TERRACING PLOW

ASSEMBLY**OPERATION**MAINTENANCE INSTRUCTIONS

AMCO MANUFACTURING COMPANY

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TO THE PURCHASER

The care you give your new AMCO Terracing Plow will greatly determine the satisfaction and service you will obtain from it. By observing the instructions and suggestions in this manual, your AMCO Terracing Plow will serve you well for many years.

As an Authorized Dealer, we stock Genuine AMCO Parts, which are manufactured with the same precision and skill as the original equipment. For best performance and longer life, use only Genuine AMCO replacement parts. Our factory trained staff is kept fully informed of the most efficient methods of servicing AMCO equipment and is ready and able to assist you.

When you sell your plow, you should pass this manual to the new owner.

If you should require additional aid or information, contact us.

OSHA requires that, as a farm employer, you meet certain safety requirements. Become familiar with and comply with those requirements. Be sure anyone who operates this equipment understands all safety related items. If this plow is repainted, be certain new decals are ordered. Decals pertaining to personal safety must be replaced.

Look for this symbol to point out important safety precautions. It means--
ATTENTION! Become alert! Your safety is involved.

To insure efficient and prompt service, please provide the model number and serial number of your AMCO Plow in all correspondence or contacts. Remember, the right and left hand sides of the plow are determined by standing at the rear of the plow and facing the direction of travel.

_____ _____

MODEL NUMBER SERIAL NUMBER

(Rev. 9/98)

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Rev. 2/23/12

HYDRAULIC TERRACING PLOW
Standard Specifications

AXLES: 1-1/2" square, high carbon cold rolled steel
BLADES: (14) 26" x 1/4" Plain with (2) 24" x 1/4" with Back-up Step down & (2) 20" x 3/16" Plain with Back-up.
SCRAPERS: High carbon replaceable and adjustable blades with 3/8" x 2" heat treated spring steel shanks, mounted to 3" x 2" x 1/2" high carbon angle iron bar
GANG FRAME: 6" x 4" x 3/8" welded tube
GANG ANGLE: Adjustable from 21°--29°
GANG TILT: Hydraulically controlled from 18° down to 43° up
HYDRAULIC CYLINDERS: Two 4" x 16" independent
HYDRAULIC HOSES: Four 3/8" dia. Hoses to mount from hydraulic cylinders to tractor
TILT INDICATOR: Allows positive setting of gangs at desired tilt from driver's seat
MAIN FRAME: 7" x 7" x 3/8" tool bar with ASAE Cat. III hitch for quick coupler and conventional three point
BEARING: Protect-O-Shield, extra heavy duty 1-1/2" square bore, greasable ball type, toggle mounted. Two year guarantee on bearings.
SPACER SPOOLS: Fabricated steel
TRANSPORT WIDTH: 9 feet
WRENCH: One for gang bolt nut
WEIGHT PER FOOT: 190 pounds
WEIGHT PER BLADE: 201 pounds
PARKING STANDS: Two

MODEL NO.	Width of Unit	No. of Bearings	No. of Blades	Blade Spacing	Approx. Drawbar HP Required	Approx. Weight
			10-1/2" SPACING			
TJ3-1826	16'-10"	6	18	10-1/2"	130-200	3212

OPTIONAL EQUIPMENT

Shock Absorber gang risers in lieu of standard cast gang risers, add per bearings.

26" x 1/4" Cut-Out Blades in lieu of standard 26" x 1/4" Plain Blades.

NOTE: Use of disk on tractors with higher than recommended drawbar horsepower will cause excessive maintenance cost and may void your warranty.

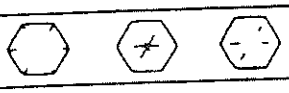
GENERAL TORQUE SPECIFICATION TABLE

ALL BOLTS SHOULD BE TIGHTENED TO THE RECOMMENDED TORQUES SHOWN IN THE "GENERAL TORQUE SPECIFICATION TABLE"

GENERAL TORQUE SPECIFICATION TABLE

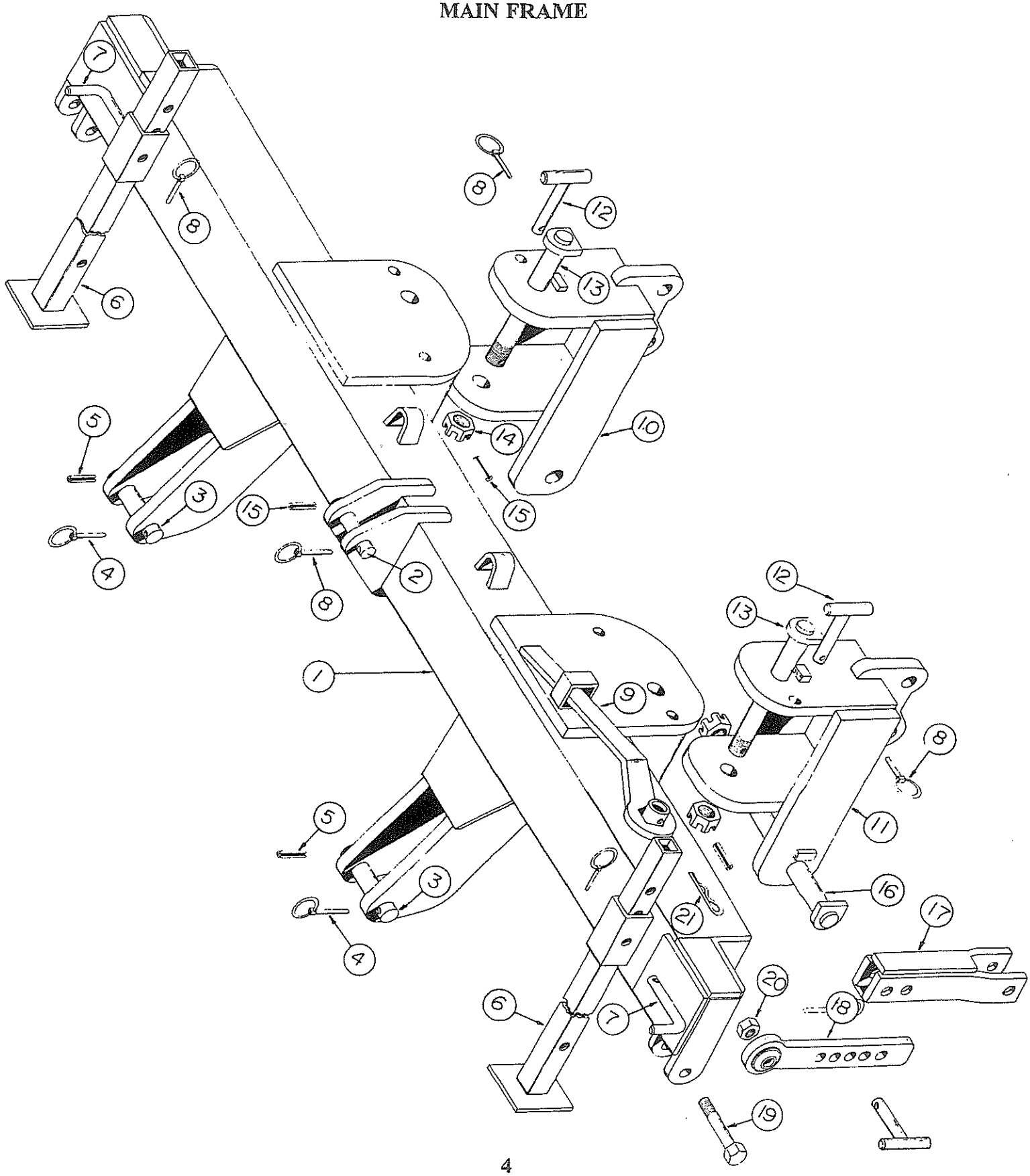
USE THE FOLLOWING TORQUES WHEN SPECIAL TORQUES ARE NOT GIVEN

Note: These values apply to fasteners as received from supplier, dry, or when lubricated with normal engine oil. They do not apply if special graphited or moly-disulphide greases or other extreme pressure lubricants are used. This applies to both UNF and UNC threads.

SAE Grade No		2		5		8 *	
Bolt head identification marks as per grade NOTE: Manufacturing Marks Will Vary							
Bolt Size		Torque Foot Pounds		Torque Foot Pounds		Torque Foot Pounds	
Inches	Millimeters	Min	Max	Min	Max	Min	Max
1/4	6 35	5	6	9	11	12	15
5/16	7 94	10	12	17	20 5	24	29
3/8	9 53	20	23	35	42	45	54
7/16	11 11	30	35	54	64	70	84
1/2	12 70	45	52	80	96	110	132
9/16	14 29	65	75	110	132	160	192
5 8	15 88	95	105	150	180	220	264
3/4	19 05	150	185	270	324	380	456
7/8	22 23	160	200	400	480	600	720
1	25 40	250	300	580	696	900	1080
1 1/8	25 58			800	880	1280	1440
1 1/4	31 75			1120	1240	1820	2000
1 3 8	34 93			1460	1680	2380	2720
1 1/2	38 10			1940	2200	3160	3560

* Thick nuts must be used with Grade 8 bolts

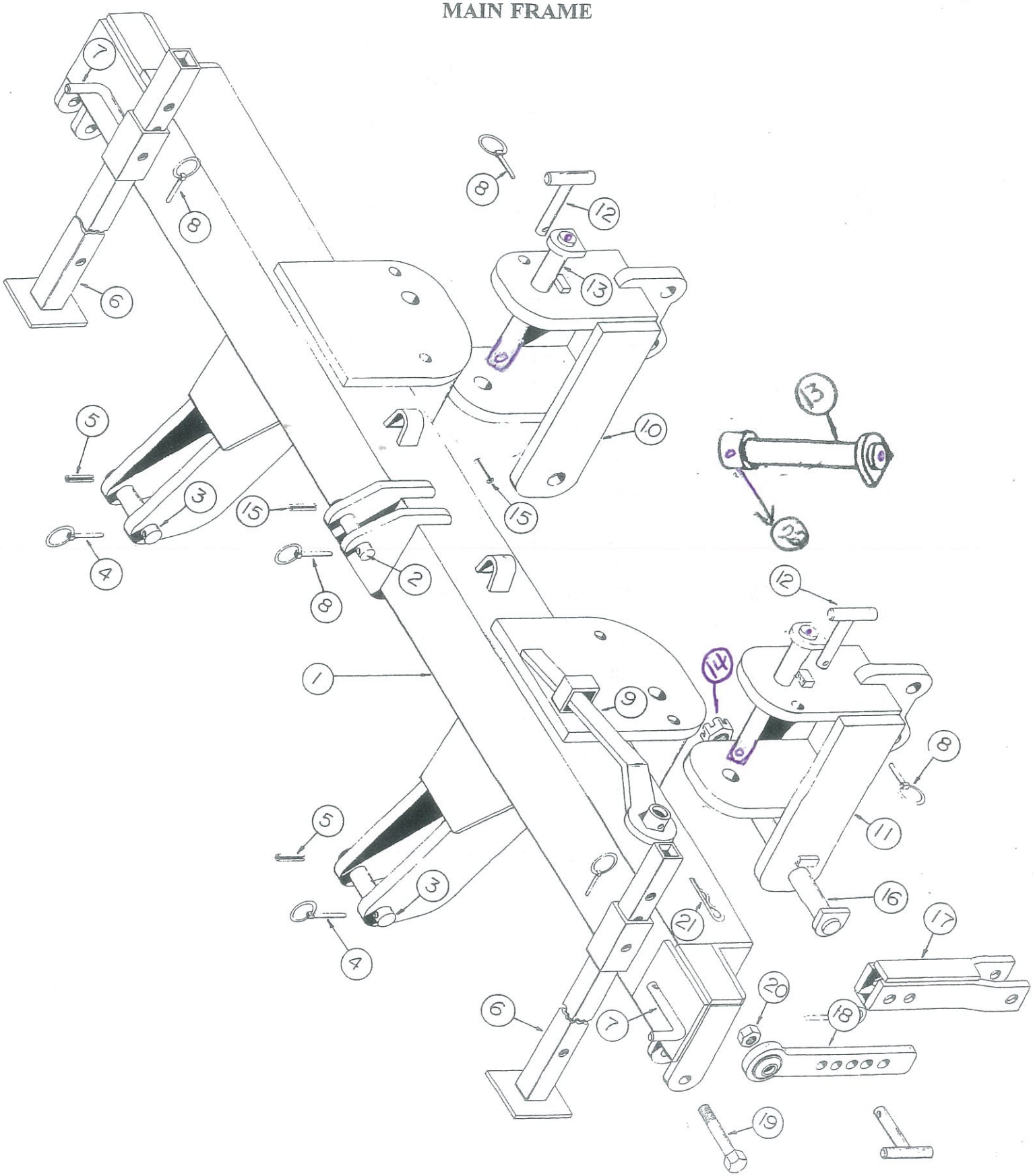
MAIN FRAME



TJ3 SERIES
TERRACING PLOW
MAIN FRAME

Ref. No.	Part No.	Description	No. Req'd.
1	20171	Main Frame	1
2	101381	Top Hitch Pin 1-1/4" Dia.	1
3	101380	Lower Hitch Pin 1-7/16" Dia	2
4	11697	Klik Pin 1/16" Dia.	2
5	11659	Steel Roll Pin 5/16" x 2-1/2"	2
6	20166A	Parking Stand	2
7	100683	Lock Pin 3/4" Dia.	2
8	10317	Klik Pin 1/4" Dia.	6
9	100134	Wrench Nut	1
10	20178	Pivot Bracket - RH	1
11	20179	Pivot Bracket - LH	1
12	0871	Transport Pin 1" Dia.	4
13	0593	Pivot Pin 1-1/2" x 12-1/16"	2
14	10232	Slotted Hex Nut 1-1/2 NC	4
15	10910	Roll Pin 5/16" x 2-1/4"	5
16	0545	Pivot Pin 1-1/2" x 11-3/4"	2
17	20172	Outer Slide	1
18	20173	Adjusting Slide	1
19	10228	Machine Bolt 1" x 4-1/2" NC, PL	2
20	10868	Lock Nut 1" NC, PL	2
21	10803	Hair Pin	1
		Use these parts before **Serial # 98080320**	

MAIN FRAME



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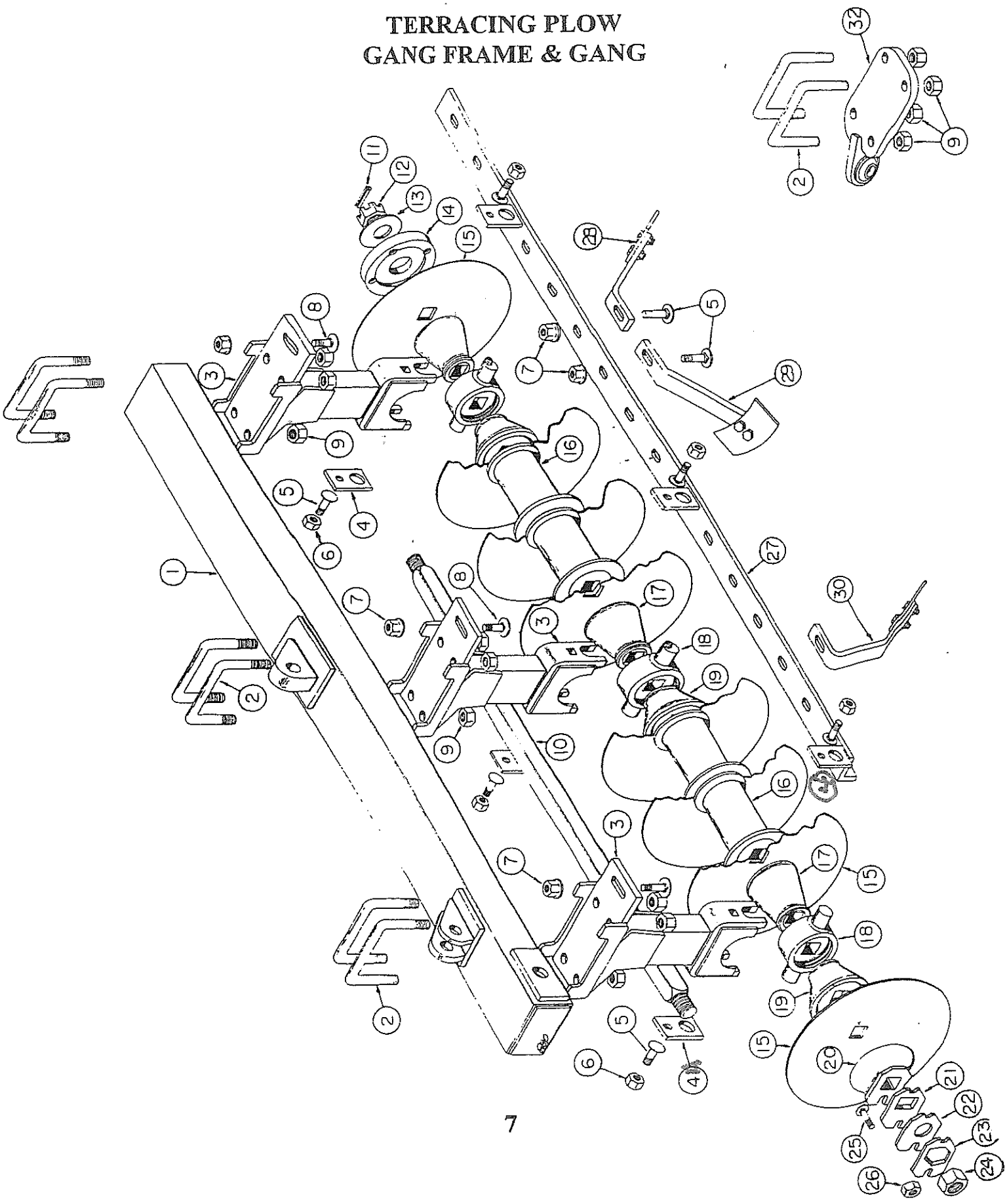
7	100683	Lock Pin 3/4" Dia.	2
8	10317	Klik Pin 1/4" Dia	6
9	100134	Wrench Nut	1
10	20178A	Pivot Bracket - RH	1
11	20179A	Pivot Bracket - LH	1
12	0871	Transport Pin 1" Dia.	4
13	20588	Pivot Pin 2" Dia. X 14-1/2" Long	2
14	10232	Slotted Hex Nut 1-1/2" NC	2
15	10910	Roll Pin 5/16" x 2-1/4"	3
16	0545	Pivot Pin 1-1/2 x 11-3/4"	2
17	20172	Outer Slide	1
18	20173	Adjusting Slide	1
19	10228	Machine Bolt 1" x 4-1/2" NC, PL	2
20	10868	Lock Nut 1" NC, PL	2
21	10803	Hair Pin	1
22	102546	Sleeve - 2-5/8" O.D. x 9/32" W.T. x 2-5/8" Long	2
23	10833	Hex Bolt 1/2" x 3-1/2" NC, PLT, Gr.5 (Not shown)	2
24	10786	1/2" Lock Washer (Not shown)	2
25	10832	1/2" Cut Washer (Not shown)	2
26	10787	1/2" Hex Nut NC, PLT (Not shown)	2
27	11081	Grease Fitting 20588 Dia. (Not shown)	2

Use these parts before **Serial # 98080321**

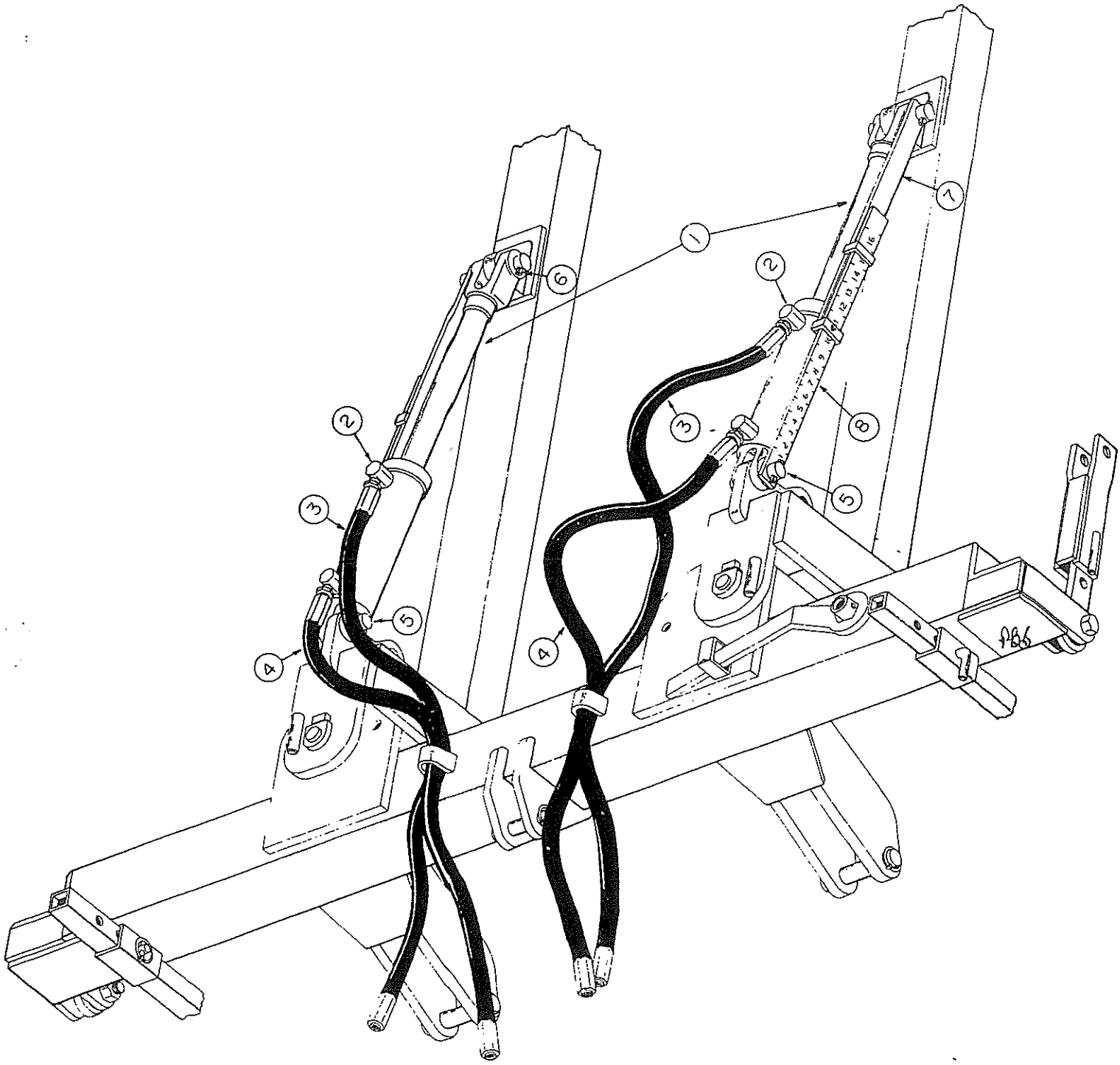
TERRACING PLOW
GANG FRAME & GANG



TJ3 SERIES
TERRACING PLOW
GANG FRAME & GANG

Ref. No.	Part No.	Description	No. Req'd.
1	20352	Gang Frame	1
2	9752	U-Bolt 7/8" Dia.	8
3	20070	Bearing Riser	3
4	20579	Grease Guard	3
4A	102489	Wear Guard	3
5	10135	Carriage Screw 5/8" x 1-3/4" NC, PL, Gr.5	15
6	10299	Lock Nut 5/8" NC, PL	6
7	11647	Flange Lock Nut 5/8" NC, PL	12
8	10665	Carriage Screw 5/" x 2" NC, PL, Gr.5	3
9	10396	Lock Nut 7/8" NC, PL	16
10	9454	Gang Bolt 1-1/2" Sq. - 9 Blade	1
11	10910	Roll Pin 5/16" x 2-1/4"	1
12	10226	Gang Bolt Nut 1-1/2" NF, Slotted	1
13	10872	Flat Washer 1-3/8" USS, PLT	1
14	2404	Bumper Washer	1
15	3263	Blade 26" x 1/4" Plain	7
15	2456	Blade 26" x 1/4" Cut-out	7
16	0523	Spacer Spool	5
17	17007	End Bell - Small	3
18	FB-09-0015	Bearing & Housing Assy.	3
A	16003	Bearing Housing	1
B	11503	Bearing 100mm - GW211P-SPL	1
C	11064	Snap Ring	1
D	100104	Washer 100m	2
E	12384	Grease Fitting 1/8" NPT, Straight	1
19	17006	End Bell - Large	3
20	1222A	End Gang Washer	1
21	100099	Spacer Plate	1
22	100098	Bearing Plate	1
23	5622A	Lock Plate	1
24	10489	Gang Bolt Nut 1-1/2" NF	1
25	10710	Carriage Screw 1/2" x 2" NC, PL, Gr.5	1
26	10395	Lock Nut 1/2" NC, PL	1
27	101051	Scraper Bar 3" x 2" x 3/8" - 91" long	1
28	20069	Scraper Assy. - RH	8
A	101049	Scraper Shank	1
B	101019	Scraper Blade	1
C	11652	Hex Screw 1/2" x 1-1/4: NC, GR	2
D	10395	Lock Nut 1/2" NC, PL	2
29	20068	Scraper - LH (same components as 20069)	8
30	20112	Scraper (Special) - RH	1
A	101173	Scraper Shank	1
B	101019	Scraper Blade	1
C	11652	Hex Screw 1/2" x 1-1/4" NC, GR	2
D	10395	Lock Nut 1/2" NC, PL	2
E	10832	Flat Washer 1/2" USS, PL	2
31	20113	Scraper (Special) - LH (same as components as 20112)	1
32	20169	Anchor Bracket	1
33	3278	Back-up Blade 10" x 11 Ga. Plain (not shown)	3
34	3255	Blade 24" x 1/4" Plain	1
34	3250	Blade 24" x 1/4" Cut-Out	1
35	11588	Blade 20" x 1/4" Plain (not shown)	1
35	11589	Blade 20" x 1/4" Cut-Out (not shown)	

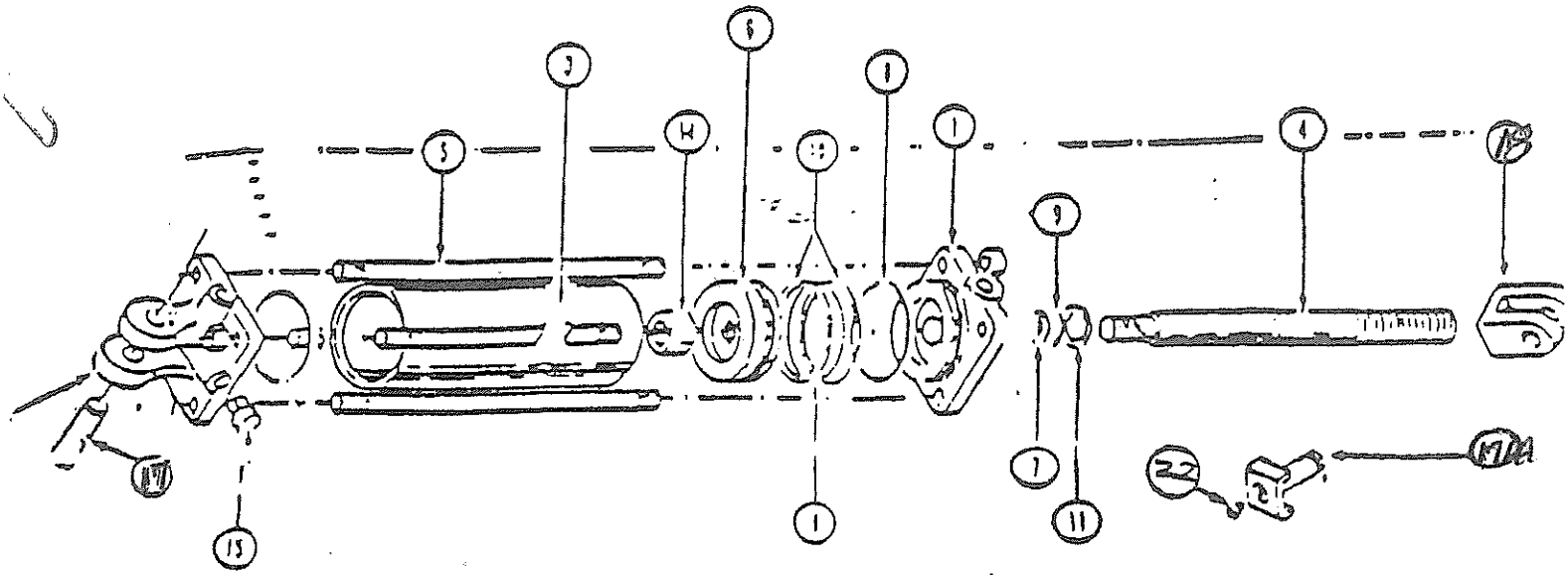
HYDRAULIC CIRCUIT



TJ3 SERIES
TERRACING PLOW
HYDRAULIC CIRCUIT

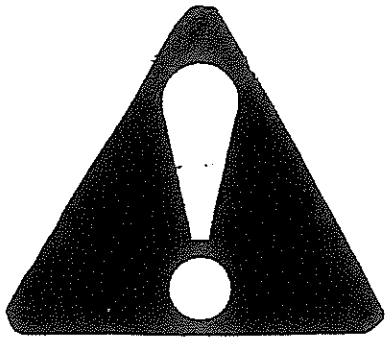
Ref. No.	Part No.	Description	No. Req'd.
1	12204	4 x 16 Hydraulic Cylinder	2
2	12180	Elbow 90 Swivel 1/2" female to 1/2" male ORB	4
3	10927	Hydraulic Hose - 3/8" I.D. -- 108" Long	2
4	10925	Hydraulic Hose - 3/8" I.D. -- 96" Long	2
5	101379	Pin Special 1-1/4" Dia. - 6-1/8" Long	4
6	10910	Roll Pin 5-16" x 2-1/4"	12
7	20175	Indicator (Female)	2
8	20210	Indicator (Male) - RH	1
8	20211	Indicator (Male) - LH	1
9	11695	Decal - Indicator - RH (Not Shown)	1
10	11696	Decal - Indicator - LH (Not Shown)	1

4 X 16 HYDRAULIC CYLINDER (LION) 3000 PSI



Ref. No.	Part No.	Description	No. Req'd.
	12204	Cylinder Complete	1
1	12249	Piston Head	1
2	12234	Butt	1
3	12250	Tube	1
4	12251	Piston Rod	1
5	12252	Tie Rod	4
6	12253	Piston	1
	12237	Seal Repair Kit	1
7		O-Ring	1
8		O-Ring	3
9		Washer	1
10		Washer	2
11		Rod Wiper	1
14	12246	Lock Nut 1-1/8" - 12 UNF, GR-C	1
15	12277	Plug 3/4" - 16 UNF, ORB	1
17	100171	Cylinder Pin	1
17A	20570	Pin 1-1/4" (w/Lube Fitting & 5/16 x 2-1/4" Roll Pin)	1
18	11502	Clevis	1
21	10910	Roll Pin 5/16" x 2-1/4" (not shown)	3
22	11081	Grease Fitting	1
23	10077	1-1/4" Cut Washer PLT (not shown)	2
24	12180	Adapter 1/2" to 1/2" ORB ASAE Thread	2

NOTE: Items 7, 8, 9, 10 & 11 sold in repair kit only.
Use these parts **beginning** with Serial #**95060243**.



THIS SAFETY ALERT SYMBOL INDICATES IMPORTANT SAFETY MESSAGES IN THIS MANUAL. WHEN YOU SEE THIS SYMBOL, CAREFULLY READ THE MESSAGE THAT FOLLOWS AND BE ALERT TO THE POSSIBILITY OF PERSONAL INJURY.

CAUTION! When working on the plow, care should be exercised in handling or tightening bolts near disc blades to avoid injury.

CAUTION! Park or block the terracing plow so it will not roll when disconnected from the tractor.

CAUTION! When transporting machinery over public roads, the SMV emblem must be used for protection of tractor and motor vehicle operators.

CAUTION! Never stand between tractor and terracing plow when hitching unless all controls are in neutral and the brakes are locked.

CAUTION! When transporting machinery over public roads, comply with your local and state laws regarding length, width and lighting.

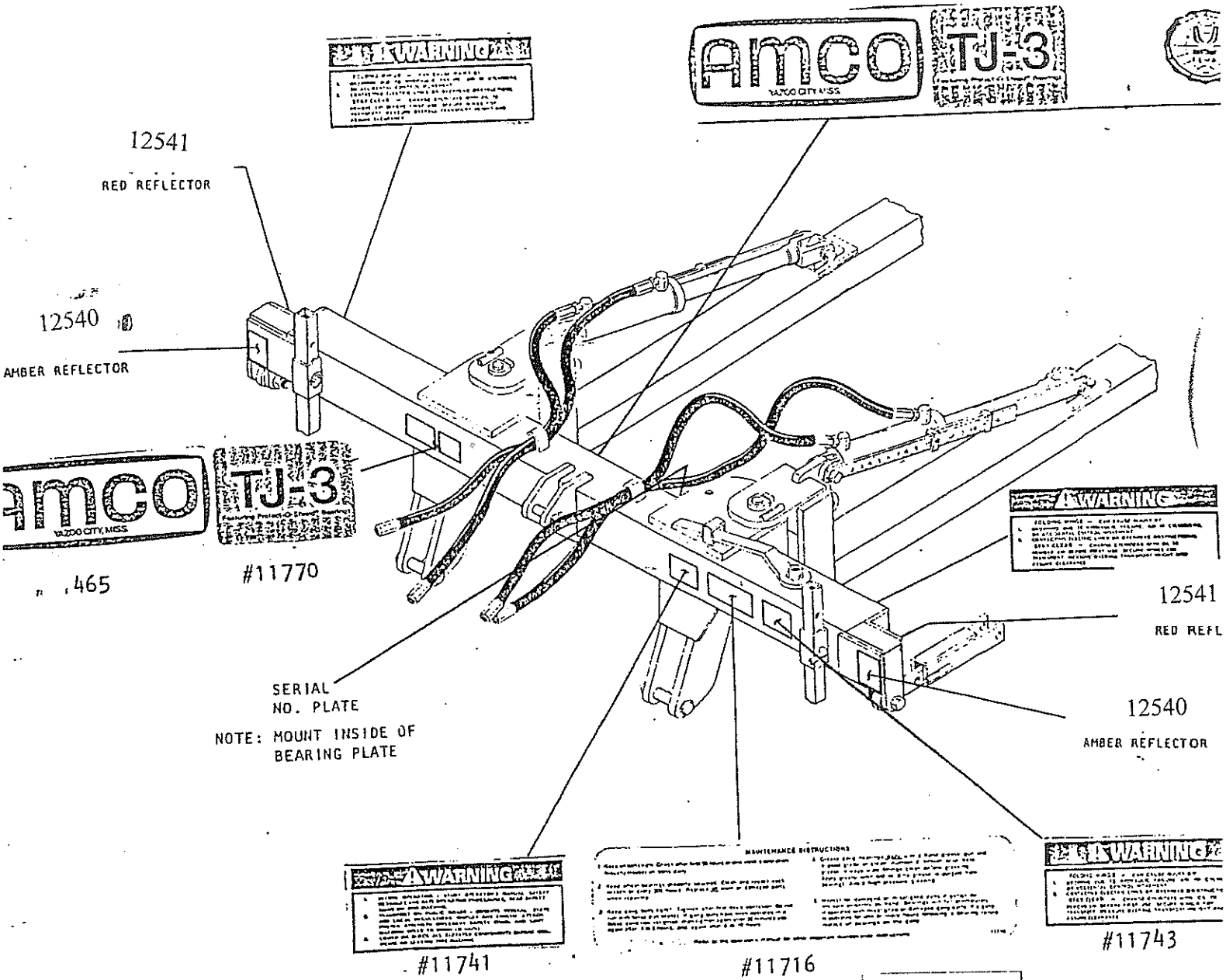
CAUTION! When transporting farm implements on public roads after dusk, it is the responsibility of the operator to provide lighting and reflectors on the rear of the implement in accordance with your state law.

CAUTION! All hydraulically or mechanically elevated operating components must be blocked to prevent accidental lowering or must be lowered to the ground when making adjustments or when the equipment is idle.

WARNING! Before transporting over public roads, lock pivot brackets so that gangs are rearward and lock gangs in raised position.

WARNING! Stay clear of raised gangs. Serious injury can result if raised wings drop due to hydraulic system failure, air in the cylinders or accidental movement of controls. Operate cylinders several times to purge air from the system.

DECAL PLACEMENT CHART



TJ3 SERIES
TERRACING PLOW
DECAL PLACEMENT CHART

Quantity	Part No.	Description
2	11465	AMCO Logo -- Large
2	11770	Model Number
2	12540	Amber Reflector
2	12541	Red Reflector
1	11716	Maintenance Instructions
1	11741	Warning Before Operating
3	11743	Warning Folding Winds
1	11548	FEMA

ASSEMBLY INSTRUCTIONS

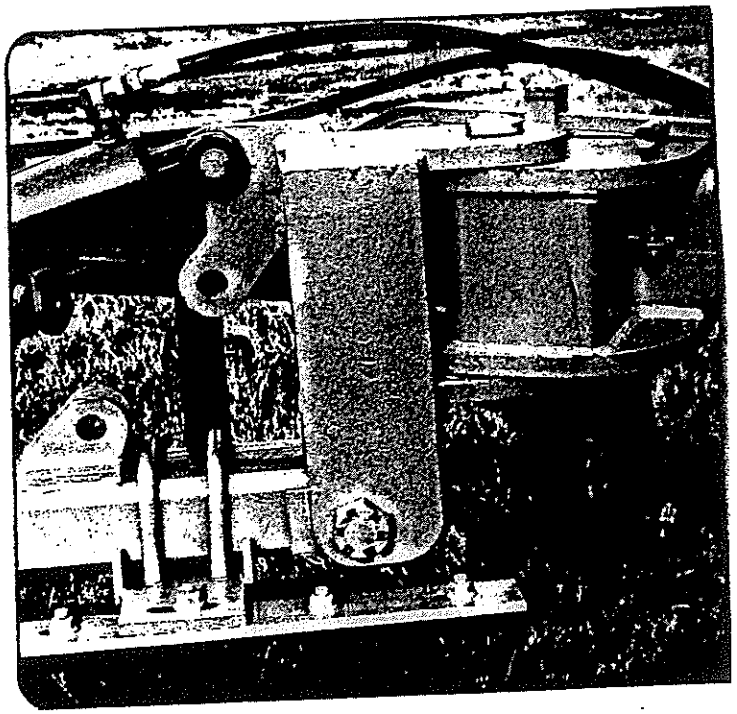
The Terracing Plow is shipped from the factory with maximum pre-assembly in the following bundles:

A. Main Frame
B. Two gang & frame bundles with scrapers & scraper bars attached
C. Hydraulic cylinders and hoses

Place all bundles where they will be convenient. Arrange loose parts so they may be readily seen when needed. To insure good alignment of the units and parts, always insert all bolts leaving the nuts loose. Tighten the nuts evenly to prevent misalignment, distortion, or binding. Be sure all bolts are tight, all cotter pins properly spread and all pins properly inserted.

STEP 1

Select clean, level area for assembly. Place parking stands in main frame. Set main frame on sturdy assembly stands at least 40" high.



STEP 2

Attach the pivot brackets to the center holes in the rear main frame plates by the 1-1/2" x 12-1/16" pins.

STEP 3

Attach gangs and frames to pivot brackets by the 1-1/2" x 10-1/2" pins. Connect outer slides to the anchor brackets on each gang frame. Bolt the adjusting slides to the lower ends of the main frame with 1" x 4-1/2" machine bolts.

STEP 4

Position adjusting slide from the main frame into the outer slide from the gang frame and pin with 1" transport pin.

STEP 5

Install 4 x 16 hydraulic cylinders on each gang frame; connect to the pivot brackets. Make sure the butt end of each cylinder is connected to the pivot brackets and the rod end attached to the gang frames. Install a tilt indicator on each of the 4 x 16 cylinders as shown in the picture. Secure with roll pins.

NOTE: Remember, the right and left hand sides of the plow are determined by standing at the rear of the plow and facing the direction of travel.

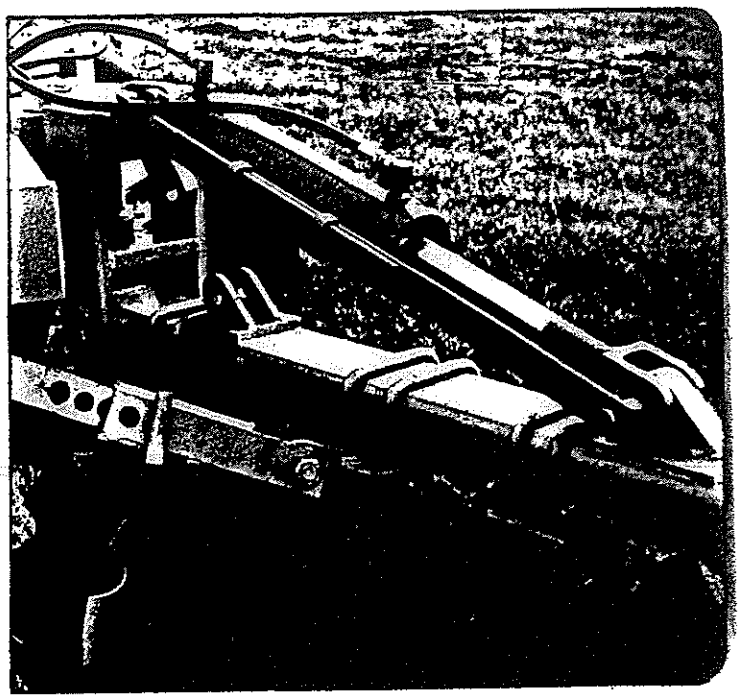
STEP 6

Install hydraulic fittings and hoses as follows:

(A) Install four #10921 1/2" male to 1/2" female swivel elbows into the ports on the 4 x 16 cylinders. Turn fittings as shown in picture. Turn fittings as shown in picture. Coat fittings with pipe sealant before installation. **DO NOT** put sealant over end of fitting. This will keep the sealant out of the tractor hydraulic system. Tighten fittings!

(B) Connect cylinders with hoses. Lay the hoses out where they will be readily accessible. Connect hoses and fittings as follows:

(1) The two #10927 3/8" x 108" hoses connect the rod end of the 4 x 16 cylinders to the tractor. Route hoses through supports.



(2) The two #10925 3/8" x 96" hoses are used to connect the butt end of the 4 x 16 cylinders to the tractor. Route hoses through supports.

This completes assembly of the hydraulic circuit for gang tilt. Carefully check your assembly and hose routing. All hoses must be routed through the support brackets to prevent damage.

STEP 7

Final grooming and check points:

(A) Check all bolts for proper torque.

(B) Check scraper adjustment. Scrapers should be adjusted to run 1/16" to 1/8" from disk blades.

(C) Check all hydraulic hoses and fittings for leaks. Repair as required. Replace fittings that continue to leak after tightening.

(D) Lubrication for plow:

Raise plow to transport position. Use a good grade of clean lithium soap base chassis grease to grease the entire plow. This is very important if the plow will be kept in inventory for several weeks before being placed in service. Grease the plow as follows:

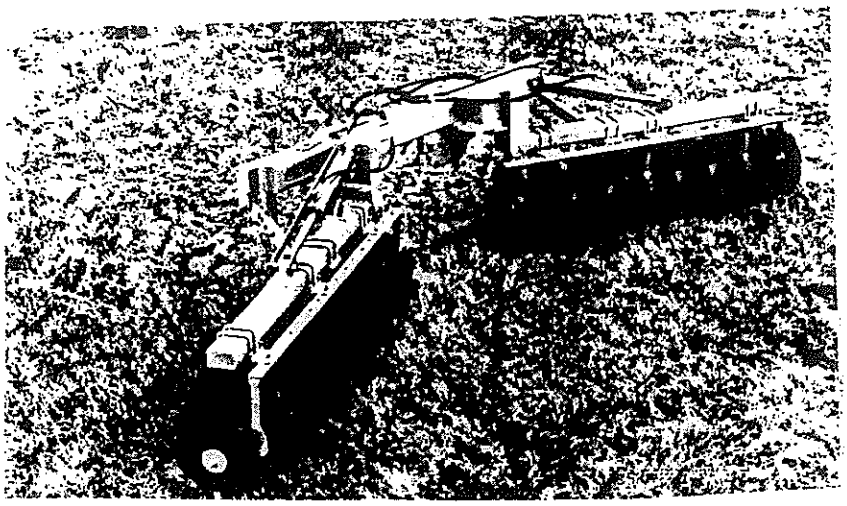
(1) Grease all pivot pins until grease appears.

(2) Grease the gang bearings with 4 or 5 shots of grease to purge any condensation that has accumulated during shipment and storage. If the harrow is in storage for four to six months, the entire plow should again be lubricated before placing in service. It should also be greased every 50 hours while in use, at the end of each season and at the start of each season.

(E) Check decals to be certain they are in place and in good condition. Touch-up paint as required before delivery. Place operator's manual in the heavy plastic shipping bag. Tape bag to main frame so the operator's manual will be delivered to your customer along with the plow.

(F) Review all steps of the assembly process to be certain the plow is properly assembled. Check all bolts to be sure they are properly torqued. Visually inspect the plow for any missing, damaged, or defective parts. Repaint any areas that need improvements.

Remember, a little extra attention to details at this time can prevent problems after the plow is placed in service.



LUBRICATION

Careful and regular attention to lubrication will greatly increase the life of the harrow. For economical and efficient operation, proper lubrication of the gang bearings, and pivot bracket pins is necessary.

Be sure the grease fittings are free of dirt or paint before using the grease gun. Replace any damaged or missing fittings. Use a good grade No. 2 grease (lithium base). Never use greases which contain metallic additives. Always make sure that grease is clean and not contaminated with dirt or other foreign matter.

The gangs are equipped with ball bearings, which are initially greased at the factory. They should be greased at least every week or fifty (50) hours of operation under normal conditions. Daily greasings may be necessary under extreme conditions such as in wet ground, during hot dry weather, or when operating at high speeds. These bearings must also be greased at the start of each season, and at the end of each season.

Protect-O-Shield bearings should be greased until grease "pops" out around the bearings. The bearing will thus be purged of any dirt or foreign matter. The Protect-O-Shield prevents any possibility of blown seals.

Grease pivot bracket pins each week or fifty (50) hours of operation. These pivot bracket pins should also be greased at the start of each season and at the end of each season.

OPERATING INSTRUCTIONS

Your new AMCO terracing plow has been set up, inspected, and adjusted by your dealer before delivery. However, before using your new harrow, or one that has been stored, make certain that all nuts and bolts are tight, all cotter pins spread and that the harrow has been lubricated.

The instruction manual should be carefully and thoroughly read to enable the operator to care for and operate the plow properly. The right and left hand sides of the terracing plow as used in these instructions are determined by standing at the rear of the plow and facing the direction of travel.

Refer to your tractor operator's manual for complete tractor operating instructions.

HITCH: The AMCO terracing plow is designed to hitch to ASAE Standard Category III three-point hitches and to ASAE Standard Category III quick couplers.

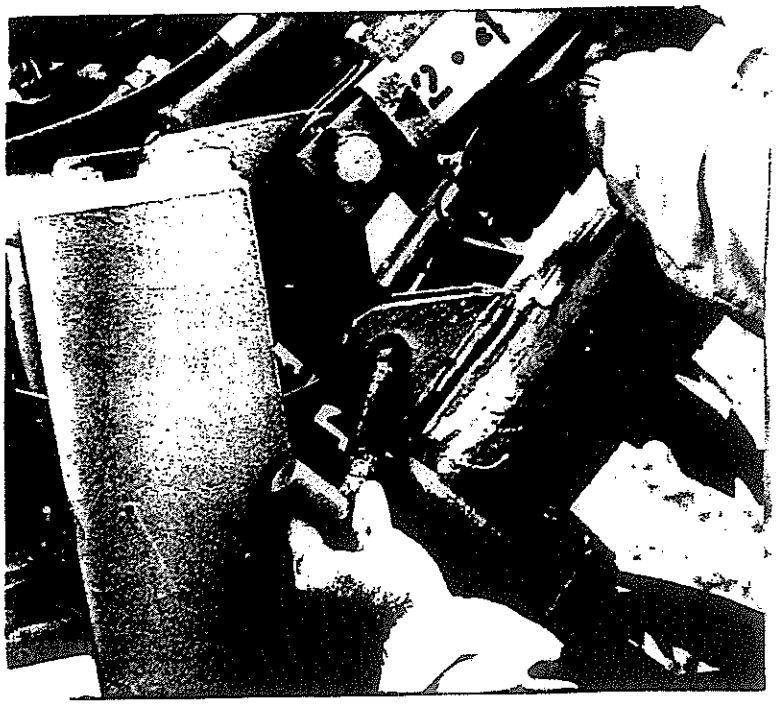
PARKING STANDS: Adjustable parking stands are provided as standard equipment. These stands should be raised and pinned for transport or field work. The stands should always be lowered and pinned to prevent the plow from falling forward while unhitching or while in storage. The plow should be parked on level ground to prevent the possibility of a tipover.

CAUTION! After parking the terracing plow, always check to make sure that it cannot be overturned either forward or backward accidentally.

TRANSPORTING: Transport width for the AMCO terracing plow can be reduced to approximately 9' by a simple operation. Raise the plow on the three-point hitch with both gangs approximately level. Disconnect the angle adjusting slide links for one gang and swing the gang backward until it is straight behind the tractor. Align holes in the top of the pivot bracket and main frame, and insert the 1" transport (tee-handle) pin which was removed from the angle adjusting slide links to prevent the gangs from shifting sideways.

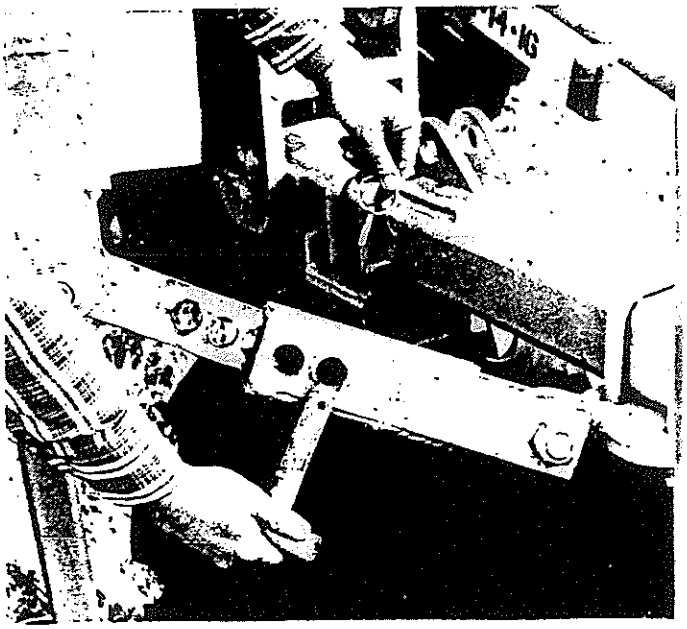
Next fully retract the 4 x 16 hydraulic cylinder. Remove 1" transport pin from its carrying slot on the main frame, and insert the pin in holes which connect the pivot bracket and the gang frame. This connection will prevent the possibility of a serious accident in case of hydraulic circuit failure during transport.

Repeat the steps above for the opposite gang. Refer to safety alert messages on page 13 about important requirements for safe transport.



WARNING! Before transporting over public roads, always lock pivot brackets to gangs in raised position. Failure to do so could result in serious accidental injury.

ADJUSTMENTS: Before operating the terracing plow, adjust the top link on the three-point hitch so that the main frame is approximately when the gangs are flat on the ground. To provide freedom of terrace construction, adjustment of gang angle and gang tilt is independent for each gang.



GANG ANGLE ADJUSTMENT: Gang cutting angle can be set from 21 degrees to 29 degrees. Under normal conditions, a setting about halfway between extremes is advisable. Increased cutting angle will generally increase cutting depth, move soil further and cover residue better. Increased angle is advisable in very hard ground or heavy cover. Decreased cutting angle will generally reduce the occurrence of large clods, will help to prevent "balling up" in wet conditions and will reduce tractor horsepower requirement.

To decrease gang angle, remove the tee-handle pins in the angle adjusting slide links at each end of the main frame. Shift the gangs forward and replace the pins at the desired setting. Adjust gangs rearward to increase gang angle.

GANG TILT ADJUSTMENT: Vertical gang tilt for the terracing plow is adjusted hydraulically from the tractor. Two valve outlets are required on the tractor. When operating the plow, tilt for each gang is controlled individually. By completely retracting one cylinder to raise one gang out of the ground, the other gang can be operated like a one-way disk plow. Tilt indicators are provided to show accurate settings of gang tilt while building terraces and to enable both gangs to be set the same.

IMPORTANT: When changing gang tilt, always lower the three point hitch so that the gangs are forced into the ground somewhat. This procedure will insure a positive setting of gang tilt, by removing slack in the gangs due to frame deflection and pinned connections. Failure to set tilt with gangs in the ground may result in the gangs riding up out of the ground.

TERRACE SYSTEMS

Although there are several types of terrace systems, the three major classifications of terrace systems are narrowbase, broadbase and steep backslope.

NARROWBASE terraces have relatively steep sideslopes and a narrow width.

BROAD BASE terraces are wide with low sideslopes so that they can be farmed, but are generally limited to use on gently sloping land.

STEEP BACKSLOPE terraces have steep backslopes (downhill side) which are grassed and gentle front slopes (uphill side) which are farmed.

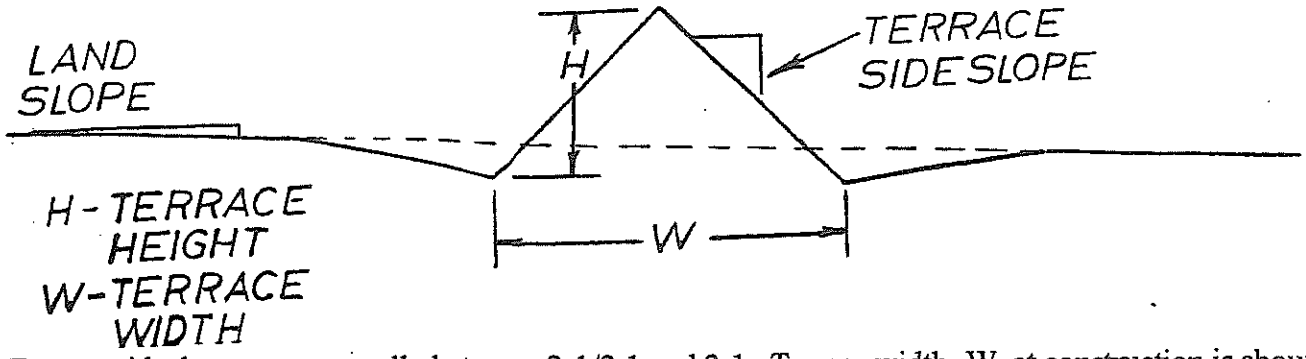
The Natural Resources Conservation Service (NRCS) should be consulted for assistance in choosing and designing the best terracing system for a given field or farm. The application of the AMCO terracing plow for building several types of terraces is discussed below. Construction techniques are discussed in the section on Terrace Construction.

NARROWBASE TERRACES:

The AMCO Terracing Plow was designed primarily for construction of narrowbase terraces. The plow is operated for several passes up and down the length of the terrace line, with each pass increasing the height of the terrace until sufficient height is achieved. NRCS requirements for narrowbase terraces vary somewhat depending on field conditions and climate; however, the AMCO Terracing Plow is designed to meet most requirements.

Terrace height after settling is measured from the bottom of the channel to the top of the terrace ridge and will vary depending on conditions, with land slope being the major factor. (Allowance for settling of the terrace is very important and is discussed in the section on Terrace Construction.) The following table shows expected terrace height depending on land slope for terraces built with the AMCO Terracing Plow.

Land Slope	Settled Terrace Height, H
0%	2.8 to 3.1 feet
2%	2.6 to 3.0 feet
4%	2.5 to 2.8 feet
6%	2.4 to 2.7 feet
8%	2.3 to 2.6 feet



Terrace sideslopes are generally between 2-1/2:1 and 3:1. Terrace width, W, at construction is about 15 feet; however, terrace width in many cases can be reduced to 13 or 14 feet by farming closely against the base of the terraces. Several types of narrowbase terraces that can be built with the AMCO Terracing Plow are described below.

GRADIENT TERRACES are built on an established grade, and the AMCO Terracing Plow can generally be used to do 100% of the construction. In some cases, a blade or other tool may be helpful to connect the terrace channel into an outlet waterway. It is generally best to fill gullies or depressions along the terrace line prior to terrace construction, since they will cause a low place in the terrace and will hamper tractor operation somewhat.

PARALLEL GRADIENT TERRACES are designed so that terraces are parallel to each other to avoid short rows and unfarmed cropland in fields with relatively even slopes. The terraces are kept parallel by cutting high spots and filling low spots to obtain grade or by varying channel grade where appropriate.

A land scraper, blade or bulldozer is required only in order to make cuts or fills. Cuts and fills can be made prior to operation of the Terracing Plow to get the complete terrace to grade. This method of cut and fill will insure that terrace height is even for the length of the terrace. If it is important to achieve only a minimum height with no concern about excessively high areas, cuts and fills may be made in the terrace channel only. If cuts and fills are minor, they can be made after the terrace ridge is completed with the Terracing Plow and in the terrace channel only. However, it is important to make sure that terrace height is adequate at fill areas in the channel.

STORAGE TERRACES are usually built parallel and require cuts and fills. They are designed so that rain water flows to a central portion of the terrace and is stored behind the terrace ridge like water behind a pond dam. The water is drained slowly from the field through underground pipes laid perpendicular to the terraces. This system allows soil particles to settle out of the water and remain in the field. The water will drain fast enough to avoid crop damage. Cuts and fills in the terrace line can be made as described above for parallel gradient terraces using bulldozers, scrapers or blades. Also, a machine other than the Terracing Plow is generally required to give additional ridge height in the storage area and to lay underground pipe. Underground pipe can be installed either before or after building the terrace with the Terracing Plow.

OTHER TERRACES AND DIVERSIONS:

The AMCO Terracing Plow can be used for building other types of terraces. By raising one gang and operating the opposite gang like a one-way disk plow, Broad base and steep backslope terraces can be built with the AMCO Terracing Plow. Steep backslope terraces can be "finished off" by setting one gang at full tilt for the backslope and the other gang at another tilt for the more gentle frontslope. The Terracing Plow can in many cases be used to build diversions, which "divert" water from hillsides to prevent damage to cropland in lower fields. However, diversions generally must handle much higher quantities of water than terraces, and special attention should be given to be sure that height is adequate. Also, a scraper or other equipment is usually required to enlarge the channel section for handling diverted water. Refer to the TERRACE CONSTRUCTION section for suggestions on how to build terraces and diversions using the AMCO Terracing Plow.

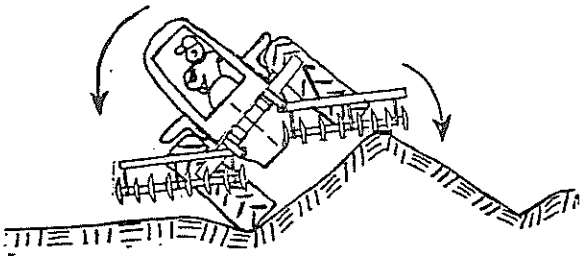
In all cases, when planning for terraces or diversions, the Soil Conservation Service office in your district should be contacted for advise.

TERRACE CONSTRUCTION

Several important points to remember concerning terrace construction are:

1. One gang can be operated alone like a one-way disc plow to move extra soil toward the terrace centerline after the first one or two passes with both gangs down. The one-way operations will reduce the depth of furrows on each side of the terrace and will increase the height of the terrace above the original ground level. Also the tractor tires will pack the core of the terrace on passes made in this manner therefore reducing future settling. The single gang feature can be used to work soil from greater distances in order to build broadbase or steep-backslope terraces.

DANGER! When operating the terracing plow with a single gang on steep slopes, use extreme caution in setting gang tilt. The powerful hydraulic cylinders can tilt a tractor sideways with the gangs, causing an overturn.

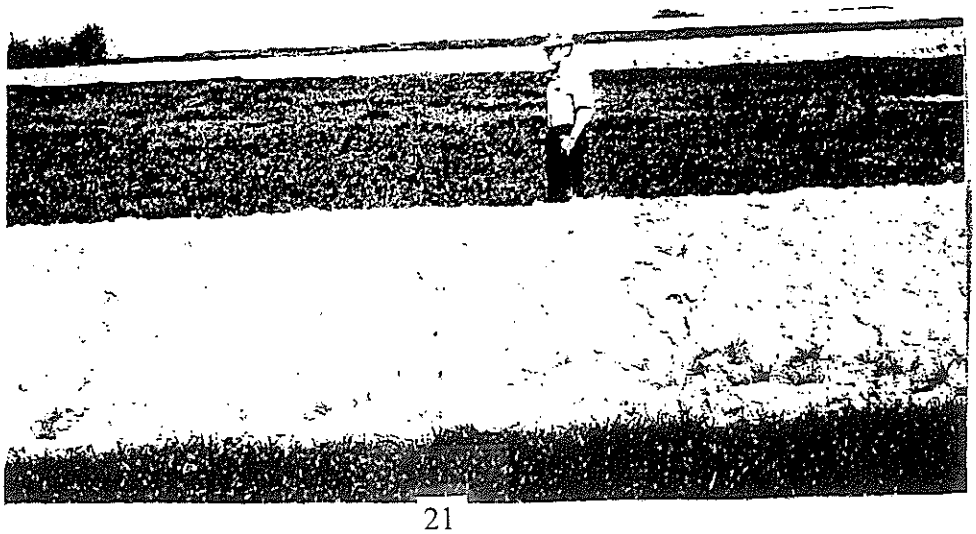


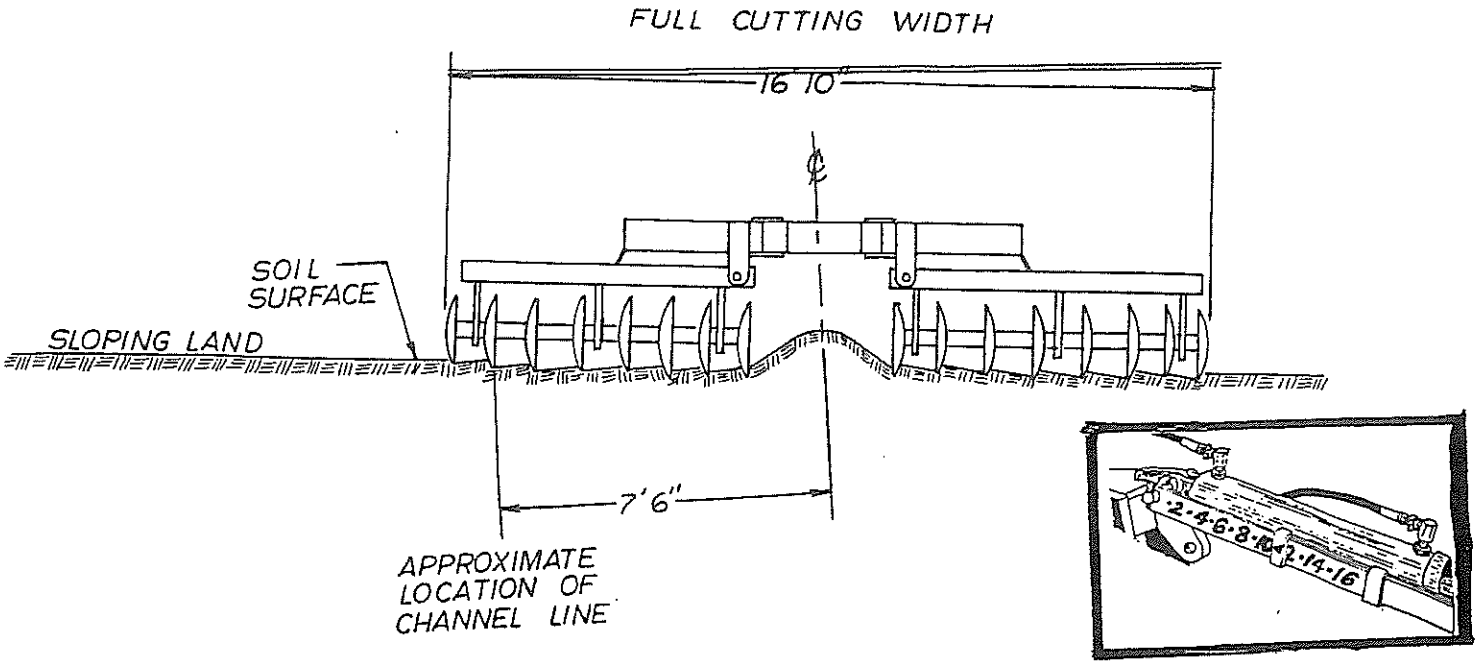
2. When building a terrace, if only the outside blades are cutting, the gang tilt should be reduced so that all blades on the gang are cutting. Gang tilt should be increased if only the inside gangs are cutting. This procedure will speed terrace completion.

3. When using a two-wheel drive tractor with the terracing plow, a maximum number of front-end weights or other front-end ballast will help to steady the tractor during operation of the plow. A differential lock (on tractors thus equipped) and dual rear wheels may be useful to improve control of the terracing plow when used with smaller two-wheel drive tractors or on steep or rough ground.

4. For best results, maintain tractor speed at or above 5 miles per hour. High speeds improve movement of soil upward and inward on the terrace, reducing construction time. Excessive slippage or inadequate horsepower could be detrimental to efficient terrace construction due to reduced speed.

The steps on the following pages are suggested for constructing narrowbase terraces. Variations of this method can be adapted to meet your individual needs.

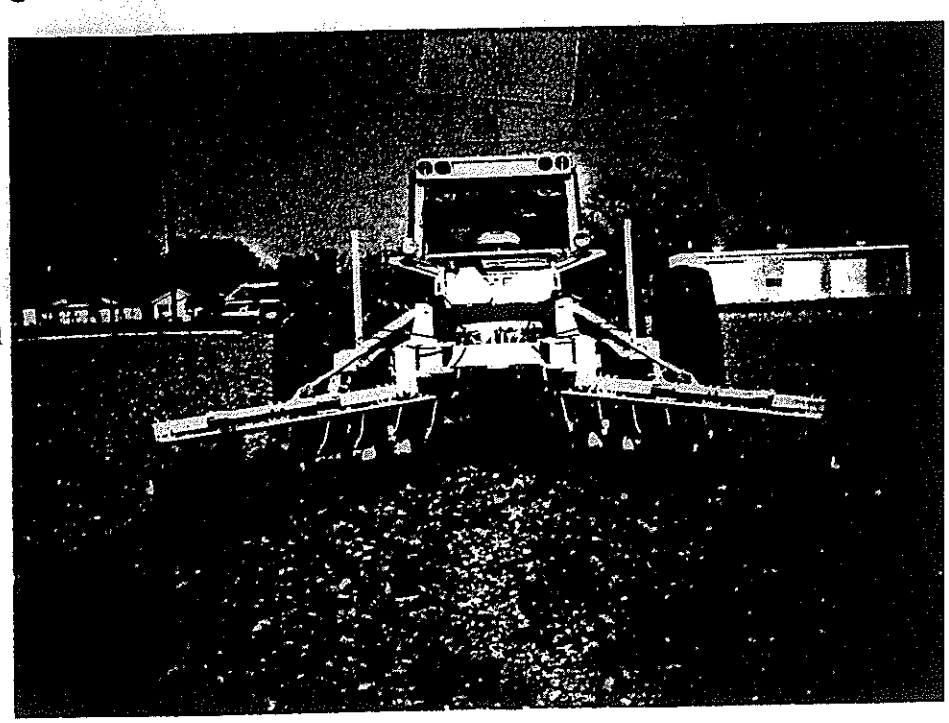




STEP I. START FORMING TERRACE.

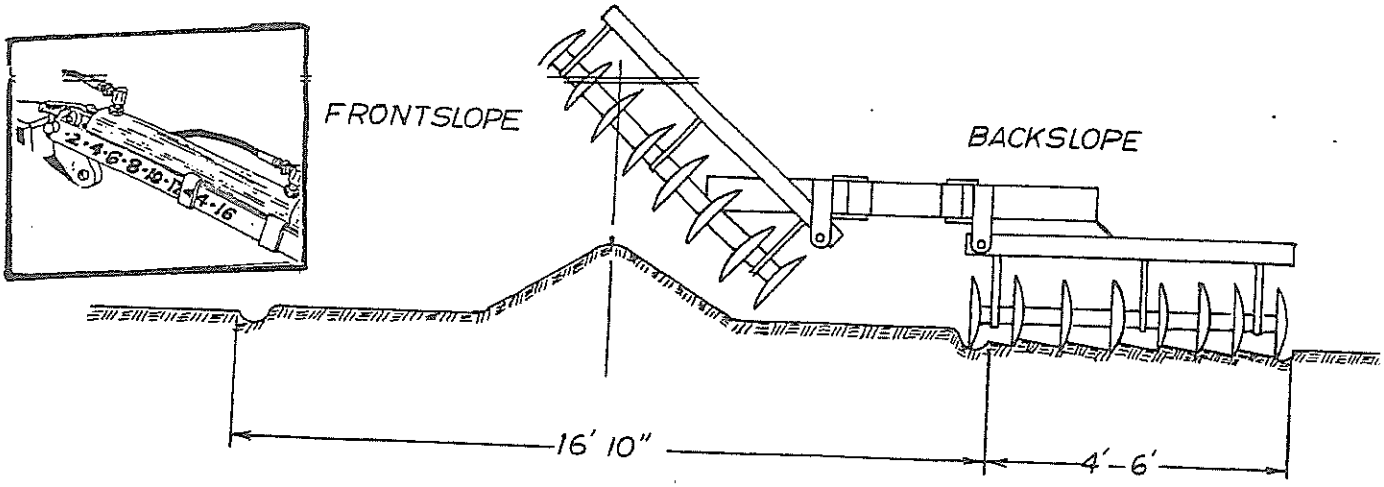
Begin to form the terrace by making one or two passes along the terrace centerline at 4 to 6 inches deep with both gangs set at 10 to 11 inches on the indicators (see insert of lefthand indicator above). This step will mark the terrace line, will begin to move soil toward the centerline of the terrace and will form the cone of the terrace.

IMPORTANT: When changing gang tilt, always lower the three point hitch so that the gangs are forced somewhat into the ground.



It is important to carefully follow survey stakes for the terrace center line to keep from causing high and low spots in the terrace. If stakes are placed along the terrace channel line (for grading purposes) the terracing plow should be operated on a line one half the completed terrace width (about 7'6") below the channel line (see sketch above).

In fields where topsoil is very shallow, it may be necessary to remove the topsoil prior to making STEP 1. The terracing plow can be operated with one gang like a one-way disc plow to move some of the topsoil to each side of the construction site (25 to 30 feet wide). When the terrace is near completion, the topsoil can be worked back into the cut areas. A couple of finishing passes on the terrace ridge will move more topsoil onto the terrace.



STEP II. MOVE ADDITIONAL SOIL INTO BASE OF TERRACE

Move soil into the base of the terrace from the area on each side by using only one gang. Lower the right hand gang and operate the left hand rear tractor tire just to the right of the terrace centerline which was formed into a small ridge during Step I. The gang should extend 4 to 6 feet beyond the furrow left by the outside disc blade on the previous pass as shown above. The tilt indicator should be set on about 11 or 12 inches.

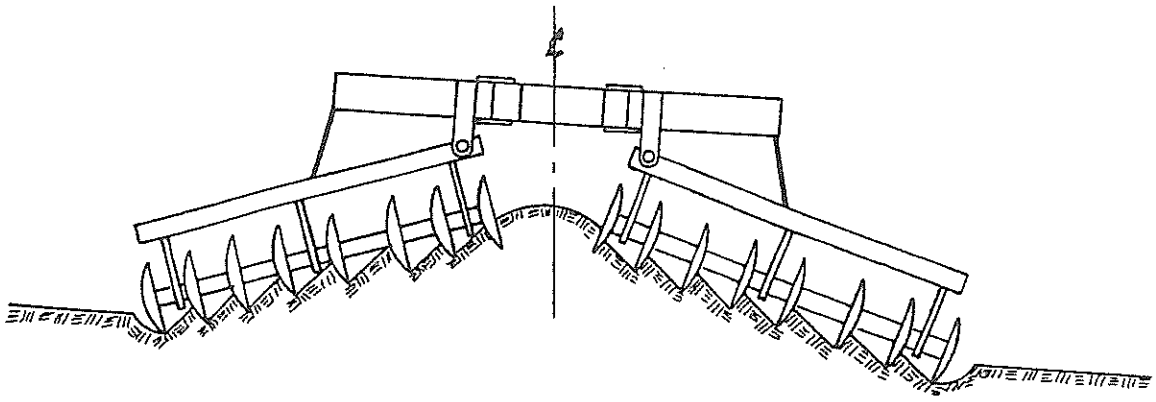
Make two or three rounds to work both sides of the terrace, moving soil inward on each round until extra soil is worked into the base of the terrace. When soil has been worked inward such that the tractor is almost centered on the terrace, the terrace is ready for Step III. **NOTE:** Be sure on occasion to use the left hand gang in the opposite manner as just described so as not to wear one gang more than the other.

IMPORTANT: Be sure to keep up with the location of the terrace centerline.

STEP II serves two important functions. First, it provides soil for the terrace from outside the terrace base. The furrows cut on either side of the terrace ridge will not be as deep as they would if Step II were omitted, and the terrace ridge will stand higher above the original ground level. Second, during the process of working with the single gang, the rear tractor tires pack the core of the terrace ridge. Settling of the terrace is therefore greatly reduced, such that this terrace settles no more than a terrace built and packed with a bulldozer. In situations where deep furrows are not undesirable and terrace channel capacity is more than adequate, Step II may be eliminated.

DANGER: When operating the terracing plow with a single gang on steep slopes, use extreme caution in setting gang tilt. The powerful hydraulic cylinders can tilt a tractor sideways with the gang, causing an overturn.

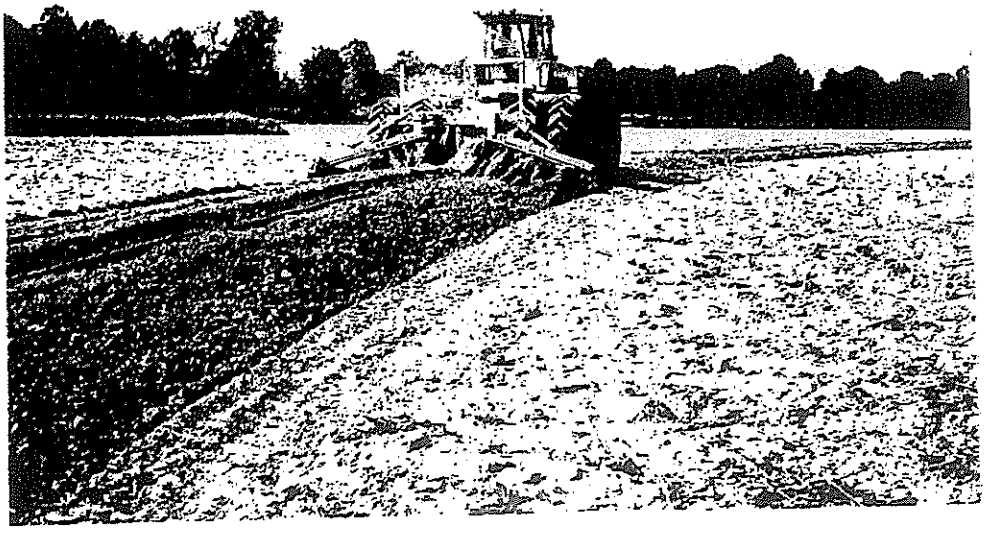
STEP III. FORM TERRACE

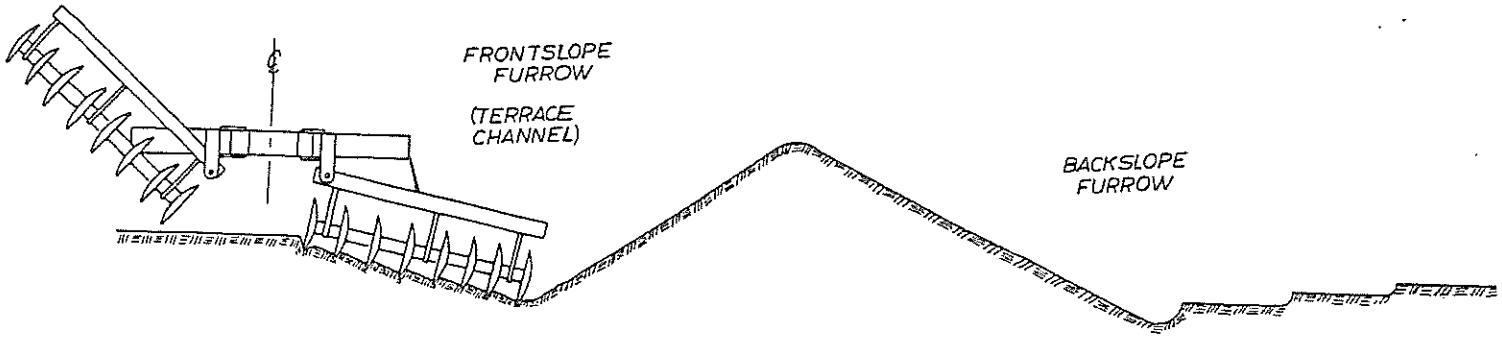


With both gangs set at about 12 or 13 inches on the tilt indicators, further build and shape the terrace. Make several passes increasing gang tilt about 1 to 1-1/2 inches each pass.

IMPORTANT: Tilt the gangs in such a way that all blades on the gang are moving soil. If only one end of the gang is cutting, increase or decrease gang tilt to provide more nearly even cutting up and down the gang.

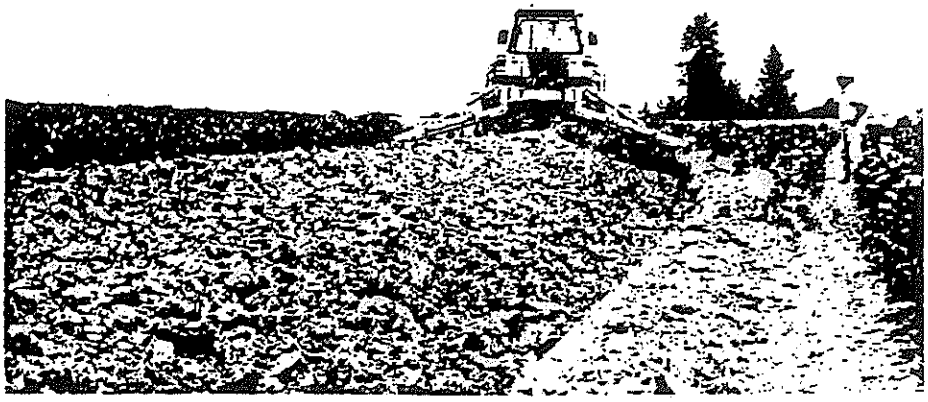
Continue to build the terrace higher until a pass at full tilt is completed. At this point, another pass or two with tilt set at 15 inches will generally help to smooth up the side slopes and "crown off" the terrace.

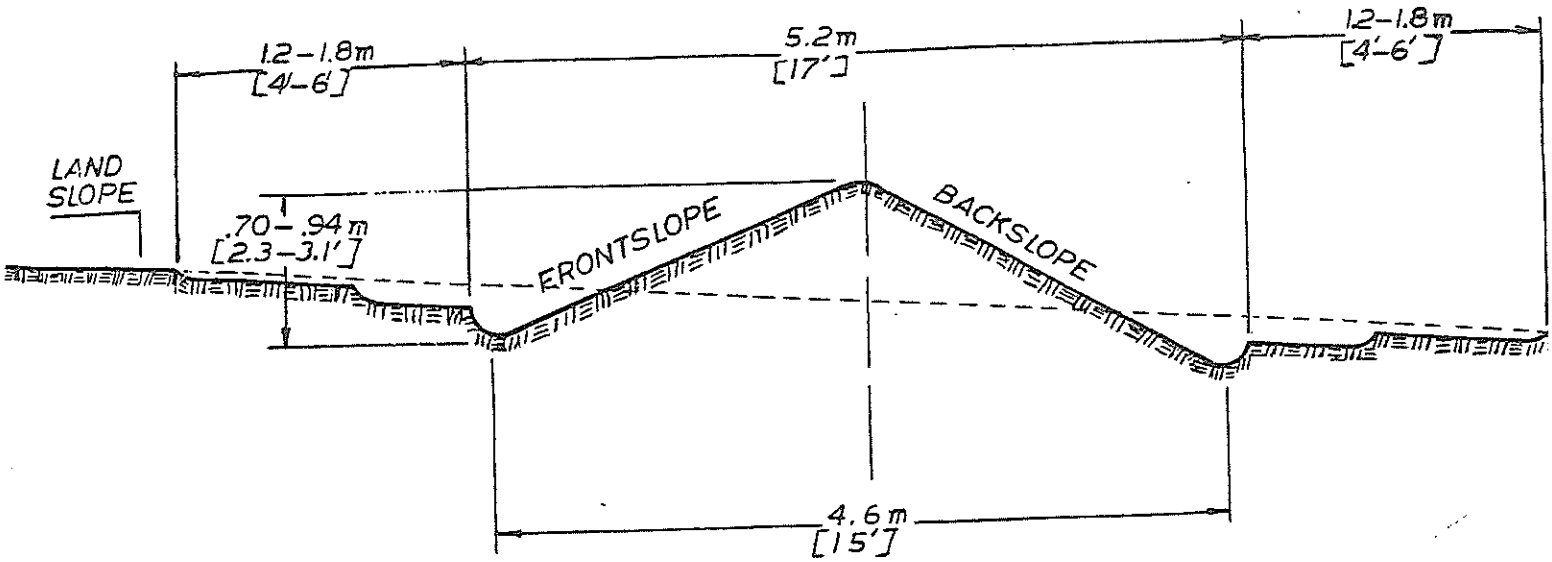




STEP IV. FINISH TERRACE.

In order to prepare the field for cropping and to insure proper erosion control, it will likely be important to perform minor operations with the terracing plow or other equipment. The sketch above shows how to smooth and broaden the terrace channel and backslope furrow for cropping. This can also be done with a disk harrow or other equipment. Using the terracing plow or a blade, it may be necessary to tie the terrace channel into a waterway or do other finishing operations.





FORMED TERRACE

The above sketch shows approximate dimensions of a narrow base terrace built with the AMCO Terracing plow. Note that terrace sideslopes are smooth. Maximum terrace height, H, should be between 26 and 40 inches depending on land slope and other factors. (See approximate settled heights in the section on NARROWBASE TERRACES, page 19.) Terrace channel capacity is also important to adequate terrace construction. The Soil Conservation Service can determine whether your terrace has adequate channel capacity with a brief inspection. If your terrace is rough or has inadequate height or channel capacity, you may need additional passes of the terracing plow. Review suggestions on TERRACE CONSTRUCTION. Additional operations to complete the terrace are discussed in Step IV.

RECONSTRUCTION OF EXISTING TERRACES

The need for terrace construction equipment is not over once a new terrace is completed. Terrace channels collect sediment and the terrace ridge erodes, reducing terrace height and channel capacity. On grassed terraces, weeds and sprouts must be controlled. Neglect of proper maintenance may result in failure of the system. The AMCO Terracing Plow is especially well suited for maintenance work on narrowbase terraces. Generally, only two or three passes of the plow over an old terrace will rebuild the terrace to its original condition. The tractor and plow straddle the terrace ridge without disturbing cropland on either side. By doing maintenance work with the plow during slow summer months while a crop grows to either side, there is no interference with important tillage or planting schedules.

On the left is a terrace in need of reconstruction. The ridge has worn down and the channels are full of sediment. The terrace height has been greatly reduced.

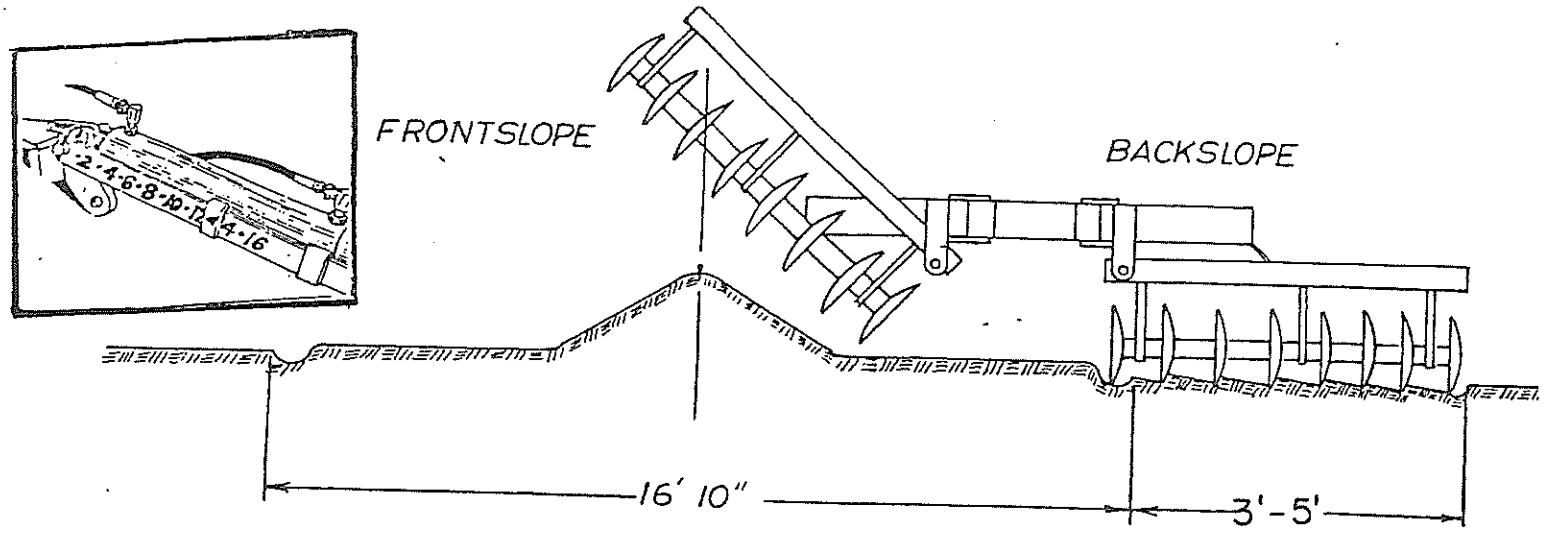
On the right is the same terrace as above after reconstruction with the AMCO Terracing Plow. Terrace height has been increased considerably. A ridge has formed along the top of the terrace and clean channels now run the length of the base.

BROAD BASE TERRACE CONSTRUCTION

STEP I. START FORMING BROAD BASE TERRACE

First make sure that you read important points concerning terrace construction on page 21. Next follow the same procedure as is described for starting to form narrowbase terraces in STEP I on page 22.

STEP II. MOVE ADDITIONAL SOIL INTO BASE OF BROAD BASE TERRACE



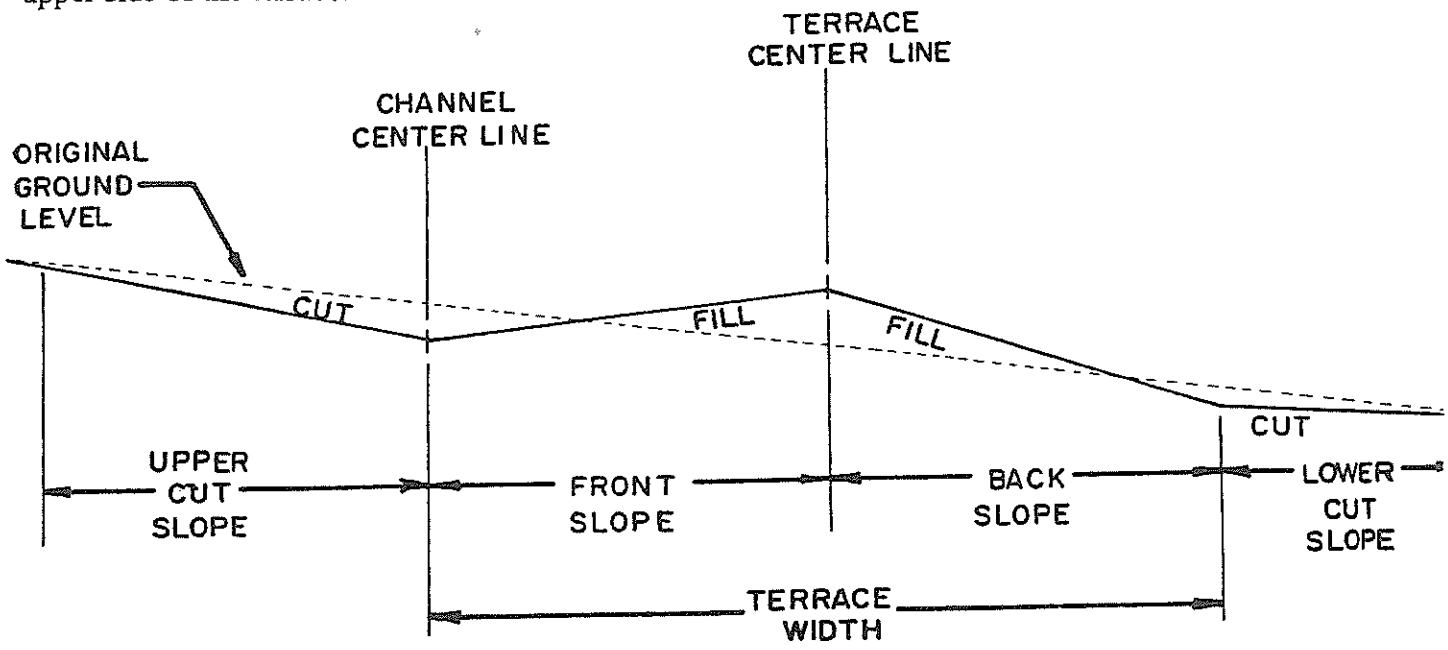
This step is similar to STEP II for constructing narrow base terraces; however, it must be repeated more for broadbase terraces because of the greater width of the terrace. Construction of broadbase terraces will take longer than construction of narrow base terraces.

Begin moving soil into the base of the terrace from the areas on each side by using only one gang. Raise the left hand gang and operate only the right hand gang 3 to 5 feet beyond the furrow left by the outside disc blade on the previous pass as shown above. The tilt indicator should be set on about 11 or 12 inches. Make two or three complete rounds to work both sides of the terrace, moving soil inward on each round until extra soil is worked into the base of the terrace. Normally, it is best to move inward on the terrace in increments of 1 to 2 feet for each successive round. When the soil has been moved enough to add height to the terrace center line, repeat the procedure above. Operate the right hand gang 3 to 5 feet beyond the widest of the previous passes, and again move soil inward with successive passes to further build terrace height. This process of starting further away from the center line and moving soil inward with successive passes should be repeated until terrace height and width are as desired. When terrace height becomes adequate at the center line, there is no need to move soil further inward than additional "fill" is needed.

Several important factors to remember concerning Broad base terrace construction by this method are listed below.

1. Soil cut below the terrace line cannot be moved uphill as efficiently as soil cut above the terrace and moved downhill. For this reason, it is generally good to make more passes on the uphill side of the terrace. In this way a greater amount of "cut" material comes from above the terrace line. Some of this cut material should be moved below the terrace center line to help build the backslope of the terrace. Right hand then left hand gangs can be operated alternately for successive passes made on the same side of the terrace line.

2. Note the drawing below showing the cross section of a typical broadbase terrace constructed as described above. Note that the greatest depth of cut below original ground level occurs at the channel center line. A greater number of passes are required to make the deeper cuts near the channel center line. This can be accomplished by repeating passes or by making successive passes closer together in that area. Note also that this drawing shows most cut material coming from the upper side of the terrace.



CROSS SECTION OF COMPLETED BROAD BASE TERRACE

3. If a terrace channel will need cuts and fills to insure adequate grade to prevent runoff water from ponding in the channel, it is generally more efficient to make cuts and fills after building the terrace ridge and channel along the surveyed line. High areas in the channel should be cut to grade and fill material deposited in low areas of the terrace ridge. Sometimes, cutting and filling may be required on the terrace ridge to insure adequate terrace height to prevent topping by runoff. Grading should be done immediately following construction of the ridge in order to avoid damage from rainfall prior to completion.

MAINTENANCE

1. Keep all bolts tight.
   A. Check before placing in service.
   B. Visually inspect all bolts daily.
   C. Check after first 50 hours or one week's operation.
   D. Check each season.
2. Do not run with loose disc blades. Keep gang bolts tight! Tighten gang bolts to 1200 ft./lbs. of torque.
3. Grease gang bearings and pivot bracket pins every week or 50 hours, under normal conditions, at the start of each season, and at the end of each season. Grease more often under extreme conditions such as in wet ground, during hot, dry weather or when operating at high speeds. Use good No. 2 gun grease (Lithium Base). Rotate gangs while greasing for best results.
4. Disc blade, bearing, and spool replacement.
   A. Remove the nuts that hold the gang bearing housing trunnion clamps.
   B. Remove clamps
   C. Raise the plow and roll the gang away from the frame.
   D. Remove the gang nut lock plate.
   E. Remove the gang hex nut from the end of the shaft.
   F. Slide off the bearing, spools, spacers, and blades.
   G. Avoid thread damage.
   H. Tear the entire gang down and clean off all parts. Check disc axle for straightness. Bowed, bent or worn axles must be replaced.
   I. Check spacer spools for damage caused by running plow with loose gangs or hitting underground obstructions. Replace spool if it is damaged.
   J. Carefully check all end bells. The large end must contact the disc blade around the entire circumference of the end bell. The small end must be smooth and perpendicular to the axle. The end bells must be replaced if they are cracked or worn on the surface adjacent to the bearing.
   K. Check all the bearings on the gang. Running a plow for one hour or more after bearing failure will seriously damage other bearings on the gang. This damaged bearing will then fail within a few hours after the failed bearing has been replaced. Continued operation with this failed bearing will damage the new bearing; thus, it will fail after a few hours of use. In most cases, it will be best to replace all bearings on a gang when it is torn down for repairs. An AMCO triple lip sealed, regreasable bearing should always be used for bearing replacement.
   L. To replace the bearing, the snap ring must be removed. The old bearing and washers should be pressed out of the housing. Clean and wash out old grease and carefully check the housing. Replace the housing if it is damaged. Press the washers and new bearing straight into the housing. Always press against the outer race of the bearing. **NEVER** press against the seal or inner race of the bearing. Check location of the grease hole in the outer race of the bearing. This hole must align with the grease groove in the bearing housing. Rotate the bearing in the housing after it is pressed in to be sure it turns freely. Install the snap ring in the housing.

4. When working with only one gang down, avoid letting the outside blades cut deeper than the inside blades, since this contributes to higher side draft on the tractor.

5. It is best to set a line of reference stakes parallel to the terrace prior to starting construction. These stakes should be placed a distance from the terrace center line which approximately equals the finished terrace width plus 10 feet. These stakes can be used to check for proper location of the terrace center line and the channel line during construction.

NOTE: Be sure on occasion to use the left hand gang in the opposite manner as described above so as not to wear one gang more than the other.

IMPORTANT: Be sure to keep up with the location of the terrace center line and channel line during construction.

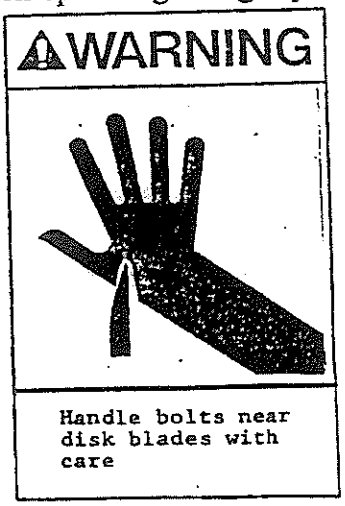
Step III. FINISH BROAD BASE TERRACE

In order to prepare the field for cropping and to insure proper erosion control, it will likely be important to perform minor operations with the terracing plow or other equipment. Using the terracing plow or a blade, it may be necessary to tie the terrace channel into a waterway or do other finishing operations. The terracing plow can be operated with both gangs down to "crown off" the center of the terrace ridge. A disk harrow or other field finishing tool may be used to smooth and level the completed terrace.

M. After cleaning, checking and replacing all damaged parts, the gang should be assembled. Be sure the grease fittings in the bearing housings face to the rear. Be sure the snap ring in the bearing housing is turned toward the convex (back) side of the disk blade. The 1-1/2" gang bolt nut should be torqued to 1200 ft./lbs. The axle nut should be locked in place with the lock strap.

N. After the gang is assembled, it should be attached to the plow. The bearing risers should be carefully spaced to match the bearing housings. Poorly spaced bearing risers will overload the bearings and cause premature failure. The gang should be rotated 4 or 5 complete revolutions to be sure that all parts are aligned and the gang turns freely.

O. The bearings should normally be greased each week or every 50 hours of use with a good grade of clean, Number 2, lithium soap base grease. Grease more often under extreme conditions such as in wet ground, during hot, dry weather or when operating at high speeds.



It is essential that gang bolts be kept tight to prevent axle bending, blade breakage, spacer spool breakage and damage to other gang parts. Gang parts tend to wear on a bevel when the plow is operated with a loose gang bolt. This reduces the area of contact between mating gang parts. Therefore, it is often difficult to keep a gang bolt tight if it has been operated in a loose condition.

After such a gang bolt has been properly torqued, it should be re-torqued after about 30 minutes of operation, again after 4 or 5 hours of operation and again after 8 to 10 hours of use. This will assure that proper gang bolt tension is maintained while the mating components are reseating. If the gang bolt will not stay tight, the gang should be completely disassembled and all parts carefully inspected. All damaged parts should be replaced before reassembling the gang.

5. **SCRAPER REPAIR:** Bent scraper bars or shanks should be replaced or straightened if possible. The blades can be replaced when they wear to the extent they are not performing properly. Keep the blades adjusted from 1/16" to 1/8" from the disc blades. The scrapers can be adjusted by loosening the mount bolt and sliding the scraper to the proper position then tightening the mount bolt. Additional adjustment can be obtained by loosening the scraper bar mount bolts and shifting the entire scraper bar. Do not allow the scraper blades to run on the spools as immediate damage to spool will occur.

6. **HYDRAULIC CYLINDER REPAIR:**
   A. Remove hoses and fittings from cylinder.
   B. Remove cylinder from the plow and clean outside of cylinder.
   C. Dis-assemble cylinder by removing the collar from the rod end of the cylinder barrel with a spanner wrench. Slip piston and gland off cylinder rod.
   D. Carefully clean and inspect all parts for wear or damage. Small nicks, scratches or blemishes on rod and inside of barrel should be smoothed with fine steel wool or emery cloth. Replace parts that cannot be repaired.
   E. Remove all O-Rings from piston and gland. Replace all seals with new parts.
   F. Assemble cylinder using care to prevent damage to O-Rings and seals. Make sure that all parts are cleaned and free of foreign matter before assembly.
   G. Replace the cylinder on the plow and attach hoses. Check cylinder for leaks.

OPERATING TIPS

1. Match the plow with the proper size tractor. Too much horsepower and speed will result in excessive maintenance cost.

2. Lubricate with clean grease at the recommended intervals.

3. Wash corrosive materials such as fertilizer and herbicides from the plow when it is not in use.

4. Insist on genuine AMCO replacement parts. Items such as bearings and blades look alike but are not as reliable as original equipment.

5. Never allow unsafe conditions or operating practices. Your safety is of prime importance.

6. Raise the Terracing Plow by the 3 Point hitch when turning around. Failure to do so will result in broken blades, bent axles, and excessive strain on the hitch and main frame.

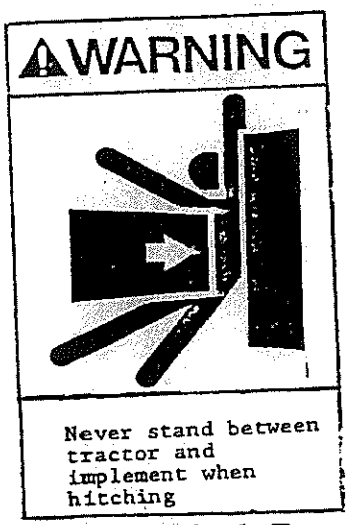
7. Reduce operating speed in any areas containing stumps or rocks.

STORAGE

Proper storage will add to the life of your terracing plow, and assure its being in good condition for the next season. The following procedure is recommended.

* Clean off all foreign matter, and thoroughly lubricate the plow. (See lubrication instructions.)
* Tighten loose bolts and replace any damaged or missing parts.
* Repaint the plow where the original paint has worn off.
* Coat the hydraulic cylinder rods with a good rust preventative or fully retract cylinder rods.
* Coat the disk blades with a good rust preventative.
* Store in a dry place with the parking stands lowered and pinned to prevent the plow from falling forward. Check to make sure the plow cannot be overturned either forward or backward accidentally.
* Carefully rotate each gang and check for worn or damaged blades, bent gang shafts, worn scrapers, damaged bearings and other parts which may need replacing.
* Whenever disk blades or bearings are replaced, the gang shaft nuts must be torqued to 1200 foot pounds.

CAUTION! All hydraulically or mechanically elevated operating components must be blocked to prevent accidental lowering or must be lowered to the ground when making adjustments or when the equipment is idle.



CAUTION! Hydraulic systems are highly pressurized. Escaping hydraulic oil, even an invisible pinhole leak can penetrate body tissues causing serious injury. Use a piece of wood or cardboard when looking for leaks--never use the hands or other parts of the body.

Relieve hydraulic pressure before disconnecting circuits. When reassembling, make absolutely certain that all connections are tight. If injured by hydraulic oil escaping under pressure, see a doctor immediately. Serious infection or reaction may occur if medical attention is not given at once.

MOST OFTEN ENCOUNTERED DISC BLADE FAILURES

Most disc blade failures can be prevented by selecting the correct blade size and thickness for individual conditions when buying a disk. Reduction of speed in areas containing rocks and stumps will greatly lengthen the blade life. Keeping gang bolts properly torqued and raising the harrow while turning will also reduce blade breakage.

FIGURE 1 -- Laminated Disc -- defective steel. Eligible for warranty consideration.

SURFACE VIEW EDGE VIEW

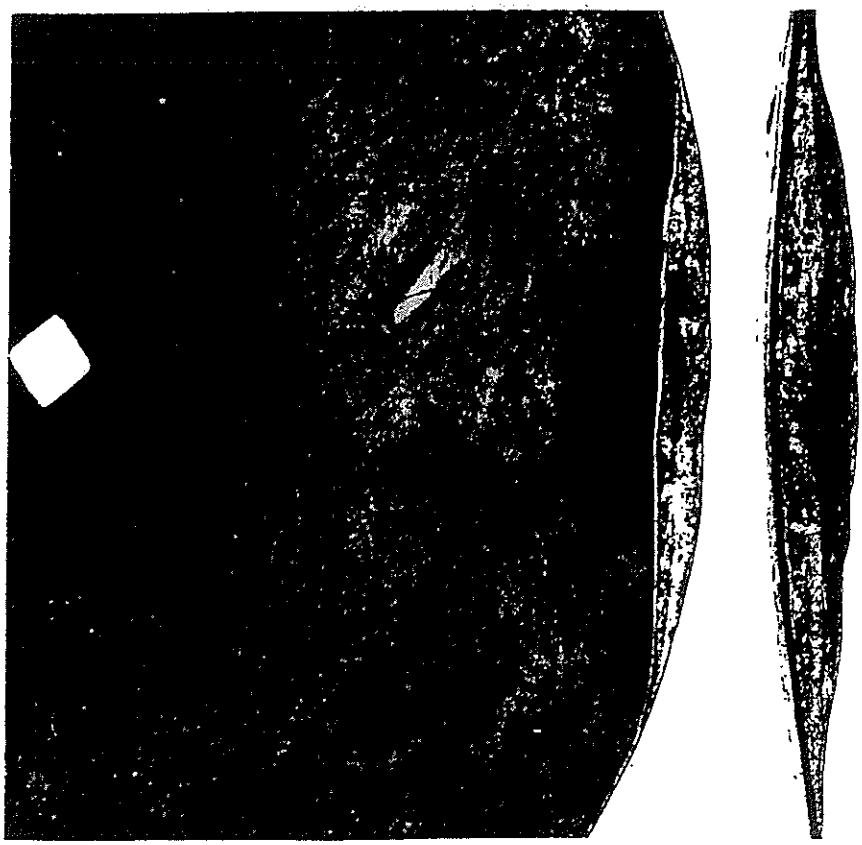
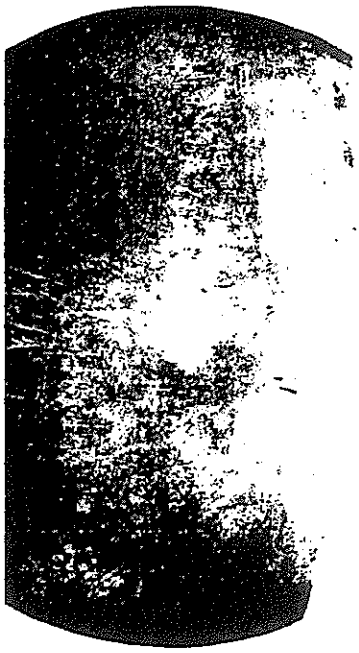


FIGURE 2
Straight directional break caused by defective steel. Eligible for warranty consideration.



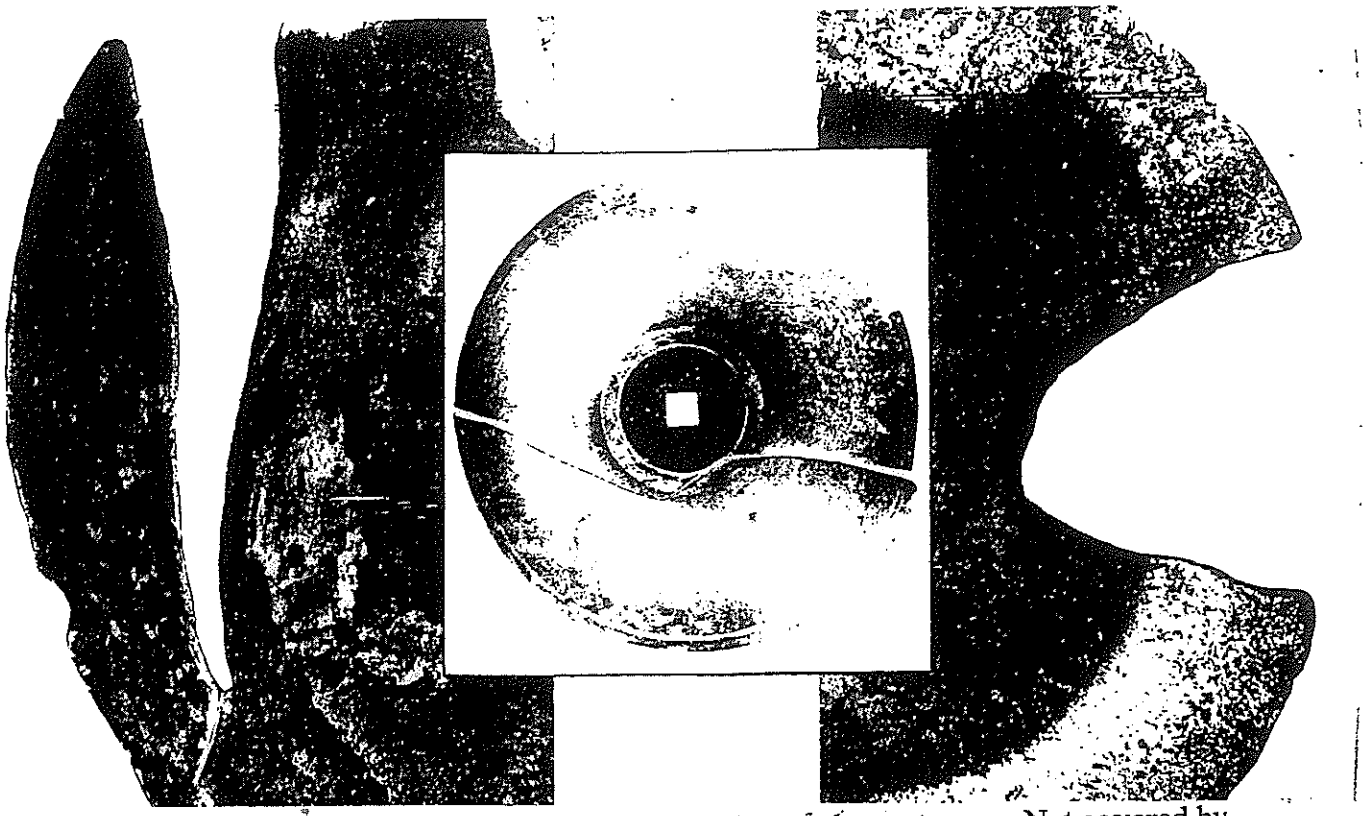


FIGURE 3,4,5 -- Irregular breaks caused by contact against rocks or stumps. Not covered by warranty.

FIGURE 6 -- Chipped or dented edges resulting from use in areas containing rocks or stumps. Not covered by warranty.

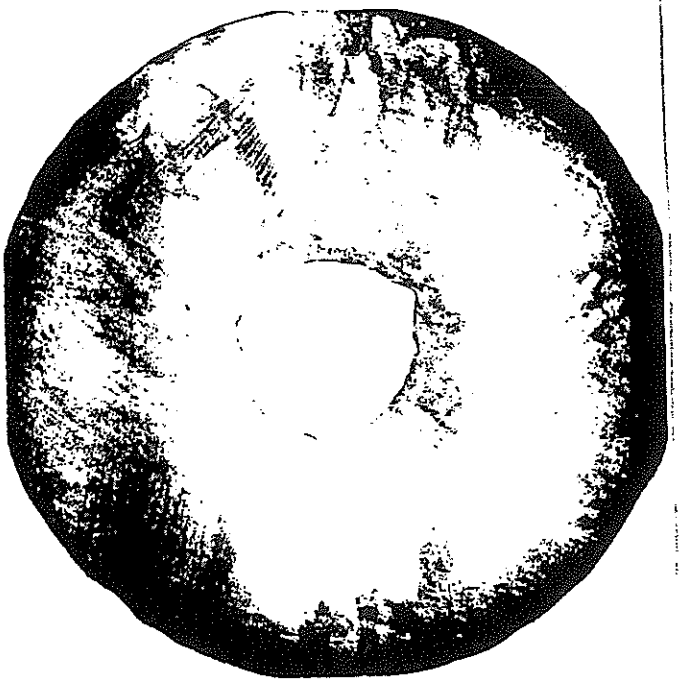


FIGURE 7 -- Center broken out-- Experience has shown that this is usually caused by loose bolts, excessive flexing, or by contact with rocks and stumps. Not covered by warranty.