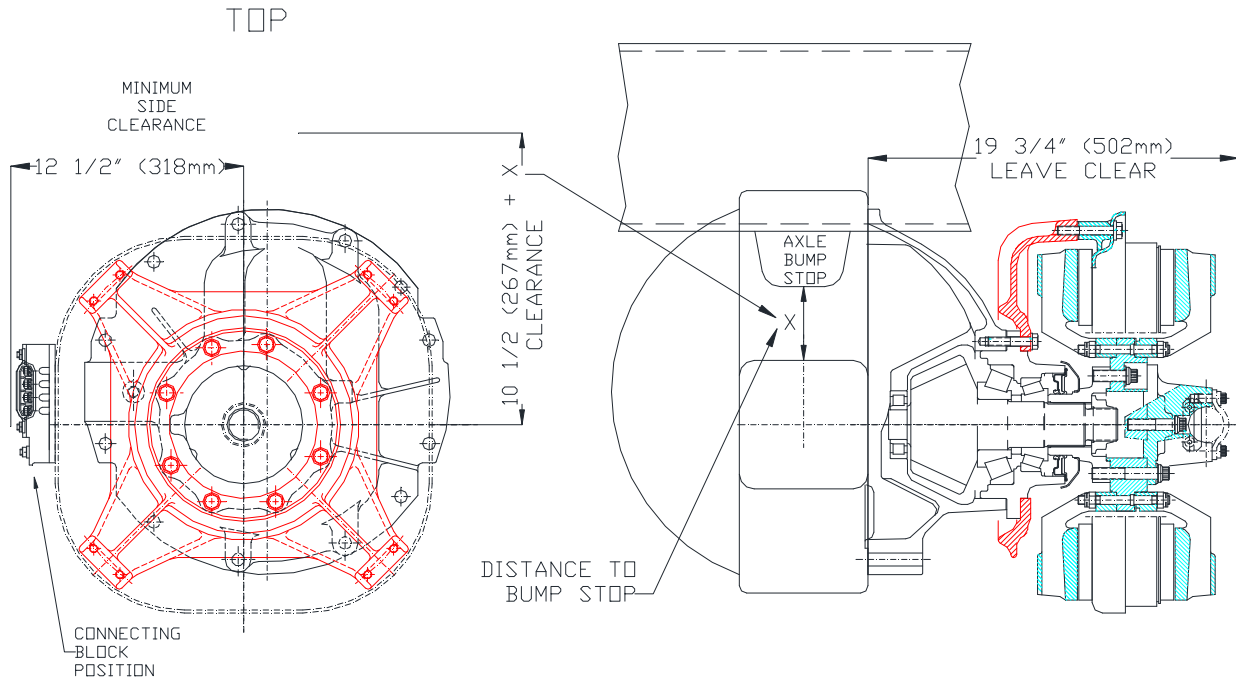
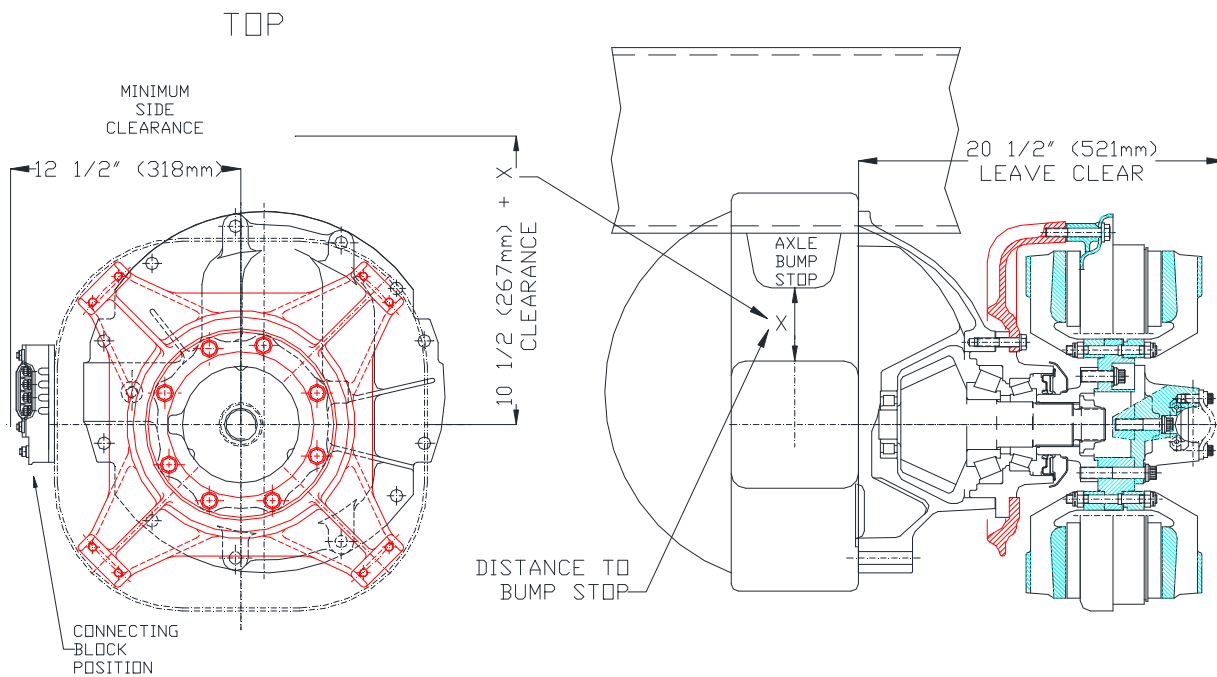


## CHECK CLEARANCES

### CLEARANCES NEEDED FV7 RETROFIT ON MERITOR RS160 AXLES

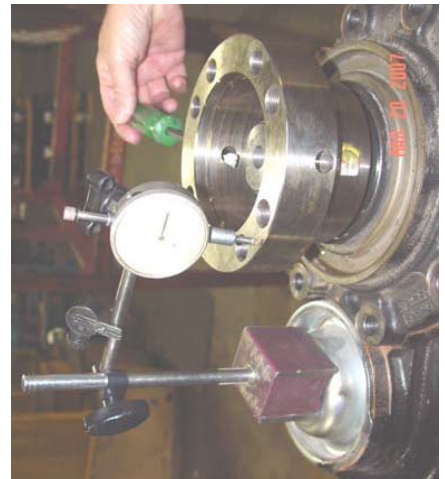


### CLEARANCES NEEDED FV7 RETROFIT ON MERITOR RS180/185 AXLES



## INSTALLATION PROCEDURE

- 1) Spot face pinion cage bolt holes
  - a. Raise at least one wheel off the ground so the pinion shaft can turn freely.
  - b. Remove all pinion cage bolts except one.
  - c. Assemble the shaft guide onto the tool frame.
  - d. Install the spot facing bit and shaft assembly into the shaft guide oriented so the long part of the guide will be facing away from the axle.
  - e. Install the depth stop onto the shaft.
  - f. Mount the assembled tool on the end yoke using longer bolts (not included) that fit into the u-joint strap mounting holes.
  - g. Attach the drill motor to the bit driver shaft.
  - h. Position the spot facing tool in a pinion cage hole.
  - i. Lock down the shaft assembly onto the tool frame.
  - j. Make sure the spot facing bit is seated all the way against the surface of the pinion cage.
  - k. Lock down the depth stop in a position using a feeler gauge of thickness 0.020" between the depth stop and the shaft guide
  - l. Spot face the surface of each pinion cage hole. Remove the one bolt holding the pinion cage in place and move it to a hole that has been spot faced in order to cut all holes.
  - m. If after cutting all holes at least once, any hole is not cut all the way around, reset the depth stop using a feeler gauge of 0.010" and spot face again. Repeat spot face procedure using a 0.010" feeler gauge if additional steps are needed to have a completely machined surface around each hole. Contact Telma technical department before total spot face depth exceeds 0.040". This depth will be reached after the first cut of 0.020" depth plus two cuts each of 0.010" depth.
  - n. Remove the spot face tool and end yoke from the axle after spot facing procedure is complete.
- 2) Install stator carrier.
  - a. Install the stator carrier TIB04047 onto the pinion cage using the 8 M12x1.75x60mm hex bolts TIF04054. Reuse the original hardened flat washers under the heads of the bolts. Install the 8 hardened flat washers (spacers) TIF04079 (25mmx12.5mmx2.5mm) supplied in the kit between the stator carrier and pinion cage. Tighten to 85 lb-ft ( $\pm 10\%$ ). Use high strength Loctite 271. Put a paint mark on each bolt and the stator carrier after tightening.
- 3) Install pinion companion flange.
  - a. Install a new pinion seal
  - b. Install the companion flange TIF04071(RS160) or TIF04072 (RS180-185)
  - c. Use a new pinion nut. Tighten to 1100-1200 lb-ft. Use high strength Loctite 271. Put a paint mark on the nut and shaft after tightening.
  - d. Check companion flange runout. Check that the flange runout is no greater than 0.002" (0.05mm). Replace the flange if not within specifications



- 4) Install the retarder.
  - a. Place the retarder equipped with the rotor spacer onto a transmission jack with the 4 countersunk holes of the rotor spacer facing away from the axle.
  - b. Align the 4 countersunk holes of the rotor spacer with the holes in the companion flange.
  - c. Place a hardened flat washer TIF04047 under the head of each of the four 5/8-18UNF x 1 3/4 12 point head bolts TIF04074 and attach the rotor spacer to the companion flange in the countersunk holes. Tighten to 150 lb-ft. Use high strength Loctite 271. A pry bar can be put in the fins of the rotor and against one of the stator arms to prevent rotation. Put a paint mark on each bolt and rotor spacer after tightening.
- 5) Adjust the rear air gap.
  - a. Use a small pry bar to lift the stator corners and install the 8 bolts VF100615 (M12x1.5x75 class 10.9 with silver Dacromet coating). Temporarily use M12 or 1/2" flat washers under the head of each bolt instead of the Trep washers VF201400 which will be used for final assembly.
  - b. Remove the air gap adjusting shims from the crate that the focal was packaged in. Each crate contains one plastic bag with 5 individual bags of shims inside. The bags are labeled with the shim thickness in millimeters.



<i><b>Stator Shim Set VB200330</b></i>		
<i><b>Thickness</b></i>		<i><b>Quantity</b></i>
<i><b>mm</b></i>	<i><b>inches</b></i>	
<i><b>1/10</b></i>	<i><b>0.004"</b></i>	<i><b>4</b></i>
<i><b>2/10</b></i>	<i><b>0.008"</b></i>	<i><b>8</b></i>
<i><b>6/10</b></i>	<i><b>0.024"</b></i>	<i><b>4</b></i>
<i><b>12/10</b></i>	<i><b>0.048"</b></i>	<i><b>4</b></i>
<i><b>15/10</b></i>	<i><b>0.060"</b></i>	<i><b>4</b></i>

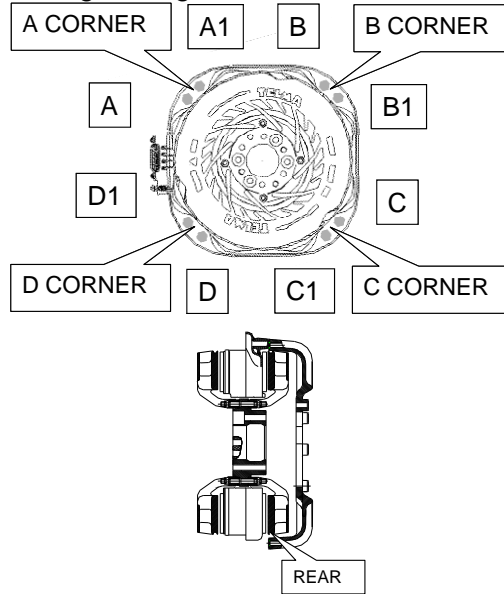
- c. Place one shim of each thickness from the stator shim set VB200330 between the stator and each of the four stator arms. If necessary, also add the spacer TIB04043 (30mmx80mmx6.3mm) included in the kit between the stator and each of the four stator arms. Tighten the eight stator bolts to 65 lb-ft.
- d. Measure the air gap between the rear rotor and the pole shoe at the end of the coil on either side of each of the stator mounting points and enter into the table below. Use the table to determine how many shims to add or remove at each corner to obtain the target of:

Focal model	Part number	Average air gap
FN71-65	DV311279	0.049-0.055
FN71-95	DU311279	0.055-0.061
FN72-20	DJ311279	0.055-0.061
FN72-40	DK311279	0.055-0.061

- e. Loosen the eight stator bolts slightly and add or remove the required shims to obtain the correct air gap.

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- f. Remove one stator bolt at a time, replace the flat washer with the Trep washer, add high strength Loctite 271, and tighten to 65 lb-ft. Repeat for the other bolts. Put a paint mark on each bolt and stator after tightening.



I	II	III	
		Thickness of shims to add or remove 0.049"± column II (FN71-65) 0.055"± column II (FN71-95 / FN72-20 / FN72-40)	
measurement	Average of each corner e.g. (A+A1)÷2	column II less than 0.049" or 0.055"	column II greater than 0.049" or 0.055"
		shims to add = 0.049" or 0.055" - column II	shims to take out = column II - 0.049" or 0.055"
A			
A1			
B			
B1			
C			
C1			
D			
D1			

6) Check the front air gap.


The air gap for the **front side** of the focal has been pre-shimmed at the factory. This means that once the rear side air gap has been established, the front rotor air gap should be within the specified range of 0.049"-0.055" (FN71-65) or 0.055"-0.061" (FN71-95 / FN72-20 / FN72-40). To check this, measure the air gap of the A, B, C and D coil positions and divide by four. If the average reading falls outside the specified range, the front rotor will need to be removed and re-shimming will be required. Choose the proper shim from the rotor shim set VB200300 or VB202045 so that the air gap will be as close as possible to 0.052" (FN71-65) or 0.058" (FN71-95 / FN72-20 / FN72-40) and between 0.049" and 0.055" (FN71-65) or 0.055"-0.061" (FN71-95 / FN72-20 / FN72-40). To add or -remove rotor shims take off the front rotor by removing the four nuts holding it on. The shims are under the rotor. Tightening torque for the nuts is 65 lb-ft.

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7) Install the flange yoke


- a. Install the flange yoke using the four 12 point head 5/8-18UNF x 3 1/2 bolts and two 12 point head bolts 5/8-8UNF x 2 1/2" and two hex head 5/8-18UNF x 1 1/2" (1760-1810 only).
- b. Use high strength Loctite 271. Tighten to 180-230 lb-ft. Put a paint mark on each bolt and the flange yoke after tightening.

12PT. FLANGE HEAD 5/8"-UNFX 3.5" GRADE 8  
 MERITOR PART NO. SP1047  
 TELMA PART NO. TIF04075



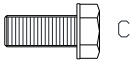
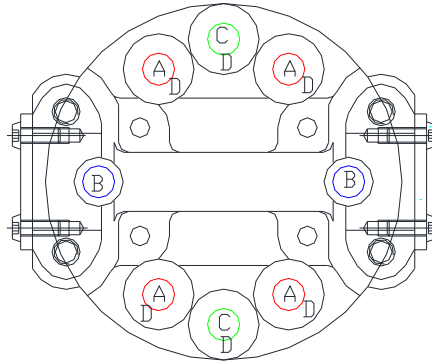
TOOLS REQUIRED:  
 5/8" 12 PT SOCKET 1/2" OR 3/4" DRIVE  
 15/16" 12 or 6 PT SOCKET  
 TORQUE WRENCH 300 LB.-FT. CAPACITY  
 AIR TOOLS

12PT. FLANGE HEAD 5/8"-UNFX 2.5" GRADE 8  
 MERITOR PART NO. SP1000  
 TELMA PART NO. TIF04045




TELMA FLANGE YOKE  
 1710 TELMA PART NO. VB107149  
 1760 TELMA PART NO. VB107793  
 1810 TELMA PART NO. VB107148

1810 ONLY  
 HEX HEAD 5/8"-UNFX 1.5" GRADE 8  
 MERITOR PART NO. S-11012A-2  
 TELMA PART NO. TIF04046

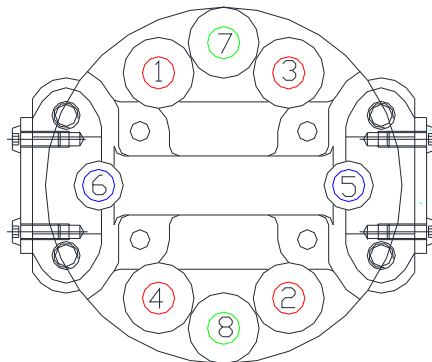



HARDENED WASHER  
 1.06 X 0.66 X 0.09  
 MERITOR PART NO. 1229-U-1503  
 TELMA PART NO. TIF04030



ASSEMBLY PROCEDURE:

- (1) INSTALL FLANGE YOKE ON RETARDER ROTOR SPACER WITH HOLES ALIGNED.
- (2) ASSEMBLE WASHERS ON BOLTS WHERE NEEDED AND START BOLTS IN HOLES BY HAND.
- (3) SCREW BOLTS DOWN WITH AIR TOOL UNTIL SNUG.
- (4) TORQUE ALL BOLTS TO 180-230LB.-FT. FOLLOWING TORQUE SEQUENCE SHOWN.



BOLT TORQUE SEQUENCE

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8) Install the focal harness bracket

If the wiring harness attached to axle mounted Focal retarders is not properly routed and secured, connecting block, harness and other consequential damage can occur.

The following specific points should be considered:

1. The harness should be routed in such a way that it cannot be damaged by contact with the retarder rotor.
2. There should be sufficient length to allow for articulation of the axle.
3. The harness should not be too close to the retarder rotor where it could sustain heat damage.

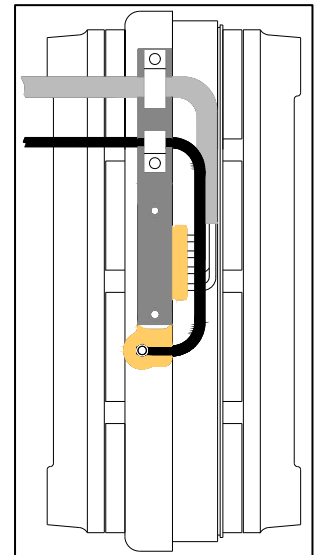
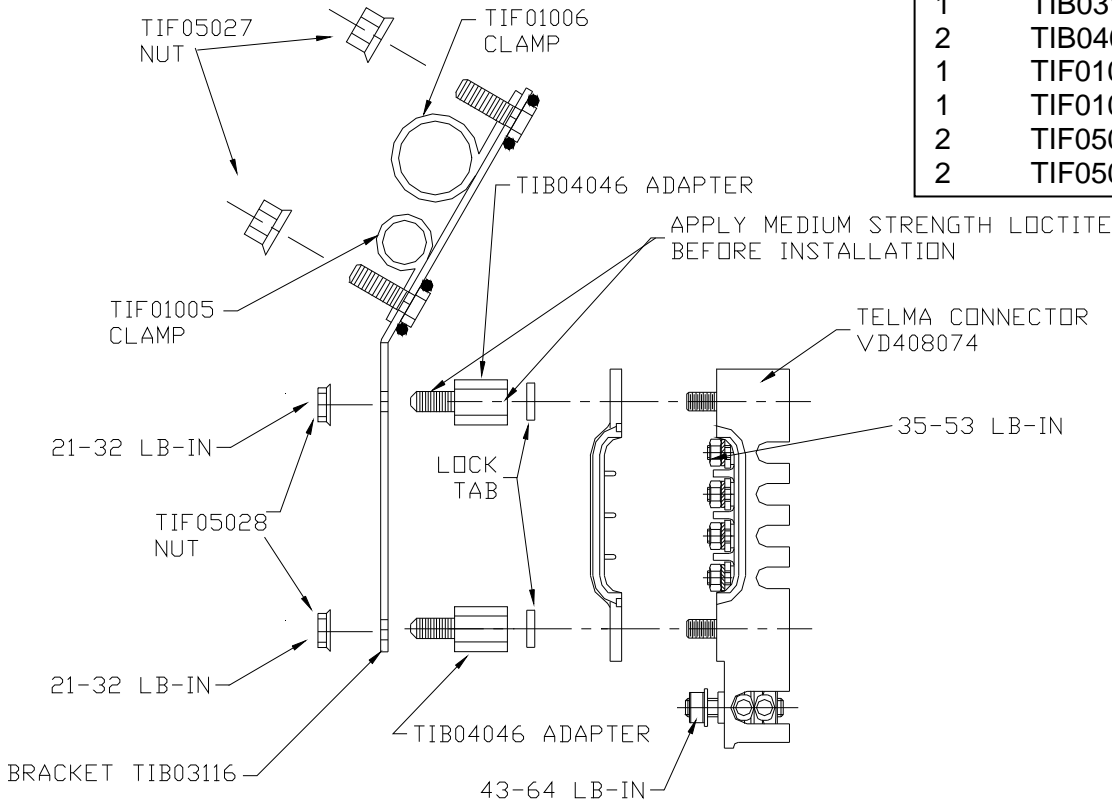
All new axle mounted Focal installations should be equipped with harness bracket kit TIK00106 or Telma approved equivalent to help ensure the proper routing of the cables near the retarder and reduce the possibility of harness or connecting block damage.

Harness bracket kit TIK00106 is available from Telma for retrofit.

Refer to Service Bulletin TIL15005 for details concerning bracket assembly.

Below is assembly information for Focal wire harness bracket kit TIK00106. Install this kit to help ensure the proper routing of the cables on single and tandem axle mounted Telma Focal to reduce the possibility of harness or connecting block damage.

PARTS LIST TIK00106		
QTY.	PART NO.	DESCRIPTION
1	TIB03116	BRACKET
2	TIB04046	BRASS ADAPTER
1	TIF01006	1 1/4" CLAMP
1	TIF01005	3/4" CLAMP
2	TIF05027	3/8-16 NUT
2	TIF05028	M8X1.25 NUT



**NOTE 1:** Use a 5/8" open-end wrench to hold adapters TIB04046 to prevent them from turning while tightening the (2) TIF05028 nuts.

**NOTE 2:** Make sure harness is secured to allow for axle articulation and avoid damage from rotors

**NOTE 3:** This bracket kit or Telma supplied equivalent must be installed on all new axle mounted focal installations.