

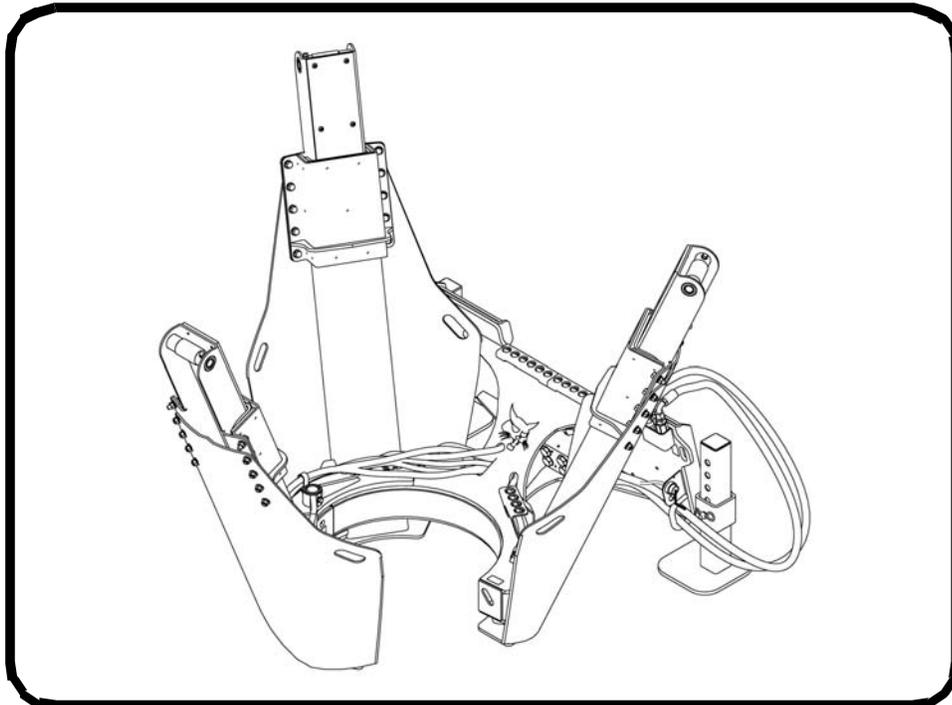


Service Manual

Tree Spade

TS24T Convertible S/N A9SK00101 & Above
TS24T (Bobcat Only) S/N A9U200101 & Above
TS24M Convertible S/N A9SN00101 & Above
TS24M (Bobcat Only) S/N A9U500101 & Above
TS24C Convertible S/N A9UW00101 & Above
TS24C (Bobcat Only) S/N A9VC00101 & Above
TS28T Convertible S/N A8WG00101 & Above
TS28T (Bobcat Only) S/N A9U800101 & Above
TS28M Convertible S/N A9RT00101 & Above
TS28M (Bobcat Only) S/N A9UB00101 & Above
TS28C Convertible S/N A9V000101 & Above
TS28C (Bobcat Only) S/N A9VE00101 & Above
TS32T Convertible S/N A9TS00101 & Above
TS32T (Bobcat Only) S/N A9UE00101 & Above

TS32M Convertible S/N A9TV00101 & Above
TS32M (Bobcat Only) S/N A9UH00101 & Above
TS32C Convertible S/N A9V300101 & Above
TS32C (Bobcat Only) S/N A9VG00101 & Above
TS36T Convertible S/N A9SA00101 & Above
TS36T (Bobcat Only) S/N A9UL00101 & Above
TS36M Convertible S/N A9TZ00101 & Above
TS36M (Bobcat Only) S/N A9UP00101 & Above
TS36C Convertible S/N A9V600101 & Above
TS36C (Bobcat Only) S/N A9VJ00101 & Above
TS44 Convertible S/N A9SG00101 & Above
TS44 (Bobcat Only) S/N A9UT00101 & Above
TS44C Convertible S/N A9V900101 & Above
TS44C (Bobcat Only) S/N A9VL00101 & Above



Product: 2001 Bobcat TS24,TS24,TS28,TS32,TS36,TS44 Tree Spade Service Repair Workshop Manual

Full Download: <https://www.arepairmanual.com/downloads/2001-bobcat-ts24ts24>

[ts28ts32ts36ts44-tree-spade-service-repair-workshop-manual/](https://www.arepairmanual.com/downloads/2001-bobcat-ts24ts24ts28ts32ts36ts44-tree-spade-service-repair-workshop-manual/)

Sample of manual. Download All 106 pages at:

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MAINTENANCE SAFETY



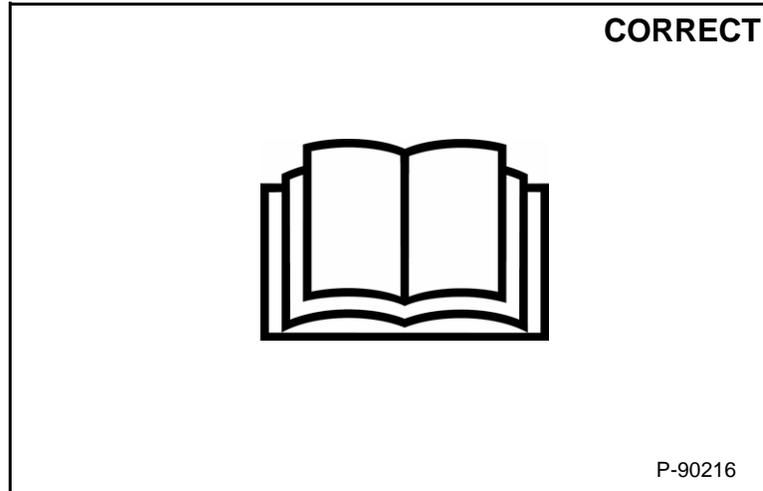
WARNING

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, Operator's Handbook and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause injury or death.

W-2003-0807



Safety Alert Symbol: This symbol with a warning statement, means: "Warning, be alert! Your safety is involved!" Carefully read the message that follows.



-  Never service attachments / implements without instructions. See Operation & Maintenance Manual and Attachment / Implement Service Manual.
-  Cleaning and maintenance are required daily.
-  Never service or adjust attachment / implement with the engine running unless instructed to do so in manual.
-  Always lower the attachment / implement to the ground before lubricating or servicing.
-  Avoid contact with leaking hydraulic fluid or diesel fuel under pressure. It can penetrate skin or eyes.
-  Stop, cool and clean engine of flammable materials before checking fluids.
-  Keep body, loose objects and clothing away from moving parts, electrical contacts, hot parts and exhaust.
-  Safety glasses are needed for eye protection from electrical arcs, battery acid, compressed springs, fluids under pressure and flying debris or when tools are used. Use eye protection approved for type of welding.



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Bobcat[®]

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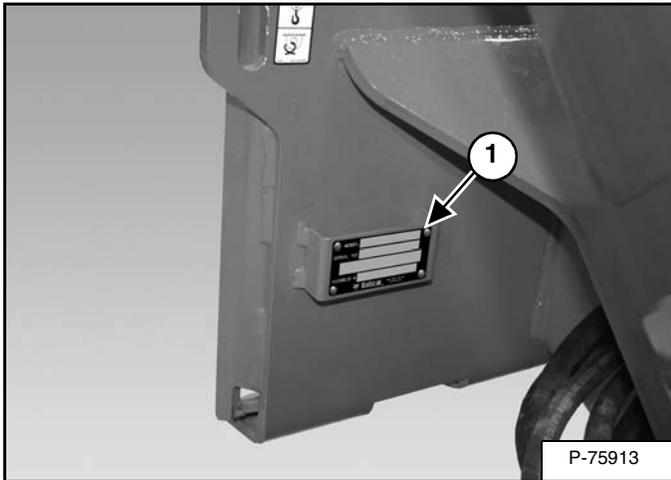


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SERIAL NUMBER LOCATION

Attachment Serial Number

Figure 1



The tree spade serial number plate (Item 1) [Figure 1] is located on the frame.

Always use the serial number of the tree spade when requesting service information or when ordering parts. Early or later models (identification made by serial number) may use different parts, or it may be necessary to use a different procedure in doing a specific service operation.

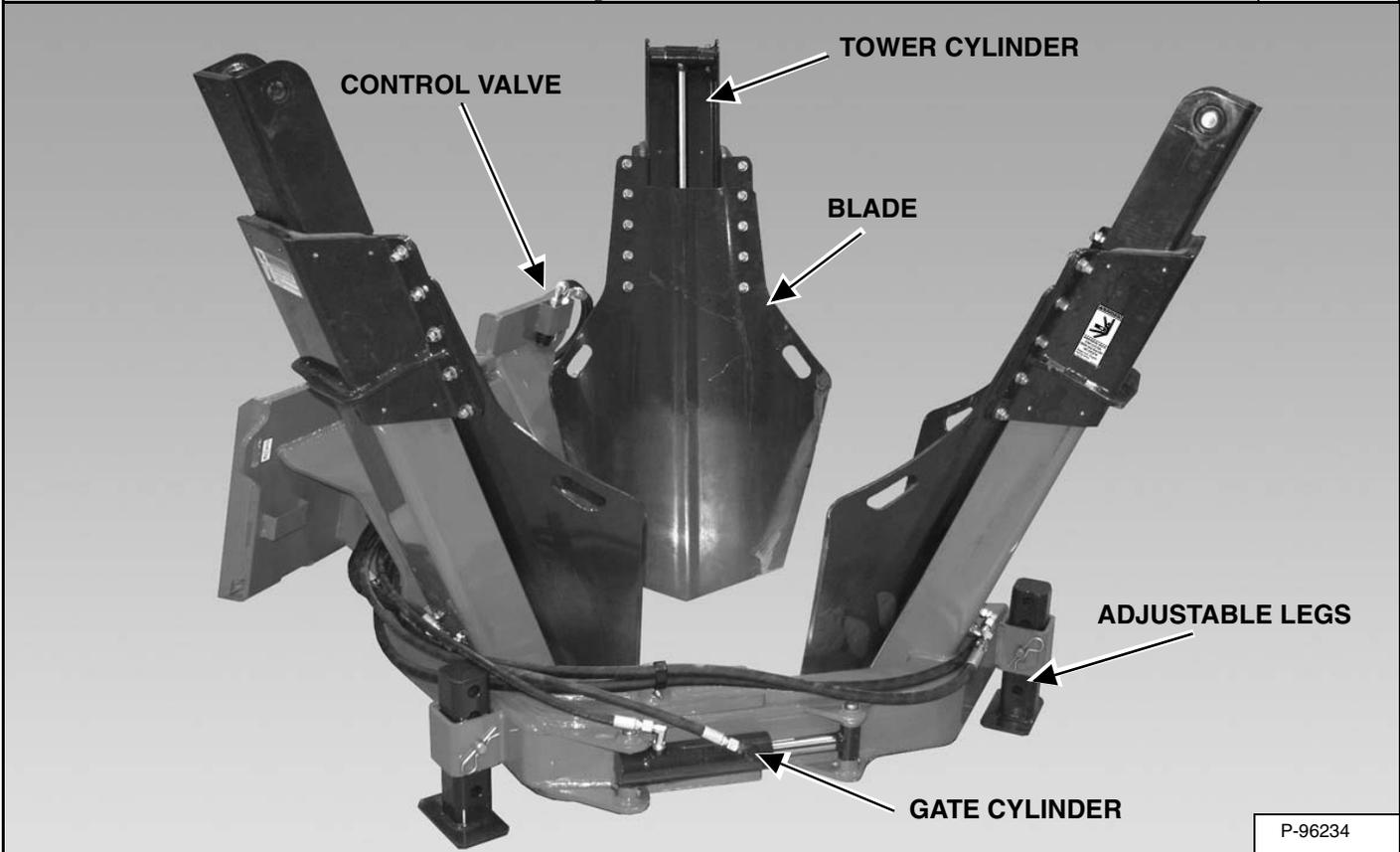
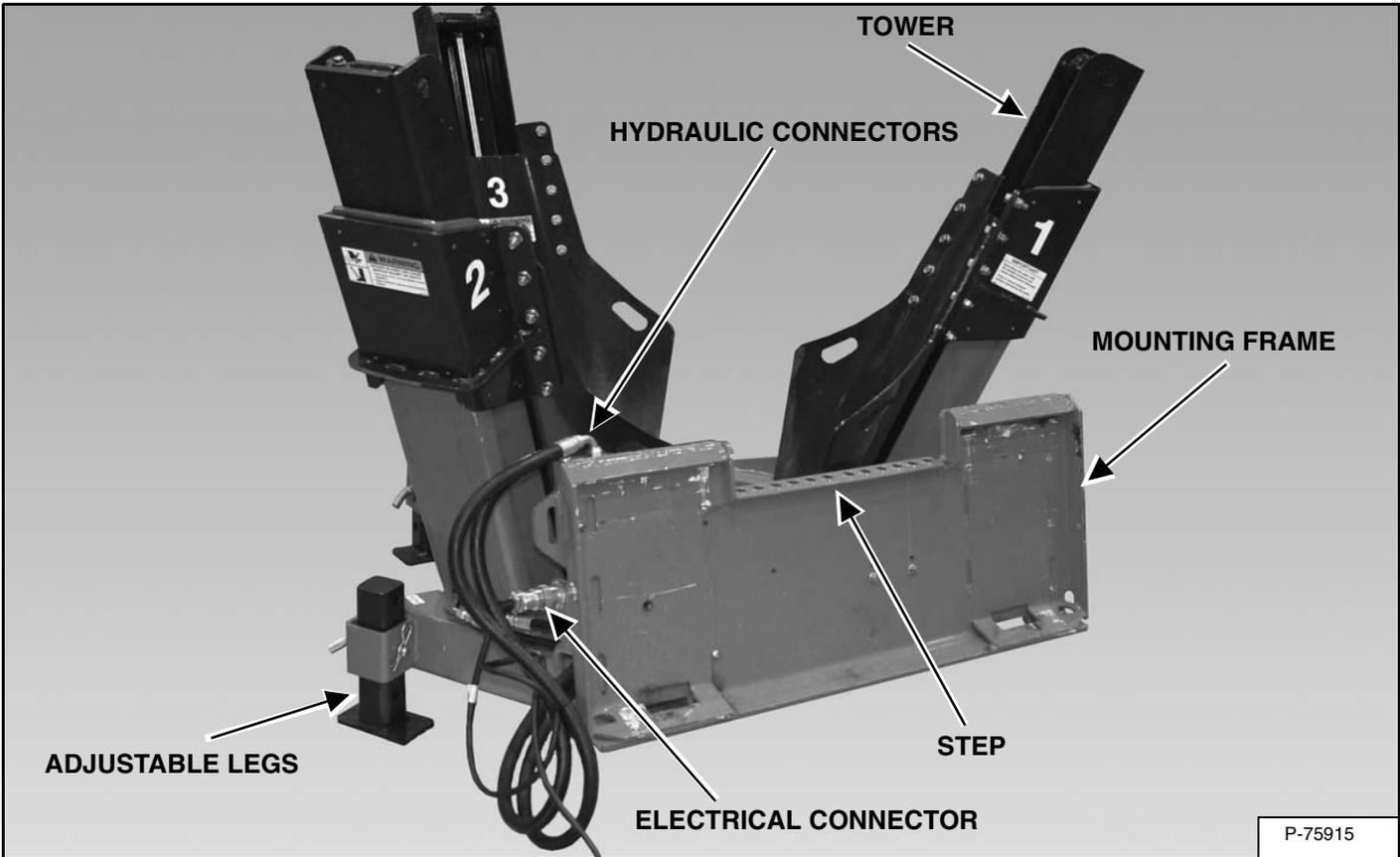
DELIVERY REPORT

Figure 2

The delivery report [Figure 2] must be completed by the dealer and signed by the owner or operator when the Bobcat tree spade is delivered. An explanation of the form must be given to the owner.

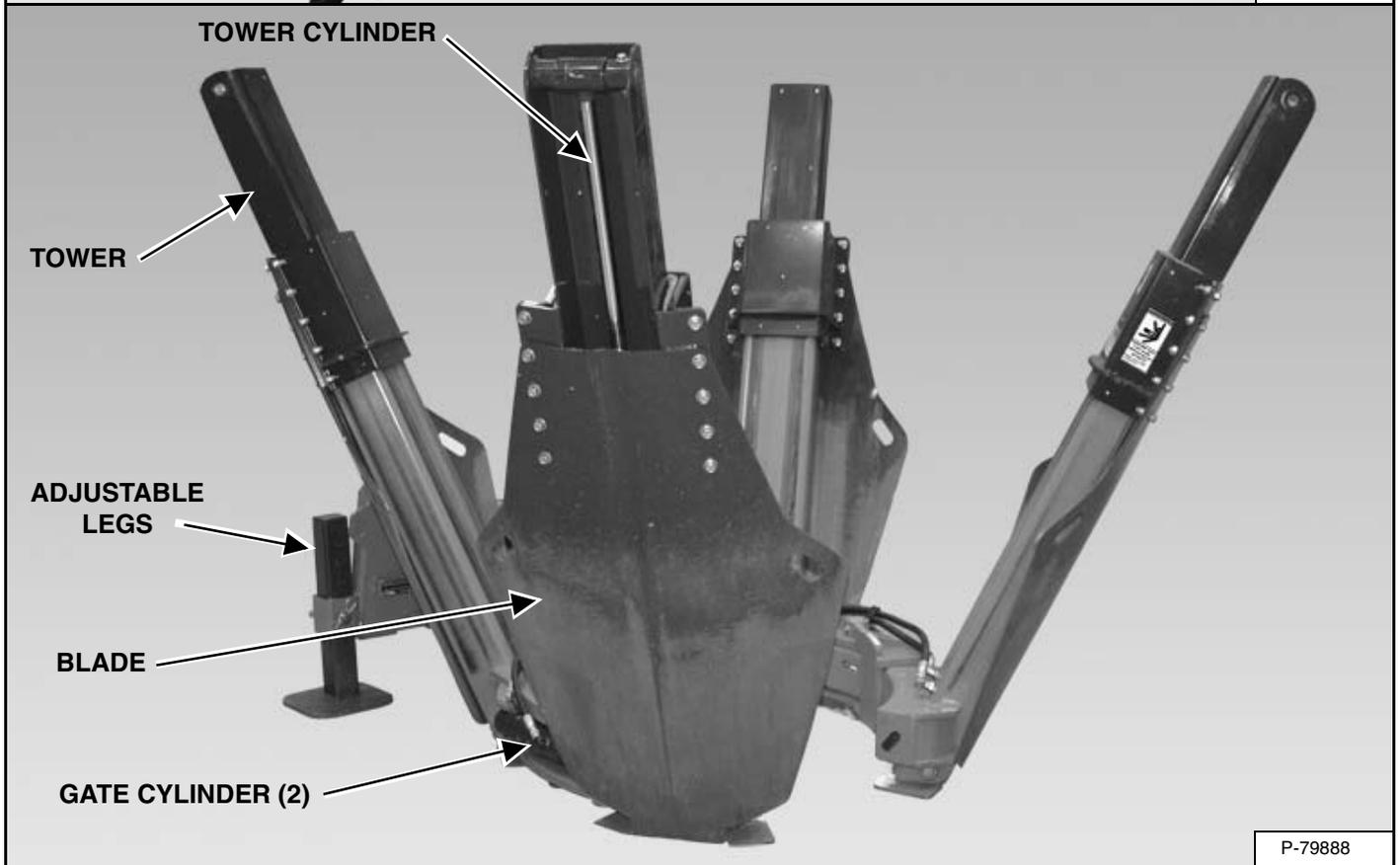
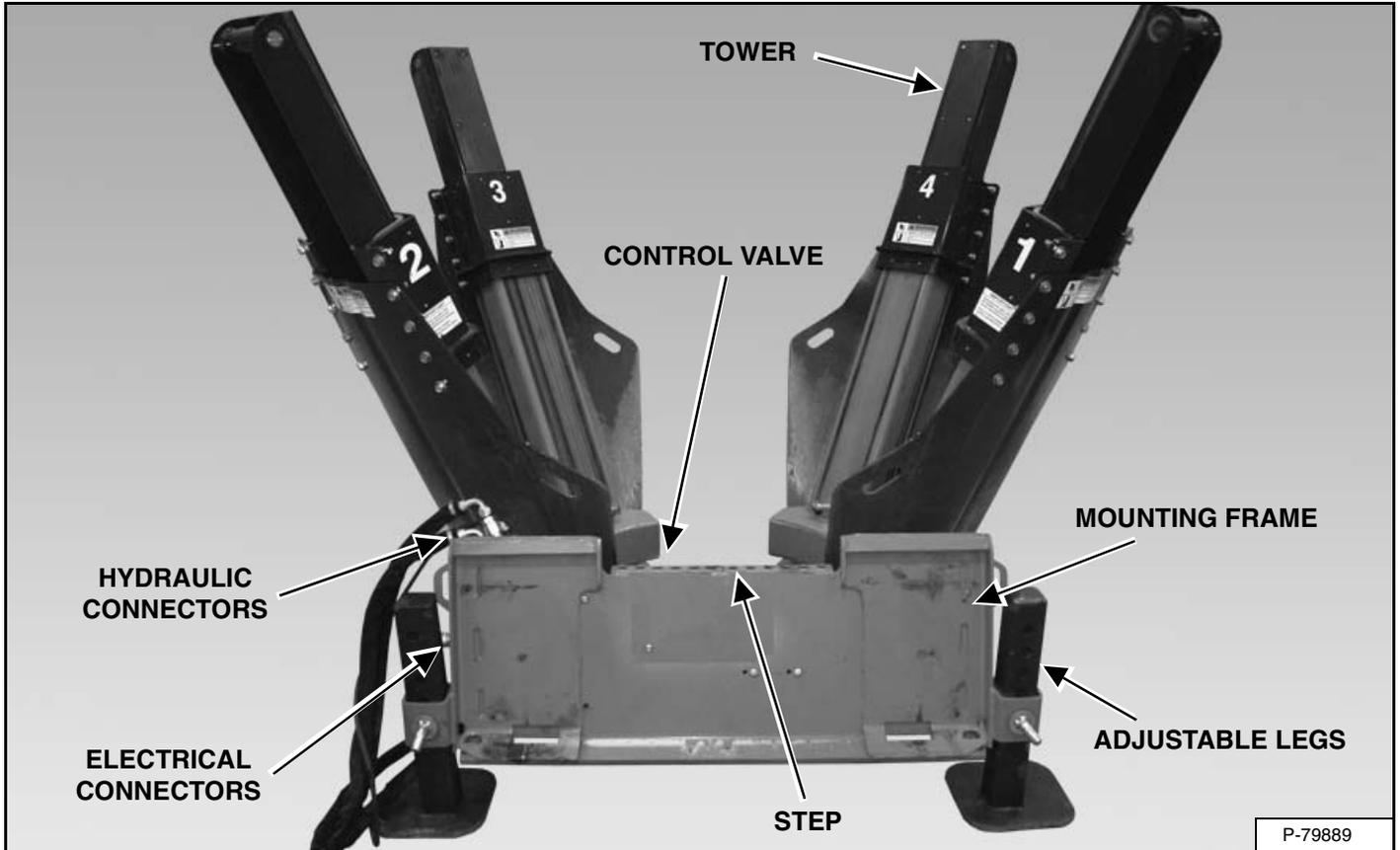
ATTACHMENT IDENTIFICATION

3 Blade



ATTACHMENT IDENTIFICATION (CONT'D)

4 Blade





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SAFETY & MAINTENANCE

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TROUBLESHOOTING

Chart

 <b style="font-size: 24pt; margin-left: 10px;">WARNING	<p>Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, Operator's Handbook and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause injury or death.</p> <p style="text-align: right; font-size: 10pt;">W-2003-0903</p>
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If the attachment is not working correctly, check the hydraulic system of the machine thoroughly before making any repairs on the attachment. Attachment problems can be affected by a hydraulic system that is not operating to specifications. Connect a flow meter to the machine to check the hydraulic pump output, relief valve setting and tube lines to check flow and pressure. (See the machine's Service Manual for the correct procedure to connect the flow meter.)

Use the following troubleshooting chart to locate and correct problems which most often occur with the attachment.

TROUBLESHOOTING THE TREE SPADE		
PROBLEM	CAUSE	CORRECTION
The tree spade does not mount properly on Bob-Tach.	Bob-Tach wedges are not fully retracted during hook-up.	Retract Bob-Tach wedges before installing attachment.
	Mud, dirt or stones are lodged between the Bob-Tach and the tree spade mount.	Remove debris between Bob-Tach and tree spade mount.
The tree spade does not operate.	No hydraulic flow.	Activate loader front auxiliary hydraulics.
		Check quick couplers connection. Check for damaged hose ends and fittings.
		Check the tree spade couplers to make sure they are installed on the correct hoses. A check valve in the tree spade hydraulic system allows hydraulic flow in one direction only.
	No electrical contact.	Check electrical connections. Check loader fuse.
The tree spade gate cylinder opens or closes.	Tree spade control valve and / or solenoids.	Check electrical connections.
		Repair or replace solenoid valves.
		Check controller switches.
	Air in the tree spade hydraulic system.	Open and close gate cylinder until air is purged from the tree spade.
Blades are loose in uprights.	Worn nylon wear pads.	Replace nylon wear pads.
Tree spade does not cut like new.	Worn and / or dull blades.	Sharpen blades.

TROUBLESHOOTING (CONT'D)

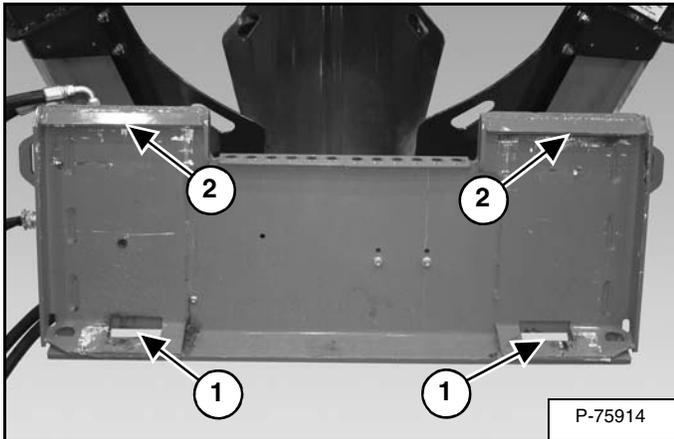
Chart (Cont'd)

TROUBLESHOOTING THE TREE SPADE		
PROBLEM	CAUSE	CORRECTION
Tree spade will not penetrate soil.	Soil is too dry or hard for proper digging of tree spade.	Schedule digging when soil moisture is appropriate.
	Soil contains rocks or debris.	Reposition tree spade away from rocks and debris.
	Tree roots are too large for blades to cut.	Follow recommended tree size guidelines when operating the tree spade.
	Inadequate down pressure on tree spade.	Rear stabilizers are required when using the tree spade.
	Blades are dull or worn.	Sharpen blades.
Soil sticks to blades.	Soil conditions are too wet.	Schedule digging when soil conditions are appropriate.
Root ball of tree crumbles or breaks when digging.	Dull or worn blades will not cut tree roots.	Sharpen blades.
	Soil conditions are too dry.	Schedule digging when soil conditions are appropriate.
	Digging too large of tree for tree spade size.	Follow recommended tree size guidelines when operating tree spade.
Root ball falls out bottom of tree spade.	Soil conditions are too dry.	Schedule digging when soil conditions are appropriate.
	Improper model choice of tree spade.	Choose a Bobcat tree spade model with more blade closure.
Excessive wear or damage to the slide surface.	Uneven down pressure on blades of tree spade when digging.	Position the loader so it is level side to side when digging. Then use the loader tilt function to level the tree spade.
	Loose or exposed screw fasteners on nylon wear pads.	Tighten or replace screw fasteners if needed.
Tree spade will not dig root ball sizes as specified.	Soil conditions are too hard.	Schedule digging when soil conditions are appropriate.
	Operator not relieving down pressure of blades when digging.	Keep frame in contact with the ground. Retract blade to remove down pressure from tip prior to extending the next blade.
	Inadequate down pressure on tree spade.	Rear stabilizers are required when using the tree spade.

INSPECTION

Attachment Mounting Frame

Figure 10-20-1



Inspect the Bob-Tach wedge mounts (Item 1), mounting flange (Item 2) [Figure 10-20-1] and all welds on the tree spade for wear and damage each time the tree spade is removed from the loader.

Frequently inspect the tree spade to ensure that all components are secure and that all bolts and nuts are thoroughly tightened.

Bob-Tach

Hand Lever Bob-Tach

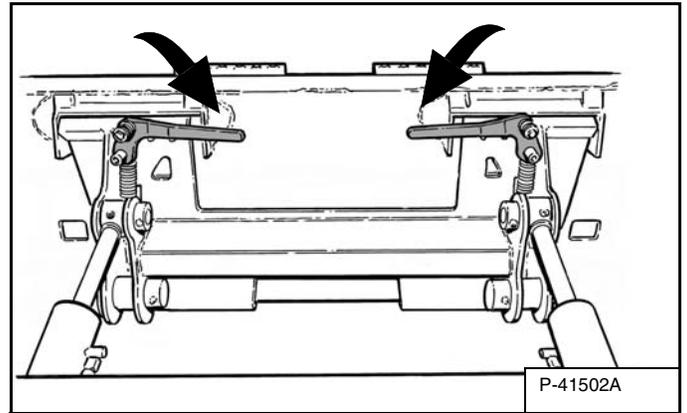


AVOID INJURY OR DEATH

The Bob-Tach wedges must extend through the holes in the attachment mounting frame. Levers must be fully down and locked. Failure to secure wedges can allow attachment to come off.

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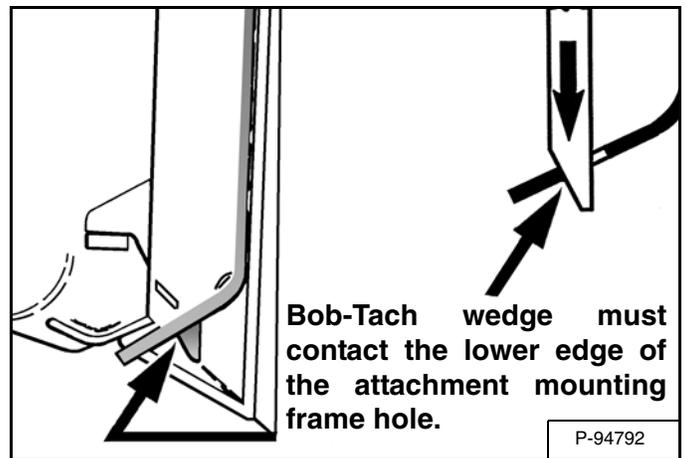
Figure 10-20-2



Push down on the Bob-Tach levers until they are fully engaged in the locked position [Figure 10-20-2] (wedges fully extended through the attachment mounting frame holes).

The levers and wedges must move freely [Figure 10-20-2].

Figure 10-20-3



The wedges must extend through the holes in the attachment mounting frame, securely fastening the attachment to the Bob-Tach [Figure 10-20-3].

NOTE: If the wedge does not contact the lower edge of the hole, the attachment will be loose and can come off the Bob-Tach.

Inspect the mounting frame on the attachment. (See the machine's Operation and Maintenance Manual for inspecting the Bob-Tach). Replace any parts that are damaged, bent or missing. Keep all fasteners tight. Look for cracked welds. Contact your Bobcat dealer for repair or replacement parts.

Lubricate the wedges. (See the machine's Operation & Maintenance Manual for the correct procedure.)

INSPECTION (CONT'D)

Bob-Tach (Cont'd)

Power Bob-Tach

WARNING

AVOID INJURY OR DEATH

The Bob-Tach wedges must extend through the holes in the attachment mounting frame. Levers must be fully down and locked. Failure to secure wedges can allow attachment to come off.

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Figure 10-20-4

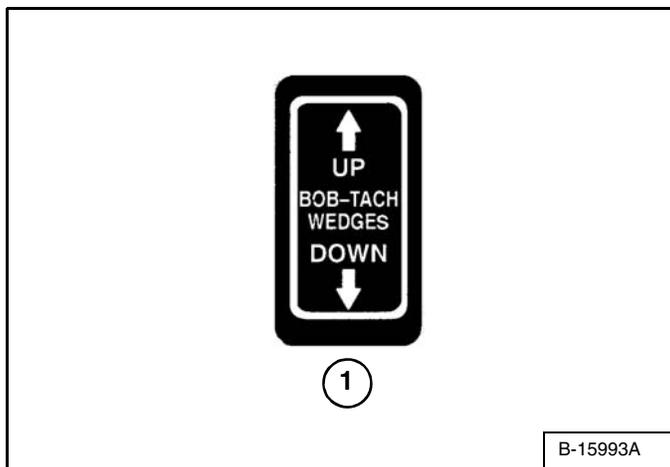
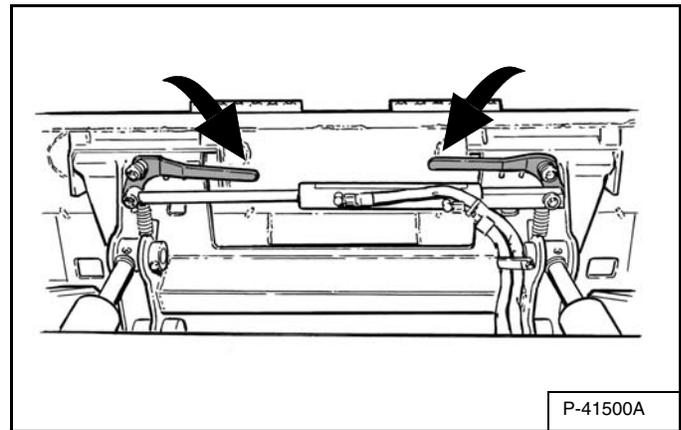
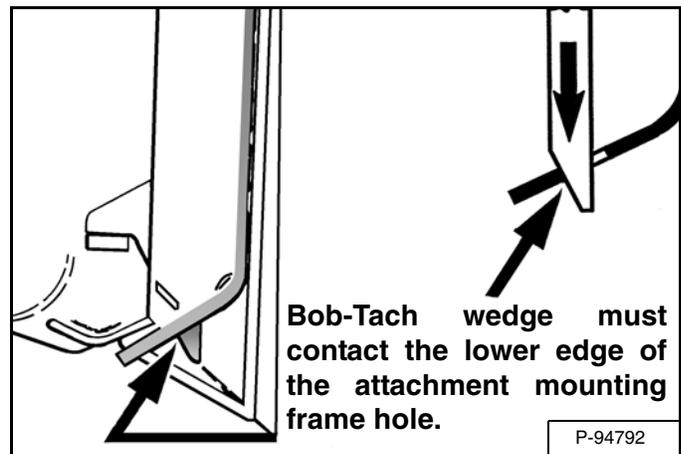


Figure 10-20-5



Push (Item 1) [Figure 10-20-4] and hold the BOB-TACH “WEDGES DOWN” switch until the levers are fully engaged in the locked position [Figure 10-20-5] (wedges fully extended through the attachment mounting frame holes).

Figure 10-20-6



The wedges must extend through the holes in the attachment mounting frame, securely fastening the attachment to the Bob-Tach [Figure 10-20-6].

NOTE: If the wedge does not contact the lower edge of the hole, the attachment will be loose and can come off the Bob-Tach.

Inspect the mounting frame on the attachment. (See the machine's Operation & Maintenance Manual for inspecting the Bob-Tach). Replace any parts that are damaged, bent or missing. Keep all fasteners tight. Look for cracked welds. Contact your Bobcat dealer for repair or replacement parts.

Lubricate the wedges. (See the machine's Operation & Maintenance Manual for the correct procedure.)

LUBRICATING THE ATTACHMENT

Lubrication Locations

Always use a good quality lithium base multi-purpose grease when lubricating the tree spade. Apply lubricant until extra grease shows.

Lubricate the grease fittings, EVERY 8-10 hours.

Figure 10-30-1

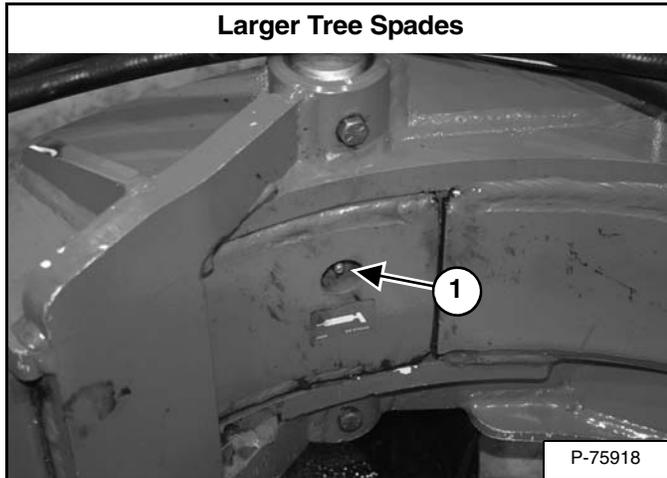
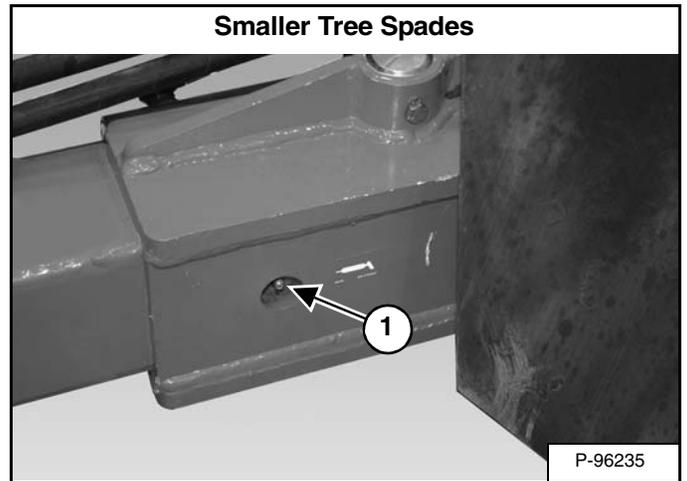


Figure 10-30-2



Close the gates fully.

Grease the pivot pin (Item 1) [Figure 10-30-1] or [Figure 10-30-2].

IMPORTANT

Do not open or close the gate until the blades are in the full raised position. Damage to the machine could occur.

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REGULAR MAINTENANCE ITEMS

Slide Removal / Replacement

WARNING

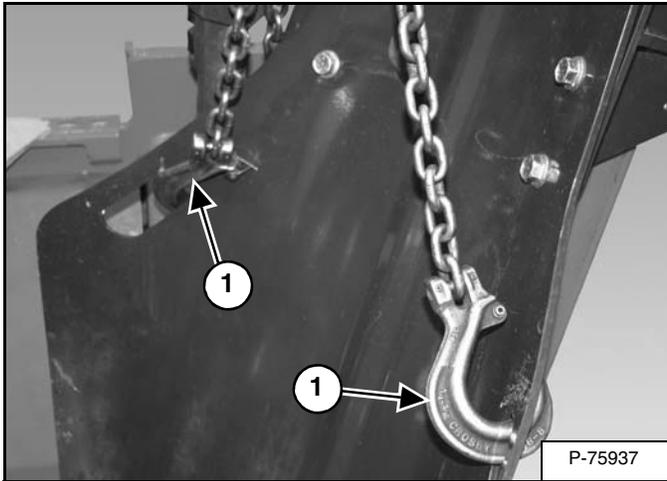
AVOID INJURY OR DEATH

Wear safety glasses to prevent eye injury when any of the following conditions exist:

- When fluids are under pressure.
- Flying debris or loose material is present.
- Engine is running.
- Tools are being used.

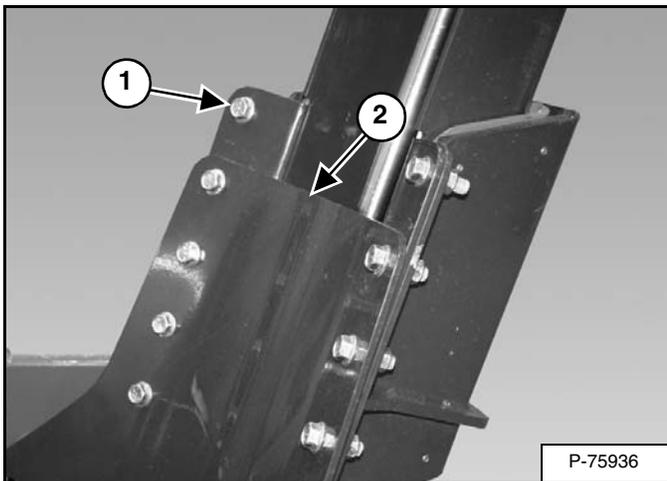
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Figure 10-40-1



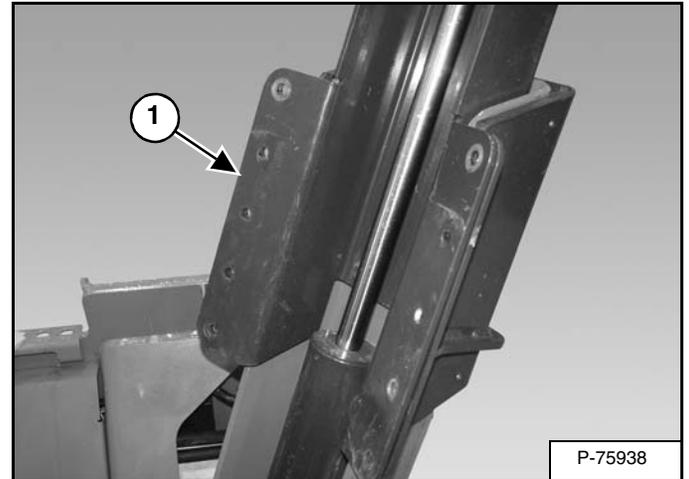
Use a lifting device and chains (Item 1) [Figure 10-40-1] to support the blade before removing.

Figure 10-40-2



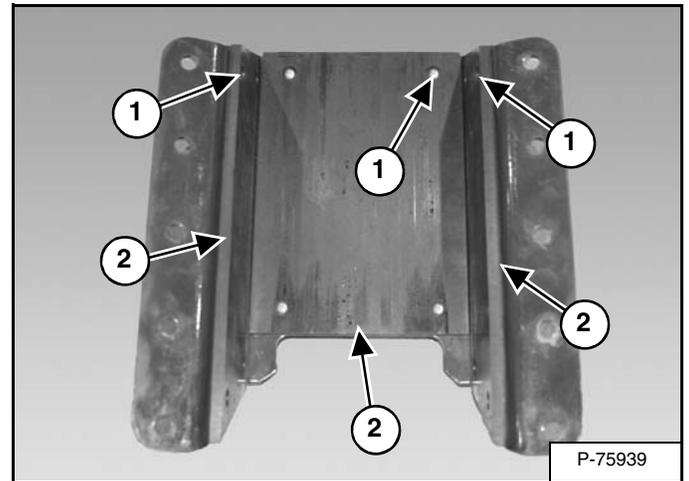
Remove the ten bolts and nuts (Item 1) and remove the blade (Item 2) [Figure 10-40-2].

Figure 10-40-3



Remove the slide (Item 1) [Figure 10-40-3].

Figure 10-40-4

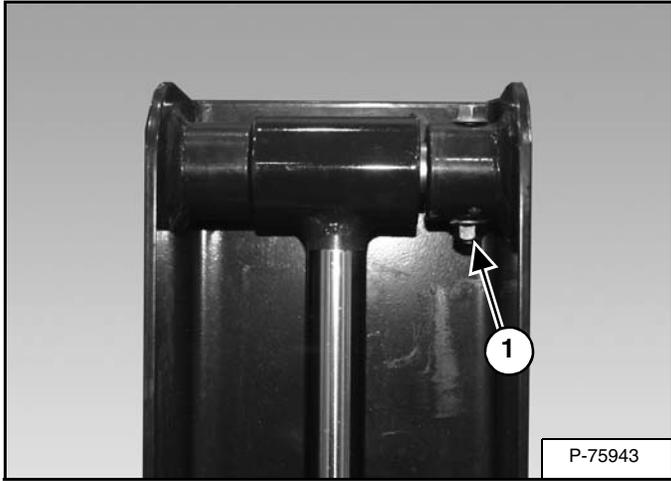


Remove the twelve screws (Item 1), then the three wear pads (Item 2) [Figure 10-40-4].

REGULAR MAINTENANCE ITEMS (CONT'D)

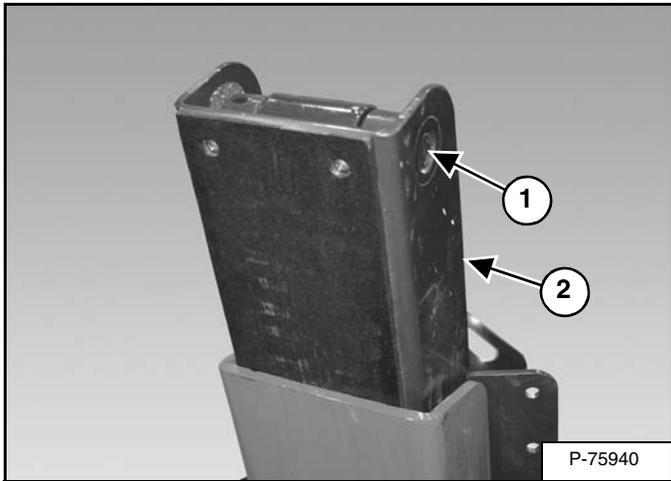
Slide Removal / Replacement (Cont'd)

Figure 10-40-5



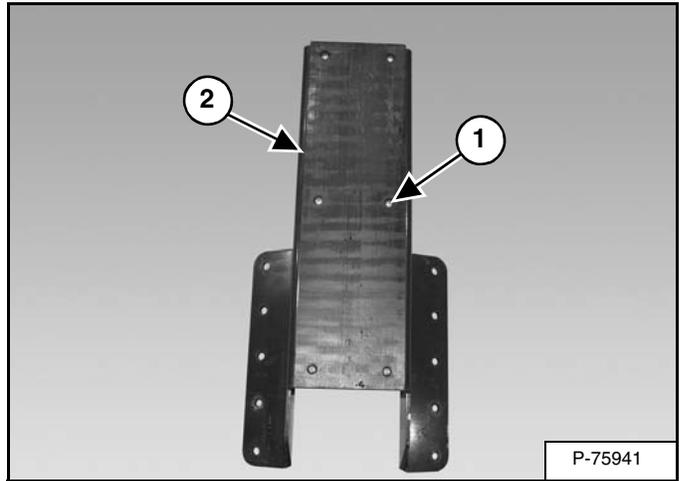
Remove bolt and nut (Item 1) [Figure 10-40-5] securing pin on rod end of cylinder.

Figure 10-40-6



Remove the cylinder pin (Item 1) and remove back plate (Item 2) [Figure 10-40-6].

Figure 10-40-7



Remove the screws (Item 1), then the wear pad (Item 2) [Figure 10-40-7].

REGULAR MAINTENANCE ITEMS (CONT'D)

Blade Sharpening

The blades need to be kept sharp at all times to assure optimum digging performance. Frequency of sharpening will be dependent on soil conditions and types of trees to be dug. When the blade edges start to become rounded or when the operator notices that it takes more effort to extract a tree, sharpen the blades.

Sharpen the blades with the blade fully retracted, the gates fully open and with the loader engine off. Do not sharpen the blades with the loader running.

The tree spade blades need to be sharp enough to easily cut tree roots and penetrate hard soils (do not sharpen to a point). Concentrate sharpening of the blade to the bottom half of the blade and the blade point. Do not get the metal too hot while sharpening or you will take some of the temper out of the blade.

Figure 10-40-8

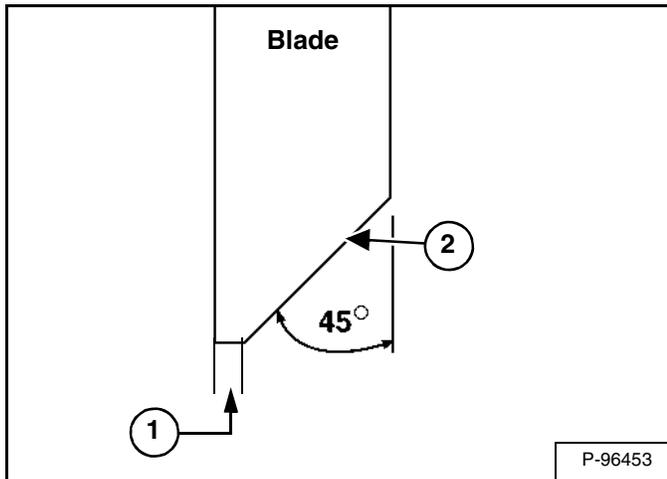
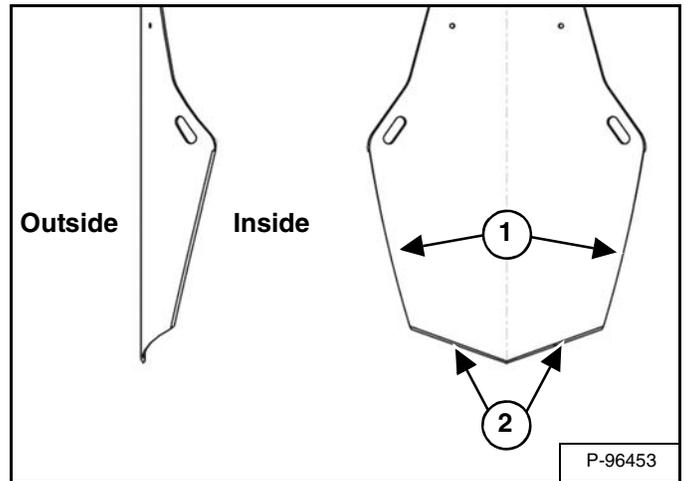


Figure 10-40-9



Sharpen the blades to a 45° angle with a 0.30 - 0.40 in. (0.7 - 1 mm) flat (Item 1) [Figure 10-40-8] at the edge of the blade.

NOTE: Over sharpening will reduce overall blade and sharpening edge life.

Sharpen so the beveled side (Item 2) [Figure 10-40-8] is to the outside of the blade at the sides (Item 1) [Figure 10-40-9] and the inside blade at the bottom (Item 2) [Figure 10-40-9]

To sharpen the blade point, it may be necessary to slightly raise and block the tree spade up to better access the blade point.



Eye and body protection is required when welding or grinding. Wear approved goggles, helmet and clothing. Failure to wear eye and body protection can result in serious injury.

W-2009-1285



Bobcat®

ATTACHMENT STORAGE AND RETURN TO SERVICE

Storage

Sometimes it may be necessary to store your Bobcat attachment for an extended period of time. Below is a list of items to perform before storage.

- Thoroughly clean the attachment.
- Lubricate the attachment.
- Inspect the Bob-Tach wedge mounts, mounting flange and all welds on the attachment for wear and damage.
- Check for loose hardware, missing guards, or damaged parts.
- Replace worn or damaged parts.
- Check for damaged or missing decals. Replace if necessary.
- Place the attachment in a dry protected shelter.
- Place the attachment flat on the ground.
- Put all controls in neutral position.

NOTE: In muddy conditions or to prevent the attachment from freezing to the ground, put the attachment on planks or blocks before removing the attachment from the machine.

Return to Service

After the Bobcat attachment has been in storage, it is necessary to follow a list of items to return the attachment to service.

- Be sure all shields and guards are in place.
- Lubricate the attachment.
- Install and operate attachment, check for correct function.



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HYDRAULIC SYSTEM

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Parts Identification - 4 Blade	20-10-4
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CONTROL VALVE - CONVERTIBLE	20-11-1
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Removal And Installation	20-21-1
Parts Identification	20-21-4
Disassembly	20-21-5
Assembly	20-21-8



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CONTROL VALVE - MAIN

Removal And Installation

IMPORTANT

When repairing hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

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IMPORTANT

Contain and dispose of any oil leakage in an environmentally safe manner.

I-2066-0395

! WARNING

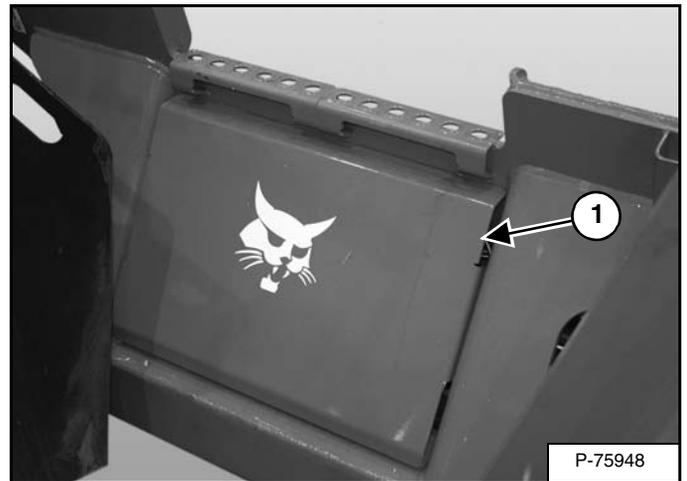
AVOID INJURY OR DEATH

Wear safety glasses to prevent eye injury when any of the following conditions exist:

- When fluids are under pressure.
- Flying debris or loose material is present.
- Engine is running.
- Tools are being used.

W-2019-0907

Figure 20-10-1



Place the tree spade flat on the floor.

Remove the cover (Item 1) [Figure 20-10-1] to expose the control valve.

NOTE: Removing blade No. 2 will make it easier to remove the control valve on the TS32, TS36 & TS44 tree spade models.

See blade removal procedure. (See Removal And Installation on Page 30-20-1.)

CONTROL VALVE MAIN (CONT'D)

Removal And Installation (Cont'd)

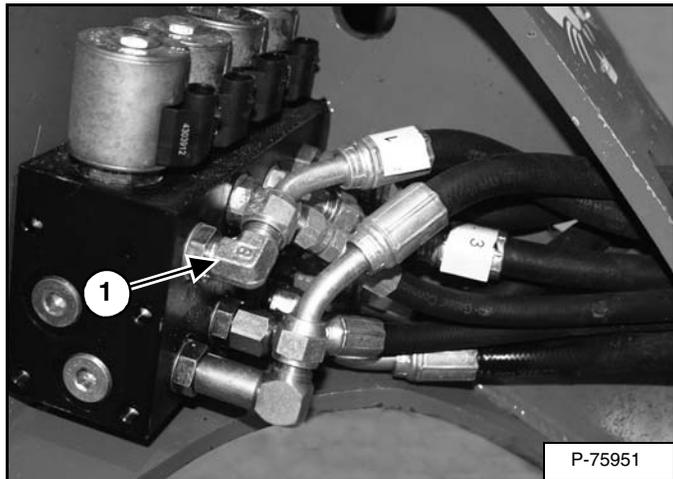
Figure 20-10-2



Disconnect the electrical harness (Item 1) [Figure 20-10-2] from the control valve.

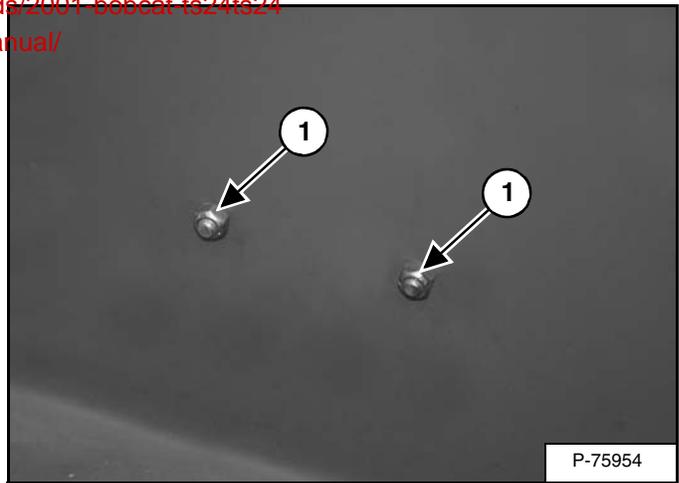
NOTE: Mark wire connections for correct installation.

Figure 20-10-3



Mark and remove all hydraulic hose connections (Items 1) [Figure 20-10-3].

Figure 20-10-4



Remove the nuts (Item 1) [Figure 20-10-4] and bolts, then remove the control valve.

Installation: Tighten bolts and nuts to 25 - 28 ft.-lb. (34 - 38 N•m) torque.