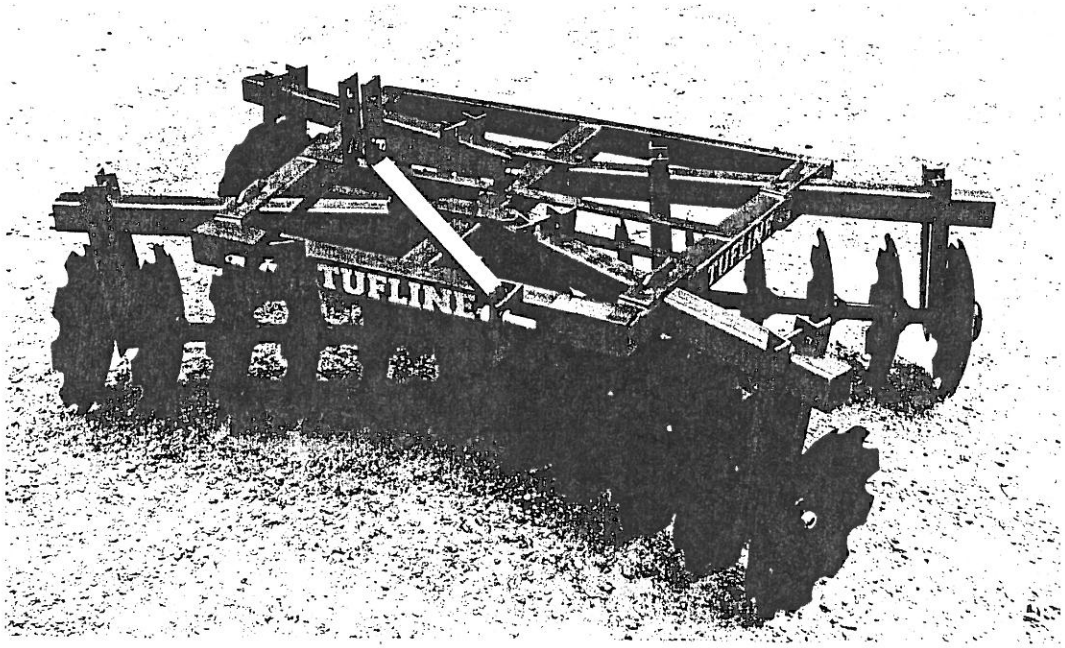
N° 14313

T4X, TXH, & TXHF SERIES

3 PT. LIFT TANDEM DISC HARROWS

BY TUFLINE

ASSEMBLY & OPERATING INSTRUCTIONS



MONROE-TUFLINE MANUFACTURING CO., INC.
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INTRODUCTION

We are pleased that you have chosen a TUFLINE product. To assist you in the assembly and safe operation of your unit, we are providing this booklet. We urge you to read this booklet and thoroughly familiarize yourself with all aspects of safety, assembly, and operation. **Note:** All information contained in this booklet is general in nature and to be used for instructional purposes only. Actual appearance, material and specifications may vary somewhat depending on the specific model being assembled or adjusted.

All references made to the left or right in this booklet are determined by standing a the rear of the machine and facing the direction of travel.

** DISCLAIMER**

Any modifications to this product without the specific permission of TUFLINE are not allowed. Unauthorized modifications beyond the original factory specifications could cause damage to the unit and void the warranty.

LIMITED WARRANTY

Monroe Tufline Mfg. Co. Inc., the manufacturer, warrants only to the original purchaser of new TUFLINE equipment that they are free of defects in material and workmanship under normal use and service. This warranty is applicable for six months form date of purchase if for personal use; 90 days for commercial or rental purposes. This warranty does not apply to any equipment which has been improperly assembled or which has been subjected to abuse, negligence, normal ear and tear, modifications, tampering or failure to follow operating instructions, or which has been used for a purpose for which the product is not designed. This warranty does not cover any parts not manufactured by Monroe-Tufline Mfg., Inc.

Claims shall be made to the dealer who originally sold the equipment. Warranty coverage is not valid unless the owner registration card below is completed and returned. All claims must be submitted within 30 days of equipment failure and faulted parts or equipment are subject for return to TUFLINE at TUFLINE'S expense and discretion. Monroe-Tufline reserves the right to make improvements and/or changes in specifications of the product at any time without notice or obligation to modify previously manufactured unit.

No other warranty of any kind whatsoever, express or implied, is made with respect to this sale; and all implied warranties of merchantability and fitness for a particular purpose which exceed the obligations set forth in this written warranty are hereby disclaimed and excluded from this sale.

Please fill out the registration card below and mail it to:
Monroe Tufline MFG. Attention: Owner Registration
P.O. Box 7755 Columbus, MS 39705

OWNER REGISTRATION

Name_____Address/City

State_____

Dealer Name_____ City/State_____

Date of Purchase_____Model No._____Serial #_____

Comments_____

TABLE OF CONTENTS

GENERAL SAFETY

⚠ Before hitching, always be certain that the proper hitch pins and retaining pins are available for each hitch position. Use of incorrect parts can allow an unexpected and possibly disastrous partial or complete disconnection which can result in serious property damage and/or personal injury to the operator and others in the vicinty. Direct hitched equipment can be jerked up on top of the tractor and operator and trail type can go anywhere. Jet blasts of escaping hydraulic fluid can severely injure also.

⚠ It is very important to throttle the engine to idle speed as the tractor is backed up to the implement and to keep helpers clear.

⚠ Be sure implement is solidly supported to prevent movement during hitching.

⚠ Never place hands or feet in possible "pinch holes" such as hitch pin holes.

⚠ Watch out for high pressure hydraulic fluid spray and leaks. They can injure your skin, blind you, or allow the implement to drop suddenly. Never activate tractor hydraulic control while not in the tractor seat. Repair all hydraulic leaks immediately.

⚠ Never allow anyone close to the implement when the hydraulic components are being operated. Be sure the instruction manual has been followed on bleeding air from the system and that the tractor system is full of fluid before operating. Air in the system can cause dangerous eratic operation.

⚠ Never allow anyone other than the operator to be on or around the tractor or implement when it is being operated or moved. No riders anywhere! The vast majority of accidents are from falls off of tractors!

⚠ Double check wheel bearings, wheel lugs, wing locks, and transport locks before starting and every 5 to 10 miles.

⚠ Use all legally required safety equipment such as slow moving signs, flashing ambers, front and rear caution vehicles, and obey all applicable area traffic regulations for such transportation. Watch for overheads including power lines.

⚠ If the implement is "over width", use common sense courtesy by periodically pulling off the road and stopping when you have an opportunity to let long lines of impatient traffic to unjam.

⚠ Never transport at night without adequate forerunner and rearrunner caution lights plus width clearance cautions.

⚠ Never transport over 20 MPH on highways or roads where "bumps" may exist. Be aware that heavy implements cannot be designed economically and strong enough to withstand "severe bouncing". Hitting even small bumps at speeds faster than field speed can cause dangerous accidents for anyone in the vicinity and also cause most transport component problems. It is important that operators realize how severe these shocks can be!

⚠ STOP tractor engine and PTO and apply park/brake before leaving tractor seat.

⚠ Always operate at reasonable field speeds. Absolute maximum for earthe working implements is 7 MPH. If occasional rocks and/or other obstructions, ground litter, and uneven terrain are present, 1½ to 3 MPH will seem slow but actually more productive and safer.

⚠ Use extra caution and slow speeds on steep slopes, near power lines, gullies, or overhanging obstructions such as tree limbs.

⚠ Lower the implement to the ground whenever possibl before performing adjustment or maintenance.

⚠ If implement cannot be lowered, keep all parts of the body clear from under it or block it up securely.

⚠ Keep all parts of the body clear of pinch point possiblities when adjusting or maintaining. Never check hole alignments with the fingers. Sliding metal parts can shear or break flesh or bones.

⚠ Never step on top of implement wheels or walk on top of frames. Disc blades and other parts are very sharp and can cause fatal cuts from falls. Wheels can spin!

⚠ Never operate implement without all wheels in place. It may overturn.

T4X

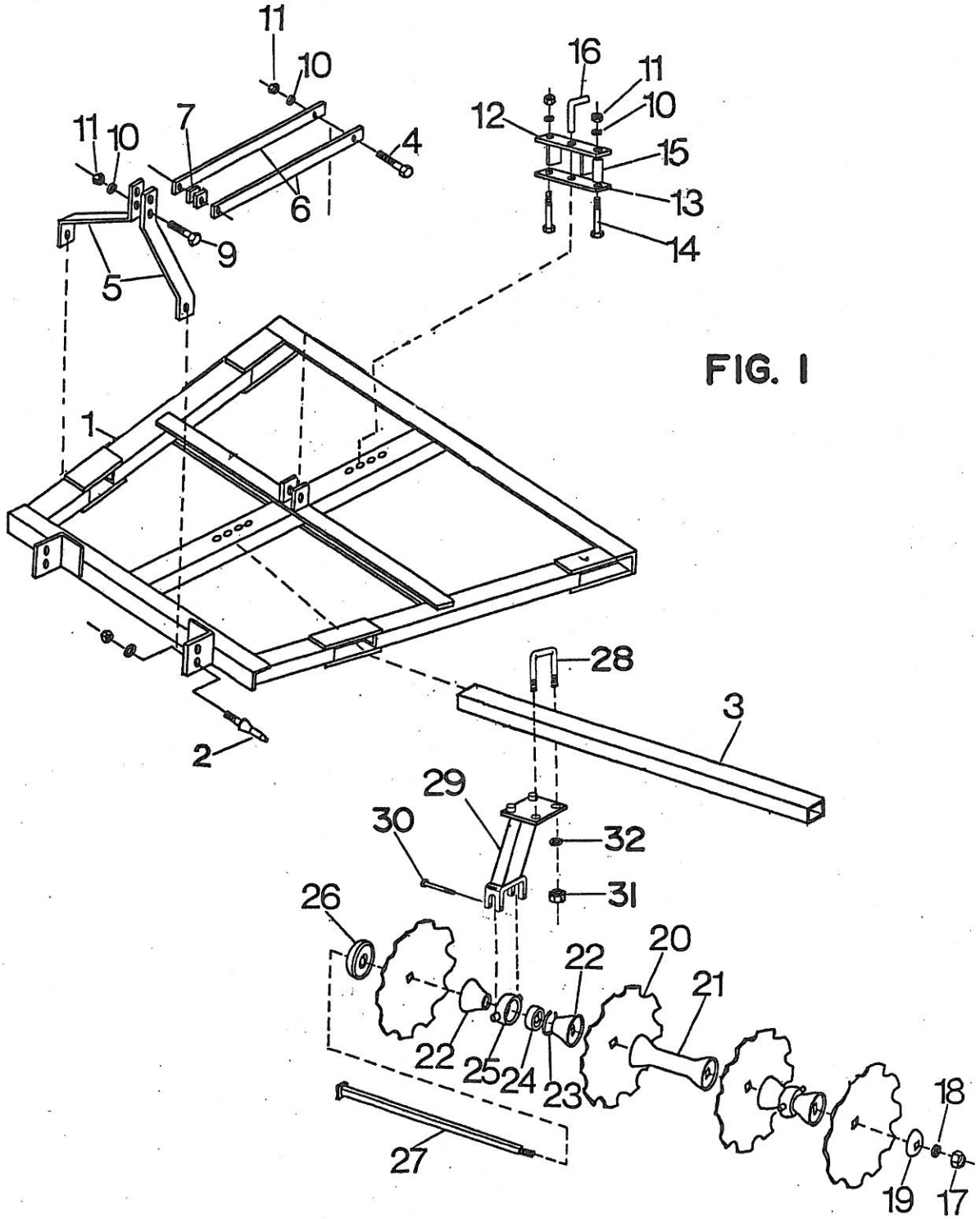
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FIG. 1

T4X ASSEMBLY

Ref. No.	Part No.	Description
1	11341	Main Frame
2	T-331	Hitch Pin, 1 1/8", Cat. II
3		Gang Beam 4" x 4" (Specify Length)
4	T-770	Hex Bolt, 7/8" x 3½", Gr. 5
5	T-682	A-Frame, 3" heavy duty
6	T-681	Strut, 38½"
7	T-391	Strut Spacer, ½"
9	T-725	Hex Bolt, 5/8" x 3 3/4" Gr. 5
10	T-24	Lockwasher, 5/8"
11	T-22	Hex Nut, 5/8"
12	T-7042	Slide Plate Top
13	11421	Slide Plate Bottom
14	T-747	Hex Bolt, 5/8" x 6", Gr. 2
15	T-610	Bushing, 5/8" x 4 1/16"
16	T-730	Angle Adjusting Pin, 5/8" x 5 3/4"
17	T-18	Hex Nut, 1 1/8" or
	T-18A	Hex Lock Nut, 1 1/8"
18	T-20	Lockwasher, 1 1/8"
19	T-1	End Washer, 1 1/8" Sq.
20		Disc Blade (Specify Size)
21	T-3	Spacer Spool, 1 1/8" Sq. x 9"
22	T-49	End Spacer, 1 1/8" Sq.
23	T-722	Snap Ring, 3½"
24	T-602	Bearing, 1 1/8" Sq. (W208PPB12)
25	TMB	Trunnion Bearing Housing
26	T-2	Bumper Washer, 1 1/8" Sq.
27		Axle, 1 1/8" Sq. (Specify Length)
28	11971	U-Bolt, 3/4" for 4" x 4" Gang Beam
29	12021	Tube Hanger for 1 1/8" Axle & 4" x 4" Gang Beam
30	12163	Hex Bolt, ½" x 3½", Gr. 5
31	T-27	Hex Nut, 3/4"
32	T-31	Lockwasher, 3/4"

TXH

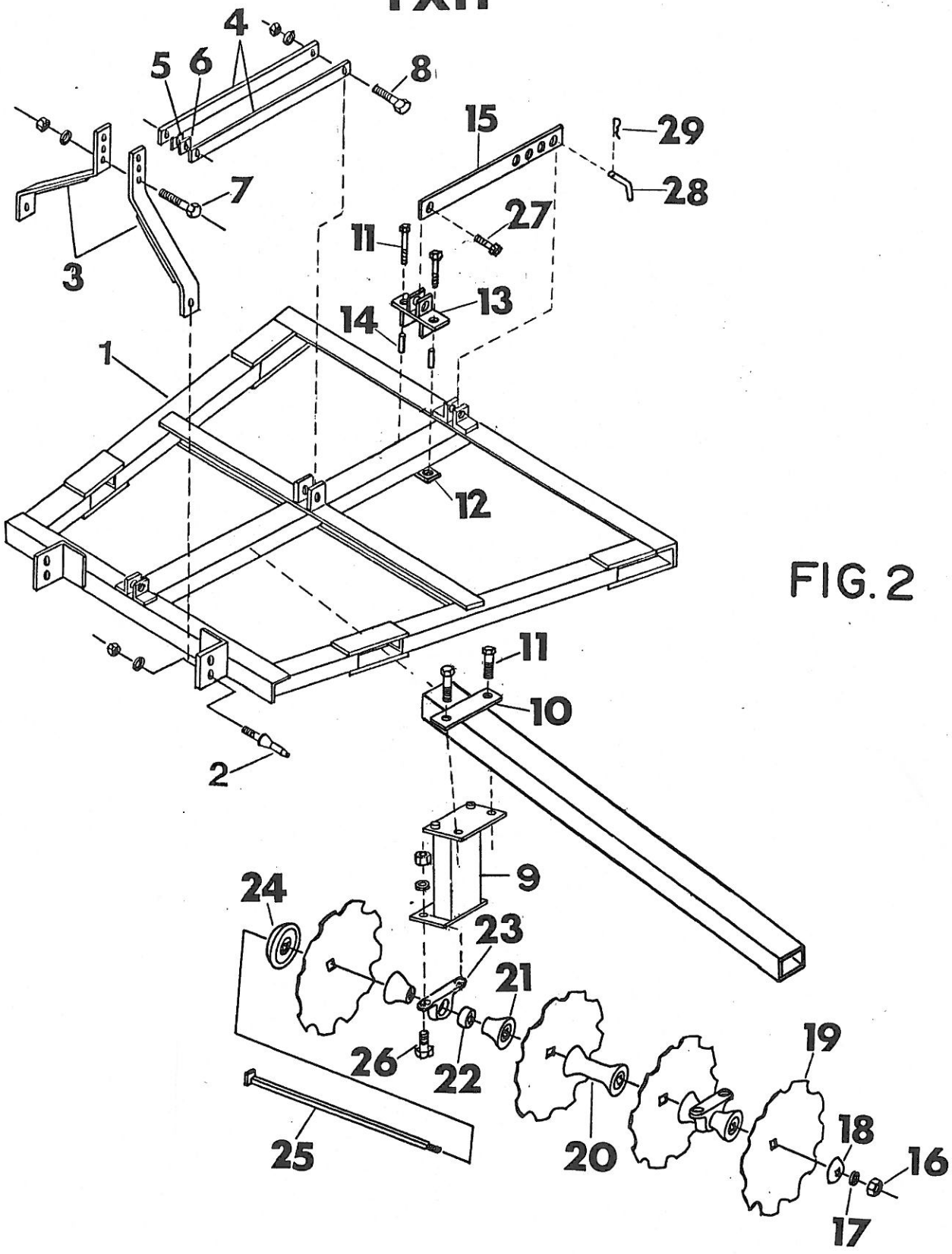
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FIG. 2

TXH ASSEMBLY

REF. NO.	PART NO.	DESCRIPTION
1	11342	MAIN FRAME
2	T-331	HITCH PIN, 1 1/8", CAT. II
3	9364	A-FRAME, 3" HEAVY DUTY
4	T-680	STRUT, 39"
5	T-391	STRUT SPACER, 1/2"
6	T-392	STRUT SPACER, 3/8"
7	T-725	HEX BOLT, 5/8" x 3 3/4", GR. 5
8	T-742	HEX BOLT, 5/8" x 3 1/2", GR. 5
9	T-41	PILLOW BLOCK GANG HANGER, 18" & 20" BLADES
	12378	PILLOW BLOCK GANG HANGER, 22" BLADES
10	T-741	GANG BEAM STRAP
11	T-745	HEX BOLT, 5/8" x 5", GR. 2
12	12896	SLIDE PLATE BOTTOM
13	12895	SLIDE PLATE TOP
14	T-56	BUSHING
15	12901	GANG ANGLE ADJUSTING BAR - FRONT, 26"
	12902	GANG ANGLE ADJUSTING BAR - REAR, 22 1/4"
16	T-18	HEX NUT, 1 1/8" OR
	T-18A	LOCK NUT, 1 1/8"
17	T-20	LOCK WASHER, 1 1/8"
18	T-1	END WASHER, 1 1/8"
19		DISC BLADE (SPECIFY SIZE)
20	T-3	SPACER SPOOL, 1 1/8" SQ. x 9" SPACING
	T-91	SPACER SPOOL, 1 1/8" SQ. x 7 1/2" SPACING
21	T-49	END SPACER, 1 1/8" SQ. x 9" SPACING
	T-47	END SPACER, 1 1/8" SQ. x 7 1/2"
22	T-60	BEARING, 1 1/8" SQ. (W208PPB5)
23	TPB	PILLOW BLOCK BEARING HOUSING
24	T-2	BUMPER WASHER, 1 1/8" SQ.
25		AXLE (SPECIFY LENGTH)
26	T-740	HEX BOLT, 5/8" x 2", GR. 2
27	T-741	HEX BOLT, 5/8" x 2 1/2", GR. 2
28	9690	ADJUSTING BAR PIN
29	9979	HAIR PIN CLIP

TXHF

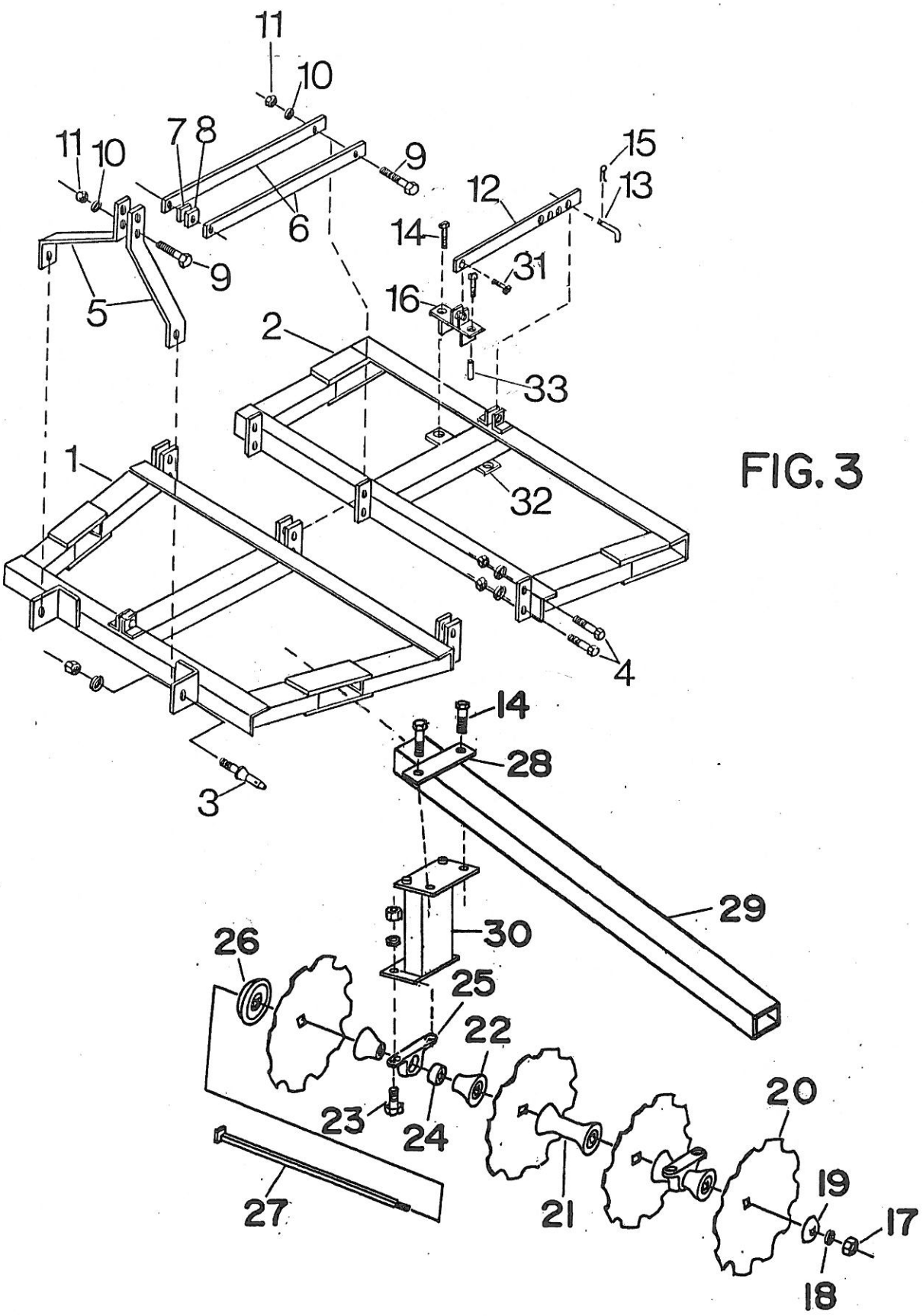
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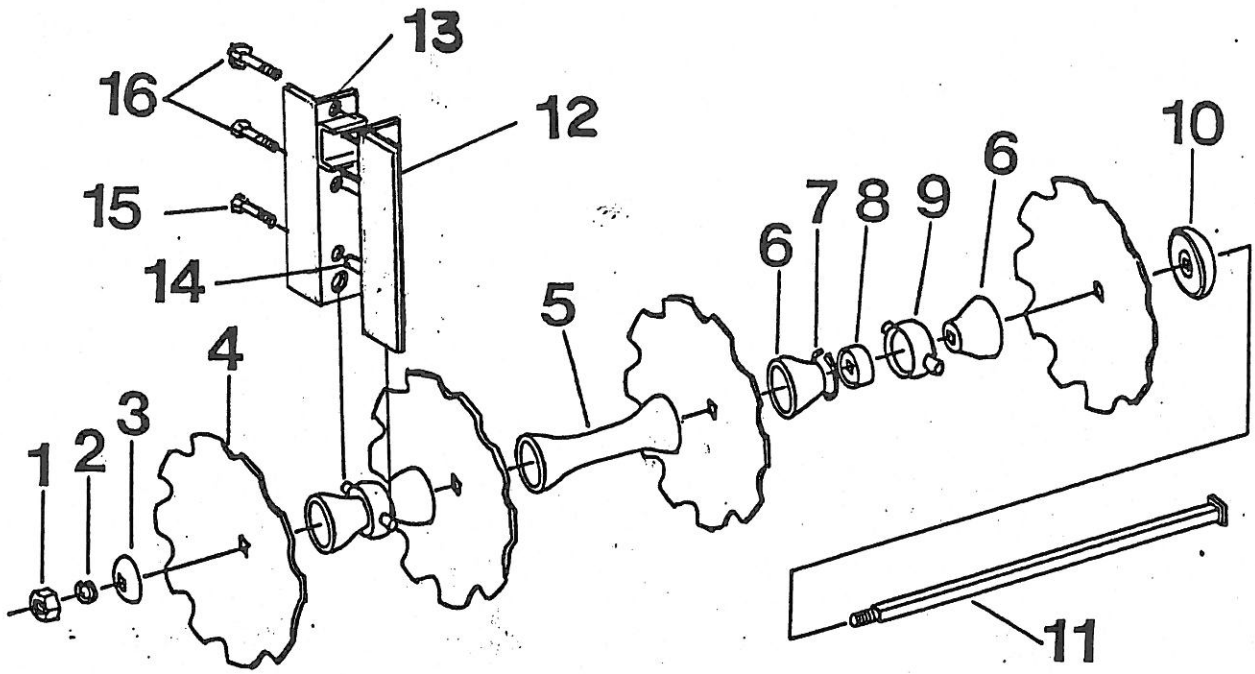
FIG. 3

TXHF ASSEMBLY

Ref. No.	Part No.	Description
1	10022	Front Main Frame
2	10031	Rear Main Frame
3	T-33	Hitch Pin, 7/8" Cat. I, w/ nut & washer
4	9192	Hex Bolt, 5/8" x 2½", Gr. 5
5	T-687	A-Frame Hitch, 3"
6	T-39	Strut, 37½"
7	T-391	Strut Spacer, ½"
8	T-392	Strut Spacer, 3/8"
9	T-725	Hex Bolt, 5/8" x 3 3/4"
10	T-24	Lockwasher, 5/8"
11	T-22	Hex Nut, 5/8"
12	12901	Front Adjusting Bar, 26"
	12443	Rear Adjusting Bar, 18 1/2"
13	9690	Adjusting Bar Pin
14	T-745	Hex Bolt, 5/8" x 5", Gr. 2
15	9979	Hair Pin Clip
16	12895	Slide Plate Top
17	T-18	Hex Nut, 1 1/8" or
	T-18A	Hex Lock Nut, 1 1/8"
18	T-20	Lockwasher, 1 1/8"
19	T-1	End Washer, 1 1/8"
20		Disc Blade (Specify Size)
21	T-91	Spacer Spool, 1 1/8" x 7½"
	T-3	Spacer Spool, 1 1/8" x 9"
22	T-47	End Spacer, 1 1/8" Sq. (7½" Spacing)
	T-49	End Spacer, 1 1/8" Sq. (9" Spacing)
23	T-740	Hex Bolt, 5/8" x 2", Gr. 2
24	T-60	Bearing, 1 1/8" (W208PPB5)
25	TPB	Pillow Block Bearing Housing
26	T-2	Bumper Washer, 1 1/8" Sq.
27		Axle, 1 1/8" Sq. (Specify Length)
28	T-714	Gang Beam Strap
29		Gang Beam
30	T-41	Pillow Block Gang Hanger for 18" & 20" Blades
	12378	Pillow Block Gang Hanger for 22" Blades
31	T-741	Hex Bolt, 5/8" x 2½" Gr. 2
32	12896	Slide Plate Bottom
33	T-56	Bushing

TXH-TXHF



TRUNNION MOUNTED BALL BEARINGS

Ref. No.	Part No.	Description
1	T-18	Hex Nut, 1 1/8" or
	T-18A	Hex Lock Nut, 1 1/8"
2	T-20	Lockwasher, 1 1/8"
3	T-1	End Washer, 1 1/8" Sq.
4		Disc Blade (See Chart on Page 65)
5	T-3	Spacer Spool, 1 1/8" x 9"
	T-91	Spacer Spool, 1 1/8" x 7½"
6	T-49	End Spacer, 1 1/8" x 3 3/4"
	T-47	End Spacer, 1 1/8" x 3"
7	T-722	Snap Ring, 3½"
8	T-602	Bearing 1 1/8" Sq. (W208PPB12)
9	TMB	Trunnion Bearing Housing
10	T-2	Bumper Washer, 1 1/8" Sq.
11		Axle, 1 1/8" Sq (See Chart on Page 67)
12	T-683L	LH Angle Hanger
13	T-683R	RH Angle Hanger
14	T-822	Spacer, ½" x 4 1/8"
15	T-735	Hex Bolt, ½" x 5½", Gr.2
16	T-746	Hex Bolt, 5/8" x 5½", Gr. 2

ASSEMBLY

Main Frame:

Refer to Fig. 1, 2, or 3 depending on which model you have. Lay frame on stands approximately 24" tall. On TXHF models, the front and rear frames must be bolted together using the 5/8" x 2½" Gr. 5 hex bolts. Install short gang beams in the front and longer gang beams in the rear of the frame. Note: Many frames are shipped from the factory with gang beams and slide plates installed.

Assemble slide plates on the center member of the main frame with front slide plate in extreme rear adjusting position and the rear slide plate in the extreme front position. Insert the drilled end of the gang beam into the slide plate and fasten with 5/8" x 6" Gr. 2 hex bolts, T4X or 5/8" x 5" Gr. 2 TXH, TXHF.

For TXH and TXHF models, note the placement of the adjustment bars to the slide plate and main frame. The front adjusting bar is usually longer than the rear bar. The adjusting bar is held in place on the slide plate with a 5/8" x 2½" hex bolt. The adjusting bar pin holds the bar in place on the main frame.

For T4X models, the slide plates are adjusted on the main frame using pin adjustment with holes drilled through the center member of the main frame.

Attach the A-frame, Ref. 5 (TXHF,T4X) and Ref. 3 (TXH), to the hitch ears of the main frame with the hitch pins, Ref. 3 (TXHF) and Ref. 2 (TXH, T4X). Next connect the struts, Ref. 6 (TXHF,T4X) and Ref. 4 (TXH), to the A-frame with the ½" and 3/8" strut spacers, Ref. 7 and 8 (THXF, T4X) and Ref. 5 and 6 (TXH), being between the struts using a 5/8" x 3 3/4" Gr. 5 hex bolt. Connect the opposite end of the struts to the main frame with 5/8" x 3 3/4" hex bolt, TXHF, or 5/8" x 3½" hex bolt, TXH, or 7/8" x 3½" hex bolt, T4X.

Gangs:

Gangs are shipped loosely assembled less the disc blades. Carefully observe the sequence and location of each spool and bearing. Disassemble gangs in order to reassemble them with the disc blades being careful tc put each blade, spool, and bearing back into its proper location. After reassembly, tighten each axle nut to the proper torque as specified in the Torque Chart on page 17.

⚠ Caution: Tighten by hand. Do not rely on an impact wrench because proper torque is critical to trouble free operation of your unit.

Arrange disc gangs under the gang beams. The front gangs are mounted with blade concavity turned out and the rear gangs with the concavity turned in. Note: The outside rear 1 1/8" gangs are shipped equipped with outrigger washers. On units with combination spacing, the 9" spacing is always mounted on the front and the 7½" spacing is on the rear of the disc.

Pillow block hangers are place underneath the gang beam and the gang beam strap goes on the top of the beam. Align hole and clamp the top strap and gang hanger onto the gang beam with 5/8" x 5" Gr. 2 hex bolts, Ref. 14 (TXHF) and Ref.11 (TXH).

Angle hangers, Fig. 4 , page 8 , which consist fo LH and RH angle halves, Ref. 12 and 13, are used for trunnion mounted ball bearings. Assemble the hanger halves with the spacer, Ref. 14, between them using a ½" x 5½" hex bolt, Ref. 15. Leave this bolt very loose so that the bottom end of the gang hangers can be installed over the trunnion housing ears, Ref. 9, and the upper end can be clamped to the sides of the gang beam. Install the 5/8" x 5½" hex bolts with one over the gang beam and one underneath clamping the LH and RH angle hangers to the gang beam. Tighten these bolts enought to secure them in place while gang positions and spacing can be checked. After all adjustments are made, tighten all bolts to proper torque, see page 17.

Mount the tubular gang hangers onto the gangs at the trunnion bearing housing using ½" x 3½" Gr. 5 hex bolts, Ref. 30, Fig. 1. Attach the hangers underneath the gang beams with the 3/4" U-bolt, Ref. 28. Loosely tighten the U-bolt until gangs are aligned and blade spacing is checked. When gangs are properly positioned, tighten U-bolts to correct torque, see page 17.

Gang Adjustment:

Locate the center of the main frame and position the front gangs so that the bumper washers and disc blades of each gang are an equal distance from the center of the unit and ½" apart from one another. See Fig. 5.

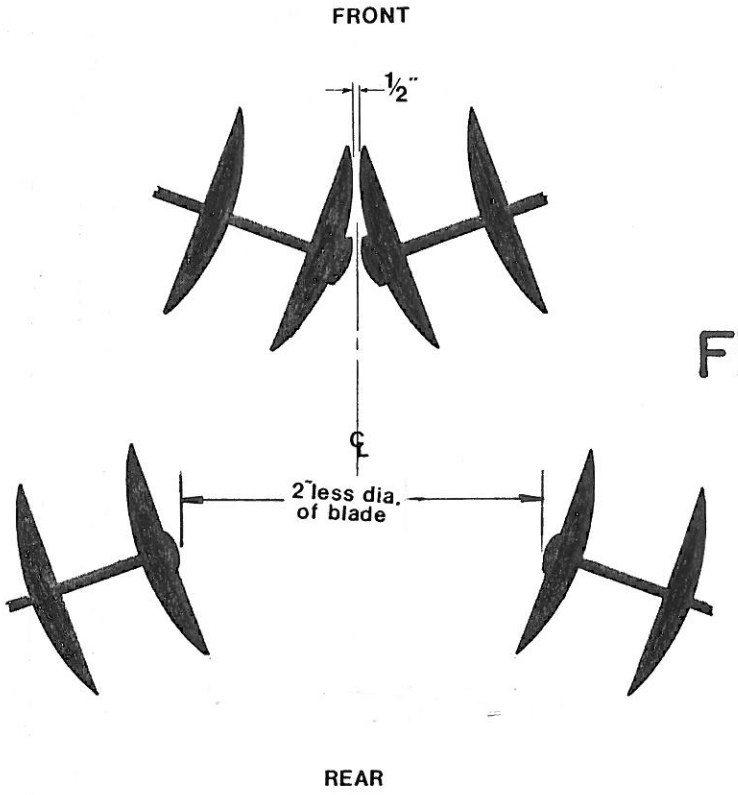


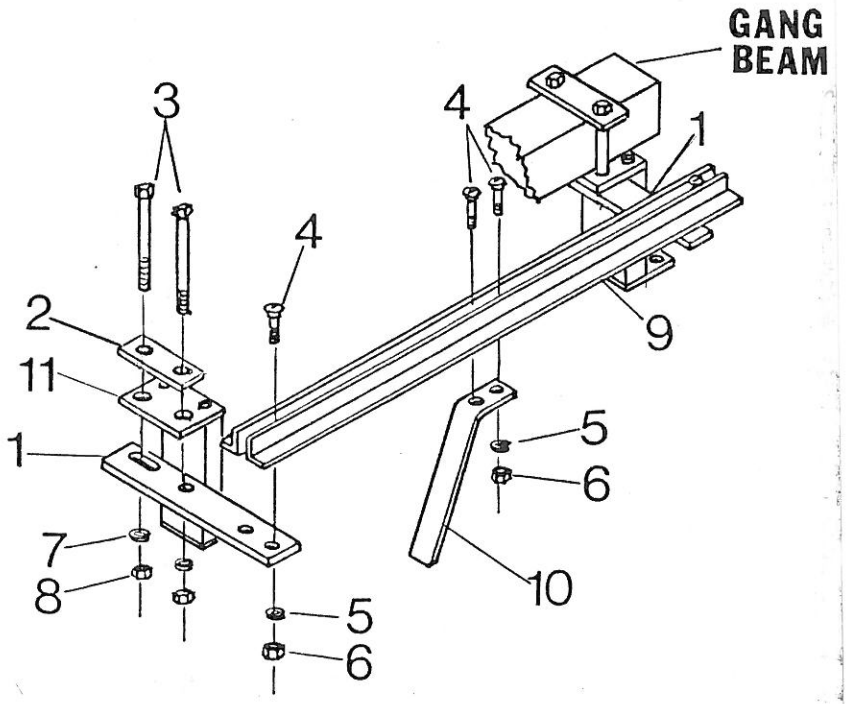
FIG.5

The spacing of the rear gangs depends on the size of the disc blades used on the unit. Spacing is usually 2" less than the diameter of the disc blade. For example: If the unit has 20" disc blades, the spacing should be 18" between the axle nuts of each gang. Again locate the center of the main frame and equally space the gangs from that point.

Scraper Kits:

Two different scraper kits are available for the 3 pt. lift disc harrows. They are the RSK (regular scraper kit) and the SK (heavy scraper kit). Each kit contains the components to outfit one complete unit with scraper blades. We do not provide the scraper blades for the outside front and inside rear disc blades.

RSK- Regular Scraper Kit: Refer to Fig.6 for scraper attachment to harrows with pillow block hangers. Mount the universal scraper mounting bracket, Ref. 1, underneath the top plate of the pillow block hanger using the 5/8" hex bolt, Ref. 3. These bolts should go through the clamp plate, hanger, and mounting bracket. The mounting bracket should be placed so that the scraper bar is on the rear of the gang beam. Place the scraper bar, Ref. 9, on top of the mounting bracket and secure with ½" x 2" carriage bolts, Ref. 4. Scrapers mount underneath the scraper bar with ½" x 2" carriage bolts. Position each scraper blade as close to the disc blade as possible without touching it. Turning the gang after mounting and tightening each scraper blade is recommended to prevent dragging or binding of the gang. After all scraper blades are correctly adjusted, tighten each bolt to approximately 40 ft./lbs.



REGULAR SCRAPER KIT (RSK)

FIG. 6

Ref. No.	Part No.	Description
1	12889	Scraper Bar Mtg. Brkt.
2	T-714	Top Gang Beam Strap
3	T-746	Hex Bolt, 5/8" x 5½" Gr. 2 for 3 x 3 GB
	9661	Hex Bolt, 5/8" x 6½" Gr. 2 for 4 x 4 GB
4	T-805	Carriage Bolt, ½" x 2"
5	T-25	Lockwasher, ½"
6	T-26	Hex Nut, ½"
7	T-24	Lockwasher, 5/8"
8	T-22	Hex Nut, 5/8"
9		Scraper Bar
10	T-265	Regular Scraper Blade
11		Pillow Block Hanger

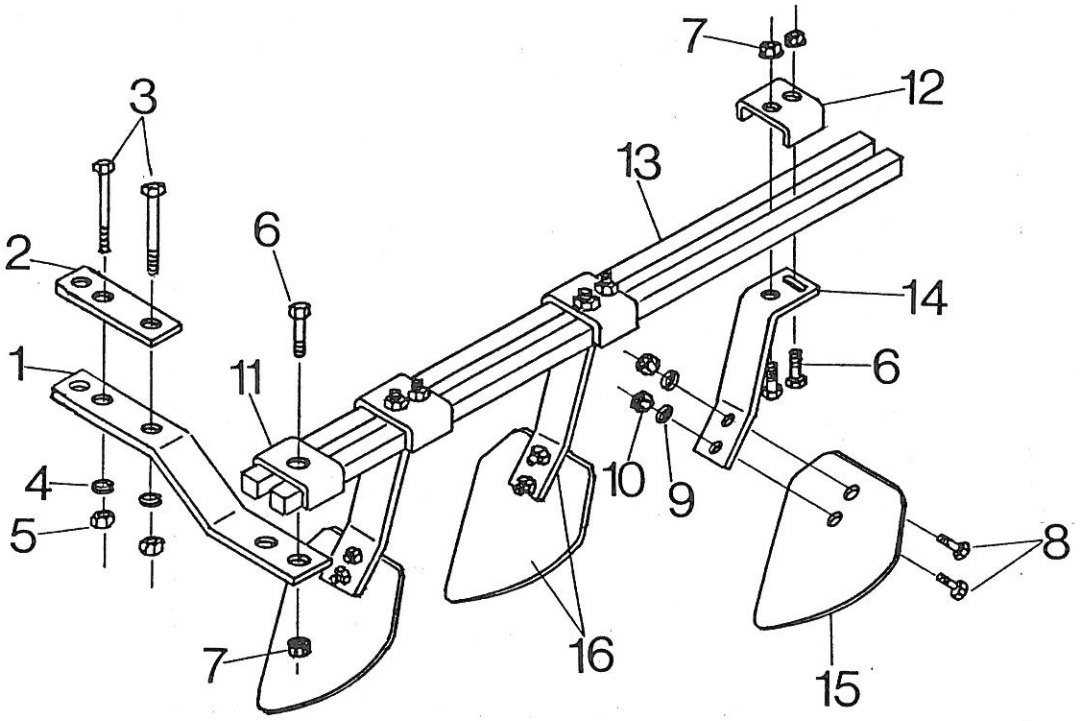


FIG. 7

REF. NO.	PART NO.	DESCRIPTION
1	12892	SCRAPER BAR MOUNTING BRACKET
2	12894	TOP CLAMP PLATE
3	T-745	HEX BOLT, 5/8" x 5", GR. 2 FOR 3 x 3 TUBE
4	T-24	LOCKWASHER, 5/8"
5	T-22	HEX NUT, 5/8"
6	11082	HEX BOLT, 1/2" x 2 1/2", GR. 2
7	9226	FLANGE LOCK NUT, 1/2"
8	T-733	HEX BOLT, 1/2" x 1 1/2", GR. 2
9	T-25	LOCKWASHER, 1/2"
10	T-26	HEX NUT, 1/2"
11	T-803	CLAMP, 1 HOLE
12	9356	CLAMP, 2 HOLE
13		SCRAPER BAR, 1" SQ.
14	10151	SCRAPER ARM
15	11081	SCRAPER BLADE
16	T-8023	ARM & BLADE ASSY. (RH FRONT, LH REAR)
	T-8024	ARM & BLADE ASSY. (LH FRONT, RH REAR)

SK - Heavy Scraper Kit: The heavy scraper kit assembly is shown in Fig. 7. As with the regular scraper kit, the scraper bar mounting bracket, Ref. 1, is clamped underneath the gang beam with the top clamp plate, Ref. 2, using 5/8" hex bolts, Ref. 3. The mounting bracket is placed so that the scraper bar is on the rear of the gang beam. Place the scraper bar, Ref. 13, on top of the mounting bracket and secure with the one hole clamp, Ref. 11, and ½" x 2½" hex bolts, Ref. 6. Scraper arm and blade assemblies, Ref. 16, come assembled from the factory with half of them being right hand and the other half left hand. Bolt the scraper arm and blade assembly underneath the scraper bar using a two hole clamp, Ref. 12, and two ½" x 2½" hex bolts. Mount a scraper blade to each disc blade except the outside front and inside rear disc blades. Position each scraper as near to the disc blade as possible without touching it. The mounting arm, Ref. 14, has a slotted hole for angular adjustment to more closely fit the blade concavity. Turning the gang after mounting is recommended to prevent dragging or binding of the gang. After all scrapers are correctly adjusted, tighten bolts to approximately 50 ft./lbs.

LUBRICATION

All Tufline ball bearing harrows are shipped with triple sealed ball bearings unless specifically ordered with re-greasable type bearings. Sealed bearings require no lubrication since they are pre-lubricated by the bearing manufacturer. All friction bearings should be thoroughly lubricated before each use and again after each five hours of use. Regular thorough lubrication is essential to the life of the bearing. Failure to do so will result in promoting bearing failure.

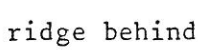
INITIAL ADJUSTMENT

Your harrow should be ready for use after proper assembly and lubrication. As in any new machine, all bolts and nuts should be checked to insure that they are tight prior to use. Pay special attention to axle nuts and gang hanger bolts. If the harrow has been in storage for a lengthy period of time, it is recommended that it be lubricated prior to use. It is important that only one adjustment be made at a time and then tried between each adjustment. Remember each adjustment affects another; therefore, extreme care should be used when adjusting. Keep in

mind that any disc with 7½" spacing is primarily a pulverizing disc and will perform much better in tilled soil. Normally a blade spacing of 9" or 10½" is recommended for cutting untilled soil.

Each trial run should be made with the tractor in the same gear and approximately the same RPM. Changing discing speed while attempting to adjust will result only in excessive time and labor loss due to changing conditions.

While making your first trial run, observe the disc closely as it is traveling. It should be level from the front to rear as it travels. If not, level it by adjustment of your top link. After making the necessary adjustments, the disc should pull level with both front and rear gangs penetrating the soil at approximately the same depth.

Now observe the soil behind the disc. It should be level and smooth. If after making the above adjustments, the disc leaves a water furrow in the center (Example: ), it would indicate that the front gangs are more aggressive than the rear gangs. To correct this, either increase the angle of the rear gangs or decrease the angle of the front gangs. Conversely, if the disc is ridging, that is leaving a ridge behind it (Example: ), this would indicate that the rear gang is is more aggressive than the front gang. To correct this, either decrease the angle of the rear gangs or increase the angle of the front gangs.

Keep in mind that many variables affect the operation of your disc. These include, but are not limited to penetration, speed, soil conditions, etc. Any changes in any one of these could cause a requirement for further adjustments. The final adjustment will be the one that best meets the requirement of the user.

QUICK REFERENCE TROUBLE SHOOTING GUIDE

PROBLEM	POSSIBLE SOLUTION
1. Unit not tracking or fishtailing.	A. Adjust top link to increase weight on the rear of the disc.
	B. Disc assembled incorrectly. Refer to assembly instructions.
2. Unit not tracking: skipping, jumping, and fishtailing (Untilled hard soil)	A. Insure equal depth of cut front and rear.
	B. Reduce speed.
	C. Reduce gang angle.
	D. Reduce depth of cut by carrying on 3 pt. lift discing shallow first time over. NOTE: Some experimentation may be required by trial and error depending on soil conditions to arrive at proper solution.
3. Unit leaving water furrow .	A. Increase speed.
	B. Increase angle on rear gangs.
	C. Decrease angle on front gangs.
	D. Disc not level. Lower rear gangs or raise front gangs.
	E. Any combination of the above.
4. Unit ridging or leaving behind a a high spot.	A. Decrease speed.
	B. Decrease angle on rear gangs.
	C. Decrease angle on front gangs.
	D. Disc not level. Raise rear gangs or lower front gangs.
	E. Any combination of the above.
5. Unit leaving water furrows on outside of each rear gang.	A. Add optional T-703 outrigger attachments with a round disc blade approximately 4" smaller than stock blades
	B. Taper ouside blade size on last one or two blades of each gang by replacing blades with blades decreasing in size.
6. Blades plugging with soil or trash.	A. Add optional regular or heavy scraper kit. If already equipped, readjust.
	B. Soil conditions not suitable for discing due to excessive moisture.
7. Unit leaving balk between front inside gangs.	A. Add optional balkbreaker assembly.

TUFLINE BOLT TIGHTENING TORQUE CHART

Bolt or axle size	Description	Ft/lbs. Tightening Torque, Lubricated Threads, SAE or ASTM Grade		
		2	3	5
1/2"	Hex Bolt	45		75
5/8"	Hex Bolt	93		150
3/4"	Hex Bolt	150		250
7/8"	Hex Bolt	202		378
7/8"	Gang Axle	250		
1"	Hex Bolt	300		583
1 1/8"	Hex Bolt	474		782-78*
1 1/8"	Gang Axle		700-70*	

* Torque wrenches are not ordinarily available for these torques. Complete tightening process with 10 ft. lever measured from the center of the wrench using last figure shown as pounds of force at end of lever. Spring scales may be used to check.

SAFETY DECAL PLACEMENT

** **NOTE:** If safety decals have been damaged, removed, or become illegible, new decals must be applied. New decals are available from your distributor or dealer parts department or the factory.