



Progressive Engineering Inc.

LIPPERT COMPONENTS INC.

SAE J684 Hitch Test and Safety Chain Attachment Test
on a 8,000 lb Hitch Assembly Part No. 360232

8/4/2014

Revised on

8/20/2014 - Revised part number from 347628 throughout document. Added part no. 360231 note to conclusion. Updated client part drawings with new part numbers and changed quantity of pages for report.

This test report contains twenty-seven (28) pages, including the cover sheet. Any additions to, alterations of, or unauthorized use of excerpts from this report are expressly forbidden.

2014-1173

1. TITLE

SAE J684 Hitch Test and Safety Chain Attachment Test on a 8,000 lb Hitch Assembly Part No. 360232

2. OBJECTIVE

To test a Class 4 (8,000 pound) rated hitch assembly and its safety chain attachment.

This test report pertains only to the specimens tested. It remains the sole responsibility of the manufacturer to provide a product consistent to that which was tested.

3. TESTED FOR

Lippert Components Inc.
3501 CR 6 East
Elkhart, IN 46514

4. TESTING ORGANIZATION

Progressive Engineering Inc.
58640 State Road 15
Goshen, IN 46528
www.p-e-i.com

See IAS Evaluation Report No. TL-178 for ISO 17025 Accreditation.

5. TESTING PERSONNEL

Test Engineer	- Timothy A. Baldrige, P.E.
Director of Testing	- Jason R. Holdeman
Project Manager	- Andrew Alger
Technician	- Justin Witmer

This testing was witnessed by Gary Stilwell of Thor Motor Coach.

6. REFERENCE STANDARDS

SAE J684 JUL2005 - Trailer Couplings, Hitches, and Safety Chains - Automotive Type

7. TEST EQUIPMENT

Two (2) Hydraulic Cylinders (PEI No. 689 and 691)
Two (2) Pressure Transducers (PEI No's. 633 and 665)
One (1) Load Cells (PEI No. 863)
Data Acquisition System (PEI No. 643)
Digital Angle Finder (PEI No. 603)

8. TEST SPECIMEN

Lippert Components Inc. 8,000 lb rated weight carrying hitch assembly, part number 360232. The hitch assembly was mounted to a rigid platform test fixture using one (1) 1/2"-13 x 1-3/4" long Grade 5 carriage bolt with, one (1) rectangular carriage washer, one (1) belleville toothed lock washer, and one (1) Grade 5 nut in six (6) locations. See attached drawings for hitch details.

9. TEST SETUP

Hitch Performance Test

The Lippert Components Inc. Hitch Assembly was secured to the rigid platform test fixture. Hardware was torqued to 75 ft-lbs. Hydraulic cylinders were set at the centerline of the ball socket parallel with the longitudinal and transverse horizontal axis of the ball and another cylinder parallel with the vertical axis of the ball. See attached fixture drawings for details.

Safety Chain Attachment Test

The Lippert Components Inc. Hitch Assembly was secured to the rigid platform test fixture. A hydraulic cylinder with a tension load cell was attached to the safety chain attachment using a shackle with a 1/2" diameter shackle pin. See attached fixture drawings.

10. TEST PROCEDURE

Hitch Performance Test

The loads were generated using the hydraulic cylinders. The loads were applied to the hitch through the test coupling in the required directions for 1 minute. The applied forces were measured with calibrated data acquisition. No attempt was made to subject the test specimen to dynamic loads. A permanent record of the forces was made on the attached data sheets.

At the completion of each step, the hitch angle was measured in three (3) directions and recorded.

Safety Chain Attachment Test

A hydraulic cylinder with a tension load cell was attached to the safety chain attachment location. Load was applied until the required load and time were met or until failure of the safety chain attachment occurred.

11. TEST RESULTS

See attached data sheets for details.

12. CONCLUSION

The Lippert Components Inc. 8,000 lb rated weight carrying hitch assembly, part number 360232, as shown on the attached drawings, did have adequate securement and structure to reach and sustain the test loads as required per the SAE J684, July 2005, Table 3 for a 8,000 pound GVWR hitch without exceeding a permanent set angle of 5°.

The Lippert Components Inc. 8,000 lb rated weight carrying hitch assembly, part number 360232, with the installed safety chain attachments as shown on the attached drawings, provided adequate structure to exceed the 8,000 lb breaking strength, as required in Section 7.2 of SAE J684.

Note: Lippert hitch part no. 360231 is the same as the hitch in this report with the exception of the electrical bracket depicted as item # 3 on drawing 328668. The addition of the electrical bracket should not adversely affect the structure of the hitch if installed as shown on drawing 328668. See attached drawings for details.



Timothy A. Baldrige
Date Signed: Aug 20, 2014

Progressive Engineering Inc.

Hitch Test

Date: 8/4/2014

Client: Lippert Components Inc.

Specimen: Class 4 Hitch Assembly (Part No. 360232)

Test Performed: SAE J684 section 6 - Hitch Strength Test

Rating: 8,000 lb

*Step	Load Direction	Load Required	Load Achieved
A	Longitudinal Compression	4,240 lbf	4,829 lbf
	Vertical Compression	4,240 lbf	4,755 lbf
B	Longitudinal Tension	3,370 lbf	4,010 lbf
	Vertical Compression	1,200 lbf	1,744 lbf
C	Longitudinal Compression	3,370 lbf	3,867 lbf
	Vertical Compression	1,200 lbf	1,750 lbf
D	Transverse Leftward	2,100 lbf	2,639 lbf
**E	Transverse Rightward	2,100 lbf	---

* Steps referenced in Table 3 SAE J684, July 2005

** Not tested this direction due to symmetry.

Progressive Engineering Inc.

Hitch Test - Permanent Deflection

Date: 8/4/2014

Client: Lippert Components Inc.

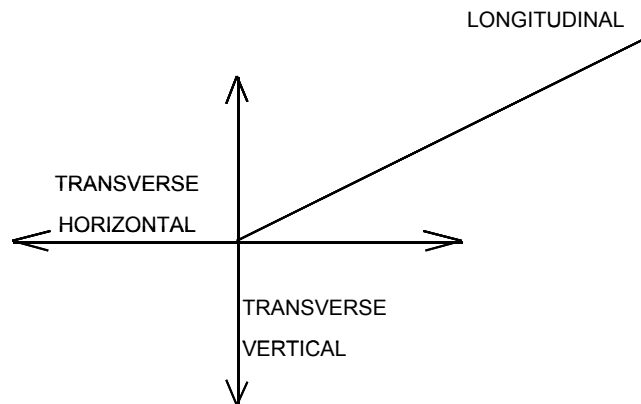
Specimen: [Class 4 Hitch Assembly \(Part No. 360232\)](#)

Test Performed: SAE J684 section 6 - Hitch Strength Test

Rating: 8,000 lb

Step	TRANSVERSE		LONGITUDINAL
	Horizontal Angle of Ball	Vertical Angle of Ball	Horizontal Angle of Ball
Initial	-0.25 deg.	-89.7 deg.	-1.04 deg.
A	-0.31 deg.	-89.6 deg.	-0.72 deg.
B	-0.31 deg.	-89.6 deg.	-0.58 deg.
C	-0.37 deg.	-89.6 deg.	-0.57 deg.
D	-0.26 deg.	-89.60 deg.	-0.80 deg.
*E	-	-	-

Max. Difference 0.12 deg. 0.10 deg. 0.47 deg.



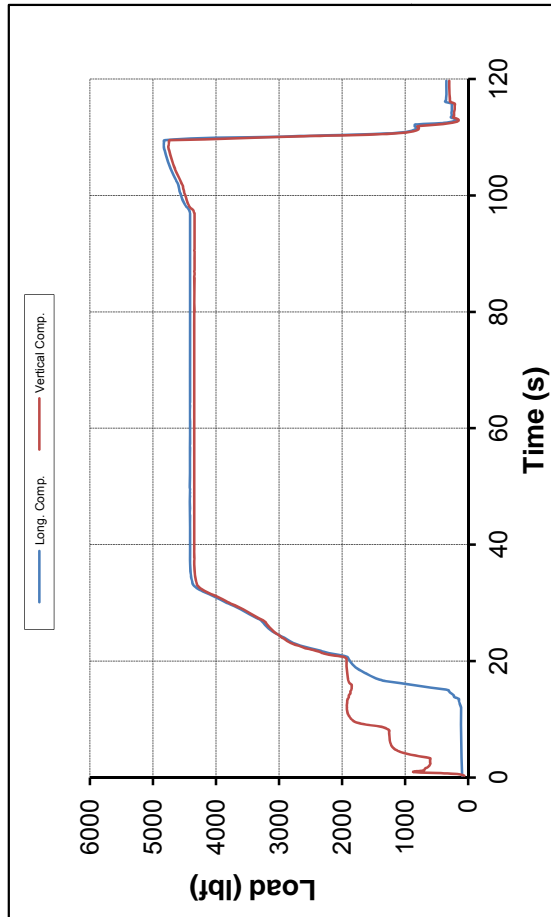
* Not tested this direction due to symmetry.

Date: 8/4/2014

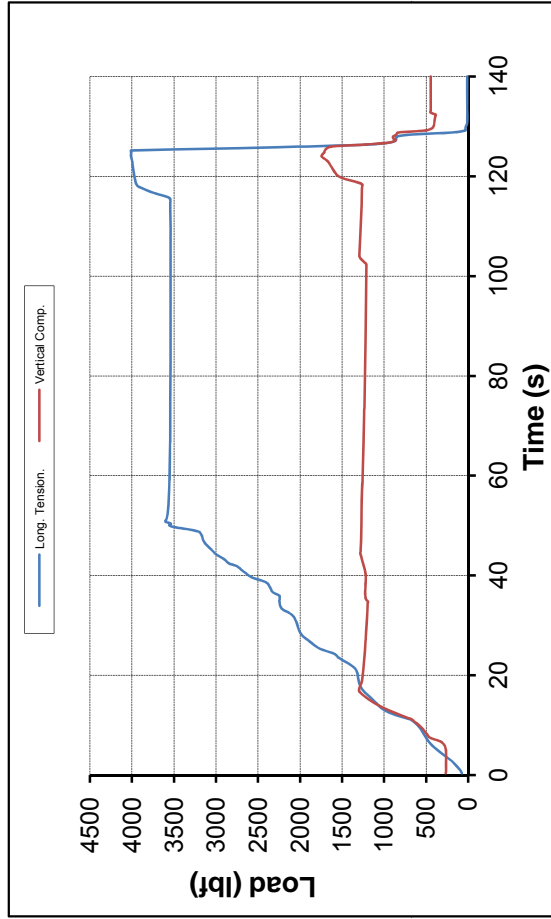
Client: Lippert Components Inc.

Specimen: Class 4 Hitch Assembly (Part No. 360232)

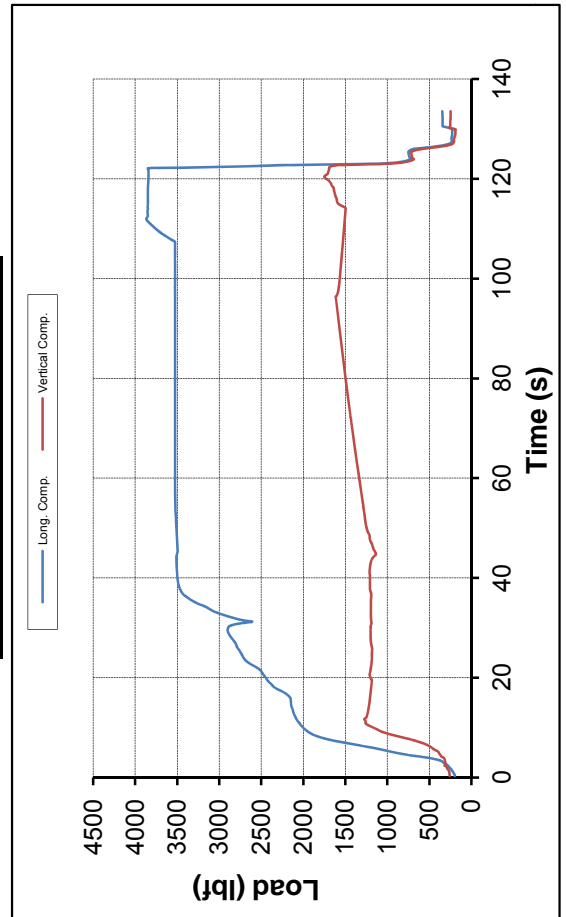
Step A - Load versus Time



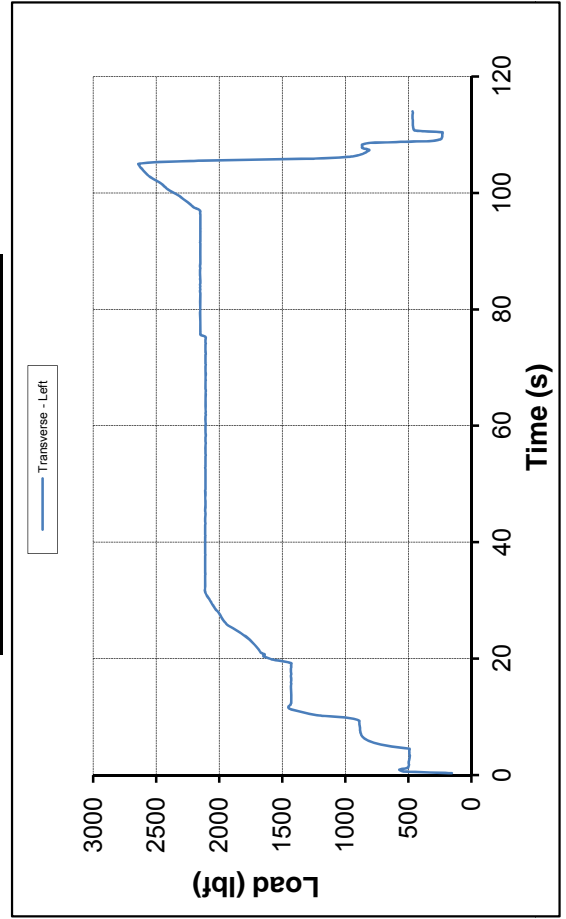
Step B - Load versus Time



Step C - Load versus Time



Step E - Load versus Time



Progressive Engineering Inc.

SAE J684 - Safety Chain Test Summary

Date: 8/4/2014

Client: Lippert Components Inc.

Test Standard(s): [Safety Chain Attachment Test](#)

Specimen: Class 4 Hitch Assembly (LCI Part Number 360232)

Test Performed: SAE J684 s7 - Safety Chains

SAE J684 Test Loads

Requirements: Set-up Angle must be 0 degrees.
Minimum time at load is 60 seconds.

	Roadside	Curbside
Load Required:	8,000 lbf	8,000 lbf
Load Achieved:	8,820 lbf	n/a*

* Due to the symmetry of the hitch assembly only one side of the safety chain attachment was tested.

Test Comments / Observations

Bolt used as shackle pin bent during application of force. Safety chain loop on hitch holding 1/2" bolt has a small dent from the 1/2" bolt after required force was applied.

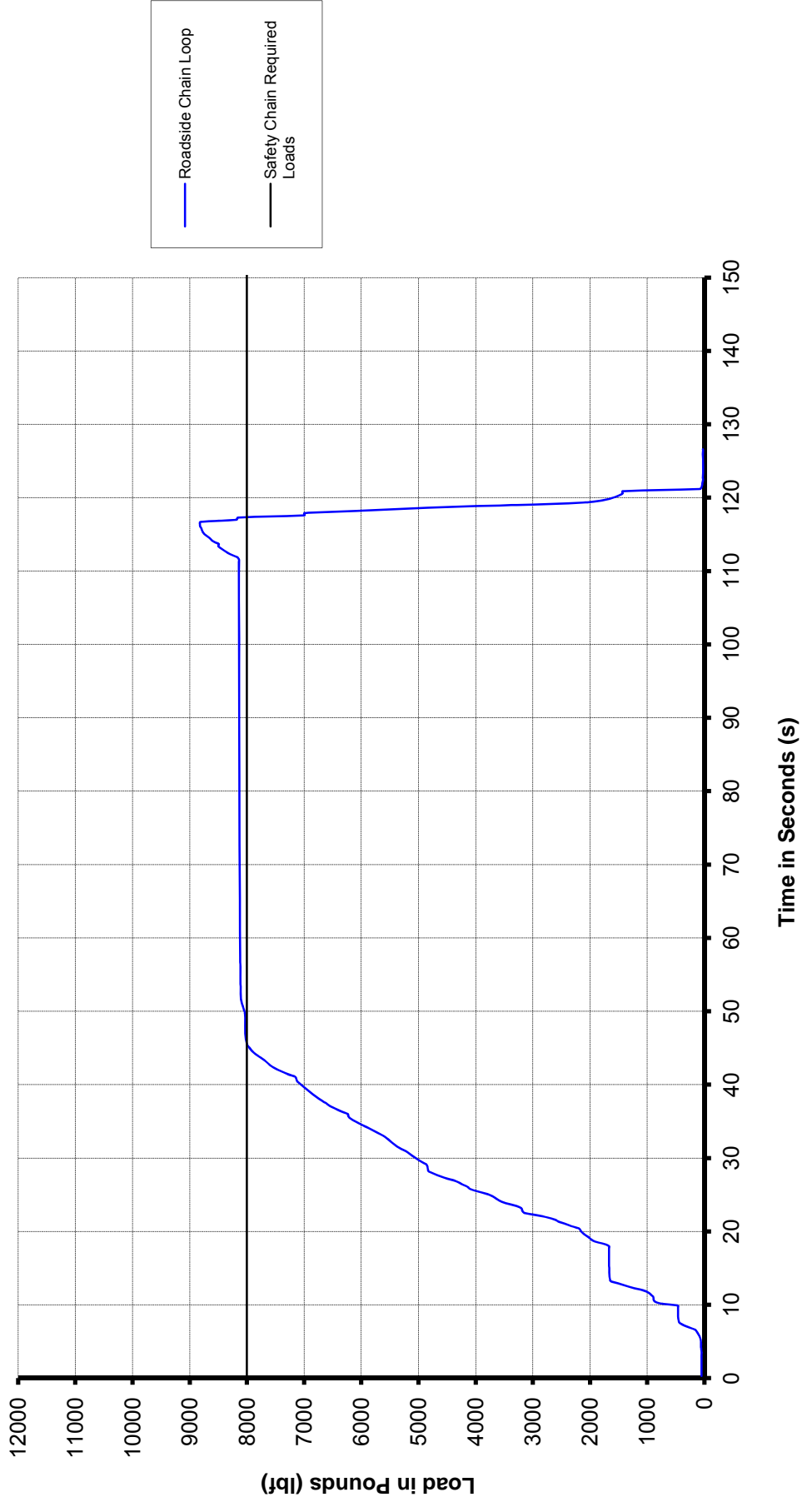
TEST RESULTS

Roadside	PASS
Curbside	N/A

See attached graph for load vs. time information.

Lippert Components Inc.
SAE J684 - Safety Chain Test
on a 8,000 lb GVWR Hitch Assembly Part No. 360232

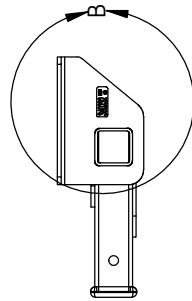
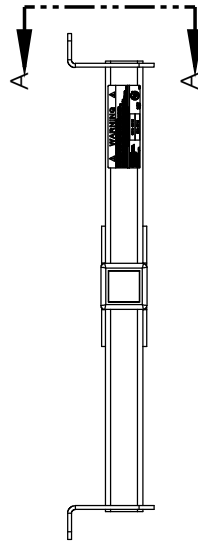
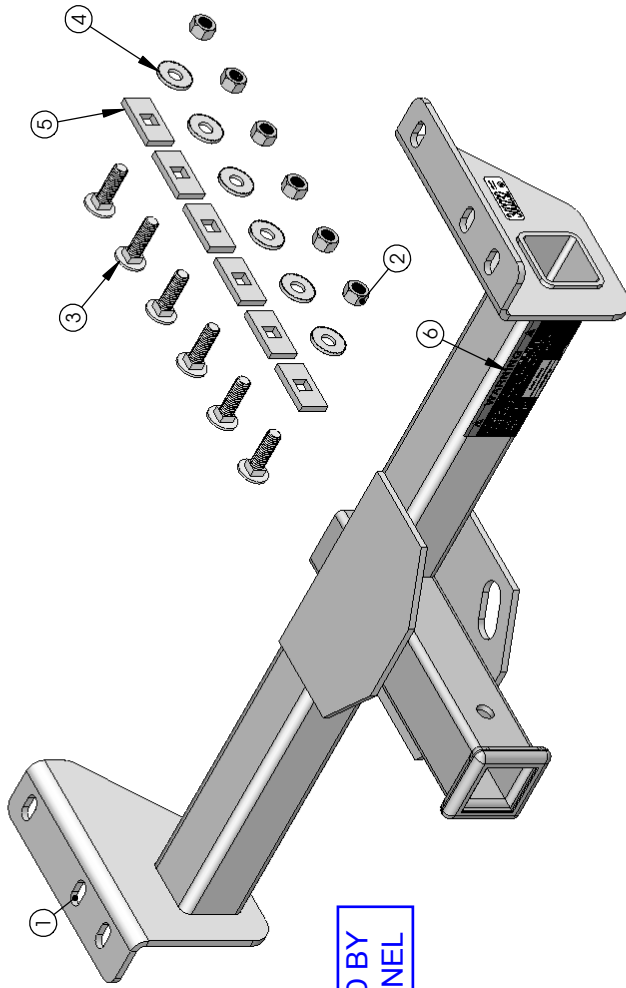
Load vs. Time



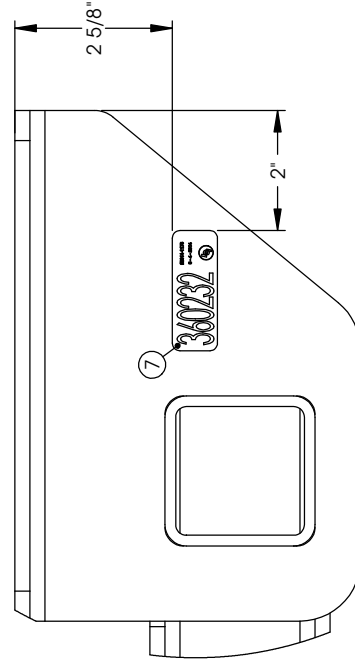
Note: Due to the symmetry of the hitch assembly only one side of the safety chain attachment was tested.

REVISION HISTORY			
REV	DATE	DESCRIPTION	DWR
A	8/8/2014	RELEASED TO PRODUCTION.	MJF
B	8/14/2014	UPDATED DESCRIPTION (ECN-SP-DE-12941)	NRL
C	8/15/2014	ADDED TORQUE NOTE (ECN-SP-DE-12962)	NRL

TORQUE TO 75 FT LBS



SECTION A-A
SCALE 1 : 8



DETAIL B
SCALE 1 : 2

ITEM	PART NO.	CONFIG	DESCRIPTION	NAME	GA	QTY.
1	328659	Default	WELDMENT, 2" HITCH RECEIVER, 31 11/16 ON CENTER, BLACK	SUB ASSY		1
2	118610	Default	NUT - 1/2 - 13; HEX; GR5 ZINC	FASTENER		6
3	346260	Default	BOLT - 1/2 - 13 X 1 3/4 CB GR5 ZN FTNP ST	FASTENER		6
4	122802	Default	WASHER - 1/2 BVSW YEL ZN 1050/1055 HR	FASTENER		6
5	346254	1	2" X 1 1/16" CL ZN	PLT	1/4	6
6	358933	Default	LABEL - 8K GT / 500 LB TONGUE HITCH WEIGHT RATING	PURCH		1
7	360234	Default	360232 KIT LABEL	PLT		1

TOLERANCES (EXCEPT AS NOTED)			
DECIMAL	.XX	.XXX	.005
FRACTIONAL	±1/16		
ANGULAR	±1°		

UPPER COMPONENTS			
DWG. NO.	360232	DATE	08/08/2014
REV.	C	SCALE	1:4
ENG	MJF	DWR	MJF
SHEET	1	OF	1

UNLESS OTHERWISE SPECIFIED
1. ALL DIMENSIONS ARE IN INCHES/BREAK
2. SHARP EDGES & DEBURR
3. MATERIAL & FINISH TO BE AS NOTED
4. DIMENSIONS APPROVED
5. UNTESTED EQUIVALENT

FILETS R0.15 FINISH 125

THIRD ANGLE PROJECTION

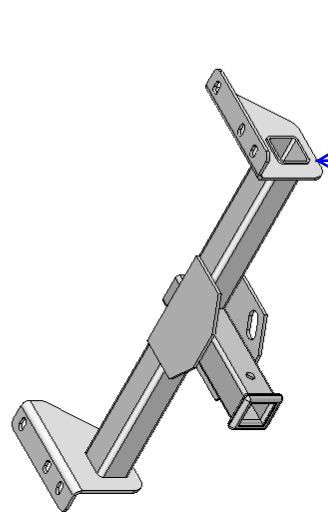
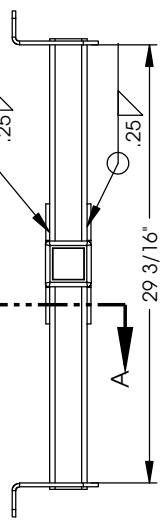
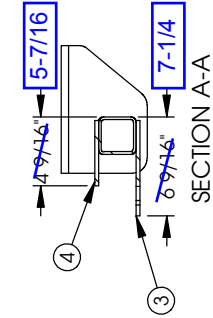
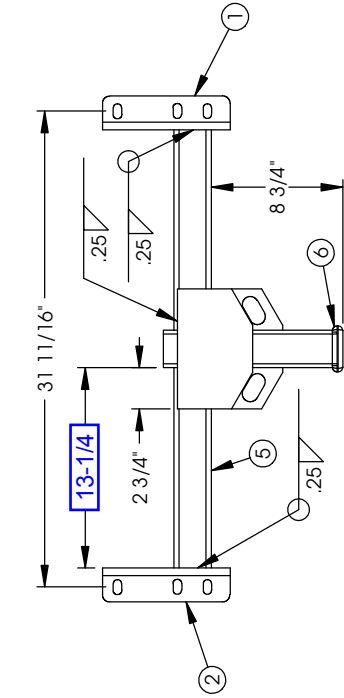
UPPER COMPONENTS
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF
UPPER COMPONENTS, INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN
PERMISSION OF UPPER COMPONENTS, INC. IS PROHIBITED.

2700 COLLEGE AVE
GOSHEN, IN 46528

REVISION HISTORY			
REV	DATE	DESCRIPTION	DWR
A	10/24/2013	RELEASED TO PRODUCTION	MJF
B	4/1/2014	UPDATED TO REFLECT CHANGES MADE TO 328667 & 328666	MTH

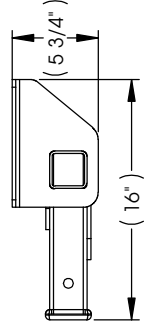
REV	DATE	DESCRIPTION	DWR	APVD
A	10/24/2013	RELEASED TO PRODUCTION	MJF	JA
B	4/1/2014	UPDATED TO REFLECT CHANGES MADE TO 328667 & 328666	MTH	MF

NOTES:
 1. FNISH GOOD WEIGHT: 32.595 LBS
 2. FINISH: PC BLACK



ITEM #5 TO #1 & #2 IS NOT WELDED ON OUTSIDE SURFACE

= VERIFIED BY PEI PERSONNEL



ITEM	PART NO.	CONFIG	DESCRIPTION	NAME	GA	QTY.
1	328667	Default	8 1/2" X 2 1/4" X 5 3/4"	ANG	1/4	1
2	328666	Default	8 1/2" X 2 1/4" X 5 3/4"	ANG	1/4	1
3	328662	Default	8" X 7"	PLT	250	1
4	328663	Default	8" X 5"	PLT	1/4	1
5	328664	206	13-7/8 X 2.500 X 2.500	TUBE	7	2
6	142248	Default	11 15/16" X 3 1/16" X 3 1/16"	MISC	4	1

TITLE: WELDMENT, 2" HITCH RECIEVER, 31 11/16 ON CENTER, BLACK

UNLESS OTHERWISE SPECIFIED
 1. ALL DIMENSIONS ARE IN INCHES BREAK
 SHARP EDGES & DEBURR
 2. MATERIAL & FINISH TO BE AS NOTED
 OR AS APPROVED
 AND TESTED EQUIVALENT

TOLERANCES
 (EXCEPT AS NOTED)
 DECIMAL .XX ±.03
 .XXX ±.005

FINISH 125

THIRD ANGLE PROJECTION

UPPER COMPONENTS

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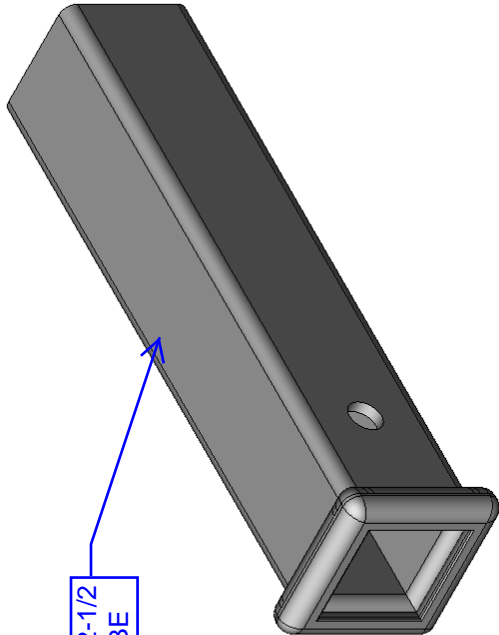
DWG. NO. 328659
 DATE 10/25/2013
 REV. B

SCALE: 1:8

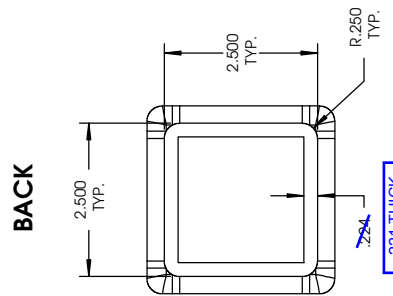
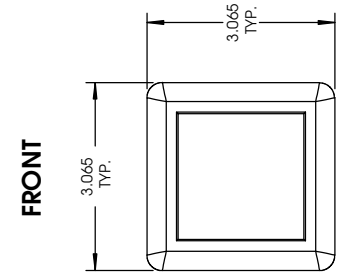
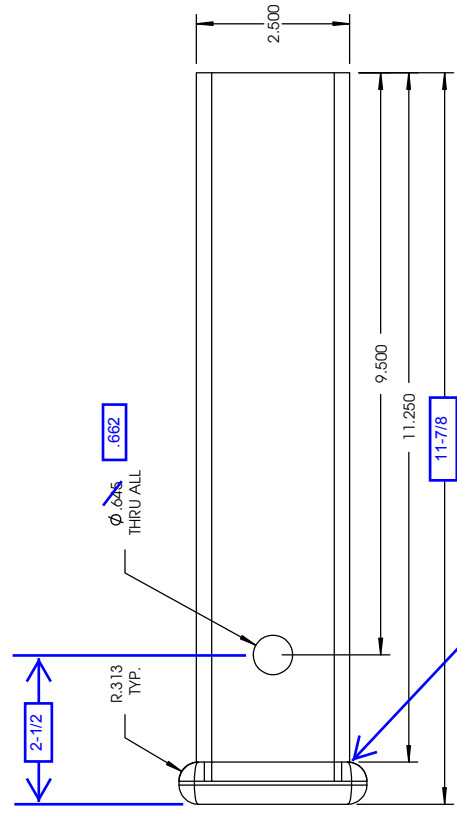
ENG MJF DWR MJF SHEET 1 OF 1

PART NO. 142248	
Size: 4 GA	RECEIVING TUBE FOR BOAT HITCH

DRWN BY	REV.	DESCRIPTION	DATE	APPROVED
	A		8/21/2008	

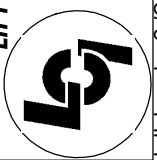


= VERIFIED BY
PEI PERSONNEL



MISC

DIMENSIONS ARE IN INCHES TOLERANCES: X-CRITICAL +.1/.16 X-CRITICAL -.1/.16 XX-.1/.015 XXX-.1/.015 ANGLE +.1/-.1 DEGREE		SCALE: 1:3	Mat. Type: HR	Blank Size:
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF LIPPERT COMPONENTS INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT WRITTEN PERMISSION OF LIPPERT COMPONENTS INC. IS PROHIBITED.		PAGE : 1 OF 1	Mat. Grade: C	DWG. NO. 142248
LIPPERT COMPONENTS INC. A Division of Drew Industries 2475 E. Kercher rd. Goshen, IN 46526 (574) 533-2180 Phone (574) 534-0990 Fax			Mat. Class: SH	Customer: LIPPERT
			Gauge: 4	DRAWN BY: P. MOORE
			Decimal: .224	DATE 08/21/08
			Blk. Weight:	DATE 08/21/08
			WEIGHT: 7.232 lbs.	REV. A



NOTES:

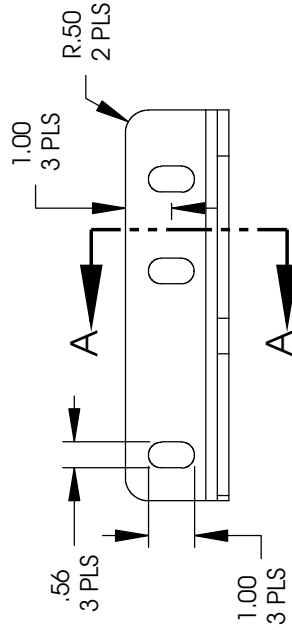
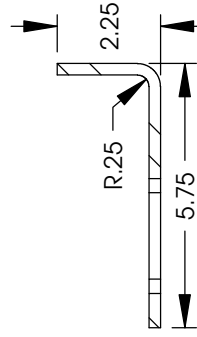
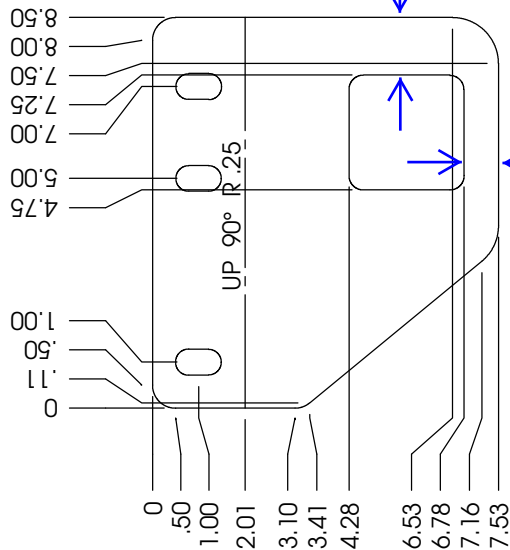
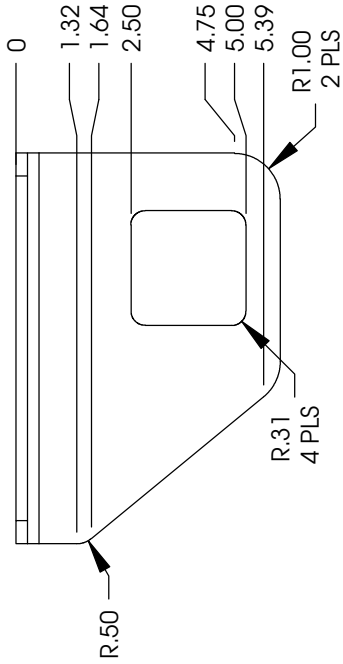
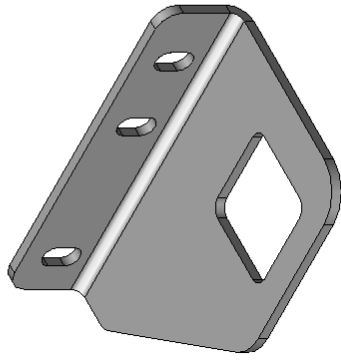
- MATL: ASTM A1011 CS TY B; STL
 SURFACE QUALITY: C
 NOM GAUGE: 1/4
 BLANK SIZE: 8.50 X 2.25 X 7.53
 FNISH GOOD WEIGHT: 3.483 LBS
 BLANK WEIGHT: 4.78

REVISION HISTORY

REV	DATE	DESCRIPTION	DWR	APVD
A	10/25/2013	RELEASE TO PRODUCTION. ECN-PE-NP-17612	MJC	MJF
B	4/1/2014	MOVED SLOTS TO 1", 5", AND 7". ECN-PE-DE-08067	MJC	MJF

**= VERIFIED BY
PEI PERSONNEL**

.258" THICK



TITLE:

8.50 X 2.25 X 5.75

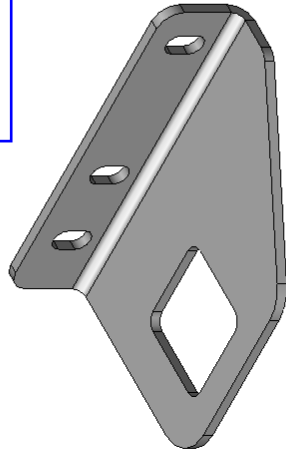
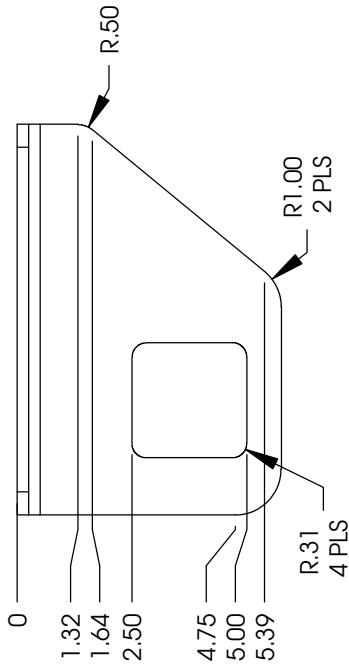
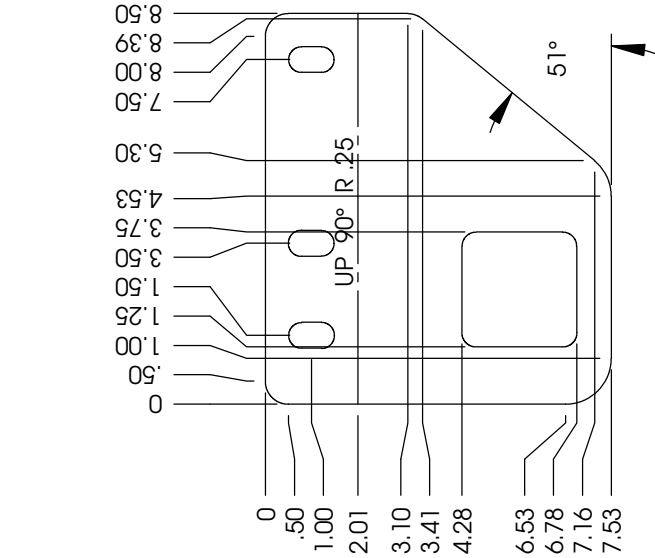
UNLESS OTHERWISE SPECIFIED 1. ALL DIMENSIONS ARE IN INCHES BREAK SHARP EDGES & DEBURR 2. MATERIAL & FINISH TO BE AS NOTED OR SUBSTITUTED WITH AN APPROVED AND TESTED EQUIVALENT		LIPPERT COMPONENTS		THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF LIPPERT COMPONENTS, INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF LIPPERT COMPONENTS, INC. IS PROHIBITED.	
TOLERANCES (EXCEPT AS NOTED)		DWG. NO. 328666		REV. B	
DECIMAL .X ±.1 .XX ±.03 .XXX ±.005	DATE 10/25/2013		SIZE A		SCALE 1:4
FRACTIONAL ±1/16	ENG. MJC		DWN. MJC		SHEET 1
ANGULAR ±1°	FINISH 125/		OF 1		
THIRD ANGLE PROJECTION		LIPPERT COMPONENTS		LIPPERT COMPONENTS, INC. IS PROHIBITED.	
				2703 COLLEGE AVE. GOSHEN, IN 46528	

NOTES:

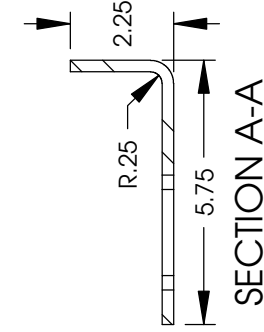
- MATL: ASTM A1011 CS TY B; STL
 SURFACE QUALITY: C
 NOM GAUGE: 1/4
 BLANK SIZE: 8.50 X 2.25 X 7.53
 FNISH GOOD WEIGHT: 3.483 LBS
 BLANK WEIGHT: 4.78

REVISION HISTORY

REV	DATE	DESCRIPTION	DWR	APVD
A	10/25/2013	RELEASE TO PRODUCTION. ECN-PE-NP-17613	MJC	MJF
B	4/1/2014	MOVED SLOTS TO 1.5", 3.5", AND 7.5". ECN-PE-DE-08066	MJC	MJF



SAME DIMENSIONS AS
 PART NO. 328666 EXCEPT
 OPPOSITE BEND



TITLE:

8.50 X 2.25 X 5.75

UNLESS OTHERWISE SPECIFIED		LIPPERT COMPONENTS		LIPPERT COMPONENTS	
1. ALL DIMENSIONS ARE IN INCHES BREAK SHARP EDGES & DEBURR		TOLERANCES (EXCEPT AS NOTED)		THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF LIPPERT COMPONENTS, INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF LIPPERT COMPONENTS, INC. IS PROHIBITED.	
2. MATERIAL & FINISH TO BE AS NOTED OR SUBSTITUTED WITH AN APPROVED AND TESTED EQUIVALENT		DECIMAL .X ±.1 .XX ±.03 .XXX ±.005		DWG. NO. 328667	REV. B
FILLET'S R.015 FINISH 125/		FRACTIONAL ±1/16		DATE: 10/25/2013	SIZE: A
THIRD ANGLE PROJECTION		ANGULAR ±1°		SCALE: 1:4	REV. B
				DWN. MJC	SHEET 1
				ENG. MJC	OF 1

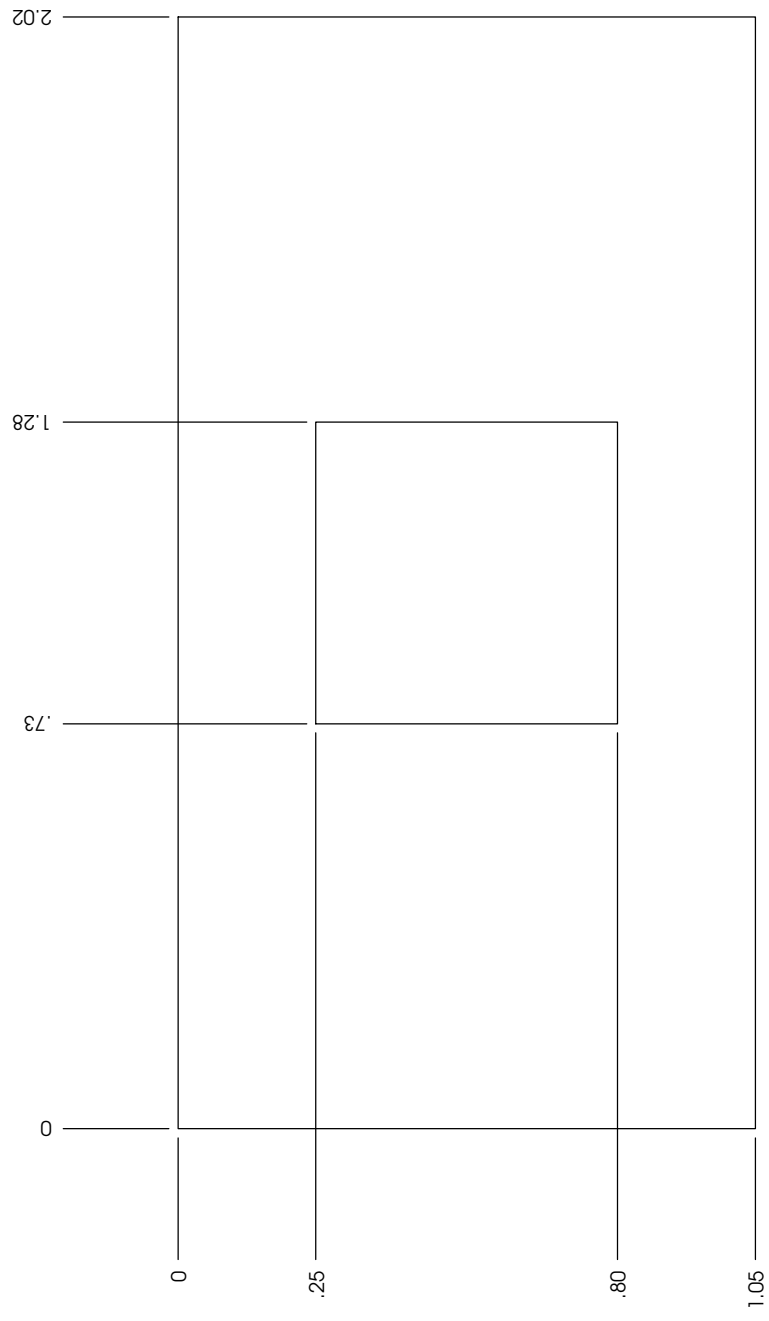


2703 COLLEGE AVE.
 GOSHEN, IN 46528

REVISION HISTORY			
REV	DATE	DESCRIPTION	APVD
A	2/26/2014	RELEASED TO PRODUCTION	BJR


NOTES:
 1. 346254 - RAW
 3462541 - CLEAR ZINC
 2. FINISH SPEC: ZINC AND CLEAR CHROMATE PER
 ASTM B633 TYPE III CLASS SC2

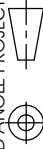
.241 THICK



**= VERIFIED BY
 PEI PERSONNEL**

TITLE: 2.02 X 1.05

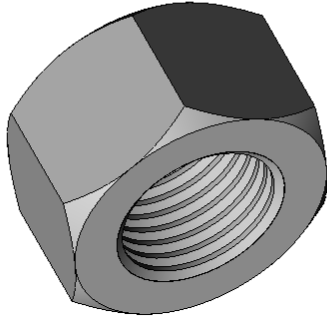
REFERENCE NUMBER:	ASTM A1011 CS TY B; STL	 LIPPERT COMPONENTS™	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF LIPPERT COMPONENTS, INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF LIPPERT COMPONENTS, INC. IS PROHIBITED.
MATERIAL TYPE:	C. USE MATERIAL SPEC: 345840		DWG. NO.
SURFACE QUALITY:	.250	SIZE	A
DECIMAL:	0.129	DATE	02/26/2014
FINSH GOOD WEIGHT:	.159	SCALE:	3:1
BLANK WEIGHT:	2.02 X 1.05	CHECKED BY	BJR
BLANK SIZE:		DRAWN BY	BJR
		APPROVED BY	
		SHEET	1
		OF	1

UNLESS OTHERWISE SPECIFIED	
1. ALL DIMENSIONS ARE IN INCHES BREAK SHARP EDGES & DEBURR	
2. MATERIAL & FINISH TO BE AS NOTED OR SUBSTITUTED WITH AN APPROVED AND TESTED EQUIVALENT	
FILLET'S R.015	FINISH: 125
THIRD ANGLE PROJECTION	
	

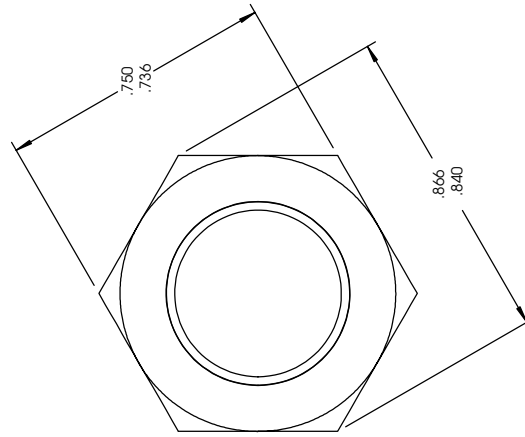
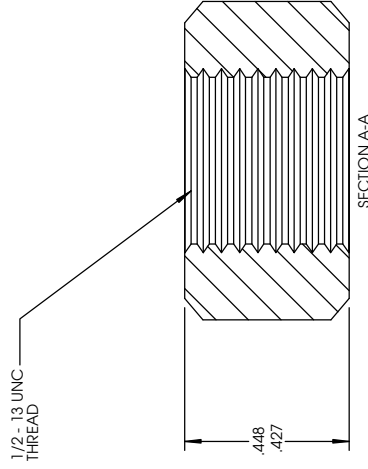
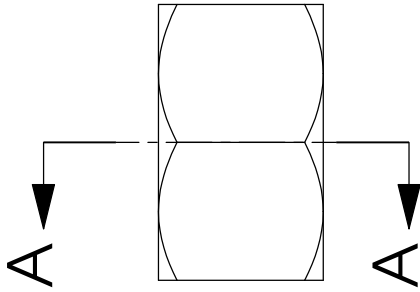
TOLERANCES (EXCEPT AS NOTED)	
DECIMAL	.X ±.1 .XX ±.010 .XXX ±.005
FRACTIONAL	±1/16
ANGULAR	±1°

PART NO.	118610
Size:	GA NUT - 1/2 - 13; HEX, ZN

REV. A	DATE 10/17/2005	APPROVED
DESCRIPTION		



= VERIFIED BY
PEI PERSONNEL



NOTES:
MATERIAL: ASTM GRADE B OR SAE GRADE 5
PLATE: ZINC

FASTENER

LIPPERT COMPONENTS INC. A Division of Drew Industries Axle Division 2703 College Ave. Goshen, IN 46526 (574) 971-4100 Phone (574) 534-0990 Fax	DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: +/- 1/16" .X: +/- .003 .XX: +/- .005 .XXX: +/- .005 ANGLE: +/- 1 DEGREE	SCALE: 2:1 PAGE: 1 OF 1	Mat. Type: Mat. Grade: Mat. Class: Gauge: Decimal: Blk. Weight: WEIGHT:	Blank Size: DWG. NO. 118610 Customer: LIPPERT DRAWN BY: J.Frick APPR. BY: CD	DATE 04/20/06 DATE 04/20/06 REV. A
	PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF LIPPERT COMPONENTS INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF LIPPERT COMPONENTS INC. IS PROHIBITED.	lbs.	DATE 04/20/06 DATE 04/20/06 REV. A		

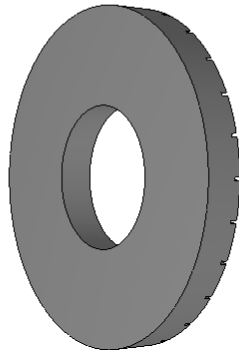


NOTES:

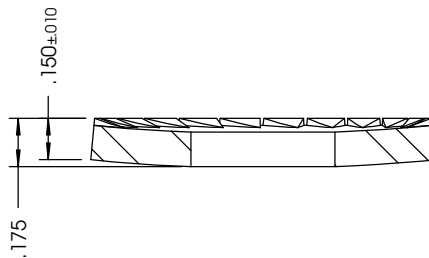
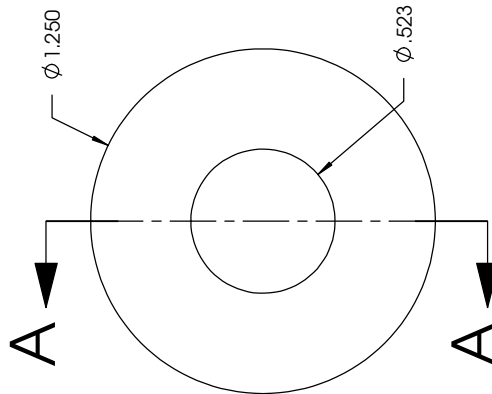
- MATL TYPE: 1050/1055 HR,HRC 40-45
FINISH SPECS: Fe/Zn 5C PER ASTM F1941
FNH GOOD WEIGHT: 0.04 LBS
BELLEVILLE WASHER

REVISIONS

REV.	DATE	DESCRIPTION	ECN	DWR	APVD
D	11/30/2011	UPDATED PRINT & DESCRIPTION		RAW	ML
E	3/26/2014	CHANGED MODEL BACK TO REV C. ECN-PE-DE-08047		MJC	RC
F	6/23/2014	ADDED HEIGHT DIMENSION AND BELLEVILLE NOTE. ECN-PE-DE-08345		MJC	JLF
G	7/29/2014	UPDATED MODEL; ADD TOLERANCE TO HEIGHT DIM	ECN-SP-DE-12765	DAL	CMM



NOT VERIFIED BY
PEI PERSONNEL



SECTION A-A

TITLE: WASHER - 1/2 BVSW YELZN 1050/1055 HR

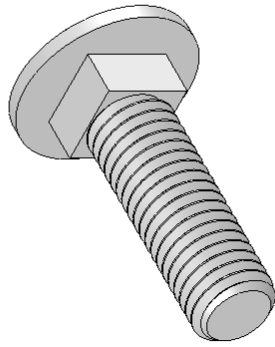
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES BREAK SHARP EDGES & DEBURR		TOLERANCES (EXCEPT AS NOTED)		LIPPERT COMPONENTS		THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF LIPPERT COMPONENTS, INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF LIPPERT COMPONENTS, INC. IS PROHIBITED.	
FILLET'S R.015	FINISH 125	DECIMAL X ± .1 .XX ± .03 .XXX ± .005	SIZE A	DWG. NO. 122802	DATE 02/15/2007	REV. G	REV. OF 1
THIRD ANGLE PROJECTION		FRACTIONAL ±1/16	SCALE 3:2	ENG. RAW	DWN. RAW	SHEET 1	OF 1
		ANGULAR ±1°			2703 COLLEGE AVE. GOSHEN, IN 46528		

NOTES:

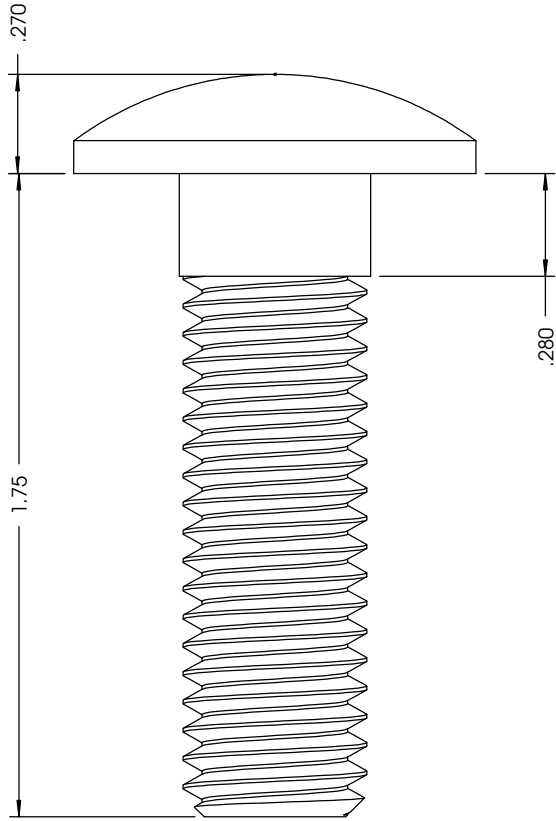
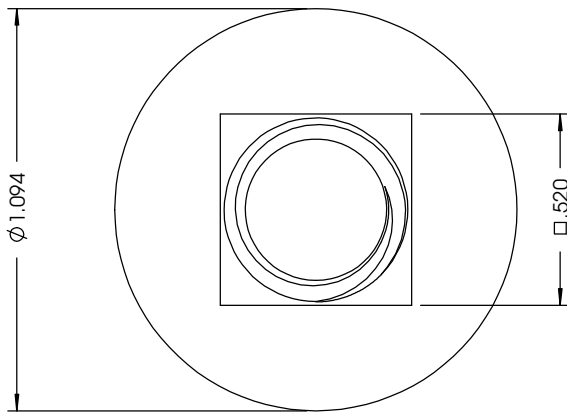
1. FINISH: ZINC AND CLEAR CHROMATE PER ASTM B 633 TYPE III CLASS SC-2
2. THREAD REQUIREMENTS: ASME B1.1, CLASS 2A UNC & UNF

REVISION HISTORY

REV	DATE	DESCRIPTION	DWR	APVD
A	2/25/2014	RELEASED TO PRODUCTION	BJR	JA



= VERIFIED BY
PEI PERSONNEL

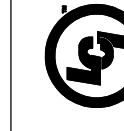


TITLE:

BOLT - 1/2 - 13 X 1 3/4 CB GR5 ZN FTNP ST

UNLESS OTHERWISE SPECIFIED
1. ALL DIMENSIONS ARE IN INCHES BREAK SHARP EDGES & DEBURR
2. MATERIAL & FINISH TO BE AS NOTED OR SUBSTITUTED WITH AN APPROVED AND TESTED EQUIVALENT

TOLERANCES
(EXCEPT AS NOTED)
DECIMAL .X ± .1
.XX ± .010
.XXX ± .005
FRACTIONAL ± 1/16
ANGULAR ± 1°



**LIPPERT
COMPONENTS™**

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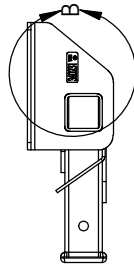
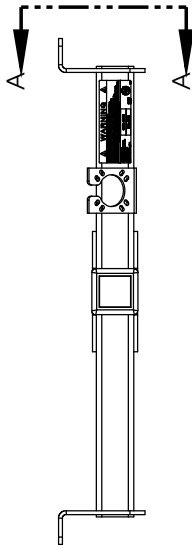
DWG. NO.	346260	DATE	02/26/2014	REV.	A
SIZE	A	SCALE	2:1		
DRAWN BY	BJR	CHECKED BY	BJR	APPROVED BY	
				SHEET	1 OF 1

REFERENCE NUMBER:	
MATERIAL TYPE:	
SURFACE QUALITY:	
DECIMAL:	0.017
FINSH GOOD WEIGHT:	X
BLANK WEIGHT:	X
BLANK SIZE:	X



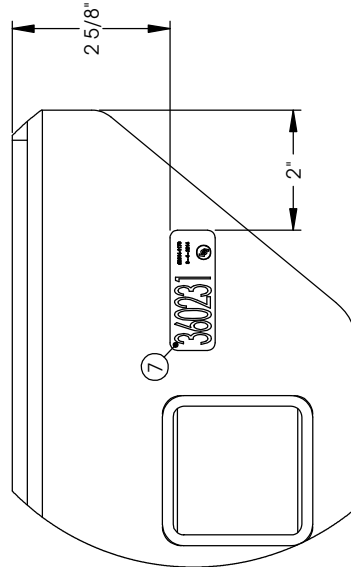
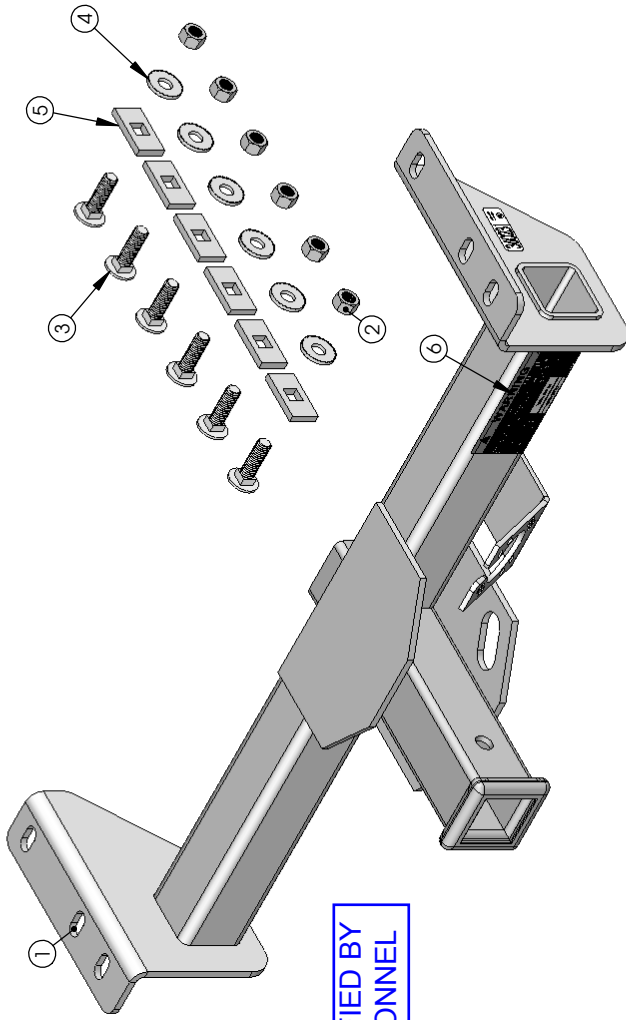
REVISION HISTORY			
REV	DATE	DESCRIPTION	DWR
A	8/8/2014	RELEASED TO PRODUCTION.	MJF
B	8/15/2014	ADDED TORQUE NOTE (ECN-SP-DE-12962)	NRL

TORQUE TO 75 FT LBS



SECTION A-A
SCALE 1 : 8

NOT VERIFIED BY
PEI PERSONNEL



DETAIL B
SCALE 1 : 2

ITEM	PART NO.	CONFIG	DESCRIPTION	NAME	GA	QTY.
1	328668	Default	WELDMENT, 2" HITCH RECEIVER W/ MOUNT, 31 11/16 ON CENTER, BLACK	SUB ASSY		1
2	118610	Default	NUT - 1/2 - 13; HEX; GR5 ZINC	FASTENER	6	6
3	346260	Default	BOLT - 1/2 - 13 X 1 3/4 CB GR5 ZN FTNP ST	FASTENER	6	6
4	122802	Default	WASHER - 1/2 BVSW YELZN 1050/1055 HR	FASTENER	6	6
5	346254	Default	2" X 1 1/16"	PLT	1/4	6
6	358933	Default	LABEL - 8K GT / 500 LB TONGUE HITCH WEIGHT RATING	PURCH		1
7	360233	Default	360231 KIT LABEL	PLT		1

TITLE
8K ASSEMBLY, 2" HITCH RECEIVER W/ MOUNT, 31 11/16 ON CENTER

UNLESS OTHERWISE SPECIFIED:
1. ALL DIMENSIONS ARE IN INCHES/BREAK
SHARP EDGES & DEBURR
2. MATERIAL & FINISH TO BE AS NOTED
OR AS APPROVED
3. DIMENSIONS ARE TO CENTER UNLESS NOTED OTHERWISE

TOLERANCES
(EXCEPT AS NOTED)
DECIMAL .XX ±.03
XXX ±.005

FILETS R0.15 FINISH 125°

THIRD ANGLE PROJECTION

UPPER COMPONENTS
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PERMISSION OF UPPER COMPONENTS, INC. IS PROHIBITED.

DATE 08/08/2014
DWG. NO. 360231
SCALE: 1:4

REV. B

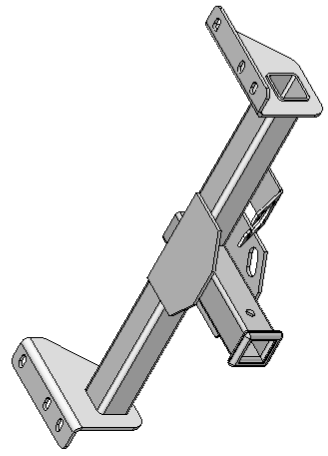
ENG MJF DWR MJF SHEET 1 OF 1

2700 COLLEGE AVE
GOSHEN, IN 46528

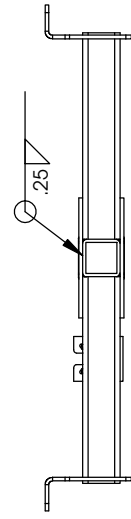
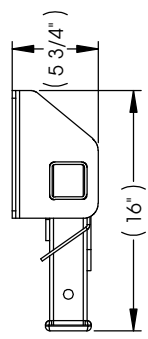
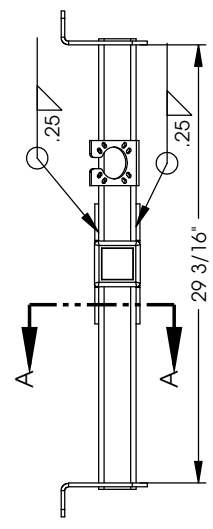
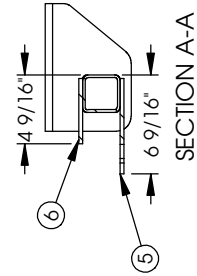
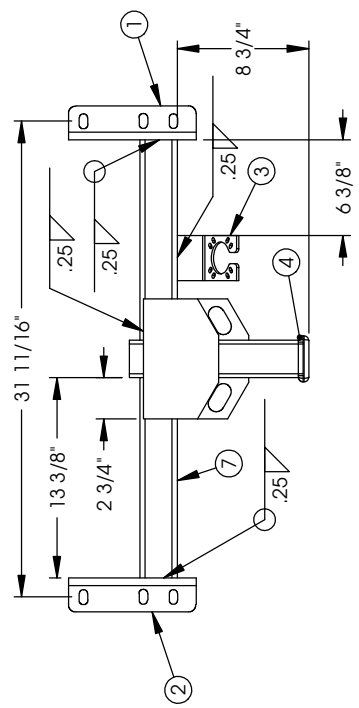
REVISION HISTORY			
REV	DATE	DESCRIPTION	DWR
A	10/24/2013	RELEASED TO PRODUCTION	MJF
B	4/1/2014	UPDATED TO REFLECT CHANGES MADE TO 328667 & 328666	MTH

REV	DATE	DESCRIPTION	DWR	APVD
A	10/24/2013	RELEASED TO PRODUCTION	MJF	JA
B	4/1/2014	UPDATED TO REFLECT CHANGES MADE TO 328667 & 328666	MTH	MF

NOTES:
 1. FNISH GOOD WEIGHT: 33.470 LBS
 2. FINISH: PC BLACK



NOT VERIFIED BY
PEI PERSONNEL



ITEM	PART NO.	CONFIG	DESCRIPTION	NAME	GA	QTY.
1	328667	Default	8 1/2" X 2 1/4" X 5 3/4"	ANG	1/4	1
2	328666	Default	8 1/2" X 2 1/4" X 5 3/4"	ANG	1/4	1
3	328669	Default	3" X 3 7/8" X 3 5/8"	ANG	7	1
4	142248	Default	11 15/16" X 3 1/16" X 3 1/16"	MISC	4	1
5	328662	Default	8" X 7"	PLT	.250	1
6	328663	Default	8" X 5"	PLT	1/4	1
7	328664	206	13.750 X 2.500 X 2.500	TUBE	7	2

TOLERANCES (EXCEPT AS NOTED)		DATE	
DECIMAL	.XX ±.03	DATE	10/25/2013
FRACTIONAL	±1/16	SCALE	1:8
ANGULAR	±1°	REV	B

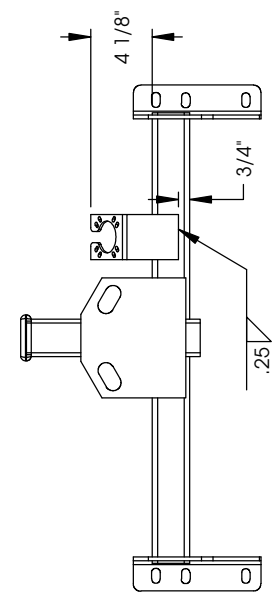


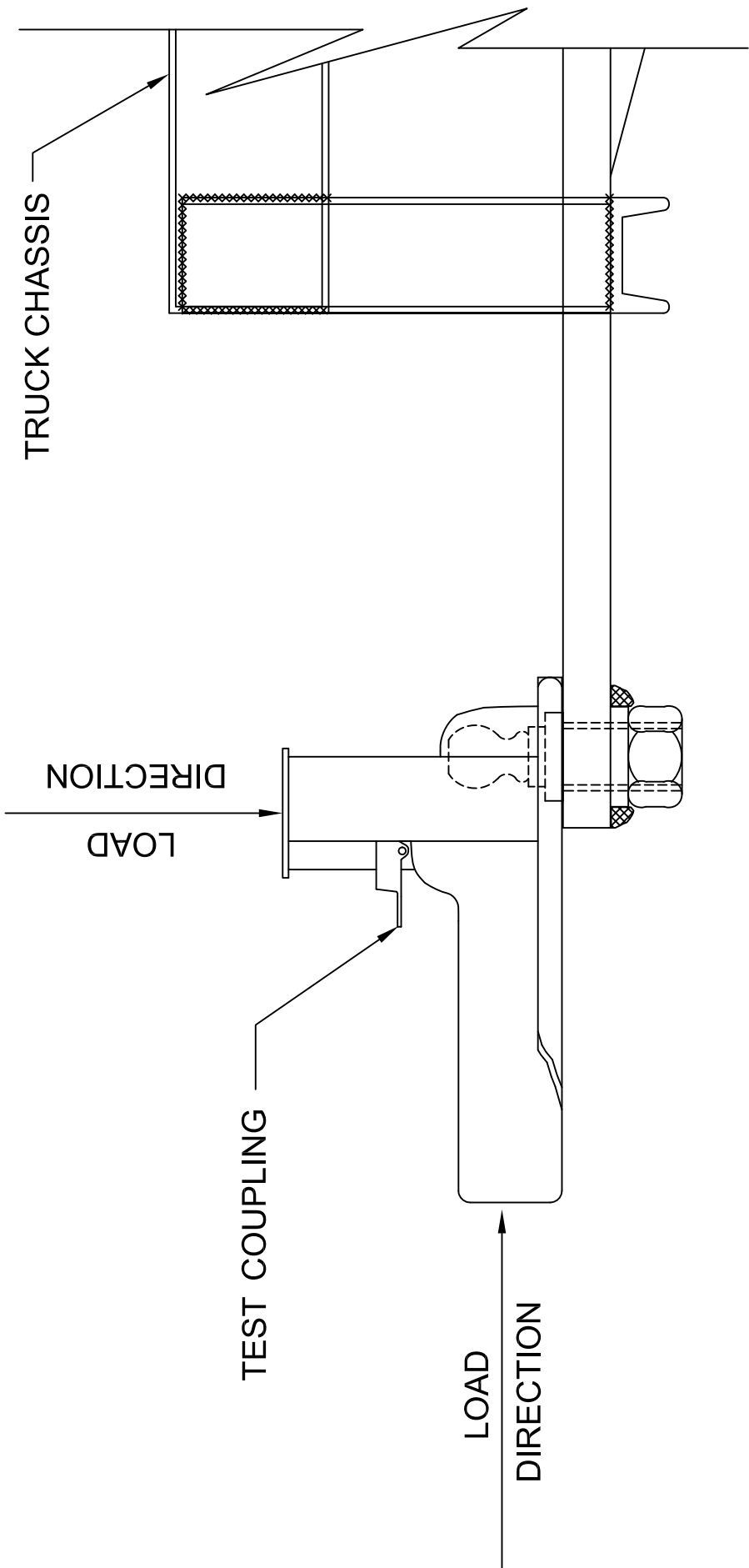
UPRRF COMPONENTS
 2700 COLLEGE AVE
 GOSHEN, IN 46528

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DWG. NO. 328668
 ENG MJF

DATE 10/25/2013
 SCALE 1:8
 SHEET 1 OF 1





STEP A & C

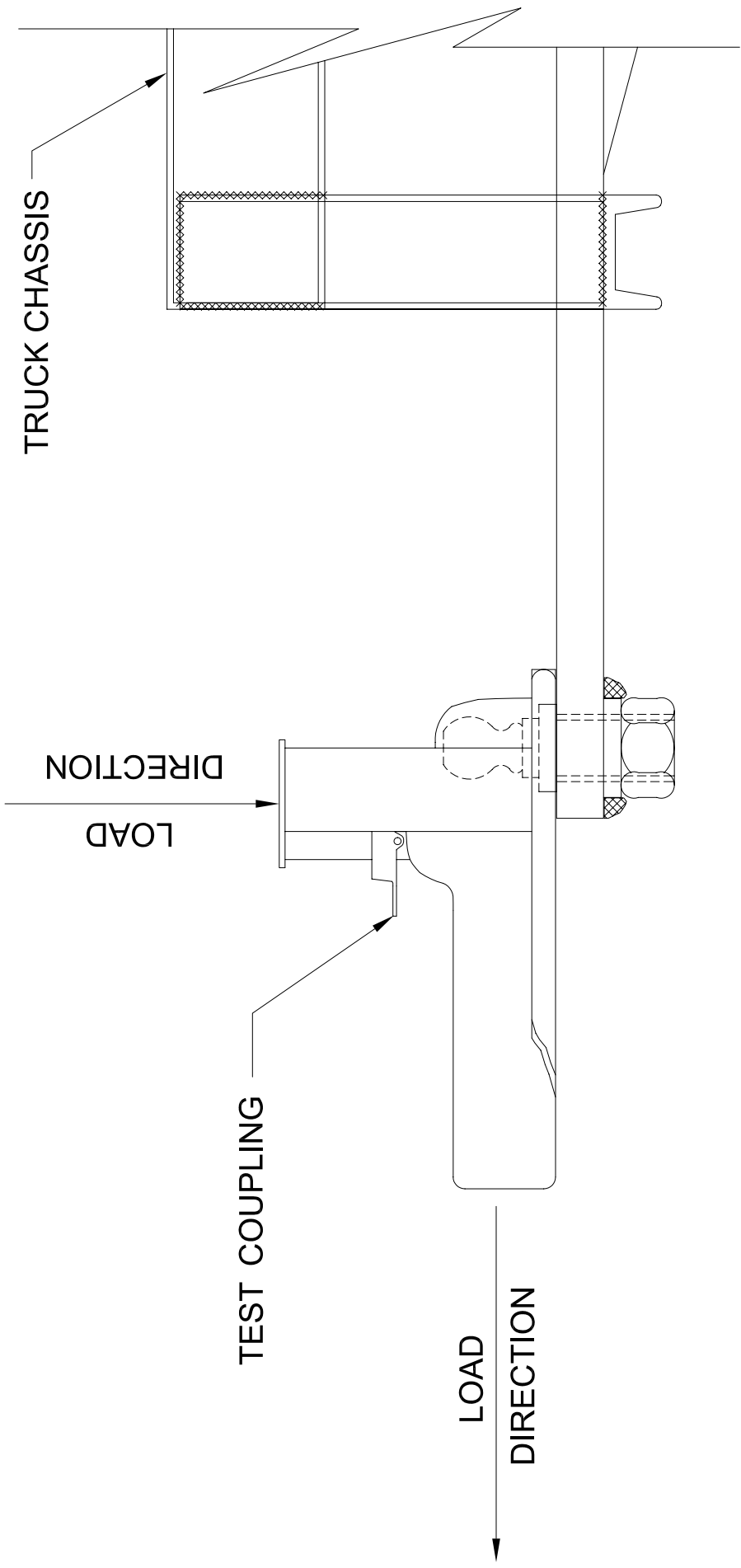
LONGITUDINAL COMPRESSION & VERTICAL COMPRESSION

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DRAWN BY:	A. BENDER
DATE:	6/17/04
SCALE:	
DRAWING NUMBER	F190
TITLE:	TEST SET-UP

Progressive Engineering Inc.

58640 State Road 15
Goshen, IN 46528
Phone (574) 533-0337
Fax (574) 533-9736

www.p-e-i.com



STEP B

LONGITUDINAL TENSION & VERTICAL COMPRESSION

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DRAWN BY:	A. BENDER
DATE:	6/17/04
SCALE:	
DRAWING NUMBER	F191
TITLE:	TEST SET-UP

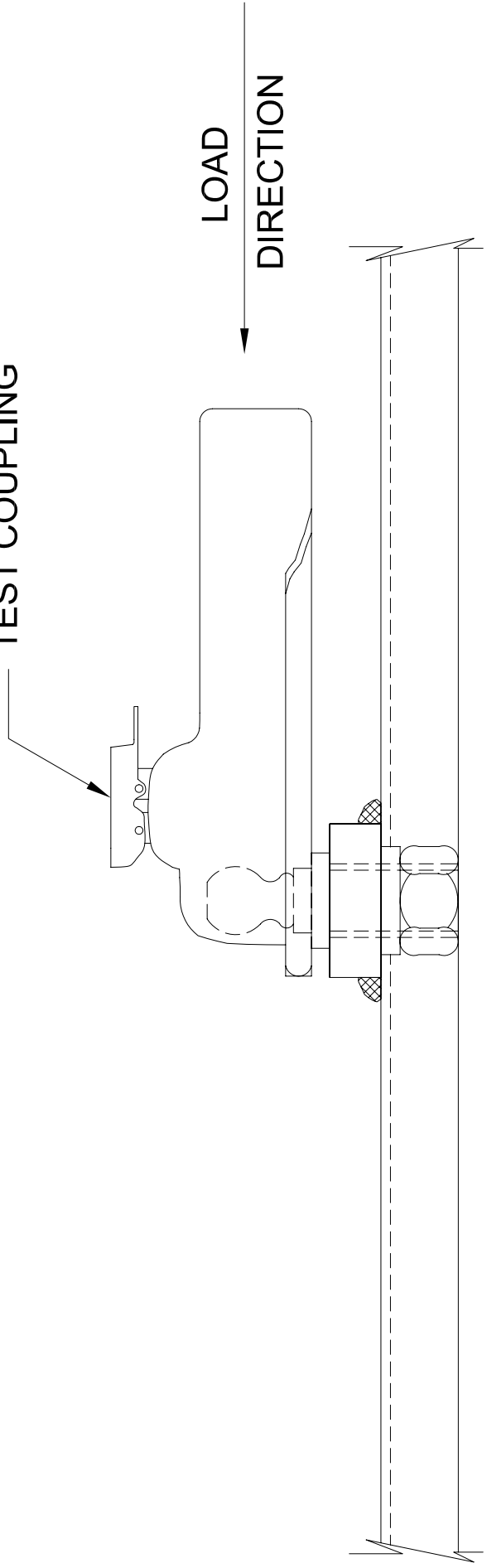


Progressive Engineering Inc.
 58640 State Road 15
 Goshen, IN 46528
 Phone (574) 533-0337
 Fax (574) 533-9736

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TEST COUPLING

LOAD
DIRECTION



STEP D

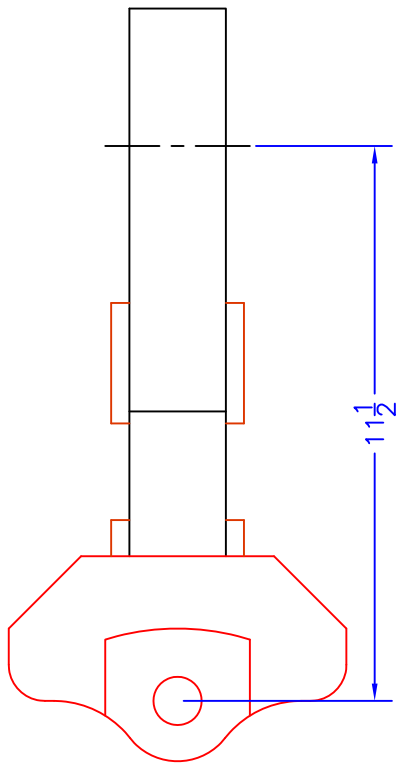
TRANSVERSE THRUST LEFT

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DRAWN BY:	A. BENDER
DATE:	6/17/04
SCALE:	
DRAWING NUMBER	F192
TITLE:	TEST SET-UP

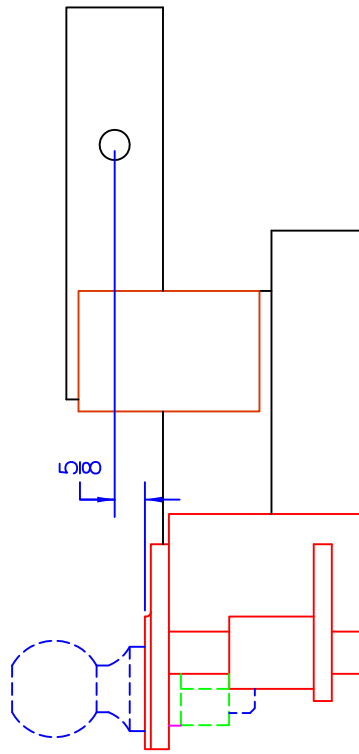


Progressive Engineering Inc.
 58640 State Road 15
 Goshen, IN 46528
 Phone (574) 533-0337
 Fax (574) 533-9736

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ALL ITEMS JOINED WITH A MINIMUM OF 1/4" FILLET WELD



DWN BY: ALGER	This drawing and all information contained herein is the property of PROGRESSIVE ENGINEERING, INC. and is not to be reproduced without the written permission of P.E.I. assumes no responsibility for unauthorized use of this drawing.
DATE: 4-22-13	
SCALE:	
DRAWING NUMBER	

F1898

TITLE: HITCH

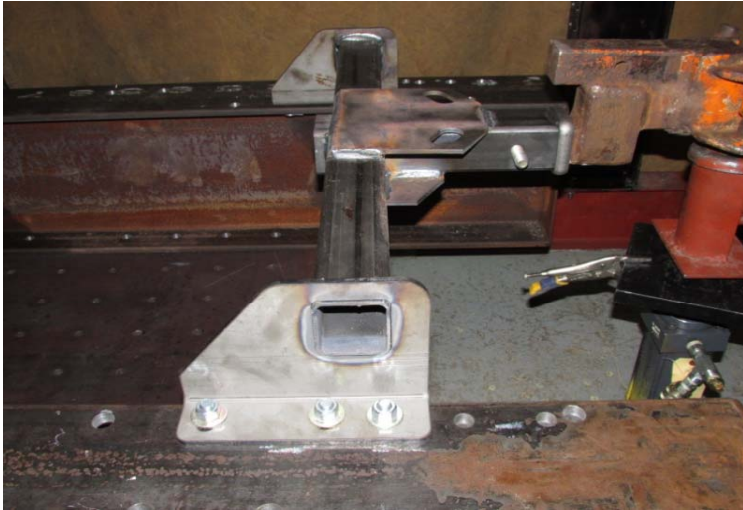


Progressive Engineering Inc.

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Goshen, IN 46528
Phone (574) 533-0337
Fax (574) 533-9736

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Progressive Engineering Inc.



Hitch Attachment to Fixture



Hitch Attachment to Fixture



Step A - Full Load Applied



Step B - Full Load Applied



Step C - Full Load Applied



Step E - Full Load Applied

Progressive Engineering Inc.



Safety Chain Attachment - Full Load Applied



Safety Chain Attachment - Deformation



Hardware Used



Typical Weld Placement



Typical Weld Placement



Typical Weld Placement