Installation Instructions

Bolt-on Tailwheel Shimmy Dampener for Scott & ABI 3200 & 3400 (not 3425) Series Tailwheel Assemblies

Keller Engineering Group, LLC.

18714 Mink Creek

Chugiak, AK 99567

FAA Project Number: ST02291AK-A

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Record of Revisions

Rev Level	Date	Page	Author	Explanation of Revisions
IR	1/23/2021	-	Doug Keller	Initial Release
A	4/28/2021	1,5, & 7	Doug Keller	(not 3425) added
B	5/2/2022	8 - 21	Doug Keller	Updated Drawings

Distribution of Changes

A current copy of this manual will be maintained on the Keller Engineering, LLC. website.

Table of Contents

Background

Tail wheel shimmy on conventional gear aircraft has proven to be difficult to correct and control. Tail wheel shimmy is induced by a number of variables including: caster angle, tail weight, speed, and overall tailwheel maintenance and condition among other things. As aircraft age, the tailwheel caster angle changes with tail spring plastic deformation. Aircraft tail weight changes with various loading scenarios. As aircraft age and wear, the tail wheel assembly shimmy friction tends to lessen which helps promote shimmy. These variables are difficult to monitor and maintain in the field thus making tail wheel shimmy difficult to keep under control.

Keller Engineering, LLC. has designed and developed a bolt-on, tailwheel shimmy dampener for Scott and ABI 3200 & 3400 (not 3425) series tailwheel assemblies that will minimize tail wheel shimmy. This dampener works regardless of caster angle, tail weight, speed, and tail wheel assembly condition which should reduce or eliminate the nagging problem that many tail dragger pilots endure.

Installation Instructions

The tail wheel shimmy dampener STC is applicable to all the aircraft outlined on the Approved Model List (AML). There are 6 different tail wheel installation configurations:

Shimmy Dampener 3400 Bent Assembly	Drawing KEG-111
Shimmy Dampener 3400 Straight Assembly	Drawing KEG-112
Shimmy Dampener 3450 Straight Assembly	Drawing KEG-113
Shimmy Dampener 3200 Straight Assembly	Drawing KEG-116
Shimmy Dampener 3200 Bent Assembly	Drawing KEG-117
Shimmy Dampener 3200 2-Bolt Straight Assembly	Drawing KEG-118

The drawings are attached to the appendix of this document. Browse through the drawings to determine which drawing best suits your application. You will reference this drawing as you install the shimmy dampener to your particular aircraft make and model.

Note: Your tail wheel shimmy dampener comes completely full of oil and bleed of all air. Do not adjust the volume of oil in the shimmy dampener or allow any air in the dampener cavity. See the Instructions for Continued Airworthiness for instructions on how to fill and bleed the shimmy dampener assembly

Note: Your tailwheel assembly must use a long pawl to install the tailwheel shimmy dampener.

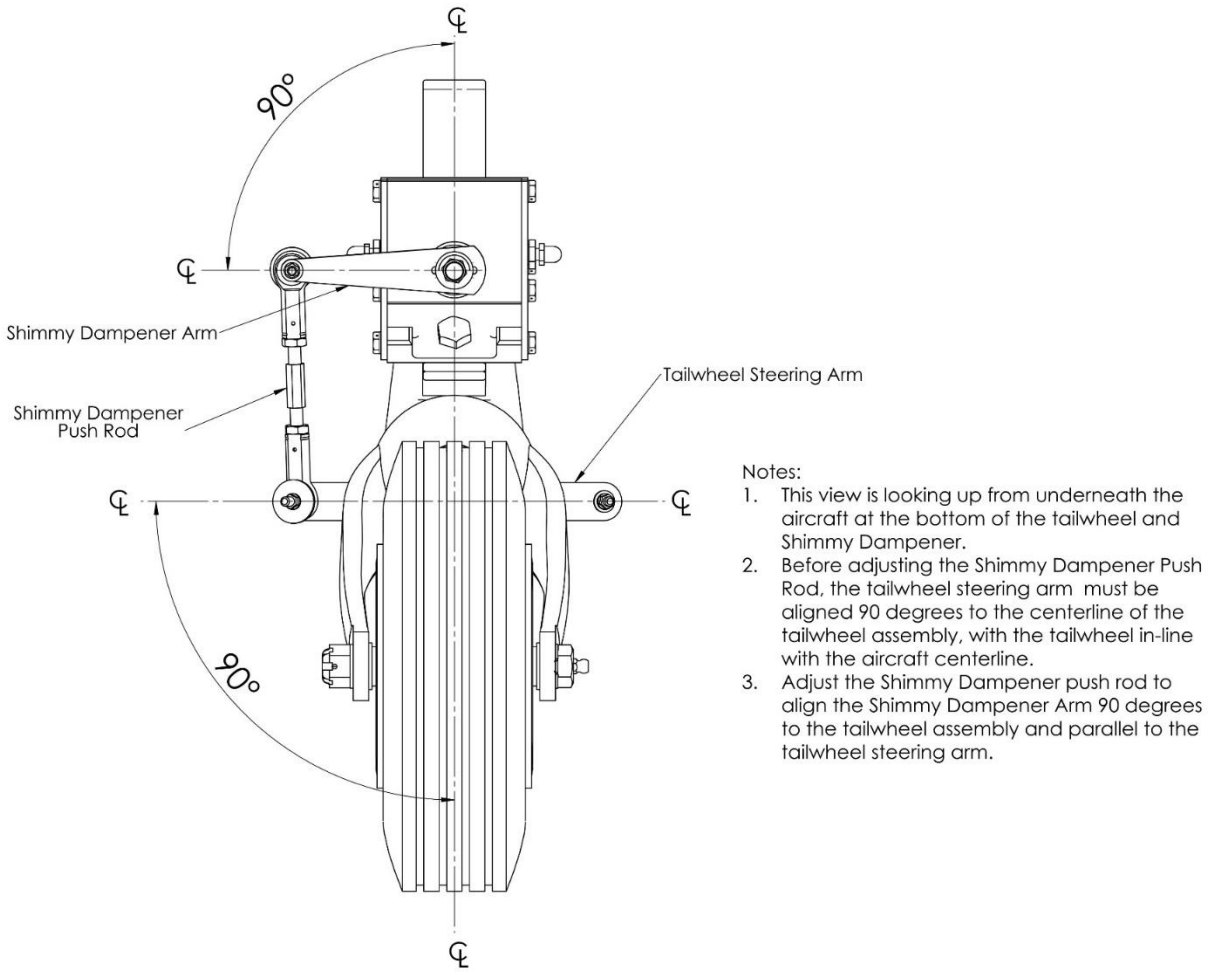
Follow these steps to properly install the shimmy dampener to your aircraft:

Chock the aircraft main tires to prevent the aircraft from moving.

Raise the tail of your aircraft and support it per your aircraft's approved maintenance manual so that your tailwheel can freely swivel 360 degrees without any external resistance.

Install the shimmy dampener assembly per the appropriate installation drawing above. Carefully read and comply with all the notes in the appropriate drawings.

The pushrod assembly connecting your steering arm to the shimmy dampener needs to be properly adjusted. It is critical that the shimmy dampener pushrod is adjusted so that the dampener arm is perpendicular to the shimmy dampener body (perpendicular to the longitudinal axis of the aircraft) while your tail wheel steering arm is also perpendicular to the longitudinal axis of the aircraft. If this is not adjusted properly you could damage your shimmy dampener. It is critical that the tailwheel assembly reach its break-away angle prior to the shimmy dampener reaching the end of its angular stroke. You do not want the shimmy dampener to bottom out before your tailwheel breaks free from the angular break-away detent (see diagram below).



After the shimmy dampener pushrod assembly is properly adjusted, cycle your tailwheel assembly around both directions to ensure that the pushrod assembly does not bind and that the tailwheel steering arms break away properly. After checking this, tighten both push rod jam nuts against the rod end bearings to ensure they do not move over time.

Make sure that all the drilled head mounting bolts are properly safety wired per AC 65-15A.

Remove the tail stand and lower your aircraft tail so that its tailwheel is resting on the ground.

Remove the main tire chocks. Your shimmy dampener should now be properly installed.

Update your aircrafts weight and balance and fill out a FAA form 337 and submit one copy to the FAA.

Taxi test the aircraft prior to first flight to ensure the tail wheel functions properly.

Weight and Balance

The addition of the bolt on tailwheel shimmy dampener for Scott & ABI 3200 & 3400 (not 3425) series tailwheels adds a slight amount of weight to your aircraft and therefore your aircrafts weight and balance needs to be modified accordingly.

The added weight of the tailwheel shimmy dampener is: 1.5 Lbs.

Since all aircraft makes and models vary, you will have to determine the location of the shimmy dampener assembly relative to your aircrafts datum and update your aircrafts weight and balance accordingly.

Trouble Shooting

Problem: My shimmy dampener slightly binds when it travels stop to stop.

Solution: It is impossible to document the proper installations for all aircraft makes and models with varying tail spring thicknesses. The installation drawing for your particular application should work to eliminate pushrod binding. If you still experience pushrod binding you will need to adjust the pushrod washer shim stack accordingly to eliminate binding of the pushrod assembly.

Problem: I still get tail wheel shimmy after installation of the shimmy dampener.

Solution: The tailwheel shimmy dampener will not be able to eliminate tailwheel shimmy from tailwheels that are obviously in disrepair. If your tail wheel assembly is loose or wiggles, it is likely in need of an overhaul. It may also be that the dampener assembly is not properly filled with proper oil or oil quantity or there could be air trapped in the oil. See the Instructions for Continued Airworthiness for instructions on how to service the shimmy dampener oil cavity.

To be updated with common Problems and Corrections, if necessary, when and if they arise as more kits are installed in the field.

Documents and Drawings

Document Title	Document Number	Revision	Date
Instructions for Continued Airworthiness	ICA	B	5/2/2022
Shimmy Dampener 3400 Bent Assembly	KEG-111	A	4/28/2022
Shimmy Dampener 3400 Straight Assembly	KEG-112	A	4/28/2022
Shimmy Dampener 3450 Straight Assembly	KEG-113	A	4/29/2022
Shimmy Dampener 3200 Straight Assembly	KEG-116	A	4/29/2022
Shimmy Dampener 3200 Bent Assembly	KEG-117	A	4/30/2022
Shimmy Dampener 3200-2 Bolt Straight Assembly	KEG-118	A	5/1/2022

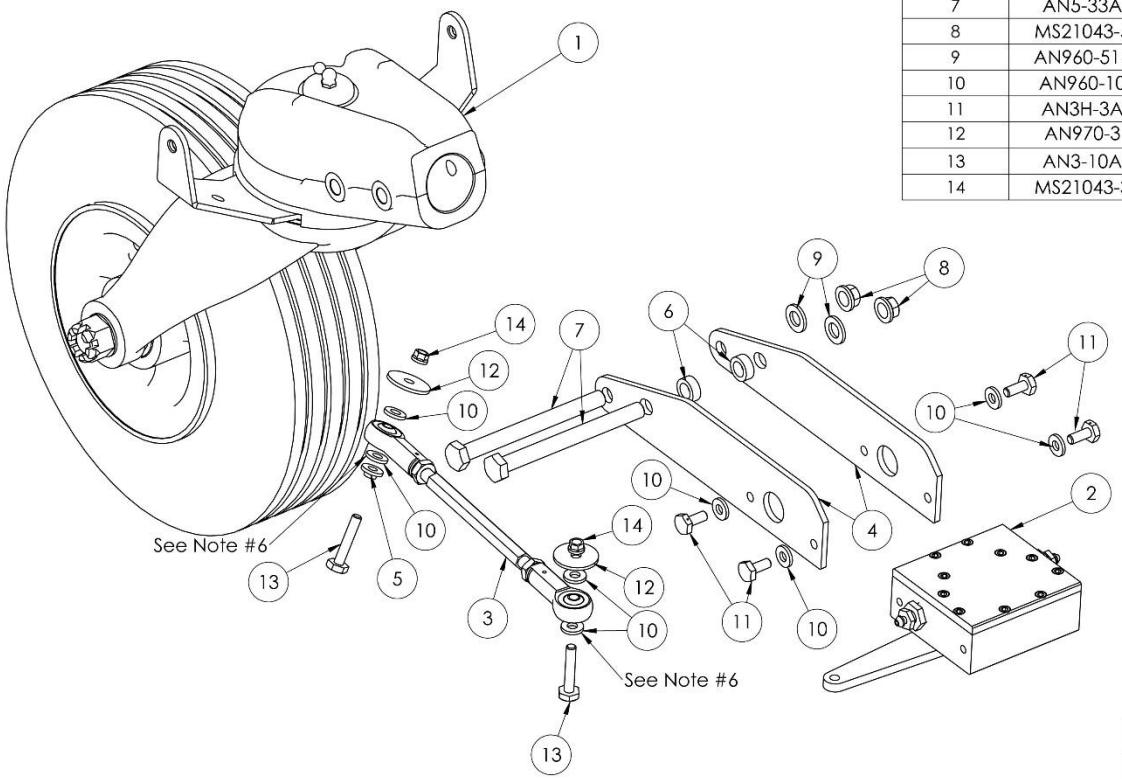
Engineering Changes and Amendments

In the event that a change or amendment is made to the design, components, or procedures contained within this manual or STC that affect airworthiness of the installation; Keller Engineering Group, LLC. will notify the recorded owners in writing of the affected item(s) and provide the necessary data for compliance.

Appendix

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
IR	Initial Release	9/17/2020	DK
A	Updated Side Plates and Pushrod attachments for added clearance above tire.	4/28/2022	DK

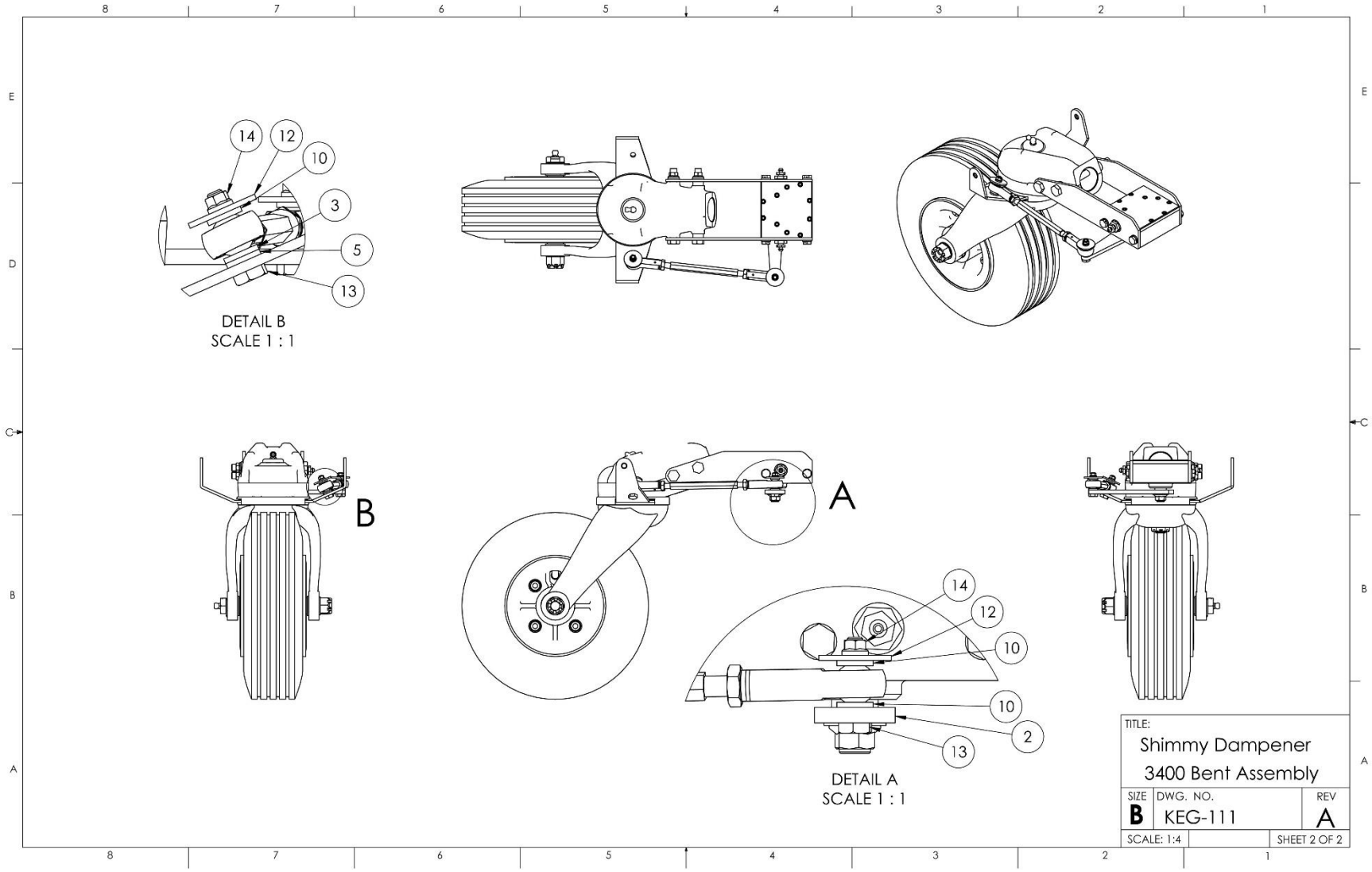
ITEM	Part Number	DESCRIPTION	QTY
1	3400-00(T)	3400 Bent Tailwheel	1
2	KEG-100	Shimmy Dampener Assembly	1
3	KEG-108-2	Push Rod Assembly	1
4	KEG-109	Stinger Side Plate	2
5	KEG-110	Flanged Bushing	1
6	KEG-119-1	3400 Stinger Side Plate Spacer - ABI Front	2
7	AN5-33A	Bolt	2
8	MS21043-5	Hex Nut	2
9	AN960-516	Flat Washer	2
10	AN960-10	Flat Washer	8
11	AN3H-3A	Bolt - Drilled Head	4
12	AN970-3	Flat Washer - Large Area	2
13	AN3-10A	Bolt	2
14	MS21043-3	Hex Nut	2



NOTES:
1. ABI 3400 TAILWHEEL IS SHOWN WITH KEG119-1 FRONT SPACERS.
2. FOR SCOTT TAILWHEELS, USE KEG-119-2 FRONT SPACERS AND KEG-119-3 REAR SPACERS BETWEEN THE KEG-109 SIDE PLATES AND THE TAILWHEEL HEAD.
3. SAFETY WIRE ALL (4) AN3H-3A DRILLED HEAD BOLTS TO ENSURE THEY DO NOT LOOSEN PER AC 43.13.
4. COMPATIBLE WITH BABY BUSHWHEEL AND ALL TIRES APPROVED ON THE 3400 BENT ASSEMBLY.
5. TAILWHEEL ASSEMBLY MUST USE THE LONG PAWL.
6. ADD WASHERS AND ADJUST BOLT LENGTHS AS REQUIRED TO AVOID BINDING OF THE PUSHROD.

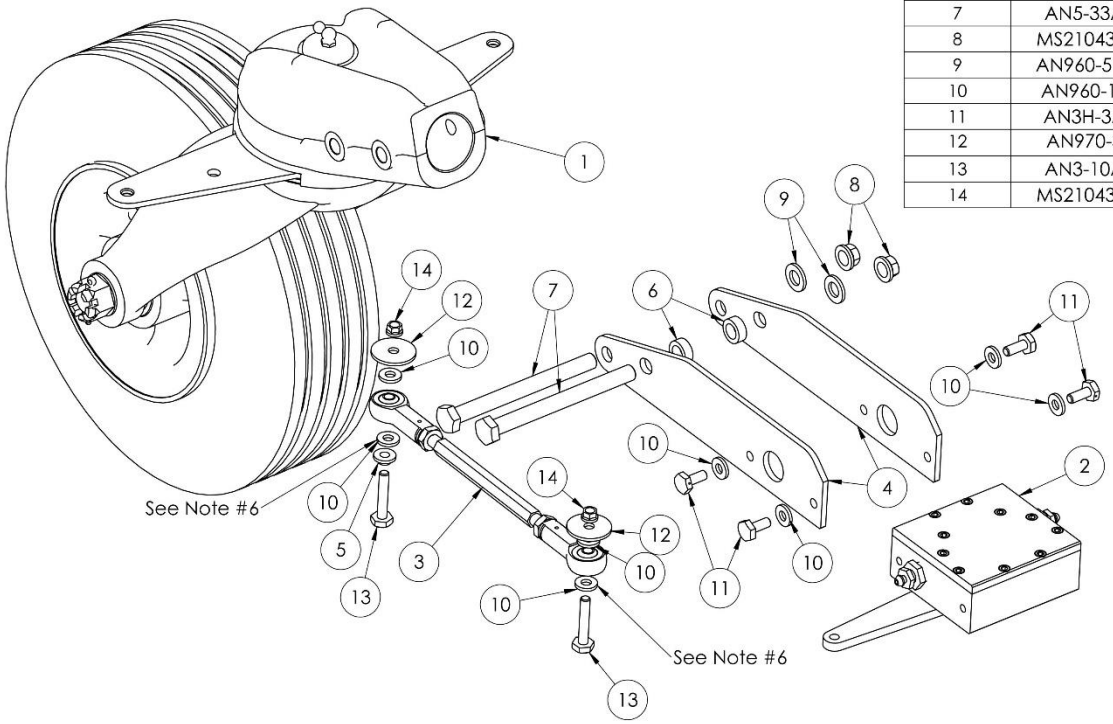
KELLER ENGINEERING GROUP, LLC.

DESCRIPTION:	Shimmy Dampener 3400 Bent Assembly
DRAWN BY: DK	THIS DRAWING IS THE PROPERTY OF KELLER ENGINEERING GROUP, LLC. CONTAINING PROPRIETARY AND CONFIDENTIAL INFORMATION AND MAY NOT BE COPIED OR SHOWN TO THIRD PARTIES WITHOUT THE EXPRESSED WRITTEN PERMISSION FROM KELLER ENGINEERING GROUP.
DATE: 9/17/2020	
CHECKED BY: XX	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES. DIM. B
DATE: XX/XX/XX	DO NOT SCALE DRAWING
PROJECT: Shimmy Dampener	SCALE: 1:2
DRAWING NUMBER: KEG-111	SHT 1 OF 2 REV. A



REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
IR	Initial Release	9/20/20	DK
A	Updated Side Plates for added clearance above tire.	4/28/2022	DK

ITEM	Part Number	DESCRIPTION	QTY
1	3400-00(S)	3400 Straight Tailwheel	1
2	KEG-100	Shimmy Dampener Assembly	1
3	KEG-108-2	Push Rod Assembly	1
4	KEG-109	Stinger Side Plate	2
5	KEG-110	Flanged Bushing	1
6	KEG-119-1	3400 Stinger Side Plate Spacer - ABI Front	2
7	AN5-33A	Bolt	2
8	MS21043-5	Hex Nut	2
9	AN960-516	Flat Washer	2
10	AN960-10	Flat Washer	8
11	AN3H-3A	Bolt - Drilled Head	4
12	AN970-3	Flat Washer - Large Area	2
13	AN3-10A	Bolt	2
14	MS21043-3	Hex Nut	2



NOTES:
1. ABI 3400 TAILWHEEL IS SHOWN WITH KEG119-1 FRONT SPACERS.
2. FOR SCOTT TAILWHEELS, USE KEG-119-2 FRONT SPACERS AND KEG-119-3 REAR SPACERS BETWEEN THE KEG-109 SIDE PLATES AND THE TAILWHEEL HEAD.
3. SAFETY WIRE ALL 4 AN3H-3A DRILLED HEAD BOLTS TO ENSURE THEY DO NOT LOOSEN PER AC 43.13.
4. COMPATIBLE WITH BABY BUSHWHEEL AND ALL TIRES APPROVED ON THE 3400 STRAIGHT ASSEMBLIES.
5. TAIL WHEEL ASSEMBLY MUST USE THE LONG PAWL.
6. ADD WASHERS AND ADJUST BOLT LENGTHS AS REQUIRED TO AVOID BINDING OF THE PUSHROD.

KELLER ENGINEERING GROUP, LLC.

DESCRIPTION:	Shimmy Dampener 3400 Straight Assembly		
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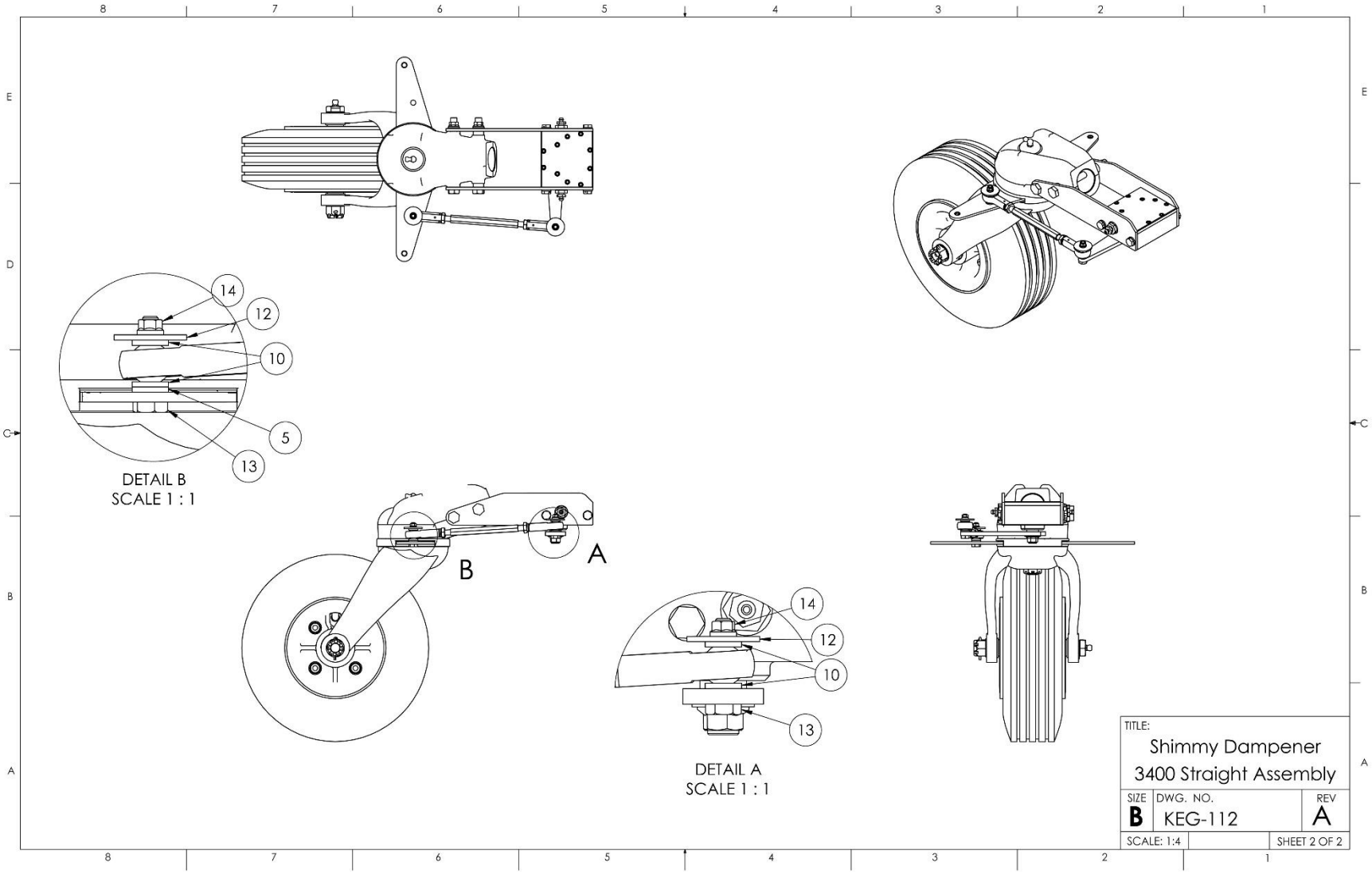
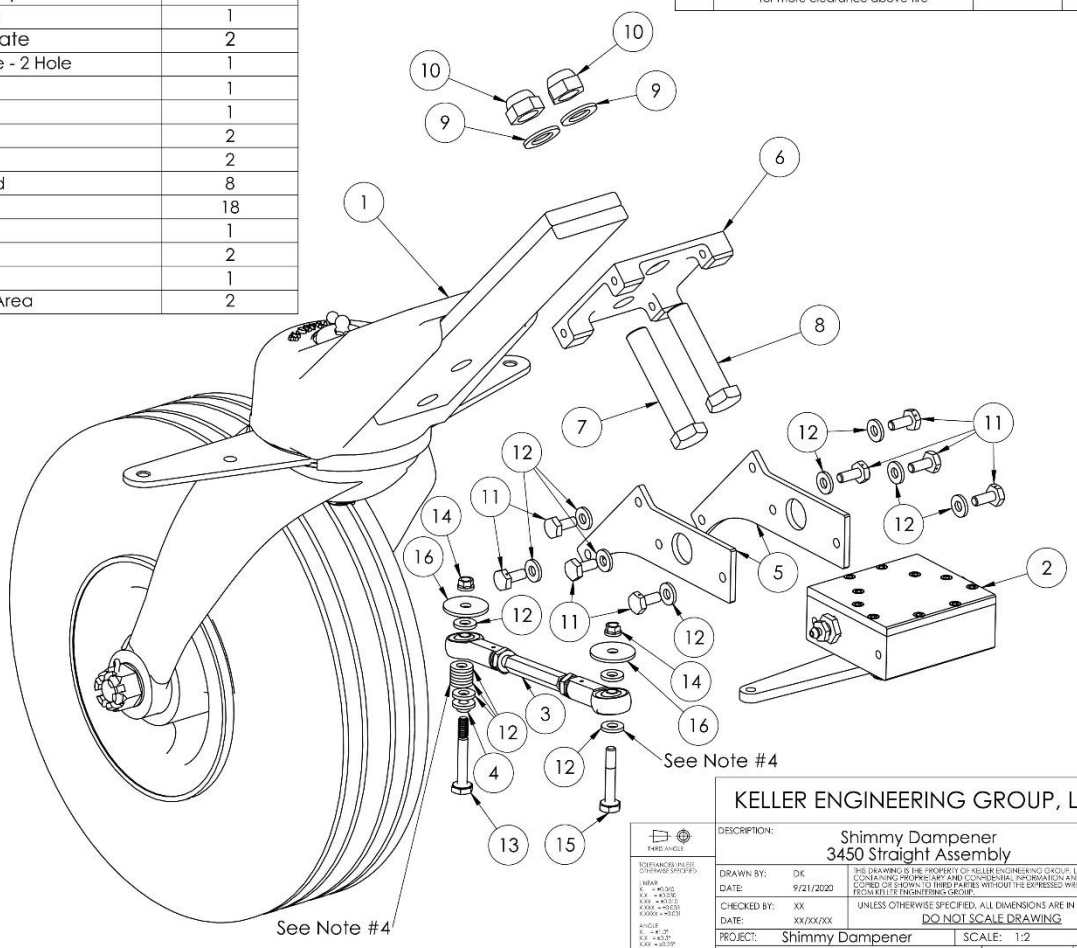
DATE:	9/20/2020		
CHECKED BY:	XX	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES	SIZE: B
DATE:	XX/XX/XX	DO NOT SCALE DRAWING	
PROJECT:	Shimmy Dampener	SCALE: 1:2	
DRAWING NUMBER:	KEG-112	SHT 1 OF 2	REV. A



ITEM	Part Number	DESCRIPTION	QTY
1	3450-S	3450 Straight Steering Arm Tailwheel Assembly	1
2	KEG-100	Shimmy Dampener Assembly	1
3	KEG-108-1	Push Rod Assembly	1
4	KEG-110	Flanged Bushing	1
5	KEG-114	Leaf Spring Side Plate	2
6	KEG-115-4	Leaf Spring Adapter Plate - 2 Hole	1
7	AN7-26A	Bolt	1
8	AN7-24A	Bolt	1
9	AN960-716	Flat Washer	2
10	AN365-720A	Hex Nut	2
11	AN3H-3A	Bolt - Drilled Head	8
12	AN960-10	Flat Washer	18
13	AN3-13A	Bolt	1
14	MS21043-3	Hex Nut	2
15	AN3-11A	Bolt	1
16	AN970 - 3	Flat Washer - Large Area	2

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
IR	Initial Release	9/21/2020	DK
A	Revised side plates and pushrod attachment for more clearance above tire	4/29/2022	DK

NOTES:
1. AN7-26A AND AN7-24A MOUNTING BOLTS ARE NOMINAL LENGTHS. ACTUAL REQUIRED BOLT LENGTHS SHOULD BE DETERMINED AT TIME OF INSTALLATION.
2. SAFETY WIRE ALL (8) AN3H-3A DRILLED HEAD BOLTS TO ENSURE THEY DO NOT LOOSEN PER AC 43.13.
3. COMPATIBLE WITH THE BABY BUSHWHEEL AND ALL TIRES APPROVED ON ALL 3450 STRAIGHT ASSEMBLIES.
4. WASHER SHIM STACK MAY VARY DEPENDING ON SPRING THICKNESS.
5. TAIL WHEEL ASSEMBLY MUST USE THE LONG PAWL.



KELLER ENGINEERING GROUP, LLC.

DESCRIPTION:	Shimmy Dampener 3450 Straight Assembly		
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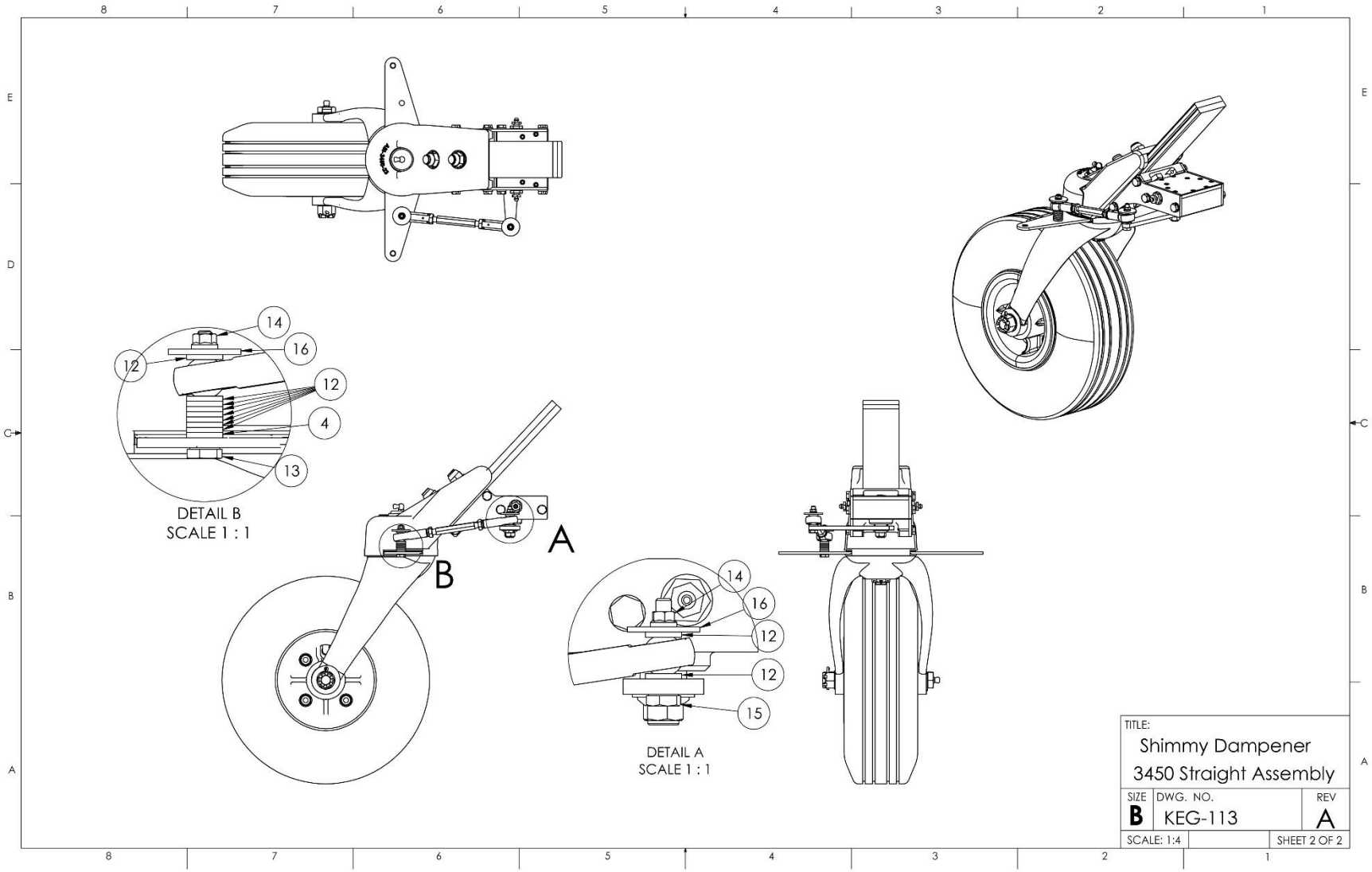
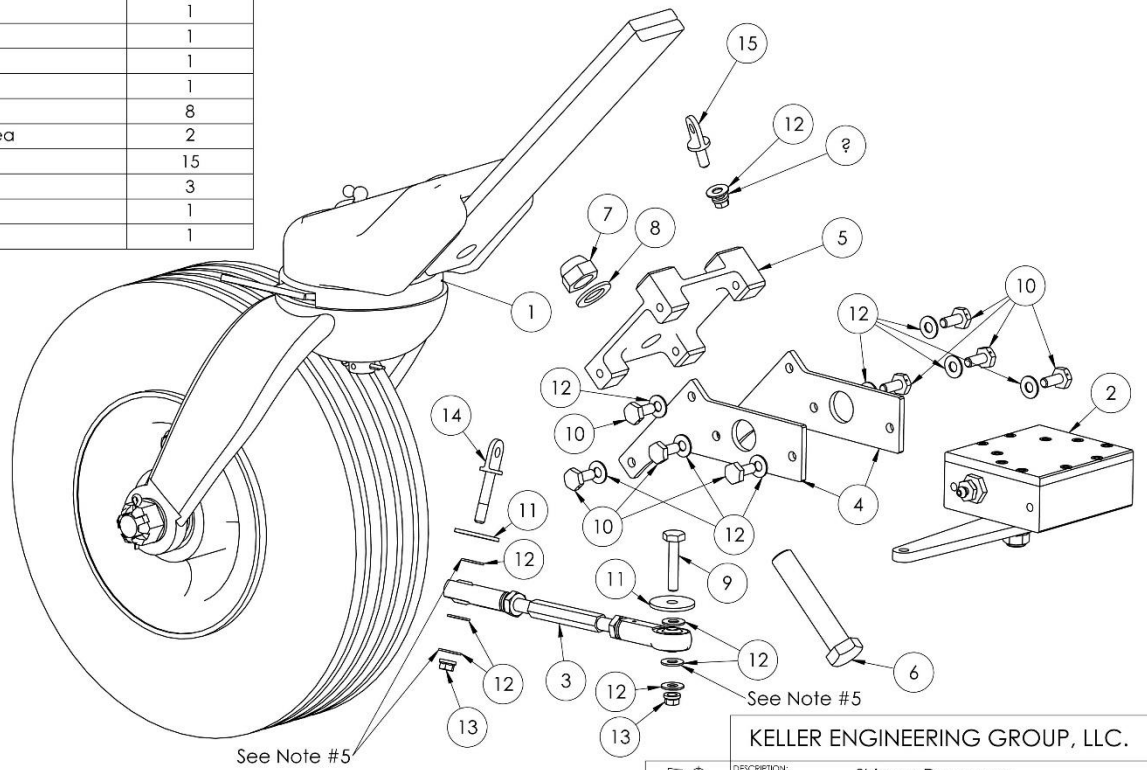
DATE:	9/21/2020		
CHECKED BY:	XX	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES	DIM B
DATE:	XX/XX/XX	DO NOT SCALE DRAWING	
PROJECT:	Shimmy Dampener	SCALE: 1:2	
DRAWING NUMBER:	KEG-113	SHT 1 OF 2	REV. A



ITEM	Part Number	DESCRIPTION	QTY
1	3200-S	3200 Standard Tailwheel - Straight	1
2	KEG-100	Shimmy Dampener Assembly	1
3	KEG-108-1	Push Rod Assembly	1
4	KEG-114	Leaf Spring Side Plate	2
5	KEG-115-X	Leaf Spring Adapter Plate	1
6	AN7-26A	Bolt	1
7	AN365-720A	Hex Nut	1
8	AN960-716	Flat Washer	1
9	AN3-10A	Bolt	1
10	AN3H-3A	Bolt - Drilled Head	8
11	AN970 - 3	Flat Washer - Large Area	2
12	AN960-10	Flat Washer	15
13	MS21043-3	Hex Nut	3
14	AN42B-10A	Eye Bolt	1
15	AN42B-3A	Eye Bolt	1

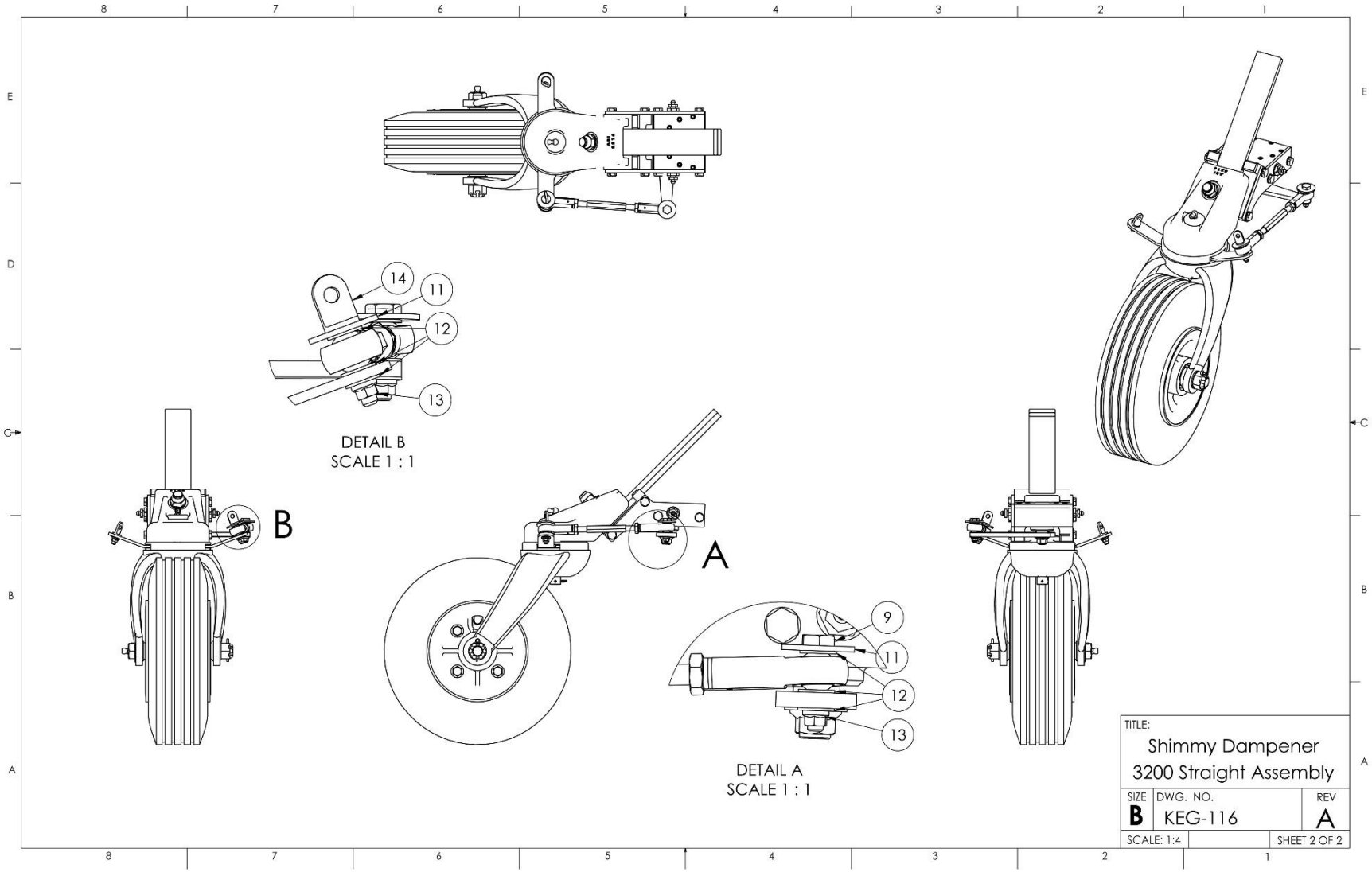
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
IR	Initial Release	12/20/2020	DK
A	Revised side plates and pushrod attachment for more clearance above tire	4/29/2022	DK

NOTES:
1. AN7-26A MOUNTING BOLT IS NOMINAL LENGTH. ACTUAL REQUIRED BOLT LENGTH SHOULD BE DETERMINED AT TIME OF INSTALLATION.
2. SAFETY WIRE ALL (8) AN3H-3A DRILLED HEAD BOLTS TO ENSURE THEY DO NOT LOOSEN PER AC 43.13.
3. COMPATIBLE WITH BABY BUSHWHEEL AND ALL OTHER TIRES APPROVED FOR THE 3200 STRAIGHT ASSEMBLY.
4. USE KEG-115-1 FOR 1-1/4" WIDE SPRING
   USE KEG-115-2 FOR 1-1/2" WIDE SPRING
   USE KEG-115-3 FOR 1-3/4" WIDE SPRING
   USE KEG-115-5 FOR 1.5" CESSNA 170 SPRING
5. WASHER SHIM STACK MAY VARY DEPENDING ON SPRING THICKNESS.
6. TAIL WHEEL ASSEMBLY MUST USE THE LONG PAWL.



KELLER ENGINEERING GROUP, LLC.

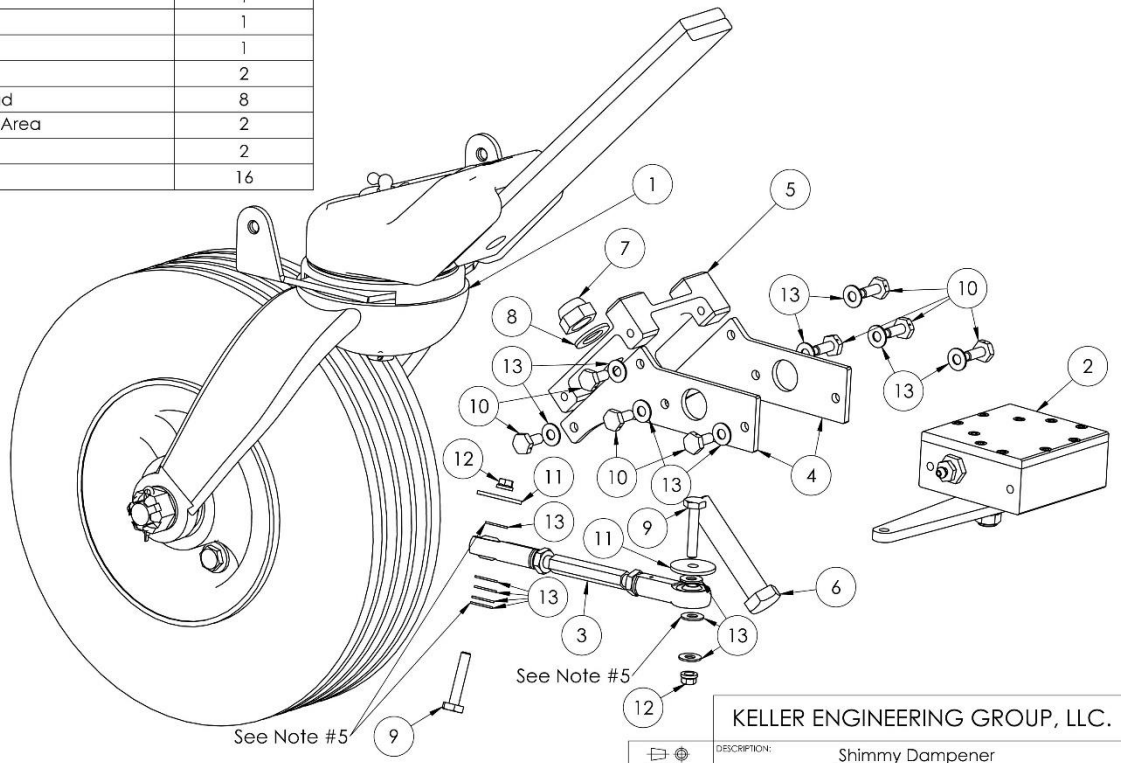
DESCRIPTION:	Shimmy Dampener 3200 Straight Assembly		
DRAWN BY:	DK	THIS DRAWING IS THE PROPERTY OF KELLER ENGINEERING GROUP, LLC, CONTAINING PROPRIETARY AND CONFIDENTIAL INFORMATION AND MAY NOT BE COPIED OR SHOWN TO THIRD PARTIES WITHOUT THE EXPRESSED WRITTEN PERMISSION FROM KELLER ENGINEERING GROUP.	
DATE:	12/20/2020		
CHECKED BY:	XX	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES	SIZE B
DATE:	XX/XX/XX	DO NOT SCALE DRAWING	
PROJECT:	Shimmy Dampener	SCALE: 1:2	
DRAWING NUMBER:	KEG-116	SHT 1 OF 2	REV. A



ITEM	Part Number	DESCRIPTION	QTY
1	3200 Bent	3200 Bent Tailwheel	1
2	KEG-100	Shimmy Dampener Assembly	1
3	KEG-108-1	Push Rod Assembly	1
4	KEG-114	Leaf Spring Side Plate	2
5	KEG-115-X	Leaf Spring Adapter Plate	1
6	AN7-26A	Bolt	1
7	AN365-720A	Hex Nut	1
8	AN960-716	Flat Washer	1
9	AN3-10A	Bolt	2
10	AN3H-3A	Bolt - Drilled Head	8
11	AN970 - 3	Flat Washer - Large Area	2
12	MS21043-3	Hex Nut	2
13	AN960-10	Flat Washer	16

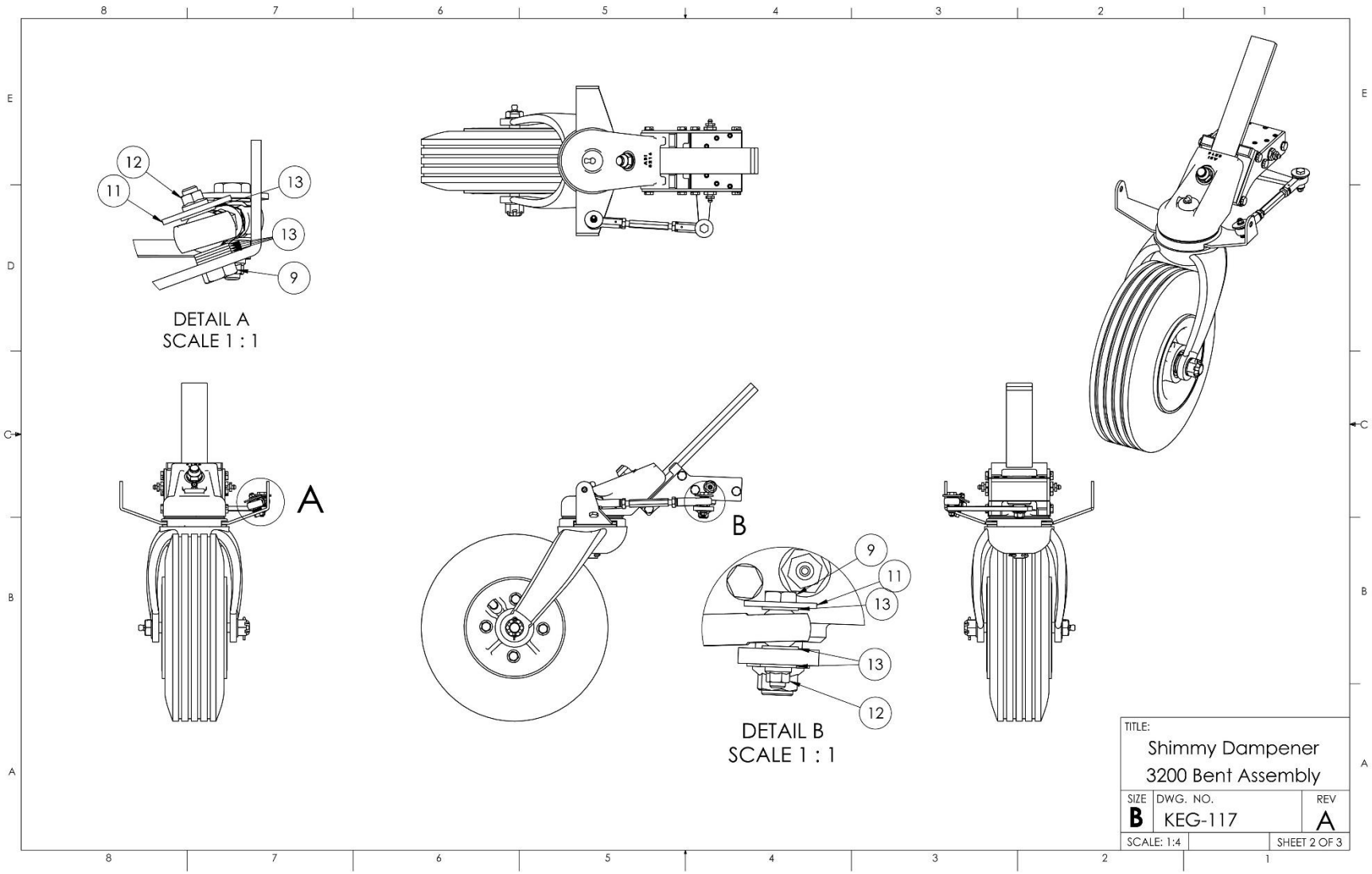
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
IR	Initial Release	12/20/2020	DK
A	Revised side plates and pushrod attachment for more clearance above tire	4/30/2022	DK

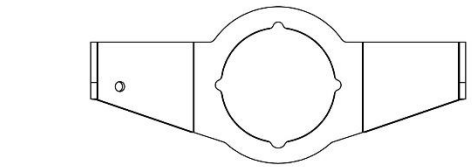
NOTES:
1. AN7-26A MOUNTING BOLT IS NOMINAL LENGTH. ACTUAL REQUIRED BOLT LENGTH SHOULD BE DETERMINED AT TIME OF INSTALLATION.
2. SAFETY WIRE ALL (8) AN3H-3A DRILLED HEAD BOLTS TO ENSURE THEY DO NOT LOOSEN PER AC 43.13.
3. COMPATIBLE WITH BABY BUSHWHEEL AND ALL OTHER TIRES APPROVED FOR THE 3200 STRAIGHT ASSEMBLY.
4. USE KEG-115-1 FOR 1-1/4" WIDE SPRING
   USE KEG-115-2 FOR 1-1/2" WIDE SPRING
   USE KEG-115-3 FOR 1-3/4" WIDE SPRING
   USE KEG-115-5 FOR 1.5" CESSNA 170 SPRING
5. WASHER SHIM STACK MAY VARY DEPENDING ON SPRING THICKNESS.
6. DRILL HOLE IN 3214 STEERING ARM PER DRAWING ON SHEET 3 OF THIS DRAWING.
7. TAIL WHEEL ASSEMBLY MUST USE THE LONG PAWL.

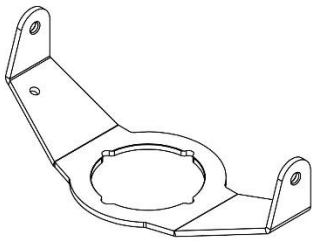


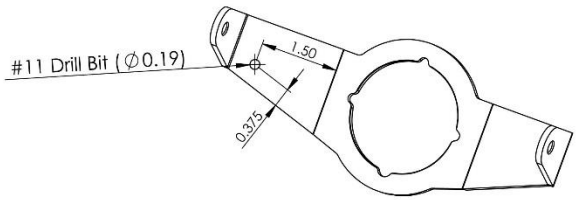
KELLER ENGINEERING GROUP, LLC.

DESCRIPTION:	Shimmy Dampener 3200 Bent Assembly
DRAWN BY: DK / DATE: 12/20/2020	THIS DRAWING IS THE PROPERTY OF KELLER ENGINEERING GROUP, LLC. CONTAINING PROPRIETARY AND CONFIDENTIAL INFORMATION AND MAY NOT BE COPIED OR SHOWN TO THIRD PARTIES WITHOUT THE EXPRESSED WRITTEN PERMISSION FROM KELLER ENGINEERING GROUP.
CHECKED BY: XX / DATE: XX/XX/XX	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES. DO NOT SCALE DRAWING. SIZE B
PROJECT: Shimmy Dampener	SCALE: 1:2
DRAWING NUMBER: KEG-117	SHT 1 OF 3 / REV. A









VIEW A

3214 STEERING ARM HOLE LOCATION

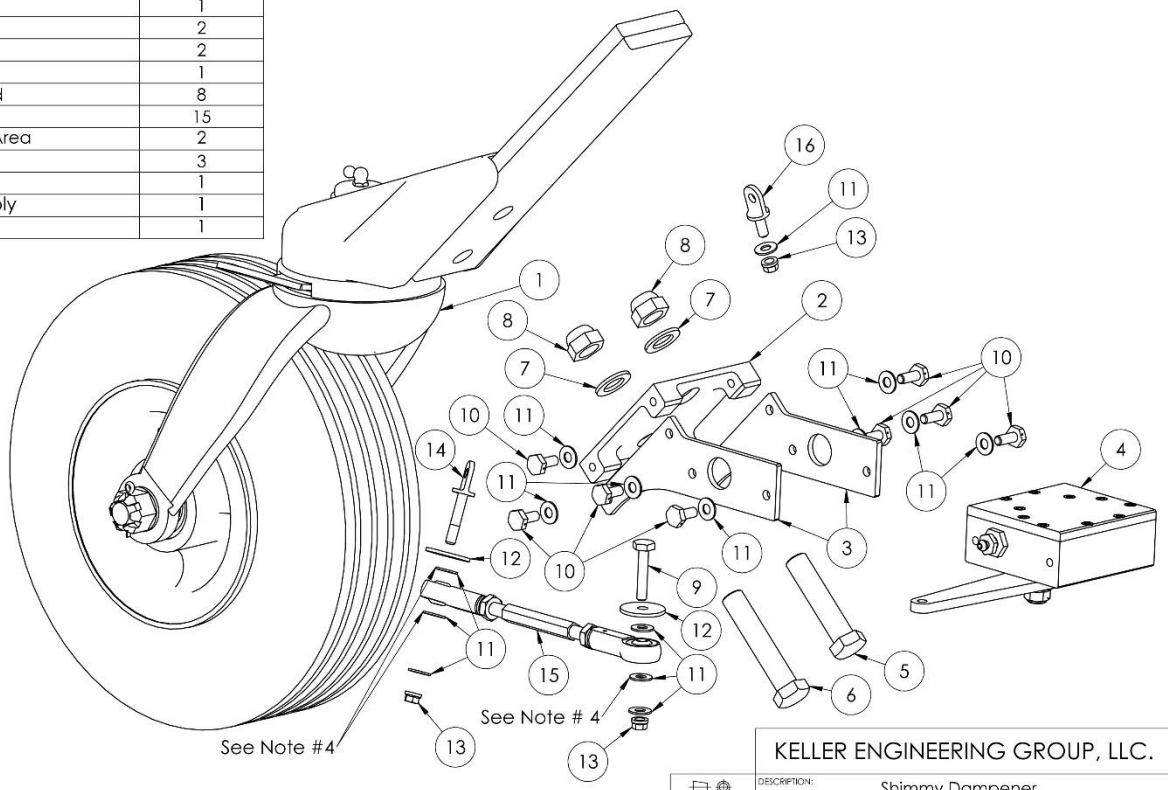
NOTES:
1. DRILL HOLE WITH #11 DRILL BIT (.1910) ON 3214 STEERING ARM AT LOCATION SHOWN IN VIEW A.
2. BREAK SHARP EDGES.

TITLE: Shimmy Dampener 3200 Bent Assembly		
SIZE B	DWG. NO. KEG-117	REV A
SCALE: 1:2		SHEET 3 OF 3

ITEM	Part Number	DESCRIPTION	QTY
1	3200-3	3200 2-Hole Straight Tailwheel	1
2	KEG-115-4	Leaf Spring Adapter Plate - 2 Hole	1
3	KEG-114	Leaf Spring Side Plate	2
4	KEG-100	Shimmy Dampener Assembly	1
5	AN7-24A	Bolt	1
6	AN7-26A	Bolt	1
7	AN960-716	Flat Washer	2
8	AN365-720A	Hex Nut	2
9	AN3-10A	Bolt	1
10	AN3H-3A	Bolt - Drilled Head	8
11	AN960-10	Flat Washer	15
12	AN970 - 3	Flat Washer - Large Area	2
13	MS21043-3	Hex Nut	3
14	AN42B-10A	Eye Bolt	1
15	KEG-108-1	Push Rod Assembly	1
16	AN42B-3A	Eye Bolt	1

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
IR	Initial Release	12/20/2020	DK
A	Revised side plates and pushrod attachment for more clearance above tire	5/1/2022	DK

NOTES:
1. AN-26A AND AN-24A MOUNTING BOLTS ARE NOMINAL LENGTHS. ACTUAL REQUIRED BOLT LENGTHS SHOULD BE DETERMINED AT TIME OF INSTALLATION.
2. SAFETY WIRE ALL (8) AN3H-3A DRILLED HEAD BOLTS TO ENSURE THEY DO NOT LOOSEN PER AC 43.13.
3. COMPATIBLE WITH BABY BUSHWHEEL TIRE AND ALL TIRES APROVED ON THE 3200 2-HOLE STRAIGHT ASSEMBLY.
4. WASHER SHIM THICKNESS MAY VARY DEPENDING ON SPRING THICKNESS.
5. TAIL WHEEL ASSEMBLY MUST USE THE LONG PAWL.



KELLER ENGINEERING GROUP, LLC.

DESCRIPTION:	Shimmy Dampener 3200 2-Hole Straight Assembly		
DRAWN BY:	DK	THIS DRAWING IS THE PROPERTY OF KELLER ENGINEERING GROUP, LLC. CONTAINING PROPRIETARY AND CONFIDENTIAL INFORMATION AND MAY NOT BE COPIED OR SHOWN TO THIRD PARTIES WITHOUT THE EXPRESSED WRITTEN PERMISSION FROM KELLER ENGINEERING GROUP.	
DATE:	12/20/2020		
CHECKED BY:	XX	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES	SIZE: B
DATE:	XX/XX/XX	DO NOT SCALE DRAWING	
PROJECT:	Shimmy Dampener	SCALE: 1:2	
DRAWING NUMBER:	KEG-118	SHT 1 OF 2	REV. A