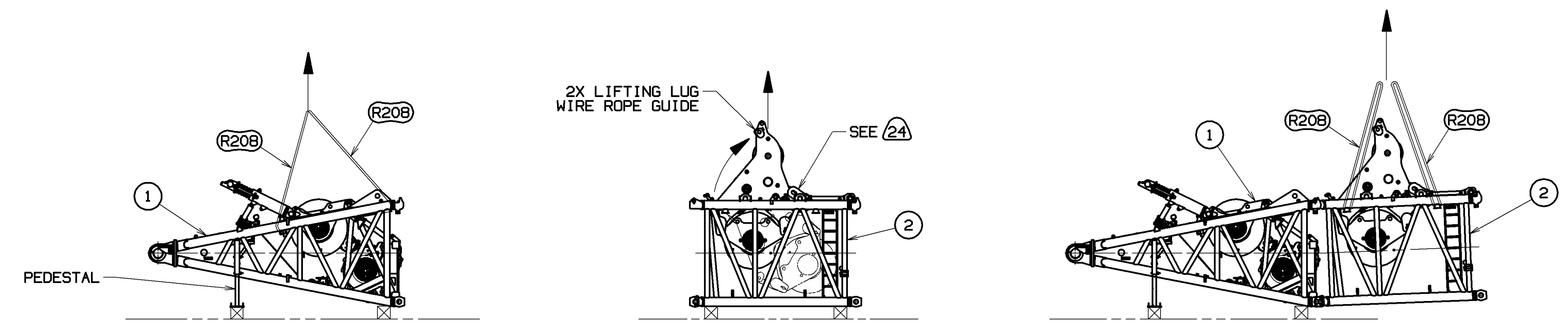


RECOMMENDED BOOM MAKEUP
FOR TYP PIN JOINT SEE SECTION B-B
AND DETAILS D,E,G,P & W

TOLERANCES UNLESS OTHERWISE SPECIFIED		FINISH	WELDING	DR. RHY	CK. P.J.H	APP J.R.R
DECIMAL PLACES	F. TO FEET	F. TO FEET	TO FEET	TO FEET	TO FEET	TO FEET
(1) PLACE 0.5	±.12	±.18	±.05	±.05	±.05	±.05
(2) PLACE 0.00	±.08	±.12	±.015	±.015	±.015	±.015
(3) PLACE 0.000	±.008	±.012	±.005	±.005	±.005	±.005

MANUFACTURED BY	Manitowoc Cranes, Inc.
MODEL	MLC650
BOOM RIGGING	B65:685-680

PRIVATE LABELING
REQUIREMENT TO
CONFORM TO
ENGINEERING
SPECIFICATION
6829103794 FOR
COMPONENTS LISTED
IN SECTION C6-026
DATE
03-21-17



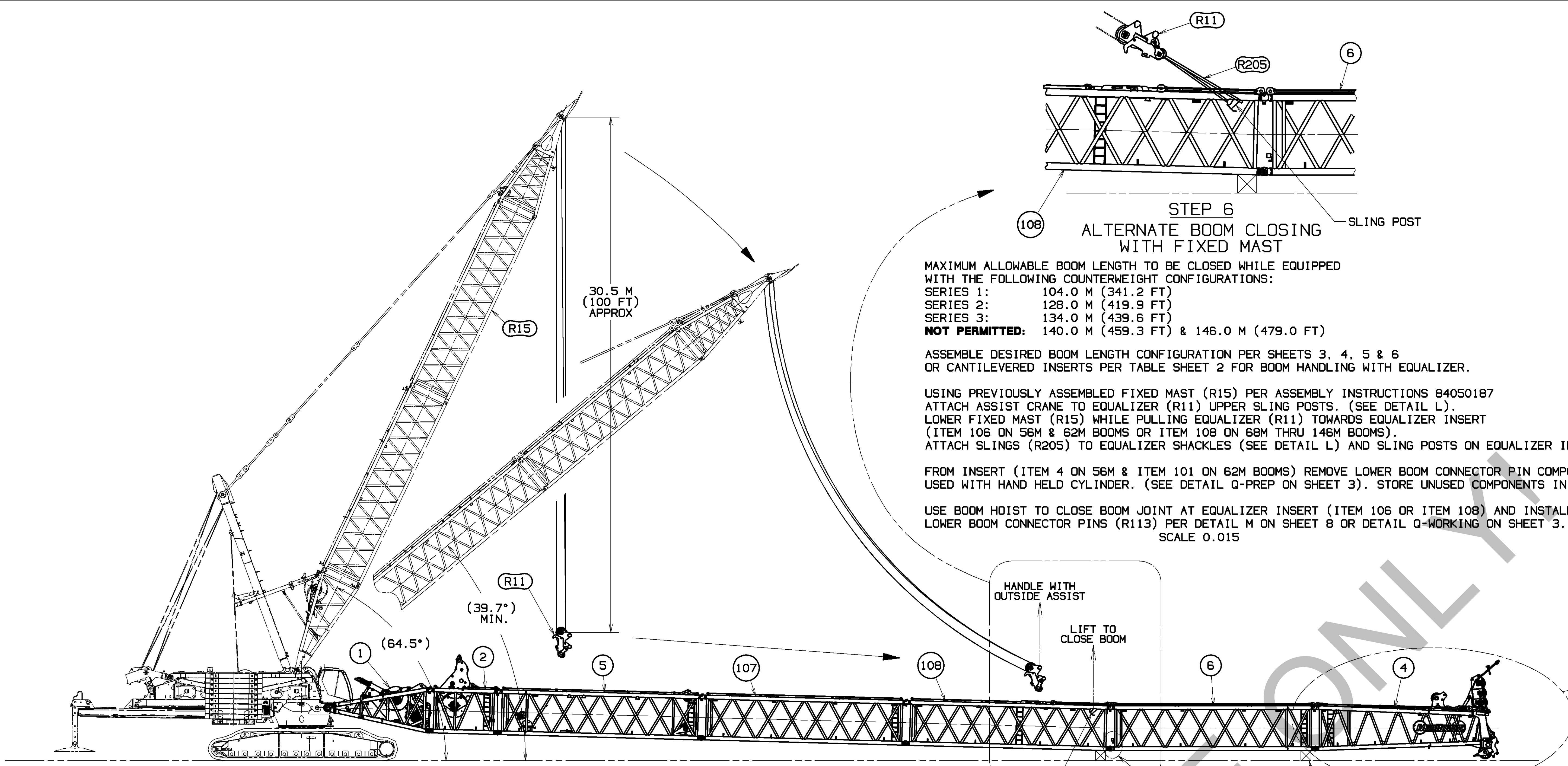
DECIMAL PLACES	FRACTIONS	MACHINING	WELDING	CASTING	OTHER
(1) PLACE 0.5	1/2	±.18	±.05	±.10	±.05
(2) PLACE 0.00	1/16	±.08	±.015	±.05	±.015
(3) PLACE 0.000	1/64	±.04	±.008	±.008	±.008

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MANITOWOC CRANES, INC.
Milwaukee, Wisconsin
MODEL: MLC650
APP: JRR

BOOM RIGGING
865:685-680

84038307
SHT 7 OF 10



**STEP 6
 ALTERNATE BOOM CLOSING
 WITH FIXED MAST**

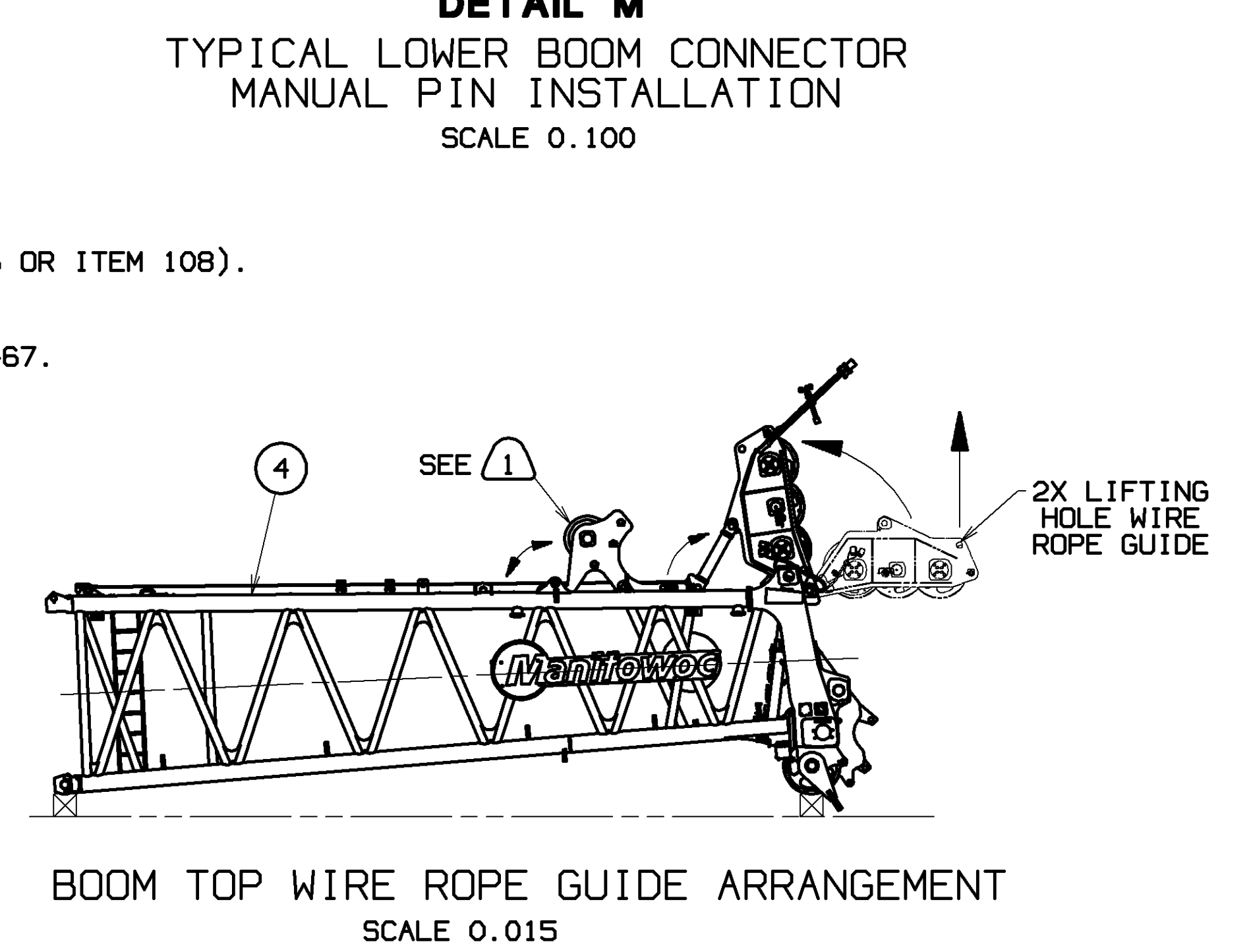
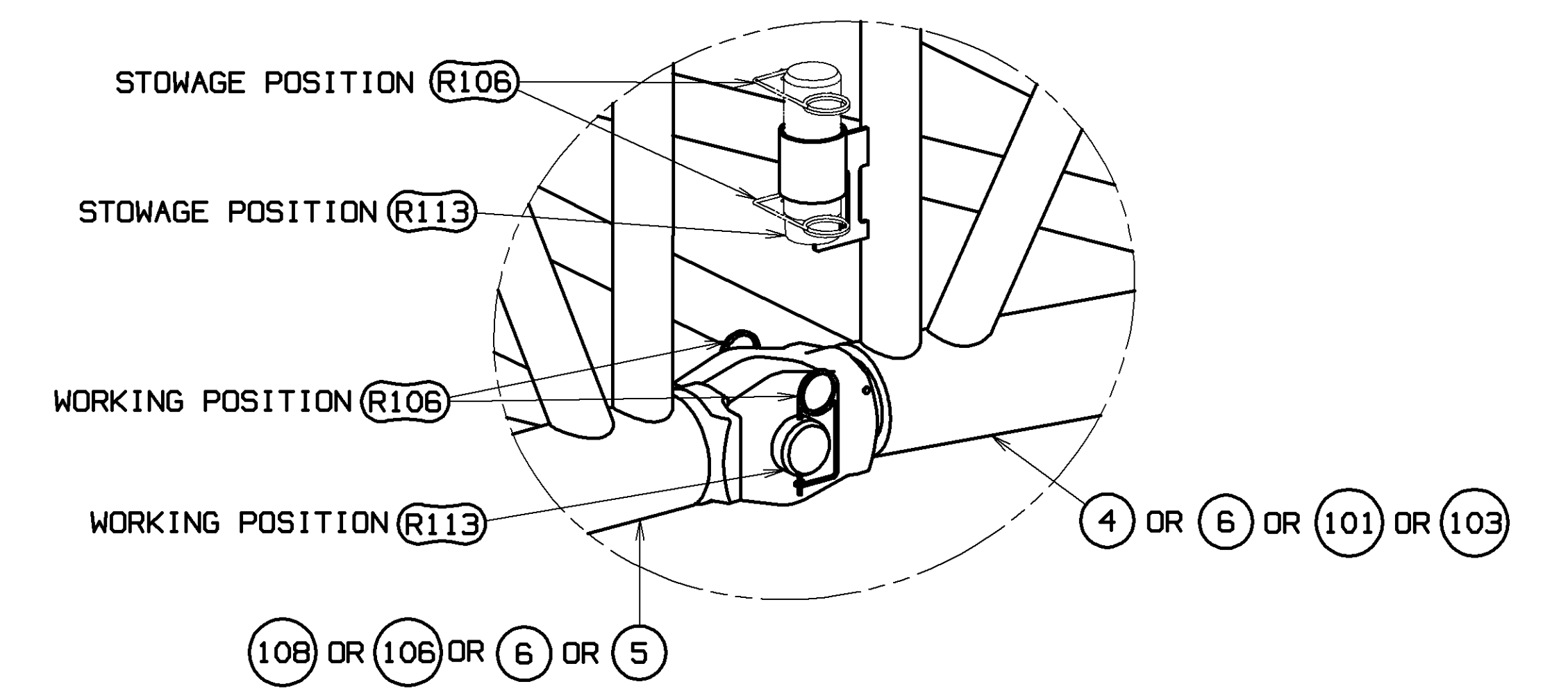
MAXIMUM ALLOWABLE BOOM LENGTH TO BE CLOSED WHILE EQUIPPED WITH THE FOLLOWING COUNTERWEIGHT CONFIGURATIONS:
 SERIES 1: 104.0 M (341.2 FT)
 SERIES 2: 128.0 M (419.9 FT)
 SERIES 3: 134.0 M (439.6 FT)
NOT PERMITTED: 140.0 M (459.3 FT) & 146.0 M (479.0 FT)

ASSEMBLE DESIRED BOOM LENGTH CONFIGURATION PER SHEETS 3, 4, 5 & 6 OR CANTILEVERED INSERTS PER TABLE SHEET 2 FOR BOOM HANDLING WITH EQUALIZER.

USING PREVIOUSLY ASSEMBLED FIXED MAST (R15) PER ASSEMBLY INSTRUCTIONS 84050187 ATTACH ASSIST CRANE TO EQUALIZER (R11) UPPER SLING POSTS. (SEE DETAIL L). LOWER FIXED MAST (R15) WHILE PULLING EQUALIZER (R11) TOWARDS EQUALIZER INSERT (ITEM 106 ON 56M & 62M BOOMS OR ITEM 108 ON 68M THRU 146M BOOMS). ATTACH SLINGS (R205) TO EQUALIZER SHACKLES (SEE DETAIL L) AND SLING POSTS ON EQUALIZER INSERT (INSERT 106 OR ITEM 108).

FROM INSERT (ITEM 4 ON 56M & ITEM 101 ON 62M BOOMS) REMOVE LOWER BOOM CONNECTOR PIN COMPONENTS USED WITH HAND HELD CYLINDER. (SEE DETAIL Q-PREP ON SHEET 3). STORE UNUSED COMPONENTS IN PARTS BOX 81028467.

USE BOOM HOIST TO CLOSE BOOM JOINT AT EQUALIZER INSERT (ITEM 106 OR ITEM 108) AND INSTALL LOWER BOOM CONNECTOR PINS (R113) PER DETAIL M ON SHEET 8 OR DETAIL Q-WORKING ON SHEET 3.
 SCALE 0.015



**STEP 6
 BOOM CLOSING WITH OUTSIDE ASSIST**

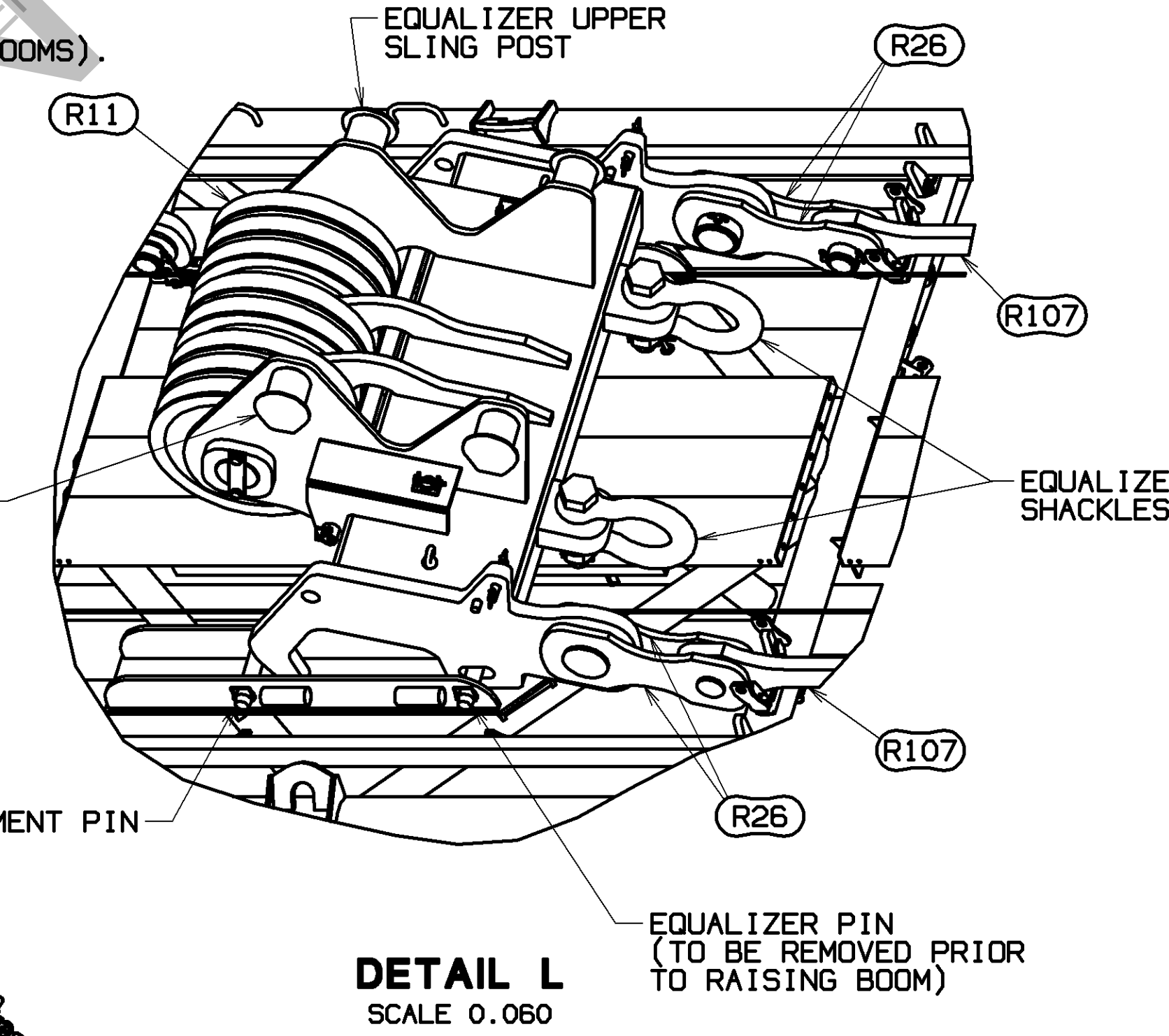
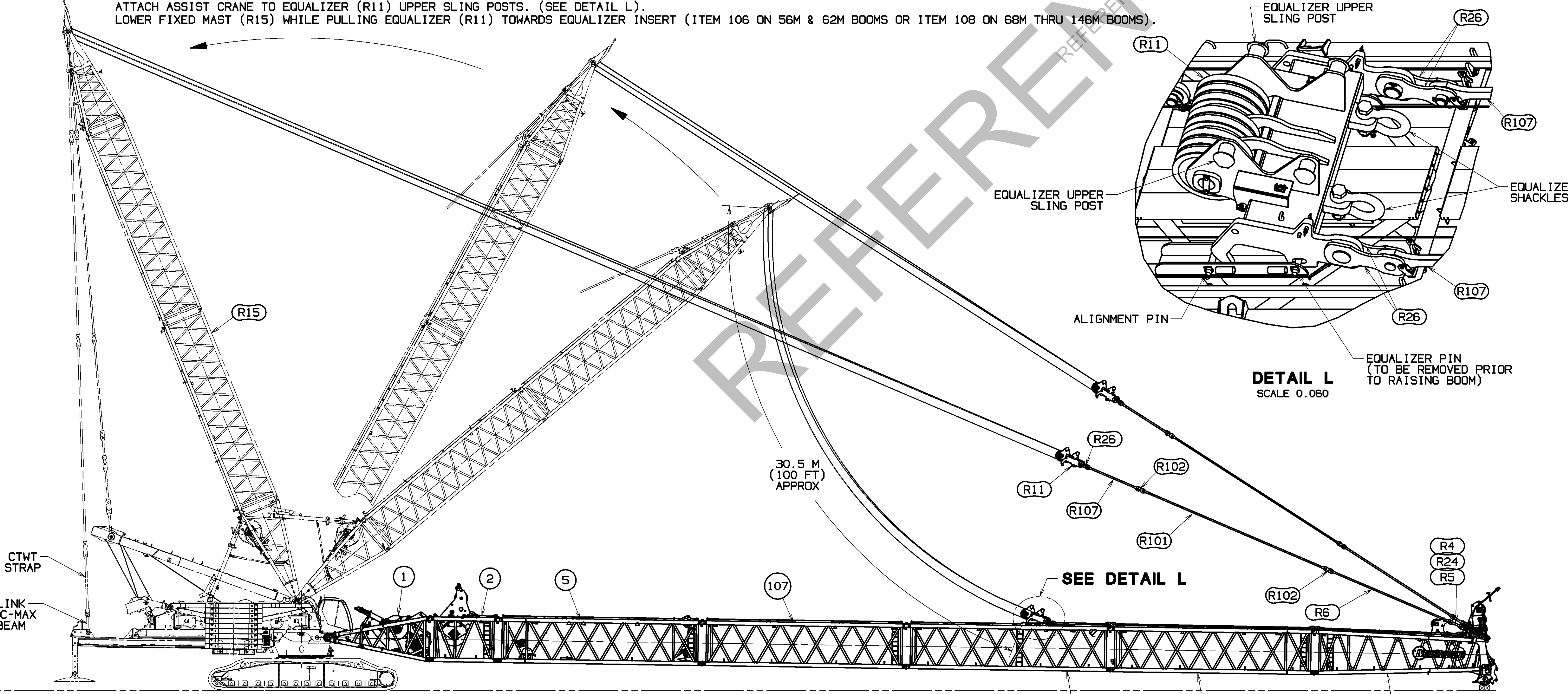
ASSEMBLE DESIRED BOOM LENGTH CONFIGURATION PER SHEETS 3, 4, 5 & 6 OR CANTILEVERED INSERTS PER TABLE SHEET 2 FOR BOOM HANDLING WITH EQUALIZER. (REFER TO DELTA 35 ON SHEET 1 AND INTERMEDIATE BLOCKING VIEW ON SHEET 7 FOR BLOCKING REQUIREMENTS).

USING OUTSIDE ASSIST TO CLOSE BOOM, LIFT UP ON EQUALIZER INSERT (ITEM 106 ON 56M & 62M BOOMS OR ITEM 108 ON 68M THRU 146M BOOMS) AT SLING POSTS. INSTALL EQUALIZER INSERT LOWER BOOM CONNECTOR PINS (R113) PER DETAIL M AND SEE DELTA NOTE 37 FOR BOOM LENGTHS 56M & 62M. ATTACH ASSIST CRANE TO EQUALIZER (R11) UPPER SLING POSTS. (SEE DETAIL L). LOWER FIXED MAST (R15) WHILE PULLING EQUALIZER (R11) TOWARDS EQUALIZER INSERT (ITEM 106 ON 56M & 62M BOOMS OR ITEM 108 ON 68M THRU 146M BOOMS).

ANGLE: (64.5°)
 MIN. (39.7°)

HANDLE WITH OUTSIDE ASSIST
 LIFT TO CLOSE BOOM

SEE DELTA NOTE 35 (SHEET 1) AND RECOMMENDED BOOM MAKEUP CONFIGURATIONS (SHEET 6) FOR BOOM BLOCKING RESTRICTIONS



PROCEDURE TO DISASSEMBLE BOOM

1. BOOM DOWN AND SUPPORT BOOM ON BLOCKING.
2. BOOM FIXED MAST (R15) 1° TOWARD MAST STOPS AND DISCONNECT MAST COUNTERWEIGHT STRAPS FROM LINKS ON VPC-MAX BEAM.
3. PAY OUT BOOM HOIST TO LOWER EQUALIZER (R11) ONTO INSERT RAILS AND SECURE WITH EQUALIZER PIN. (SEE DETAIL L).
4. DISCONNECT LINKS (R26) FROM EQUALIZER STRAPS (R107) AND PIN LINKS (R26) INTO STOWAGE POSITION.
5. DISCONNECT BOOM STRAPS/LINKS AT EACH JOINT.
6. WITH PROPER BLOCKING IN PLACE AND SUPPORT FROM ASSIST CRANE REMOVE INSERT LOWER CONNECTOR PINS AND DISENGAGE UPPER CONNECTOR PINS FROM INSERTS TOWARD BOOM TOP FROM EQUALIZER INSERT.

WARNING:
 BOOM MUST BE PROPERLY BLOCKED TO PREVENT SHIFTING DURING PIN REMOVAL

7. REMOVE PINS SECURING EQUALIZER TO INSERT IF INSTALLED.
8. FOR REMOVAL OF BOOM BUTT/EQUALIZER INSERT ASSEMBLY REVERSE INSTALLATION STEPS 1 THRU 5 ON SHEET 7.

PROCEDURE TO DISASSEMBLE BOOM FOR BOOM MAKE UP RECONFIGURATIONS

1. BOOM DOWN AND SUPPORT BOOM ON BLOCKING.
2. PAY OUT BOOM HOIST TO LOWER EQUALIZER (R11) ONTO INSERT RAILS AND SECURE WITH EQUALIZER PIN. (SEE DETAIL L).
3. DISCONNECT LINKS (R26) FROM EQUALIZER STRAPS (R107) AND PIN LINKS INTO STOWAGE POSITION.
4. DISCONNECT BOOM STRAPS/LINKS NECESSARY FOR BOOM RECONFIGURATION.
5. WITH PROPER BLOCKING IN PLACE AND SUPPORT FROM ASSIST CRANE REMOVE INSERT LOWER CONNECTOR PINS AND DISENGAGE UPPER CONNECTOR PINS PER REQUIRED CONFIGURATION.

WARNING:
 BOOM MUST BE PROPERLY BLOCKED TO PREVENT SHIFTING DURING PIN REMOVAL

**STEP 7
 EQUALIZER TO STRAPS ASSEMBLY**

LOWER EQUALIZER (R11) ONTO RAILS OF EQUALIZER INSERT (ITEM 106 ON 56M & 62M BOOMS OR ITEM 108 ON 68M THRU 146M BOOMS).
 NOTE: IF USED ALTERNATE BOOM CLOSING W/FIXED MAST, DETACH SLINGS (R205) FROM EQUALIZER (R11) AND EQUALIZER INSERT (ITEM 106 OR ITEM 108) SLING POSTS. CONNECT BOOM STRAPS/LINKS FROM BOOM TOP (ITEM 4) TO EQUALIZER INSERT (ITEM 106 OR ITEM 108) IF NOT PREVIOUSLY DONE. CONNECT EQUALIZER LINKS (R26) TO BOOM STRAPS (R107). REMOVE PINS SECURING EQUALIZER TO INSERT IF INSTALLED. (PINS SECURING EQUALIZER TO INSERT (SEE DETAIL L) ARE ONLY REQUIRED WHEN CHANGING BOOM LENGTHS AND THE EQUALIZER IS NOT SUPPORTED BY AN ASSIST CRANE OR CONNECTED TO THE BOOM STRAPS). CONNECT MAST COUNTERWEIGHT STRAPS TO LINKS ON VPC-MAX BEAM PER FIXED MAST ASSEMBLY INSTRUCTIONS 84050187. BOOM UP TO DESIRED ANGLE.

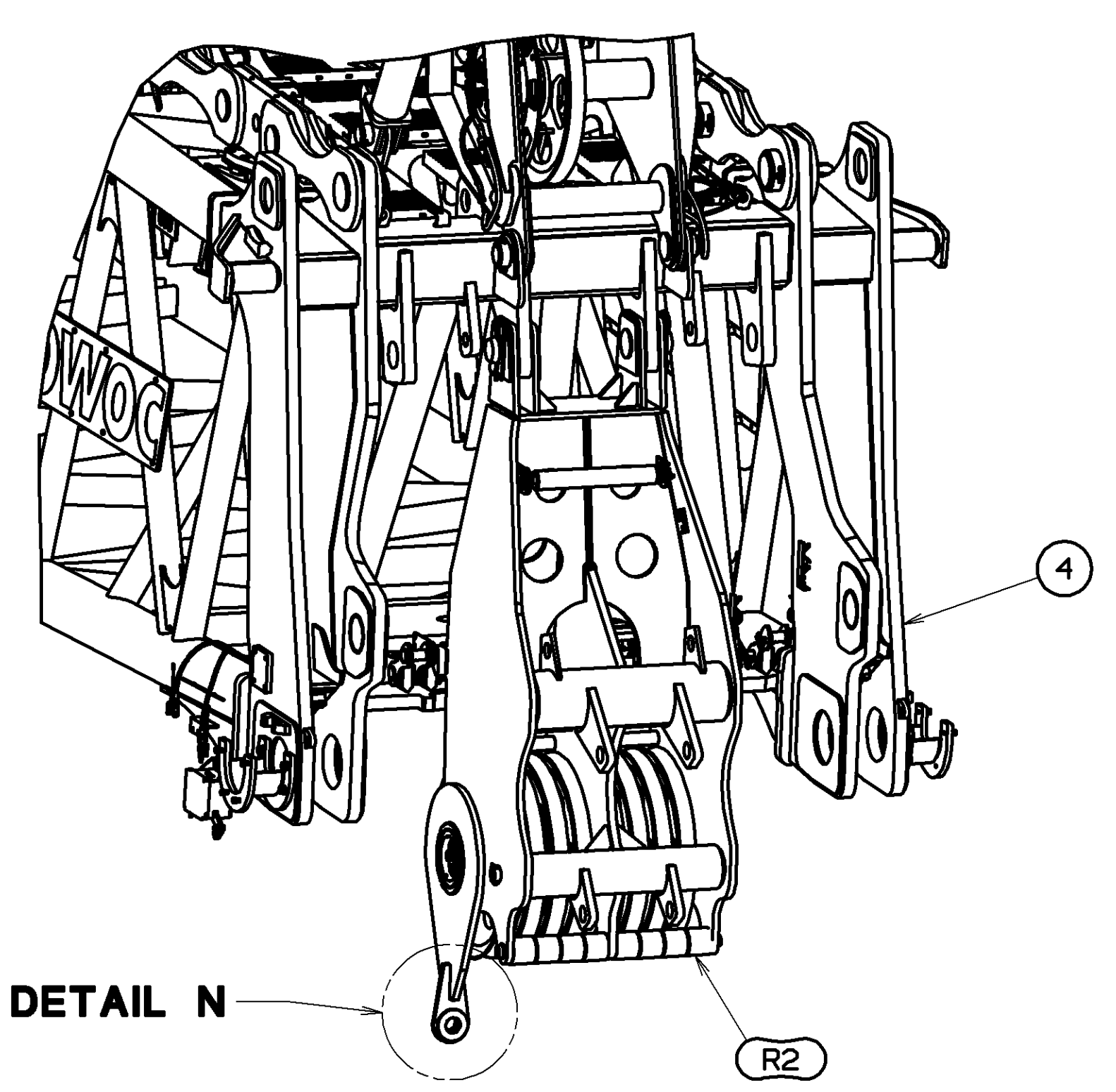
DECIMAL PLACES	FRACTION	WELDING	SCALE	DATE	BY	CHECKED	APP	REV.	DESCRIPTION
1	1/16	1/16	1:1	03-21-17	DR. RHY	CK. PUH	APP. JRR	1	BOOM RIGGING
2	1/32	1/32	1:1					2	B65:685-680
3	1/64	1/64	1:1					3	

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MANITOWOC CRANES, INC.
 Manitowoc, Wisconsin
 MODEL MLC650

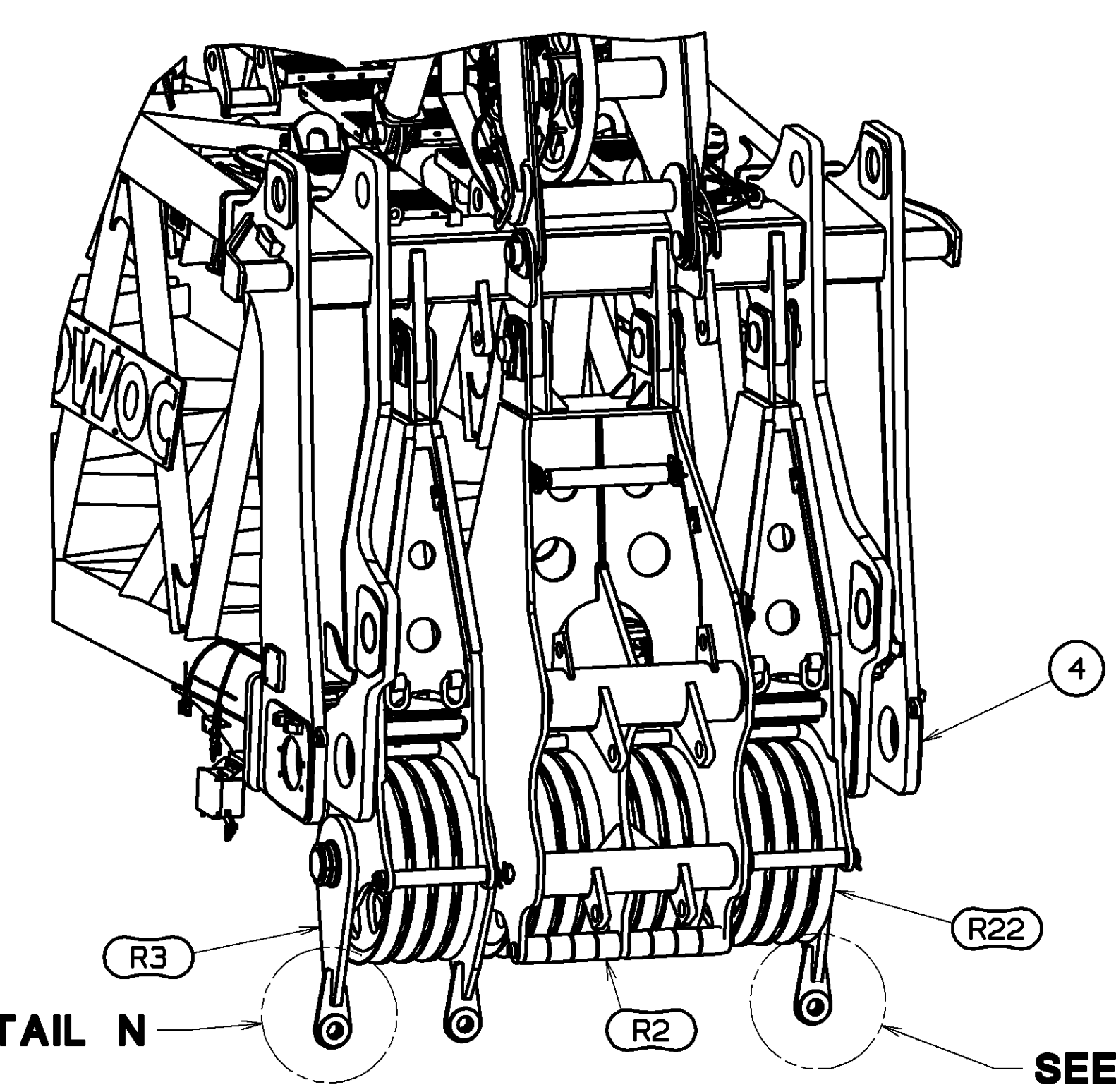
DATE: 03-21-17
 REV. LNK: A

84038307
 SHT 8 OF 10



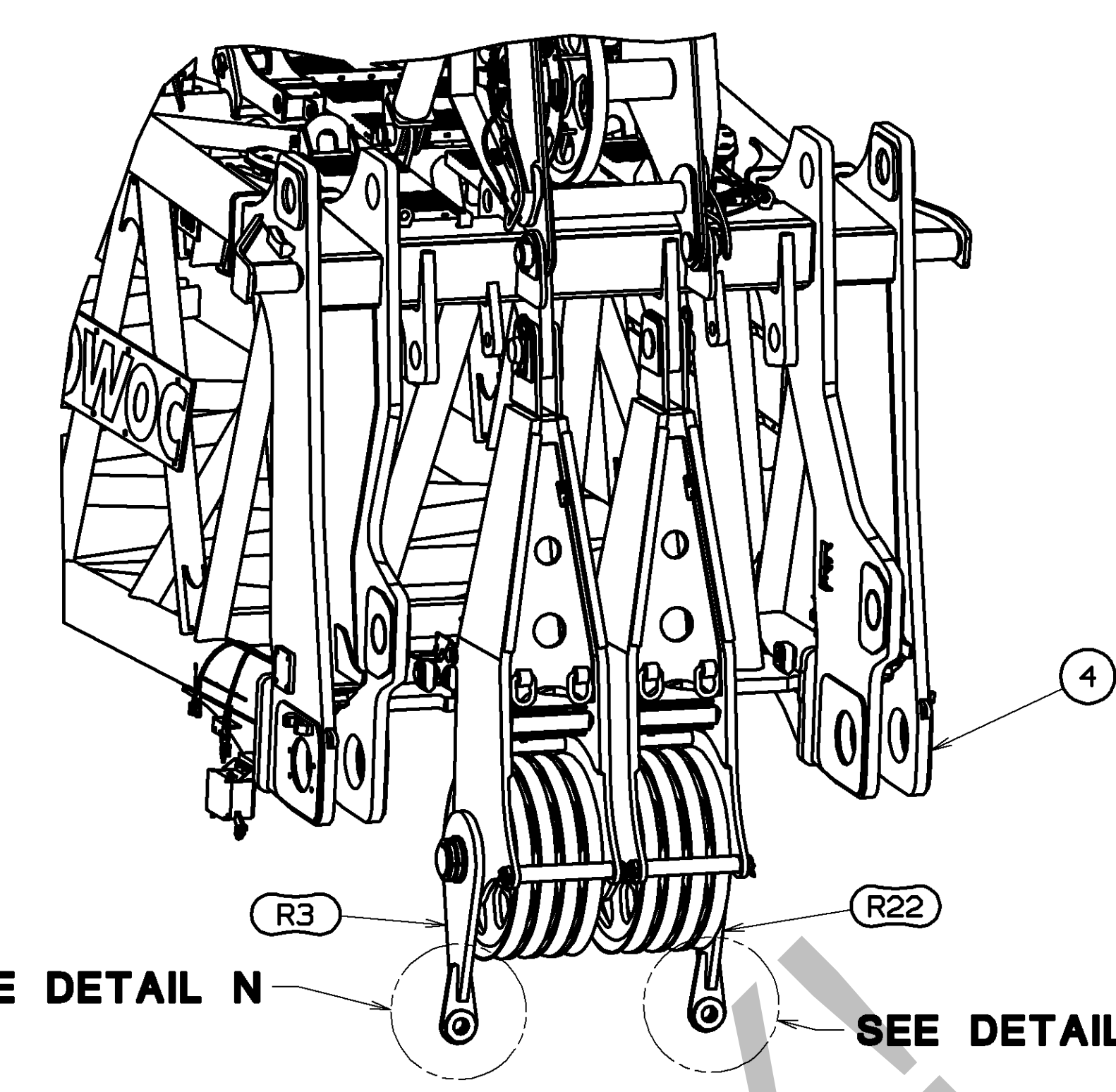
SEE DETAIL N

BASIC W/O OPTION CONFIGURATION
FOR BOOM ONLY
8 SHEAVE CENTER SHEAVE PACK
SCALE 0.050



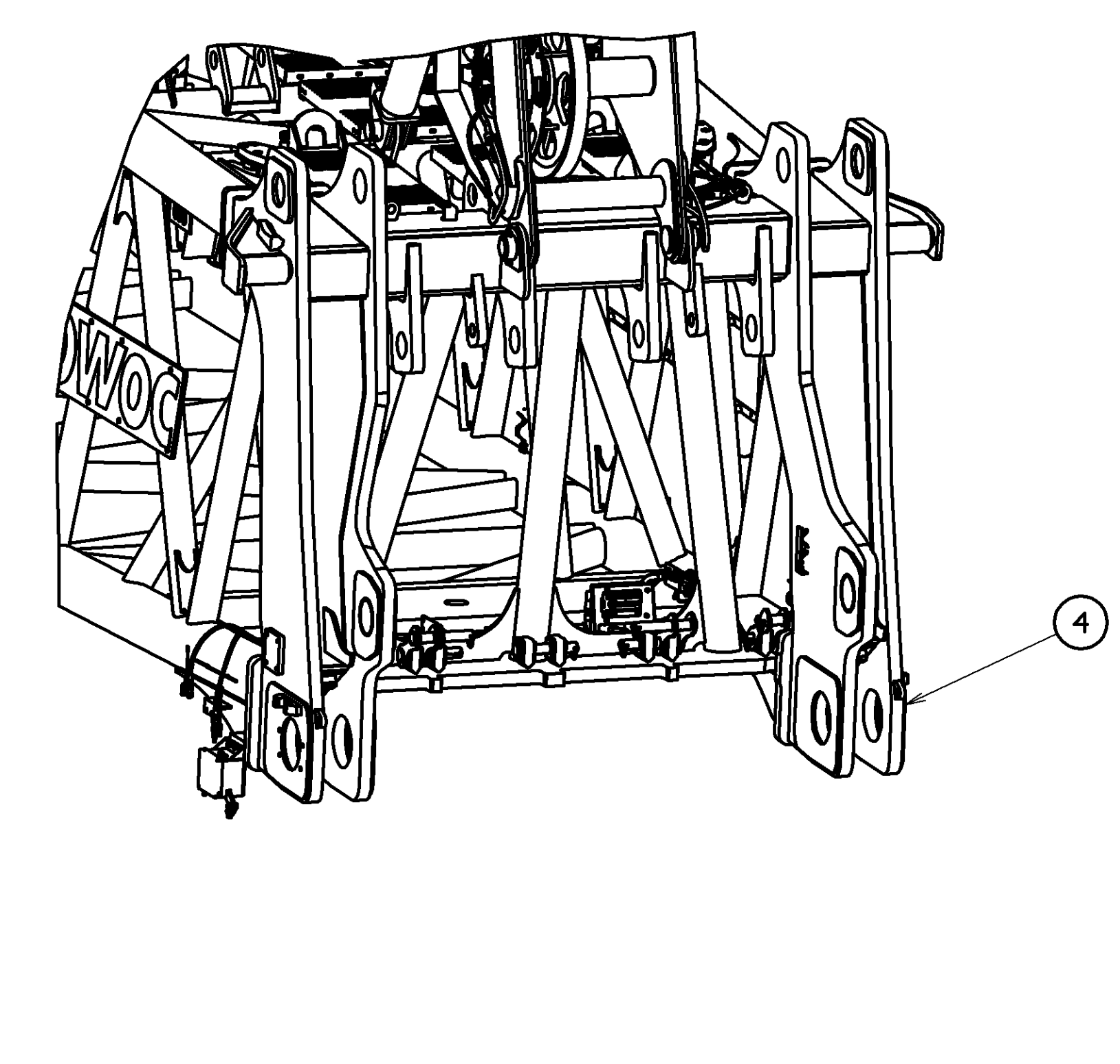
SEE DETAIL N

BASIC W/OPTION CONFIGURATION
FOR BOOM ONLY
8 SHEAVE CENTER & (2) 4 SHEAVE SIDE PACK
SCALE 0.050

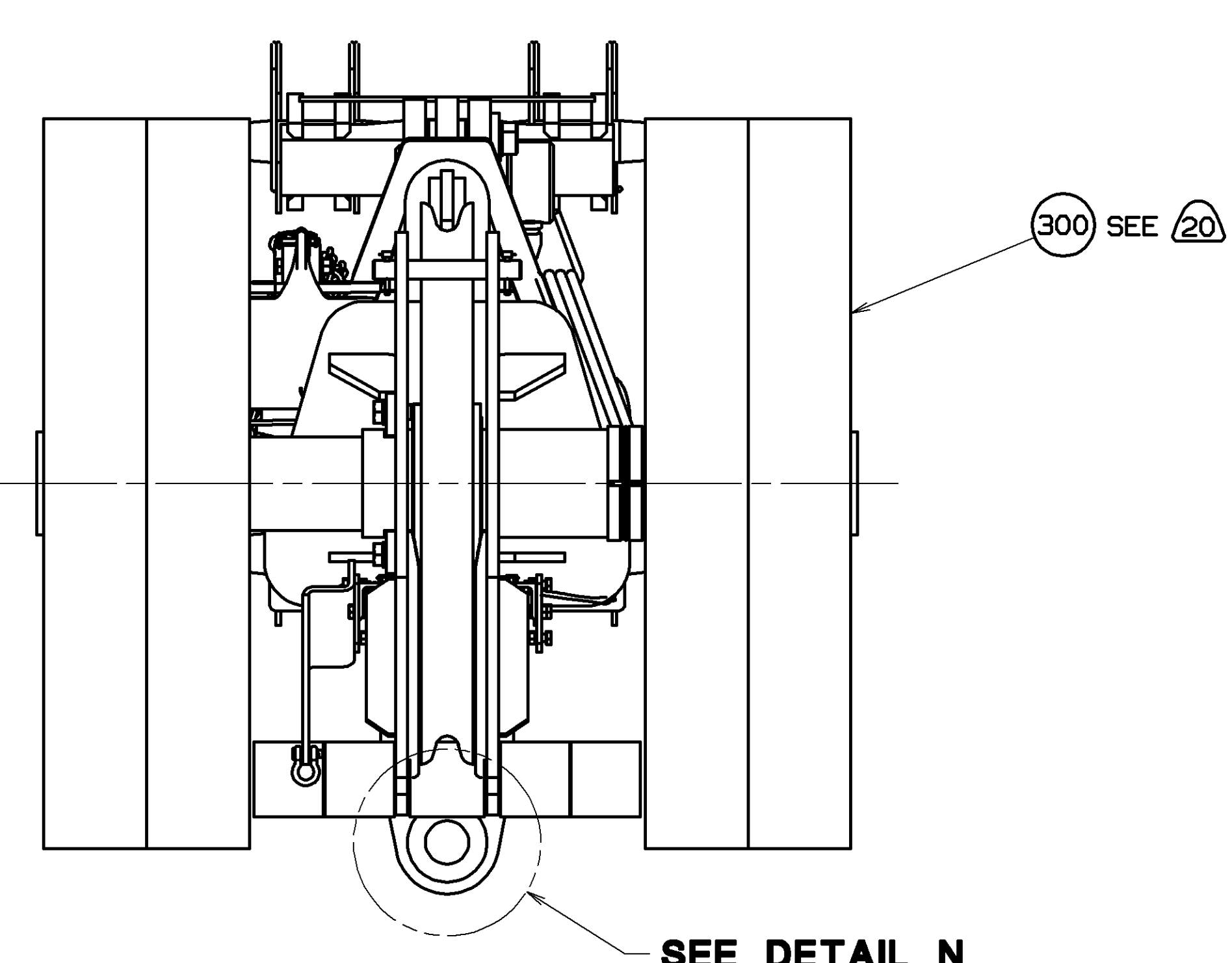


SEE DETAIL N

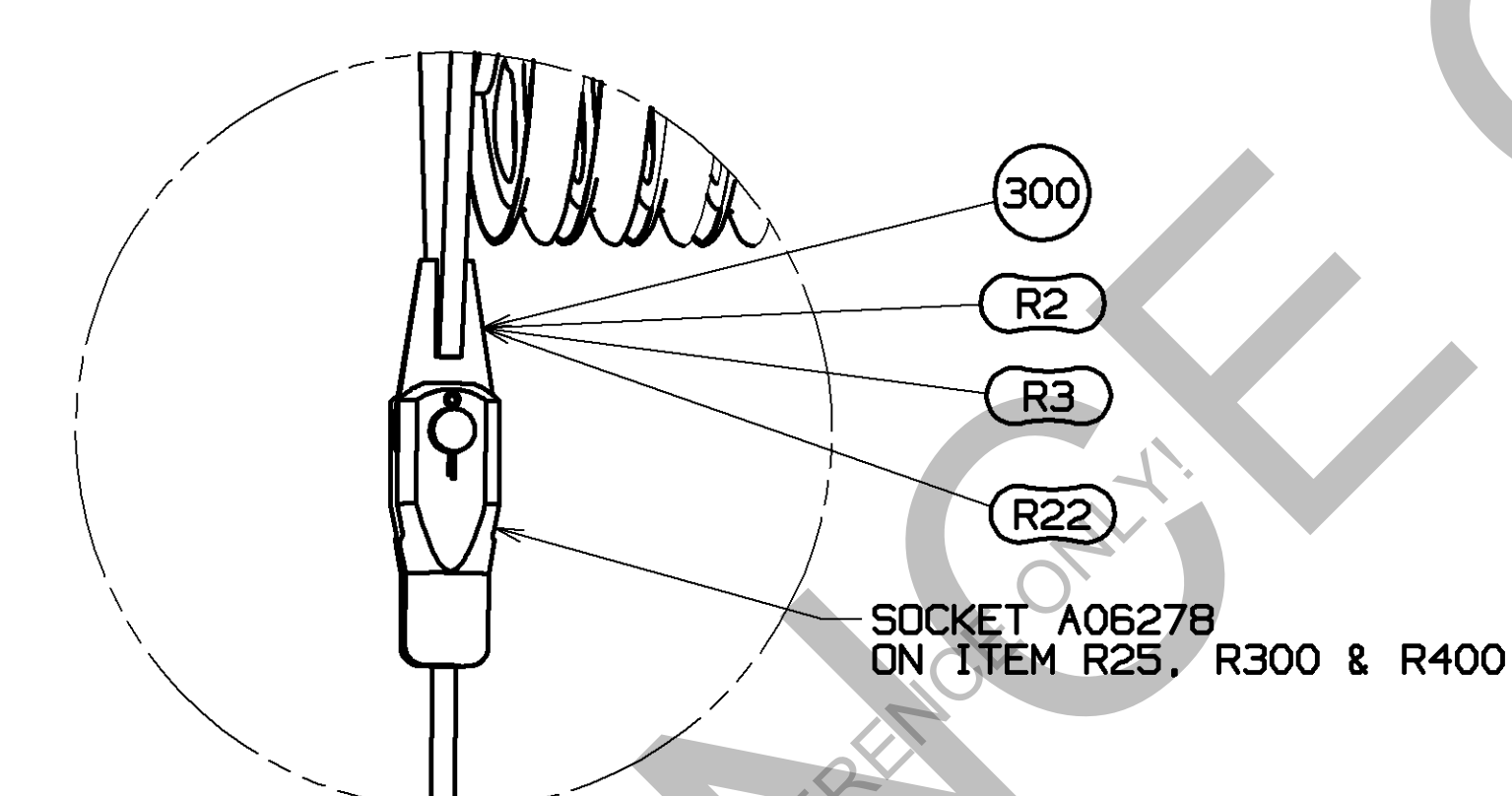
OPTION W/O BASIC CONFIGURATION
FOR BOOM ONLY OR BOOM W/LUFFING JIB
(2) 4 SHEAVE CENTER PACKS
SCALE 0.050



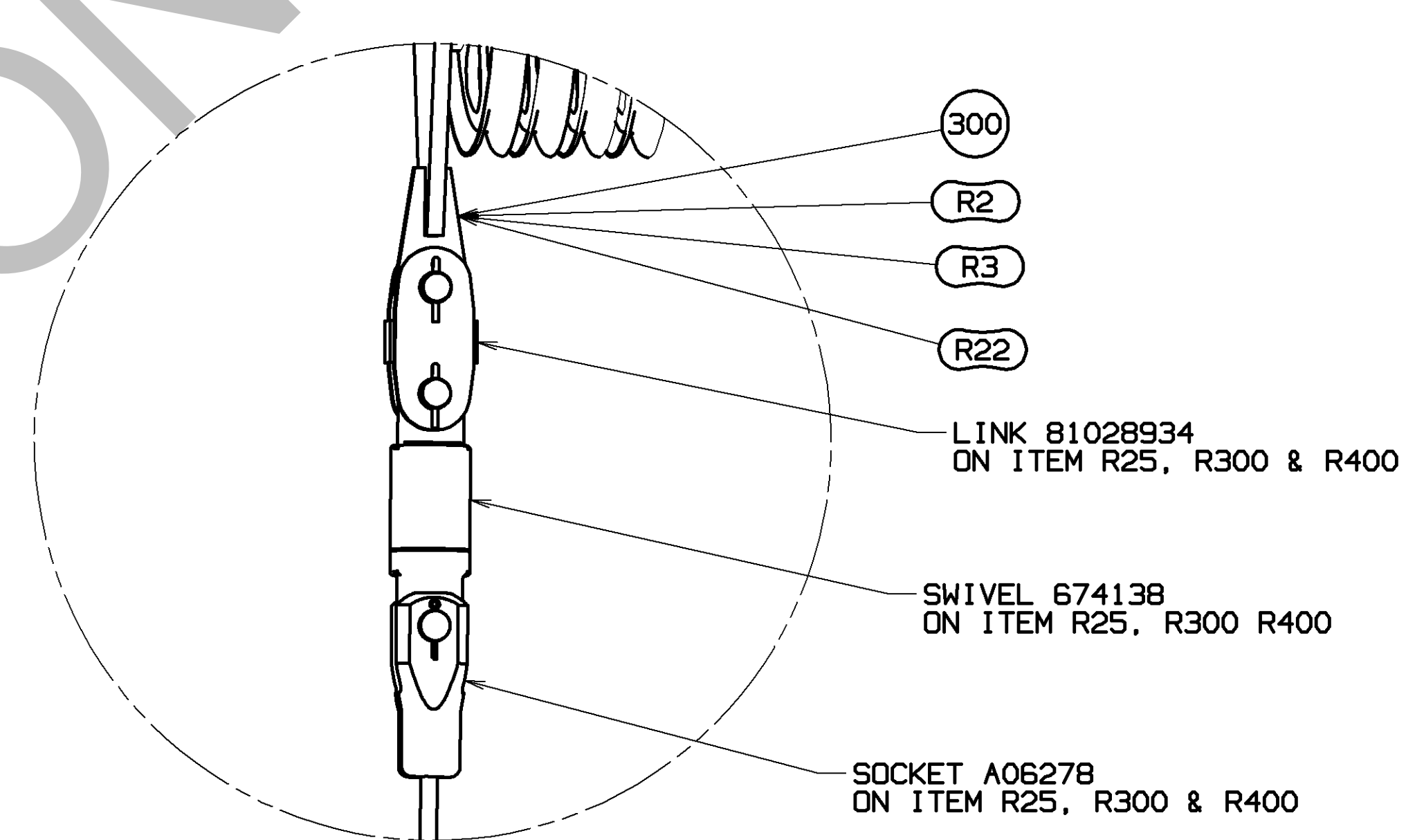
W/O BASIC AND OPTION CONFIGURATION
FOR BOOM W/LUFFING JIB
WITHOUT SHEAVE PACKS
SCALE 0.050



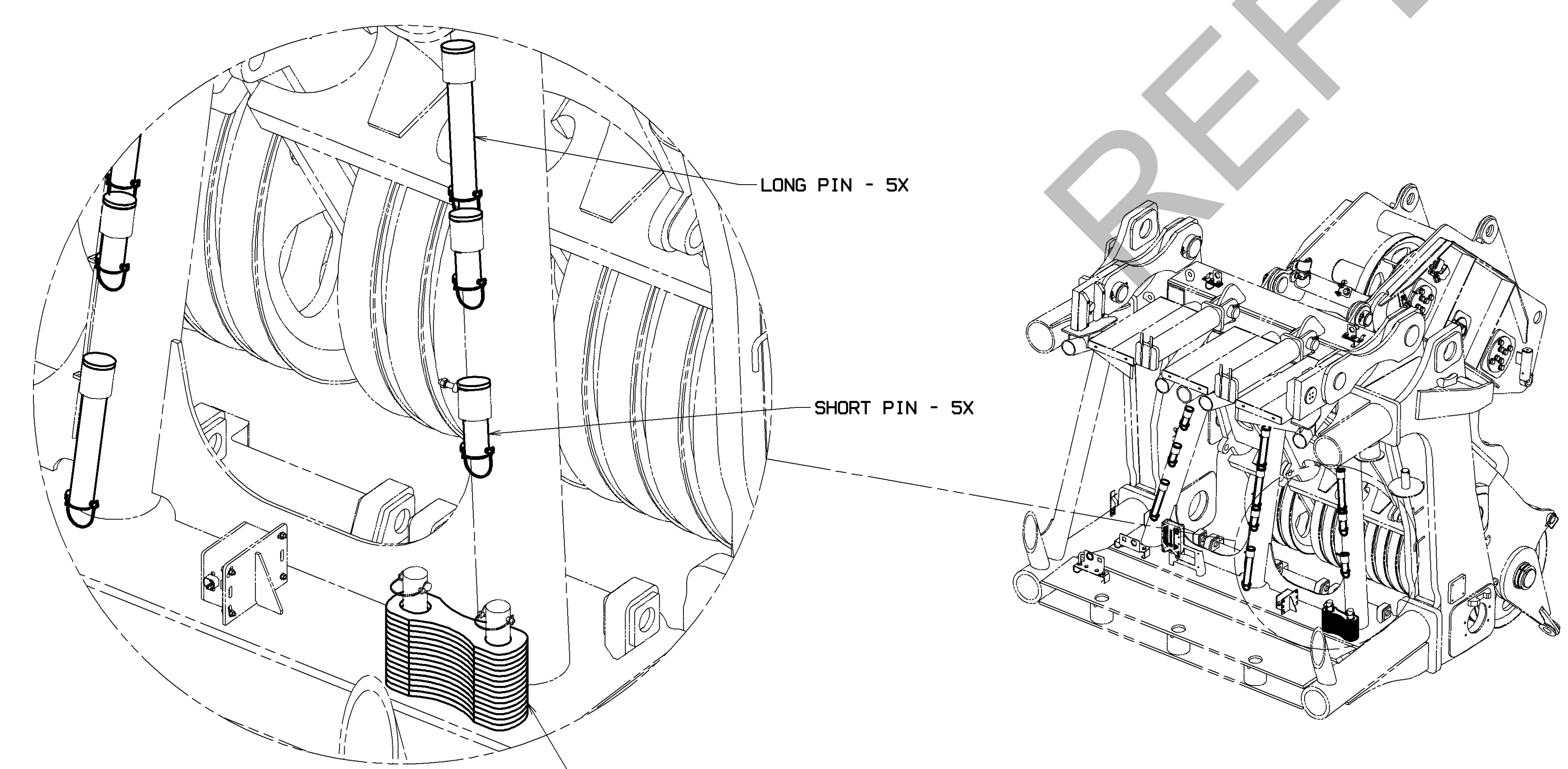
VIEW V-V
(FROM SHEET 1)
SCALE 0.150



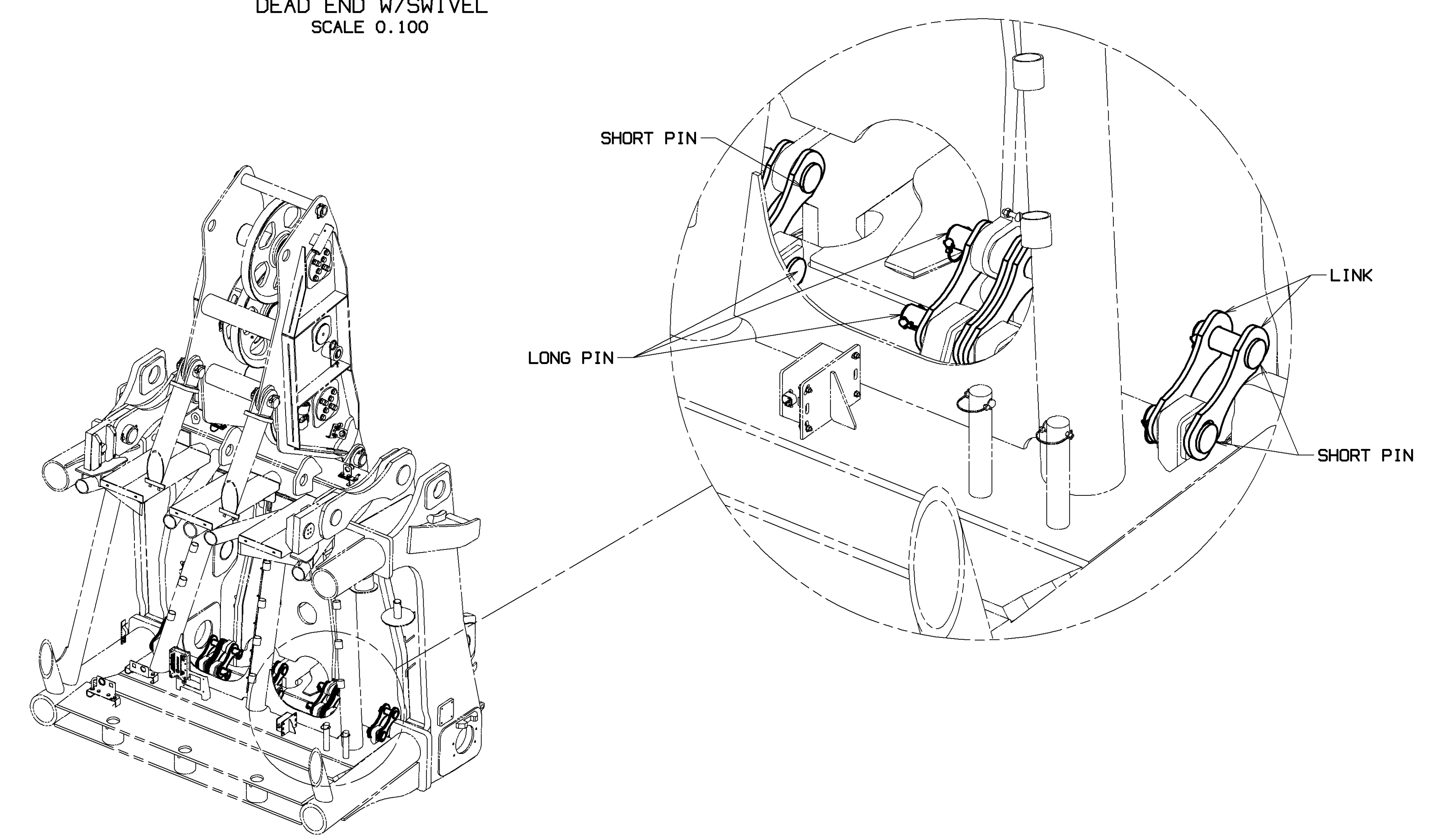
DETAIL N
ITEM R25, R300 & R400
DEAD END W/O SWIVEL
SCALE 0.100



DETAIL N
ITEM R25, R300 & R400
DEAD END W/SWIVEL
SCALE 0.100



LOWER SHEAVE POINT PINS AND LINKS IN STOWAGE POSITION.
FOR SHIPPING OF BOOM TOP WITH LOWER BOOM POINT
PIVOTED AWAY FROM BEARING PLATE OR FOR REMOVAL
OF SHEAVE PACKS PER VARIOUS CONFIGURATIONS.
SCALE 0.050

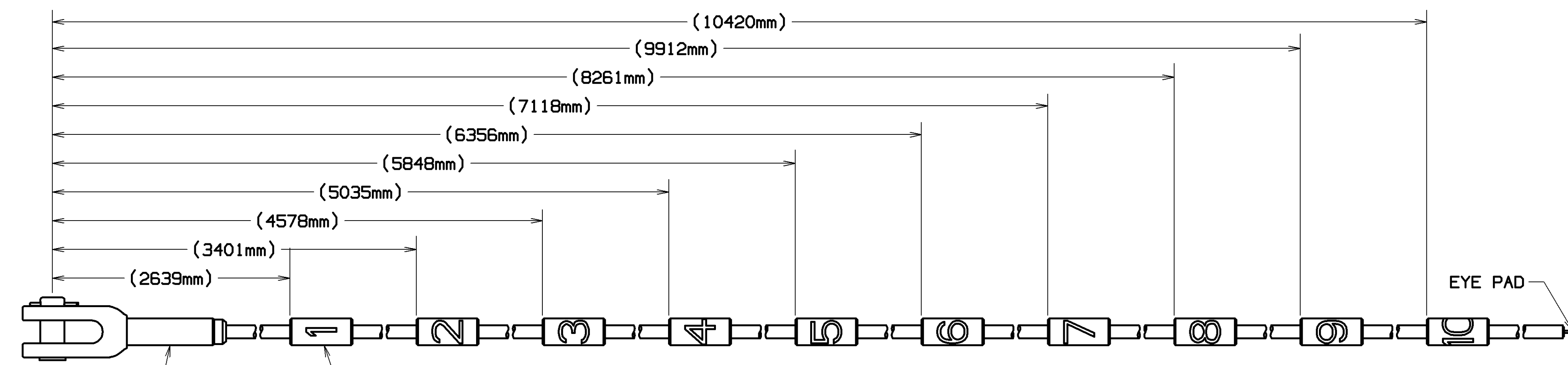


LOWER SHEAVE POINT PINS AND LINKS IN WORKING POSITION
AND FOR SHIPPING OF BOOM TOP WITH
POINT CONTACTING BEARING PLATE.
SCALE 0.050

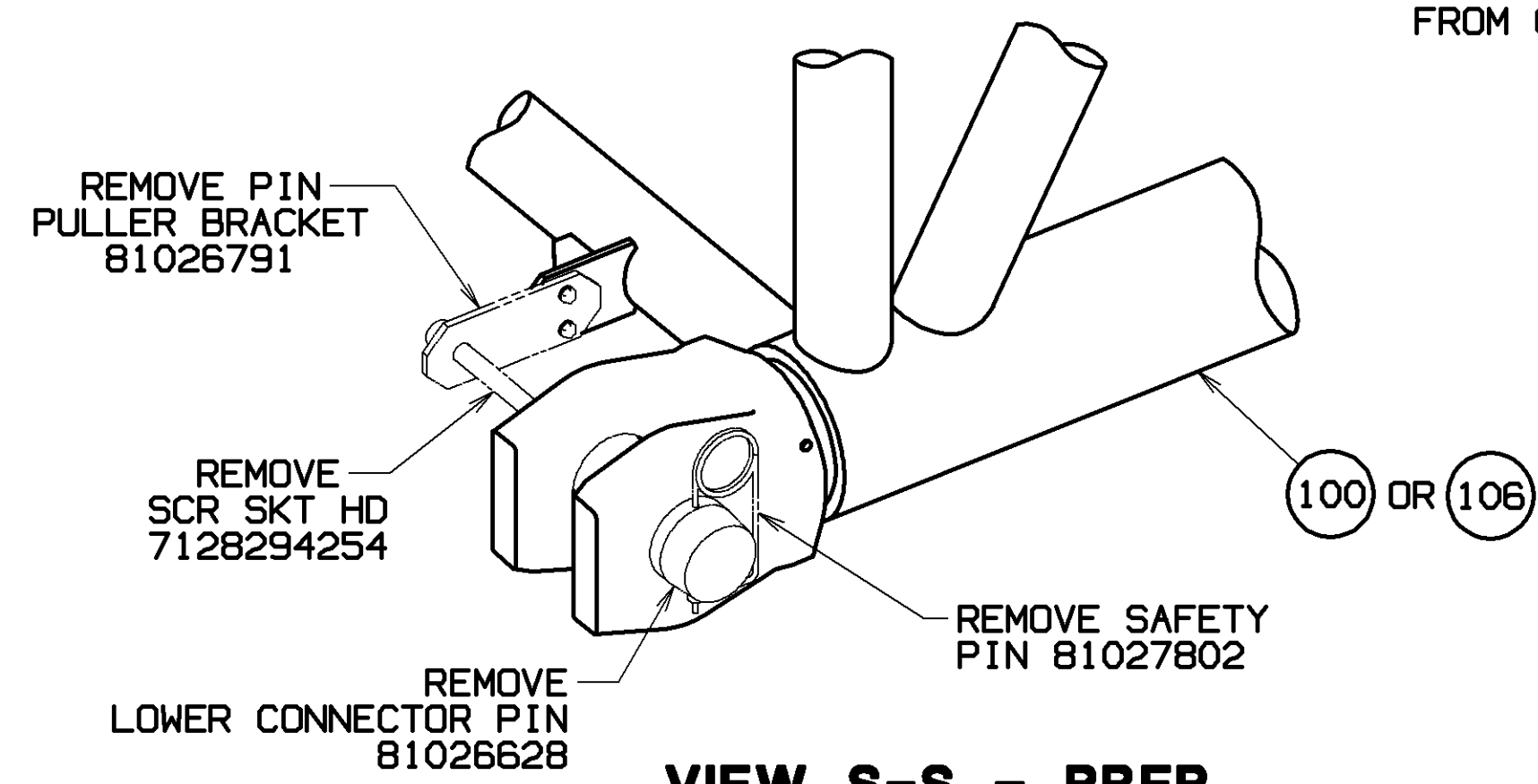
84038307
SHT 9 OF 10

PRIVATE LABELING
REQUIREMENT TO
CONFORM TO
ENGINEERING
SPECIFICATION
8629103794 FOR
COMPONENTS LISTED
IN 86500-05-026
DATE
03-21-17
REV. LNK
A

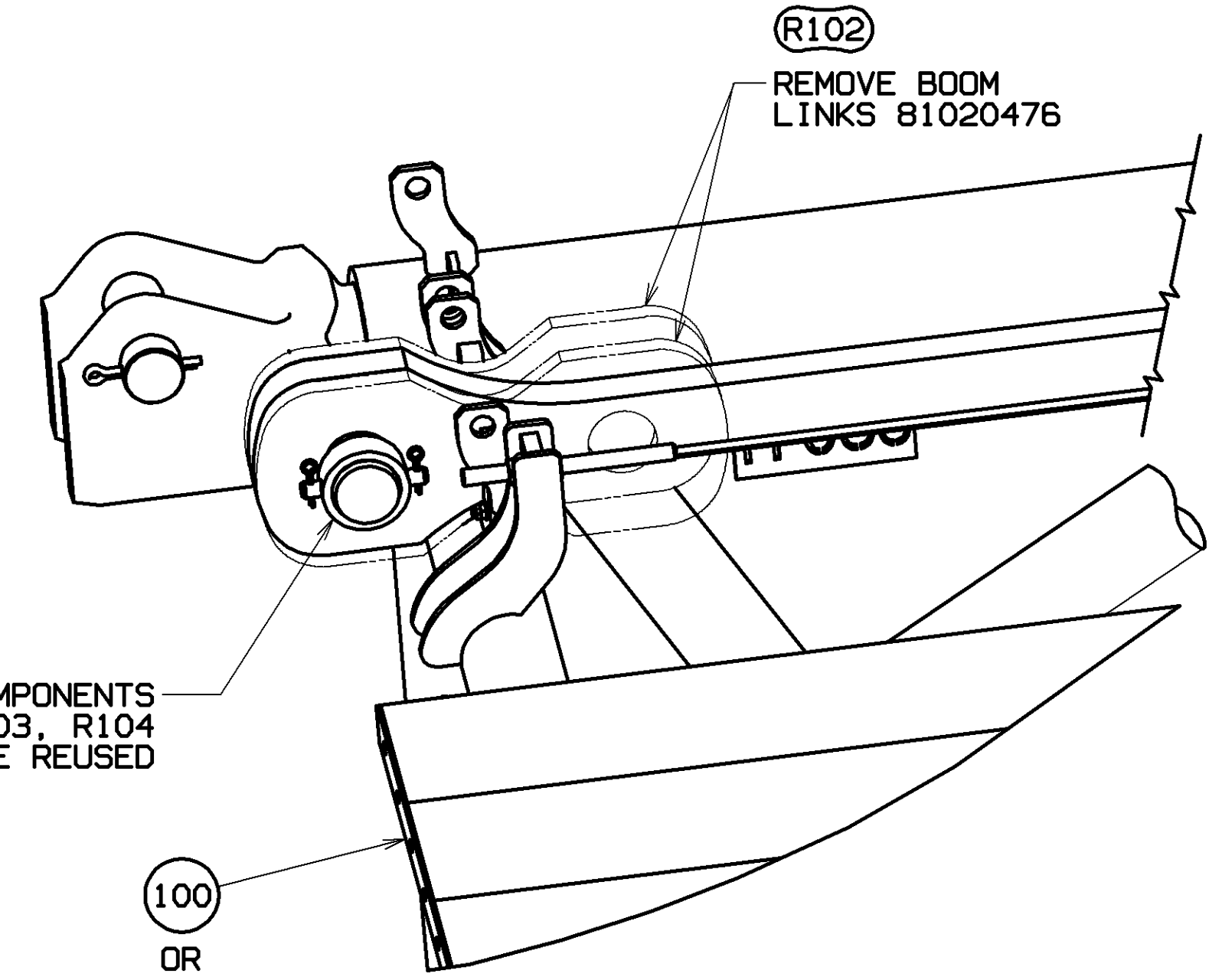
TOLERANCE UNLESS OTHERWISE SPECIFIED		NOTE	MATERIAL	MODEL	PART NO.
DECIMAL PLACES	FABRICATION	NOTED			
(1) PLACE 0.5	± 0.12	DR. RHY	MANITOWOC, WISCONSIN	BOOM RIGGING	
(2) PLACE 0.00	± 0.08	DR. PUH	MODEL MLC650	B65:685-680	
(3) PLACE 0.000	± 0.015	APP. JRR			
ANGLES	± 1.30°				



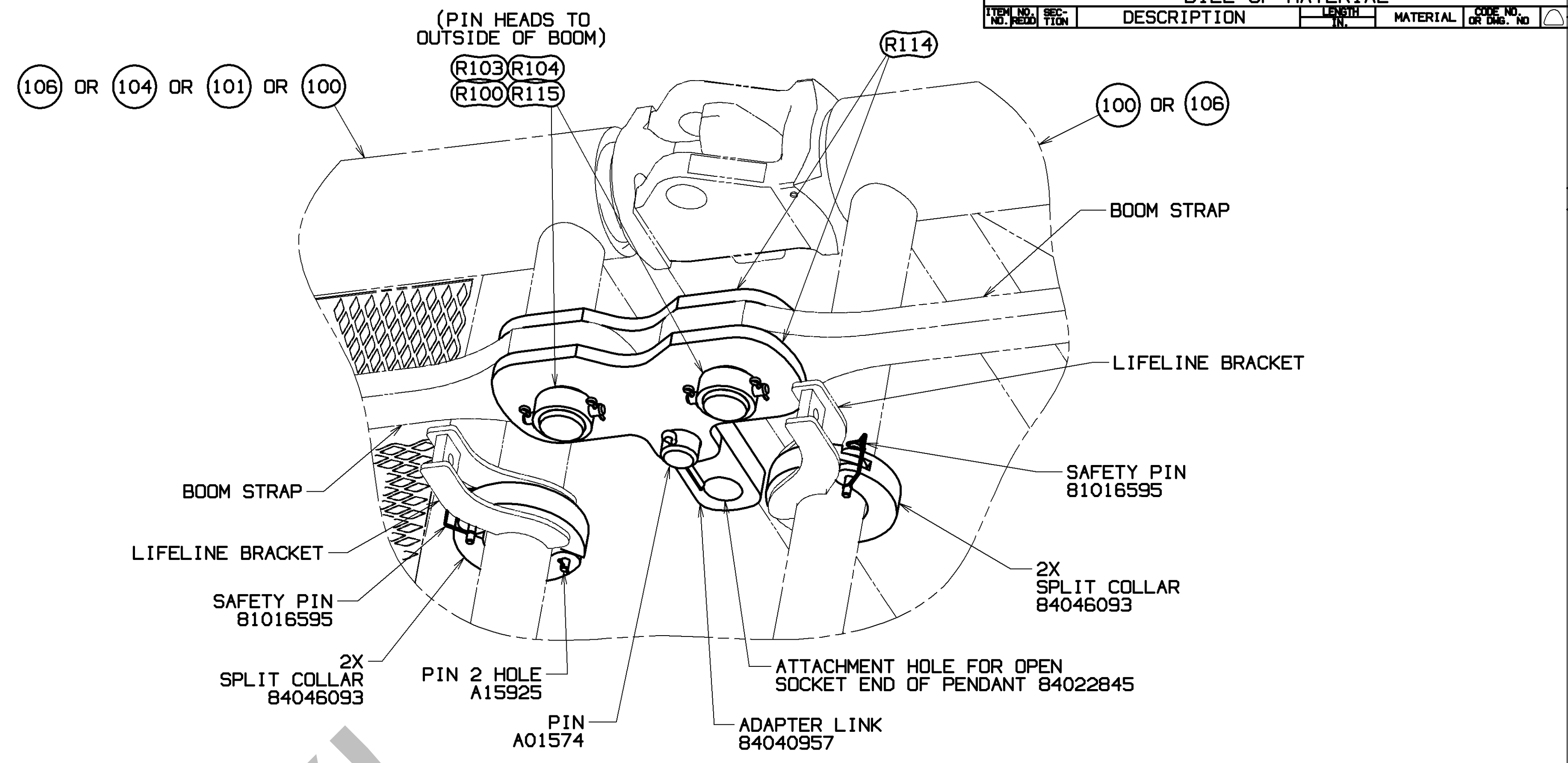
PENDANT (84022845) BUTTON NUMBER IDENTIFICATION LOCATION
SCALE 0.125



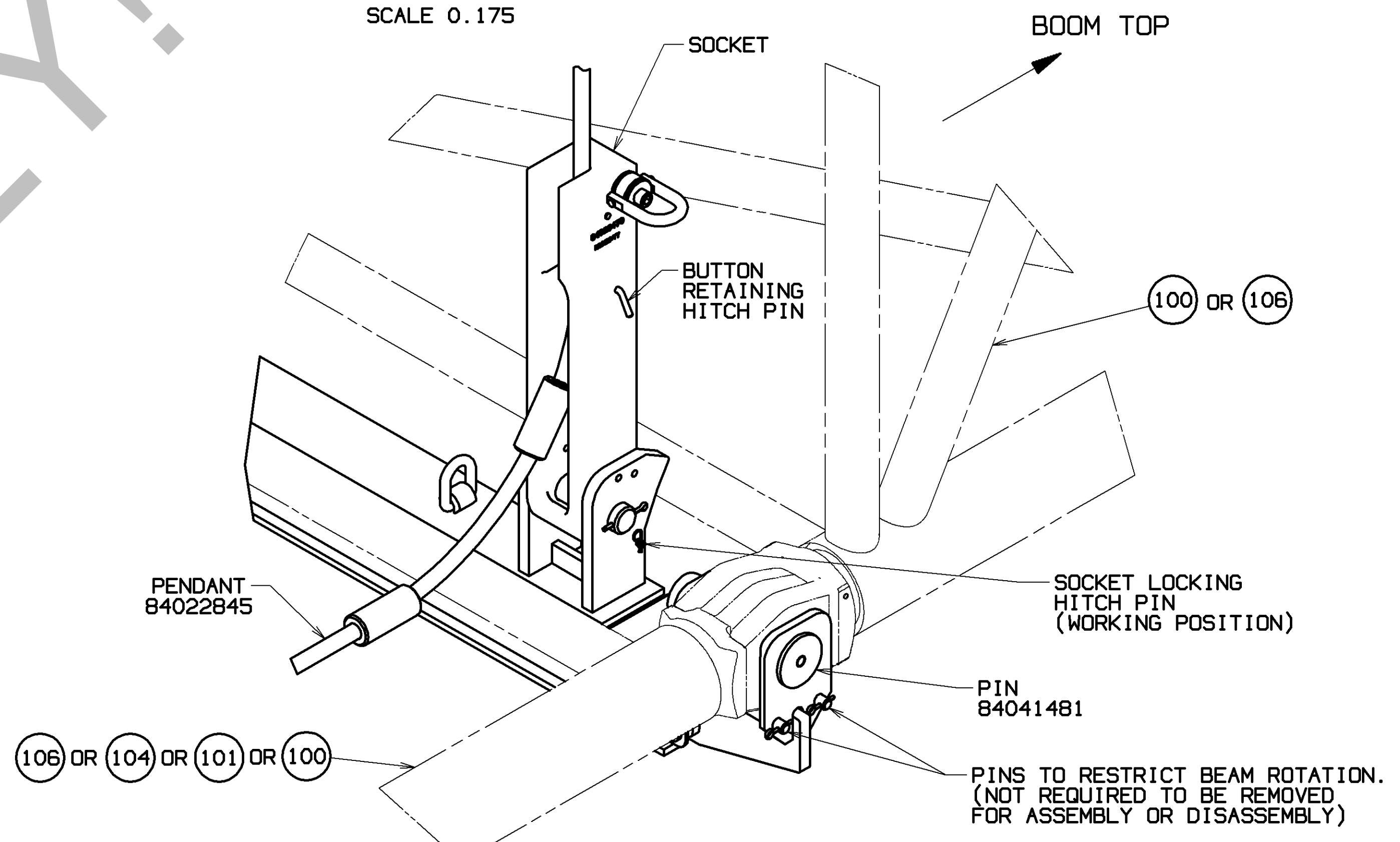
VIEW S-S - PREP
(IF EQUIPPED WITH LOWER BOOM CONNECTOR PIN COMPONENTS USED WITH HAND HELD CYLINDER R204)
SCALE 0.125



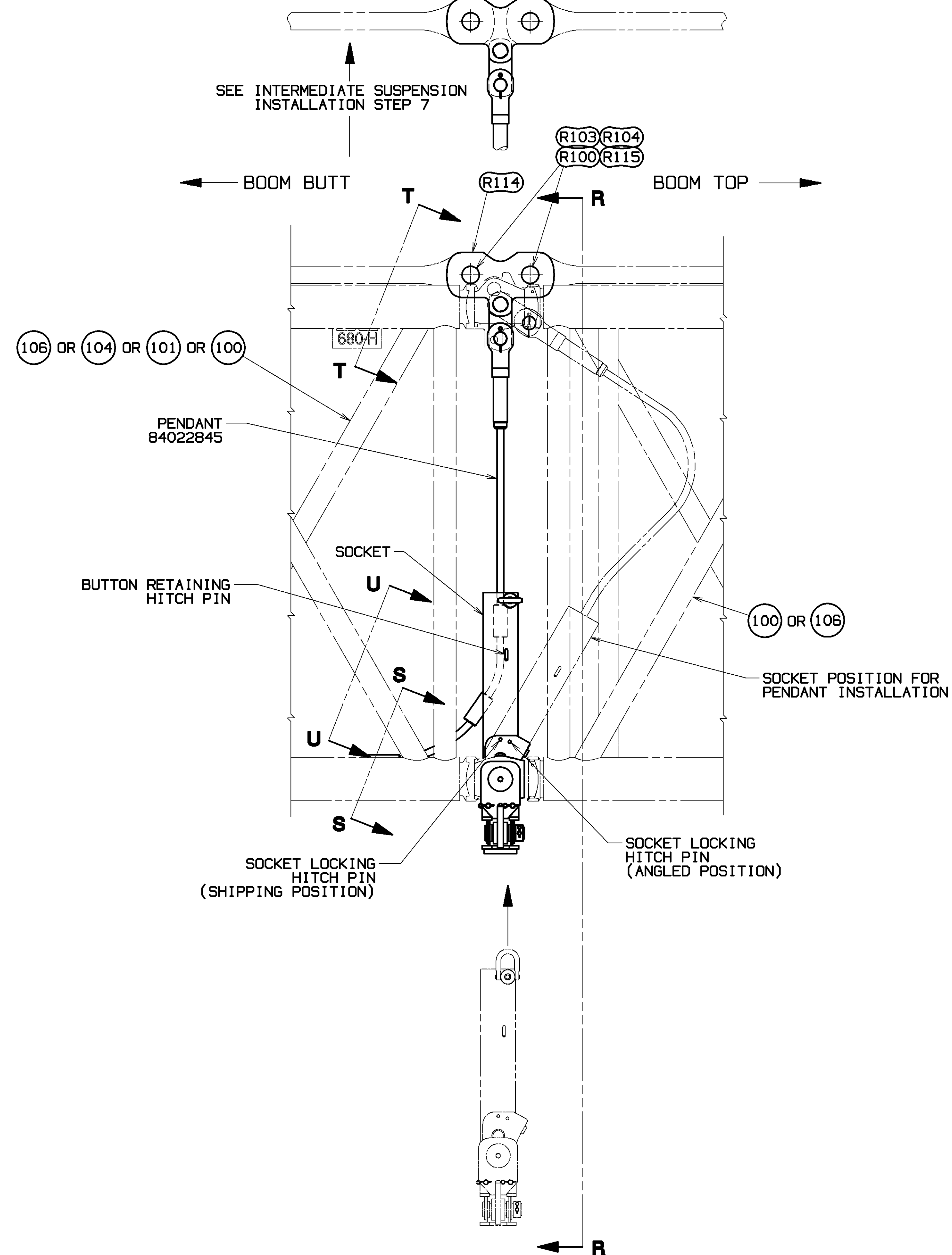
VIEW T-T - PREP
SCALE 0.150



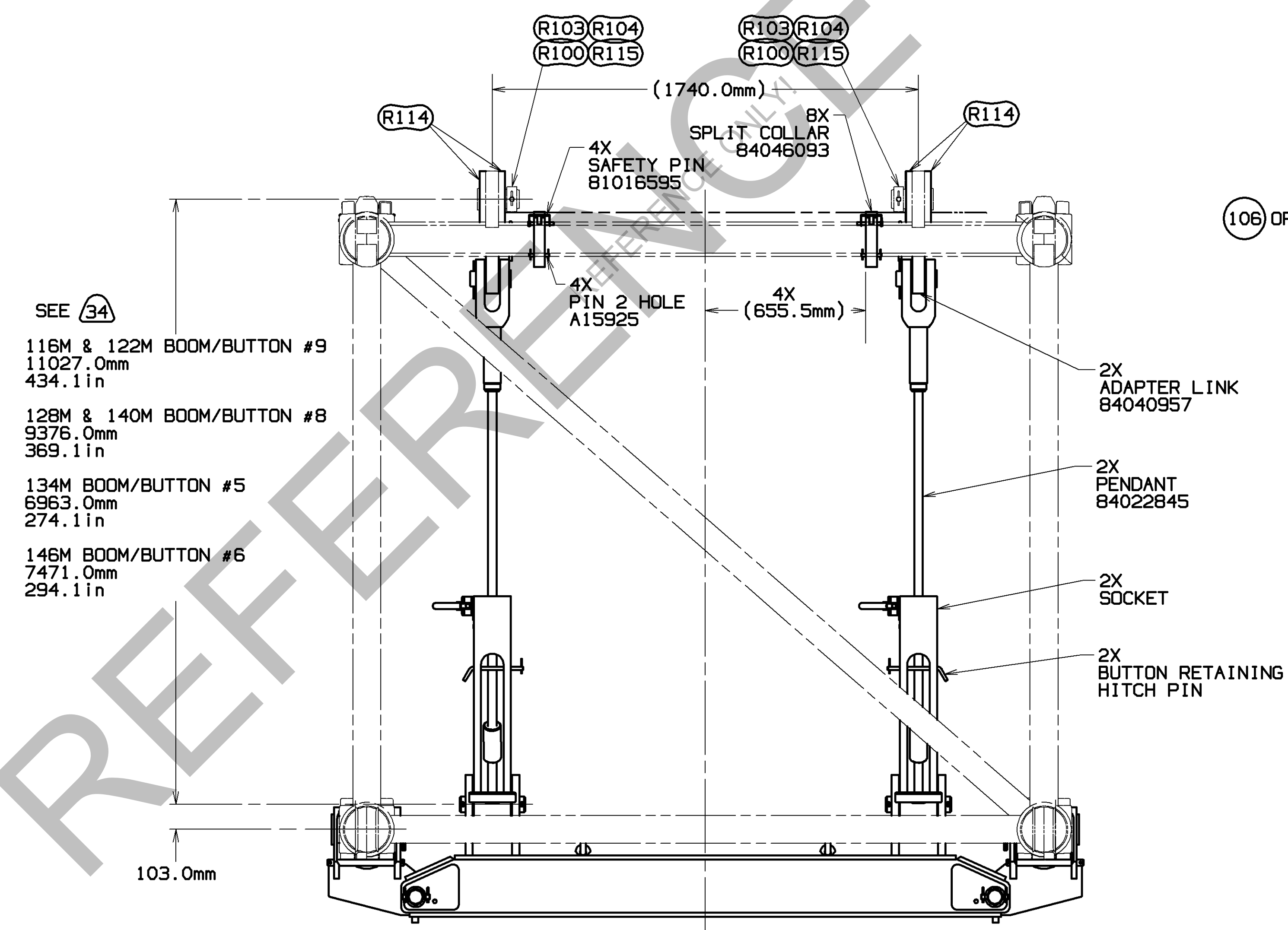
VIEW T-T - WORKING
SCALE 0.175



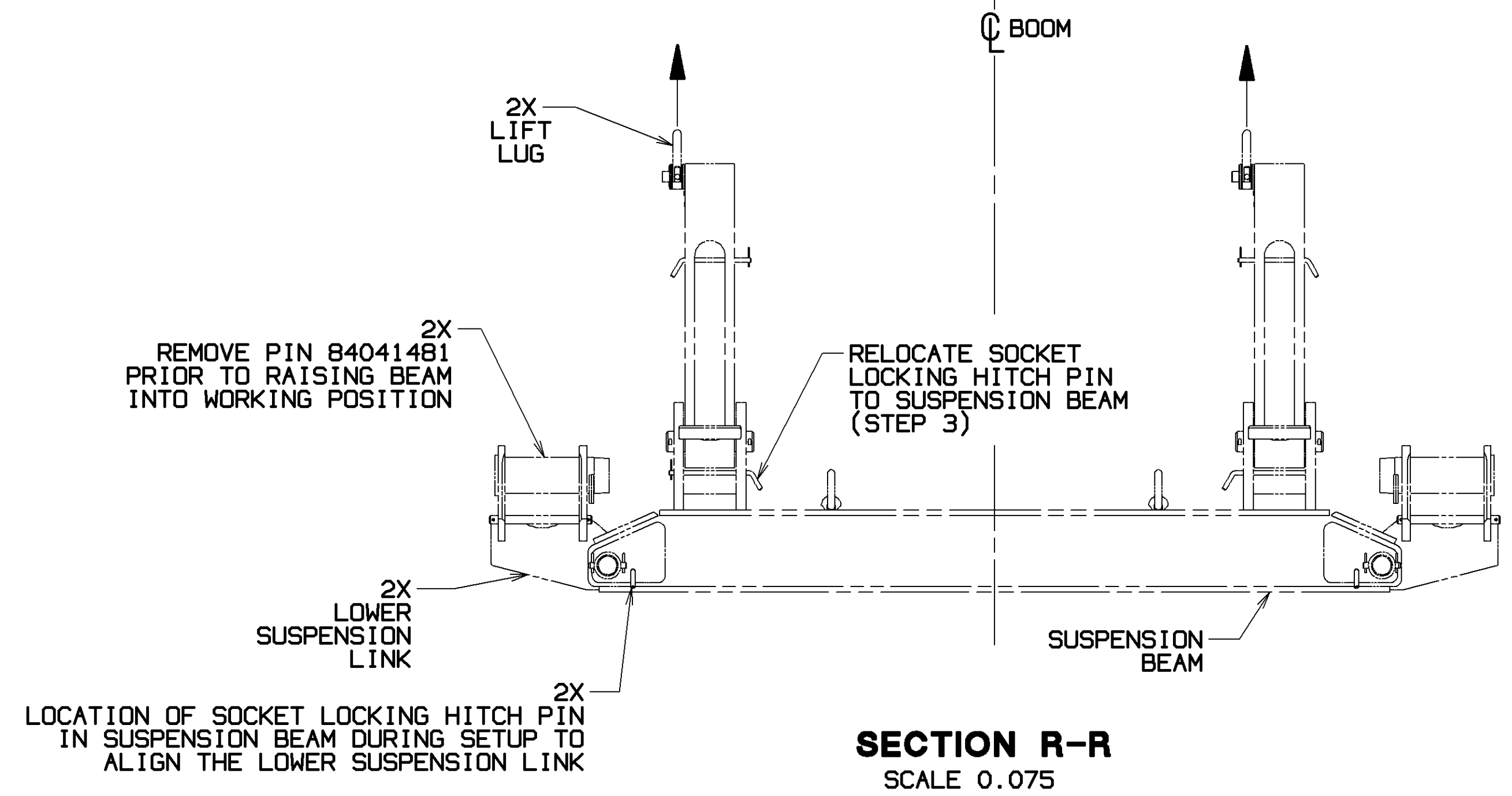
VIEW U-U - WORKING
SCALE 0.125



DETAIL P
SUSPENSION WIRE ROPE
ITEM 109, 84040952
(FROM SHEET 5)
SCALE 0.075



SECTION R-R
SCALE 0.075



INTERMEDIATE SUSPENSION (ITEM 109) INSTALLATION

- SEE BOOM MAKEUP VIEWS ON SHEETS 5 & 6 AND BOOM LENGTH TABLE ON SHEET 2 FOR REQUIRED SUSPENSION & WIRE ROPE BUTTON IDENTIFICATION LOCATION. REFERENCE SUSPENSION WIRE ROPE ASSY 84040952 FOR ADDITIONAL INFORMATION. (REFER TO VIEW OF PENDANT 84022845 ON THIS SHEET FOR BUTTON NUMBER I.D. LOCATION).
1. FROM MATING INSERT TOWARD BOOM TOP (ITEMS 100 OR 106), REMOVE LOWER BOOM CONNECTOR PIN COMPONENTS USED WITH HAND HELD CYLINDER IF SO EQUIPPED. (SEE VIEW S-S - PREP).
 2. FROM SAME MATING INSERT ABOVE, REMOVE (4) BOOM LINKS (R102) AND STORE IN PARTS BOX 81028467. PIN/COLLAR/PIN COMPONENTS (ITEMS R100, R103, R104 & R115) WILL BE REUSED WITH SUSPENSION LINK PER STEP 5 BELOW. (SEE VIEW T-T - PREP).
 3. POSITION SUSPENSION BEAM AND LOWER SUSPENSION LINK UNDER APPROPRIATE INSERT AT MALE CONNECTOR END. ASSEMBLE UPPER CONNECTOR OF MATING INSERT AND PIVOT INSERT TO ALIGN LOWER CONNECTOR HOLES. RELOCATE THE SOCKET LOCKING HITCH PINS FROM THE SOCKET AND UPPER MOST BRACKET HOLE (SHIPPING POSITION) TO THE SUSPENSION BEAM TO ALIGN THE LOWER SUSPENSION LINKS. (SEE SECTION R-R) WITH SUSPENSION LINK PINS 84041481 REMOVED, USE AN ASSIST TO RAISE SUSPENSION BEAM ASSY TO ALIGN LOWER CONNECTOR AND LOWER SUSPENSION LINK HOLES. REINSTALL PIN 84041481. (SEE DETAIL P AND SECTION R-R).
 4. PIVOT SOCKET INTO 30° POSITION AND REINSTALL SOCKET LOCKING PIN THRU BRACKET AND SOCKET (ANGLED POSITION). (SEE DETAIL P).
 5. ATTACH INSERT BOOM STRAPS WITH DOUBLE LINKS (R114) USING EXISTING PIN/COLLAR/PIN COMPONENTS (ITEMS R100, R103, R104 & R115) REMOVED IN VIEW T-T - PREP. ATTACH ADAPTER LINK (84040957) TO DOUBLE LINKS (R114). ATTACH OPEN SOCKET END OF PENDANT 84022845 TO ADAPTER LINK. (SEE VIEW T-T - WORKING).
 6. BETWEEN THE (4) LIFELINE BRACKET SIDE PLATES NEAR THE SUSPENSION, ASSEMBLE THE SPLIT COLLARS (84046093) WITH THE SAFETY PIN (81016595) UPWARDS TOWARD BRACKET SIDE PLATES AND 2 HOLE PIN (A15925) AND COTTER TOWARD SUSPENSION PENDANT. (SEE VIEW T-T - WORKING).
 7. WITH SOCKET LOCKED IN 30° POSITION, SLOWLY RAISE BOOM. AS THE STRAPS RISE, GUIDE THE INTERMEDIATE SUSPENSION PENDANTS THROUGH THE OPENING BETWEEN THE BOOM INSERTS. STOP THE BOOM RAISING PROCEDURE WHEN THE REQUIRED PENDANT BUTTON NEARS THE SOCKET. REMOVE BUTTON RETAINING HITCH PIN FROM SOCKET. POSITION THE IDENTIFIED PENDANT BUTTON OF THE MULTI-BUTTON PENDANT 84022845 INTO SOCKET AND REINSTALL BUTTON RETAINING HITCH PIN INTO SOCKET, LOCKING PENDANT IN POSITION. (SEE DETAIL P).
 8. PRIOR TO CONTINUATION OF BOOM RAISING, REMOVE SOCKET LOCKING HITCH PIN FROM 30° POSITIONED SOCKET AND BRACKET. STOW IN LOWEST BRACKET HOLE (WORKING POSITION) ALLOWING SOCKET TO PIVOT AS BOOM STRAPS RAISE. (SEE VIEW U-U - WORKING).
 9. BOOM UP SLOWLY AS PENDANT BECOMES TIGHT AND SOCKET PIVOTS INTO WORKING POSITION.
- FOR REMOVAL OF DROP-DOWN INTERMEDIATE SUSPENSION (ITEM 109) REVERSE INSTALLATION STEPS 1 THRU 9, ASSURING SOCKET PIVOTS TOWARD 30° POSITION WHEN LOWERING BOOM STRAPS.

BILL OF MATERIAL				ASSEMBLIES USED ON
QTY	DESC	MATERIAL	REV	

84038307
SHT 10 OF 10

DECIMAL PLACES	FRACTION	ISO	ASME	UNITS	DATE	REV	BY	CHK	APP	DATE	REV
0.00	1/16	0.00	0.00	IN	03-21-17	A					
0.01	1/32	0.01	0.01	IN							
0.02	1/64	0.02	0.02	IN							
0.03	3/32	0.03	0.03	IN							
0.04	1/8	0.04	0.04	IN							
0.05	5/32	0.05	0.05	IN							
0.06	3/16	0.06	0.06	IN							
0.07	7/32	0.07	0.07	IN							
0.08	1/4	0.08	0.08	IN							
0.09	9/32	0.09	0.09	IN							
0.10	5/16	0.10	0.10	IN							
0.12	3/8	0.12	0.12	IN							
0.15	1/2	0.15	0.15	IN							
0.20	5/8	0.20	0.20	IN							
0.25	3/4	0.25	0.25	IN							
0.30	7/8	0.30	0.30	IN							
0.375	3/8	0.375	0.375	IN							
0.50	1/2	0.50	0.50	IN							
0.75	3/4	0.75	0.75	IN							
1.00	1	1.00	1.00	IN							

PRIVATE LABELING REQUIREMENT TO CONFORM TO SPECIFICATION 8629103794 FOR COMPONENTS LISTED IN 862900-05-026