



TL113012
INSTALLATION MANUAL
FOR
TELMA AD50-90
ON
IC BUS UC & HC CUTAWAY CHASSIS
MaxxForce7 and MaxxForceDT engine
AIR AND HYDRAULIC BRAKES
WITH SPL100 U-JOINTS
FROM MODEL YEAR 2010
WITH DIAMOND LOGIC CONTROL

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SCOPE OF THIS MANUAL

This manual covers the installation of Telma into the IC Bus UC and HC cutaway chassis equipped with Spicer Life SPL100 driveline. This manual and the kits listed are not compatible with driveline u-joint sizes larger than SPL100 such as Spicer Life SPL140 or Spicer 10 series 1710. Contact Telma engineering support at engineering@telmacse.com for additional information or help with a Telma installation on a chassis equipped with these larger u-joint sizes.

Due to the nature of the Navistar HC and UC chassis which can have many different options which affect the driveline such as engine choice, transmission choice, air or hydraulic brakes, and air or spring suspension, it is necessary to submit an installation drawing request using our [Online Installation Drawing Request Form](#). [TIL03019 Chassis Measurement Templates](#) and [TIL03020 Driveline Retarder Pre-Installation Measurement Guide](#) can be used as worksheets to gather the necessary information. Contact Telma engineering support at engineering@telmacse.com if you have any questions.

The control system instructions included in this manual take advantage of the Navistar body controller and the programmable functions using Advanced Diamond Logic. If programming support is needed contact Navistar to locate a facility with Advanced Diamond Logic level 3 programming certification.

SECTION 1 PREPARATION OF THE CHASSIS

1.1 DRIVELINE

Remove the complete drive-shaft assembly after measurements have been taken.

1.2 EXHAUST

Cut the exhaust just past the DPF sensors and before the first bend. Remove for later re-installation.

1.3 CROSS MEMBER (169WB HC CHASSIS ONLY)

On 169WB HC chassis the "C" cross member will need to be moved back to clear the Telma. This has been approved by Navistar and should provide for a better positioning of the rear drive shaft hoop when the Telma is installed. The distance to move the cross member is not specified but should be far enough to clear the Telma unit and position the drive shaft hoop and may be approximately 12 to 14 inches.

SECTION 2	RETARDER INSTALLATION
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2.1 INSTALLATION KIT TIK11203 (HYDRAULIC BRAKES)

PART NUMBER	DESCRIPTION	QTY
BB301158	AD50-90 12V 1480/1550/1610/SPL90/SPL100	1
JC120102	FOOT CONTROL SWITCH	1
JZ100280	SIDE PLATE FASTENERS	1
JZ1007XX-45	MOUNT KIT	1
TIB01017	RELAY BOX BRACKET INSIDE MOUNT	2
TIB01022	NAV HC PEDAL BRACKET	1
TIB01031	NAV HC FOOT SWITCH BRACKET	1
TIB03121	LEFT RETARDER BRACKET	1
TIB03122	RIGHT RETARDER BRACKET	1
TIB03108	INSIDE MOUNT CHASSIS BRACKET	2
TIB03109	RELAY BOX BRACKET OUTSIDE MOUNT	1
TIB01023	NAV 3200 PEDAL CLAMP	1
TID13021	HARNESS W/BAC NAV HC DIAMOND LOGIC	1
TIF01063	HEX BOLT 1/4"-28UNF X 1"	2
TIF03001	3/8-24UNF ALL METAL LOCK NUT	16
TIF03003	9/16-12UNC NUT	10
TIF03005	9/16" LOCK WASHER	10
TIF04001	HEX BOLT 9/16-12UNC X 2"	10
TIF05000	LOCK WASHER 1/4"	2
TIF05002	NUT 3/8 – 16 UNC HEX G5	2
TIF05003	LOCKWASHER 3/8 G5	1
TIF05004	NUT 1/4-28UNF	2
TIF05010	LOCKWASHER 5/16" RELAY BOX MOUNTING	4
TIF05011	NUT 5/16" RELAY BOX MOUNTING	4
TIF05012	BOLT 5/16"-18UNC X 1 1/4" RELAY BOX MOUNTING	4
TIF05019	BOLT 3/8 – 16 UNC x 2 ELEVATOR BOLT G5	1
TIF05021	RETURN SPRING	1
TIG11010	TELMA LIGHT BAR DISPLAY	1
TIB05013	1/2" bolt for relay box bracket	2
TIB05014	1/2" lock washer for relay box bracket	2

Note: SPL90 flange yokes 2 x Spicer part number 90-2-19 must be ordered separately.

**2.2 INSTALLATION KIT TIK11204 (AIR BRAKES)**

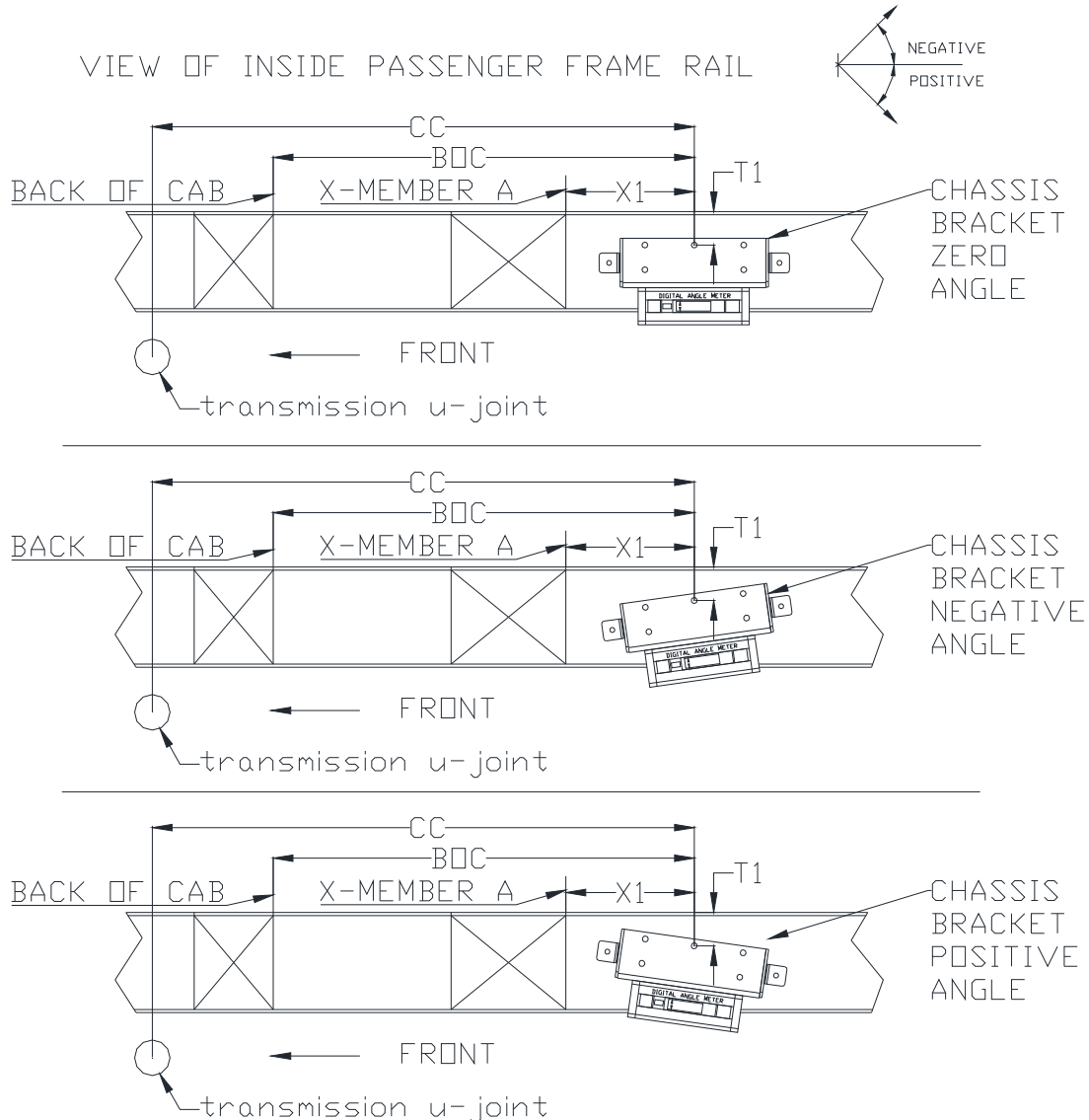
BB301158	AD 50-90 12V 1610 SAE	1
TIB03121	LEFT RETARDER BRACKET	1
TIB03122	RIGHT RETARDER BRACKET	1
TIB03108	INSIDE CHASSIS BRACKET BUS (AD5)	2
JZ100280	SIDE PLATE FASTENERS	1
JZ1007XX-45	2-PC TELMA MOUNT KIT WITH FASTENERS (AC/CC	1
TIF03001	LOCKNUT 3/8 – 24 UNF	16
TIF03002	CAP SCREW 9/16 12 UNC 2 1/2 LONG GR8	10
TIF03003	NUT 9/16 – 12 UNC G8	10
TIF03005	LOCKWASHER 9/16 G8	10
TID13021	HARNESS W/BAC NAV HC DIAMOND LOGIC	1
TID11012	PRESSURE SWITCH MANIFOLD	1
TIB03109	OUTSIDE MOUNT RELAY BOX BRACKET	1
TIF05010	LOCKWASHER 5/16 SPLIT	4
TIF05011	NUT 5/16	4
TIF05012	BOLT 5/16-18UNC x 1-3/4 HEX HEAD G5	4
TIG11010	TELMA LIGHT BAR DISPLAY	1

Note: SPL90 flange yokes 2 x Spicer part number 90-2-19 must be ordered separately.

2.3 INSTALLATION OF THE CHASSIS BRACKETS

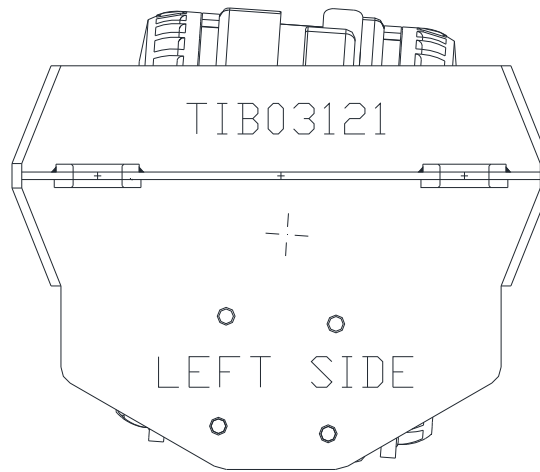
- Remove any bolts such as battery box and/or exhaust hanger mounts that will interfere with the chassis bracket mounting
 - Mark the reference hole at dimension T1 from the top of the frame down to the reference hole.
 - Mark the reference hole at dimension CC from the center of the transmission u-joint or X1 from cross member A, or BOC from back of cab.
 - Drill a 9/16" hole in the frame and bolt the chassis bracket (TIB03108) against the inside of the frame rail.
 - Rotate the bracket to the angle specified on the installation drawing and tighten the reference bolt and nut to the specified torque to hold the bracket in place at the correct angle.
- NOTE: Use electronic angle meter with 0.1° accuracy (e.g. SPI Pro360 digital protractor). All angles indicated are with frame reference of 0°.
- Drill four more 9/16" holes in the chassis bracket and frame rail keeping away from fuel and brake lines and secure with bolts (TIF03002), nuts (TIF03003), and lock washers (TIF03005) included in the kit.
 - Tighten the 9/16" bolts to 150 lb-ft (±10%).
 - Drill through the chassis bracket any holes needed for battery box and/or exhaust hanger mounts and reinstall the original bolts that were previously removed.

NOTE: cross member must be moved back approximately 12-14 inches for 169WB.

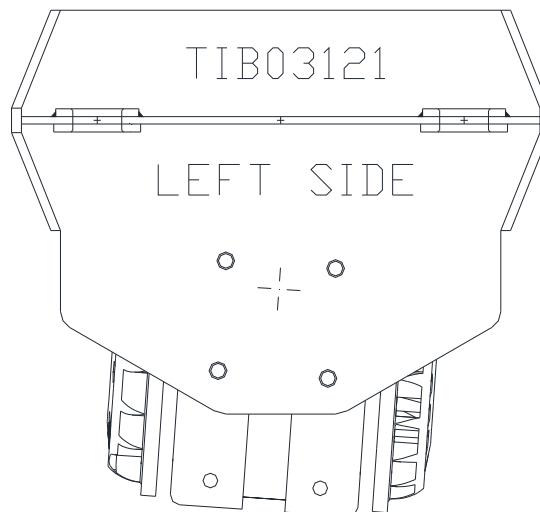


2.4 RETARDER BRACKET INSTALLATION

- Identify the Telma brackets. TIB03122 is for the right or passenger side. TIB03121 is for the left or driver side. The part numbers are stamped into the bracket.
- Identify the driver's side of the Telma from the passenger side. To do so, orient the arrow of the red plate on the Telma towards the axle with the red sticker on the driver's side.
- Attach the retarder brackets to the retarder as shown below according to the position indicated on the installation drawing.
- Use four of the M14x2.0x30mm bolts, and Trep washers provided with the set of fasteners (JZ100280) to fasten each Telma bracket onto the side of the unit. Tighten bolts to 65 lb.-ft. ($\pm 10\%$). Do not use the flat washers included in the kit.



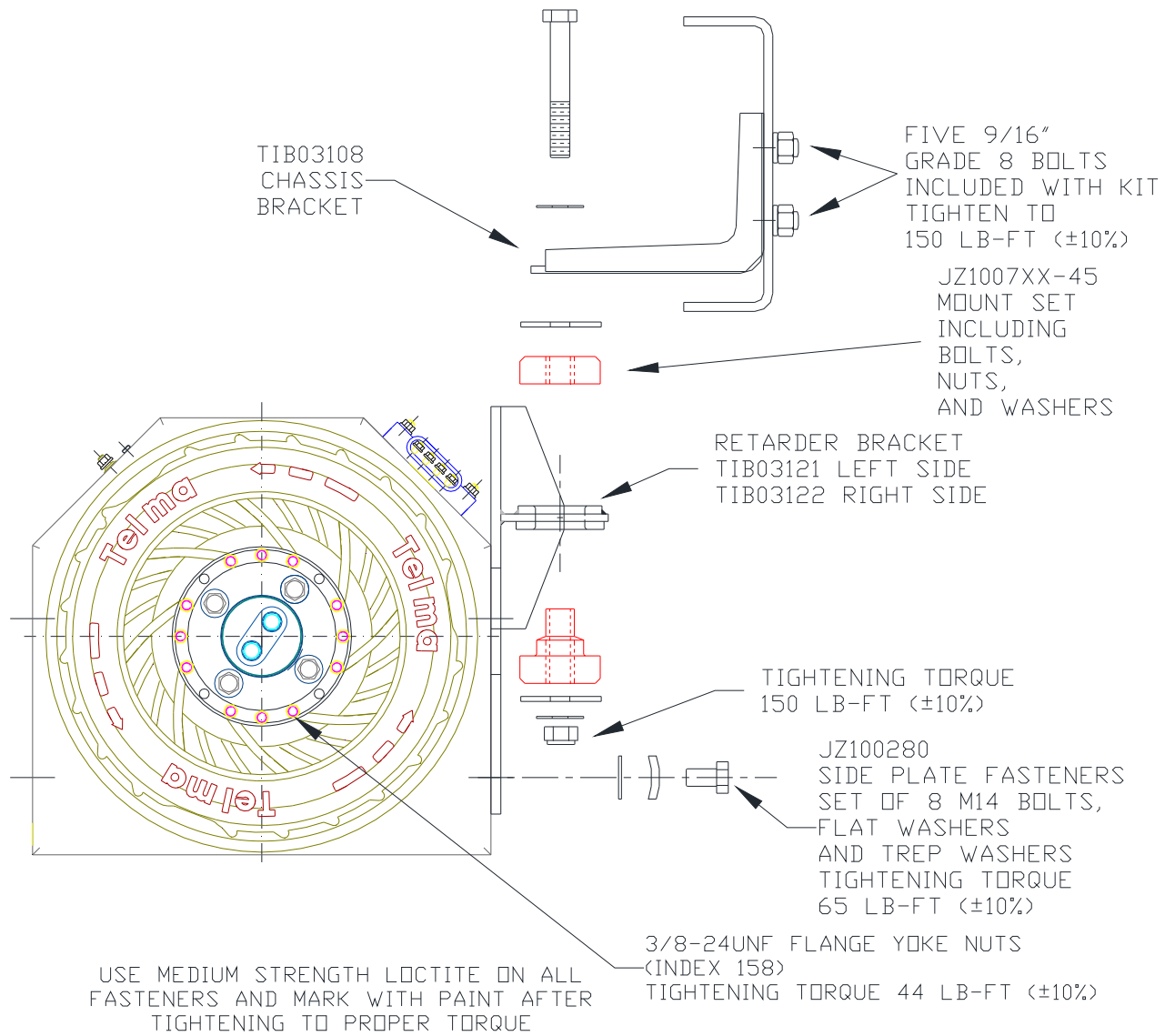
POSITION 3



POSITION 4

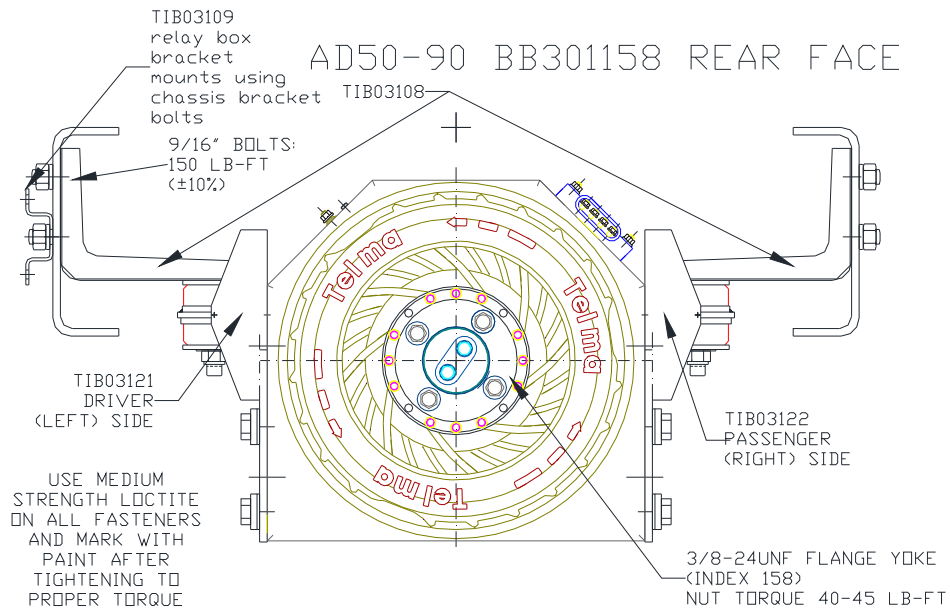
2.5 INSTALLATION OF THE TELMA IN THE CHASSIS

- Assemble the mounts to the Telma brackets as shown below with the female portion of the mounts on the bottom side of the brackets.
- Use fasteners included in the rubber mount kit JZ1007XX-45 to attach the Telma and bracket assembly to the chassis brackets which were installed previously.
- Install the Telma, equipped with the brackets and rubber mounts to the chassis brackets in the hanging position.
- As shown below, secure the Telma to the chassis bracket using the M16x2.0x110mm long bolts through the holes in the chassis brackets, mounts and retarder brackets. At each mount, install two M16x71mm (2.80") diameter flat washers (one on each end of the rubber mount, one M16 spring washer under the head of the bolt and another between the large diameter flat washer and the M16 all metal lock nut. Tighten to 150 lb.-ft. ($\pm 10\%$).

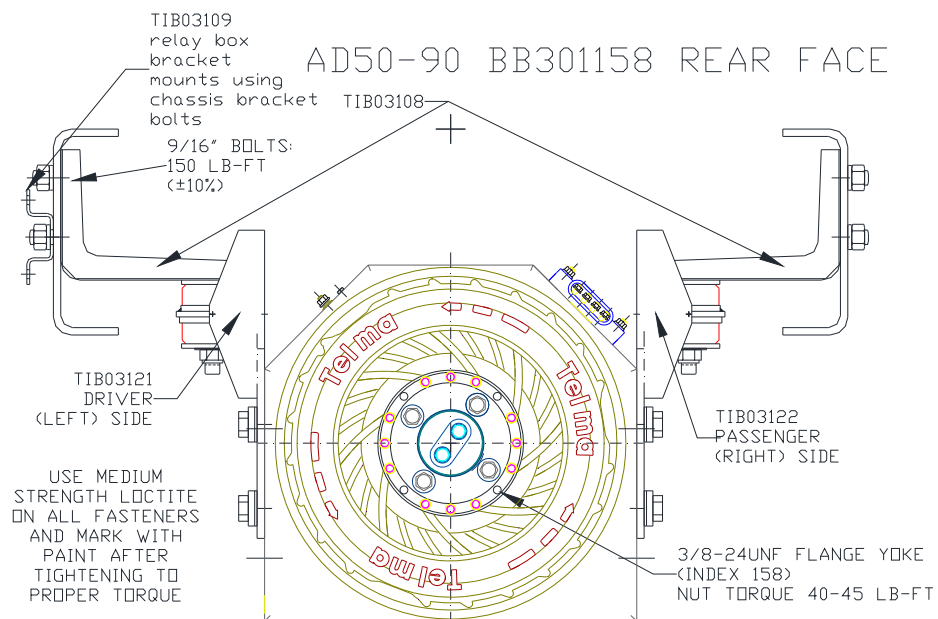


2.6 INSTALLATION OF THE TELMA IN THE CHASSIS

- Install the Telma, equipped with the brackets to the chassis brackets in the hanging position.
- Secure the Telma to the chassis brackets using the M16 x 110mm long bolts through the holes in the chassis brackets, mounts and side plate brackets. At each mount, install the 2 3/4" diameter flat washer, the 5/8" lock nut and tighten to 150 lb.-ft (±10%).



POSITION 3



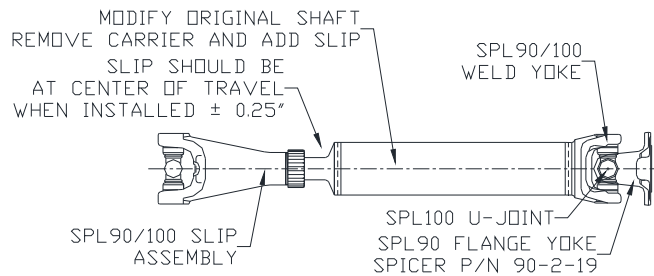
POSITION 4

IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

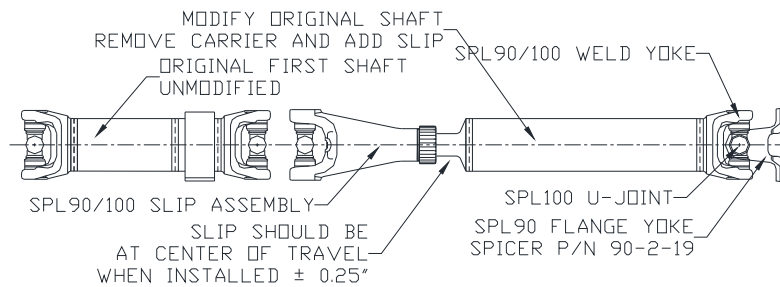
2.7 DRIVE SHAFT MODIFICATION AND INSTALLATION

- A slip assembly is required on each side of the Telma. The slip position should be at center of slip travel when the shaft is installed.
- Refer to chassis manufacturers guidelines for proper drive shaft manufacture, balance, straightness, and critical speed limits.
- Refer to the installation drawings in the appendix for approximate shaft lengths.
- Always verify proper shaft lengths before modification.
- Connect the flange yoke to the Telma coupling flange using 3/8-24UNF all metal locknuts TIF03001.

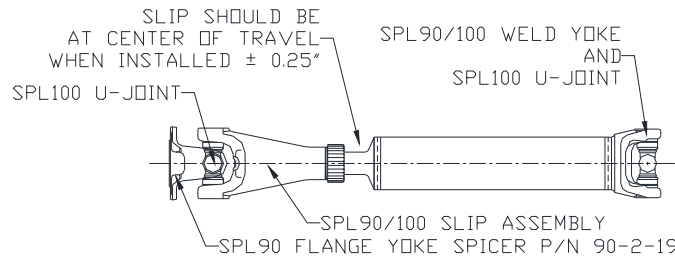
FRONT DRIVE SHAFT 1-1 OR 1-2 CONFIGURATION



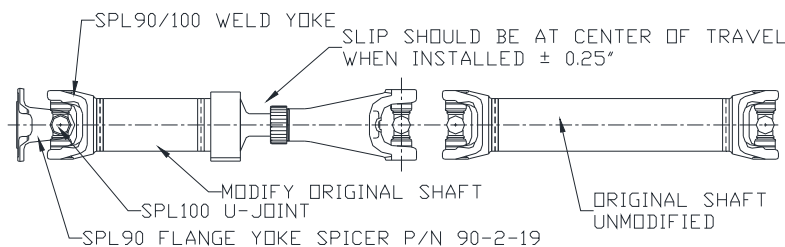
FRONT DRIVE SHAFT 2-1 OR 2-2 CONFIGURATION



REAR DRIVE SHAFT 1-1 OR 2-1 CONFIGURATION



REAR DRIVE SHAFT 1-2 OR 2-2 CONFIGURATION



FOLLOW DANA-SPICER GUIDELINES PERTAINING TO MANUFACTURE, STRAIGHTNESS, DYNAMIC BALANCING AND CRITICAL SPEED.
ALWAYS VERIFY SHAFT LENGTHS BEFORE MODIFICATION

2.8 EXHAUST MODIFICATION

- Cut the exhaust as shown below about 1 inch past the exhaust sensors
- Rotate the exhaust pipe outboard to clear Telma
- After the Telma bring the exhaust back to the original position in accordance with Navistar document G-2481 (Exhaust Modifications Allowed) estimated to require (2) 45 degree bends.
- Reuse existing exhaust hangers and positions as much as possible.



Ok to cut here and rotate exhaust outboard to clear Telma. After the Telma bring the exhaust back to original position in accordance with International document G-2481 (Exhaust Modifications Allowed) estimated to require two 45 degree bends. Reuse original exhaust hangers and positions as much as possible.

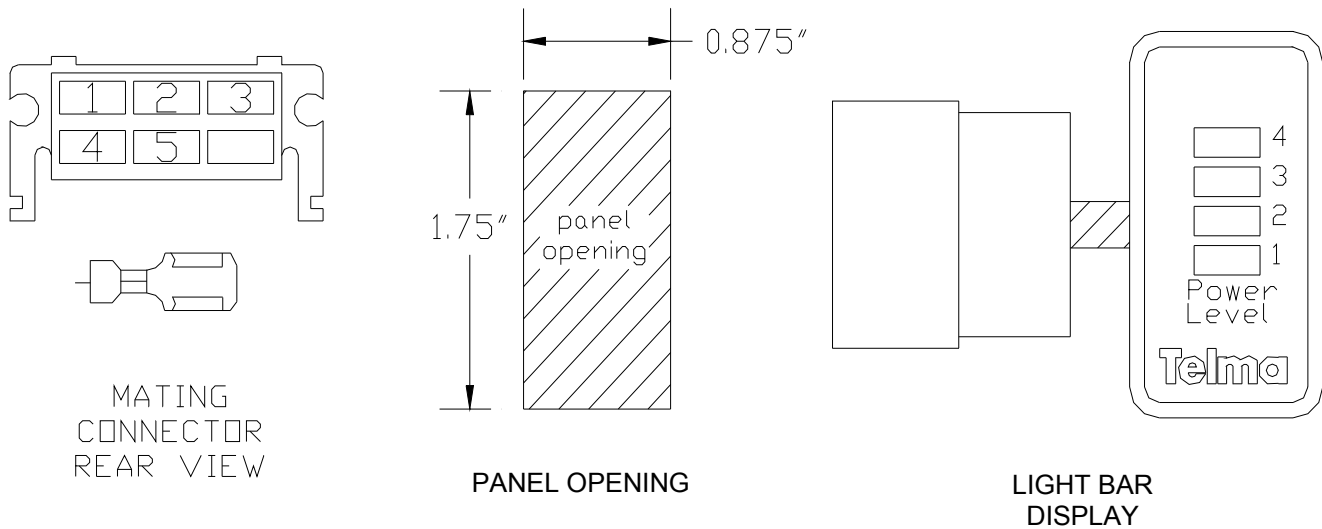
SECTION 3 CONTROL SYSTEM COMPONENTS INSTALLATION

3.1 RELAY BOX MOUNTING

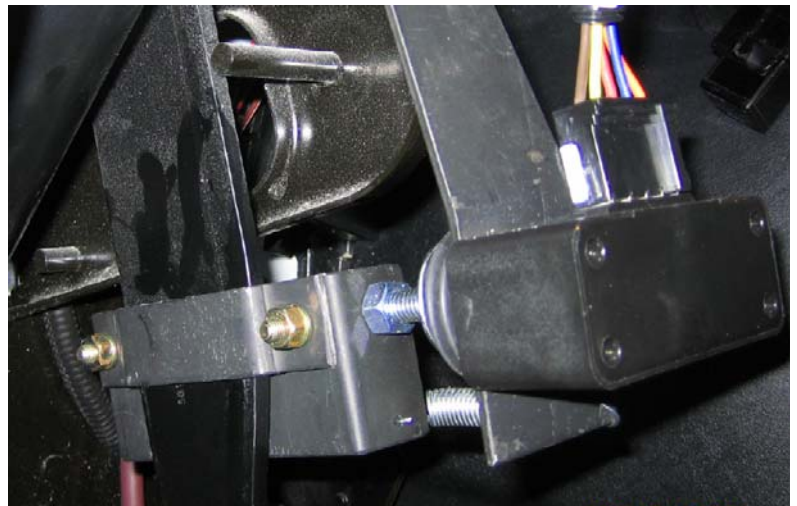
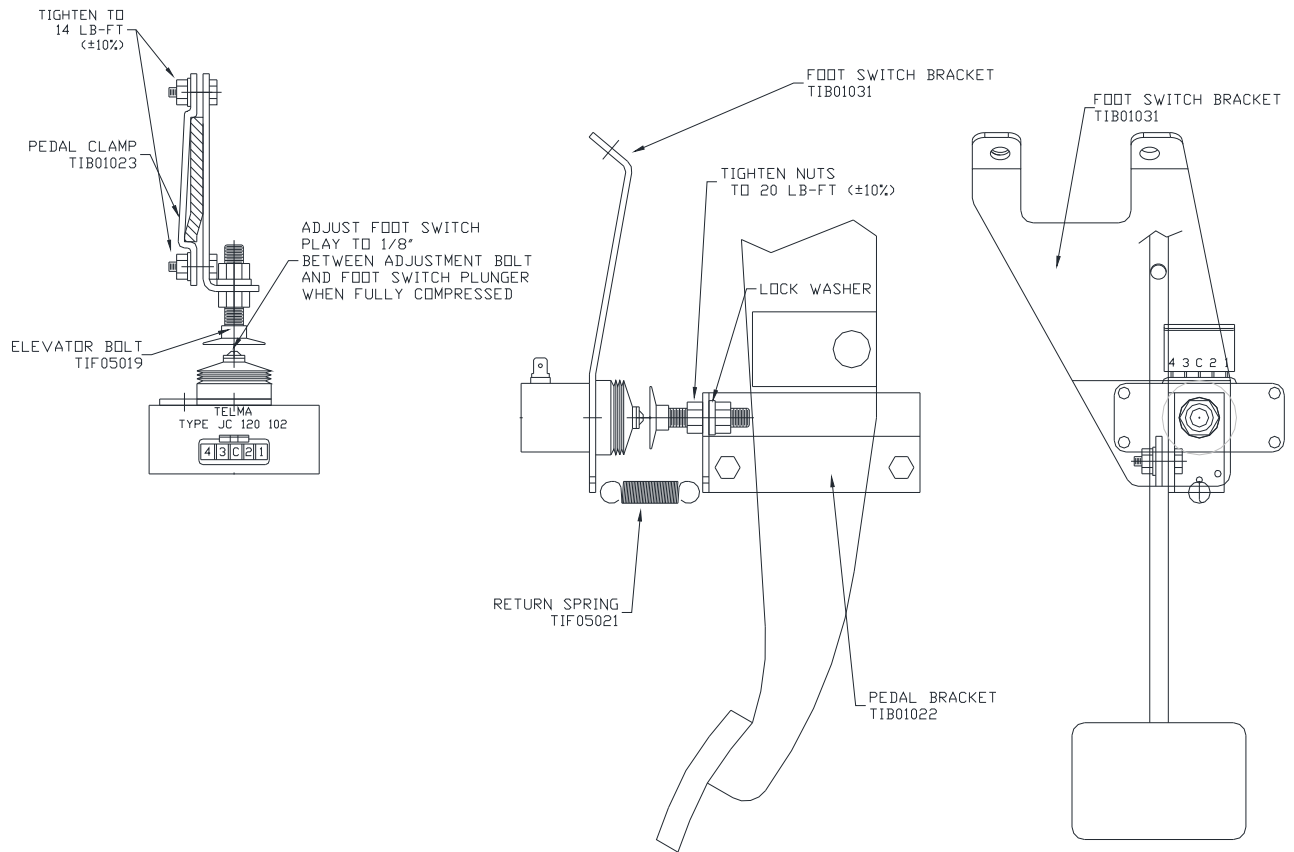
- Mount the relay box bracket TIB03109 to the outside left frame rail using two of the chassis bracket mounting bolts.
- Install the relay box on bracket TIB03109. Refer to diagram in section 2.5.
- Tighten the four 5/16" bolts to 17 lb-ft (±10%) and the two 1/2" bolts to 75 lb-ft (±10%).

3.2 LIGHT BAR INSTALLATION

- The Light Bar should be mounted so that it is easily visible to the driver.
- Make a rectangular hole, 7/8" wide x 1 3/4" tall in the lower dash to the right of the steering column or install the Light Bar in an existing console receptacle.
- Feed the harness through the hole and connect to the Light Bar.
- Plug the light bar into the hole.



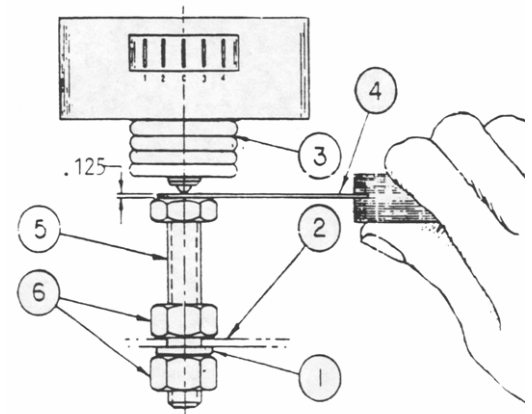
3.3 HYDRAULIC BRAKE FOOT SWITCH ASSEMBLY (HYDRAULIC BRAKES ONLY)



3.4 HYDRAULIC BRAKE FOOT SWITCH ADJUSTMENT (HYDRAULIC BRAKES ONLY)

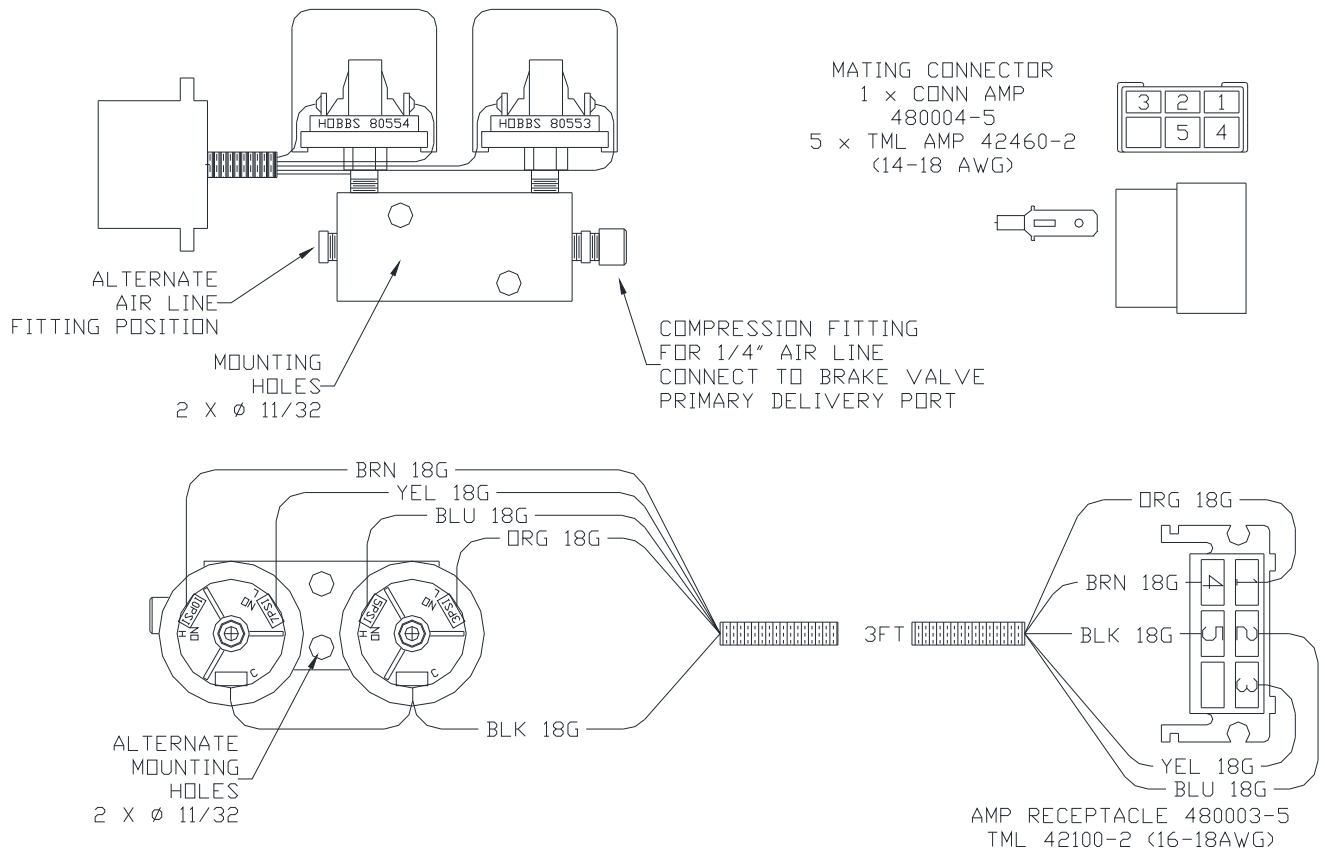
The plunger type foot switch should be carefully adjusted to avoid switch damage and optimize retarder activation in the free play of the pedal. With the return spring installed, use a feeler gauge and adjust the switch stop (item 5) until there is 1/8" gap. The switch plunger should be fully compressed and the brake pedal should be in its highest position.

ITEM	DESCRIPTION
1	3/8" lock washer
2	Pedal bracket
3	foot switch JC120102
4	feeler gauge
5	3/8" diameter switch stop adjusting bolt
6	3/8" jam nuts



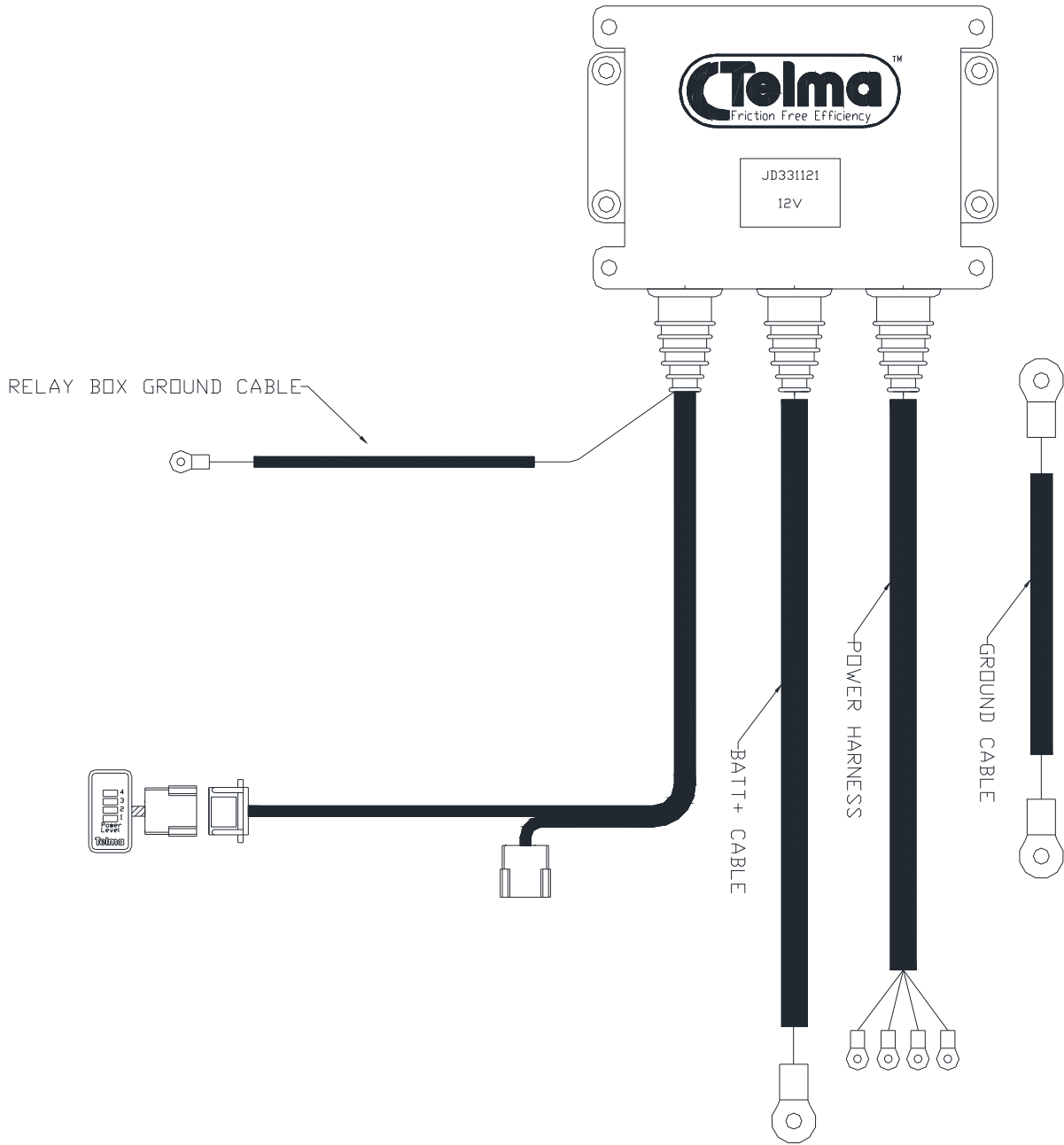
3.5 AIR BRAKE PRESSURE SWITCH MANIFOLD (AIR BRAKES ONLY)

- Mount the pressure switch manifold so that the pressure switches face up and will not collect air line water and in a suitable place convenient for connecting the air line from the brake pedal valve and connection to the relay box harness
- Connect a 1/4" air line from the pressure switch manifold to the primary delivery port of the brake pedal valve



SECTION 4 WIRING HARNESS INSTALLATION

4.1 HARNESS ASSEMBLY TID11021



4.1 POWER HARNESS INSTALLATION

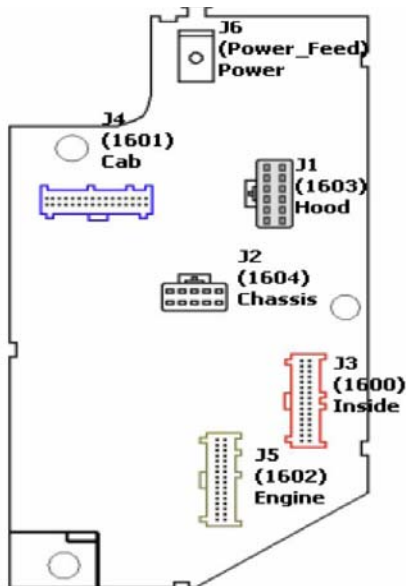
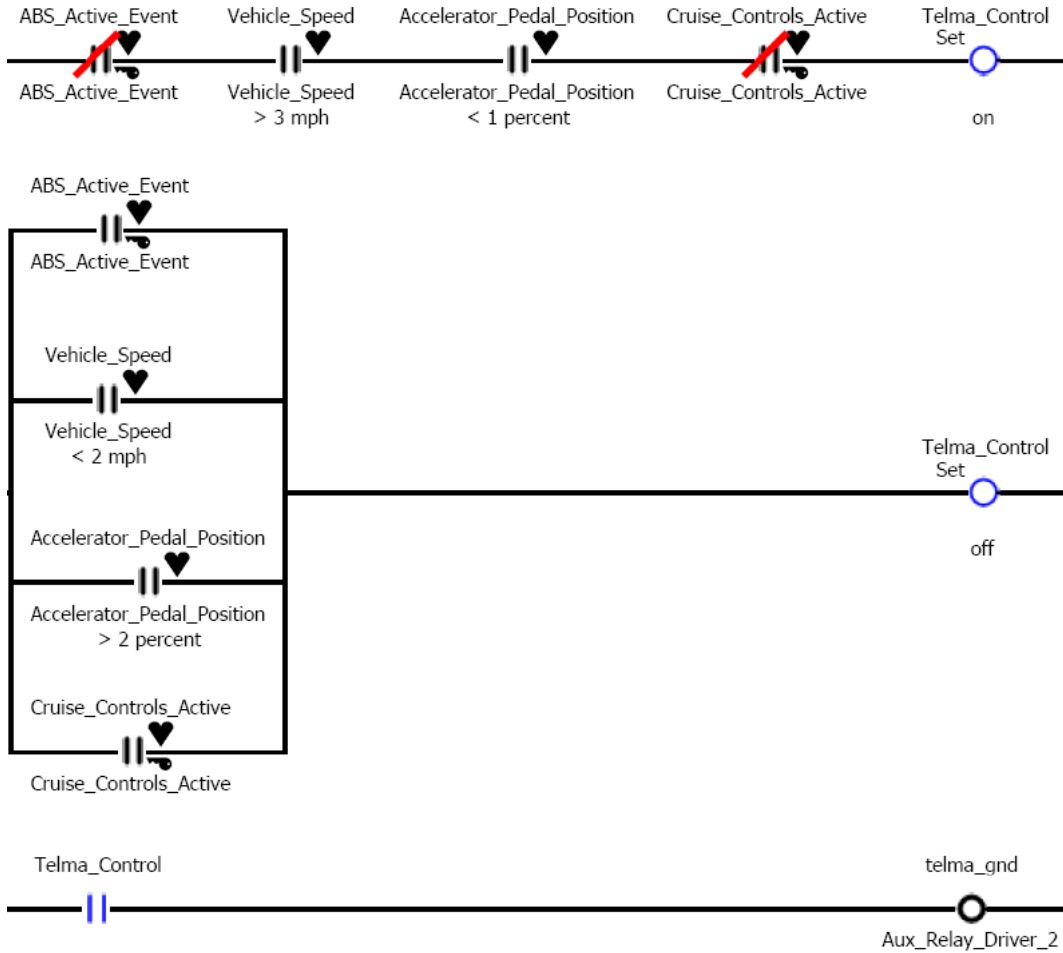
- From the relay box, route the Telma power connection and ground harness along the inside of the frame rail and up over the top along the middle of the Telma.
- Connect the 8G orange, blue, yellow, and brown wires to the connecting block at the top right corner.
- Connect the 8G relay box ground cable and the 2G Telma main ground cable to the insulated ground terminal at the Telma top left corner. Coat the terminals with anti-corrosion paint or body undercoat after the connections are made.
- Secure the harness to the center of the Telma brackets with rubber coated cable clamps. The harness should be secured along the centerline of the Telma and as far away as possible from either rotor to avoid heat damage to the harness. No cables should cross the heat outlets in the periphery of the rotors.
- Connect the black 2G ground cable and to negative terminal of the battery pack or frame mounted battery pack ground point. Secure the cable with rubber coated cable clamps.
- Connect the red 2G power positive cable to the positive terminal of the battery pack or battery disconnect switch. Secure the cable with rubber coated cable clamps.

4.2 CONTROL HARNESS INSTALLATION

- Route the control harness into the cab through a hole with rubber grommet in the fire wall.
- For hydraulic brake applications:
 - Install the four wires (org, blu, yel, brn) found in the relay box control harness into the hydraulic brake foot switch connector positions 1, 2, 4, 5 respectively.
 - Install the wire from the Diamond logic body controller relay into position 3 of the connector.
 - Plug the connector onto the foot switch JC120102.
- For air brake applications:
 - Install the four wires (org, blu, yel, brn) found in the relay box control harness into the pressure switch mating connector positions 1, 2, 3, 4 respectively.
 - Install the wire from the Diamond logic body controller relay into position 5 of the connector.
 - Plug the connector onto the pressure switch manifold connector.
- Install the five wires (org/wht, blu/wht, yel/grn, brn/wht, blk) found in the relay box control harness into the Light Bar mating connector positions 1-5 respectively.
- Feed the harness equipped with the light bar mating connector through the light bar hole and plug in the Light Bar.
- Plug the light bar into the hole.

IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

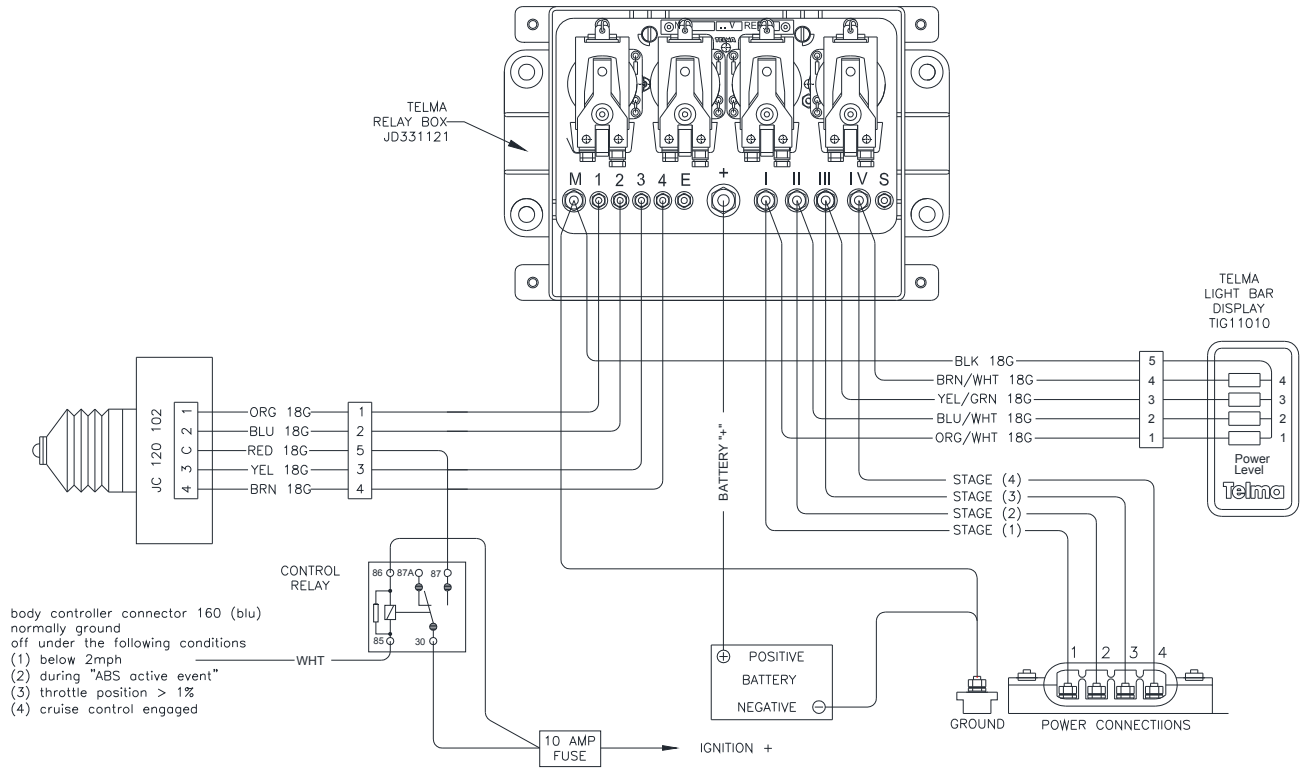
- Program the Diamond Logic Body Controller as shown below.
 Note: Navistar Advanced Diamond Logic Level 3 programming certification is required.



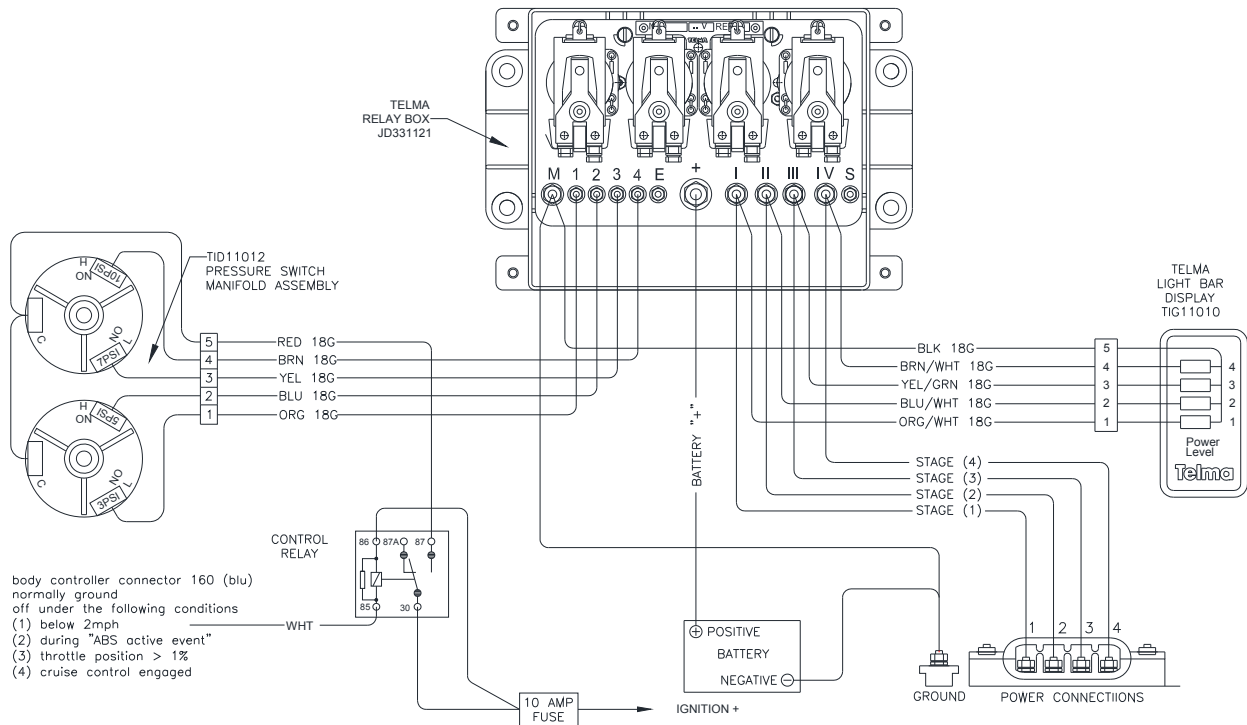
(with kick panel removed)

IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

4.3 HYDRAULIC BRAKE WIRING DIAGRAM



4.3 AIR BRAKE WIRING DIAGRAM



SECTION 5	RECOMMENDED TOOLS
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- Transmission Jack
- Heavy duty drill motor
- Standard assortment of mechanics hand tools
- Vehicle hoist, pit, or floor jack with stands
- Electrical terminal crimping pliers for use with non-insulated terminals
- Electronic angle meter with 0.1° accuracy (e.g. SPI Pro360 digital protractor)



IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

SECTION 6 INSTALLATION FOLLOWUP CHECKLIST

Use checklist below to verify that correct installation was performed and file in the vehicle records.

TL105068
Revised: 6apr12jh



CHASSIS #:	
CHASSIS MAKE/MODEL:	
Telma P/N, serial #:	
End Customer:	
INSTALLER:	
INSPECTION DATE:	
INSPECTED BY:	

INSTALLATION FOLLOWUP CHECKLIST	√	X	N/A	COMMENTS
air gap within specifications (focal)				
harness bracket installed (focal)				
harness properly routed at Telma to prevent rotor damage and allow for axle articulation (focal)				
sufficient clearance to crossmember to prevent contact in bumped condition (focal)				
AC/AD minimum 1/4" clearance between chassis bracket and retarder bracket (AC/AD)				
harnesses routed on inside of frame rail away from heat sources, sharp edges, etc. and secured with rubber coated metal cable clamps				
correct cable eyelet size at battery / disconnect switch				
relay box mounted vertical with wiring exiting from the bottom and can be easily accessed				
Telma battery power cable connected to battery switch or to battery "+" terminal and is protected with corrosion inhibitor				
Telma battery ground cable connected to frame rail bare metal surface where battery pack is grounded or directly to battery ground post and protected with corrosion inhibitor				
cables, hoses and air lines are at least 4" from rotors or are heat wrapped				
drive shaft weld quality, slip installed on each side of Telma at center of travel, balance, u-joints same quality as OEM				
Telma angle measurement				
T1 dimension measurement				
CC dimension measurement				
First shaft angle and installed length measurement				
Second shaft angle and installed length measurement				
Third shaft angle and installed length measurement				
Fourth shaft angle and installed length measurement				
drive shaft lengths/angles, Telma angle conforms to drawing				
AC/AD flange yokes in same plane				
electrical connections connections (weatherproof connectors, no quick splice, avoid butt connectors)				
hydraulic foot switch installation and adjustment				
pressure switch manifold mounted with screws and oriented with switches up to prevent water damage				
Light Bar Display installed correctly, visible to driver, and operates properly				
Telma Control Module accessible and secured with screws				
Alternator / batteries / charge circuit - sufficient capacity (refuse 200A / 2AWG / 3 to 4 batteries)				
Telma activates when moving and brakes are applied or hand control is activated				
Telma foot control shuts off automatically no higher than 2 mph				



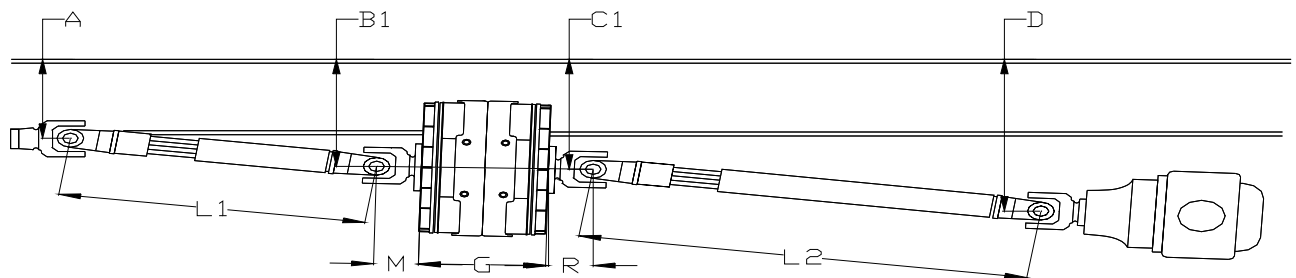
APPENDIX

IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

VEHICLE TECHNICAL DATA			
CHASSIS MAKE / MODEL	NAVISTAR	HC	CUSTOMER
WHEELBASE	169.0"		VEHICLE NUMBER
ENGINE MAKE / MODEL	NAVISTAR	MaxxForce7	CONTROLS
TRANSMISSION MAKE / MODEL	ALLISON	2100PTS (5SP)	TIRE SIZE
AXLE MAKE / MODEL	MERITOR	RS17145	GVW / GCW
DRIVE TYPE	4X2		BRAKES
RETARDER MODEL	AD50-90		ABS
RETARDER PART NUMBER	BB301158		BENDIX
RETARDER SERIAL NUMBER			AXLE RATIO
RETARDER CONTROL SYSTEM	FOOT		DRIVE LINE SERIES
MILEAGE AT TIME OF INSTALL			FLANGE YOKE
HOURS AT TIME OF INSTALL			SUSPENSION TYPE
			VOCATION
			SHUTTLE

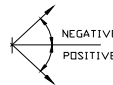
Note: If any of the above mentioned factors vary with your application, please call our TECHNICAL DEPARTMENT.

Dc loaded/unloaded: 20 3/16

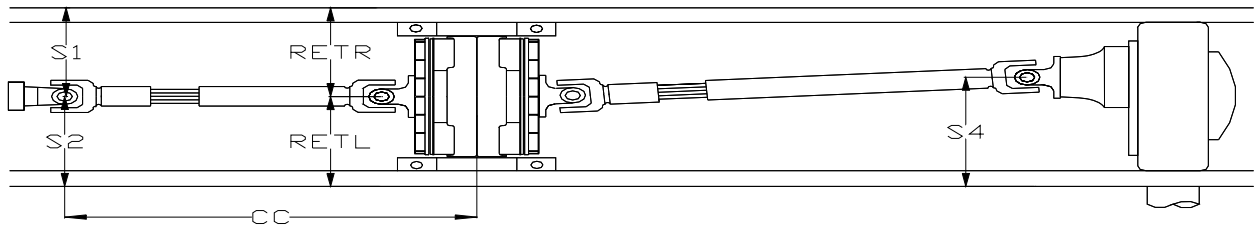


TRANSMISSION: 3.5°
L1: 4.5°

CHASSIS BRACKET: 1.5°
RETARDER: 5.5°



L2 (±1.0°): 8.6°
REAR AXLE: 5.5°



A	B1	C1	M	G	R	L1	L2	L3	L4
9 1/2	13 13/16	15 7/16	3 1/4	3 1/4	10 7/16	55 5/16	31 1/2	N/A	N/A
CC	T1	X1	S1	S2	S5	S6	RETR	RETL	S4
63 5/8	3 1/2	13	17	17	n/a	n/a	17	17	18

CAUTION: Angle tolerance ± 0.2°. Dimension tolerance ± 1/16"

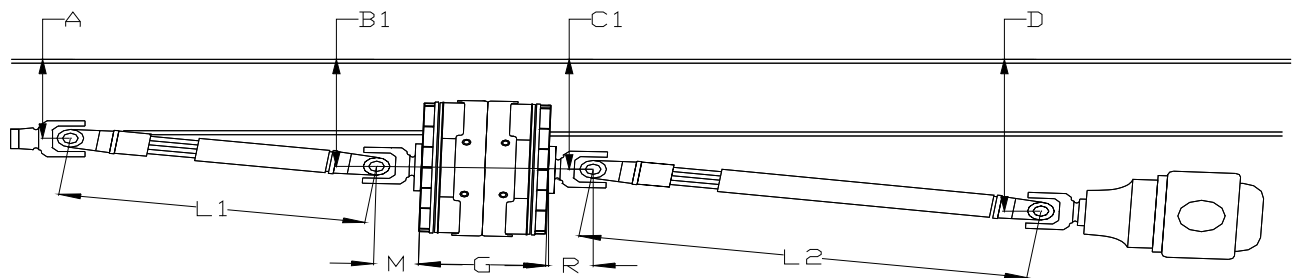
- NOTE 1: Drive shaft lengths are measured from center of U-joint and are installed lengths.
- NOTE 2: All drive shafts must be dynamically balanced after modification. Always verify proper shaft lengths before modification
- NOTE 3: Flange Yokes on either side of the Telma must be in the same plane
- NOTE 4: When not specified, the front & the rear drive shafts, on each retarder side, must have at least the same slip as the original drive shaft
- NOTE 5: When not specified, the flange yoke on each retarder side must have the maximum working angle capacity available in the driveline series concerned.
- NOTE 6: **After installation is completed, measure drive shaft angles and compare to the angles on the installation drawing. Contact TELMA Customer Support Engineering if the angles measured do not conform to the drawing**
- NOTE 7: USE MOUNTING BRACKETS TIB03108, TIB03121, TIB03122
- NOTE 8: USE BRACKET POSITION 4
- NOTE 9: adjust retarder to angle indicated by rotating bracket
- NOTE 10: IF NECESSARY, ADJUST AXLE ANGLE TO 5.5° WITH CHASSIS REFERENCE OF 0°
- NOTE 11: Move "C" cross member back to clear Telma

IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

VEHICLE TECHNICAL DATA			
CHASSIS MAKE / MODEL	NAVISTAR	HC	CUSTOMER
WHEELBASE	169.0"		VEHICLE NUMBER
ENGINE MAKE / MODEL	NAVISTAR	MaxxForceDT	CONTROLS
TRANSMISSION MAKE / MODEL	ALLISON	2100PTS (5SP)	TIRE SIZE
AXLE MAKE / MODEL	MERITOR	RS17145	GVW / GCW
DRIVE TYPE	4X2		BRAKES
RETARDER MODEL	AD50-90		ABS
RETARDER PART NUMBER	BB301158		AXLE RATIO
RETARDER SERIAL NUMBER			DRIVE LINE SERIES
RETARDER CONTROL SYSTEM	FOOT		FLANGE YOKE
MILEAGE AT TIME OF INSTALL			SUSPENSION TYPE
HOURS AT TIME OF INSTALL			VOCATION

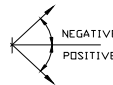
Note: If any of the above mentioned factors vary with your application, please call our TECHNICAL DEPARTMENT.

Dc loaded/unloaded: 20 3/16

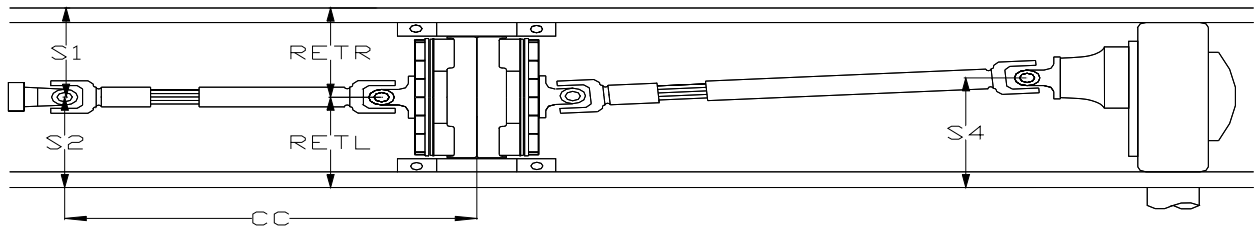


TRANSMISSION: 3.5°
L1: 5.2°

CHASSIS BRACKET: 2.5°
RETARDER: 6.5°



L2 (±1.0°): 8.6°
REAR AXLE: 6.5°



A	B1	C1	M	G	R	L1	L2	L3	L4
9 1/2	13 12/16	15 10/16	3 1/4	3 1/4	10 7/16	46 3/8	30 1/2	N/A	N/A
CC	T1	X1	S1	S2	S5	S6	RETR	RETL	S4
54 5/8	3 1/2	13	17	17	n/a	n/a	17	17	18

CAUTION: Angle tolerance ± 0.2°. Dimension tolerance ± 1/16"

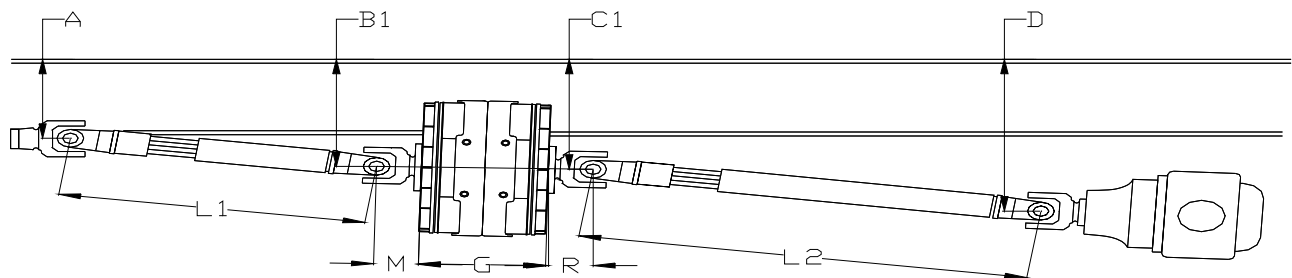
- NOTE 1: Drive shaft lengths are measured from center of U-joint and are installed lengths.
- NOTE 2: All drive shafts must be dynamically balanced after modification. Always verify proper shaft lengths before modification
- NOTE 3: Flange Yokes on either side of the Telma must be in the same plane
- NOTE 4: When not specified, the front & the rear drive shafts, on each retarder side, must have at least the same slip as the original drive shaft
- NOTE 5: When not specified, the flange yoke on each retarder side must have the maximum working angle capacity available in the driveline series concerned.
- NOTE 6: **After installation is completed, measure drive shaft angles and compare to the angles on the installation drawing.**
Contact TELMA Customer Support Engineering if the angles measured do not conform to the drawing
- NOTE 7: USE MOUNTING BRACKETS TIB03108, TIB03121, TIB03122
- NOTE 8: USE BRACKET POSITION 4
- NOTE 9: adjust retarder to angle indicated by rotating bracket
- NOTE 10: IF NECESSARY, ADJUST AXLE ANGLE TO 6.5° WITH CHASSIS REFERENCE OF 0°
- NOTE 11: Move "C" cross member back to clear Telma

IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

VEHICLE TECHNICAL DATA			
CHASSIS MAKE / MODEL	NAVISTAR	HC	CUSTOMER
WHEELBASE	193.0"		VEHICLE NUMBER
ENGINE MAKE / MODEL	NAVISTAR	MaxxFORCE7	CONTROLS
TRANSMISSION MAKE / MODEL	ALLISON	2100PTS (5SP)	TIRE SIZE
AXLE MAKE / MODEL	MERITOR	RS17145	GVW / GCW
DRIVE TYPE	4X2		BRAKES
RETARDER MODEL	AD50-90		ABS
RETARDER PART NUMBER	BB301158		WABCO HPB
RETARDER SERIAL NUMBER			AXLE RATIO
RETARDER CONTROL SYSTEM	FOOT		DRIVE LINE SERIES
MILEAGE AT TIME OF INSTALL			FLANGE YOKE
HOURS AT TIME OF INSTALL			SUSPENSION TYPE
			VOCATION
			SHUTTLE

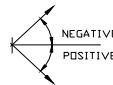
Note: If any of the above mentioned factors vary with your application, please call our TECHNICAL DEPARTMENT.

Dc loaded/unloaded: 20 1/2

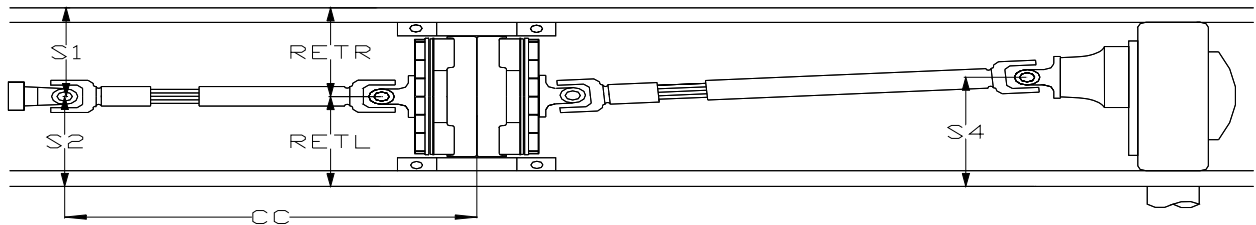


TRANSMISSION: 3.5°
L1: 4.4°

CHASSIS BRACKET: -0.8°
RETARDER: 3.2°



L2 (±1.0°): 6.2°
REAR AXLE: 3.0°



A	B1	C1			M	G	R	L1	L2	L3	L4
9 1/2	13 11/16	14 5/8			3 1/4	3 1/4	10 7/16	55 5/16	54 1/2	N/A	N/A
CC	T	T1	DD INSIDE	X1	S1	S2	S5	S6	RETR	RETL	S4
63 5/8	7 5/16	3	33 1/2	13	17	17	n/a	n/a	17	17	18

CAUTION: Angle tolerance ± 0.2°. Dimension tolerance ± 1/16"

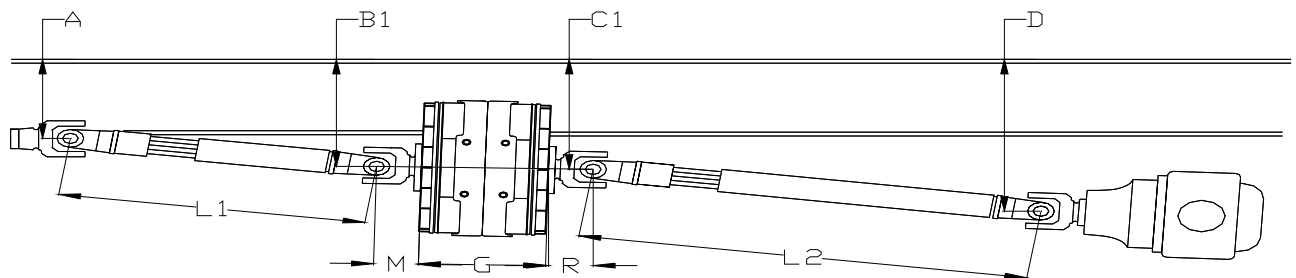
- NOTE 1: Drive shaft lengths are measured from center of U-joint and are installed lengths.
- NOTE 2: All drive shafts must be dynamically balanced after modification. Always verify proper shaft lengths before modification
- NOTE 3: Flange Yokes on either side of the Telma must be in the same plane
- NOTE 4: When not specified, the front & the rear drive shafts, on each retarder side, must have at least the same slip as the original drive shaft
- NOTE 5: When not specified, the flange yoke on each retarder side must have the maximum working angle capacity available in the driveline series concerned.
- NOTE 6: **After installation is completed, measure drive shaft angles and compare to the angles on the installation drawing. Contact TELMA Customer Support Engineering if the angles measured do not conform to the drawing**
- NOTE 7: USE MOUNTING BRACKETS TIB03108, TIB03121, TIB03122
- NOTE 8: USE BRACKET POSITION 4
- NOTE 9: adjust retarder to angle indicated by rotating bracket
- NOTE 10: IF NECESSARY, ADJUST AXLE ANGLE TO 3.0° WITH CHASSIS REFERENCE OF 0°

IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

VEHICLE TECHNICAL DATA			
CHASSIS MAKE / MODEL	NAVISTAR	HC	CUSTOMER
WHEELBASE	193.0"		VEHICLE NUMBER
ENGINE MAKE / MODEL	NAVISTAR	MaxxForceDT	CONTROLS
TRANSMISSION MAKE / MODEL	ALLISON	2100PTS	TIRE SIZE
AXLE MAKE / MODEL	MERITOR	RS17145	GVW / GCW
DRIVE TYPE	4X2		BRAKES
RETARDER MODEL	AD50-90		ABS
RETARDER PART NUMBER	BB301158		WABCO HPB
RETARDER SERIAL NUMBER			AXLE RATIO
RETARDER CONTROL SYSTEM	FOOT		DRIVE LINE SERIES
MILEAGE AT TIME OF INSTALL			FLANGE YOKE
HOURS AT TIME OF INSTALL			SUSPENSION TYPE
			VOCATION
			SHUTTLE

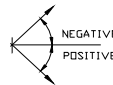
Note: If any of the above mentioned factors vary with your application, please call our TECHNICAL DEPARTMENT.

Dc loaded/unloaded: 20 1/2

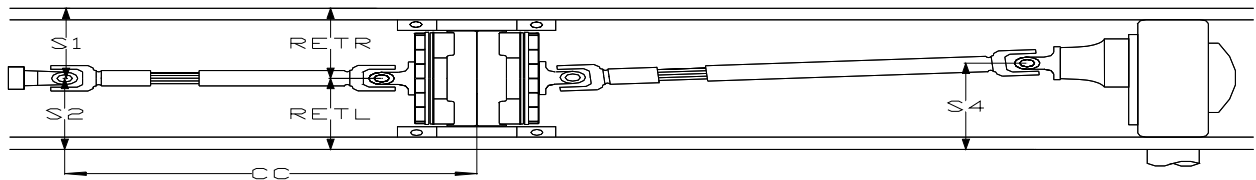


TRANSMISSION: 3.5°
L1: 5.2°

CHASSIS BRACKET: -0.8°
RETARDER: 3.2°



L2 (±1.0°): 6.2°
REAR AXLE: 3.0°



A	B1	C1			M	G	R	L1	L2	L3	L4
9 1/2	13 11/16	14 10/16			3 1/4	3 1/4	10 7/16	46 3/8	54 1/2	N/A	N/A
CC	T	T1	DD INSIDE	X1	S1	S2	S5	S6	RETR	RETL	S4
54 5/8	7 5/16	3	33 1/2	13	17	17	n/a	n/a	17	17	18

CAUTION: Angle tolerance ± 0.2°. Dimension tolerance ± 1/16"

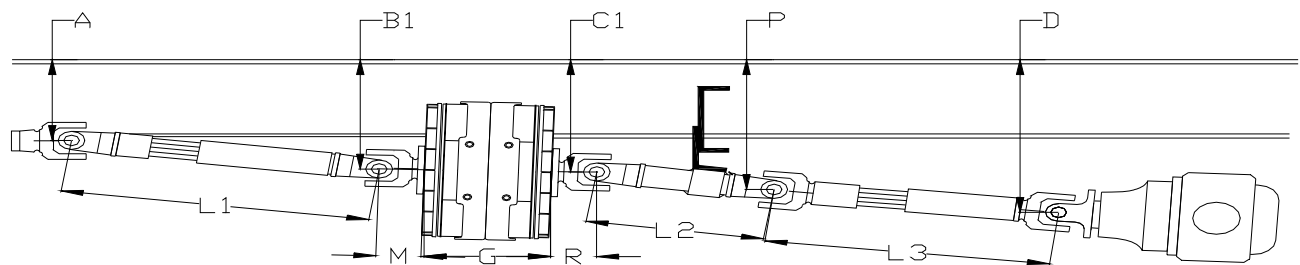
- NOTE 1: Drive shaft lengths are measured from center of U-joint and are installed lengths.
- NOTE 2: All drive shafts must be dynamically balanced after modification. Always verify proper shaft lengths before modification
- NOTE 3: Flange Yokes on either side of the Telma must be in the same plane
- NOTE 4: When not specified, the front & the rear drive shafts, on each retarder side, must have at least the same slip as the original drive shaft
- NOTE 5: When not specified, the flange yoke on each retarder side must have the maximum working angle capacity available in the driveline series concerned.
- NOTE 6: **After installation is completed, measure drive shaft angles and compare to the angles on the installation drawing.**
Contact TELMA Customer Support Engineering if the angles measured do not conform to the drawing
- NOTE 7: USE MOUNTING BRACKETS TIB03108, TIB03121, TIB03122
- NOTE 8: USE BRACKET POSITION 4
- NOTE 9: adjust retarder to angle indicated by rotating bracket
- NOTE 10: IF NECESSARY, ADJUST AXLE ANGLE TO 3.0° WITH CHASSIS REFERENCE OF 0°

IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

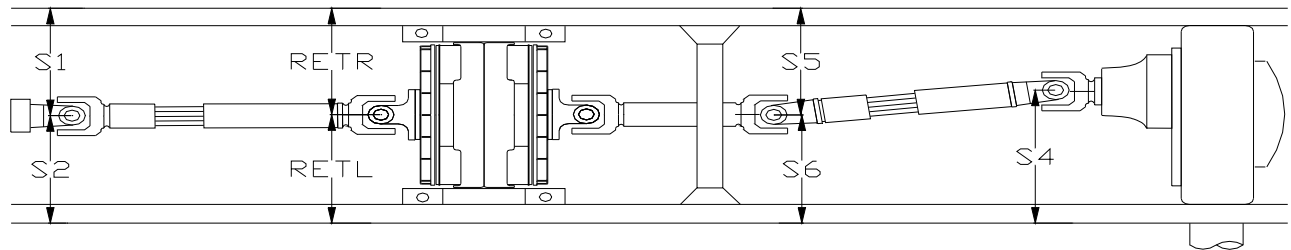
VEHICLE TECHNICAL DATA			
CHASSIS MAKE / MODEL	NAVISTAR	HC	CUSTOMER
WHEELBASE	205.0"		VEHICLE NUMBER
ENGINE MAKE / MODEL	NAVISTAR	MaxxForce7	CONTROLS
TRANSMISSION MAKE / MODEL	ALLISON	2100PTS (5SP)	TIRE SIZE
AXLE MAKE / MODEL	MERITOR	RS17145	GVW / GCW
DRIVE TYPE	4X2		BRAKES
RETARDER MODEL	AD50-90		ABS
RETARDER PART NUMBER	BB301158		AXLE RATIO
RETARDER SERIAL NUMBER			DRIVE LINE SERIES
RETARDER CONTROL SYSTEM	FOOT		FLANGE YOKE
MILEAGE AT TIME OF INSTALL			SUSPENSION TYPE
HOURS AT TIME OF INSTALL			VOCATION

Note: If any of the above mentioned factors vary with your application, please call our TECHNICAL DEPARTMENT.

Dc loaded/unloaded: 20 1/2



TRANSMISSION: 3.5°
L1: 4.3°
CHASSIS BRACKET: -0.5°
RETARDER: 3.5°
L2: 2.5°
L3 (±1.0°): 6.9°
REAR AXLE: 2.5°



A	B1	C1	P		M	G	R	L1	L2	L3	L4
9 1/2	13 11/16	14 11/16	16		3 1/4	3 1/4	10 7/16	55 5/16	28 3/4	37 3/4	N/A
CC	T	T1	DD inside	X1	S1	S2	S5	S6	RETR	RETL	S4
63 5/8	7 5/16	3	33 1/2	13	17	17	17	17	17	17	18

CAUTION: Angle tolerance ± 0.2°. Dimension tolerance ± 1/16"

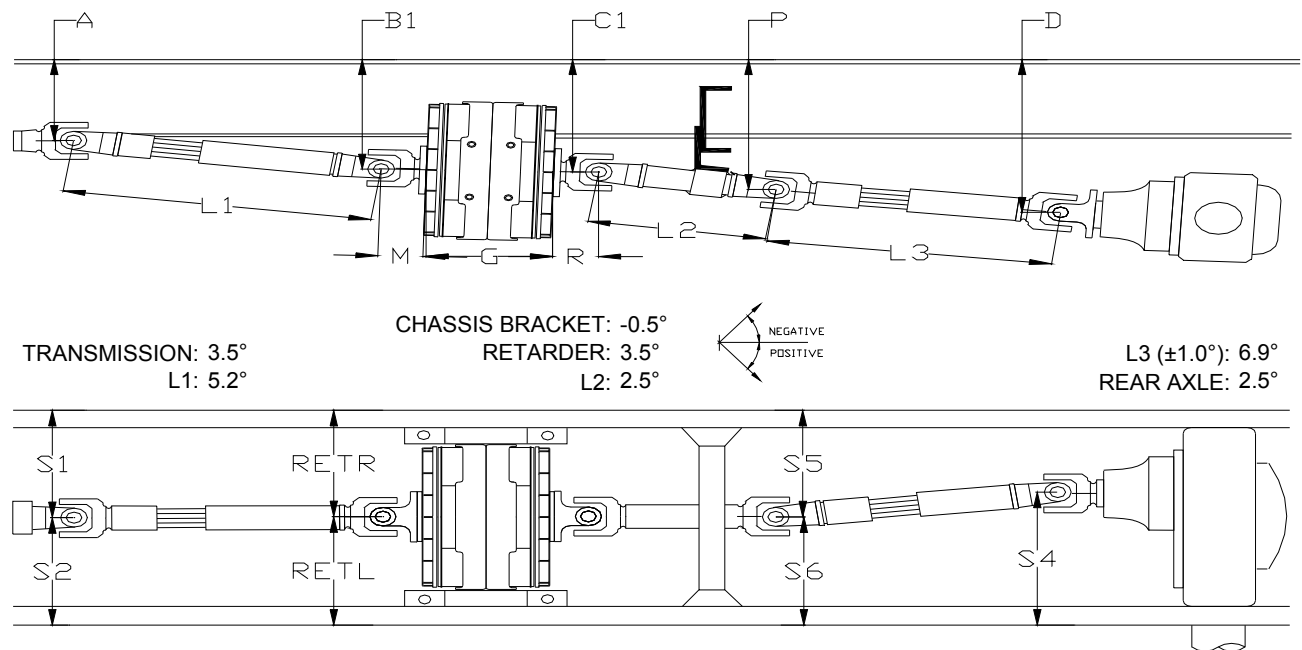
- NOTE 1: Drive shaft lengths are measured from center of U-joint and are installed lengths.
- NOTE 2: All drive shafts must be dynamically balanced after modification. Always verify proper shaft lengths before modification
- NOTE 3: Flange Yokes on either side of the Telma must be in the same plane
- NOTE 4: When not specified, the front & the rear drive shafts, on each retarder side, must have at least the same slip as the original drive shaft
- NOTE 5: When not specified, the flange yoke on each retarder side must have the maximum working angle capacity available in the driveline series concerned.
- NOTE 6: **After installation is completed, measure drive shaft angles and compare to the angles on the installation drawing. Contact TELMA Customer Support Engineering if the angles measured do not conform to the drawing**
- NOTE 7: USE MOUNTING BRACKETS TIB03108, TIB03121, TIB03122
- NOTE 8: USE BRACKET POSITION 4
- NOTE 9: adjust retarder to angle indicated by rotating bracket
- NOTE 10: ADJUST SECOND SHAFT (L2) TO 2.5° WITH CHASSIS REFERENCE OF 0°
- NOTE 11: IF NECESSARY, ADJUST AXLE ANGLE TO 2.5° WITH CHASSIS REFERENCE OF 0°

IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

VEHICLE TECHNICAL DATA			
CHASSIS MAKE / MODEL	NAVISTAR	HC	CUSTOMER
WHEELBASE	205.0"		VEHICLE NUMBER
ENGINE MAKE / MODEL	NAVISTAR	MaxxForceDT	CONTROLS
TRANSMISSION MAKE / MODEL	ALLISON	2100PTS (5SP)	TIRE SIZE
AXLE MAKE / MODEL	MERITOR	RS17145	GVW / GCW
DRIVE TYPE	4X2		BRAKES
RETARDER MODEL	AD50-90		ABS
RETARDER PART NUMBER	BB301158		WABCO HPB
RETARDER SERIAL NUMBER			AXLE RATIO
RETARDER CONTROL SYSTEM	FOOT		DRIVE LINE SERIES
MILEAGE AT TIME OF INSTALL			SPL100
HOURS AT TIME OF INSTALL			FLANGE YOKE
			90-2-19
			SUSPENSION TYPE
			AIR
			VOCATION
			SHUTTLE

Note: If any of the above mentioned factors vary with your application, please call our TECHNICAL DEPARTMENT.

Dc loaded/unloaded: 20 1/2



A	B1	C1	P		M	G	R	L1	L2	L3	L4
9 1/2	13 11/16	14 11/16	16		3 1/4	3 1/4	10 7/16	46 3/8	28 3/4	37 3/4	N/A
CC	T	T1	DD inside	X1	S1	S2	S5	S6	RETR	RETL	S4
54 5/8	7 5/16	3	33 1/2	13	17	17	17	17	17	17	18

CAUTION: Angle tolerance ± 0.2°. Dimension tolerance ± 1/16"

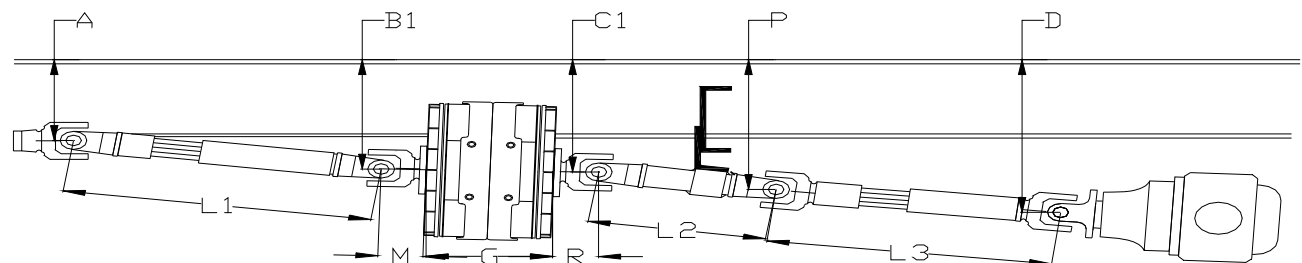
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 NOTE 3: Flange Yokes on either side of the Telma must be in the same plane
 NOTE 4: When not specified, the front & the rear drive shafts, on each retarder side, must have at least the same slip as the original drive shaft
 NOTE 5: When not specified, the flange yoke on each retarder side must have the maximum working angle capacity available in the driveline series concerned.
 NOTE 6: **After installation is completed, measure drive shaft angles and compare to the angles on the installation drawing.**
Contact TELMA Customer Support Engineering if the angles measured do not conform to the drawing
 NOTE 7: USE MOUNTING BRACKETS TIB03108, TIB03121, TIB03122
 NOTE 8: USE BRACKET POSITION 4
 NOTE 9: adjust retarder to angle indicated by rotating bracket
 NOTE 10: ADJUST SECOND SHAFT (L2) TO 2.5° WITH CHASSIS REFERENCE OF 0°
 NOTE 11: IF NECESSARY, ADJUST AXLE ANGLE TO 2.5° WITH CHASSIS REFERENCE OF 0°

IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

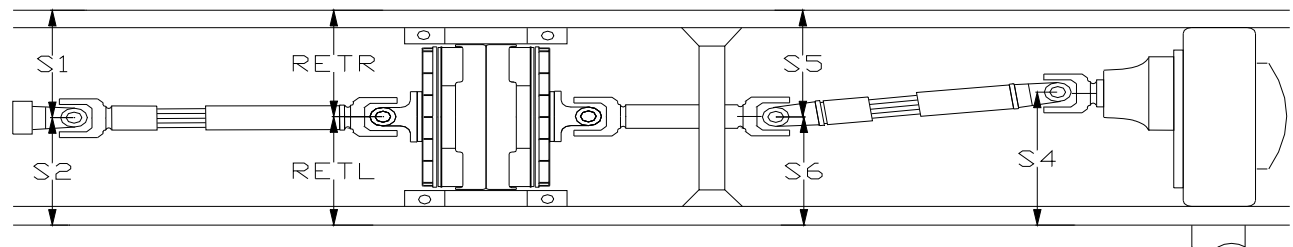
VEHICLE TECHNICAL DATA			
CHASSIS MAKE / MODEL	NAVISTAR	HC	CUSTOMER
WHEELBASE	217.0"		VEHICLE NUMBER
ENGINE MAKE / MODEL	NAVISTAR	MaxxForce7	CONTROLS
TRANSMISSION MAKE / MODEL	ALLISON	2100PTS (5SP)	TIRE SIZE
AXLE MAKE / MODEL	MERITOR	RS17145	GVW / GCW
DRIVE TYPE	4X2		BRAKES
RETARDER MODEL	AD50-90		ABS
RETARDER PART NUMBER	BB301158		WABCO HPB
RETARDER SERIAL NUMBER			AXLE RATIO
RETARDER CONTROL SYSTEM	FOOT		DRIVE LINE SERIES
MILEAGE AT TIME OF INSTALL			SPL100
HOURS AT TIME OF INSTALL			FLANGE YOKE
			90-2-19
			SUSPENSION TYPE
			AIR
			VOCATION
			SHUTTLE

Note: If any of the above mentioned factors vary with your application, please call our TECHNICAL DEPARTMENT.

Dc loaded/unloaded: 20 1/2



TRANSMISSION: 3.5°
 L1: 4.3°
 CHASSIS BRACKET: -0.5°
 RETARDER: 3.5°
 L2: 2.5°
 L3 (±1.0°): 5.2°
 REAR AXLE: 2.5°



A	B1	C1	P		M	G	R	L1	L2	L3	L4
9 1/2	13 11/16	14 11/16	16		3 1/4	3 1/4	10 7/16	55 5/16	28 3/4	49 3/4	N/A
CC	T	T1	DD inside	X1	S1	S2	S5	S6	RETR	RETL	S4
63 5/8	7 5/16	3	33 1/2	13	17	17	17	17	17	17	18

CAUTION: Angle tolerance $\pm 0.2^\circ$. Dimension tolerance $\pm 1/16''$

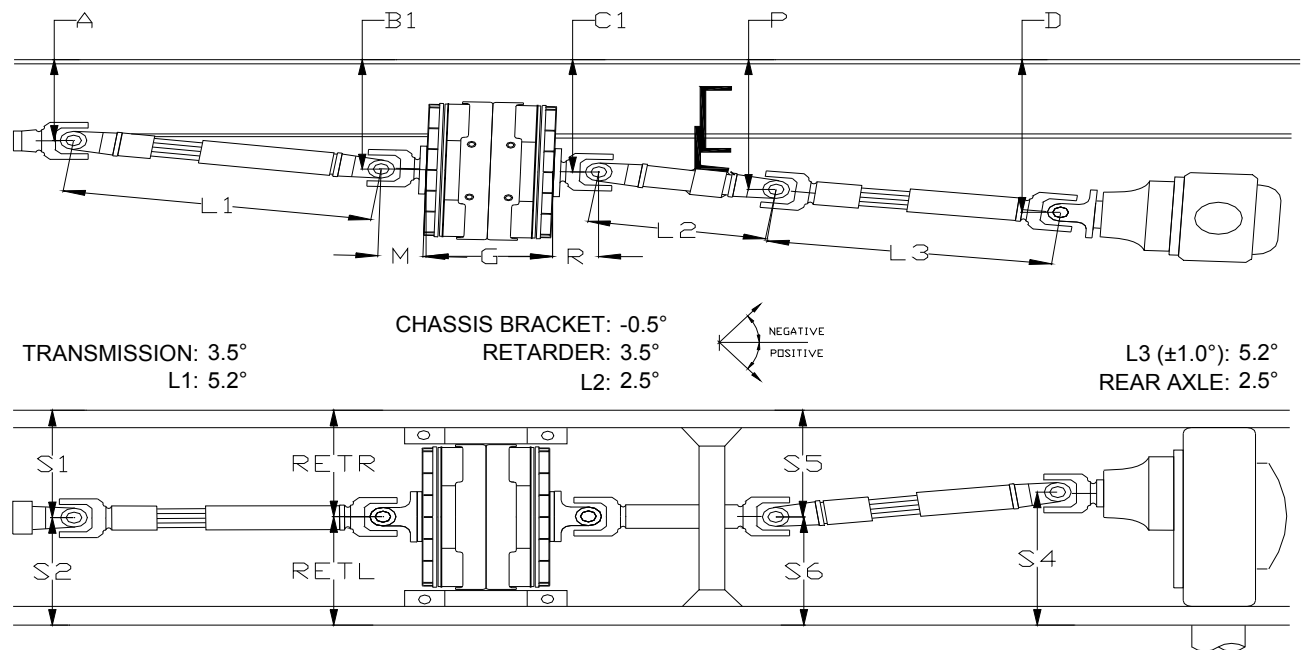
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- NOTE 2: All drive shafts must be dynamically balanced after modification. Always verify proper shaft lengths before modification
- NOTE 3: Flange Yokes on either side of the Telma must be in the same plane
- NOTE 4: When not specified, the front & the rear drive shafts, on each retarder side, must have at least the same slip as the original drive shaft
- NOTE 5: When not specified, the flange yoke on each retarder side must have the maximum working angle capacity available in the driveline series concerned.
- NOTE 6: **After installation is completed, measure drive shaft angles and compare to the angles on the installation drawing. Contact TELMA Customer Support Engineering if the angles measured do not conform to the drawing**
- NOTE 7: USE MOUNTING BRACKETS TIB03108, TIB03121, TIB03122
- NOTE 8: USE BRACKET POSITION 4
- NOTE 9: adjust retarder to angle indicated by rotating bracket
- NOTE 10: ADJUST SECOND SHAFT (L2) TO 2.5° WITH CHASSIS REFERENCE OF 0°
- NOTE 11: IF NECESSARY, ADJUST AXLE ANGLE TO 2.5° WITH CHASSIS REFERENCE OF 0°

IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

VEHICLE TECHNICAL DATA			
CHASSIS MAKE / MODEL	NAVISTAR	HC	CUSTOMER
WHEELBASE	217.0"		VEHICLE NUMBER
ENGINE MAKE / MODEL	NAVISTAR	MaxxForceDT	CONTROLS
TRANSMISSION MAKE / MODEL	ALLISON	2100PTS (5SP)	TIRE SIZE
AXLE MAKE / MODEL	MERITOR	RS17145	GVW / GCW
DRIVE TYPE	4X2		BRAKES
RETARDER MODEL	AD50-90		ABS
RETARDER PART NUMBER	BB301158		WABCO HPB
RETARDER SERIAL NUMBER			AXLE RATIO
RETARDER CONTROL SYSTEM	FOOT		DRIVE LINE SERIES
MILEAGE AT TIME OF INSTALL			SPL100
HOURS AT TIME OF INSTALL			FLANGE YOKE
			90-2-19
			SUSPENSION TYPE
			AIR
			VOCATION
			SHUTTLE

Note: If any of the above mentioned factors vary with your application, please call our TECHNICAL DEPARTMENT.

Dc loaded/unloaded: 20 1/2



A	B1	C1	P		M	G	R	L1	L2	L3	L4
9 1/2	13 11/16	14 11/16	16		3 1/4	3 1/4	10 7/16	46 3/8	28 3/4	49 3/4	N/A
CC	T	T1	DD inside	X1	S1	S2	S5	S6	RETR	RETL	S4
54 5/8	7 5/16	3	33 1/2	13	17	17	17	17	17	17	18

CAUTION: Angle tolerance $\pm 0.2^\circ$. Dimension tolerance $\pm 1/16''$

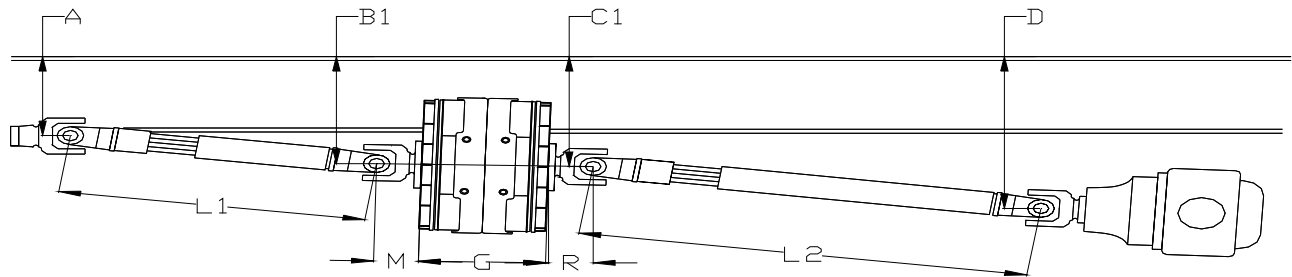
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- NOTE 3: Flange Yokes on either side of the Telma must be in the same plane
- NOTE 4: When not specified, the front & the rear drive shafts, on each retarder side, must have at least the same slip as the original drive shaft
- NOTE 5: When not specified, the flange yoke on each retarder side must have the maximum working angle capacity available in the driveline series concerned.
- NOTE 6: **After installation is completed, measure drive shaft angles and compare to the angles on the installation drawing. Contact TELMA Customer Support Engineering if the angles measured do not conform to the drawing**
- NOTE 7: USE MOUNTING BRACKETS TIB03108, TIB03121, TIB03122
- NOTE 8: USE BRACKET POSITION 4
- NOTE 9: adjust retarder to angle indicated by rotating bracket
- NOTE 10: ADJUST SECOND SHAFT (L2) TO 2.5° WITH CHASSIS REFERENCE OF 0°
- NOTE 11: IF NECESSARY, ADJUST AXLE ANGLE TO 2.5° WITH CHASSIS REFERENCE OF 0°

IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

VEHICLE TECHNICAL DATA			
CHASSIS MAKE / MODEL	Navistar IC Bus UC	CUSTOMER	Translink
WHEELBASE	195.0"	chassis VIN	DH239550
ENGINE MAKE / MODEL	NAVISTAR MaxxForce7	CONTROLS	DIAMOND LOGIC
TRANSMISSION MAKE / MODEL	ALLISON 1000PTS (5SP)	TIRE SIZE	225/70R-19.5
AXLE MAKE / MODEL	DANA S110	GVW / GCW	19500 lbs
DRIVE TYPE	4X2	BRAKES	HYD
RETARDER MODEL	AD50-90 (3 stages)	ABS	TRW 355 (3 channel)
RETARDER PART NUMBER	BB301158	AXLE RATIO	4.33
RETARDER SERIAL NUMBER		DRIVE LINE SERIES	SPL100
RETARDER CONTROL SYSTEM	FOOT	FLANGE YOKE	90-2-19
MILEAGE AT TIME OF INSTALL	4049km	SUSPENSION TYPE	SPRING
HOURS AT TIME OF INSTALL		VOCATION	SHUTTLE

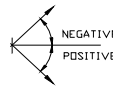
Note: If any of the above mentioned factors vary with your application, please call our TECHNICAL DEPARTMENT.

Dc loaded/unloaded: 17

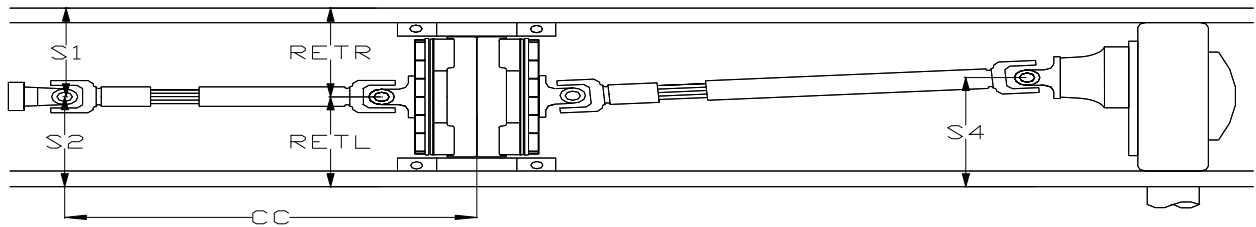


TRANSMISSION: 3.5°
L1: 3.0°

CHASSIS BRACKET: -1.5°
RETARDER: 2.5°



L2 (±1.0°): 4.6°
REAR AXLE: 2.5°



A	B1	C1	M	G	R	L1	L2	L3	L4
9	11 7/8	12 5/8	3 1/4	3 1/4	10 7/16	55 1/4	54 7/16	N/A	N/A
CC	T1	BOC	S1	S2	S5	S6	RETR	RETL	S4
63 5/8	4 5/8	44 1/8	16 3/4	16 3/4	n/a	n/a	16 3/4	16 3/4	17 3/4

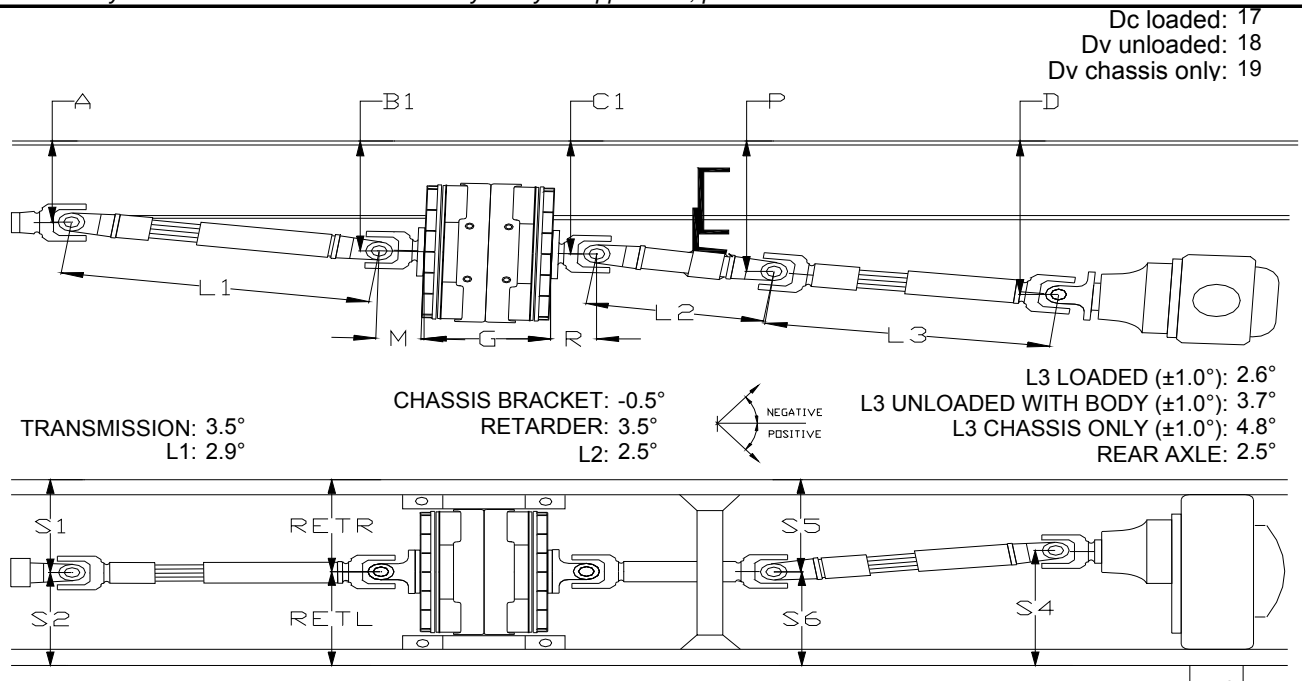
CAUTION: Angle tolerance ± 0.2°. Dimension tolerance ± 1/16"

- NOTE 1: Drive shaft lengths are measured from center of U-joint and are installed lengths.
- NOTE 2: All drive shafts must be dynamically balanced after modification. Always verify proper shaft lengths before modification
- NOTE 3: Flange Yokes on either side of the Telma must be in the same plane
- NOTE 4: When not specified, the front & the rear drive shafts, on each retarder side, must have at least the same slip as the original drive shaft
- NOTE 5: When not specified, the flange yoke on each retarder side must have the maximum working angle capacity available in the driveline series concerned.
- NOTE 6: **After installation is completed, measure drive shaft angles and compare to the angles on the installation drawing. Contact TELMA Customer Support Engineering if the angles measured do not conform to the drawing**
- NOTE 7: USE MOUNTING BRACKETS TIB03108, TIB03121, TIB03122
- NOTE 8: USE BRACKET POSITION 3
- NOTE 9: adjust retarder to angle indicated by rotating bracket
- NOTE 10: IF NECESSARY ADJUST AXLE ANGLE USING STEEL WEDGE SHIMS TO 2.5° (CHASSIS REFERENCE = 0°)

IC BUS UC & HC CUTAWAY CHASSIS WITH DIAMOND LOGIC CONTROL

VEHICLE TECHNICAL DATA			
CHASSIS MAKE / MODEL	NAVISTAR UC	CUSTOMER	Champion
WHEELBASE	234.0" (stretch from 195)	CHASSIS NUMBER	DH302468
ENGINE MAKE / MODEL	NAVISTAR MaxxForce7	CONTROLS	DIAMOND LOGIC
TRANSMISSION MAKE / MODEL	ALLISON 1000PTS (5SP)	TIRE SIZE	225/70R-19.5
AXLE MAKE / MODEL	DANA S110	GVW / GCW	19500 lbs
DRIVE TYPE	4X2	BRAKES	HYD
RETARDER MODEL	AD50-90 (3 stages)	ABS	TRW 355 (3 channel)
RETARDER PART NUMBER	BB301158	AXLE RATIO	4.33
RETARDER SERIAL NUMBER		DRIVE LINE SERIES	SPL100
RETARDER CONTROL SYSTEM	FOOT	FLANGE YOKE	90-2-19
MILEAGE AT TIME OF INSTALL		SUSPENSION TYPE	SPRING
HOURS AT TIME OF INSTALL		VOCATION	SHUTTLE

Note: If any of the above mentioned factors vary with your application, please call our TECHNICAL DEPARTMENT.



A	B1	C1	P	M	G	R	L1	L2	L3	L4
9	11 3/4	12 3/4	14 1/2	3 1/4	3 1/4	10 7/16	55 1/4	40	53 3/4	N/A
CC	BOC	T1	DD inside	S1	S2	S5	S6	RETR	RETL	S4
63 5/8	44 1/8	4 5/8	33 1/2	17	17	17	17	17	17	18

Angle tolerance ± 0.2°. Dimension tolerance ± 1/16"

- CAUTION:**
- NOTE 1: Drive shaft lengths are measured from center of U-joint and are installed lengths.
 - NOTE 2: All drive shafts must be dynamically balanced after modification. Always verify proper shaft lengths before modification
 - NOTE 3: Flange Yokes on either side of the Telma must be in the same plane
 - NOTE 4: When not specified, the front & the rear drive shafts, on each retarder side, must have at least the same slip as the original drive shaft
 - NOTE 5: When not specified, the flange yoke on each retarder side must have the maximum working angle capacity available in the driveline series concerned.
 - NOTE 6: **After installation is completed, measure drive shaft angles and compare to the angles on the installation drawing. Contact TELMA Customer Support Engineering if the angles measured do not conform to the drawing**
 - NOTE 7: USE MOUNTING BRACKETS TIB03108, TIB03121, TIB03122
 - NOTE 8: USE BRACKET POSITION 3
 - NOTE 9: adjust retarder to angle indicated by rotating bracket
 - NOTE 10: ADJUST SECOND SHAFT (L2) TO 2.5° TO MATCH AXLE ANGLE (CHASSIS REFERENCE = 0°)
 - NOTE 11: IF NECESSARY, ADJUST AXLE ANGLE USING STEEL WEDGE SHIMS TO 2.5° (CHASSIS REFERENCE = 0°)