

## International Harvester (Eaton style) FA-50 Front Axle Repair

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Many thanks to Rob Peterson who put together this document originally, while working on his 56 S-140 4x4. See pics at the end of the document.

The following photos and narrative show the re-assembly process for the outer ends of an IHC FA-50 axle. This axle has some similarities to the front driving axles used in the WWII-vintage M-series trucks and was used from 1953-1961 in the IH 140 & 160 4x4 trucks. The axle shown in this example is in a 1956 S-140 4x4 (see final pictures in narrative).

NOTE – Production run changes - These axles were used in the R-140 & R160 4x4's from 1953-1955 and the S-140 & S-160 4x4's from 1955-1956. Then, for the A-140 & A-160 4x4's (1957-1958) and the B-140 & B-160 4x4's (1959-1961), there were a couple of changes made. First, the axles were widened by approximately 4 inches. Also, the axle seal (in the tube part of the housing) was changed. Per the IH parts manuals, the seal for the R & S series uses one seal. The A series uses a different part – called “Baffle” in the parts manual. The B series uses a different “Baffle” part number. I noticed this when comparing inner axle shafts between the early “narrow” axle and the later “wide” axle. The diameter of the inner axle shaft, where the axle seal rides, is smaller on the later “wide” axles.

Related Parts List			
<b>Axle Seal</b>	R-140, R-160, S-140 & S-160 4x4's (Narrow Axle)	IH “Seal”	108294H
		National / Carquest	473235
		National	50265
		NAPA	NOS 16816
		Chicago Rawhide	16816
	A-140, A-160 4x4's (Wide axle)	IH “Baffle”	184797R1
		This part became 218013R91 – See next rows	
	B-140 & B-160 4x4's (Wide axle)	IH “Baffle”	218013R91
		No cross reference found at this time - TBD	
Dimensions: ID: (axle diameter) 1.5" / 38.1mm; OD: 2.6265" / 66.71mm; Width: 0.5" / 12.74mm			
<b>Hub Grease Seal</b>	IHC	108320HAX	
	NAPA	NOS 36220	
	Chicago Rawhide	36220	
<b>Trunnion seal</b>	IHC	108310 H	
	Possible replacement found by Bareknucklebinder		
<b>Wheel Cylinder Kit</b> Step bore 1.375" and 1.125"	NAPA	UP 120	
	CarQuest	BRK C11301	
	Possible alternative part		
<b>Brake Hose</b>	NAPA	UP 4900	

## Axle Width

In case you are working on these axles without the original truck (swamp buggy, etc.) and need to determine which axles you have (narrow or wide), here's how to measure the axle width.

On each end of the axle, there's a place where eight bolts attach the axle ends to the main axle housing. This makes a convenient place to measure. The oddity is that the tape measure has to go over the hump of the housing. I'm measuring across what would be the front of the axle, if it were installed in the truck.

This pic (below) shows you where I'm starting the measurement, the inside of the flange on the long side of the axle. (This is a narrow axle.)



This photo (below) shows the over the hump measurement.



This photo (below) is the measurement on the narrow R/S axle. Sorry for the bad angle. Width is approximately 48.75 inches.





This photo (below) is the same measurement on the wide A/B axle. Again, bad angle, but close enough for what we're doing. Width is approximately 52.75 inches.



FYI, in case you were wondering, I also took some measurements on the long side and short side of each axle, because I was curious if they lengthened one side or both sides, when they went to the wider A/B axle. The short answer is that they lengthened both sides.

### Seals



#### **R-140, R-160, S-140 & S-160 4x4's (Narrow Axle)**

On the left is the remains of the original IHC axle seal (108294H) which was damaged on removal. The sealing surface, now missing, was made of rawhide leather.

On the right is the replacement seal (C-R 16816) which has a nitrile sealing surface.



#### A-140, A-160, B-140 & B-160 4x4's (Wide Axle)

These are pics of the original leather seal (218013R91). I have not located a modern replacement, but will. The dimensions are in the grid above.



The seal on the left is the original IHC 108320HAX hub grease seal. A call to the Chicago Rawhide tech support line revealed that it is listed in their database as obsolete - not available.

Fortunately there's an even better modern alternative, shown on the right. It's C-R 36220. Thanks to [BinderPlanet](#) member **Geoff** who did the research to find this modern replacement!

These seals each take a different approach to sealing the hub. The original has a sealing surface on the **outer** edge, while the new replacement has a sealing surface in the **inner** edge. The following pictures will show how each works.



The original 108320HAX seal is pressed on to the base of the spindle, as shown on the left. The seal is in a fixed position.

This seal consists of a felt ring held in a circular steel stamping. When new, the felt extends slightly beyond the outer edge of the stamping to come into contact with the spinning hub.



This picture shows the new replacement 36220 in place on the wheel spindle **for test / photo purposes only**. During final assembly it will actually be pressed into the wheel hub. It will be in a fixed position in the hub and will spin around the axis of the spindle, instead of the original, opposite approach. The nitrile surface is on the **inner** edge.



## Knuckle / Axle Assembly



This photo shows the open end of the FA-50 axle tube (passenger side) with all components from the trunnion yoke and outward removed.

A slight ridge is visible down the inside of the axle tube, about 3.5" from the end. This is the stop for the axle seal. This axle seal has already been removed using a slide hammer with a hook attachment.



A short section of 2.5" exhaust pipe with an expanded end turned out to be a perfect tool for driving in the axle seal. It stayed perfectly square in the bore and made contact with the outer edge of the seal.





The new axle seal in position. I used a dental inspection mirror and a flashlight to ensure the seal was pressed in to the stop ridge.



Here's a shot of the trunnion yoke, prior to assembly.



I made a set of installation brackets that I call "spiderlegs" using some .375" threaded rod and some scraps of .5" water pipe welded together.



Sorry about this crummy picture.

The rear half of the knuckle case has been put in place around the trunnion yoke, and the yoke has been installed on the axle tube and held on with 4 of the 8 nuts.

The spiderlegs are used to hold the rear of the knuckle case against the bell of the trunnion yoke. The nuts are just finger tight, or less, which keeps the case against the bell. The tubes of the spiderlegs fit around the 2 top and 2 bottom studs which do not have nuts on yet.



Here are the components of the axle / CV joint assembly. The axle shaft (upper left) and drive shaft (lower right) are shown with 4 drive balls and one retaining ball. Note that the retaining ball has a hole down the center. This ball is placed on the pin protruding from the drive shaft.

Note also the small hole drilled crossways in the middle of the drive shaft. This hole contains a roll pin that serves as a stop for the retaining pin.



Here's a closeup view of the assembled CV joint.

The IH manual calls for a convoluted assembly process that involves removing the roll pin and retaining pin and moving the retaining ball around. However, during disassembly the whole CV came apart on me inadvertently when the drive shaft was manipulated at an extreme angle, so I knew it had to go back the same way. It did, after a little trial and error.

Don't force it - you don't want to bugger up the drive balls. There's one particular angle when that last ball falls right into place.





The upper and lower trunnion bearings have been lubed with Mobil 1 synthetic grease and the races have been set in position.

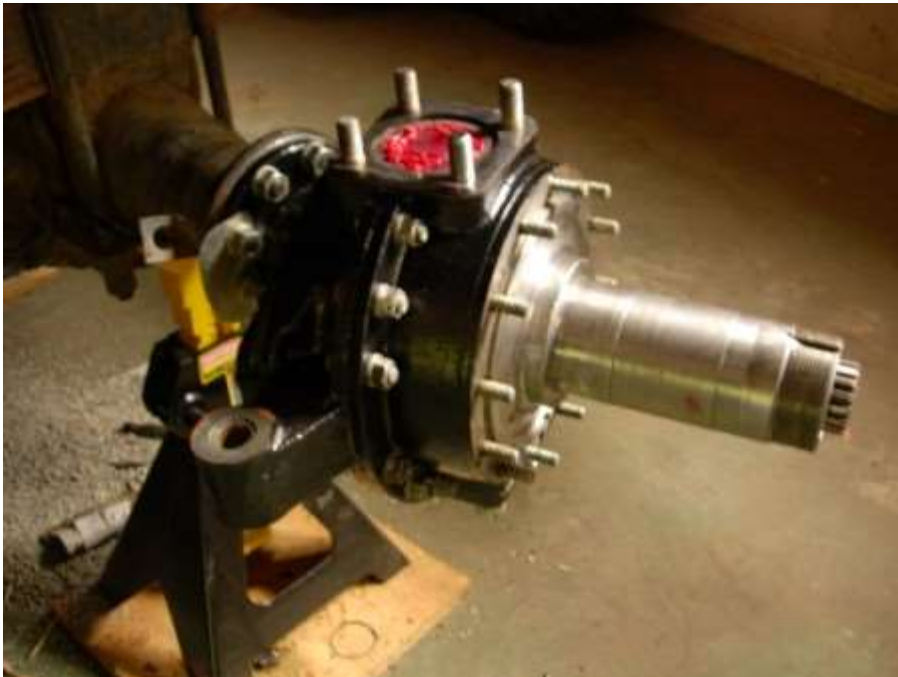
Note the spiderlegs are holding the knuckle case half snugly in position, which also helps keep the races in place. The ends of the spiderlegs will also serve as alignment pins when the outward half of the knuckle case is set in position.

The axle assembly was lubed at the appropriate places with M1 grease and installed in the axle tube. The voids within the CV joint will be also filled with M1 grease before the outer case half is installed.



The preload on the upper and lower trunnion bearings is set with shims between the knuckle case and the bearing cover plates. It's important to keep the shims together in their respective sets, and install them in the original positions.

I originally placed each set of shims in a ziploc bag along with a tag noting their location.



This shows the outer knuckle case half installed. A set of shims from the previous picture have been set in place around the opening at the top.

After the outer knuckle case was set in place and 4 of the thru-bolts were finger-tightened, the nuts on the spiderlegs were backed off and they were removed.



The square bearing cover plate has been installed over the shims and the 4 retaining nuts have been tightened down on the studs.

### Brakes



Here's the passenger side brake assembly. According to the IH shop manual the shoe with the longer lining is considered the primary and is mounted on the forward side of the assembly. The shoe with the short lining is considered the secondary

The large side of the stepped wheel cylinder is toward the forward, or primary shoe.

### Axle Boot





At the left is the original **leather** axle boot and clamps. Note the zipper down the bottom edge (facing side) that allows the boot to be removed.

This boot has a broken zipper and a number of tears in the leather.





I am a big fan of Cordura, having a set of hunting boots that I've been abusing for years with virtually no maintenance. I decided to make the replacement boots from 1050-Dernier Ballistic Cordura.

I made an initial attempt to sew these myself, and although my wife's sewing machine is a very nice model, it simply wasn't up to the task of sewing this tough material.

Fortunately, I have a friend with a commercial sewing business who was kind enough to sew these with a commercial-grade machine. The new boots came out quite nicely, as the picture shows. Note the zipper along the top of the boot.



Here's a picture of the hub and trunnion yoke. The new boots will cover the exposed "bell" of the trunnion yoke.



This picture shows the new boot, installed.

The following photos are of the truck itself. It was a brush fire truck from Adams County, WA and it originally had a rectangular water tank on the back which I replaced with a custom "pickup" box. Although it has surface rust, the truck is rock-solid and free from rot.

The truck is almost 8' high at the roofline. I have about a half-inch of overhead clearance in the garage door opening. I am a little over 6' tall and the hoodline is at eye level. The rims are 20" Budds and the tires are 38" in diameter, so it has plenty of ground clearance.





