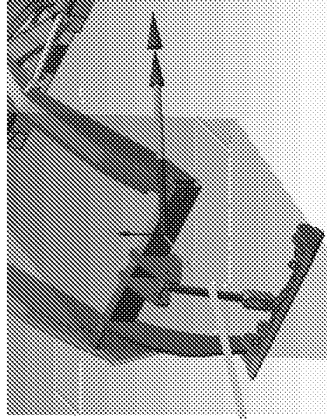




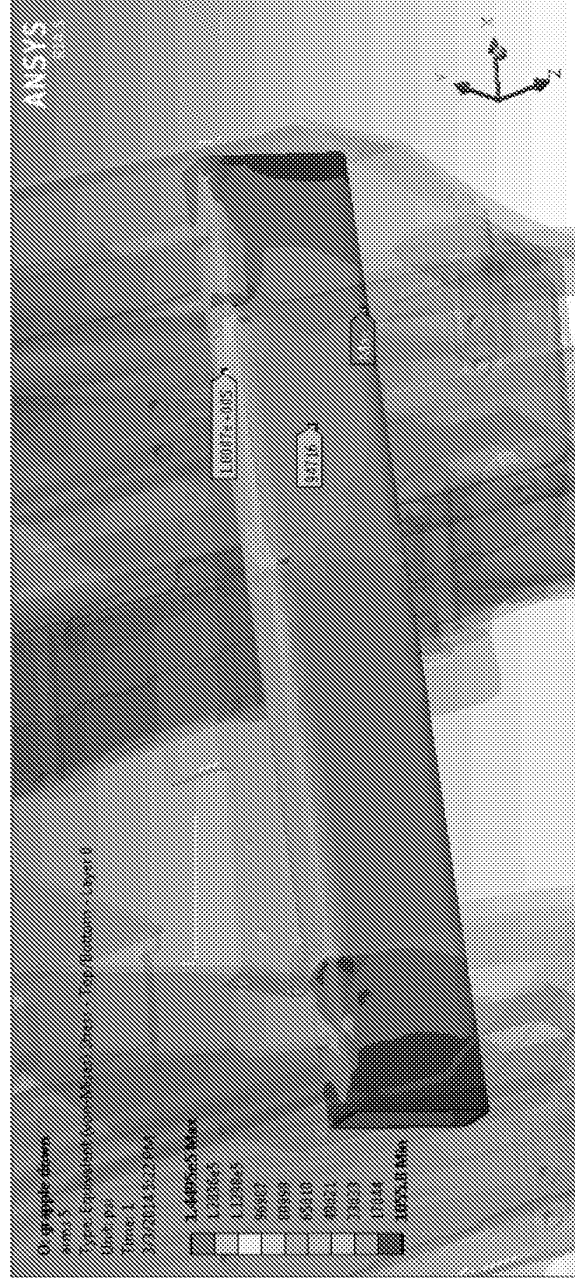
Yield Criteria (45 ksi)



- Offset Grapple, Low is critical case
 - 100 ksi equivalent stress
 - 1.2 kip axial force
 - 9 kip shear force
 - **180,000 in-lb torsional moment (MZ)**
 - 20,000 in-lb long moment (MY)
 - 5,800 in-lb short moment (MX)



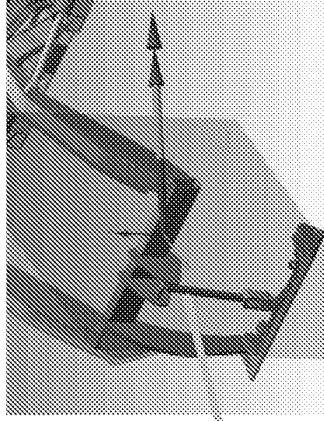
Reference axes



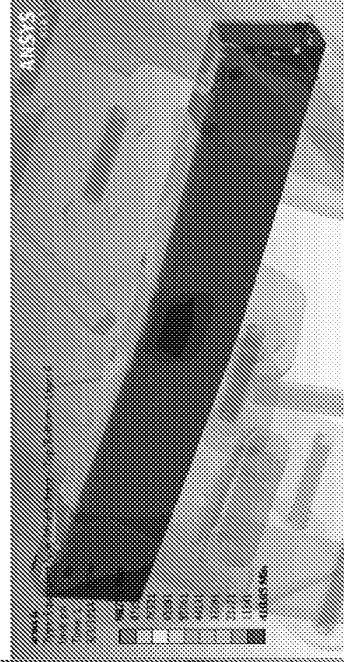
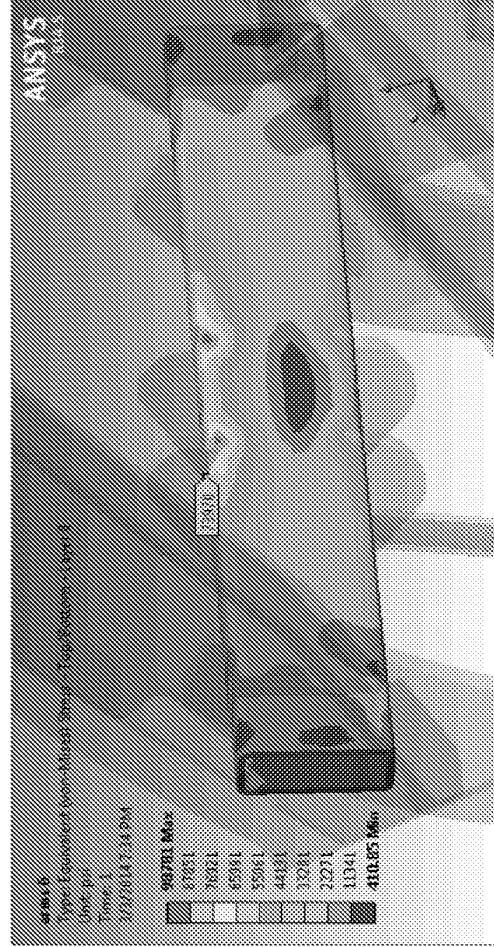
Yield Criteria (45 ksi)



- Auger Bounce, Low is also high-stress case
 - 74 ksi equivalent stress
 - 1 kip axial force
 - 17 kip shear force
 - **87,800 in-lb torsional moment (MZ)**
 - **80,900 in-lb long moment (MY)**
 - 14,300 in-lb short moment (MX)



Reference axes

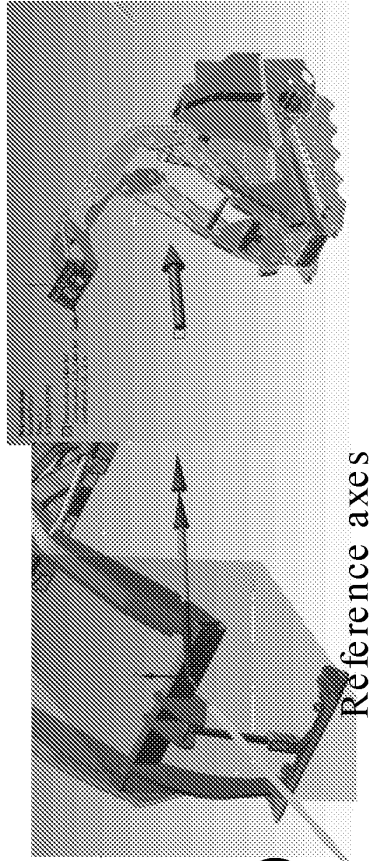




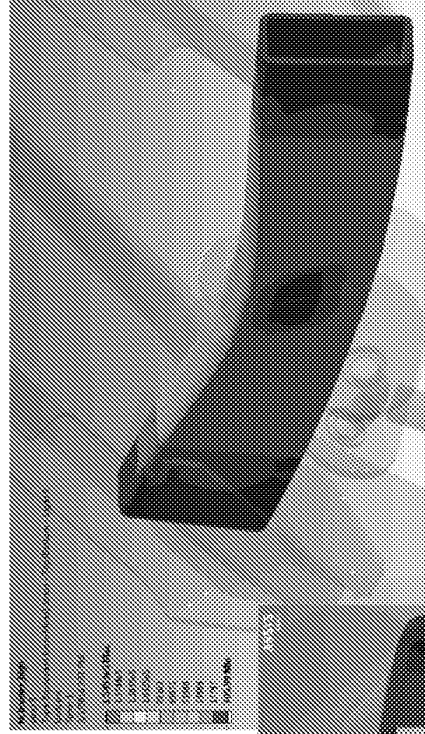
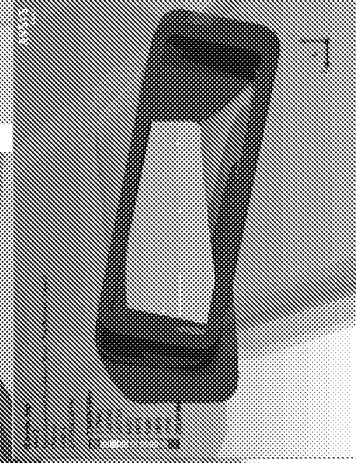
Fatigue Criteria (17 ksi?)



- Leveler, High is critical case
 - 90 ksi equivalent stress
 - 5 kip axial force
 - 24 kip shear force
 - **254,000 in-lb torsional moment (MZ)**
 - **271,000 in-lb bending moment (MY)**
 - 22,000 in-lb bending moment (MX)
 - 45 kip bucket piston force



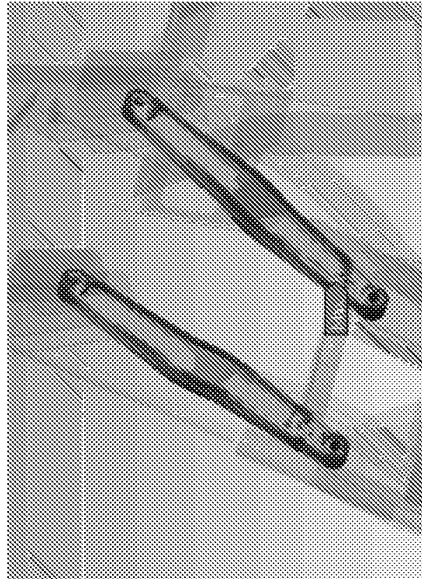
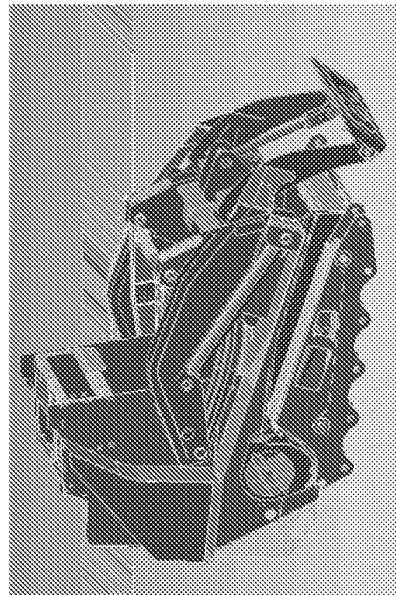
Reference axes





TMAX Loader Upper Arm Stresses

02/27/2014





21 Load cases



- Uses defined loads (21 cases)

Load Maximum weight of implement or trailer 75,000 lbs (33,900 kg) - 10,000 lbs (4,500 kg) - 5,000 lbs (2,250 kg) - 2,500 lbs (1,125 kg) - 1,250 lbs (562 kg) - 625 lbs (281 kg) - 312 lbs (141 kg) - 156 lbs (70 kg) - 78 lbs (35 kg) - 39 lbs (18 kg) - 19 lbs (9 kg) - 9 lbs (4 kg) - 4 lbs (2 kg) - 2 lbs (1 kg) - 1 lb (0.5 kg) - 0.5 lb (0.2 kg) - 0.25 lb (0.1 kg) - 0.125 lb (0.06 kg) - 0.0625 lb (0.03 kg) - 0.03125 lb (0.01 kg) - 0.015625 lb (0.007 kg) - 0.0078125 lb (0.003 kg) - 0.00390625 lb (0.001 kg) - 0.001953125 lb (0.0005 kg) - 0.0009765625 lb (0.0002 kg) - 0.00048828125 lb (0.0001 kg) - 0.000244140625 lb (0.00005 kg) - 0.0001220703125 lb (0.000025 kg) - 0.00006103515625 lb (0.0000125 kg) - 0.000030517578125 lb (0.00000625 kg) - 0.0000152587890625 lb (0.000003125 kg) - 0.00000762939453125 lb (0.0000015625 kg) - 0.000003814697265625 lb (0.00000078125 kg) - 0.0000019073486328125 lb (0.000000390625 kg) - 0.00000095367431640625 lb (0.0000001953125 kg) - 0.000000476837158203125 lb (0.00000009765625 kg) - 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Summary



- See Excel sheets

Case Label		Peak Stress (ksi)	P.S.	Axial Force (lb)	Shear Load (lb)	Moment (ft Moment)	PX	PY	PZ	FX	FY	FZ	MX	MY	MZ	Thick
Auger Bounce	High	150	0.30	34,000	4,208	1355	1543	-785	0	-263.73	-234.25	4208	-233.7	72.2	-735.6	46.5
	Med	68	0.06	-	0	0	-	-	-	-	-	-	-	-	-	14.5
	Low	65	0.69	16,458	2276	1275	703	479	0	-171.13	2709	2276	130	66	852	6.9
Offset Grapple	High	125	0.35	21,336	9376	2144	18872	13904	3376	-2489	1557	0	2140	-1876	713	202
	Med	111	0.41	15,897	-2157	-5366	-18077	-301	-2137	2386	-274	0	-6685	2286	-1552	1054
	Low	112	0.41	-	0	0	-	-	-	-	-	-	-	-	-	8.9
Auger Kick-out / Angle	High	62.8	0.74	10,041	-1445	-651	-8555	-6657	-1445	968	-379	0	-1037	-42	-138	46.5
	High	53.0	0.84	13,079	-1450	-959	-589	235	0	9794	9007	-1450	20	24	-17	2463
Side Bucket Hit	High	111	0.43	13,059	1882	1136	1769	-1182	0	-11683	-8417	3980	689	553	9925	2052
	Med	32.1	1.43	-	-	-	-	-	-	-	-	-	-	-	-	-
	Low	10.8	4.17	-	-	-	-	-	-	-	-	-	-	-	-	-
Corner Bucket Hit	Med	33.4	1.35	-	-	-	-	-	-	-	-	-	-	-	-	6.9
	Low	27.6	1.89	-	-	-	-	-	-	-	-	-	-	-	-	-
High Cycle Fatigue Factors																
Leveler	High	27.4	0.25	14,474	3452	-1299	965	-301	0	-11390	-10038	2632	-779	17	-1809	46.5
	Med	26.2	0.65	931	-5800	422	537	37	-5800	-225	877	0	89	128	239	314
Trencher	Med	2.4	7.08	-	-	-	-	-	-	-	-	-	-	-	-	-
	Low	3.8	5.87	-	-	-	-	-	-	-	-	-	-	-	-	-
Digging	Med	34.4	1.18	-	-	-	-	-	-	-	-	-	-	-	-	-
	Low	29.3	0.58	7,491	921	177	250	247	0	-7643	1185	921	-5	-147	-23	-1364

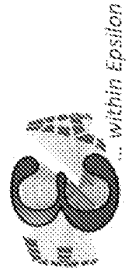
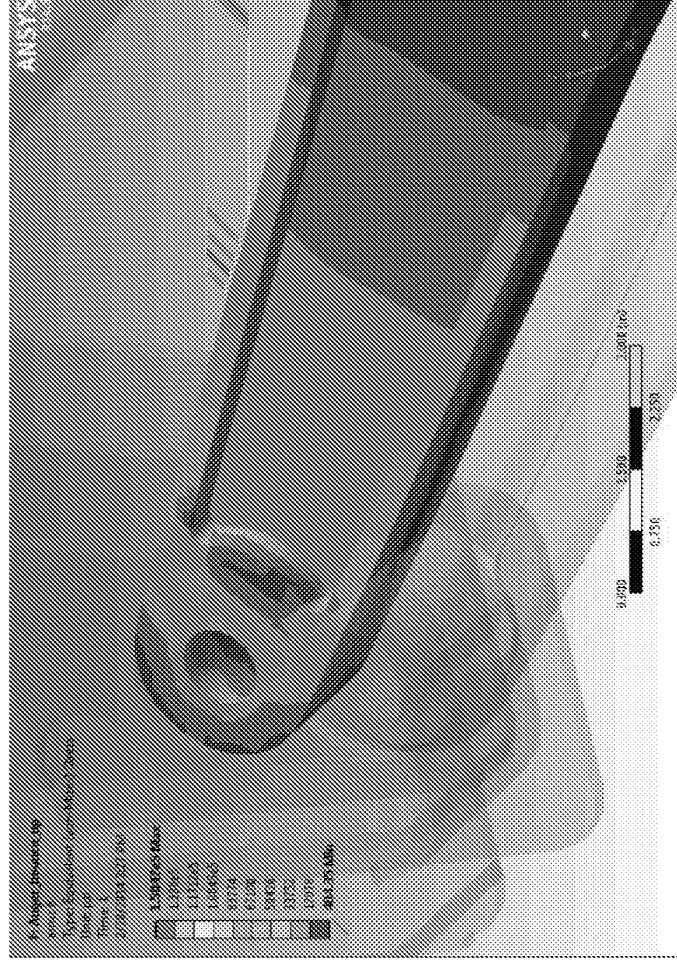




Yield Criteria (45 ksi)



- Auger Bounce, High is critical case
 - 150 ksi equivalent stress
 - 34 kip axial force
 - 4 kip shear force
- Offset Grapple Middle has highest moment (longitudinal) ,6300 in-lb
- Side Bucket Hit, High gives larges moment (bending), 5000 in-lb

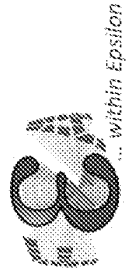
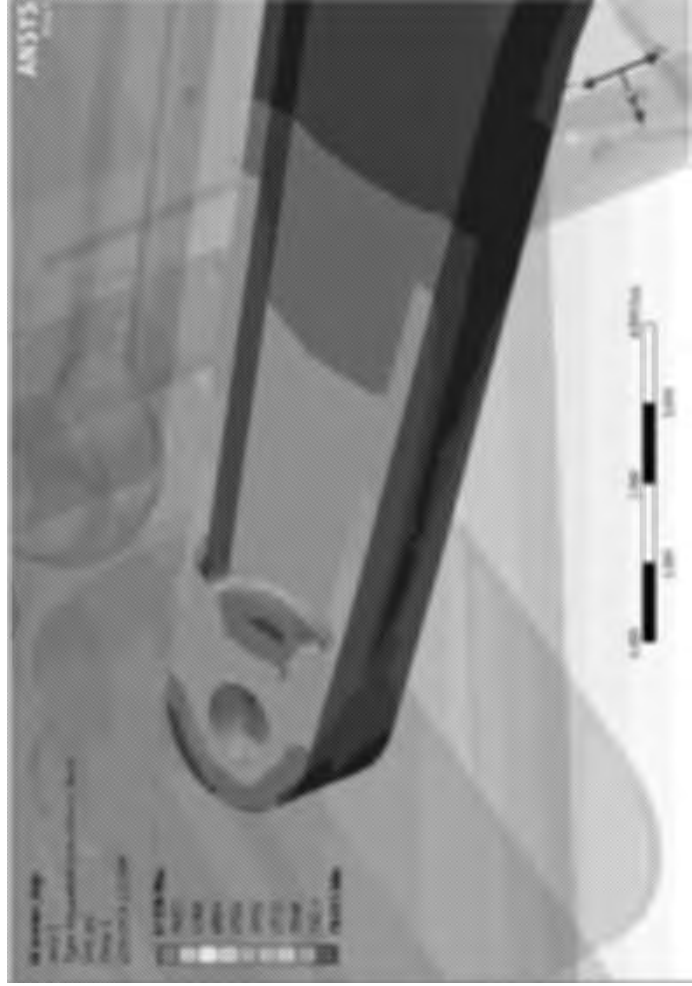




Fatigue Criteria (17 ksi?)



- Leveler, High is critical case
 - 67 ksi equivalent stress
 - 14 kip axial force
 - 2.4 kip shear force
 - 1300 in-lb longitudinal moment
 - 2270 in-lb bending moment

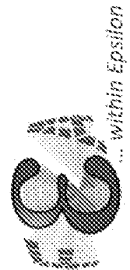
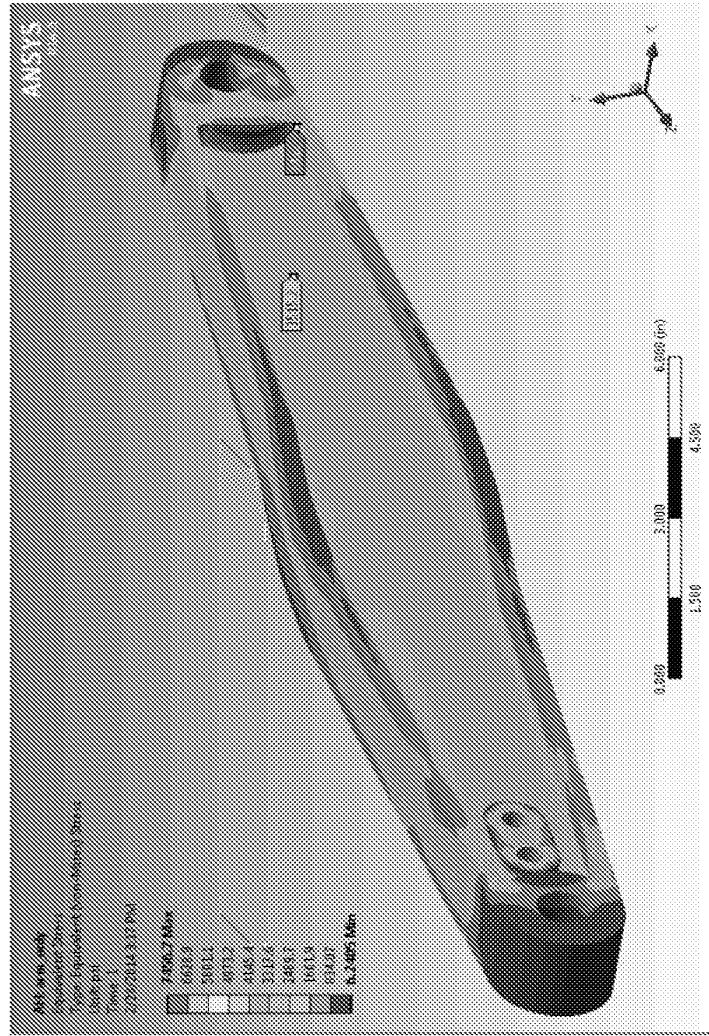
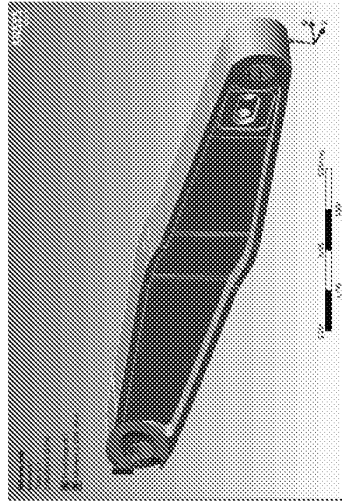




Baseline Stresses



- 1000 in-lb longitudinal moment

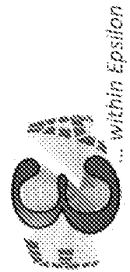
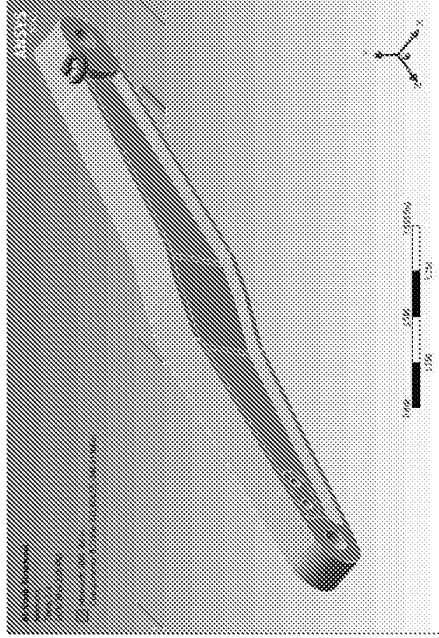
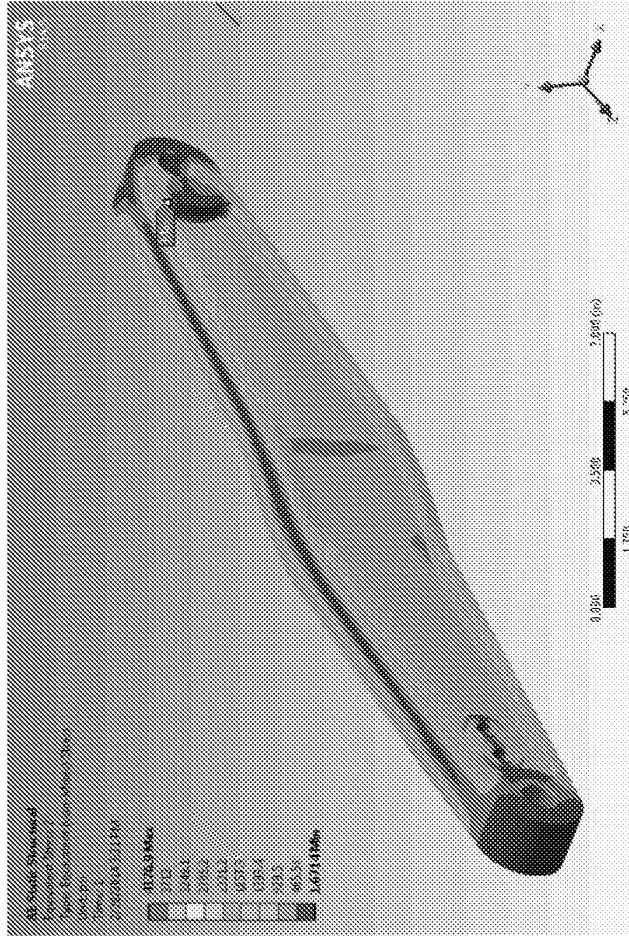




Baseline Stresses



- 1000 in-lb bending moment





- 1000 lbf axial

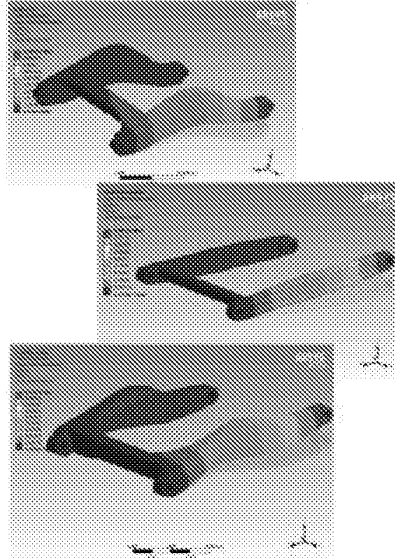


W298 TX1000 UPDATE

12/15/14

Loader Arm Testing

- FEA has confirmed the upper link can flex to cause independent movement between the lift cylinders
- A fabricated single piece link was designed to exceed the 2.0 design (since this design does not have a racking problem)
- Proceeding with updating all machines with this design
- FEA on entire loader will be re-run with the new piece to confirm



Loader Arm Testing

Configuration	Case 1 Terminal Loading	Case 2 Terminal Loading (w/ROIN)
3.0	0.847	1.355
2.0	0.049	0.051
4.0	0.077	0.089
3.0 Rev 2	0.245	0.248
4.0 Rev 2	0.046	0.048

W298 TX1000 UPDATE

12/15/14

Combined Flow Aux. system

- The lab unit was set up with a combined flow system and run with the auger (found to be acceptable)
- Gear pumps are in to update all 4.0 machines with combined flow pumps
- This also gives us a future "low flow" option feature if we want it by adding a diverter valve to the circuit
- Will still pursue a split flow system as backup, but combined is the "default" design at this point.

Engine Heat work

- After modifications to the rear radiator intake; heat runs were able to be completed
 - Water and oil cooling seems adequate but we are not expelling the heat from the machine
 - Need to find exit lanes for the air out the front of the machine (move air cleaner, open up hood louvers)



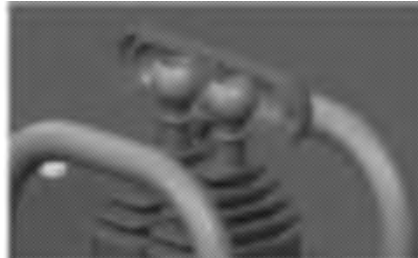
Controls and H.

W298 TX1000 UPDATE

12/15/14

Controls

- Input received from Micron on shaping, fastening, and materials for control parts
 - Outer handle: glass infused nylon
 - Inner ball: delrin
- Longer handle printed to increase available rotation (on the field unit)
- **REDACTED**



TORO-0000557



Case IH

W298 TX1000 UPDATE

12/15/14

Tomah Build / Releases

W298 T max	1305 Rele Plan	Current / Actual	Notes
Weld tool releases (902)	n/a		
Other long lead releases (902)	n/a		
3.0 updates (rework frame, muffler, and hoses)	11/12/2014	11/20/2014	1st unit up and running. 2nd unit followed a few days later.
500 hours completed (902)	n/a	n/a	The 1305 3.0 machine stopped at 324hrs due mainly to poor weather.
			Loader arm was the last major weldment released; still a full 10 wks from final date. A few minor weldments (platform) are still unreleased as we design around them.
Weld tool releases (1305)	11/9/2014	11/24/2015	Engine was released 12/1. Combined flow pump is not released but is already in Case IH's system and readily available.
Other long lead releases (1305)	12/5/2014	12/11/2014	
4.0 updates / 1305 reles	1/15/2015	1/19/2015	Current start date for the build is 1/12.
Final releases	1/27/2015	1/27/2015	
Pilot Build	3/12/2015	3/18/2015	Date officially in the line 15 schedule.
Production	4/28/2015	4/28/2015	Date officially in the line 15 schedule.
Release to ship	5/5/2015	5/5/2015	
500 hours completed 1305	8/9/2015	8/9/2015	
6000 hours on engine	10/27/2015	10/27/2015	

TORO-0000558

12/15/14

Tomah Build / Releases

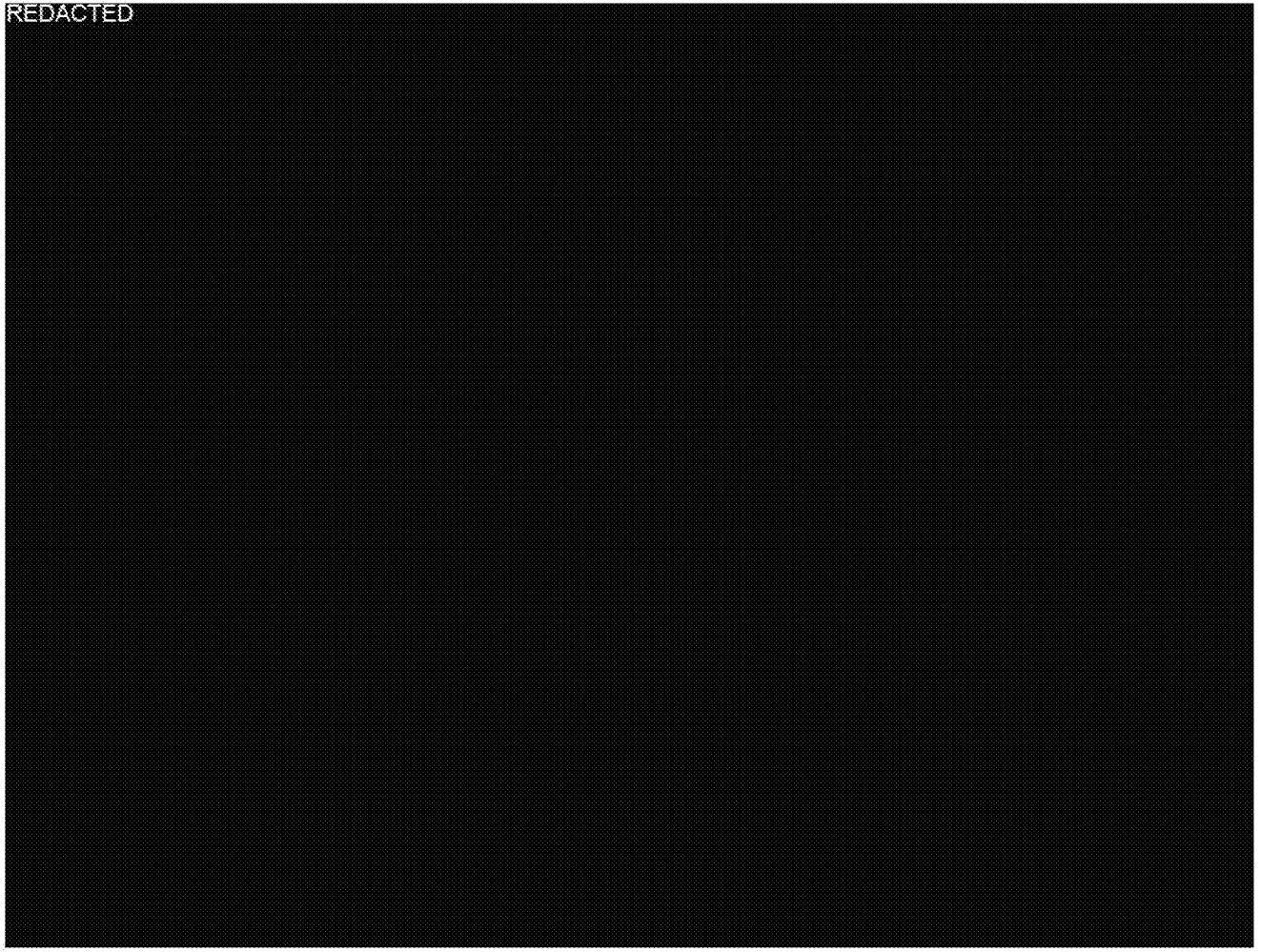
- 4.0 build

- Releasing the last of the steel parts for the 4.0
- Will begin some teardown work on the 3.0's this week (loader test unit, field unit?)
- Most weldment parts are due in prior to Christmas, will depend on Woody's availability
- Will need to tool handle parts from a rapid prototype vendor
- Gabe will likely weld all of the new upper links for 4.0 updates

- Production

- Stock Kubota engines will need to continue to be used until we finish Kubota's application approval, possibly up to and including first production
 - Stock engines steady ordered for pilot
 - Will possibly run through a Kubota dealer to rework to our spec

REDACTED





Contract and M.

W298 TX1000 UPDATE

12/15/14

Photo/video shoot - Pensacola, FL



TORO-0000561



W298 TX1000 UPDATE

12/15/14



TORO-0000562

Exhibit 3

Sitework Equipment Concept Exposure Focus Groups

DRAFT 3 Brief Summary Final Report

Prepared for:



Sitework Systems

By

Dodge Business Research Consulting

February, 2009

TORO-0000170



Sitework Equipment Concept Exposure Focus Groups

*Qualitative Findings for input to Marketing
and Product Development*

Background

Toro has identified a potentially meaningful product gap between the high end of the Dingo product line and the skid-steer product category. Current Dingo users and users of competitive Compact Utility Loaders comment on their product's limitations regarding dump height, lift capacity, durability and other performance characteristics.

While products from Ditch Witch and Vermeer have nominally filled this spec gap, it is unclear whether demand for a product that falls in this gap has been fully developed.

Toro has developed product concepts based on exploratory qualitative research into this product gap.

Toro wishes to ultimately obtain quantitative feedback on fully developed concepts. As a logical next step, Toro sought qualitative feedback on these product concepts as prelude to a further development and, ultimately, quantitative evaluation.

Objective

The objective of this project is to obtain qualitative input on product concepts from landscapers.



Methodology

A list of the participants appears below.

Minneapolis

First Name	Work status	Company	Number of pieces of equipment	Compact motorized equipment fleet description
Wayne	FT / Owner / Landscaping	APL Landscape Solutions	4-6	Track loaders, mini-skidsteer, mini excavators, skid steers, walk behind bobcat (All Bobcat)
Craig	FT / Co-owner / Landscaping	Superior Lawn & Landscape	6-10	Skid Steers, Mini Excavators, Track & Tire Loaders
Chris	FT / Vice President / Landscape & Irrigation	Mickman Brothers Inc	6-10	1 mini-excavator, 4-skid steers (Bobcat), 2 track loaders (Caterpillar), 3 wackerplates
Jeff	FT / Owner / Landscaping	Stone Creations Landscaping	1-3	Compact track loader-RSV60, Wheel loader-Case 85XT, Also rent others as needed
Junior	FT / Vice President / Landscaping	Oh Landscapes	11+	Excavator, skid steers (Bobcats), jumping jacks (John Deere)
Chad	FT / Owner / Landscaping	C & L Outdoor Design & Landscaping	6-10	4 Skid Steers-Bobcat, 2 Mini-Traxcavators, Walk-behind-Bobcat, D6 Dozers - Cat
Gary	FT / Owner / Landscaping	Aspen Landscaping	4-6	Skid loaders - Bobcat, Dump Trucks - Ford, Compaction Equipment - Wacker

.....

Methodology



Participants (Continued)

Dallas

First Name	Work status	Company	Number of pieces of equipment	Compact motorized equipment fleet description
David	FT / President / Landscaping	Texas Oasis Landscape	1-3	Backhoes, compact tractors, front end loaders Manufacturer: Kubota
William	FT/ Owner/ Landscaping	Harris Landscape & Sprinkler	4-6	Trenchers, Backhoes, Mini Skid Steers. Compact Power Bobcat & Kubota
Tim	FT/ Vice President/ Landscaping	All Metroplex Landscape	4-6	Track Loaders, Backhoe, Compact Loaders - Bobcat & Case
Rick	FT/ VP of Operations	Backyard Creations	1-3	Dingo, Skid Steers- Bobcat, Compactors-Honda
Richard	FT/ Owner/ Landscaping	Texture Landscaping	4-6	Excavators, Skid Steers, Backhoes, Kubota, Deere, Bobcat
Walter	FT / Owner / Landscaping	Walter's Landscaping	1-3	Bobcat-Front end Loader & Excavator Kubota-Small Backhoe
James	FT / Owner / Landscaping	Lakewood Landscape & Garden Service	6-10	Skidsteers, Trencher, tractor bucket, excavator (Toro & Bobcat)
Matt	FT/ Owner / Landscaping	Outback Landscape	4-6	A Case Skid Steer Loader, Ditch Witch - trencher, Kubota - Front End Loader - Mini Tractor & Plate Compactor
Dell	FT / Owner / Landscaping	Green America Services	1-3	Skid Steers- Compact Tractor, Loaders, Bob Cat- John Deere
Dan	FT / Owner / Landscaping	Advanced Sprinkler Repair	4-6	Skid Steers- Articulated Loaders, Back Hoes- Dingo, ehl, BobCat-vibratory,Burkeen
Marcus	FT / President of Sales / Landscaping	Adams Structural	6-10	New Holland - Skid steers, Komatsu - Jumping jacks, Plate compactor
John	FT / President / Landscaping	Landscapes Etc. Inc.	1-3	Vemeer - Trenchers, Mini Excavator, Compact Front End Loader, Bobcat - Mini Front End Loader

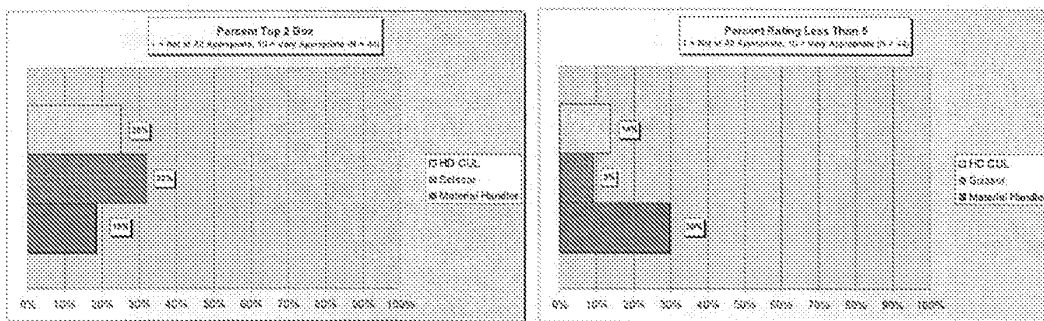


Summary - Important Findings

Overall, the Scissor-Lift concept was considered to be the most appropriate (and least inappropriate) for these types of landscaping tasks on these types of properties.

The Heavy Duty CUL (HD CUL) concept was the next most positively evaluated concept.

The Material Handler concept was considered to be the least appropriate concept for these applications.



Scissor-Lift Concept

- The most positive capability was the forward reach.
 - The majority of participants were excited about equipment with this capability and could clearly articulate a number of applications where the reach would be an advantage.
- The primary negative aspects of the Scissor-Lift concept were:
 - The Stand-On (or walk-behind) operator position
 - The concept depiction suggested, to many, that the lift capability would be less than required

Heavy Duty CUL Concept

- The most positive capability was the assumed greater power, lift capacity, and front-back stability when compared to other mini skid steers.
 - These participants were able to articulate applications where it would be of value to lift/do more with a mini skid-steer.
- The primary negative aspects of the HD-CUL were:
 - The Stand-On (or walk-behind) operator position
 - The attachment barely clears the front of the machine

Material Handler Concept

- The most positive capability was the variable width footprint
 - The primary advantage of this capability was stated to be the ability to get through narrow accesses, then being able to increase stability.
- The primary negative aspects of the Material Handler Concept are:
 - The Stand-On (or walk behind) operator position
 - It seems very specialized/limited to loading/unloading material



Summary - Important Findings

HD CUL Concept

The primary positive capabilities of this concept are:

- Assumed greater power/lift capacity than current CULs
 - Greater front-back stability
 - Lift arm movement and mechanism seemed very capable
 - Ability to access tight spaces
 - Most familiar platform
- The heavy duty nature of this concept was positively received by these participants. Advantages of this include the ability to do the following:
- Unload and move a pallet of block/sod/pavers
 - Fill a bucket with dirt or gravel
 - Accomplish more work (haul heavier loads)
 - Dump dirt into a dump truck

The primary negative aspects of this concept are:

- The Stand-On (or walk-behind) operator position
 - Attachments barely clear the front of the machine
 - This concept depiction was considered to be the least differentiated
- Concern with the Stand-On (or walk-behind) operator position touched on the following:
- Evoked negative qualities of current stand-on/walk-behind equipment (low power, limited lift height, slow travel speed)
 - Raised safety concerns
 - Operator falling off/being thrown off the machine
 - Increased fatigue from standing/walking vs. sitting
- The concern with attachments barely clearing the front of the machine generated the following areas of comment:
- Material/blocks falling out of the bucket could damage the machine
 - In the case of a wall or fence obstruction, with the nose of the machine right up to the obstruction, the bucket may be useless
 - This potentially limits the capability to load/unload a semi or dump truck

Participants indicated these attachments would make the best use of this concept's capabilities:

- Bucket
- Auger
- Forks



Summary - Important Findings

Stand-On/Walk-Behind Operator Position

Nearly every participant clearly and strongly advocated for a sit-in machine. Their reasoning for this preference was generated from the following three beliefs:

- The Stand-on/Walk-behind operator position evokes negative aspects of current/older models of stand-on/walk-behind equipment such as:
 - Under-powered
 - Slow travel speed
 - Unstable (front to back)
 - Not up to the tasks required
- Unfamiliarity with how the stand-on/walk-behind operator position really works
 - Participants assumed the worst regarding safety, fatigue, and limitations in equipment operation
 - Participants were genuinely concerned with the operator's ability to:
 - Stay on the machine on uneven ground (stand-on)
 - Use the hand controls while bouncing on the back of the machine (stand-on)
 - "Peel" the machine as its center of gravity begins to move toward tipping (stand-on)
 - Spend a long time on/behind the machine due to knee/leg fatigue (stand-on/walk-behind)
 - Maintain a good travel speed (walk-behind)
- The unexamined opinion that sitting is better than standing or walking
 - This belief is part logic and part emotion, making it very powerful
 - As the stand-on/walk-behind operator position evokes negative equipment characteristics, the sitting position is associated with positive equipment characteristics such as:
 - Powerful
 - Capable
 - Familiar
 - Universal
 - Easily operated
 - The operator being "part of the machine"



Summary - Important Findings

General Requirements

For a stand-on/walk-behind piece of equipment to be of value, participants indicated the following would be preferred:

- Have a forward reach capability
- Have a variable width footprint
- Able to lift a pallet of sod/block
- Achieve a lift height of 7 – 8 feet (high enough to dump a load of dirt/rock over the side of a one ton dump truck)
- Able to place a load/tree over a 6 foot fence
- Capably to travel, with a load, 3 – 5 mph (on these types of properties)
- Bucket should capably handle ½ - 1 yard of dense material (dirt/gravel)
- Good front visibility (Don't want to have to lean over the side to see what I'm doing during trenching or boring)
- Have a high-range and low range transmission
- Offer heavy duty characteristics including:
 - ☐ Diesel engine
 - ☐ Protected hoses
 - ☐ Metal (no body plastic)

Stand-On/Walk Behind Operator Safety

Participants gave ideas for how to deal with the perceived safety issues of the stand-on/walk-behind operator position. These included:

- "Sides" on the stand-on area of the machine that are approximately waist high
- Safety harness/belts to hold the operator on the machine
- A padded area to lean forward against
- Some type of metal cage (top) and sides to brace the operator
- A platform that has a suspension of some type
- A platform that can be raised up so a person could walk-behind it on especially rough terrain
- Kill/switch that would shut the machine down if the operator were out of position



Summary - Important Findings

Turf Damage

Participants were shown the following slide. The top two pictures show the project that was done. The job included 20 tons of fill, installation of a paver patio and transport and arrangement of stones.

The bottom two pictures show the state of the turf at the completion of work in the back yard. The lower left picture shows the turf in the front yard (to street). The lower right picture shows the turf on the side of the house, where the new patio is to the left.



- The vast majority of participants indicated that the extent of turf damage is about what they'd expect to see given the scope of this project
 - Participants believed that it had rained, at least once (or the neighbor did not turn sprinklers off) during the course of this job
- The majority of participants commonly use plywood or metal grates to mitigate damage to turf. Neither of these measures work well on curves
- Estimates (customer bid) to repair the turf (lower left is 75 feet to street) ranged from \$1,500 - \$2,500. The most frequently mentioned amount was \$2,000.
- The most common labor estimate to repair this damage was ~ 16 hours (2 workers, one day)

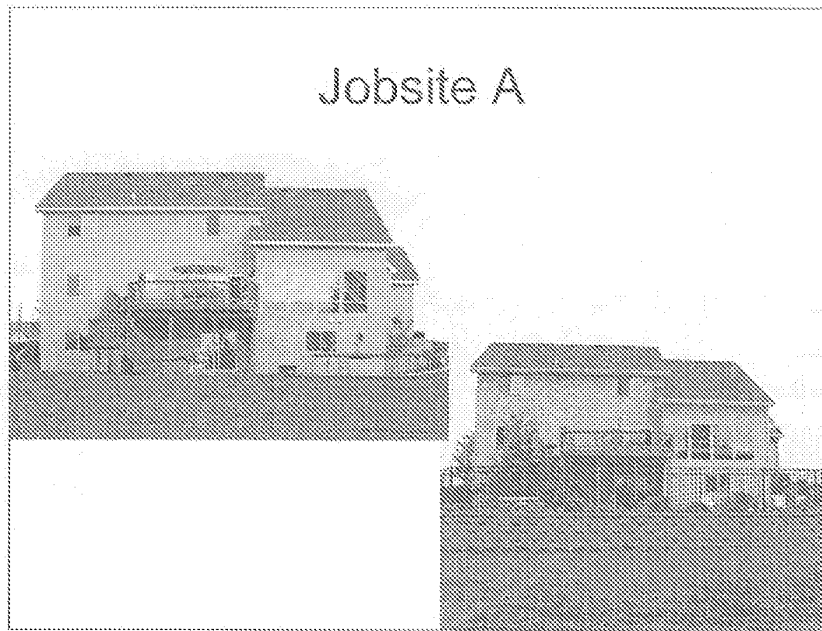


Summary - Important Findings

Concept Appropriateness by Jobsite Type

Participants were asked to rate the appropriateness of each equipment concept, for use on Jobsite A.

Rating Scale: 1 = Not at All Appropriate, 10 = Very Appropriate



The mean ratings, across all geographies, are:

Concept	Scissor-Lift	HD-CUL	Material Handler
Mean Rating*	6.7	6.8	5.2

* Not a quantitative research project, so result is not generalizable

Among these participants, the Material handler concept was rated as least appropriate for this jobsite.

According to participants, the most difficult aspect of this jobsite is the extreme elevation difference from the front of the property to the back.

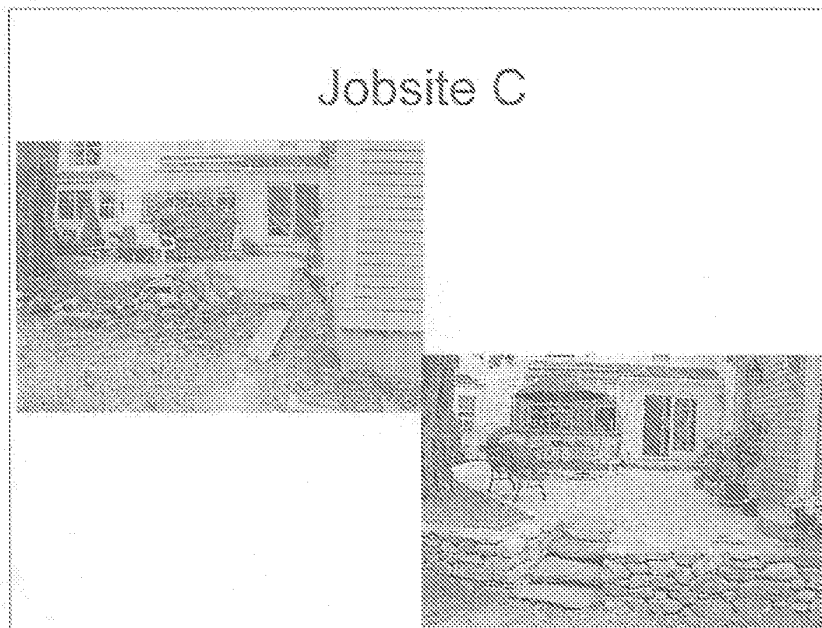


Summary - Important Findings

Concept Appropriateness by Jobsite Type

Participants were asked to rate the appropriateness of each equipment concept, for use on Jobsite A.

Rating Scale: 1 = Not at All Appropriate, 10 = Very Appropriate



The findings that suggest conditions of limited access are:

Concept	Sensor-Lift	HD-CUL	Material Handler
Mean Rating	6.8	7.0	4.8

* Not a quantitative research project, so result is not generalizable

Among these participants, the Material handler concept was rated as least appropriate for this jobsite and was rated slightly lower than on other jobsites.

According to participants, the most difficult aspect of this jobsite is the limited access and tightness of the working area.



Attachments

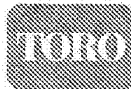
Placeholder

Skid-Steer – Dingo

Gap Detection Focus Groups

Brief Summary Final Report

Prepared for:



Sitework Systems

By

Dodge Business Research Consulting

January, 2008

TORO-0000184

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□ Recruiting Screener	
□ Discussion Guide	

Dodge Business Research Consulting offers two levels of Focus Group Reports:

- Brief Summary Written
- Complete Detailed Written + Presentation

This is a *Brief Summary Written* report. For more detail, the audio tapes of both focus groups and copies of the written tasks are available from the Market Research Library. Contact Dave Francis for access to these transcripts.

Anthony Dodge is the Principal of Dodge Business Research Consulting. Mr. Dodge holds an MBA in Marketing from the University of St. Thomas. He has been a practitioner of marketing research, strategic market planning, and business development for 25 years. He has successfully completed numerous market research and marketing assignments in the U.S., Europe and Japan. He is currently an adjunct faculty in the MBA Program in the Graduate School of Business and in the Graduate School of Professional Psychology at the University of St. Thomas, St. Paul, MN, teaching research design and statistics. Before consulting, Mr. Dodge held various positions at The Tennant Company and The Pillsbury Company. Recent clients include: Kodak (Digital), JohnsonDiversey, Xerox, Toro, Ecolab, Clorox, Saint-Gobain, and others. More information can be found on the Dodge Business Research homepage at: <http://www.dodgeresearch.com>

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January, 2006

Page 1

TORO-0000185



Skidsteer/CUL Gap Detection & Description Focus Groups

*Qualitative Findings for input to Product
Development*

Background

Toro has identified a potentially meaningful product gap between the high end of the Dingo product line and the skid-steer product category. Current Dingo users comment on the product's limitations regarding dump height, lift capacity, and some other product performance characteristics.

Currently, there is a spec gap between the high end of the Dingo product line and the low end of the skid steer product category. While products from Ditch Witch and Vermeer have recently filled this spec gap, it is unclear whether the nature and size of demand for a product that falls in this gap, is sustainable.

Toro wishes to ultimately obtain a quantitative description of the nature and size of demand for a product in this gap. As a logical first step, Toro seeks a qualitative understanding of the existence, nature and importance of this gap, and an initial understanding of the characteristics of a valued product that could fill this gap.

Objectives

To obtain qualitative input (focus groups) from current users of CULs and skid steers (primarily landscapers, irrigation contractors and some small construction companies), regarding the nature, extent, and potential product response to this gap.

Methodology

A series of Telephone Focus Groups was conducted. Participants were recruited from lists of existing Toro Dingo customers, owners of competitive CUL equipment, and from business lists of landscapers, irrigation contractors and small construction companies.

Participants were recruited from across the country. These groups were blind, meaning that the participants did not know that Toro was the sponsor of the groups.

This project focused on members of the following targeted product use segments:

Decision-Makers

- Segment 1 - CUL owners (Dingo) who also own a Skid Steer
- Segment 2 - CUL owners (Competitive) who also own a Skid Steer
- Segment 3 - Skid Steer owners who do not own a CUL

Primary Operators/Influencers

- Segment 4 - CUL owners (Dingo and Competitive) who also use a Skid Steer

The detailed choreography of the groups (discussion guide) is attached to this report.

Participants were paid \$150 for their participation.

In addition to this brief report, each group was recorded. These audio files are housed in Sitework Systems Marketing.



Methodology

A list of the 26 participants appears below.

CUL Operator-Makers Driving Toro CUL and a 3rd Steer										
Name	Title	Company	Location	Level	# of Steers Owned	SS Brand	SS Model	# of CULs Owned	CUL Brand	CUL Model
David Tash	Owner	Mountain View Landscaping	Hartford, CT 06114	Decision Maker	1	Bobcat	721	1	Toro 3000	1 case Model
Steve Schuster	Owner	Orin's Children's Garden	Concord, MA 01742	Decision Maker	2	John Deere	LN 540	1	Toro	T 300
Kevin Sordani	Manager	Harvard University	Cambridge, MA 02138	Decision Maker	1	Bobcat	7200	1	Toro 3000	425 3700 Tractor
David Sordani	Owner	Harvard University	Cambridge, MA 02138	Decision Maker	1	Bobcat	LN 540	1	Toro 3000	425 3700 Tractor
For King	Owner	Castell, CA 95007	Castell, CA 95007	Decision Maker	1	Case	2400	1	Toro	300

CUL Operator-Makers Driving a Non-Toro CUL and a 3rd Steer										
Name	Title	Company	Location	Level	# of Steers Owned	SS Brand	SS Model	# of CULs Owned	CUL Brand	CUL Model
David Dine	Owner	David Dine & Sons	Beaver Creek, OH 44021	Decision Maker	3	Bobcat	690	2	John Deere	SR 650
John Dine	Owner	David Dine & Sons	Beaver Creek, OH 44021	Decision Maker	3	Bobcat	690	2	John Deere	SR 650
John Dine	Owner	David Dine & Sons	Beaver Creek, OH 44021	Decision Maker	3	Bobcat	690	2	John Deere	SR 650
Greg Anderson	Manager	Spring Hill Landscaping	Faribault, MN 56003	Decision Maker	1	Bobcat	690	1	John Deere	SR 650
Bryan Mallory	Manager	Best Lawn Care	St. Louis, MO 63103	Decision Maker	1	Bobcat	690	1	John Deere	SR 650
Greg Mallory	Manager	Best Lawn Care	St. Louis, MO 63103	Decision Maker	1	Bobcat	690	1	John Deere	SR 650
Adam Mallory	Manager	Best Lawn Care	St. Louis, MO 63103	Decision Maker	1	Bobcat	690	1	John Deere	SR 650
Adam Mallory	Manager	Best Lawn Care	St. Louis, MO 63103	Decision Maker	1	Bobcat	690	1	John Deere	SR 650
Adam Mallory	Manager	Best Lawn Care	St. Louis, MO 63103	Decision Maker	1	Bobcat	690	1	John Deere	SR 650
Adam Mallory	Manager	Best Lawn Care	St. Louis, MO 63103	Decision Maker	1	Bobcat	690	1	John Deere	SR 650

CUL Operator-Makers Driving a Toro CUL and a 3rd Steer										
Name	Title	Company	Location	Level	# of Steers Owned	SS Brand	SS Model	# of CULs Owned	CUL Brand	CUL Model
David Branson	Owner	AAA Supply Solutions & Landscaping	Atlanta, GA 30302	Decision Maker	4	Bobcat	7200	1	Toro	3000
David Branson	Owner	AAA Supply Solutions & Landscaping	Atlanta, GA 30302	Decision Maker	4	Bobcat	7200	1	Toro	3000
David Branson	Owner	AAA Supply Solutions & Landscaping	Atlanta, GA 30302	Decision Maker	4	Bobcat	7200	1	Toro	3000
David Branson	Owner	AAA Supply Solutions & Landscaping	Atlanta, GA 30302	Decision Maker	4	Bobcat	7200	1	Toro	3000
David Branson	Owner	AAA Supply Solutions & Landscaping	Atlanta, GA 30302	Decision Maker	4	Bobcat	7200	1	Toro	3000
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David Branson	Owner	AAA Supply Solutions & Landscaping	Atlanta, GA 30302	Decision Maker	4	Bobcat	7200	1	Toro	3000
David Branson	Owner	AAA Supply Solutions & Landscaping	Atlanta, GA 30302	Decision Maker	4	Bobcat	7200	1	Toro	3000

CUL Operator-Makers Driving a Toro CUL and a 3rd Steer										
Name	Title	Company	Location	Level	# of Steers Owned	SS Brand	SS Model	# of CULs Owned	CUL Brand	CUL Model
Kevin McCreath	Manager	McCreath & Sons	St. Louis, MO 63104	Operator/Influencer	4	Bobcat	7200	1	Toro	3000
Kevin McCreath	Manager	McCreath & Sons	St. Louis, MO 63104	Operator/Influencer	4	Bobcat	7200	1	Toro	3000
Kevin McCreath	Manager	McCreath & Sons	St. Louis, MO 63104	Operator/Influencer	4	Bobcat	7200	1	Toro	3000
Kevin McCreath	Manager	McCreath & Sons	St. Louis, MO 63104	Operator/Influencer	4	Bobcat	7200	1	Toro	3000
Kevin McCreath	Manager	McCreath & Sons	St. Louis, MO 63104	Operator/Influencer	4	Bobcat	7200	1	Toro	3000
Kevin McCreath	Manager	McCreath & Sons	St. Louis, MO 63104	Operator/Influencer	4	Bobcat	7200	1	Toro	3000
Kevin McCreath	Manager	McCreath & Sons	St. Louis, MO 63104	Operator/Influencer	4	Bobcat	7200	1	Toro	3000
Kevin McCreath	Manager	McCreath & Sons	St. Louis, MO 63104	Operator/Influencer	4	Bobcat	7200	1	Toro	3000
Kevin McCreath	Manager	McCreath & Sons	St. Louis, MO 63104	Operator/Influencer	4	Bobcat	7200	1	Toro	3000
Kevin McCreath	Manager	McCreath & Sons	St. Louis, MO 63104	Operator/Influencer	4	Bobcat	7200	1	Toro	3000

Summary - Important Conclusions

In general, the vast majority of participants do not believe that the existing spec gaps between CULs and full-size skid steers are significant or meaningful. The following comments typify this thinking:

- ❑ Full-size skid steers and CULs are made to do two different types of tasks. Full size skid steers are best for loading/unloading, digging, grading and heavy lifting. CULs are best at doing what was, most recently, hand work...close-in, detailed work in confined spaces. You really need two different types of machines to do this work.
- ❑ For residential work, the skid steer works between the staging area and the trucks. The CUL works between the staging area and the site.
- ❑ A full-size skid steer can't get through a 3 or 4 foot gate.
- ❑ A CUL can work on grass/turf without wrecking it.
- ❑ Homeowners don't like to see a skid steer coming into their yard.
- ❑ I can submit a lower bid if I don't have to replace turf/fences.

There was a general lack of interest in a product that would fill existing spec and capability gaps between full-size skid steers and CULs.

- ❑ Participants say they prefer the distinction/differences between full-size skid steers and CULs. This difference makes it clear to them and their workers what piece of equipment should (and shouldn't) be used in which applications.
- ❑ Participants believe they have developed ways to use the differing equipment to its greatest advantage.
- ❑ Participants indicate that there are currently too many options near the border of CULs and full-size skid steers, and that the products overlap. The array of horsepower, attachments, product size, etc can be confusing. This is one reason some opt for simple product choice navigation: the largest horsepower I can get through a 3 foot gate is the CUL I want.



Summary - Important Conclusions

Participants acknowledge that there are capabilities gaps between full-size skid steers and CULs that could be addressed.

- All participants believe any gaps should be addressed by expanding the capabilities of CULs (rather than increasing the specialization of, or "dialing back" the capabilities of, skid steers)
- The gaps are fairly complex to define. The gaps are the result of interactions among the following variables.
 - CUL Horsepower
 - CUL Equipment Size
 - CUL Attachments Most Valued
- For example, the gaps when comparing a bucket or fork attachment application will always be more pronounced than the gaps when comparing a trencher application.

The most prominent gaps, in order of frequency/universality, (CUL/Dingo -- Full-Size Skid Steer) are:

- Lift Height
 - There are a number of applications, primarily residential, where the CUL is used for 95% of the work, and the full-size skid steer is used for only a few key tasks (primarily loading/unloading material to/from a flatbed or dump truck.
 - In a residential situation, it is common to use a full-size skid steer to remove pallets of sod or rock from a flatbed or dump truck and place them in a staging area. The CUL is then used to transport material from the staging area to the actual application point. Both machines need to be on-site, for a time, to load/unload from/to the truck because the CUL can't reach the bed of the truck, or lift some of the heavier loads.
 - While this is a spec gap, participants feel the two pieces of equipment (full-size skid steers and CULs) are optimized for what they do.
- Lift Capacity
 - This is the area most-often "pushed" on a CUL. Participants realize that there are limits to how much a CUL can lift. They consider this a limit of (primarily) the counterweight of the machine, not a limit on power. All participants have dealt with tipped CULs
 - This is a gap that makes sense to participants given the different functionality of this equipment. Participants always want a greater lift capacity, but not at the expense of a wider footprint or to a lesser extent, making the machine heavier (i.e. more likely to tear up a lawn).

Summary - Important Conclusions

The most prominent gaps, in order of frequency/universality, (CUL -- Full-Size Skid Steer) are:

- ❑ Travel Speed
 - This is especially prevalent for the stand-on CULs. There are job sites that are large and they would like to travel faster, without a load, from point to point.
 - While safety is paramount, participants are sometimes frustrated that this equipment won't move faster when not under load.
- ❑ For the most part, the concept of a gap is only relevant when certain attachments are being used.
 - When using a trencher, hammer/breaker or auger for example, the capabilities gaps were not significant. They default to the CUL for trenching and the concept of a gap compared to the full-size skid steer is irrelevant.
 - The gap is most pronounced when buckets/forks are used.
- ❑ Desired product characteristics/improvements
 - While the optimal application for this package involves building demolition, participants in landscaping and irrigation businesses find value many of these improvements.
 - Heavier duty attachments/buckets
 - Heavier duty attachment mounting
 - Heavier duty frame/bodies
 - Diesel engine
 - Covered hydraulic hoses
 - Re-routed hydraulic hoses
 - Foam-filled tires
 - More durable tracks
 - Metal "hood" to protect engine
 - Reinforced front-end
- ❑ Further develop the Dingo as a "power plant" that can be used to power hand-held attachments
 - According to one participant, a hammer/breaker currently exists as an attachment for a Dingo



Summary - Important Conclusions

The most prominent gaps, in order of frequency/universality, (CUL -- Full-Size Skid Steer) are:

- Participants subscribe to the following story line:
 - In areas that are too small or the task too intricate for large-scale construction/earth-moving equipment:

-First, all work was done by hand

Hand Work

-Then, came tractors and other equipment that were very blunt instruments which mechanized larger scale, labor intensive tasks

Hand Work

Tractors/
Other

-Then came full-size skid steers

Hand Work

Full-Size
Skid Steer

Tractors/
Other

-Then came CULs

Hand Work

CUL

Full-Size
Skid Steer

Tractors/
Other

- The CULs filled important gaps between hand work and full-size skid steers.
- Whereas skid steers do a different type of work, participants say that CULs make, what most recently was hand work, easier/more efficient (as opposed to doing skid-steer type work on a smaller scale).
- When asked, most participants put the CUL slightly to the left of center; closer to hand work than to a full-size skid steer.

Summary - Important Conclusions

These participants indicate that for residential projects, CULs are used on a higher percentage of job sites, and for a longer period of time than full-size skid steers.

- ❑ CULs are used between 10 and 50 hours per week (Median ~ 20 hours/week)
- ❑ CULs perform a wider variety of tasks than full-size skid steers
- ❑ The most useful attachments for CULs are:
 - Construction/Concrete Build
 - Hammer
 - Grapple Bucket
 - Blade
 - Bucket
 - Forks
 - Tree/Fence Construction
 - Auger
 - Trencher
 - Bucket
 - Forks
 - Landscaper/Irrigation Contractor
 - Trencher
 - Harley Rake
 - Auger
 - Tiller
 - Bucket
 - Forks
- ❑ The true value of a CUL, to the decision-maker, lies in the following benefits:
 - Reduce the number of workers
 - Make workers more efficient
 - Make tasks easier for workers to complete



Summary - Important Conclusions

These participants indicate that for residential projects, full-size skid steers are used on a lower percentage of job sites, and for a somewhat shorter period of time than CULs.

- ❑ Skid Steers are used between 10 and 40 hours per week (Median ~ 15 - 20 hours/week)
- ❑ The most useful attachments for Skid Steers are:
 - Construction/Concrete Build
 - Bucket
 - Forks
 - Blade
 - Hammer
 - Tree/Fence Construction
 - Bucket
 - Forks
 - Auger
 - Landscaper/Irrigation Contractor
 - Bucket
 - Forks
- ❑ The true value of a full-size skid steer, to the decision maker, lies in the following benefits:
 - The ability to perform "make or break" types of tasks: those that no other piece of equipment or person can perform. Examples include:
 - Unloading pallets of material from a flatbed to a staging area
 - More direct-shipped material comes on pallets on flatbeds without lift trucks
 - Lifting material from the ground into a full size dump truck
 - Transporting/placing large (1,000 - 2,000 pound) rocks and trees
 - The ability to eliminate a worker and make current workers more efficient
 - Primarily new construction with some very limited applications for existing construction
 - An example of an application for existing construction would include concrete demolition/grading work where there is room for a full-size skid steer (driveway/garage)

As a general rule:

- ❑ New construction indicates heavier reliance on a full-size skid steer
- ❑ Existing construction indicates heavier reliance on a CUL
- ❑ A CUL (not including attachments) should cost less than a full size skid steer.

Summary - Important Conclusions

From this qualitative research, the following segments are hypothesized:

- *More is Better* Segment (Spec-based buyer)
 - Within the desired footprint (pass through a 3 foot gate) and ground pressure restrictions (won't damage turf), the more horsepower/lift capacity/lift height, the better
 - The spec gaps are important
 - These are more likely to be inexperienced CUL buyers and frequent renters
- *Educated Buyer* Segment (Capabilities-based buyer)
 - Wants the optimal/minimal/least expensive CUL and attachments that will allow the achievement of a goal (i.e.: eliminate one person/crew)
 - The spec gaps are only part of the story. This segment focuses on capabilities gaps based on how they use the machine in their business.
 - They value attachments that will work on both CUL and full size skid steer
 - Dealer performance often trumps product/brand

The following were mentioned as negatives of the Dingo and, to some extent, CULs in general:

- Tracks come off on 90 degree turns (very tight quarters)
 - We use these in tight quarters.
- Plastic hoods break very easily. There is little or no engine protection
- Frequent flat tires
- The connections for attachments and hoses are difficult/flimsy/inadequate
 - You should be able to take off a blade and hook up a bucket without leaving the seat, like you can with excavators.
 - Participants suggest taking the lead from the ag equipment industry which has developed the ability to couple under pressure (hydraulic)
- Larger (mesh) bucket would hold a large amount of lighter material (mulch)
- Track/Tire wear on pavement is a problem



Summary - Important Conclusions

Many participants found it difficult to compare CUL performance. The following represent the most important clues they use to determine whether the CUL will perform the tasks they need.

- ☐ Horsepower
- ☐ Lift Capacity
- ☐ Diesel/Non-Diesel
- ☐ Lift height
- ☐ Brand
- ☐ Tipping weight
- ☐ Secondary
- ☐ Dealer recommendation/claims
- ☐ Professional word-of-mouth
- ☐ Hydraulic flow level

The following variables were revealed as primary candidates for quantitative investigation as a next-step for product development.

- ☐ Brand
- ☐ Price
- ☐ Horsepower
- ☐ Diesel/non Diesel
- ☐ Width
- ☐ Length
- ☐ Height
- ☐ Weight
- ☐ Lift Capacity/Tipping Weight
- ☐ Hydraulic attachment "power"
- ☐ Quick connect/disconnect attachments
- ☐ Ability to connect attachments under pressure/not
- ☐ Metal Protective Hood
- ☐ Attachments that can also be used on skid steer/not

Important Summary Findings

Rear visibility, while operating a skid steer, is a problem

- ❑ There is universal agreement that there is a large blind spot directly behind a skid steer
- ❑ While participants recognize this, they consider it an inherent problem that can't be solved. They believe it can be accounted for by careful operation.
- ❑ It is an issue for reasons of:
 - Safety
 - Job performance (running into other equipment/job elements)
- ❑ Some participants have developed their own/purchased rear view mirror applications that have not worked well.
 - The primary problem with current rear-view solutions is that they go out of adjustment quickly as a skid steer bounces/vibrates

Side visibility of skid steers, is much less of a problem.

- ❑ While there is limited visibility, the arms can be moved if necessary
 - Participants considered the periodic side view they get, during normal operation of a skid steer, adequate for them to feel safe and competent during skid steer operation

Participants generally agreed that climbing in and out of a skid steer can be difficult, especially if it is used in the snow, or when wet.

- ❑ The general feeling here is that this "goes with the territory".
 - Skid steers are considered to be awkward, but not dangerous. Participants indicate that they're not meant to be comfortable or easy to get in and out of...and that is OK with them.
 - Some of the participants have had experience with side-entry skid steers and gave them low marks for ease of entry and comfort.



Important Summary Findings

There are two areas that bear mentioning however, that were considered very important from an ergonomic standpoint:

- There is a strong belief that suspension should be developed for this equipment.
 - An air-ride seat is the most frequently-mentioned solution to the body jarring that is part of skid steer operation.
 - This comment goes beyond a comfort issue and is usually mentioned in realm of operator fatigue and back/neck/muscle pain.

There is a substantial negative opinion of small, ride-on skid steers.

- Toward the smallest end of the ride-on skid steers, is a class of machines that are very similar to CUL specs. Participants mentioned John Deere and New Holland as marketers of ride-on skid steers that are no larger than CULs. These machines are considered to be :
 - Very difficult to enter/exit
 - Have no room to move, once the operator is seated
 - Do not perform a substantially different type of work than a CUL
- When given the choice between using a CUL, or a small ride-on skid steer in this spec range, the CUL is strongly preferred.

Key Individual (Anecdotal) Comments

- Full-size skid steers and CULs are made to do two different types of tasks. Full size skid steers are best for loading/unloading, digging, grading and heavy lifting. CULs are best at doing what was, most recently, hand work...close-in, detailed work in confined spaces. You really need two different types of machines.
- For residential work, the skid steer works between the staging area and the trucks. The CUL works between the staging area and the site.
- A full-size skid steer can't get through a 3 foot gate.
- A CUL can work on grass/turf without wrecking it.
- Homeowners don't like to see a skid steer coming into their yard.
- I can submit a lower bid if I don't have to replace turf/fences.
- There is no rear view on skid steers. While it is probably a safety hazard, you learn to adapt by remembering your surroundings and making sure everyone knows not to step behind a skid steer.
- The reverse warning device makes me feel a little more comfortable
- Side vision from a skid steer is terrible, but it isn't so bad that you can't operate confidently.
- All skid steers are difficult to get into and out of. It is more difficult when it is wet or in winter with snow and ice.
- Climbing in and out (of a skid steer) is difficult, but these things aren't supposed to be like sitting on the couch at home. They're basic machines with few/no creature comforts. This is what I expect on a job site.
- Skid steers, especially the small ones, leave no room to move your elbows or arms.
- Bobcat makes a larger CUL, but it is bulkier than the Dingo and doesn't do any more.
- The way to look at this (buying a CUL) is that you can replace a man, and you are going to make better use of the remaining men.
- None of my guys has ever come to me asking for a less powerful CUL with a lower lift height.



Key Individual (Anecdotal) Comments

- There needs to be some type of tensioner that keeps tracks tight. We see a lot of situations where the tracks come off.
- We want the littlest machine to do more than it should be able to do.
- Dingo, a plastic hood on a piece of equipment that is build like a Sherman tank, doesn't make sense.
- There are hydraulic breakers/hammers that you can get (not by Toro) that you can attach to the Dingo. 60 pound hammers that uses the Dingo as a power plant.
- Watch out for Komatsu (skid steers). They are a fantastic product...excellent rear-view.
- Dingo's have the worst battery access I've ever seen.
- John Deere and New Holland make very small skid steers, nearly as small as CULs. In all of central New York, there are only 2 dealers that rent those. The market is very small.
- The true gap exists in knowing which CUL and attachment should be used to complete the job proficiently.
- We use it (CUL) with plywood so that we don't wreck the yard and I can eliminate yard repair costs from my bid.
- The important thing is the footprint of the machine (CUL). Once you get to a machine that would have more capability than the DW-650, you're into a skid-steer size machine.
- There are already enough choices between skid steers and CULs. If I can just go bobcat (skid steer) and mini (CUL), I can efficiently transport these types of equipment to the jobs I need to.
- There is not a big difference in price between the high end minis and the low/medium size skid steers.
- DW makes the 500 and the 650. When you get the DW tool carrier, it becomes too large to get into the places we are using our minis for. The fact that it does more doesn't do me any good. Also, the 650 costs about \$20k. You can buy a small skid steer for \$25k.
- I wouldn't want to have a mini where unloading a pallet represents the very top end of its capability. I don't want to be working routinely in that range.

Attachments



Recruiting Screener

Respondent's Name: _____

Title: _____

Company Name: _____

Street Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

ONLY IF REQUIRED

Email: _____ @ _____

Date: _____

Introduction

Hello, my name is _____ from _____, a national market research firm. Could I please talk to (NAME)? (If available)?

Hello Mr./Ms. _____, My name is _____ from _____, a national market research firm.

Decision-Maker Start → Quota 1, 2, 3

1a. I am looking for a person who makes decisions regarding which skid steer and compact utility loader equipment your company uses.

Are you someone who fits this description?

Yes _____ CONTINUE

No _____ DETERMINE IF THERE IS SOMEONE ELSE
RECYCLE TO INTRODUCTION

Operator/Influencer Start → (Quota 4)

1b. I am looking for a person who is very familiar with the operation of the skid steers or compact utility loaders used at your company and has some involvement in the evaluation process regarding which skid steers and compact utility loaders your company uses.

Are you someone who fits this description?

Yes _____ CONTINUE

No _____ DETERMINE IF THERE IS SOMEONE ELSE
RECYCLE TO INTRODUCTION

1b. On a scale of 1 – 10, where a 1 = Not at all Familiar and a 10 is Very Familiar, how familiar are you with the operation and use of the skid steers or compact utility loaders?

If less than 5, ask if there is someone else involved in the evaluation process, that is more familiar with the operation and use of stand-on mowers...Recycle to Q. 1a

2. How many skid-steers does your company have in operation at this time?

_____ Skid Steers

IF 0, THANK, TERM, TALLY

3a. Which manufacturer(s) of skid steers do you have?

3b1. (IF MORE THAN ONE, ASK:) Which of these do you have most of?

_____ Manufacturer

3b2. (IF ONE OF EACH, ASK:) Which of these was acquired most recently?

_____ Manufacturer

3c. Would you give me the model or size of one of these (Manufacturer from 3b1 or 3b2) skid steers you own so I can write it down?

_____ model or size

Now I want to switch gears and ask you just a couple of questions about any compact utility loaders you might have. This is equipment that is smaller than skid steers.

4. How many compact utility loaders does your company have in operation at this time?

_____ Compact Utility Loaders

IF 0, Quota 3 SKIP TO INVITE

5a. Which manufacturer(s) of compact utility loaders do you have? (POMPT WITH: Any others?)

IF TORO/DINGO → Quota 1 or 4

IF OTHER THAN TORO/DINGO → Quota 2 or 4

(FOCUSSING ON THE MANUFACTURER OF INTEREST, ASK:)

5b. How many (Manufacturer) compact utility loaders do you have at this time?

_____ Compact Utility Loaders

5c. Would you give me the model or size of this/these (Manufacturer) compact utility loaders?

Model/Size _____

Model/Size _____

Model/Size _____

.....
INVITE

The reason I have been asking these questions is that we are very interested in your professional opinion regarding new product development. A market research discussion is being held (Thursday, (November 8)) OR (Tuesday, (November 13)) at 6:00pm (Central) OR 8:00pm (Central)...(additional dates and times). This will be done on a conference telephone call, the focus group discussion will take about an hour and 45 minutes, and you will be paid \$150 for your time.

This project does not involve sales and no sales person will call you as a result of your participation. You will be in a group discussion with others, like yourself, from around the country. Most people find these sessions to be interesting and enjoyable.

If your schedule will allow, can we count on you to participate? **DO NOT READ. CIRCLE ONE.**

.....YES 1. ➔
CONTINUE.

.....NO 2. ➔ **THANK, TERM
TALLY**

READ

Because we invite only a small number of people, your participation is very important to us. If for some reason a scheduling conflict should occur, please call our office as soon as possible, as we will need to replace you. Our telephone number is ().

- **GET CONTACT INFO, INCLUDING EMAIL ADDRESS/FAX NUMBER**
- **TELL THEM YOU WILL BE EMAILING/FAXING A PICTURE THAT THEY NEED TO HAVE IN FRONT OF THEM AT THE TIME OF THE DISCUSSION.**

**IF RESPONDENT AGREES TO PARTICIPATE, FOLLOW INSTRUCTIONS
BELOW**

- **RECORD INFORMATION ON FRONT OF SCREENER**
- **HAVE RESPONDENT MARK DATE AND TIME ON THEIR CALENDAR**
- **GIVE RESPONDENT _____ RESEARCHER'S NAME AND PHONE NUMBER**

- **ASK RESPONDENT FOR A CONTACT NUMBER**

*CONTACT PHONE NUMBER AT TIME OF CALL: _____ Is this a
HOME number or a WORK number?*

- **TELL RESPONDENT THEY WILL RECEIVE A FAX/EMAIL CONFIRMING THEIR
APPOINTMENT. THE FAX/EMAIL WILL ALSO CONTAIN FURTHER DETAILS
REGARDING THIS INTERVIEW**
- **THEY WILL RECEIVE A PICTURE ALONG WITH THIS REMINDER THAT THEY NEED
TO HAVE WITH THEM AT THE TIME OF THE DISCUSSION.**
- **THEY WILL RECEIVE A REMINDER CALL A DAY OR TWO BEFORE THE GROUP
DISCUSSION.**

Discussion Guide

- 10 Min
1. Opening
 - a. Logistics
 - b. Framing the Discussion
 - (Skid Steers and Compact Utility Loaders you use in your business)
 - c. Introductions
 - (Name, company, your primary business and manufacturers/models of Skid Steers/CULs.)
- 20 Min
2. Product CUL
 - a. Let's Talk About your CUL
 - What is the most important reason your company owns a CUL?
 - What is the most important reason you decided on this particular (Brand/Model) of CUL?
 - Describe for me the primary type of jobs/applications where you use your CUL
 - Approximately how many hours/day are you using your CUL?
 - What is the primary function of your CUL? What, primarily, are you using it for?
 - (Determine most important and discuss to understand depth/breadth)
 - What is your primary area of dissatisfaction with the operation, performance, or design of your CUL?
 - (Performance or Design)
 - How can I improve the operation, performance or design of your CUL?

IF NO CUL

Why no CUL?

Have you ever rented a CUL?

Why/For what applications?

Have you ever considered buying a CUL?

Why/Why not?

30 Min

3. Product SSL

a. Let's Talk About your SSL

- What is the most important reason your company owns a SSL?
- What is the most important reason you decided on this particular (Brand/Model) of SSL?
- Describe for me the primary type of jobs/applications where you use your SSL.
- Approximately how many hours/day are you using your SSL?
- What is the primary function of your SSL? What, primarily, are you using it for?
 - (Determine most important and discuss to understand depth/breadth)
- What is your primary area of dissatisfaction with the operation, performance, or design of your CUL?
 - (Performance or Design)
- Is climbing in and out of your SSL a problem?
 - How/When/Where?
- Is the side and/or rear visibility a problem?
 - How/When/Where?
- Is your SSL a vertical or radial lift machine?
 - Which type would you purchase next?
 - Why?
- Approximately what percentage of the time do you run hydraulic attachments with your SS?
 - Which attachments do you use most?

TORO-0000209

45 Min

4. CUL/SSL Gap/Needs – Big Picture

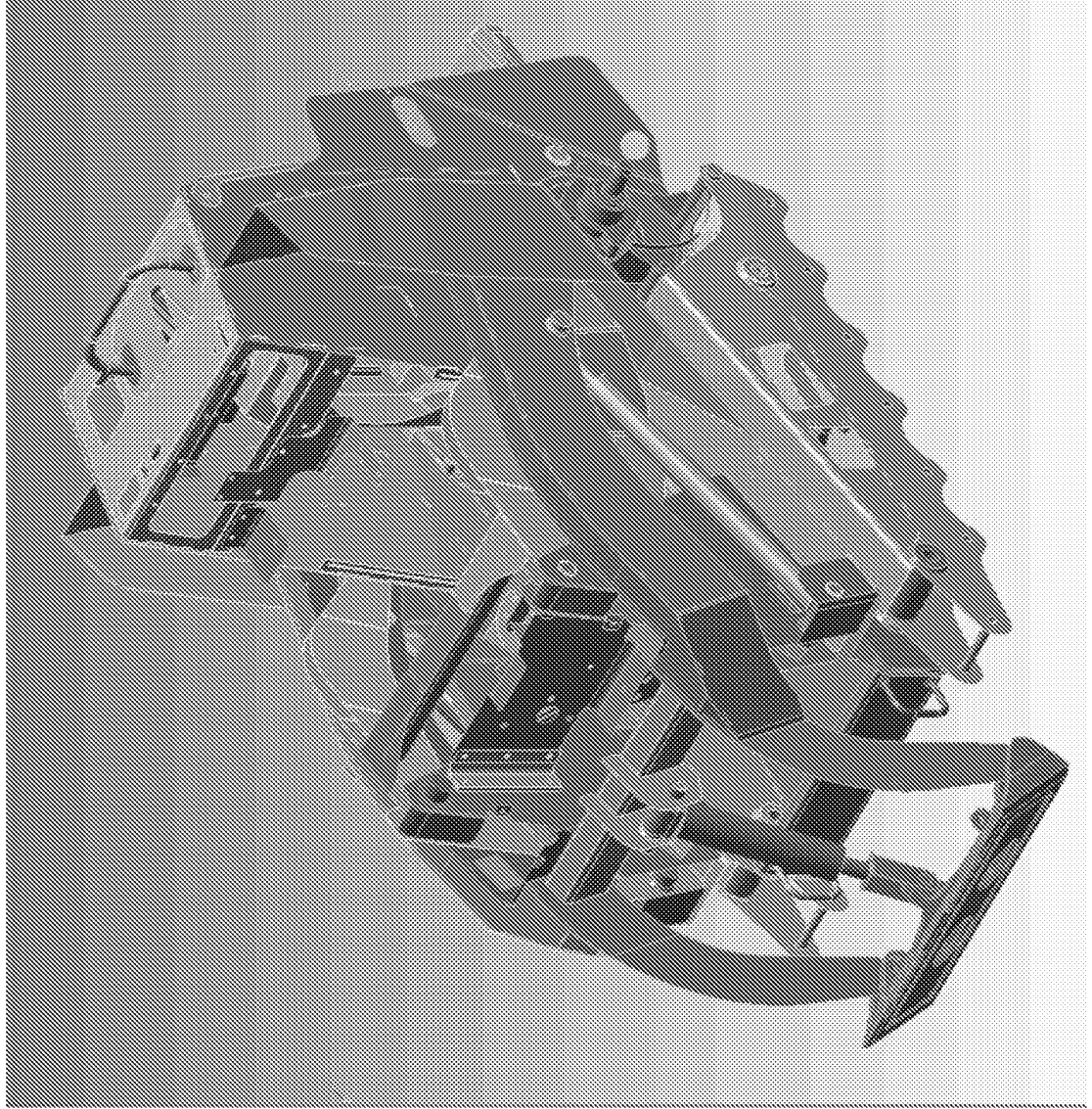
- Which do you use most on the average job, the SSL or the CUL?
 - Why is that?
- On what percentage of your jobs are you using the CUL only?
- On what percentage of your jobs are you using your SSL only?
- On what percentage of your jobs are you using both?
 - Why is that?
- Would you say you rely more on one of these over the other? (SSL/CUL)
 - Why do you say that?
- Are there any situations where a job requires only a CUL for the vast majority of the relevant tasks to be done, but you have to bring in a SSL for 1 or 2 tasks that you don't want to do with a CUL?
 - What percent of your jobs, in the past 6 months fall into this category?
- Please give me an example of a recent situation where a job required primarily a CUL, but you had to bring in a SSL for one or two tasks that you didn't want the CUL to do.
- Are there some rules that you use to determine whether you need a CUL only, an SS only, or both?
 - What are these?
- Are there gaps in the capabilities between the high-side of your CUL capabilities and the low-side of your SSL capabilities? (Weight, dump height, speed, turf wear, any performance capability variable).
- What are the two most important gaps?
 - Why are these most important?
 - Translate the most important gaps into something that impacts your business.
- If I could either extend the high end of the capabilities of a CUL, or the Low-end of the capabilities of a SSL, to fill this gap, which should I do and why?
- Please give me some ideas on how I should do this

TMAX Loader Preliminary FEA (Geometry Dated 9/26/13)

Results Dated:10/11/2013

Full Simulation Geometry

(Major portions removed in following results slide for better visibility)

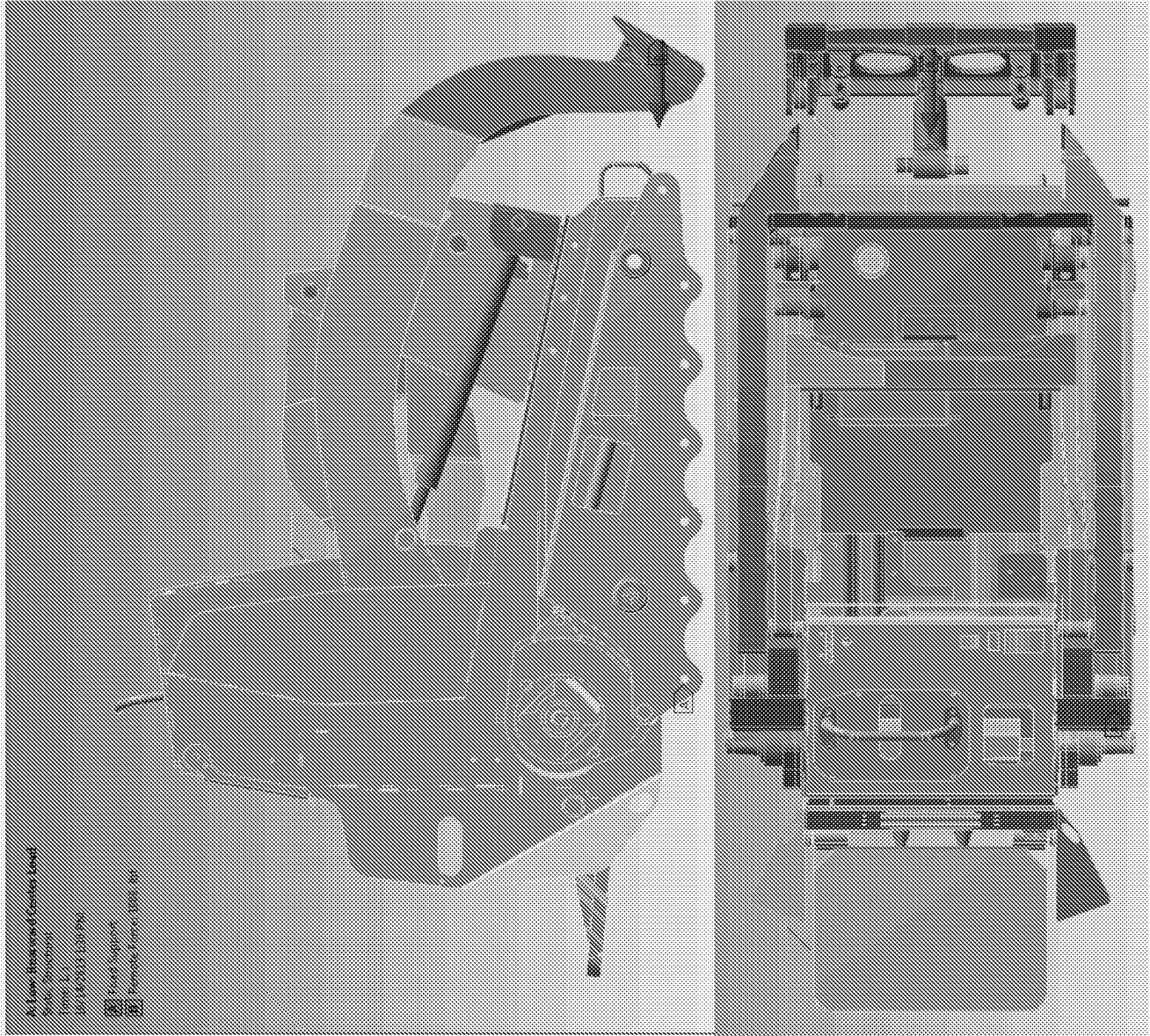


Load Cases:

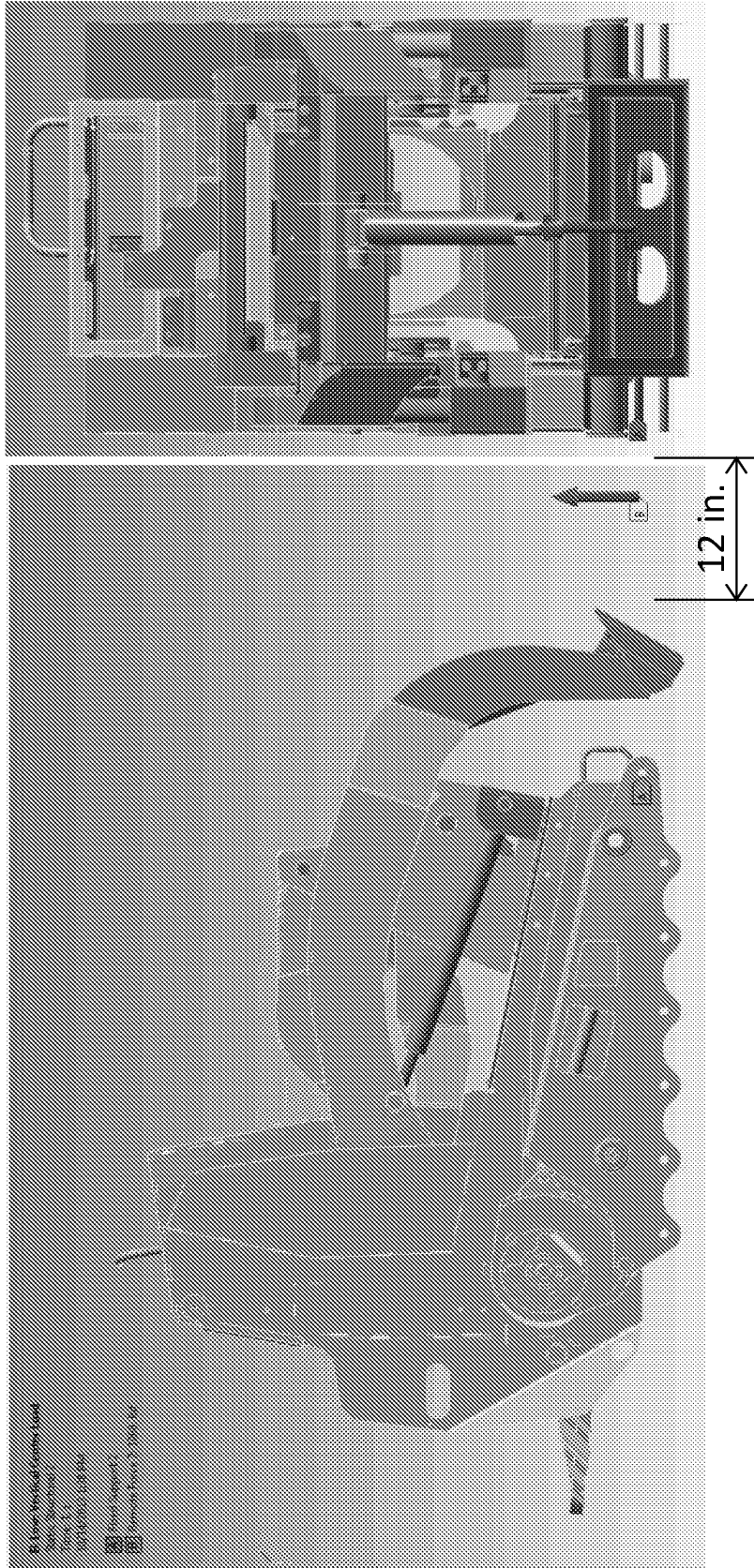
1. 1000 lbf – Rearward Center
2. 1000 lbf – Vertical Center
3. 1000 lbf – Lateral
4. 1000 lbf – Rearward Offset
5. 1000 lbf – Vertical Offset
6. Max Cylinder Retraction Force, Bottom Stop Contact

Load cases were repeated for low, medium, and high lift positions, except load case 6, which only occurs at the low position.

LC1

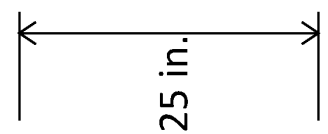


LC2



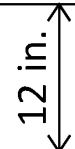


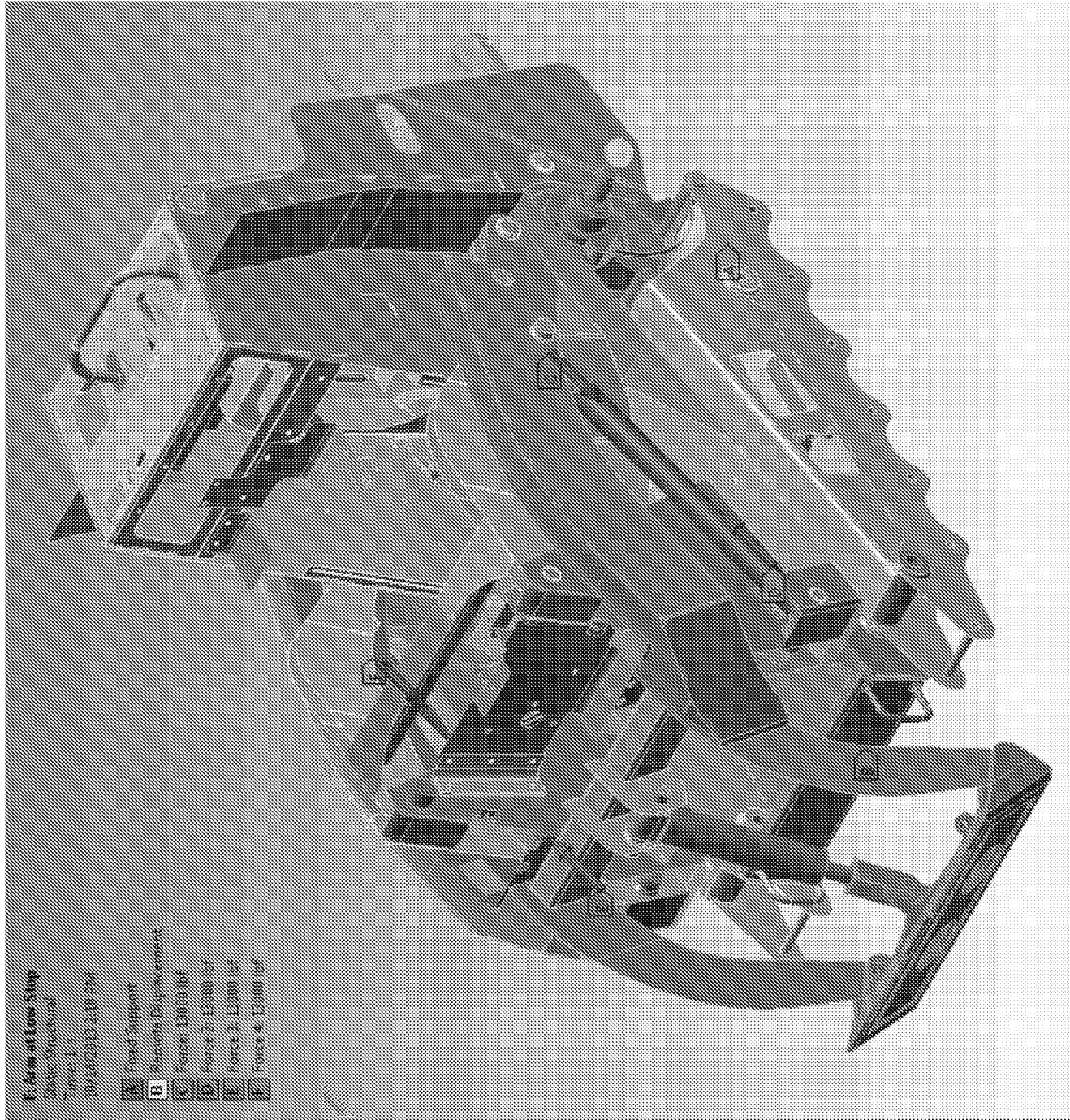
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F. Kowar – Research Assistant (Food Safety, Food Quality)
F. Kowar
120-11-2011-0008-0004

Dr. Peter Schmitt
Dr. Peter Schmitt
120-11-2011-0008-0005

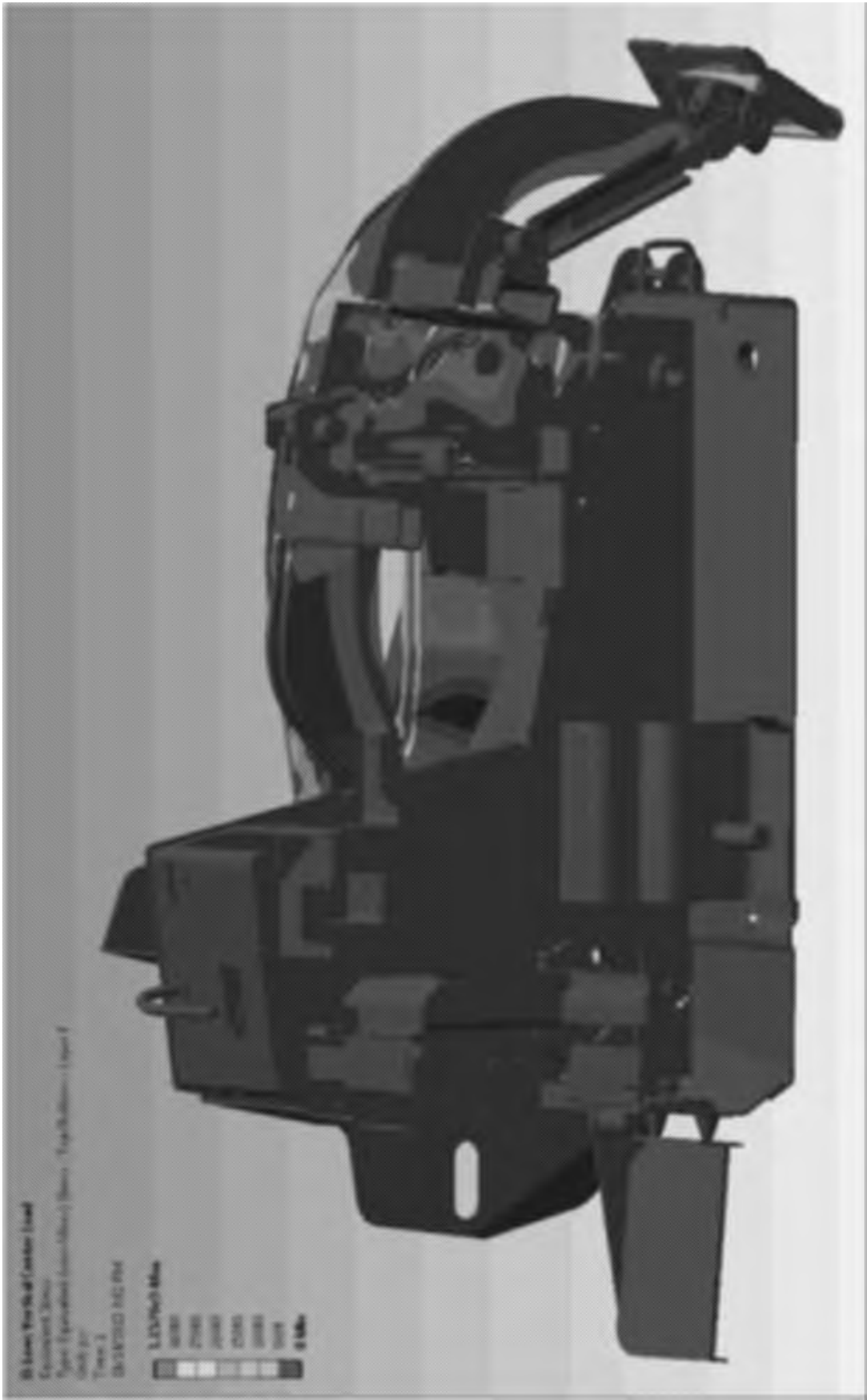




Load Case 1, Low Position

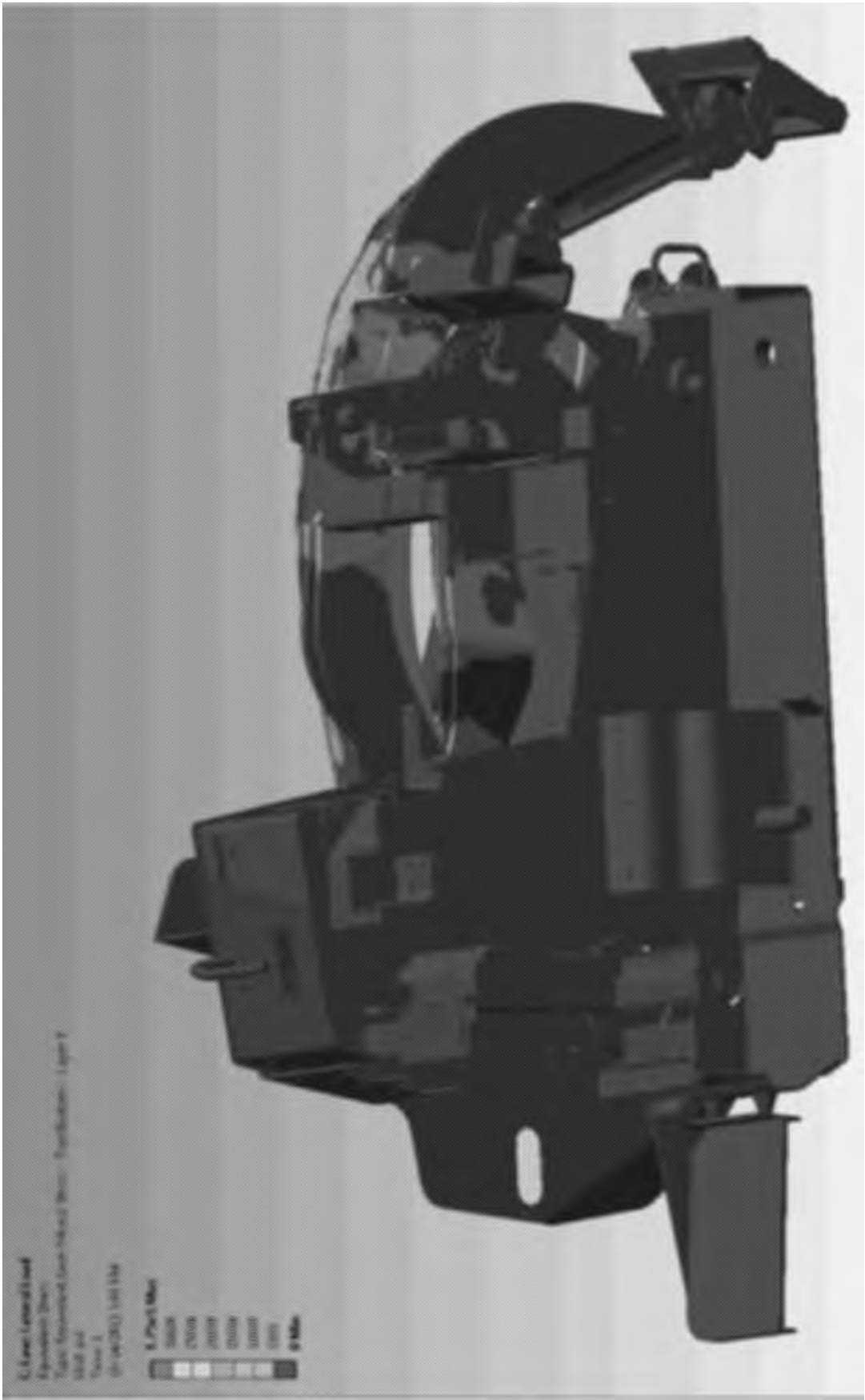


Load Case 2, Low Position



Inside cutaway view

Load Case 3, Low Position



Inside cutaway view

8,000 MPa Max

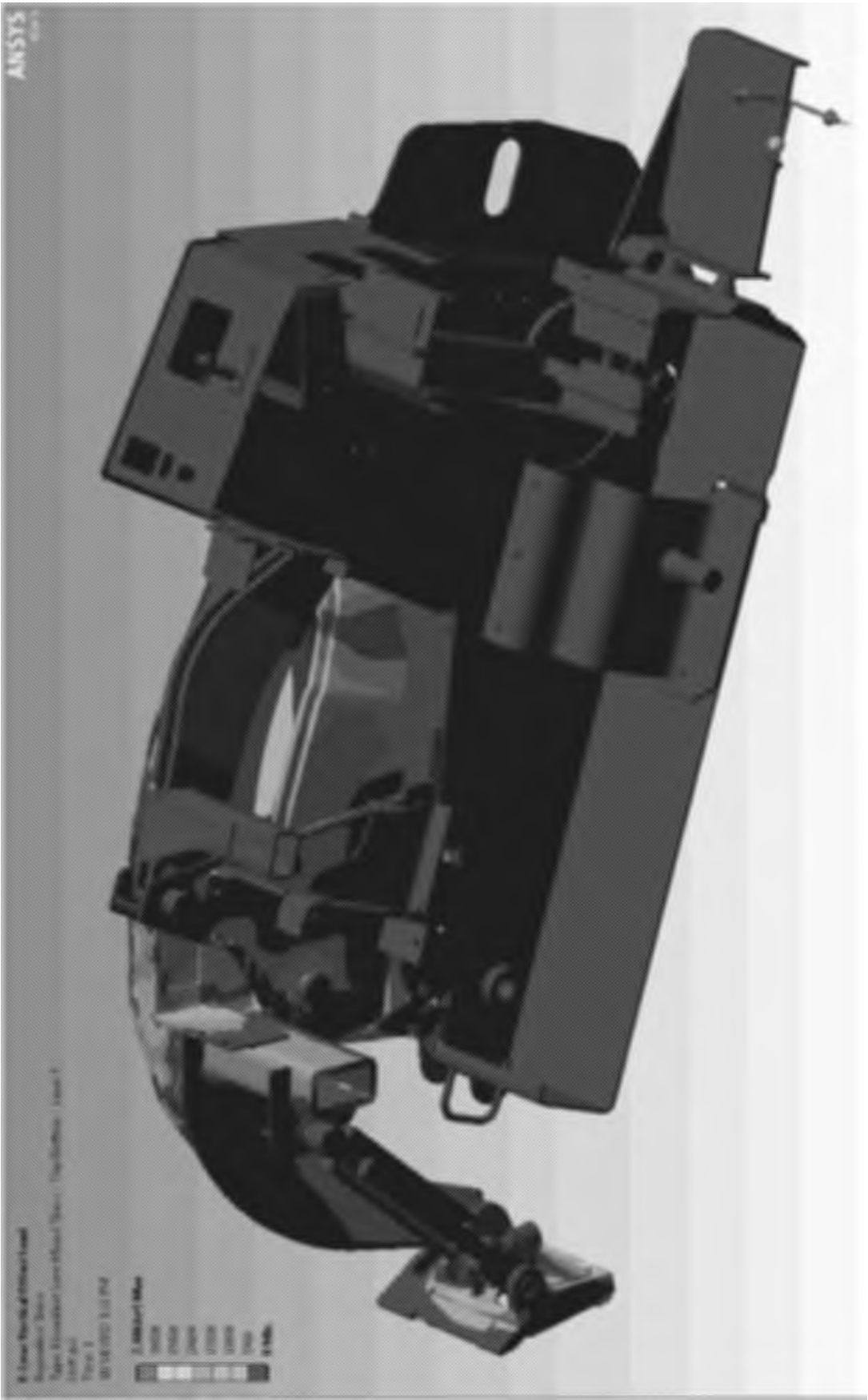
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Figure 1
MSX-B-0003 V01.000
 © 2015 GM

TORO-0000379.15/39

[illegible]

Load Case 5, Low Position



Inside cutaway view

Figure 1 shows a grayscale image of a mechanical part, likely a bracket or housing, with a finite element analysis (FEA) stress distribution overlaid. The part has a complex shape with a large central opening and several smaller holes. A color-coded stress map is overlaid on the part, with a legend at the bottom left indicating stress values from 0 to 100 MPa. A coordinate system is shown at the top right.

Load Case 6, Bottom Stop Contact



Inside cutaway view

[illegible]

EX1031 / Page 911 of 1030
Kubota North America Corporation et al

Load Case 2, Middle Position



Load Case 2, Middle Position



Load Case 3, Middle Position



Load Case 3, Middle Position



Inside cutaway view

Load Case 3, Middle Position



Inside cutaway view

Load Case 4, Middle Position



Inside cutaway view

Load Case 5, Middle Position



Load Case 1, High Position



Load Case 1, High Position

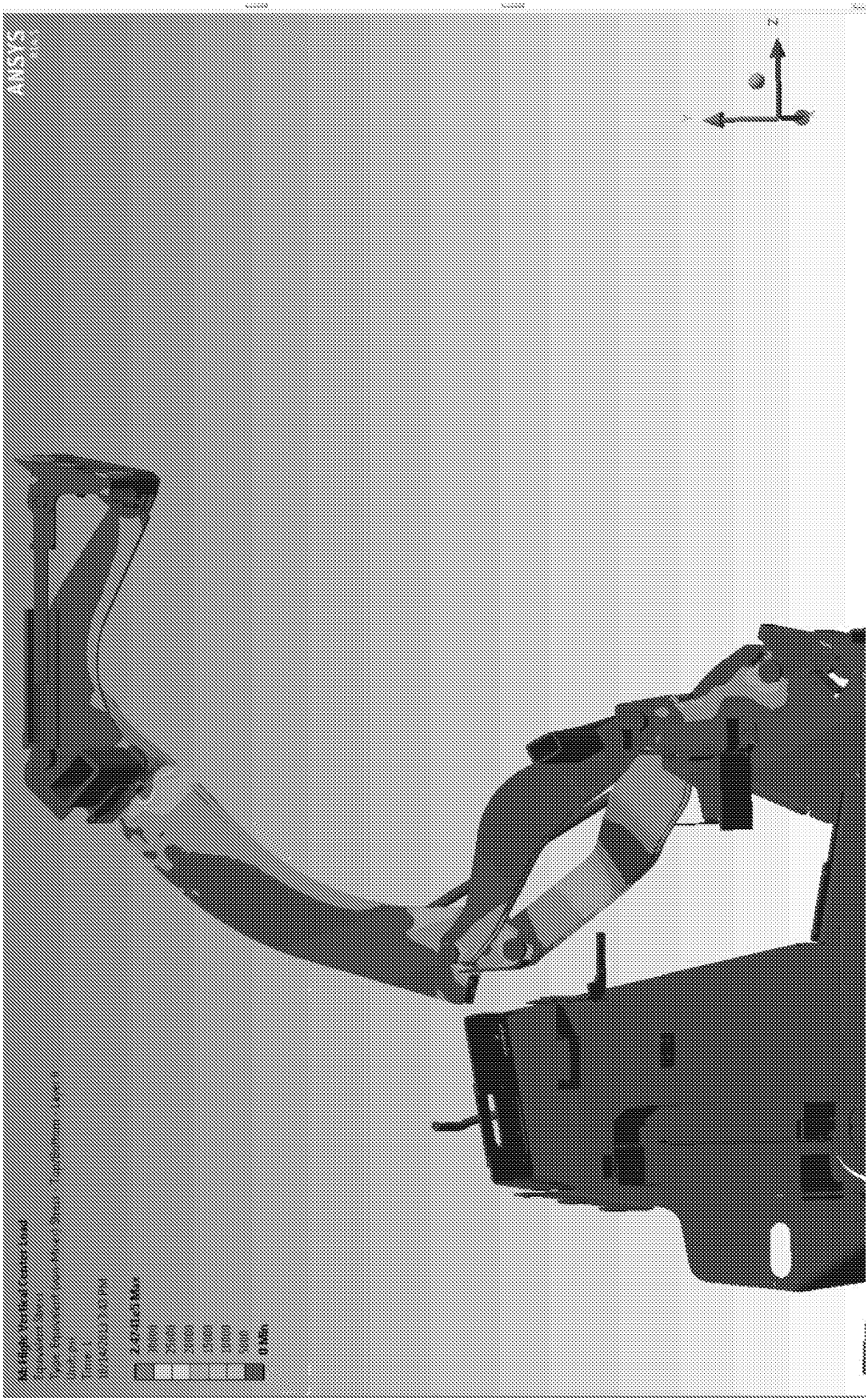


Inside cutaway view

Load Case 2, High Position



Load Case 2, High Position



Load Case 3, High Position

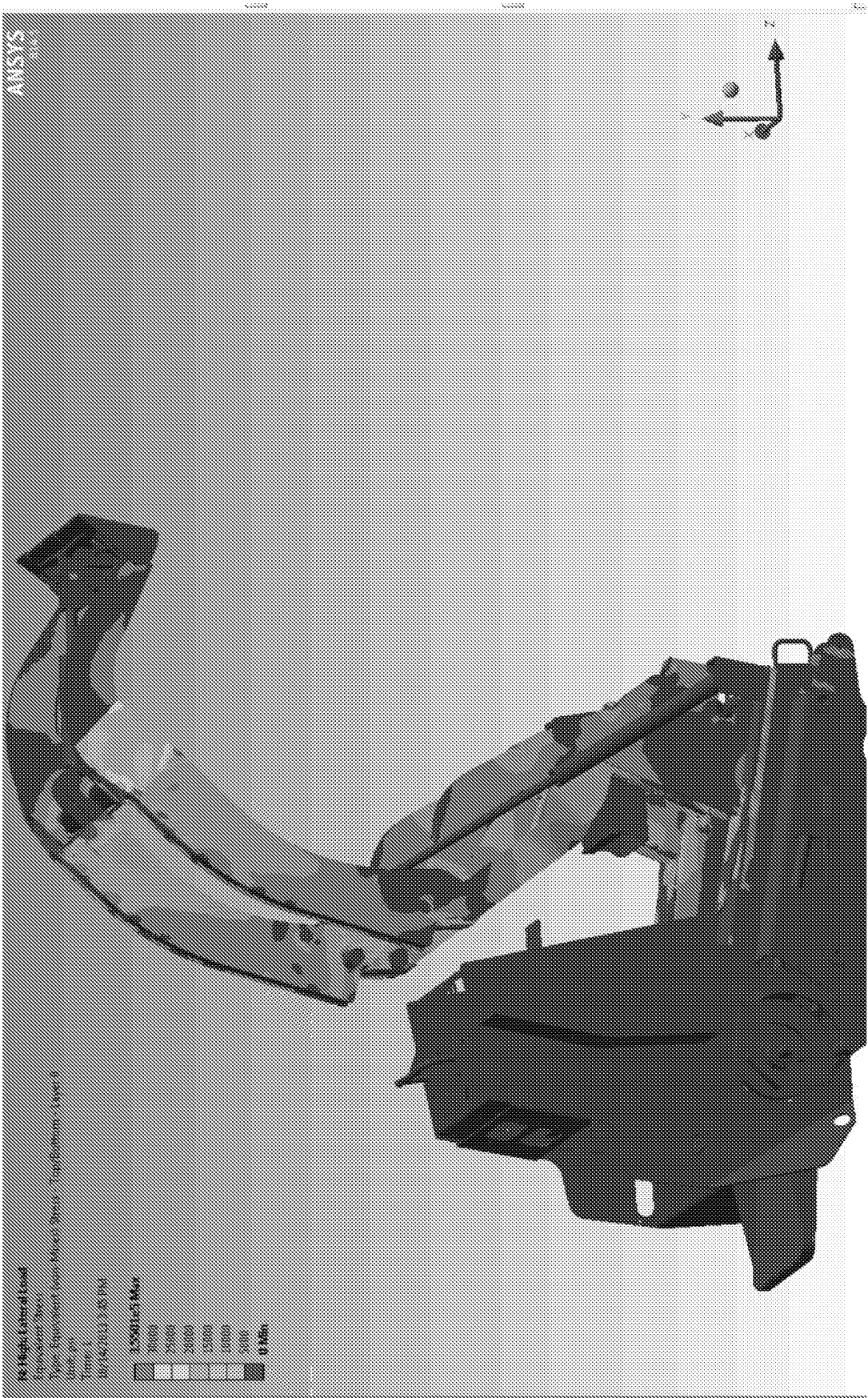


Exhibit 2

June 20, 2019

1

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF IOWA
CENTRAL DIVISION

VERMEER MANUFACTURING COMPANY,

Plaintiff, Case No. 4:19-cv-00050

vs.

THE TORO COMPANY,

Defendant.

* * *

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* * *

VIDEO DEPOSITION TESTIMONY OF

NEIL B. BORENSTEIN

THURSDAY, JUNE 20, 2019

MINNEAPOLIS, MINNESOTA

* * *

1 A. Sometimes.

2 Q. Yeah. Is it usually people from the
3 marketing team or from the engineering team or
4 both?

5 A. Both.

6 Q. Is there some standardized result
7 that you receive from these firms or final work
8 product?

9 A. We receive final work product. I
10 wouldn't say any of it is standardized.

11 Q. Is that final work product saved
12 somewhere, the i: drive perhaps?

13 A. Sometimes.

14 Q. Okay.

15 A. It depends on the marketing manager
16 responsible for it.

17 Q. I should know this, but I don't.

18 Can you give me an understanding of
19 the breadth of the products that the Siteworks
20 division manufactures?

21 A. We manufacture construction products,
22 primarily, compact construction products. We
23 manufacture compact utility loaders, walk-behind
24 trenchers, stump grinders, track stump grinders,
25 handlebar stump grinders. We manufacture riding

1 trenchers. We manufacture directional boring
2 machines. We manufacture cement mixers, mortar
3 mixers, compactors, aerators, dethatchers, brush
4 cutters, Mud Buggies, track Mud Buggies, wheel
5 Mud Buggies. That's all I can remember at this
6 time.

7 Q. That's plenty. Thanks.

8 Mud Buggies, are those just basically
9 motorized buckets that you can move around and
10 tote concrete with?

11 A. Yes.

12 Q. I don't mean to downplay their
13 significance and engineering that goes into
14 them. I'm just curious.

15 Um, do you know how many studies
16 Axiom or Dodge Consulting have done specifically
17 relating to compact utility loaders since you
18 started in 2004?

19 A. I can't remember the exact number.

20 Q. Can you give me a rough estimate?

21 A. I'd say between them, maybe a half a
22 dozen.

23 Q. And are those studies to your
24 recollection evenly distributed throughout that
25 time period, or have they been concentrated?

1 Q. Sure. Your best recollection is
2 that, um, the two consulting firms did some work
3 on the compact utility loader lines, you just
4 can't recall which specific products they
5 related to.

6 Is that right?

7 A. We have employed both firms to do
8 research at different times. I can't recall
9 which firm did which research at what time.

10 Q. Yeah. When you first started with
11 the Siteworks division in 2004, I'd asked you a
12 moment ago about what you did to immerse
13 yourself in that industry to understand the
14 products that were sold and the customer
15 demands.

16 As a result of your early work to
17 embed yourself in that business, did you have an
18 understanding of what kinds of characteristics
19 or features drove consumer demand in the compact
20 utility loader segment?

21 A. I tried to determine customers'
22 needs.

23 Q. Do you have a recollection of what
24 you believed was driving consumer demand in the
25 compact utility loader space back in the 2004

1 time period?

2 A. Yes.

3 Q. What was that?

4 A. It was demand to -- uh, for a compact
5 machine to do multiple tasks, tracked to allow
6 them to operate in wet environments and to
7 reduce turf damage.

8 Q. At that time, in 2004, did you
9 appreciate or did you understand that consumers
10 were interested in a machine that could lift as
11 much as possible?

12 A. Consumers always demand more
13 capacity.

14 Q. And I throughout the day may use the
15 phrase "lift capacity."

16 Do you understand that to be the
17 amount that the machine, the compact utility
18 loader can lift?

19 A. There are multiple definitions for
20 lift capacity.

21 Q. Help me understand what you
22 understand lift capacity to refer to?

23 A. Well, there's a tip capacity and a
24 rated operating capacity.

25 Q. And is your understanding of the tip

1 machine?

2 MR. WILLIAMS: Same objection.

3 THE WITNESS: As I mentioned before,
4 we design -- you're -- we design multiple
5 machines to do multiple different tasks and have
6 multiple different operating characteristics.

7 BY MR. BROPHY:

8 Q. So let me ask it this way: Are you
9 aware of an instance in which marketing or
10 engineering decided: We need to lower the lift
11 capacity of this machine because it's too high?

12 A. I'm not aware of that instance.

13 Q. Are you aware of instances in which
14 the marketing and engineering team wanted to
15 increase the lift capacity as much as possible
16 on a newly designed machine?

17 A. We, uh -- we always -- in -- in case
18 of specific machines, we like to have higher
19 capacities.

20 Q. And so from 2004 until today,
21 whenever the Siteworks division developed a new
22 compact utility loader, it tries to maximize
23 lift capacity, right?

24 MR. WILLIAMS: Objection, asked and
25 answered.

1 THE WITNESS: I would say it depends
2 on the product you're developing. There's
3 different operating characteristics for
4 different machines.

5 BY MR. BROPHY:

6 Q. Are you aware of instances in which
7 the Siteworks division has developed compact
8 utility loaders, and one of the goals was to
9 maximize lift capacity?

10 A. State the question again?

11 Q. Sure. Are you aware of examples of
12 the Siteworks division developing compact
13 utility loaders where one of the goals of that
14 development was to maximize the lift capacity of
15 the machine?

16 A. Um, lift capacity is one dynamic of a
17 machine.

18 Q. Uh-huh.

19 A. And it is -- um, it corresponds to
20 other dynamics of the machine and may -- and,
21 um, creating the lift capacity is sometimes a
22 tradeoff between other dynamics of the machine.

23 Q. But -- I understand that but all else
24 equal, your engineers try to maximize that
25 variable, right?

1 A. They -- they would try to optimize
2 that variable based on the other characteristics
3 of the machine.

4 Q. And that means make it as high as
5 possible?

6 A. It does not necessarily mean make it
7 as high as possible.

8 Q. It means making it as high as
9 possible as long as you don't compromise the
10 other goals for the machine, right?

11 A. We would want to make it as high as
12 possible as long as other goals are not
13 compromised.

14 Q. And that effort to maximize lift
15 capacity without compromising other goals of the
16 machine, that has been a consistent goal of the
17 Siteworks division from 2004 until today, right?

18 A. I'm not -- I'm not sure that that's a
19 -- a consistent goal. I mean we try and develop
20 products that meet the needs of our customers,
21 and they have multiple attributes. Lift
22 capacity is one of those attributes.

23 Q. Are you aware of a single instance in
24 which Toro decided to make the lift capacity of
25 one of its compact utility loaders less than it

1 could have been in order to satisfy a consumer's
2 demand?

3 A. The -- again, lift capacity is one
4 dynamic of an operating machine's
5 characteristics and it -- you -- we try and --
6 you would try and meet all the character --
7 maximize all the characteristics, but sometimes
8 the characteristics work against each other.

9 Q. But, again, all else equal, you want
10 lift capacity to be as high as possible, right?

11 MR. WILLIAMS: Objection, asked and
12 answered.

13 THE WITNESS: If everything is equal,
14 you would -- you would want any specification to
15 exceed -- to be as high as possible.

16 BY MR. BROPHY:

17 Q. And you understood that lift capacity
18 was one of the things that consumers were
19 interested in when buying a compact utility
20 loader, right?

21 A. Lift capacity is one of the things
22 customers are interested in.

23 Q. And that's been consistent from 2004
24 until today, right?

25 A. Yes.

1 A. I didn't -- I did not review
2 documents in preparation for this that, uh,
3 resulted -- that were regarding vertical lift
4 machines in a certain time frame.

5 Q. Prior to the TX 1000, what is the --
6 let me ask that a different way.

7 What is the machine that -- the
8 compact utility loader machine that was
9 developed by Toro immediately before the
10 TX 1000?

11 A. State the question again?

12 Q. Sure. If we're going backwards in
13 time, obviously, the TX 1000 is one of the most
14 recent machines that Toro's developed.

15 What is the next one back in time?

16 A. Oh, I think we developed a stump -- a
17 track stump grinder.

18 Q. And I'm sorry. I mean in the compact
19 utility loader space. Excuse me.

20 A. That would be the TX 525.

21 Q. TX 525. And that's the --

22 A. Or the TX 427. We repowered the TX
23 420. It -- that -- it's probably the 427.

24 Q. Okay. And there's also a TX 525?

25 Is that right?

1 A. Correct.

2 Q. And that's a ground-up design?

3 A. No. That -- well, no. That was a
4 repowering of the TX 420 with a diesel engine.

5 Q. Okay. So the -- the TX 425 is a
6 repowered version of the 420?

7 Is that right?

8 A. Correct.

9 Q. And the TX 427 is also a repowered
10 version of the 420?

11 A. Correct.

12 Q. Um, what is the next earliest if we
13 go back in time?

14 The 525, the 427, what's the next
15 one?

16 A. We developed a -- going back earlier?

17 Q. Yes, please.

18 A. We developed a TX 413.

19 Q. And was that a ground-up design?

20 A. Yes.

21 Q. Okay. When was that released?

22 A. It was released prior to my
23 employment with the division.

24 Q. Do you happen to know what year
25 roughly?

1 Is that consistent with your
2 understanding?

3 A. When we did this research, the
4 initial thought was to go for a bigger machine
5 first.

6 Q. Uh-huh.

7 A. And then work on a smaller machine,
8 but later we decided to work on the smaller
9 machine that -- we prioritized them (witness
10 indicating).

11 Q. Would you mind looking at Exhibit 27,
12 which I'll hand to you here in a second.

13 Um, if you know, is that a
14 representation of product -- Project Atlas at
15 some point in time?

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REDACTED

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23 Q. Just at a high level, has the TX 1000
24 been a successful product for the company?

25 A. How do you define success?

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202-220-4158

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1 Q. Use your own definition.

2 A. I would say, no.

3 Q. And why is that?

4 A. Um, we've had some quality problems.

5 Q. Okay. Meaning sold, deployed units
6 coming back with broken parts?

7 A. Yes (witness indicating).

8 Q. Okay. Do you have any sense for how
9 -- what percentage of the machines you delivered
10 come back with some kind of significant quality
11 problem?

12 A. Uh, I -- I don't have it with me now.
13 I would say it's -- up to this point, it's been
14 above our expectations.

15 Q. Yeah. What steps are being
16 undertaken to correct that?

17 A. We have redesigned the track system
18 on the narrow track units.

19 Q. Is the track system the cause of most
20 of those quality issues?

21 A. Yes.

22 Q. Okay. What other components of the
23 machine are having quality issues?

24 A. When you -- when you introduce a new
25 machine, there can be numerous quality issues.

143

1 In fact, in existing machines, you can have
2 quality issues on. Um, when we address these
3 quality issues, uh, we prioritize them, and the
4 major priority has been particularly on the
5 narrow track unit on the track design.

6 There have been other issues along
7 the way that we've repaired or fixed. However,
8 because we've had such a high priority on the
9 track system, there -- the details are not as
10 highlighted as much within the organization.

11 Q. Are you aware of any quality issues
12 that pertain to the vertical lift system?

13 A. Yes.

14 Q. What specific issues?

15 A. We've had loader arms running --
16 rubbing on the frame. That's a particular issue
17 that I remember.

18 REDACTED

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1 A. And at the time, we were leaders in
2 the industry, and we felt that we were at that
3 time meeting the needs of the customers but the
4 market -- the customer change -- needs change
5 over years.

6 Q. Are you aware of any document
7 existing within Toro's -- I'll ask that
8 differently.

9 Are you aware of any document
10 reflecting a decision to either put radial lift
11 or vertical lift on a machine and for -- and for
12 Toro to decide we're going to go with radial
13 lift on this machine?

14 A. I think at this point was the point
15 we -- where -- this document here is where we
16 started talking about vertical lift.

17 Q. So before that document, you're not
18 aware of any instance in which any Toro engineer
19 thought of putting vertical lift on a compact
20 utility loader, right?

21 A. No, I can't -- I can't say that. Um,
22 I think -- I think because the vertical lift
23 concept is known on skid-steer loaders and
24 compact track loaders and numerous models are
25 marketed in both designs, we were all aware of

1 that, and we all had thought that wouldn't it be
2 -- you know, we'd like to -- someday that
3 concept may be appropriate for a CUL.

4 Q. Is there a single document you can
5 point to that corroborates what you just said?

6 A. I don't believe there is.

7 Q. I'll hand you what's been previously
8 marked as Exhibit 8.

9 Would you mind flipping through this,
10 and then letting me know what this document is?

11 A. This -- this would be the 3.0
12 document which is the development gate for the
13 TX 1000.

14 Q. So this is the next step in the
15 process after the 2.0, right?

16 A. Yes.

17 Q. And what's the general purpose of
18 this document?

19 A. The general purpose of this document
20 is to fund the next -- next stage in
21 development.

22 Q. And on the front page of this
23 document, we see certain dollar amounts
24 identified, right?

25 A. Yes.

1 A. I can't remember in specifics. When
2 you design a machine, um, there are numerous
3 decision points where you are trying to manage
4 where the weight is of the machine.

5 Q. Are you aware of instances in which
6 engineers have placed the engine for the machine
7 as far back as possible to increase lift
8 capacity?

9 A. Again, during the machine designing
10 process, where weight is distributed is
11 important on a utility loader because you're
12 lifting something heavy, and then you're
13 transporting with a light -- so moving weight
14 around or designing where weight is is important
15 for the whole operating characteristics of the
16 machine.

17 Q. Other than attaching weights to the
18 back of the machine, are you aware of other
19 examples of Toro engineers proposing designs
20 specifically for the purpose of increasing a
21 machine's lift capacity?

22 A. Say the question again?

23 Q. Sure. Other than simply adding
24 weights to the back of the machine, are you
25 aware of other designs proposed by Toro

1 engineers specifically motivated by the interest
2 of increasing lift capacity?

3 A. Oh, yeah. We -- we've increased lift
4 capacity in different ways over the years.

5 Q. What are those ways?

6 A. We've made a bigger machine. We've
7 made a heavier machine. Vertical lift is one of
8 the ways. Uh, we changed -- you can change
9 where -- how far a reach it has (witness
10 indicating).

11 Q. And by reducing reach, you mean
12 increase lift capacity?

13 Is that right?

14 A. And depending on other factors but
15 all factors being the same, I think you would.

16 Q. Any other examples of things Vermeer
17 -- pardon me -- Toro has attempted to do to
18 specifically increase lift capacity?

19 A. I think -- I think -- I mean I'm not
20 the engineer, so I don't have the full laundry
21 list of what they would have done.

22 Q. Are you aware of examples of
23 competitors making changes to their machines to
24 try to increase lift capacity?

25 A. Well, I don't know about changes. I

1 think their designs have done different things
2 in terms of reach or in terms of size of the
3 machine. All those attributes we talked about,
4 they make their own decisions based on how much
5 they want to lift and what their machine looks
6 like (witness indicating).

7 Q. Are you aware that Ditch Witch sells
8 a weight pack for some of its compact utility
9 loaders to increase lift capacity?

10 A. I'm not aware of that.

11 Q. Are you aware of Toro engineers
12 proposing a mechanism other than a radial or
13 vertical lift mechanism for a compact utility
14 loader?

15 A. I think at one time we had a design
16 thought where we could move weight back and
17 forth to increase or decrease the weight
18 capacity.

19 Q. So in other words, when the machine
20 was lifting the load, some weight would come out
21 the back of the machine?

22 A. Yes.

23 Q. Okay. Was that design ever brought
24 into prototype form?

25 A. I can't remember.

June 20, 2019

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1 C E R T I F I C A T I O N

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4 I hereby certify that the proceedings and
5 evidence noted are contained fully and
6 accurately in the notes taken by me in the
7 deposition of the above matter, and that this
8 is a correct transcript of the same.

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Rebecca L. Klanderud

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Certified Shorthand Reporter

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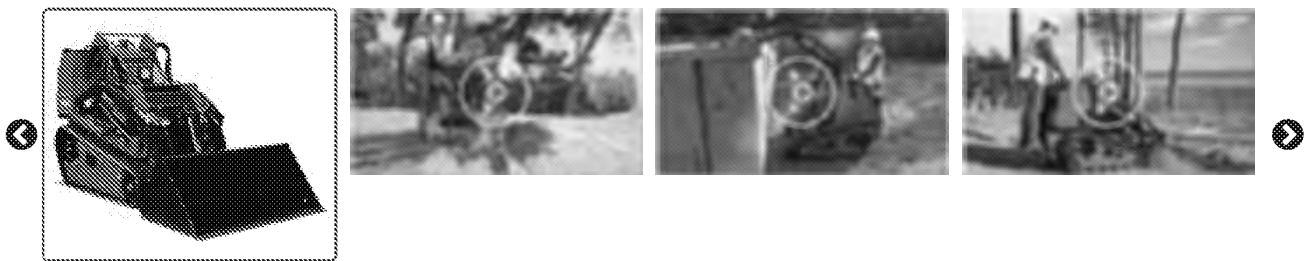
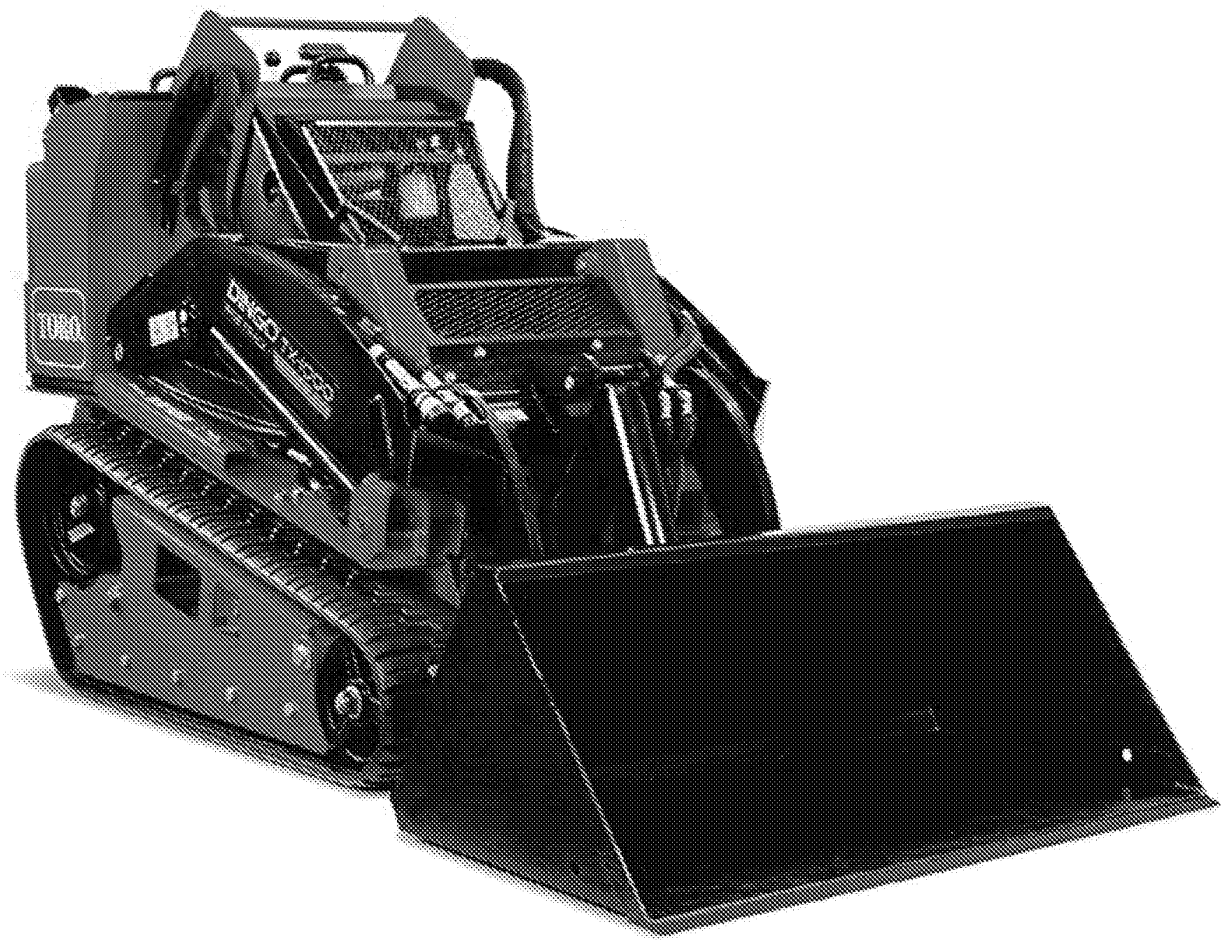
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Exhibit 7

Dingo® TX 1000 Wide Track



 [Dingo Brochure \(https://cdn2.toro.com/en/-/media/Images/Toro/sitework-systems/Professional-Contractor/Compact-Utility-Loaders/Dingo-TX1000-Wide-Track/Dingo-TX1000-Wide-Track-Brochure.pdf\)](https://cdn2.toro.com/en/-/media/Images/Toro/sitework-systems/Professional-Contractor/Compact-Utility-Loaders/Dingo-TX1000-Wide-Track/Dingo-TX1000-Wide-Track-Brochure.pdf)

Highlights 

- Toro-exclusive vertical lift loader arm design increases load capacity and greater reach at full height
- Rated operating capacity over 1,000-lbs to lift more than any compact utility loader on the market
- 81" (206 cm) hinge pin height easily clears side of a 30-yard dumpster or one-ton truck for maximum jobsite productivity
- Exclusive traction control design is intuitive, easy to operate, and effortless

Overview	▼
Specifications	▲
Air Filter Two-stage, heavy-duty, remote	
Auxiliary Flow 15.2 gpm	
Controls Patented traction control design	
Cooling System Liquid Cooled	
Engine 24.9 HP (18.6 kW) Kubota® D1305 Diesel	
Ground Clearance 6.0" (15 cm)	
Ground Pressure 3.6 PSI	
Ground Speed 4.7 mph (7.6 km/h)/ /4.7 mph (7.6 km/h)	
Height 53.2" (135 cm)	
Hinge Pin Height 81" (206 cm)	
Hydraulic System Pressure 3,000 PSI	
Length 100.7" (256 cm) w/bucket; 81.7" (208 cm) w/o bucket	
Operating Capacity 1,075 lbs (488 kg) (35% of Tip Capacity)	
Reservoir Capacity 10 gallons (57.5 liters)	
Steering Controls Patented traction control design	
Tip Capacity 3,071 lbs (1,393 kg)	
Track 127.6" x 9.5" (324 cm x 24 cm)	
Track Width 9.5" (24 cm)	
Traction Flow 13.3 gpm (each pump)	
Weight 2,860 lbs (1297 kg)	
Width 41" (104 cm)	
Accessories	▼
Documents	▼
Parts & Manuals	▼

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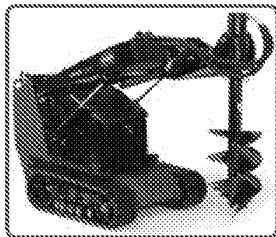
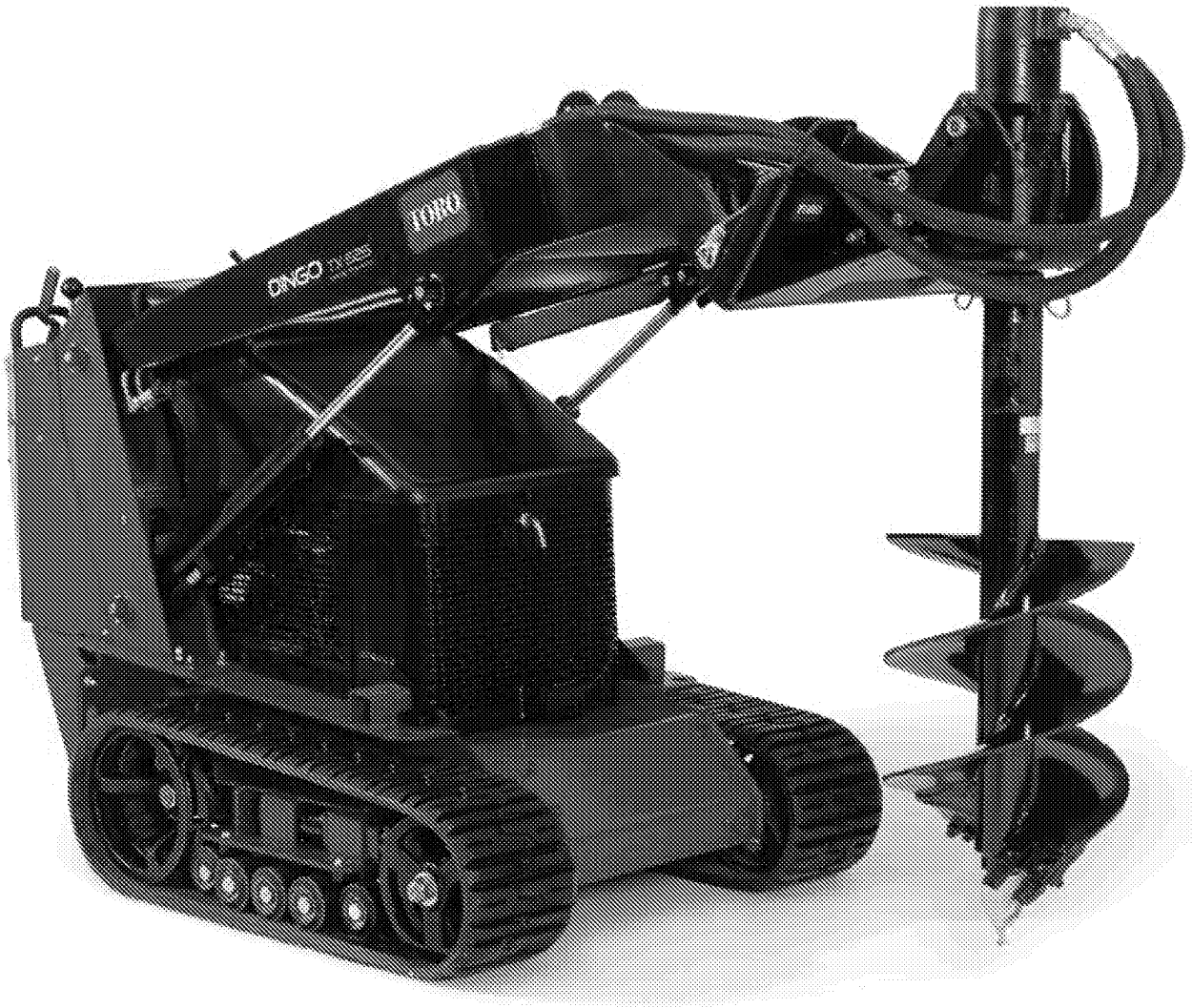
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Exhibit 6

[Home \(/en\)](#) / [Rental \(/en/rental\)](#) / [Compact Utility Loaders \(/en/rental/compact-utility-loaders\)](#)
/ [Dingo TX 525 Wide Track](#)

Dingo® TX 525 Wide Track



 [Dingo Brochure \(\)](#)

Highlights ▲

- 23.3 HP (17.3 kW) Kubota D902
- 42" width with bucket
- Turf friendly at only 2013 pounds
- Patented, easy-to-use traction control system

Overview ▼

Features ▼

Specifications ▲

Cooling System

Liquid Cooled

Engine

23.3 HP (17.3 kW) Kubota D902

Flow

13.8 gpm (52 lpm)

Ground Clearance

4.6" (11.7 cm)

Ground Pressure

3.5 PSI

Ground Speed

0-4.5 mph (0-7.2 km/h) / 0-2.0 mph (0-3.2 km/h)

Height

46.1" (117.1 cm)

Hinge Pin Height

65.8" (167.1 cm)

Hydraulic System Pressure

3,000 PSI

Length

92" (233.7 cm) w/bucket; 70.7" (180 cm) w/o bucket

Loader Arm Flow

6 gpm (23 lpm)

Loader Hydraulic System

Joystick control for all funct

Operating Capacity 553 lbs. (251 kg)
Reservoir Capacity 10.5 gallons (40 liters)
Tip Capacity 1,580 lbs. (717 kg)
Track 96.6" x 9.5" (245 cm x 24 cm)
Traction Flow 16.9 gpm (64 lpm)
Warranty Product - One Year* / Engine - Two Year*
Weight 2,013 lbs (907 kg)
Width 41" (104 cm)
Disclaimer *See your local dealer for warranty details.
Accessories ▼
Documents ▼
Parts & Manuals ▼

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[Safety \(/en/product-safety-information\)](#) | [Lawn Care \(http://yardcare.toro.com/\)](http://yardcare.toro.com/) |
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 (g)

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Exhibit 5



Count on it.

Form No. 3357-123 Rev B

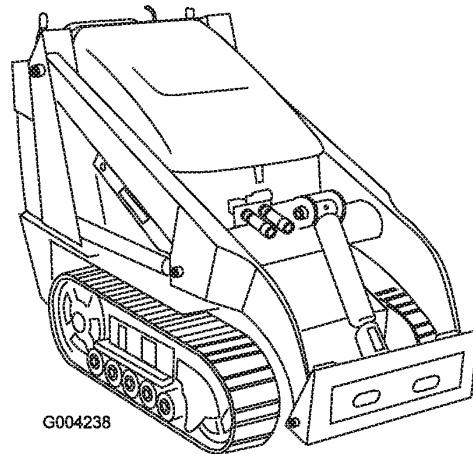
Operator's Manual

Dingo® TX 420 and TX 425 Compact Utility Loader

Model No. 22306—Serial No. 270000001 and Up

Model No. 22306G—Serial No. 270000001 and Up

Model No. 22307—Serial No. 270000001 and Up



Warning

CALIFORNIA Proposition 65 Warning

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

Because in some areas there are local, state, or federal regulations requiring that a spark arrester be used on the engine of this machine, a spark arrester is available as an option. If you require a spark arrester, contact your Authorized Service Dealer.

Genuine Toro spark arresters are approved by the USDA Forestry Service.

Important: It is a violation of California Public Resource Code Section 4442 to use or operate the engine on any forest-covered, brush-covered, or grass-covered land without a spark arrester muffler maintained in working order, or the engine constricted, equipped, and maintained for the prevention of fire. Other states or federal areas may have similar laws.

This spark ignition system complies with Canadian ICES-002.

The enclosed *Engine Owner's Manual* is supplied for information regarding the US Environmental Protection Agency (EPA) and the California Emission Control Regulation of emission systems, maintenance, and warranty. Replacements may be ordered through the engine manufacturer.

Introduction

Read this information carefully to learn how to operate and maintain your product properly and to avoid injury and product damage. You are responsible for operating the product properly and safely.

You may contact Toro directly at www.Toro.com for product and accessory information, help finding a dealer, or to register your product.

Whenever you need service, genuine Toro parts, or additional information, contact an Authorized Service Dealer or Toro Customer Service and have the model and serial numbers of your product ready. The model and serial numbers are stamped into a plate mounted under the hood near the belt drive. Write the numbers in the space provided.

Model No. _____

Serial No. _____

This manual identifies potential hazards and has safety messages identified by the safety alert symbol (Figure 1), which signals a hazard that may cause serious injury or death if you do not follow the recommended precautions.



Figure 1

1. Safety alert symbol

This manual uses 2 other words to highlight information. **Important** calls attention to special mechanical information and **Note** emphasizes general information worthy of special attention.

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Safety

Improper use or maintenance by the operator or owner can result in injury. To reduce the potential for injury, comply with these safety instructions and always pay attention to the safety alert symbol , which means: *Caution, Warning, or Danger*—personal safety instruction. Failure to comply with the instruction may result in personal injury or death.

Safe Operating Practices

This product is capable of amputating hands and feet. Always follow all safety instructions to avoid serious injury or death.



Engine exhaust contains carbon monoxide, an odorless, deadly poison that can kill you.

Do not run the engine indoors or in an enclosed area.

Training

- Read the *Operator's Manual* and other training material. If the operator(s) or mechanic(s) can not read English, it is the owner's responsibility to explain this material to them.
- Become familiar with the safe operation of the equipment, operator controls, and safety signs.
- All operators and mechanics should be trained. The owner is responsible for training the users.
- Never let children or untrained people operate or service the equipment. Local regulations may restrict the age of the operator.
- The owner/user can prevent and is responsible for accidents or injuries occurring to himself or herself, other people or property.

Preparation

- Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job. Only use accessories and attachments approved by the manufacturer.
- Wear appropriate clothing including hard hat, safety glasses, long pants, safety shoes, and hearing protection. Long hair, loose clothing or jewelry may get tangled in moving parts.

- Inspect the area where the equipment is to be used and remove all objects such as rocks, toys, and wire which can be thrown by the machine.
- Use extra care when handling gasoline and other fuels. They are flammable and vapors are explosive.
 - Use only an approved container
 - Never remove the gas cap or add fuel with the engine running. Allow the engine to cool before refueling. Do not smoke.
 - Never refuel or drain the machine indoors.
- Check that the operator's presence controls, safety switches, and shields are attached and functioning properly. Do not operate unless they are functioning properly.

Operation

- Never run an engine in an enclosed area.
- Only operate in good light, keeping away from holes and hidden hazards.
- Be sure all drives are in neutral and parking brake is engaged before starting the engine. Only start the engine from the operator's position.
- Slow down and use extra care on hillsides. Be sure to travel in the recommended direction on hillsides. Turf conditions can affect the machine's stability.
- Slow down and use caution when making turns and when changing directions on slopes.
- Never operate with the guards not securely in place. Be sure all interlocks are attached, adjusted properly, and functioning property.
- Do not change the engine governor setting or overspeed the engine.
- Stop on level ground, lower implements, disengage the auxiliary hydraulics, engage parking brake, shut off the engine before leaving the operator's position for any reason.
- Keep hands and feet away from moving attachments.
- Look behind and down before backing up to be sure of a clear path.
- Never carry passengers and keep pets and bystanders away.
- Slow down and use caution when making turns and crossing roads and sidewalks.
- Do not operate the machine under the influence of alcohol or drugs.
- Use care when loading or unloading the machine into a trailer or truck.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

- Read all attachment manuals.
- Ensure that the area is clear of other people before operating the traction unit. Stop the traction unit if anyone enters the area.
- Never leave a running traction unit unattended. Always lower the loader arms, stop the engine, set the parking brake, and remove the key before leaving.
- Do not exceed the rated operating capacity, as the traction unit may become unstable which may result in loss of control.
- Do not carry a load with the arms raised. Always carry loads close to the ground.
- Do not over-load the attachment and always keep the load level when raising the loader arms. Logs, boards, and other items could roll down the loader arms, injuring you.
- Never jerk the controls; use a steady motion.
- Watch for traffic when operating near or crossing roadways.
- Do not touch parts which may be hot from operation. Allow them to cool before attempting to maintain, adjust, or service.
- Check for overhead clearances (i.e. branches, doorways, electrical wires) before driving under any objects and do not contact them.
- Ensure that you operate the traction unit in areas where there are no obstacles in close proximity to the operator. Failure to maintain adequate distance from trees, walls, and other barriers may result in injury as the traction unit backs up during operation if the operator is not attentive to the surroundings. Only operate the unit in areas where there is sufficient clearance for the operator to safely maneuver the product.
- Before digging, have the area marked for underground utilities, and do not dig in marked areas.
- Locate the pinch point areas marked on the traction unit and attachments and keep hands and feet away from these areas.
- Before operating the traction unit with an attachment, ensure that the attachment is properly installed.

Slope Operation

Slopes are a major factor related to loss-of-control and tip-over accidents, which can result in severe injury or death. All slopes require extra caution.

- Do not operate the traction unit on hillsides or slopes exceeding the angles recommended in the

Stability Data section and those in the attachment *Operator's Manual*. See also the Slope Chart, page 7.

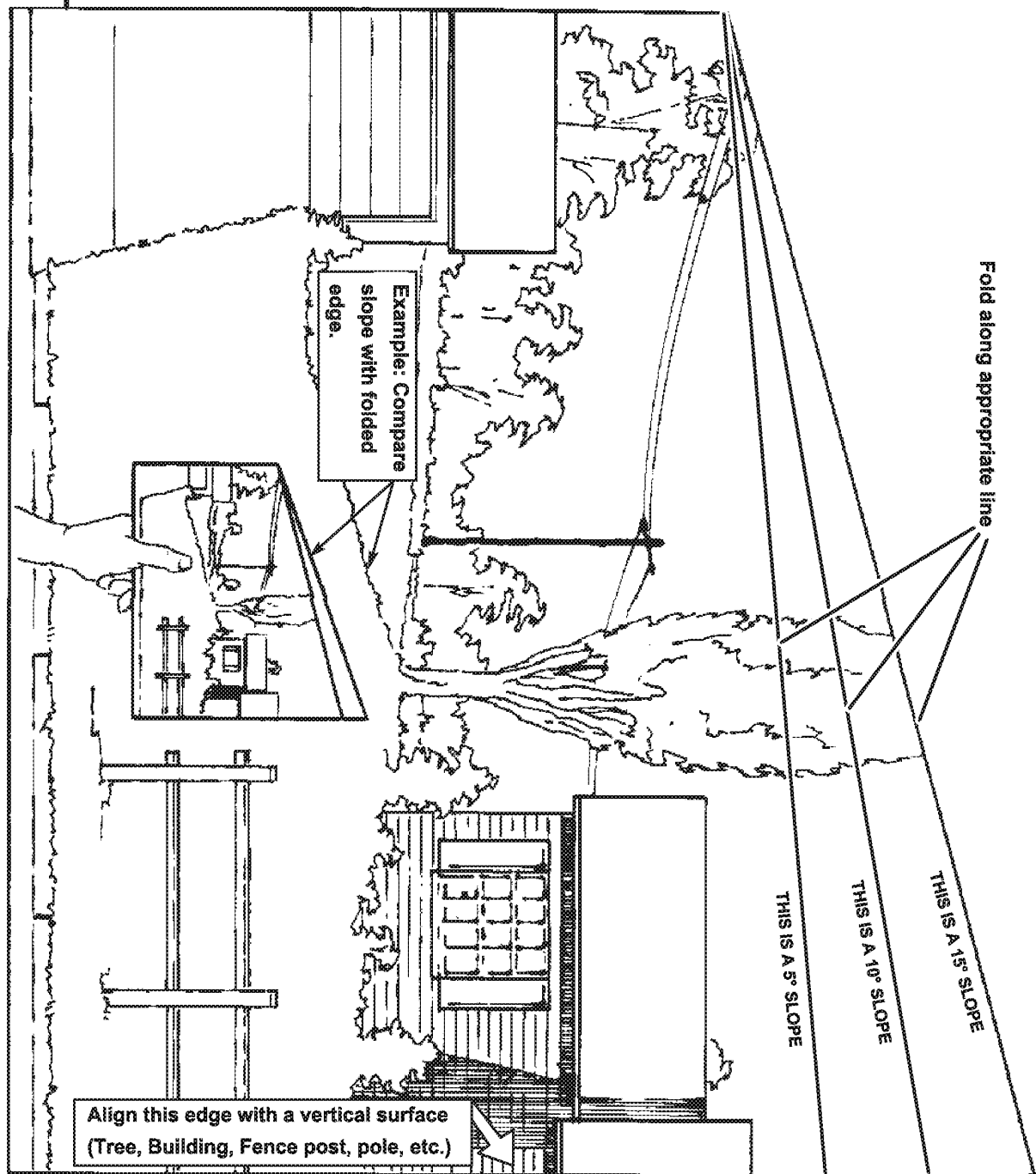
- **Operate up and down slopes with the heavy end of the traction unit uphill.** Weight distribution changes. An empty bucket will make the rear of the traction unit the heavy end, and a full bucket will make the front of the traction unit the heavy end. Most other attachments will make the front of traction unit the heavy end.
- Raising the loader arms on a slope will affect the stability of the machine. Whenever possible, keep the loader arms in the lowered position when on slopes.
- Removing an attachment on a slope will make the rear of the traction unit heavy. Refer to the Stability Data section to determine whether the attachment can be safely removed on the slope.
- Remove obstacles such as rocks, tree limbs, etc. from the work area. Watch for holes, ruts, or bumps, as uneven terrain could overturn the traction unit. Tall grass can hide obstacles.
- Use only Toro-approved attachments. Attachments can change the stability and the operating characteristics of the traction unit. Warranty may be voided if used with unapproved attachments.
- Keep all movements on slopes slow and gradual. Do not make sudden changes in speed or direction.
- Avoid starting or stopping on a slope. If the traction unit loses traction, proceed slowly, straight down the slope.
- Avoid turning on slopes. If you must turn, turn slowly and keep the heavy end of the traction unit uphill.
- Do not operate near drop-offs, ditches, or embankments. The traction unit could suddenly turn over if a track goes over the edge of a cliff or ditch, or if an edge caves in.
- Do not operate on wet grass. Reduced traction could cause sliding.
- Do not park the traction unit on a hillside or slope without lowering the attachment to the ground, setting the parking brake, and chocking the tracks.

Maintenance and Storage

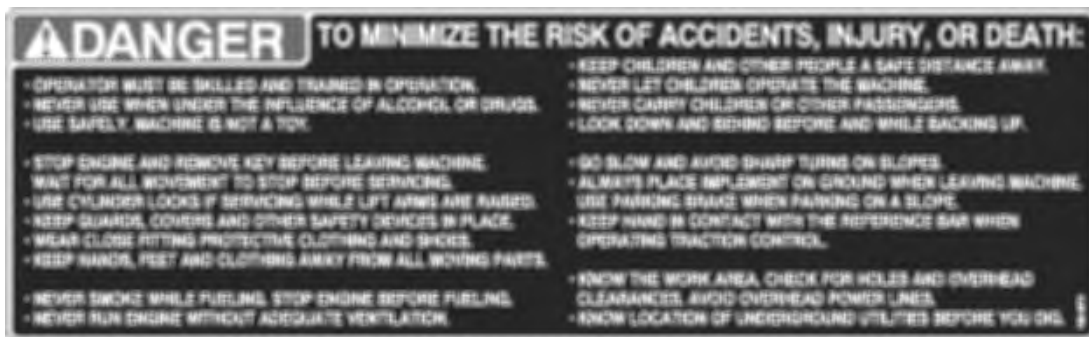
- Disengage the auxiliary hydraulics, lower the attachment, set the parking brake, stop the engine, and remove the key. Wait for all movement to stop before adjusting, cleaning, or repairing.
- Clean debris from attachments, drives, mufflers, and engine to help prevent fires. Clean up oil or fuel spillage.

- Let the engine cool before storing and do not store near flame.
- Do not store fuel near flames or drain indoors.
- Park the machine on level ground. Never allow untrained personnel to service the machine.
- Use jack stands to support components when required.
- Carefully release pressure from components with stored energy.
- Disconnect the battery or remove the spark plug wires before making any repairs. Disconnect the negative terminal first and the positive last. Reconnect positive first and negative last.
- Keep hands and feet away from moving parts. If possible, do not make adjustments with the engine running.
- Charge batteries in an open well ventilated area, away from spark and flames. Unplug the charger before connecting or disconnecting it from the battery. Wear protective clothing and use insulated tools.
- Keep all parts in good working condition and all hardware tightened. Replace all worn or damaged decals.
- If any maintenance or repair requires the loader arms to be in the raised position, secure the arms in the raised position with the hydraulic cylinder lock.
- Secure the loader arm valve with the loader valve lock anytime you need to stop the machine with the loader arms raised.
- Keep nuts and bolts tight. Keep equipment in good condition.
- Never tamper with safety devices.
- Keep the traction unit free of grass, leaves, or other debris build-up. Clean up oil or fuel spillage. Allow the traction unit to cool before storing.
- Use extra care when handling gasoline and other fuels. They are flammable and vapors are explosive.
 - Use only an approved container.
 - Never remove the gas cap or add fuel when the engine is running. Allow the engine to cool before refueling. Do not smoke.
 - Never refuel the traction unit indoors.
 - Never store the traction unit or fuel container inside where there is an open flame, such as near a water heater or furnace.
 - Never fill a container while it is inside a vehicle, trunk, pick-up bed, or any surface other than the ground.
- Keep container nozzle in contact with the tank during filling.
- Stop and inspect the equipment if you strike an object. Make any necessary repairs before restarting.
- Use only genuine Toro replacement parts to ensure that original standards are maintained.
- Battery acid is poisonous and can cause burns. Avoid contact with skin, eyes, and clothing. Protect your face, eyes, and clothing when working with a battery.
- Battery gases can explode. Keep cigarettes, sparks and flames away from the battery.
- Keep your body and hands away from pin hole leaks or nozzles that eject high pressure hydraulic fluid. Use cardboard or paper to find hydraulic leaks; never use your hands. Hydraulic fluid escaping under pressure can penetrate skin and cause injury requiring surgery within a few hours by a qualified surgeon or gangrene may result.

Slope Chart



3. Slow





DINGO TX 420/425

QUICK REFERENCE AID

 SEE OPERATING MANUAL

DISCLOSURE ONLY

1. ON-ROAD SPEED	1. AD 15/100 A&D (DISCLOSURE)
2. GEAR, DRIVE SHAFT	2. TREAD/TURN RATIO
3. DRIVE FUNCTION	3. DRIVE PARTS LTD. & COMPANY

FLUID SPECIFICATIONS, STORAGE RECOMMENDATIONS

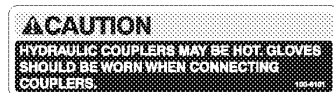
Oil Capacity (incl. 10% Reserve)	Oil Type	Viscosity	Oil Grade	Oil Type	Oil Grade
Engine Oil	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30
Hydraulic Oil	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30
Transmission Oil	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30
Brake Oil	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30
Power Steering Oil	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30
Chassis Grease	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30
Wheel Grease	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30
Ball Joint Grease	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30
Shock Absorber Grease	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30
Leaf Spring Grease	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30
Frame Grease	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30
Body Grease	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30
Paint	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30	SAE 10W-30

108-5599

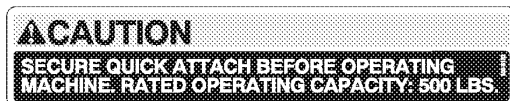


107-9309

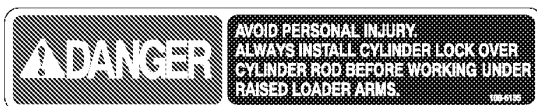
1. Warning—read the *Operator's Manual* for information on charging the battery; contains lead; do not discard.
2. Read the *Operator's Manual*.



100-6101



100-6132



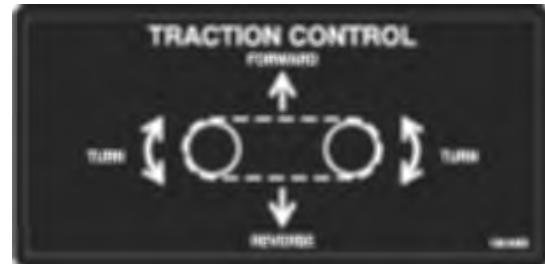
100-6135



100-6141



108-4686



106-9453



80-8040



105-8432



80-8290



108-4670



108-4671



93-9084

1. Lift point

2. Tie-down point

Setup

1

Charging the Battery

No Parts Required

Procedure

Warning

**CALIFORNIA
Proposition 65 Warning**
Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm.
Wash hands after handling.

1. Open the rear access cover.
2. Connect a charger to the battery (Figure 2) and charge it for a minimum of 1 hour at 6 to 10 amps. Do not overcharge the battery.

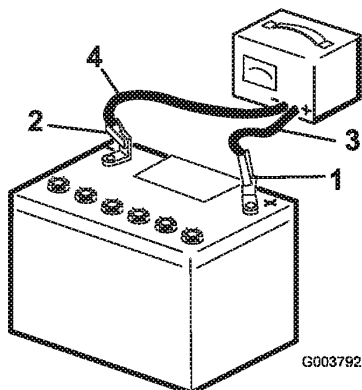


Figure 2

- | | |
|------------------|---------------------------|
| 1. Positive post | 3. Charger red (+) wire |
| 2. Negative post | 4. Charger black (—) wire |

3. When the battery is fully charged, unplug the charger from the electrical outlet, then disconnect the charger leads from the battery posts (Figure 2).
4. Close the rear access cover.

2

Checking Fluid Levels

No Parts Required

Procedure

Before starting the engine for the first time, check the engine oil and hydraulic fluid levels. Refer to Operation for more information.



Charging the battery produces gasses that can explode.

Never smoke near the battery and keep sparks and flames away from battery.

Product Overview

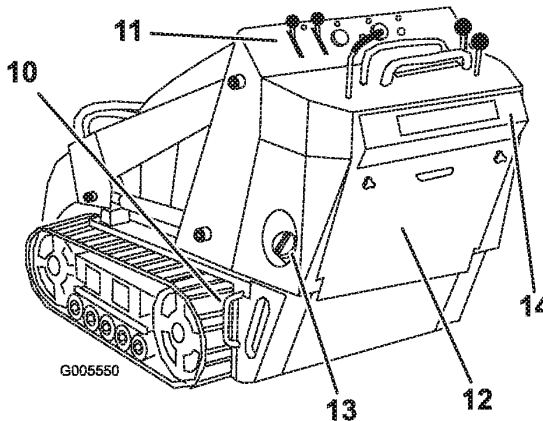
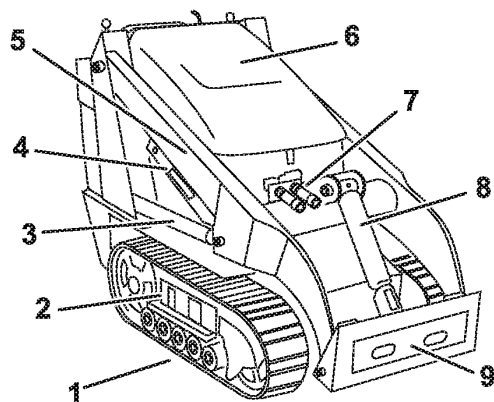


Figure 3

- | | | | |
|-----------------------------|---------------------------------|------------------------|--------------------------|
| 1. Track | 5. Loader arms | 9. Mount plate | 13. Fuel tank |
| 2. Track adjustment chamber | 6. Hood | 10. Tie-down/lift loop | 14. Reverse safety plate |
| 3. Lift cylinder | 7. Auxiliary hydraulic couplers | 11. Control panel | |
| 4. Cylinder lock | 8. Tilt cylinder | 12. Rear access cover | |

Controls

Become familiar with all the controls (Figure 4) before you start the engine and operate the traction unit.

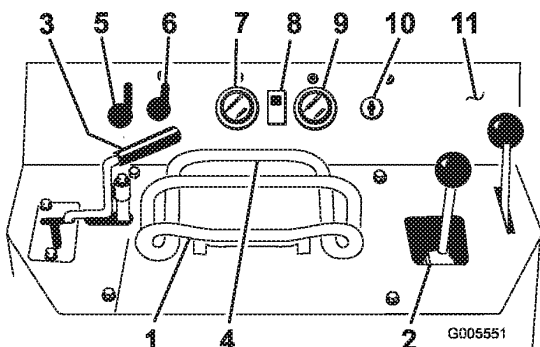


Figure 4

- | | |
|-------------------------------------|------------------------------------|
| 1. Traction control | 7. Fuel gauge |
| 2. Loader arm/attachment tilt lever | 8. Hydraulic oil temperature light |
| 3. Auxiliary hydraulics lever | 9. Hour meter/tachometer |
| 4. Reference bar | 10. Key switch |
| 5. Throttle lever | 11. Parking brake lever |
| 6. Choke lever | |

Key Switch

The key switch, used to start and stop the engine, has three positions: off, run, and start.

To start the engine, rotate the key to the start position. Release the key when engine starts and it will move automatically to the run position.

To stop the engine, rotate the key to the off position.

Throttle Lever

Move the control forward to increase the engine speed and rearward to decrease speed.

Choke Lever

Before starting a cold engine, move the choke lever forward. After the engine starts, regulate the choke to keep the engine running smoothly. As soon as possible, move the choke lever all the way rearward.

Note: A warm engine requires little or no choking.

Reference Bar

When driving the traction unit, use the reference bar as a handle and a leverage point for controlling the traction control and the auxiliary hydraulics lever. To ensure smooth, controlled operation, do not take both hands off of the reference bar while operating the traction unit.

Traction Control

To move forward, move the traction control forward. To move rearward, move the traction control rearward (Figure 5).

To turn, rotate the traction control in the desired direction (Figure 5).

The farther you move the traction control in any direction, the faster the traction unit will move in that direction.

To stop, release the traction control.

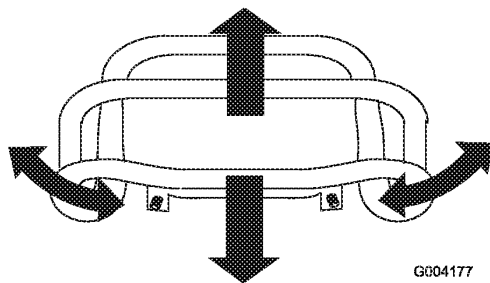


Figure 5

Loader Arm/Attachment Tilt Lever

To tilt the attachment forward, slowly move the lever to the right (Figure 6).

To tilt the attachment rearward, slowly move the lever to the left (Figure 6).

To lower the loader arms, slowly move the lever forward (Figure 6).

To raise the loader arms, slowly move the lever rearward (Figure 6).

You can also push the lever fully forward into a detent position (Figure 6) to release the loader arms so that the attachment rests on the ground. This allows attachments such as the leveler and the hydraulic blade to follow the contours of the ground (i.e., float) when grading.

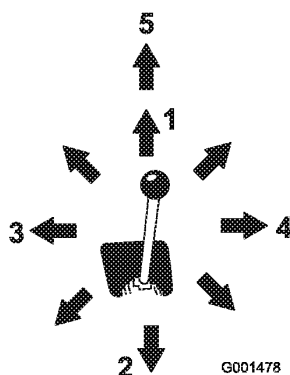


Figure 6

- | | |
|---------------------------------|--------------------------------|
| 1. Lower the loader arms | 4. Tilt the attachment forward |
| 2. Raise the loader arms | 5. Detent (Float) position |
| 3. Tilt the attachment rearward | |

By moving the lever to an intermediate position (such as, forward and left), you can move the loader arms and tilt the attachment at the same time.

Auxiliary Hydraulics Lever

To operate a hydraulic attachment in the forward direction, rotate the auxiliary hydraulics lever rearward and pull it down to the reference bar (Figure 7, number 1).

To operate a hydraulic attachment in reverse direction, rotate the hydraulics lever rearward, then move it left into the upper slot (Figure 7, number 2).

If you release the lever while in the forward position, the lever will automatically return to the neutral position (Figure 7, number 3). If it is in the reverse position, it will remain there until you pull it out of the slot.

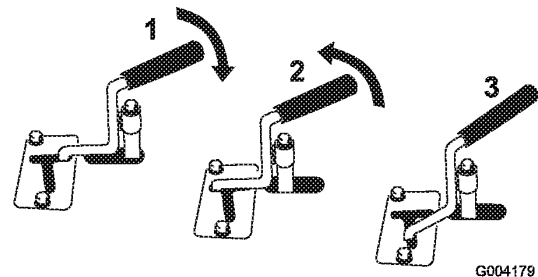


Figure 7

- | | |
|----------------------------|------------|
| 1. Forward flow hydraulics | 3. Neutral |
| 2. Reverse flow hydraulics | |

Parking Brake Lever

To set the parking brake, push the brake lever forward and to the left and then pull it rearward (Figure 8).

Note: The traction unit may roll slightly before the brakes engage in the drive sprocket.

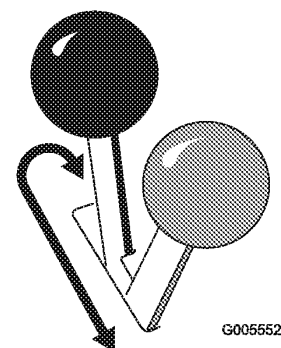


Figure 8

To release the brake, push the lever forward and then right, into the notch.

Fuel Gauge

This gauge measures the amount of fuel in the fuel tank.

Hydraulic Oil Temperature Light (Dingo TX 425 only)

If the hydraulic oil gets too hot, this light illuminates and an audible alarm sounds. If this happens, stop the engine and allow the traction unit to cool.

Hour Meter/Tachometer

When the engine is off, the hour meter/tachometer displays the number of hours of operation that have been logged on the traction unit. When the engine is running, it displays the speed of the engine in revolutions per minute (rpm).

After 50 hours and then every 100 hours thereafter (that is at 150, 250, 350, etc.) the screen displays CHG OIL to remind you to change the engine oil. After every 100 hours, the screen displays SVC to remind you to perform the other maintenance procedures based on a 100, 200, or 400 hour schedule. These reminders come on starting three hours prior to the service interval time and flash at regular intervals for six hours.

Specifications

Note: Specifications and design are subject to change without notice.

TX 420, Model 22306	
Width	34 inches (86 cm)
Length	71 inches (180 cm)
Height	46 inches (117 cm)
Weight	1880 lb (853 Kg)
Operating capacity	500 lb (227 Kg)
Tipping capacity	1480 lb (671 Kg)
Wheelbase	31.2 inches (79 cm)
Dump height (with narrow bucket)	47 inches (119 cm)
Reach—fully raised (with narrow bucket)	22 inches (55 cm)
Height to hinge pin (narrow bucket in highest position)	66 inches (168 cm)

TX 425, Model 22307	
Width	41 inches (104 cm)
Length	71 inches (180 cm)
Height	46 inches (117 cm)
Weight	2060 lb (935 Kg)
Operating capacity	500 lb (227 Kg)
Tipping capacity	1427 lb (647 Kg)
Wheelbase	31.2 inches (79 cm)
Dump height (with narrow bucket)	47 inches (119 cm)
Reach—fully raised (with narrow bucket)	22 inches (55 cm)
Height to hinge pin (narrow bucket in highest position)	66 inches (168 cm)

Attachments/Accessories

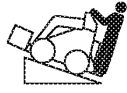
A selection of Toro approved attachments and accessories are available for use with the machine to enhance and expand its capabilities. Contact your Authorized Service Dealer or Distributor or go to www.Toro.com for a list of all approved attachments and accessories.

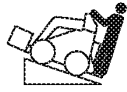
Important: Use only Toro approved attachments. Other attachments may create an unsafe operating environment or damage the traction unit.

Stability Data

The following tables list the maximum slope recommended for the traction unit in the positions listed in the tables. Slopes over the listed degree may cause the traction unit to become unstable. The data in the tables assume that the loader arms are fully lowered; raised arms may affect the stability.

In each attachment manual is a set of three stability ratings, one for each hill position. To determine the maximum slope you can traverse with the attachment installed, find the degree of slope that corresponds to the stability ratings of the attachment. Example: If the attachment installed on a TX 420 traction unit has a Front Uphill rating of B, a Rear Uphill rating of D, and a Side Uphill rating of C, then you could drive forward up a 20° slope, rearward up a 12° slope, or sideways on a 14° slope, as listed in the following table for the TX 420 traction unit.

TX 420, Model 22306			
Configuration	Maximum Recommended Slope when Operating with:		
	Front Uphill	Rear Uphill	Side Uphill
			
Traction unit without attachment	11°	21°	19°
Traction unit with an attachment rated with one of the following stability ratings for each slope position:*			
A	25°	25°	20°
B	20°	20°	18°
C	17°	17°	14°
D	10°	12°	9°
E	5°	5°	5°

TX 425, Model 22307			
Configuration	Maximum Recommended Slope when Operating with:		
	Front Uphill	Rear Uphill	Side Uphill
			
Traction unit without attachment	12°	20°	23°
Traction unit with an attachment rated with one of the following stability ratings for each slope position:*			
A	25°	25°	25°
B	22°	22°	22°
C	18°	16°	16°
D	10°	10°	10°
E	5°	5°	5°

Operation

Note: Determine the left and right sides of the machine from the normal operating position.

Important: Before operating, check the fuel and oil level, and remove debris from the traction unit. Also, ensure that the area is clear of people and debris. You should also know and have marked the locations of all utility lines.

Adding Fuel

Use unleaded gasoline (87 pump octane minimum). Leaded, regular gasoline may be used if unleaded is not available.



In certain conditions, gasoline is extremely flammable and highly explosive. A fire or explosion from gasoline can burn you and others and can damage property.

- Fill the fuel tank outdoors, in an open area, when the engine is cold. Wipe up any gasoline that spills.
- Never fill the fuel tank inside an enclosed trailer.
- Do not fill the fuel tank completely full. Add gasoline to the fuel tank until the level is 1/4 to 1/2 inch (6 to 13 mm) below the bottom of the filler neck. This empty space in the tank allows gasoline to expand.
- Never smoke when handling gasoline, and stay away from an open flame or where gasoline fumes may be ignited by a spark.
- Store gasoline in an approved container and keep it out of the reach of children. Never buy more than a 30-day supply of gasoline.
- Do not operate without entire exhaust system in place and in proper working condition.



In certain conditions during fueling, static electricity can be released causing a spark which can ignite the gasoline vapors. A fire or explosion from gasoline can burn you and others and can damage property.

- Always place gasoline containers on the ground away from your vehicle before filling.
- Do not fill gasoline containers inside a vehicle or on a truck or trailer bed because interior carpets or plastic truck bed liners may insulate the container and slow the loss of any static charge.
- When practical, remove gas-powered equipment from the truck or trailer and refuel the equipment with its wheels on the ground.
- If this is not possible, then refuel such equipment on a truck or trailer from a portable container, rather than from a gasoline dispenser nozzle.
- If a gasoline dispenser nozzle must be used, keep the nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete.

Important: Do not use methanol, gasoline containing methanol, or gasohol containing more than 10% ethanol because the fuel system could be damaged. Do not mix oil with gasoline.

Using Stabilizer/Conditioner

Use a fuel stabilizer/conditioner in the traction unit to provide the following benefits:

- Keeps gasoline fresh during storage of 90 days or less. For longer storage it is recommended that the fuel tank be drained.
- Cleans the engine while it runs
- Eliminates gum-like varnish buildup in the fuel system, which causes hard starting

Important: Do not use fuel additives containing methanol or ethanol.

Add the correct amount of gas stabilizer/conditioner to the gas.

Note: A fuel stabilizer/conditioner is most effective when mixed with fresh gasoline. To minimize the

chance of varnish deposits in the fuel system, use fuel stabilizer at all times.

Filling the Fuel Tank

1. Park the traction unit on a level surface, lower the loader arms, and stop the engine.
2. Remove the key and allow the engine to cool.
3. Clean around the fuel tank cap and remove it.
4. Add unleaded gasoline to the fuel tank, until the level is just below the bottom of the filler neck.

Important: This space in the tank allows gasoline to expand. Do not fill the fuel tank completely full.

5. Install the fuel tank cap securely.
6. Wipe up any gasoline that may have spilled.

Checking the Engine Oil Level

1. Park the traction unit on a level surface, lower the loader arms, and stop the engine.
2. Remove the key and allow the engine to cool.
3. Open the hood.
4. Clean around the oil dipstick (Figure 9).

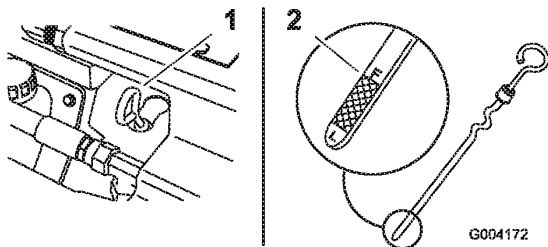


Figure 9

1. Oil dipstick
2. Metal end

5. Pull out the dipstick and wipe the metal end clean (Figure 9).
6. Slide the dipstick fully into the dipstick tube (Figure 9).
7. Pull the dipstick out and look at the metal end.
8. If the oil level is low, clean around the oil filler cap and remove the cap (Figure 10).

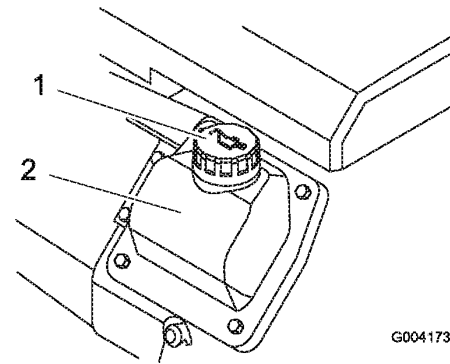


Figure 10

1. Filler cap
2. Valve cover

9. Slowly pour only enough oil into the valve cover to raise the level to the F (full) mark.

Important: Do not overfill the crankcase with oil because the engine may be damaged.

10. Replace the filler cap and dipstick.
11. Close the hood.

Checking the Hydraulic Fluid Level

Check the hydraulic fluid level before the engine is first started and after every 25 operating hours.

Hydraulic Tank Capacity: 12 US gallons (45.4 l)

Use 10W-30 or 15W-40 detergent, diesel engine oil (API service CH-4 or higher).

1. Remove the attachment, if one is installed; refer to Removing an Attachment.
2. Park the traction unit on a level surface, lower the loader arms, and fully retract the tilt cylinder.
3. Stop the engine, remove the key, and allow the engine to cool.
4. Open the hood.
5. Clean the area around the filler neck of the hydraulic tank (Figure 11).
6. Remove the cap from the filler neck and check the fluid level on the dipstick (Figure 11).

The fluid level should be between the marks on the dipstick.

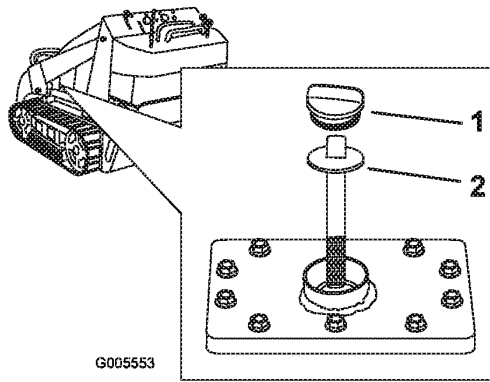


Figure 11

1. Filler neck cap
2. Dipstick

7. If the level is low, add enough fluid to raise it to the proper level.
8. Install the cap on the filler neck.
9. Close the hood.

Starting and Stopping the Engine

Starting the Engine

1. Ensure that the auxiliary hydraulics lever is in neutral.
2. Pull out the choke lever if you are starting a cold engine.
3. Move the throttle lever midway between slow (turtle) and fast (rabbit) positions.

Note: A warm or hot engine may not require choking.

4. Turn the ignition key to the start position. When the engine starts, release the key.

Important: Do not engage the starter for more than 10 seconds at a time. If the engine fails to start, allow a 30 second cool-down period between attempts. Failure to follow these instructions can burn out the starter motor.

5. After the engine starts, gradually push the choke down. If the engine stalls or hesitates, pull the choke out again until the engine warms up.
6. Move the throttle lever to desired setting.

Important: If the engine is run at high speeds when the hydraulic system is cold (i.e., when the ambient air temperature is near freezing or

lower), hydraulic system damage could occur. When starting the engine in cold conditions, allow the engine to run in the middle throttle position for 2 to 5 minutes before moving the throttle to fast (rabbit).

Note: If outdoor temperature is below freezing, store the traction unit in a garage to keep it warmer and aid in starting.

Stopping the Engine

1. Move the throttle lever to the slow (turtle) position.
2. Lower the loader arms to the ground.
3. Turn the ignition key off.

Note: If the engine has been working hard or is hot, let it idle for a minute before turning the ignition key off. This helps cool the engine before it is stopped. In an emergency, the engine may be stopped immediately.

Stopping the Traction Unit

To stop the traction unit, release the traction control, move the throttle lever to slow (turtle), lower loader arms to the ground, and stop the engine. Set the parking brake and remove the key.



A child or untrained bystander could attempt to operate the traction unit and be injured.

Remove the key from the switch when leaving the traction unit, even if just for a few seconds.

Moving a Non-functioning Traction Unit

Important: Do not tow or pull the traction unit without first opening the tow valves, or the hydraulic system will be damaged.

1. Stop the engine.
2. Open the rear access cover.
3. Using a wrench, turn the tow valves on the hydraulic pumps twice counter-clockwise (Figure 12).

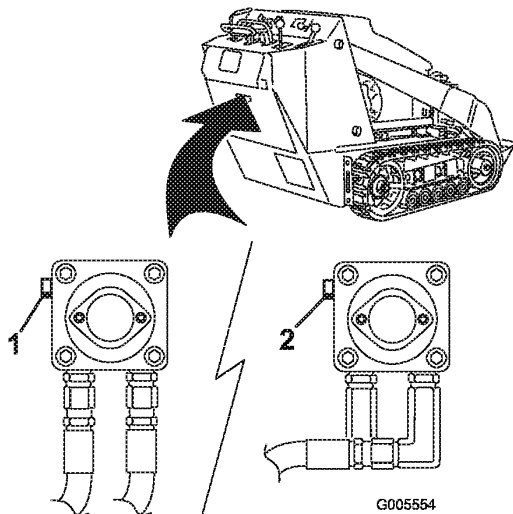


Figure 12

1. Left tow valve (right track) 2. Right tow valve (left track)

4. Tow the traction unit as required.
5. When the traction unit has been repaired, close the tow valves before operating it.

Using the Cylinder Lock



The loader arms may lower when in the raised position crushing anyone under them.

Install the cylinder lock before performing maintenance that requires raised loader arms.

Installing the Cylinder Lock

1. Remove the attachment.
2. Raise the loader arms to the fully raised position.
3. Stop the engine.
4. Remove the hairpin cotter and clevis pin securing the cylinder lock to the loader arm (Figure 13).

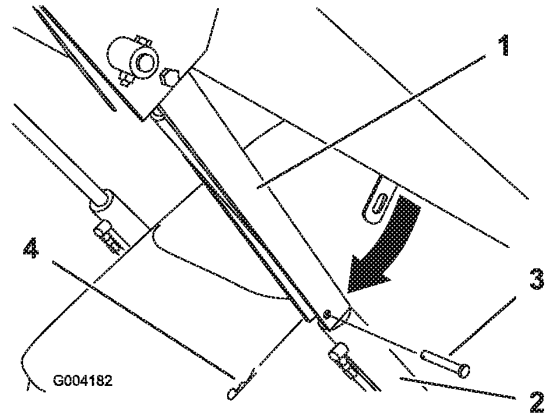


Figure 13

- | | |
|------------------|-------------------|
| 1. Cylinder lock | 3. Clevis pin |
| 2. Lift cylinder | 4. Hairpin cotter |
5. Lower the cylinder lock over the cylinder rod and secure it with the clevis pin and hairpin cotter (Figure 13).
 6. **Slowly** lower the loader arms until cylinder lock contacts the cylinder body and rod end.

Removing/Storing the Cylinder Lock

Important: Ensure that the cylinder lock is removed from the rod and fully secured in the storage position before operating the traction unit.

1. Start the engine.
2. Raise the loader arms to the fully raised position.
3. Stop the engine.
4. Remove the clevis pin and cotter pin securing the cylinder lock.
5. Rotate the cylinder lock up to the loader arm and secure it with the clevis pin and hairpin cotter.
6. Lower the loader arms.

Using Attachments

Important: If you are using an attachment with a serial number of 200999999 or earlier, the manual for the attachment may contain information specific to the use of the attachment with other Dingo models, such as settings for the flow divider control and speed selector lever and the use of a counterweight on the traction unit. These systems are built into the Dingo TX, and you should ignore any references to them.

Installing an Attachment

Important: Use only Toro-approved attachments. Attachments can change the stability and the operating characteristics of the traction unit. The warranty of the traction unit may be voided if used with unapproved attachments.

Important: Before installing the attachment, ensure that the mount plates are free of any dirt or debris and that the pins rotate freely. If the pins do not rotate freely, grease them.

1. Position the attachment on a level surface with enough space behind it to accommodate the traction unit.
2. Start the engine.
3. Tilt the attachment mount plate forward.
4. Position mount plate into the upper lip of the attachment receiver plate (Figure 14).

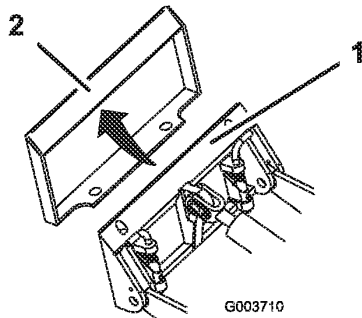


Figure 14

1. Mount plate
2. Receiver plate

5. Raise the loader arms while tilting back the mount plate at the same time.

Important: The attachment should be raised enough to clear the ground, and the mount plate should be tilted all the way back.

6. Stop the engine.
7. Engage the quick attach pins, ensuring that they are fully seated in the mount plate (Figure 15).

Important: If the pins do not rotate to the engaged position, the mount plate is not fully aligned with the holes in the attachment receiver plate. Check the receiver plate and clean it if necessary.

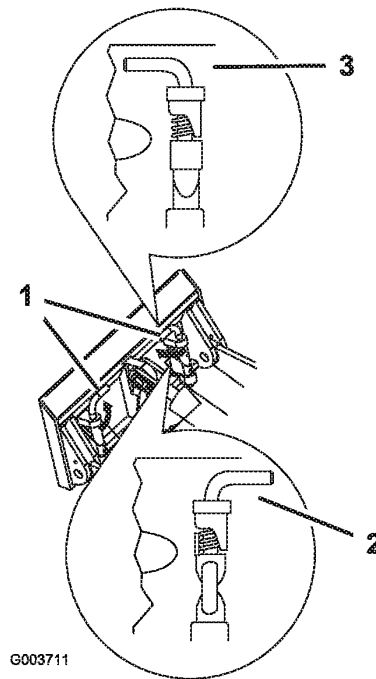


Figure 15

1. Quick attach pins (shown in engaged position)
2. Disengaged position
3. Engaged position



If you do not fully seat the quick attach pins through the attachment mount plate, the attachment could fall off of the traction unit, crushing you or bystanders.

Ensure that your quick attach pins are fully seated in the attachment mount plate.

Connecting the Hydraulic Hoses

If the attachment requires hydraulics for operation, connect the hydraulic hoses as follows:

1. Stop the engine.
2. Move the auxiliary hydraulics lever forward, backward, and back to neutral to relieve pressure at the hydraulic couplers.
3. Move the auxiliary hydraulics lever into the reverse position.
4. Remove the protective covers from the hydraulic couplers on the traction unit.
5. Ensure that all foreign matter is cleaned from the hydraulic connectors.

6. Push the attachment male connector into the female connector on the traction unit.

Note: When you connect the attachment male connector first, you will relieve any pressure built up in the attachment.



Hydraulic fluid escaping under pressure can penetrate skin and cause injury. Fluid injected into the skin must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.

- Keep your body and hands away from pin hole leaks or nozzles that eject high pressure hydraulic fluid.
- Use cardboard or paper to find hydraulic leaks, never use your hands.



Hydraulic couplers, hydraulic lines/valves, and hydraulic fluid may be hot. If you contact hot components you may be burned.

- Wear gloves when operating the hydraulic couplers.
- Allow the traction unit to cool before touching hydraulic components.
- Do not touch hydraulic fluid spills.

7. Push the attachment female connector into the male connector on the traction unit.
8. Confirm that the connection is secure by pulling on the hoses.
9. Move the auxiliary hydraulics lever to neutral.

Removing an Attachment

1. Lower the attachment to the ground.
2. Stop the engine.
3. Disengage the quick attach pins by turning them to the outside.
4. If the attachment uses hydraulics, move the auxiliary hydraulics lever forward, backward, and back to neutral to relieve pressure at the hydraulic couplers.
5. If the attachment uses hydraulics, slide the collar back on the hydraulic couplers and disconnect them.

Important: Connect the attachment hoses together to prevent hydraulic system contamination during storage.

6. Install the protective covers onto the hydraulic couplers on the traction unit.
7. Start the engine, tilt the mount plate forward, and back the traction unit away from the attachment.

Securing the Traction Unit for Transport

When transporting the traction unit on a trailer, always use the following procedure:

Important: Do not operate or drive the traction unit on roadways.

1. Lower the loader arms.
2. Stop the engine.
3. Secure the traction unit to the trailer with chains or straps using the tie-down/lift loops (Figure 3) to secure the rear of the traction unit and the loader arms/mount plate to secure the front of the traction unit.

Lifting the Traction Unit

You can lift the traction unit using the tie-down/lift loops as lift points (Figure 3).

Maintenance

Note: Determine the left and right sides of the machine from the normal operating position.

Recommended Maintenance Schedule(s)

Maintenance Service Interval	Maintenance Procedure
After the first 8 hours	• Replace the hydraulic filter.
After the first 50 hours	• Change the engine oil and filter. • Check and adjust the track tension.
Before each use or daily	• Check the engine oil level. • Grease the traction unit. • Check the condition of and clean the tracks. • Remove debris from the traction unit. • Check for loose fasteners.
Every 25 hours	• Check the hydraulic fluid level. • Clean the foam air filter element and check the paper element for damage. • Inspect the drive belt for wear or damage.
Every 100 hours	• Replace the paper air filter element. • Change the engine oil (more frequently when operating conditions are extremely dusty or sandy). • Check the battery electrolyte level (replacement battery only). • Check the battery cable connections. • Check and adjust the track tension. • Check the hydraulic lines for leaks, loose fittings, kinked lines, loose mounting supports, wear, weather, and chemical deterioration. • Check for dirt build-up in the chassis.
Every 200 hours	• Change the oil filter. • Check the spark plugs. • Change the fuel filter. • Replace the drive belt. • Replace the hydraulic filter.
Every 250 hours	• Check and grease the road wheels.
Every 400 hours	• Change the hydraulic fluid.
Every 1,500 hours	• Replace all moving hydraulic hoses.
Yearly or before storage	• Check and adjust the track tension. • Touch up chipped paint

Important: Refer to your *Engine Operator's Manual* for additional maintenance procedures.

Note: After 50 hours and then every 100 hours thereafter (that is at 150, 250, 350, etc.) the hour meter displays CHG OIL to remind you to change the engine oil. After every 100 hours, the screen displays SVC to remind you to perform the other maintenance procedures based on a 100, 200, or 400 hour schedule. These reminders come on starting three hours prior to the service interval time and flash at regular intervals for six hours.



If you leave the key in the ignition switch, someone could accidentally start the engine and seriously injure you or other bystanders.

Remove the key from the ignition and disconnect the wire from the spark plug before you do any maintenance. Set the wire aside so that it does not accidentally contact the spark plug.

Premaintenance Procedures

Before opening any of the covers, stop the engine and remove the key. Allow the engine to cool before opening any covers

Opening the Hood

1. Turn the hood latch clockwise (Figure 16).

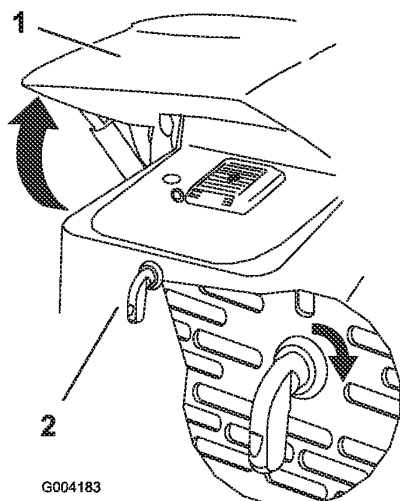


Figure 16

1. Hood
2. Hood latch

2. Swing the hood up (Figure 16).
3. Swing the prop rod up and secure it in the bracket on the hood (Figure 17).

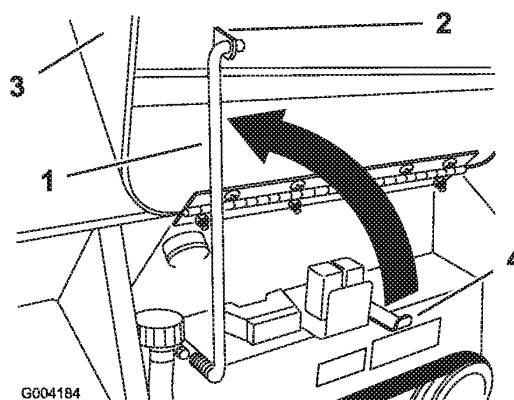


Figure 17

1. Prop rod
2. Bracket
3. Hood
4. Prop rod holder

Closing the Hood

1. Pull the prop rod out of the bracket on the hood and lower it into its holder.
2. Lower the hood and secure it by pushing down on the front of the hood until it locks in place.

Opening the Rear Access Cover

1. Unscrew the 2 hand knobs securing the rear access cover to the machine (Figure 18).

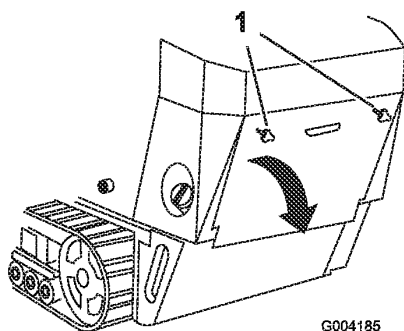


Figure 18

1. Hand knob

2. Tilt the rear access cover down and remove to access the internal components (Figure 18).

Closing the Rear Access Cover

1. Move the rear access cover in place over the back of the traction unit making sure the tabs line up in the slots.
2. Push the access cover forward, lining up the hand knob screws with the threaded holes in the machine.
3. Screw the hand knobs tight to secure the rear access cover in place.

Removing the Side Screens

1. Open the hood.
2. Slide the side screens (Figure 19) up and out of the slots in the front screen and frame.

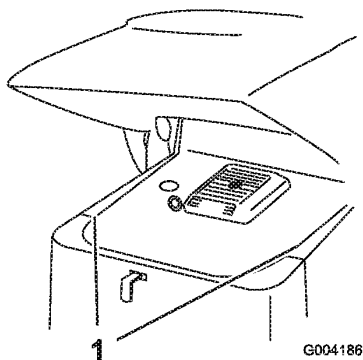


Figure 19

1. Side screen

Installing the Side Screens

Slide the side screens into place in the slots in the front screen and frame.

Removing the Front Screen



If the engine has been running the heat shield will be very hot and could burn you.

Allow the traction unit cool completely before touching the heat shield.

1. Open the hood and remove both side screens.
2. Loosen the bolts securing the front weight (Figure 20).

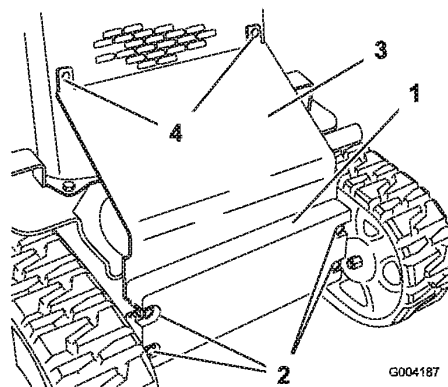


Figure 20

- | | |
|-----------------|-------------------|
| 1. Front weight | 3. Heat shield |
| 2. Bolts | 4. Carriage bolts |

3. Remove the carriage bolts and nuts securing the heat shield (Figure 20).
4. Lift the heat shield up and off of the traction unit.
5. Remove the 4 bolts securing the front screen to the traction unit frame (Figure 21).

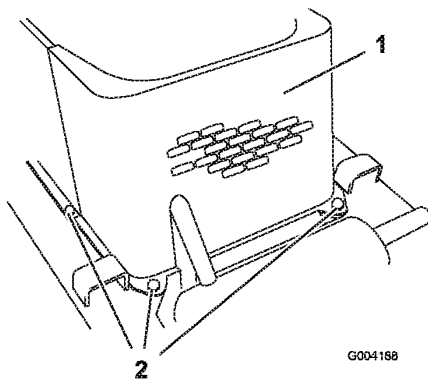


Figure 21

- | | |
|-----------------|-------------------------------------|
| 1. Front screen | 2. Bolts (left side bolt not shown) |
|-----------------|-------------------------------------|

6. Remove the shoulder bolts and nuts securing the oil cooler to the top of the front screen (Figure 22).

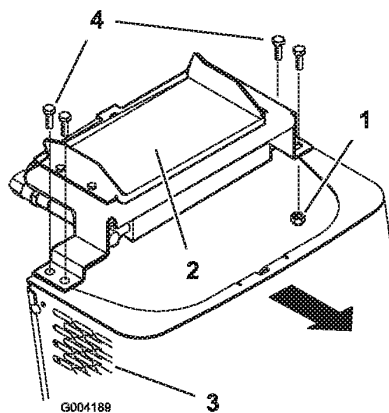


Figure 22

- | | |
|---------------|-------------------|
| 1. Nut | 3. Front screen |
| 2. Oil cooler | 4. Shoulder bolts |

7. Remove the front screen.
8. When finished, install the front screen with the 4 bolts removed previously.
9. Install the oil cooler to the front screen with the 4 shoulder bolts and nuts removed previously.
10. Slide the heat shield between the frame and the front weight and secure it to the front screen grill using the carriage bolts and nuts removed previously (Figure 20).
11. Tighten the bolts securing the front weight (Figure 20).
12. Install the side screens and close the hood.

Lubrication

Greasing the Traction Unit

Grease all pivot joints every 8 operating hours and immediately after every washing.

Grease Type: General-purpose grease.

1. Lower the loader arms and stop the engine. Remove the key.
2. Clean the grease fittings with a rag.
3. Connect a grease gun to each fitting (Figure 23 and Figure 24).

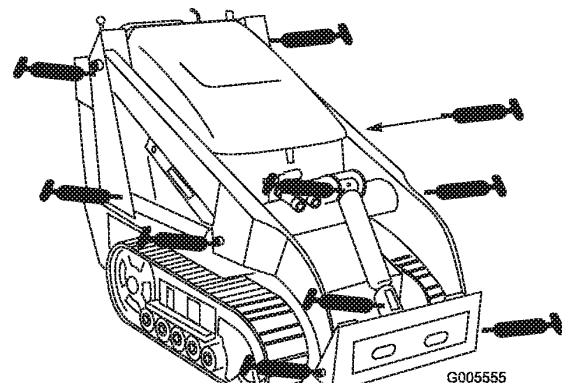


Figure 23

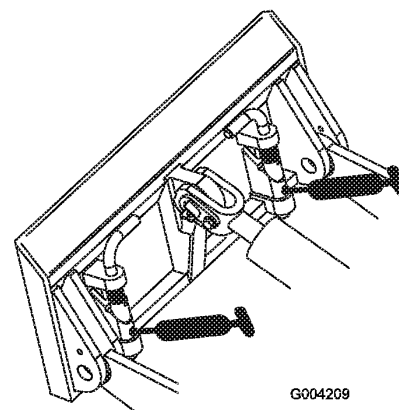


Figure 24

4. Pump grease into the fittings until grease begins to ooze out of the bearings (approximately 3 pumps).
5. Wipe up any excess grease.

Engine Maintenance

Servicing the Air Cleaner

Foam Pre-filter: Clean every 25 operating hours.

Paper Filter: Check for damage every 25 operating hours. Replace after every 100 operating hours.

Note: Service the air cleaner more frequently if operating conditions are extremely dusty or sandy.

Removing the Filters

1. Lower the loader arms, stop the engine, and remove the key.
2. Open the hood.
3. Clean around the air cleaner to prevent dirt from getting into the engine and causing damage.
4. Unscrew the knob and remove the air cleaner cover (Figure 25).

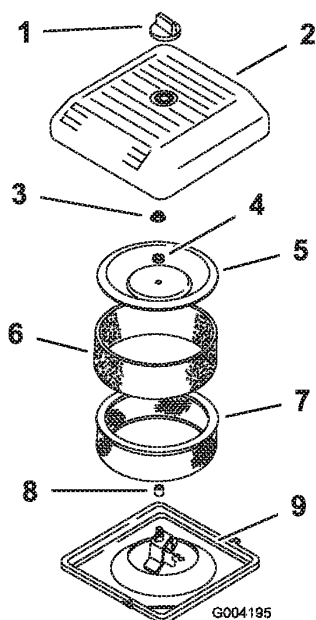


Figure 25

- | | |
|----------------------|---------------------|
| 1. Knob | 6. Foam pre-filter |
| 2. Air cleaner cover | 7. Paper filter |
| 3. Cover nut | 8. Rubber seal |
| 4. Spacer | 9. Air cleaner base |
| 5. Cover | |

5. Carefully slide the foam pre-filter off of the paper element (Figure 25).
6. Unscrew the cover nut and remove the cover, spacer and paper filter (Figure 25).

Cleaning the Foam Pre-filter

Important: Replace the foam element if it is torn or worn.

1. Wash the foam pre-filter in liquid soap and warm water. When clean, rinse it thoroughly.
2. Dry the pre-filter by squeezing it in a clean cloth (do not wring).
3. Put one or two ounces of oil on the pre-filter (Figure 26).

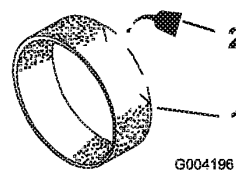


Figure 26

- | | |
|-----------------|--------|
| 1. Foam element | 2. Oil |
|-----------------|--------|

4. Squeeze the pre-filter to distribute the oil.
5. Inspect the paper filter for tears, an oily film, and damage to the rubber seal (Figure 27).

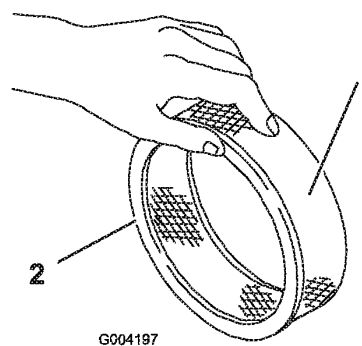


Figure 27

- | | |
|------------------|----------------|
| 1. Paper element | 2. Rubber seal |
|------------------|----------------|

Important: Never clean the paper element. Replace the paper element if it is dirty or damaged (i.e., after approximately 100 operating hours).

Installing the Filters

Important: To prevent engine damage, always operate the engine with the complete foam and paper air cleaner assembly installed.

1. Carefully slide the foam pre-filter onto the paper filter (Figure 27).
2. Place the air cleaner assembly onto the air cleaner base (Figure 25).

3. Install the cover, spacer and secure it with the cover nut (Figure 25). Torque the nut to 95 inch-lb (11 N-m).
4. Install the air cleaner cover and secure with the knob (Figure 25).
5. Close the hood.

Servicing the Engine Oil

Change oil and filter after the first 50 operating hours and then change the oil every 100 operating hours thereafter.

Note: Change oil more frequently when operating conditions are extremely dusty or sandy.

Oil Type: Detergent oil (API service SG, SH, SJ, or higher)

Crankcase Capacity: w/filter, 2.1 qt. (2 l)

Viscosity: See table below

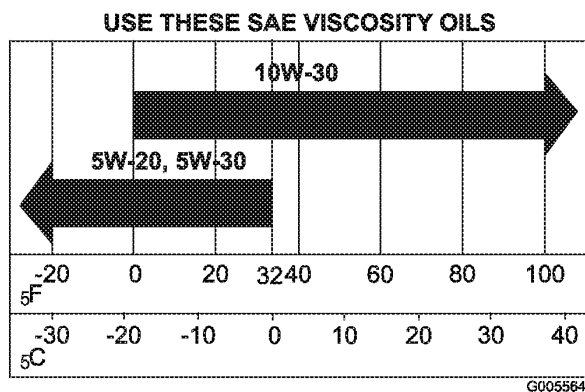


Figure 28

Changing the Oil

1. Start the engine and let it run for five minutes. This warms the oil so it drains better.
2. Park the traction unit so that the drain side is slightly lower than the opposite side to ensure that the oil drains completely.
3. Lower the loader arms, set the parking brake, stop the engine, and remove the key.



Components will be hot if the traction unit has been running. If you touch hot components you may be burned.

Allow the traction unit to cool before performing maintenance or touching components under the hood.

4. Remove the drain plug (Figure 29).

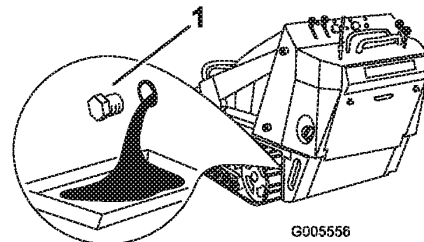


Figure 29

1. Oil drain valve

5. When the oil has drained completely, replace the plug.

Note: Dispose of the used oil at a certified recycling center.

6. Remove the oil fill cap and slowly pour approximately 80% of the specified amount of oil in through the valve cover.
7. Check the oil level; refer to Checking the Engine Oil Level.
8. Slowly add additional oil to bring the level to the F (full) mark on the dipstick.
9. Replace the fill cap.

Changing the Oil Filter

Replace the oil filter every 200 hours or every other oil change.

Note: Change the oil filter more frequently when operating conditions are extremely hot, dusty, or sandy.

1. Drain the oil from the engine; refer to Changing the Oil.
2. Place a shallow pan or rag under the filter to catch oil.
3. Remove the old filter (Figure 30) and wipe the surface of the filter adapter gasket.

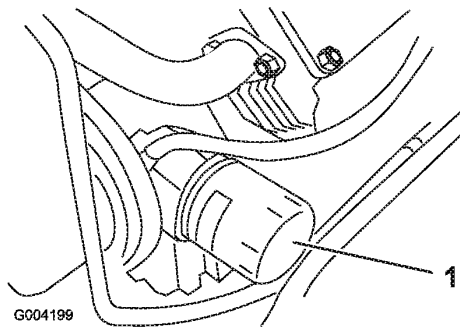


Figure 30

1. Oil filter

4. Pour new oil of the proper type through the center hole of the filter. Stop pouring when the oil reaches the bottom of the threads.
5. Allow a minute or two for the oil to be absorbed by filter material, then pour off the excess oil.
6. Apply a thin coat of new oil to the rubber gasket on the replacement filter.
7. Install the replacement oil filter to the filter adapter. Turn the oil filter clockwise until the rubber gasket contacts the filter adapter, then tighten the filter an additional 1/2 turn.
8. Fill the crankcase with the proper type of new oil; refer to Changing the Oil.

Servicing the Spark Plugs

Check the spark plugs after every 200 operating hours. Ensure that the air gap between the center and side electrodes is correct before installing each spark plug. Use a spark plug wrench for removing and installing the spark plugs and a gapping tool/feeler gauge to check and adjust the air gap. Install new spark plugs if necessary.

Type: Champion Platinum 3071, RC12YC, or equivalent.
Air Gap: 0.030 inch (0.76 mm)

Removing the Spark Plugs

1. Lower the loader arms, stop the engine, and remove the key.
2. Open the hood.
3. Pull the wires off of the spark plugs (Figure 31).

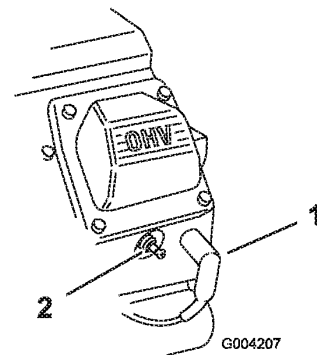


Figure 31

1. Spark plug wire
2. Spark plug

4. Clean around the spark plugs.
5. Remove both spark plugs and metal washers.

Checking the Spark Plugs

1. Look at the center of both spark plugs (Figure 32). If you see light brown or gray on the insulator, the engine is operating properly. A black coating on the insulator usually means the air cleaner is dirty.

Important: Never clean the spark plugs. Always replace the spark plugs when they have a black coating, worn electrodes, an oily film, or cracks.

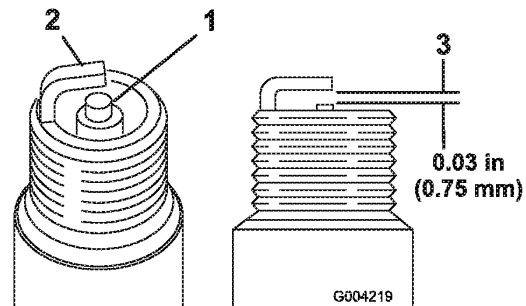


Figure 32

1. Center electrode insulator
2. Side electrode
3. Air gap (not to scale)

2. Check the gap between the center and side electrodes (Figure 32).
3. Bend the side electrode (Figure 32) if the gap is not correct.

Installing the Spark Plugs

1. Thread the spark plugs into the spark plug holes.
2. Tighten the spark plugs to 20 ft-lb (27 N-m).
3. Push the wires onto the spark plugs (Figure 31).
4. Close the hood.

Fuel System Maintenance

Changing the Fuel Filter

Change the fuel filter after every 200 operating hours or yearly, whichever occurs first.

1. Lower the loader arms, stop the engine, and remove the key.
2. Open the hood and remove the left side screen.
3. Loosen the tank cap to relieve pressure.
4. Clamp the fuel lines on both sides of the fuel filter (Figure 33).

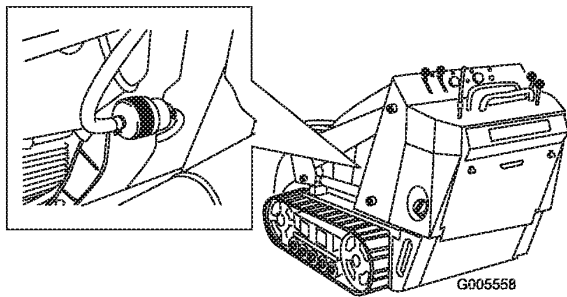


Figure 33

1. Filter

2. Hose clamp

5. Squeeze the ends of the hose clamps together and slide them away from the filter (Figure 33).
6. Place a drain pan under the fuel lines to catch any leaks, then remove the filter from the fuel lines.
7. Slide the fuel lines on the new fuel filter fittings, ensuring that the arrow on the filter points away from the fuel line coming from the fuel tank and toward the line going to the fuel pump.

Important: Never install a dirty filter.

8. Move the hose clamps close to the filter.
9. Remove the clamp blocking fuel flow and open the fuel valves.
10. Secure the tank cap.
11. Replace the side screen and close the hood.

Draining the Fuel Tank



In certain conditions, gasoline is extremely flammable and highly explosive. A fire or explosion from gasoline can burn you and others and can damage property.

- Drain gasoline from the fuel tank when the engine is cold. Do this outdoors in an open area. Wipe up any gasoline that spills.
- Never smoke when draining gasoline, and stay away from an open flame or where a spark may ignite the gasoline fumes.

1. Lower the loader arms, stop the engine, and remove the key.
2. Syphon the gasoline from the tank using a pump type syphon.

Note: Now is the best time to install a new fuel filter because the fuel tank is empty.

Electrical System Maintenance

Servicing the Battery

Warning

CALIFORNIA Proposition 65 Warning

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

Important: The following procedures apply when servicing a (dry) battery that has replaced the original battery. The original (wet) battery does not require service.

Check the electrolyte level in the battery every 100 hours. Always keep the battery clean and fully charged. Use a paper towel to clean the battery case. If the battery terminals are corroded, clean them with a solution of four parts water and one part baking soda. Apply a light coating of grease to the battery terminals to reduce corrosion.

Voltage: 12 v, 450 Cold Cranking Amps

Checking the Electrolyte Level

1. Stop the engine and remove the key.
2. Remove the 4 bolts securing the battery cover and remove it from over the battery.
3. Look at the side of the battery. The electrolyte must be up to the Upper line (Figure 34). Do not allow the electrolyte to fall below the Lower line (Figure 34).

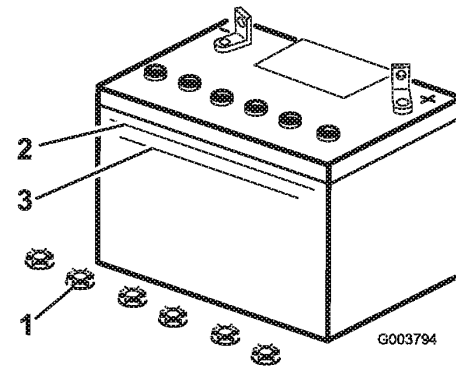


Figure 34

1. Filler caps
2. Upper line
3. Lower line

4. If the electrolyte is low, add the required amount of distilled water; refer to Adding Water to the Battery.

Adding Water to the Battery

The best time to add distilled water to the battery is just before you operate the traction unit. This lets the water mix thoroughly with the electrolyte solution.



Battery electrolyte contains sulfuric acid which is a deadly poison and causes severe burns.

- Do not drink electrolyte and avoid contact with skin, eyes or clothing. Wear safety glasses to shield your eyes and rubber gloves to protect your hands.
- Fill the battery where clean water is always available for flushing the skin.

1. Remove the battery from the traction unit.

Important: Never fill the battery with distilled water while the battery is installed in the traction unit. Electrolyte could be spilled on other parts and cause corrosion.

2. Clean the top of the battery with a paper towel.
3. Remove the filler caps from the battery (Figure 34).
4. Slowly pour distilled water into each battery cell until the electrolyte level is up to the Upper line (Figure 34) on the battery case.

Important: Do not overfill the battery because electrolyte (sulfuric acid) can cause severe corrosion and damage to the chassis.

5. Wait five to ten minutes after filling the battery cells. Add distilled water, if necessary, until the electrolyte

level is up to the Upper line (Figure 34) on the battery case.

6. Install the battery filler caps.

Charging the Battery



Charging the battery produces gasses that can explode.

Never smoke near the battery and keep sparks and flames away from battery.

Important: Always keep the battery fully charged (1.265 specific gravity). This is especially important to prevent battery damage when the temperature is below 32°F (0°C).

1. Check the electrolyte level; refer to Checking Electrolyte Level.
2. Make sure the filler caps are installed in the battery.
3. Charge the battery for 10 to 15 minutes at 25 to 30 amps or 30 minutes at 4 to 6 amps (Figure 35). Do not overcharge the battery.

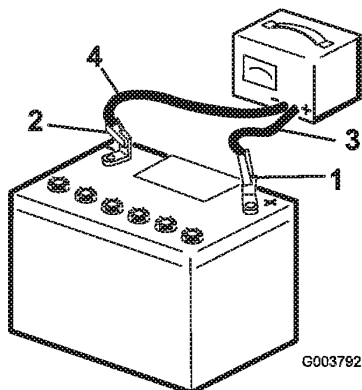


Figure 35

- | | |
|--------------------------|---------------------------|
| 1. Positive battery post | 3. Red (+) charger lead |
| 2. Negative battery post | 4. Black (-) charger lead |

4. When the battery is fully charged, unplug the charger from the electrical outlet, then disconnect the charger leads from the battery posts (Figure 35).
5. Replace the battery cover.

Drive System Maintenance

Servicing the Tracks

Cleaning the Tracks

Check the tracks for excessive wear and clean them periodically. If the tracks are worn, replace them.

1. With a bucket on the loader arms, lower the bucket to the ground so that the front of the traction unit lifts off of the ground a few inches.
2. Stop the engine, and remove the key.
3. Using a water hose or pressure washer, remove dirt from each track system.

Important: Ensure that you use high-pressure water to wash only the track area. Do not use a high-pressure washer to clean the rest of the traction unit. High-pressure washing can damage the electrical system and hydraulic valves or deplete grease.

Important: Ensure that you fully clean the road wheels, the tension wheel, and the drive sprocket (Figure 36). The road wheels should rotate freely when clean.

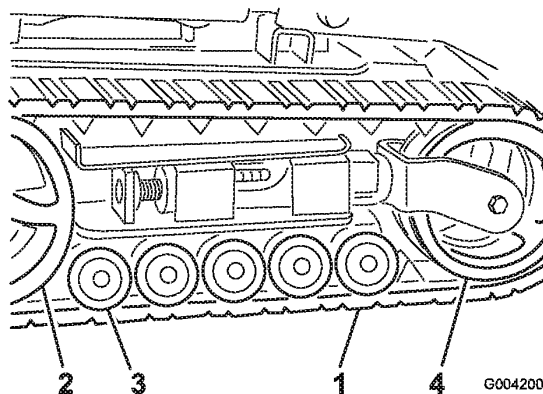


Figure 36

- | | |
|------------------|-------------------|
| 1. Track | 3. Road wheels |
| 2. Tension wheel | 4. Drive sprocket |

Adjusting the Track Tension

Check and adjust the track tension after the first 50 operating hours and every 100 operating hours thereafter. There should be 2-3/4 inches (7 cm) between the tension nut and the back of the tension tube (Figure 37). If not, adjust the track tension using the following procedure:

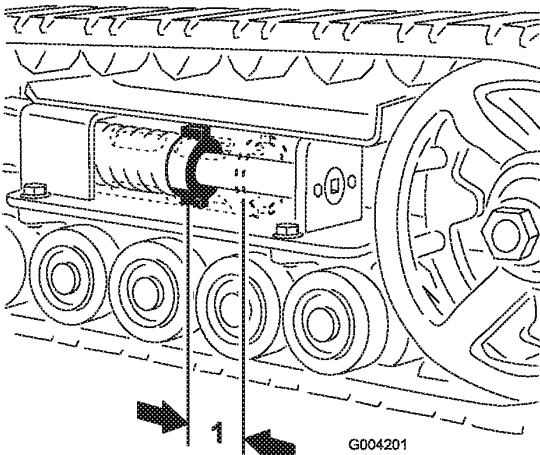


Figure 37

1. 2-3/4 inches (7 cm)

1. Lower the loader arms, stop the engine, and remove the key.
2. Lift/support the side of the unit to be worked on so that the track is off of the ground.
3. Remove the locking bolt and nut (Figure 38).

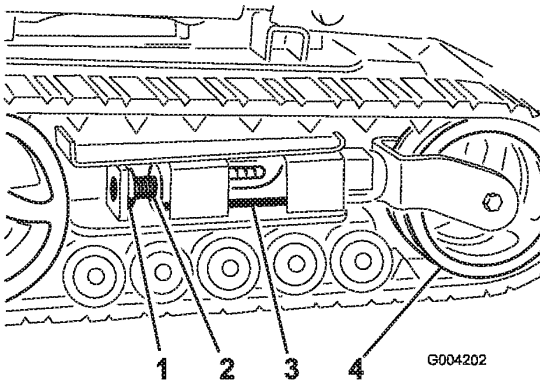


Figure 38

- | | |
|---------------------|------------------|
| 1. Locking bolt | 3. Tension tube |
| 2. Tensioning screw | 4. Tension wheel |

4. Using a 1/2 inch drive socket (Figure 39), turn the tensioning screw counter-clockwise until the distance between the tension nut and the back of the tension tube (Figure 37) is 2-3/4 inches (7 cm).
5. Align the closest notch in the tension screw to the locking bolt hole and secure the screw with the locking bolt and nut (Figure 38).
6. Lower the traction unit to the ground.

Replacing the Tracks (TX 420, Model 22306)

When the tracks are badly worn, replace them.

1. Lower the loader arms, stop the engine, and remove the key.
2. Lift/support the side of the unit to be worked on so that the track is 3 to 4 inches (7.6 to 10 cm) off of the ground.
3. Remove the locking bolt and nut (Figure 38).
4. Using a 1/2 inch drive socket, release the drive tension by turning the tensioning screw clockwise (Figure 38 and Figure 39).

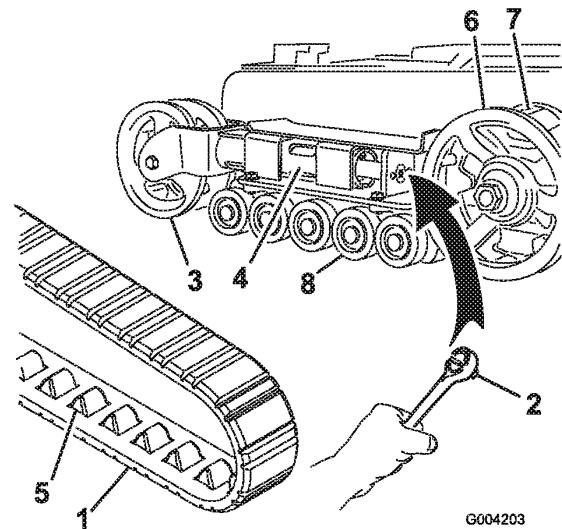


Figure 39

- | | |
|--------------------|--------------------|
| 1. Track | 5. Track lug |
| 2. 1/2 inch socket | 6. Drive sprocket |
| 3. Tension wheel | 7. Sprocket spacer |
| 4. Fork tube | 8. Road wheels |

5. Push the tension wheel toward the rear of the unit to move the fork tube against the frame (Figure 39). (If it does not touch the frame, continue turning the tensioning screw until it does.)
6. Begin removing the track at the top of the tension wheel, peeling it off of the wheel while rotating the track forwards.
7. When the track is off of the tension wheel, remove it from the drive sprocket and road wheels (Figure 39).
8. Beginning at the drive sprocket, coil the new track around the sprocket, ensuring that the lugs on the track fit between the spacers on the sprocket (Figure 39).
9. Push the track under and between the road wheels (Figure 39).
10. Starting at the bottom of the tension wheel, install the track around the wheel by rotating the track rearward while pushing the lugs into the wheel.

11. Turn the tensioning screw counter-clockwise until the distance between the tension nut and the back of the fork tube (Figure 37) is 2-3/4 inches (7 cm).
12. Align the closest notch in the tension screw to the locking bolt hole and secure the screw with the locking bolt and nut.
13. Lower the traction unit to the ground.
14. Repeat steps 2 through 13 to replace the other track.

Replacing the Tracks (TX 425, Model 22307)

When the tracks are badly worn, replace them.

1. Lower the loader arms, stop the engine, and remove the key.
2. Lift/support the side of the unit to be worked on so that the track is 3 to 4 inches (7.6 to 10 cm) off of the ground.
3. Remove the locking bolt and nut (Figure 38).
4. Using a 1/2 inch drive socket, release the drive tension by turning the tensioning screw clockwise (Figure 38 and Figure 40).

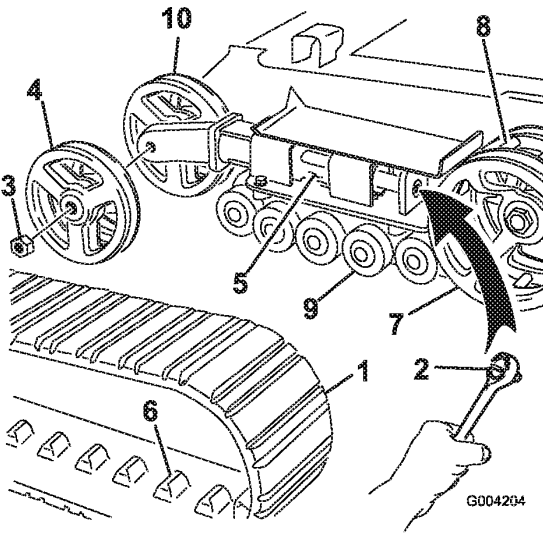


Figure 40

- | | |
|------------------------|-------------------------|
| 1. Track | 6. Track lug |
| 2. 1/2 inch socket | 7. Drive sprocket |
| 3. Tension wheel nut | 8. Sprocket spacer |
| 4. Outer tension wheel | 9. Road wheels |
| 5. Fork tube | 10. Inner tension wheel |

5. Push the tension wheel toward the rear of the unit to move the tension tube against the frame (Figure 40). (If it does not touch the frame, continue turning the tensioning screw until it does.)

6. Remove the nut securing the outer tension wheel and remove the wheel (Figure 40).
7. Remove the track (Figure 40).
8. Remove the nut securing the inner tension wheel and remove the wheel (Figure 40).
9. Pull the 4 large washers out of the 2 wheels, 1 on each side of each wheel.
10. Clean the old grease and dirt out of the area between where the washers were installed and the bearings inside the wheels, then fill this area on each side of each wheel with grease.
11. Install the large washers on the wheels over the grease.
12. Install the inner tension wheel and secure it with the nut removed previously (Figure 40).
13. Torque the nut to 300 ft-lb (407 N-m).
14. Install the new track, ensuring that the lugs in the track fit between the spacers in the middle of the drive sprocket (Figure 40).
15. Install the outer tension wheel and secure it with the nut removed previously (Figure 40).
16. Torque the nut to 300 ft-lb (407 N-m).
17. Turn the tensioning screw counter-clockwise until the distance between the tension nut and the back of the tension tube (Figure 37) is 2-3/4 inches (7 cm).
18. Align the closest notch in the tension screw to the locking bolt hole and secure the screw with the locking bolt and nut.
19. Repeat steps 2 through 18 to replace the other track.
20. Lower the traction unit to the ground.

Maintaining the Road Wheels

Check and grease the road wheels every 250 operating hours or yearly.

1. Remove the tracks; refer to Replacing the Tracks.
2. Remove the 4 bolts securing each lower track guide which contains the road wheels, and remove them (Figure 41).

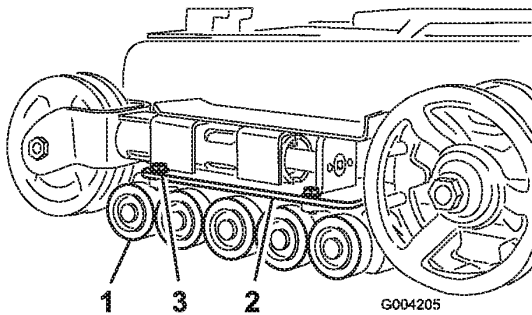


Figure 41

- | | |
|----------------------|---------------------------------------|
| 1. Road wheels | 3. Track guide bolts (only two shown) |
| 2. Lower track guide | |

-
3. Remove the snap ring and cap from a road wheel (Figure 42).

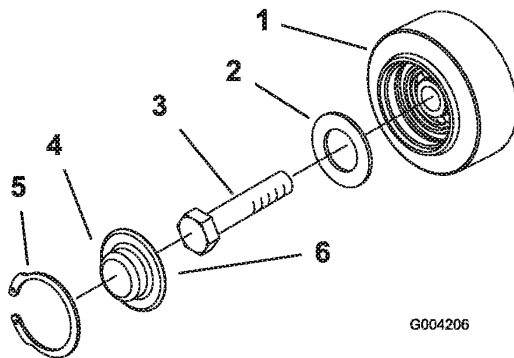


Figure 42

- | | |
|---------------|-----------------------------|
| 1. Road wheel | 4. Road wheel cap |
| 2. Gasket | 5. Snap ring |
| 3. Bolt | 6. Add grease under the cap |

-
4. Check the grease under the cap and around the gasket (Figure 42). If it is dirty, gritty, or depleted, clean out all of the grease, replace the gasket, and add new grease.
 5. Ensure that the road wheel turns smoothly on the bearing. If it is frozen, replace the road wheel as described in the *Road Wheel Kit Installation Instructions* or contact your Authorized Service Dealer for repair.
 6. Place the greased road wheel cap over the bolt head (Figure 42).
 7. Secure the road wheel cap with the snap ring (Figure 42).
 8. Repeat steps 3 through 7 for the other road wheels.
 9. Install each track guide to the traction unit frame using the fasteners you removed previously. Torque the bolts to 67 to 83 ft-lb (91 to 112 N-m).
 10. Install the tracks; refer to Replacing the Tracks.

Belt Maintenance

Inspecting/Replacing the Drive Belt

Inspect the drive belt, located behind the engine, every 25 operating hours. Replace the belt if you find any signs of wear, cracks, or damage or after 200 operating hours, whichever comes first.

To replace the drive belt, complete the following procedure:

Note: To complete this procedure, you will need a sturdy metal hook to disconnect the idler pulley spring, such as the Spring Removal Tool (Toro part number 92-5771) available for order from your Authorized Service Dealer.

1. Lower the loader arms, stop the engine, and remove the key.
2. Open the hood.
3. Connect the hook on the spring removal tool to the hook on the idler pulley spring, and disconnect the spring from the stud as illustrated in Figure 43.

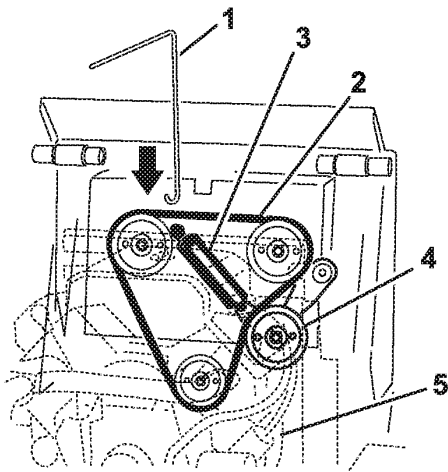


Figure 43

- | | |
|------------------------|---|
| 1. Spring removal tool | 4. Idler pulley |
| 2. Drive belt | 5. Engine (see-through for illustrative purposes) |
| 3. Idler pulley spring | |

- Remove the idler pulley spring from the idler pulley assembly (Figure 44).

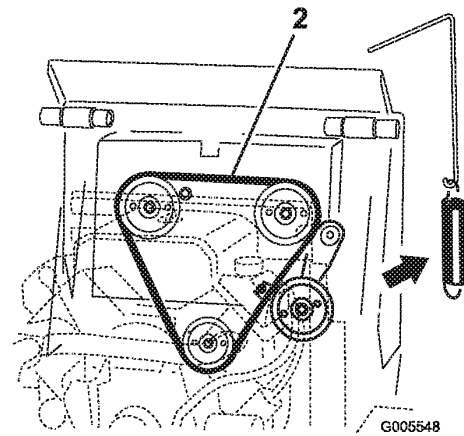


Figure 44

- | | |
|--------------------------|-----------------------|
| 1. Idler pulley assembly | 2. Drive belt routing |
|--------------------------|-----------------------|

- Remove the belt from the three pulleys (Figure 45).

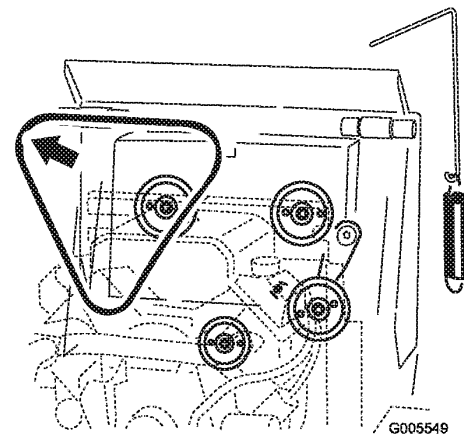


Figure 45

- Install a new drive belt around the three pulleys (Figure 44).
- Install the end of the idler pulley spring to the arm on the idler pulley assembly.
- Using the spring removal tool, pull the idler spring hook up and around the stud on the traction unit, pulling the idler pulley tight.
- Remove the spring removal tool from the spring and close the hood.

Controls System Maintenance

The factory adjusts the controls before shipping the traction unit. However, after many hours of use, you may need to adjust the traction control alignment, the neutral position of the traction control, and the tracking of the traction control in the full forward position.

Important: To adjust the controls properly, complete each procedure in the order listed.

Adjusting the Traction Control Alignment

If the traction control bar does not rest flush and square with the reference bar when in the full backward position, immediately complete the following procedure:

1. Park the traction unit on a flat surface and lower the loader arm.
2. Stop the engine and remove the key.
3. Pull straight back on the traction control so the front of the control contacts the reference bar (Figure 46).

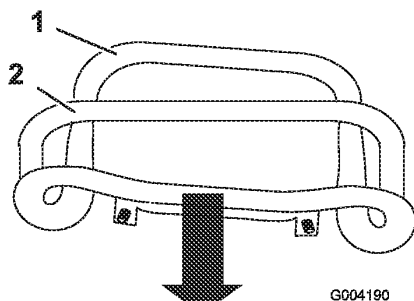


Figure 46

1. Front of the control, out of alignment
 2. Reference bar alignment
-
4. If the front of the traction control does not rest square and flush with the reference bar, loosen the flange nut and bolt in the stem of the traction control (Figure 47).

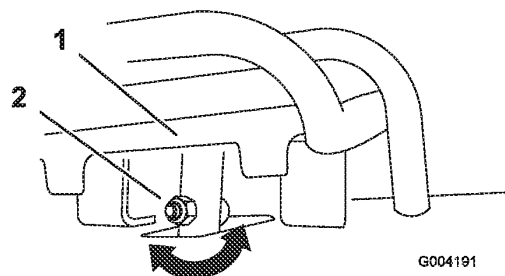


Figure 47

1. Traction control
 2. Stem , bolt and nut
-

5. Adjust the traction control so that it rests flush against the reference bar when it is pulled straight back (Figure 47 and Figure 48).

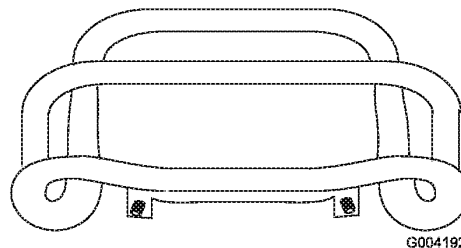


Figure 48

6. Tighten the flange nut and bolt in the traction control stem.
-

Adjusting the Traction Control Neutral Position

If the traction unit creeps forward or backward when the traction control is in neutral and the unit is warm, immediately complete the following procedure:

1. Lift/support the traction unit so that both tracks are off of the ground.
2. Open the rear access cover.
3. Loosen the jam nuts on the traction rods, under the control panel (Figure 49).

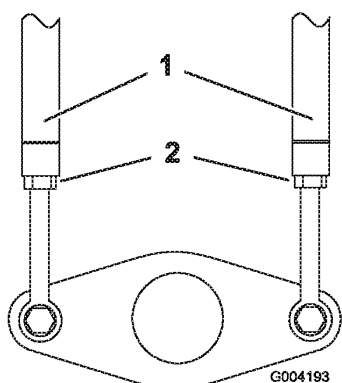


Figure 49

1. Traction rod
2. Jam nut

4. Start the traction unit and set the throttle to about 1/3 open position.



When the traction unit is running, you could be caught and injured in moving parts or burned on hot surfaces.

Stay away from pinch points, moving parts, and hot surfaces when adjusting the running traction unit.

5. If the **left** track moves, lengthen or shorten the **right** traction rod until the track stops moving.
6. If the **right** track moves, lengthen or shorten the **left** traction rod until the track stops moving.
7. Tighten the jam nuts.
8. Close the rear access cover.
9. Stop the engine and lower the traction unit to the ground.
10. Drive the traction unit in full reverse, checking to see if the unit tracks straight. If it does not, note the direction the traction unit veers. Repeat the adjustment previously described so that it tracks straight in reverse.

Adjusting the Tracking of the Traction Control, Full Forward Position

If the traction unit does not drive straight when you hold the traction control against the reference bar, complete the following procedure:

1. Drive the traction unit with the traction control against the reference bar, noting which direction the traction unit veers.
2. Release the traction control.
3. If the traction unit veers to the **left**, loosen the **right** jam nut and adjust the tracking set screw on the front of the traction control (Figure 50).
4. If the traction unit veers to the **right**, loosen the **left** jam nut and adjust the tracking set screw on the front of the traction control (Figure 50).

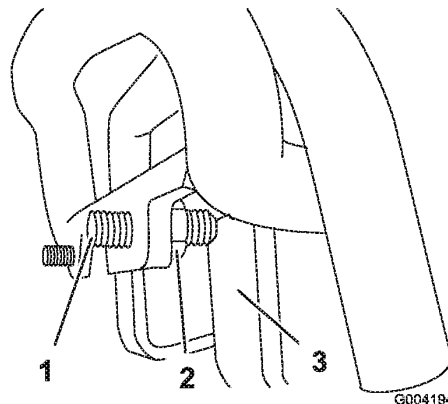


Figure 50

1. Set screw
2. Jam nut
3. Stop

5. Repeat steps 1 through 4 until the traction unit drives straight in the full forward position.

Important: Ensure the tracking set screws touch the stops in the full forward position to avoid over stroking the hydraulic pumps.

Hydraulic System Maintenance

Replacing the Hydraulic Filter

Important: Do not substitute an automotive oil filter or severe hydraulic system damage may result.

Change the hydraulic filter:

- After the first 8 operating hours
 - After every 200 operating hours
1. Position traction unit on a level surface.
 2. Lower the loader arms, stop the engine, and remove the key.
 3. Open the rear access cover.
 4. Place a drain pan under the filter (Figure 51).

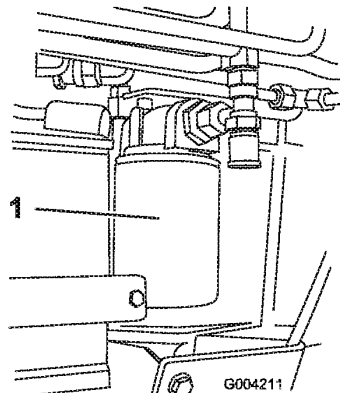


Figure 51

1. Hydraulic filter

5. Remove the old filter (Figure 51) and wipe the surface of the filter adapter gasket clean.
6. Apply a thin coat hydraulic fluid to the rubber gasket on the replacement filter.
7. Install the replacement hydraulic filter onto the filter adapter (Figure 51). Tighten it clockwise until the rubber gasket contacts the filter adapter, then tighten the filter an additional 3/4 turn.
8. Clean up any spilled fluid.
9. Start the engine and let it run for about two minutes to purge air from the system.
10. Stop the engine and check for leaks.



Hydraulic fluid escaping under pressure can penetrate skin and cause injury. Fluid injected into the skin must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.

- Keep your body and hands away from pin hole leaks or nozzles that eject high pressure hydraulic fluid.
- Use cardboard or paper to find hydraulic leaks, never use your hands.

11. Check the fluid level in the hydraulic tank (refer to Checking the Hydraulic Fluid) and add fluid to raise the level to mark on dipstick. Do not over fill the tank.
12. Close the rear access cover.

Changing the Hydraulic Fluid

Change the hydraulic fluid after every 400 operating hours or yearly.

1. Position the traction unit on a level surface.
2. Open the hood.
3. Install the cylinder lock, stop the engine, and remove the key.
4. Allow the traction unit to cool completely.
5. Remove the hydraulic tank cap and dipstick (Figure 52).

Note: The filler cap is behind the front screen. If you want to improve your access to it, remove the screen.

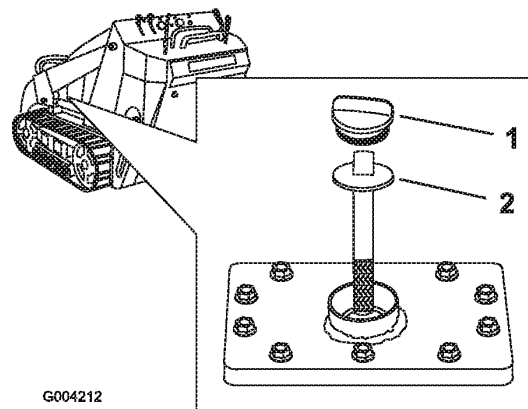
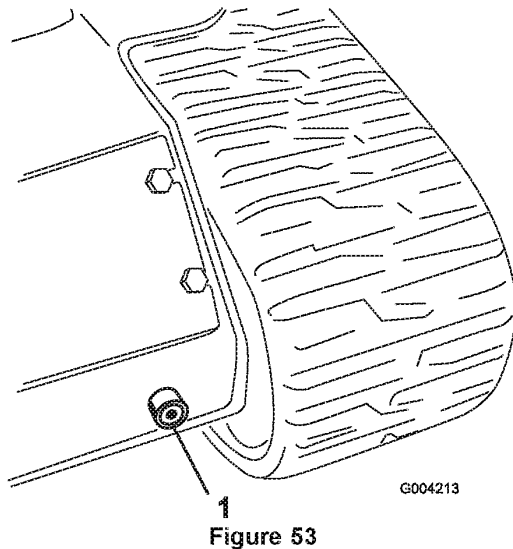


Figure 52

1. Filler neck cap
2. Dip stick

6. Place a large drain pan (capable of holding 15 US gallons) under the drain plug on the front of the traction unit (Figure 53).

Note: The drain plug is located behind the front weight, under the muffler.



1. Drain plug

7. Remove the drain plug and allow the oil to drain into the pan (Figure 53).
8. When finished, install and tighten the drain plug.

Note: Dispose of the used oil at a certified recycling center.

9. Fill the hydraulic tank with approximately 12 US gallons (45.4 l) of 10W-30 detergent, diesel engine oil (API service CH-4 or higher); refer to Checking Hydraulic Fluid.
10. Start the engine and let it run for a few minutes.
11. Stop the engine.
12. Check the hydraulic fluid level and top it off if necessary; refer to Checking Hydraulic Fluid.
13. Close the hood.

Checking the Hydraulic Lines

After every 100 operating hours, check the hydraulic lines and hoses for leaks, loose fittings, kinked lines, loose mounting supports, wear, weather, and chemical deterioration. Replace all moving hydraulic hoses every 1500 hours or 2 years, whichever comes first. Make necessary repairs before operating.



Hydraulic fluid escaping under pressure can penetrate skin and cause injury. Fluid injected into the skin must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.

- Keep your body and hands away from pin hole leaks or nozzles that eject high pressure hydraulic fluid.
- Use cardboard or paper to find hydraulic leaks, never use your hands.

Cleaning

Removing Debris from the Traction Unit

Important: Operating the engine with blocked screens, dirty or plugged cooling fins, and/or cooling shrouds removed, will result in engine damage from overheating.

1. Park the traction unit on a level surface, lower the loader arms, and stop the engine.
2. Remove the key and allow the engine to cool.
3. Open the hood.
4. Clean any debris from the front and side screens.
5. Wipe away debris from the air cleaner.
6. Clean any debris build-up on the engine and in the oil cooler fins with a brush or blower.

Important: It is preferable to blow dirt out, rather than washing it out. If water is used, keep it away from electrical items and hydraulic valves. Do not use a high-pressure washer. High-pressure washing can damage the electrical system and hydraulic valves or deplete grease.

7. Clean debris from the cooler fan grill on the hood.
8. Close the hood.

Cleaning the Chassis

Over time, the chassis under the engine collects dirt and debris that must be removed. Using a flashlight, open the hood and inspect the area under the engine on a regular basis. When the debris is 1 to 2 inches deep, complete the following procedure (refer to Figure 54 throughout this procedure):

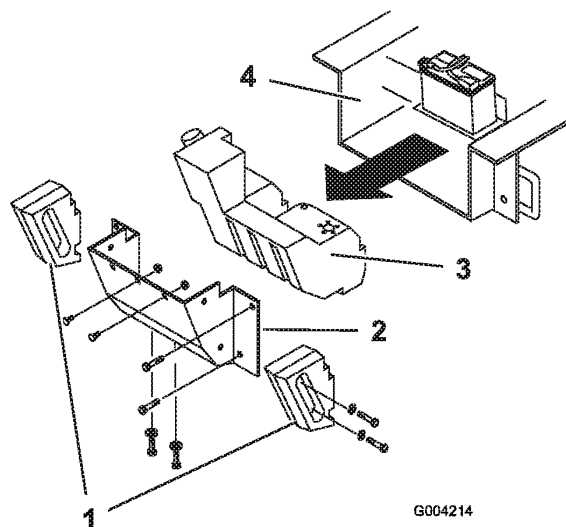


Figure 54

- | | |
|-----------------|--------------|
| 1. Side weights | 3. Fuel tank |
| 2. Rear panel | 4. Chassis |
-
1. Lift and support the front of the traction unit.
 2. Stop the engine and remove the key.
 3. Disconnect the negative battery cable.
 4. Remove the bolts, washers, and lock washers securing the two side weights, removing the weights (Figure 54).
 5. Open the rear access cover.
 6. Remove the 2 carriage bolts and washers from the battery base.
 7. Remove the six nuts and bolts securing the rear panel, removing the panel (Figure 54).
 8. Loosen the tank cap to relieve pressure.
 9. Place a clamp on the fuel line, 2 inches from where it comes out of the fuel tank.
 10. Slide the fuel tank to the rear (Figure 54).
 11. Disconnect the fuel line.
 12. Disconnect the two wires leading to the right side of the tank (Figure 55).

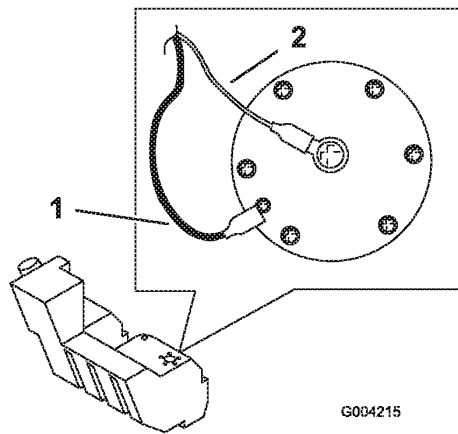


Figure 55

1. Black wire

2. Orange wire

13. Carefully remove the tank and set it upright to keep from spilling the gasoline.



In certain conditions, gasoline is extremely flammable and highly explosive. A fire or explosion from gasoline can burn you and others and can damage property.

- Remove the fuel tank outdoors in an open area. Wipe up any gasoline that spills.
- Do not remove the fuel tank near an open flame or where gasoline fumes may be ignited by a spark.
- Do not smoke while handling the fuel tank.

14. Remove any large deposits of debris.
15. Wash out the chassis with water until the water running out the back of the unit is clear.

Important: Take care not to get water into the engine or electrical components.

16. Slide the fuel tank part way into the chassis (Figure 54).
17. Connect the fuel line and remove the clamp.
18. Secure the tank cap.
19. On the right side of the tank, connect the orange wire to the center post and the black wire to the outside post (Figure 55).
20. Slide the tank all the way into the traction unit.

Important: The fuel line and wires must be away from the engine pulleys and the frame.

21. Replace the rear panel and secure it with the six bolts and nuts removed previously (Figure 54).
22. Secure the battery tray with the bolts and washers removed previously.
23. Install the side weights with the bolts, washers, and lock washers removed previously (Figure 54).
24. Close the rear access cover.
25. Lower the traction unit to the ground.

Storage

1. Lower the loader arms, stop the engine, and remove the key.
2. Remove dirt and grime from the external parts of the entire traction unit, especially the engine. Clean dirt and chaff from the outside of the engine cylinder head fins and blower housing.

Important: You can wash the traction unit with mild detergent and water. Do not pressure wash the traction unit. Avoid excessive use of water, especially near the control panel, engine, hydraulic pumps, and motors.

3. Service the air cleaner; refer to Servicing the Air Cleaner.
4. Grease the traction unit; refer to Greasing the Traction Unit.
5. Change the crankcase oil; refer to Servicing the Engine Oil.
6. Change the crankcase oil; refer to Servicing the Engine Oil
7. Remove the spark plugs and check the condition of each; refer to Servicing the Spark Plugs.
8. With the spark plugs removed from the engine, pour two tablespoons of engine oil into each spark plug hole.
9. Place rags over the spark plug holes to catch any oil spray, then use the starter to crank the engine and distribute the oil inside the cylinder.
10. Install the spark plugs, but do not install the wires on the spark plugs.
11. Charge the battery; refer to Servicing the Battery.
12. For storage over 30 days, prepare the traction unit as follows:

- A. Add a petroleum based stabilizer/conditioner to fuel in the tank. Follow mixing instructions from stabilizer manufacturer. (1 oz. per US gallon). **Do not use an alcohol based stabilizer (ethanol or methanol).**

Note: Fuel stabilizer/conditioner is most effective when mixed with fresh gasoline and used at all times.

- B. Run the engine to distribute conditioned fuel through the fuel system (5 minutes).
- C. Stop the engine, allow it to cool and drain the fuel tank using a pump type syphon.

- D. Restart the engine and run it until it stops.
- E. Choke the engine.
- F. Start and run the engine until it will not start again.
- G. Dispose of fuel properly. Recycle as per local codes.

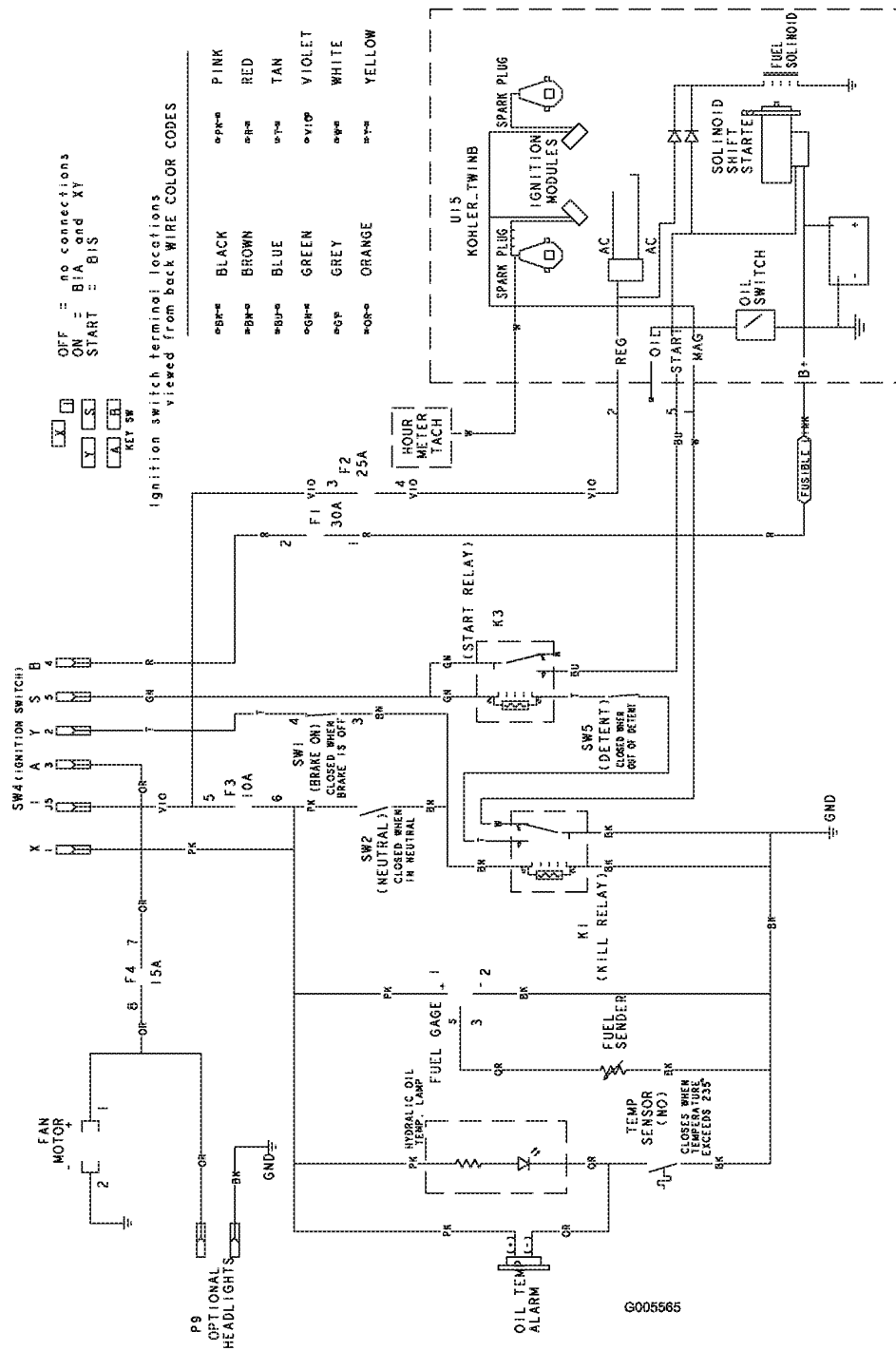
Important: Do not store stabilizer/conditioned gasoline over 90 days.

13. Check and adjust the track tension; refer to Adjusting the Track Tension.
14. Check and tighten all bolts, nuts, and screws. Repair or replace any part that is damaged.
15. Paint all scratched or bare metal surfaces. Paint is available from your Authorized Service Dealer.
16. Store the traction unit in a clean, dry garage or storage area. Remove the key from the ignition switch and keep it in a memorable place.
17. Cover the traction unit to protect it and keep it clean.

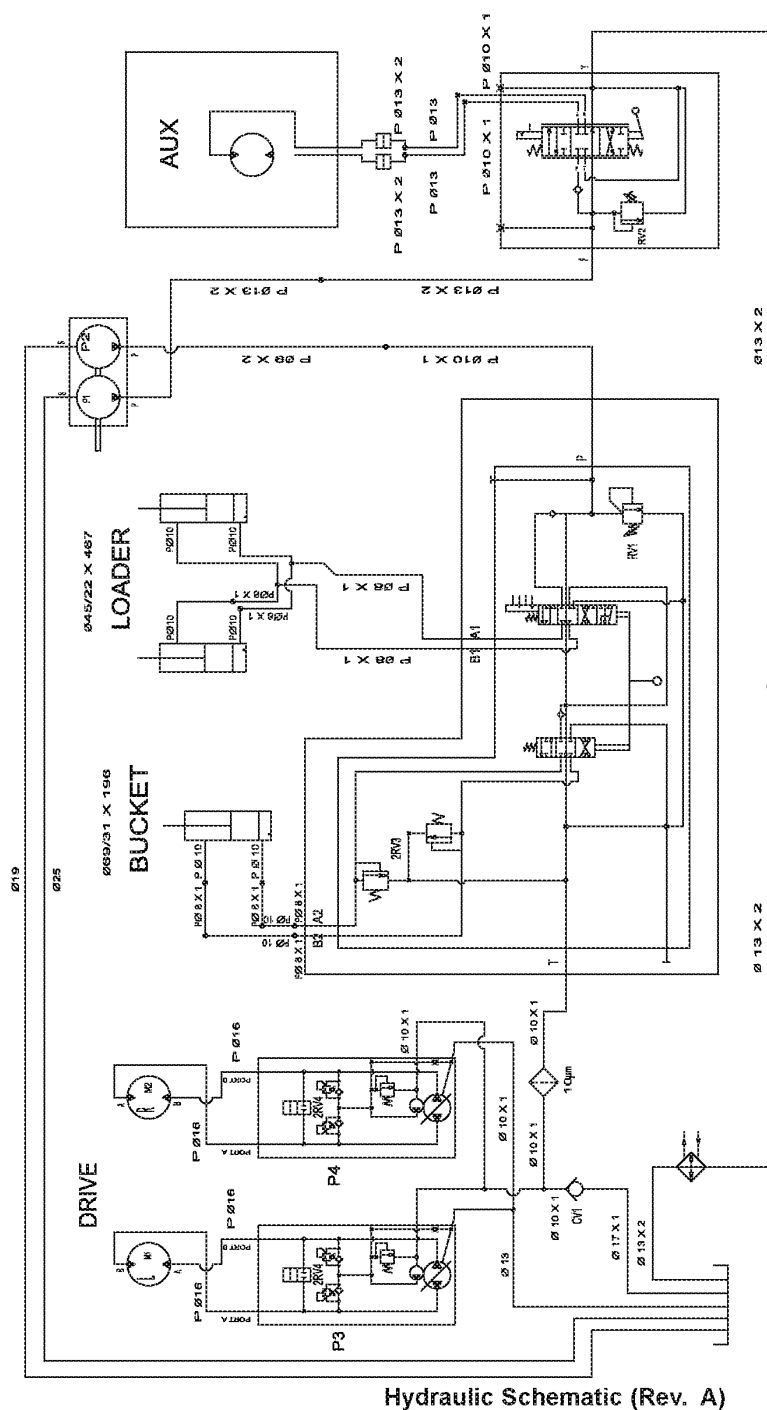
Troubleshooting

Problem	Possible Cause	Corrective Action
The starter does not crank	1. The battery is discharged. 2. The electrical connections are corroded or loose. 3. The relay or switch is damaged.	1. Charge the battery or replace it. 2. Check the electrical connections for good contact. 3. Contact your Authorized Service Dealer.
The engine will not start, starts hard, or fails to keep running.	1. The fuel tank is empty. 2. The choke is not on. 3. The air cleaner is dirty. 4. The spark plug wires are loose or disconnected. 5. The spark plugs are pitted, fouled, or the gap is incorrect. 6. There is dirt in the fuel filter. 7. Dirt, water, or stale fuel is in fuel system.	1. Fill the fuel tank with gasoline. 2. Move the choke lever fully forward. 3. Clean or replace the air cleaner elements. 4. Install the wires on the spark plugs. 5. Install new, correctly gapped spark plugs. 6. Replace the fuel filter. 7. Contact Authorized Service Dealer.
Engine loses power.	1. The engine load is excessive. 2. The air cleaner is dirty. 3. The oil level in crankcase is low. 4. The cooling fins and air passages under the engine blower housing are plugged. 5. The spark plugs are pitted, fouled, or the gap is incorrect. 6. There is dirt in the fuel filter. 7. Dirt, water, or stale fuel is in fuel system.	1. Reduce ground speed. 2. Clean or replace the air cleaner elements. 3. Check and add oil to the crankcase. 4. Remove any obstructions from the cooling fins and air passages. 5. Install new, correctly gapped spark plugs. 6. Replace the fuel filter. 7. Contact Authorized Service Dealer.
The engine overheats.	1. The engine load is excessive. 2. The oil level in crankcase is low. 3. The cooling fins and air passages under the engine blower housing are plugged.	1. Reduce ground speed. 2. Check and add oil to the crankcase. 3. Remove any obstructions from the cooling fins and air passages.
Abnormal vibration.	1. The engine mounting bolts are loose.	1. Tighten the engine mounting bolts.
The traction unit does not drive.	1. The parking brake is on. 2. The hydraulic fluid level low. 3. The tow valves are open. 4. The hydraulic system is damaged.	1. Release the parking brake. 2. Check and add hydraulic fluid. 3. Close the tow valves. 4. Contact Authorized Service Dealer.

Schematics



Electrical Schematic (Rev. A)



DISPLACEMENT AND PRESSURE CHART				
COMPONENT	DISPLACEMENT	PRESSURE	FLUID RATE	
	CUBIC INCHES	CU. IN/REV	BAR	GPM
P1	0.73 CU IN 12 CC		11.2	42.4
P2	0.98 CU IN 16 CC		5.6	21.0
M1 M2	32.3 CU IN 528 CC			
M3 M4	4.4 CU IN 72 CC			
R1	CU IN 18 CU IN 27 CC	3486 PSI	207 BAR	34
R2		3000 PSI	207 BAR	
R3		3050 PSI	210 BAR	
R4		2900 PSI	200 BAR	

* FLOWRATE CALCULATED AT 3600 RPM AND 99% EFFICIENCY.

* FLOWRATE CALCULATED AT 3600 RPM AND 80% EFFICIENCY.



Evaporative Emission Control Warranty Statement

California Evaporative Emission Control Warranty Statement

Your Warranty Rights and Obligations

Introduction

The California Air Resources Board and The Toro® Company are pleased to explain the evaporative emission control system's warranty on your 2007 model year equipment. In California, new equipment that use small off-road engines must be designed, built, and equipped to meet the State's stringent anti-smog standards. The Toro® Company must warrant the evaporative emission control system on your equipment for two years provided there has been no abuse, neglect or improper maintenance of your equipment.

Your evaporative emission control system may include parts such as: fuel lines, fuel line fittings, and clamps.

Manufacturer's Warranty Coverage:

This evaporative emission control system is warranted for two years. If any evaporative emission-related part on your equipment is defective, the part will be repaired or replaced by The Toro® Company.

Owner's Warranty Responsibilities:

- As the equipment owner, you are responsible for performance of the required maintenance listed in your Operator's Manual. The Toro® Company recommends that you retain all receipts covering maintenance on your equipment, but The Toro® Company cannot deny warranty solely for the lack of receipts.
- As the equipment owner, you should however be aware that The Toro® Company may deny you warranty coverage if your emission warranty parts have failed due to abuse, neglect, or improper maintenance or unapproved modifications.
- You are responsible for presenting your equipment to an Authorized Service Dealer as soon as the problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days. If you have a question regarding your warranty coverage, you should contact The Toro® Company at 1-952-948-4027 or call us toll free at the number listed in your Toro Warranty statement.

Defects Warranty Requirements:

1. The warranty period begins on the date the engine or equipment is delivered to an ultimate purchaser.
2. General Evaporative Emissions Warranty Coverage. The emission warranty parts must be warranted to the ultimate purchaser and any subsequent owner that the evaporative emission control system when installed was:
 - A. Designed, built, and equipped so as to conform with all applicable regulations; and
 - B. Free from defects in materials and workmanship that causes the failure of a warranted part for a period of two years.
3. The warranty on evaporative emissions-related parts will be interpreted as follows:
 - A. Any warranted part that is not scheduled for replacement as required maintenance in the written instructions must be warranted for the warranty period of two years. If any such part fails during the period of warranty coverage, it must be repaired or replaced by The Toro® Company. Any such part repaired or replaced under the warranty must be warranted for a time not less than the remaining warranty period.
 - B. Any warranted part that is scheduled only for regular inspection in the written instructions must be warranted for the warranty period of two years. A statement in such written instructions to the effect of "repair or replace as necessary" will not reduce the period of warranty coverage. Any such part repaired or replaced under warranty must be warranted for a time not less than the remaining warranty period.
 - C. Any warranted part that is scheduled for replacement as required maintenance in the written instructions must be warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part must be repaired or replaced by The Toro® Company. Any such part repaired or replaced under warranty must be warranted for a time not less than the remainder of the period prior to the first scheduled replacement point for the part.
 - D. Repair or replacement of any warranted part under the warranty provisions of this article must be performed at no charge to the owner at an Authorized Service Dealer.
 - E. Notwithstanding the provisions of subsection (D) above, warranty services or repairs must be provided at an Authorized Service Dealer.
 - F. The owner must not be charged for diagnostic labor that leads to the determination that a warranted part is in fact defective, provided that such diagnostic work is performed at an Authorized Service Dealer.
 - G. Throughout the evaporative emission control system's two year warranty period, The Toro® Company must maintain a supply of warranted parts sufficient to meet the expected demand for such parts.
 - H. Manufacturer approved replacement parts must be used in the performance of any warranty maintenance or repairs and must be provided without charge to the owner. Such use will not reduce the warranty obligations of The Toro® Company.
 - I. The use of any add-on or modified parts will be grounds for disallowing a warranty claim made in accordance with this article. The Toro® Company will not be liable under this Article to warrant failures of warranted parts caused by the use of an add-on or modified part.
 - J. The Toro® Company shall provide any documents that describe the warranty procedures or policies within five working days of request by the Air Resources Board.

Emission Warranty Parts List:

The following lists includes the parts covered under this warranty:

- Fuel Lines
- Fuel Line Fittings
- Clamps



Dingo Products
- Kohler Powered

The Toro Dingo® Product Line Warranty

A One-Year Limited Warranty

Conditions and Products Covered

The Toro® Company and its affiliate, Toro Warranty Company, pursuant to an agreement between them, jointly warrant your Toro Dingo Product ("Product") to be free from defects in materials or workmanship. The following time periods apply from the date the Product is delivered to the original retail purchaser:

The following time periods apply from the date of purchase:

Products	Warranty Period
All traction units and attachments	1 year or 1000 operational hours, whichever occurs first
Kohler engines	3 years

Where a warrantable condition exists, we will repair the Product at no cost to you including diagnosis, labor, and parts.

Instructions for Obtaining Warranty Service

If you think that your Toro Product contains a defect in materials or workmanship, follow this procedure:

1. Contact any Authorized Dingo Service Dealer to arrange service at their dealership. To locate a dealer convenient to you, access our website at www.Toro.com. You may also call our Toro Customer Care Department toll free at 888-577-7466 (U.S. customers) or 877-484-9255 (Canadian customers).
2. Bring the product and your proof of purchase (sales receipt) to the Service Dealer.

If for any reason you are dissatisfied with the Service Dealer's analysis or with the assistance provided, contact us at:

LCB Customer Service Department
Toro Warranty Company
8111 Lyndale Avenue South
Bloomington, MN 55420-1196
Toll Free: 888-577-7466 (U.S. customers)
Toll Free: 877-484-9255 (Canada customers)

Owner Responsibilities

You must maintain your Toro Product by following the maintenance procedures described in the Operator's Manual. Such routine maintenance, whether performed by a dealer or by you, is at your expense. Parts scheduled for replacement as required maintenance ("Maintenance Parts"), are warranted for the period of time up to the scheduled replacement time for that part. Failure to perform required maintenance and adjustments can be grounds for disallowing a warranty claim.

Items and Conditions Not Covered

Not all product failures or malfunctions that occur during the warranty period are defects in materials or workmanship. This express warranty does not cover the following:

- Product failures which result from the use of non-Toro replacement parts, or from installation and use of add-on, modified, or unapproved accessories

- Product failures which result from failure to perform required maintenance and/or adjustments
- Product failures which result from operating the Product in an abusive, negligent or reckless manner
- Parts subject to consumption through use unless found to be defective. Examples of parts which are consumed, or used up, during normal Product operation include, but are not limited to, digging teeth, tines, spark plugs, tires, tracks, filters, chains, etc.
- Failures caused by outside influence. Items considered to be outside influence include, but are not limited to, weather, storage practices, contamination, use of unapproved coolants, lubricants, additives, or chemicals, etc.
- Normal "wear and tear" items. Normal "wear and tear" includes, but is not limited to, worn painted surfaces, scratched decals or windows, etc
- Any component covered by a separate manufacturer's warranty
- Pickup and delivery charges

General Conditions

Repair by an Authorized Toro Service Dealer is your sole remedy under this warranty. **Neither The Toro® Company nor Toro Warranty Company is liable for indirect, incidental or consequential damages in connection with the use of the Toro Products covered by this warranty, including any cost or expense of providing substitute equipment or service during reasonable periods of malfunction or non-use pending completion of repairs under this warranty. Some states do not allow exclusions of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the above exclusions and limitations may not apply to you.** This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Except for the Emissions warranty referenced below, if applicable, there is no other express warranty. All implied warranties of merchantability and fitness for use are limited to the duration of this express warranty.

Note to California residents: The Emissions Control System on your Product may be covered by a separate warranty meeting requirements established by the U.S. Environmental Protection Agency (EPA) or the California Air Resources Board (CARB). The hour limitations set forth above do not apply to the Emissions Control System Warranty. Refer to the California Emission Control Warranty Statement printed in your operator's manual or contained in the engine manufacturer's documentation for details.

Countries Other than the United States or Canada

Customers who have purchased Toro products exported from the United States or Canada should contact their Toro Distributor (Dealer) to obtain guarantee policies for your country, province, or state. If for any reason you are dissatisfied with your Distributor's service or have difficulty obtaining guarantee information, contact the Toro importer. If all other remedies fail, you may contact us at Toro Warranty Company.

Exhibit 4

History of the Toro® Dingo® Compact Utility Loader

How Toro pioneered and revolutionized the compact utility loader marketplace

Feb 23, 2016 | Rental (/en/rental)

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Download Images (<https://cdn2.toro.com/en/-/media/Files/Newsroom/rental/2016/zip/02-23-2016-dingo-timeline-1b.ashx?la=en&hash=D60355E796F1>)

The story of how Toro invented and subsequently revolutionized the compact utility loader (CUL) marketplace in the United States begins in 1995. That is when the Dingo, an Australian-built, wheeled mini-skidsteer loader made its way to the United States. Its initial popularity in the U.S. proved that there was indeed a market for compact utility loaders and drew the attention of The Toro Company. While the Dingo unit was beginning to make a name for itself, Toro acquired the rights to the Dingo machine in the United States and began developing a 19-hp tracked unit that featured Toro's patented control system and a walk-behind design.

Due to the initial popularity of the product line, Toro expanded its operations and dedicated an entire division to the compact utility loader — the Toro Sitework Systems division. At the same time, manufacturing of the Dingo product line was moved to the company's facility in Tomah, Wisconsin.

The rest of the history of the Toro Dingo focuses on continuous improvement by listening to the wants and needs of the end user. In 2000, Toro introduced the TX 420, the first tracked, walk-behind Dingo machine. Two years later in 2002, the Dingo TX 425 was introduced to the marketplace, and proved to be an incredibly popular machine. In 2006, Toro provided yet another tracked Dingo model, the Dingo TX 525, which featured a higher rated operating capacity and a number of operator-centric upgrades.

Since 2006, many other upgrades have been incorporated into the entire Dingo product line, effectively demonstrating Toro's commitment to innovation and continuous improvement. In 2015, Toro revolutionized the compact utility loader marketplace with the introduction of the strongest CUL on the market today, the Dingo TX 1000, which features a vertical lift loader arm design and a hinge pin height of 81 inches. With a rated operating capacity of 1,075 lbs. on the wide-track model, not only does the TX 1000 stand proudly in a class of its own, but also rivals the rated operating capacities of many skid steer loaders.

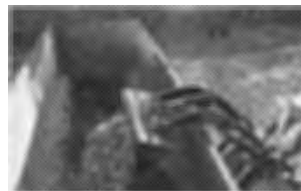
Now offering nine models of compact utility loaders, Toro prides itself on being able to offer the broadest range of compact utility loaders on the market today. It's been said that there is a Dingo unit for every application, and that still rings true today. From the wheeled 220 all the way up to the TX 1000 wide-track model, end users in the United States have been able to take advantage of the features and benefits of Toro's Dingo compact utility loaders for over 18 years.

"Innovation has always been a key driver not only for the Sitework Systems business, but for the entire company," says Rick Rodier, general manager of Toro Sitework Systems. "Frankly, it's engrained in our DNA as a company. In 1914, The Toro Company was born, and we have never wavered from our focus to offer the most innovative, and highest-quality products across the industries we serve."

In less than two decades, the Sitework Systems division has gone from focusing solely on compact utility loaders to offering tree care and turf renovation equipment, including stump grinders and chippers; concrete, masonry and rental equipment, including mud buggies, power trowels, and mixers; and, underground equipment, including horizontal directional drills, riding and pedestrian trenchers and vibratory plows. The key to the success of the business has always hinged on the ability to innovate and deliver exactly what end-users need at the right time.

Now offering a number of products for construction, landscaping and rental industries, the Toro Sitework Systems business is dedicated now — more than ever — to continuing to provide the best solutions to channel partners and end users across the globe.

For more information about the Toro Dingo or other Toro products, visit www.toro.com (<http://www.toro.com>).



Luann Monahan | Rental & Underground | 952-887-7220 (tel:952-887-7220) | luann.monahan@toro.com (mailto:luann.monahan@toro.com)

About The Toro Company

The Toro Company (NYSE: TTC) is a leading worldwide provider of innovative solutions for the outdoor environment, including turf, snow and ground engaging equipment and irrigation and outdoor lighting solutions. With sales of \$2.4 billion in fiscal 2015, Toro's global presence extends to more than 90 countries. Through constant innovation and caring relationships built on trust and integrity, Toro and its family of brands have built a legacy of excellence by helping customers care for golf courses, landscapes, sports fields, public green spaces, commercial and residential properties and agricultural fields. For more information, visit www.toro.com (<http://www.toro.com>).

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[p](https://www.pinterest.com/thetorocompany/) (<https://www.pinterest.com/thetorocompany/>) [i](https://www.instagram.com/thetorocompany/) (<https://www.instagram.com/thetorocompany/>)

Exhibit 1

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Kuemper, James A.

June 19, 2019

1

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF IOWA
CENTRAL DIVISION

VERMEER MANUFACTURING COMPANY,

Plaintiff, Case No. 4:19-cv-00050

vs.

THE TORO COMPANY,

Defendant.

* * *

CONFIDENTIAL - ATTORNEYS' EYES ONLY

* * *

VIDEO DEPOSITION TESTIMONY OF

JAMES A. KUEMPER

WEDNESDAY, JUNE 19, 2019

MINNEAPOLIS, MINNESOTA

* * *

Henderson Legal Services, Inc.

202-220-4158

www.hendersonlegalservices.com

1 Q. Okay. So there was kind of a subunit
2 that deals with rental-type equipment?

3 A. Rental equipment would be what I
4 worked on then until I retired.

5 Q. In 2009, 2010 and forward, were you
6 working both on rental group products and the
7 main compact utility loader products?

8 A. I pretty much didn't work anymore on
9 the main unit anymore.

10 Q. Okay. And so that -- that holds true
11 from 2009 --

12 A. Well, no. I can't say that because I
13 did work on the TX 1000, which was probably 2013
14 until its release.

15 Q. Uh-huh. So that was the one example
16 of you transitioning back to working on --

17 A. Back to --

18 Q. -- the full-sized compact utility
19 loaders?

20 A. Back to -- yes. I was pretty much
21 just kind of helping them out at the time.

22 Q. Got it.

23 So I guess now is as good a time as
24 any to transition to talking about that TX 1000.

25 Um, was there a project name or a

1 program name that you're aware of that Toro used
2 to refer to the TX 1000 project internally?

3 A. I believe the project number on that
4 we had was like a W298.

5 Q. And that's some kind of a code that
6 refers to that particular engineering project?

7 A. That -- that would go for that
8 project, and that's what you would charge your
9 time to.

10 Q. Okay. I've also seen reference to a
11 next gen.

12 Is that another name that you're
13 familiar with as you -- being used to refer to
14 the TX 1000?

15 A. Next gen. I think marketing used
16 that "next gen" on everything.

17 Q. Okay.

18 A. So, uh, what is -- really is a next
19 gen (witness indicating)?

20 Q. Are there -- other than W298, are
21 there other designators or names that were used
22 internally at Toro to refer to the TX 1000
23 project?

24 A. Pretty much it was TX 1000.

25 Q. Okay. When was the first time you

1 recall learning that there was an effort within
2 Toro to develop a new compact utility loader
3 that ultimately became the TX 1000?

4 A. I believe that was in 2013.

5 Q. And how did you hear about it?

6 A. I was asked to start working on it.

7 Q. Who asked you to do that?

8 A. It would be my, well, immediate
9 supervisor.

10 Q. And what was their name?

11 A. John Azure.

12 Q. And that's A-z-u-r-e, correct?

13 A. Correct.

14 Q. And when he first spoke with you
15 about this project, do you recall the
16 conversation you had with him?

17 A. I don't recall I guess.

18 Q. Well, was it -- let's put it this
19 way: Was it an email, was it a phone call, or
20 did he speak to you in person?

21 A. In person.

22 Q. And do you recall anything about that
23 conversation?

24 A. Not really. It was more like: Oh,
25 this would be a great project. Glad to be on

1 product marketplace, that they would just go
2 with the radial lift.

3 Also, at that time, they started
4 getting into all these rental products, so
5 that's why we probably didn't pursue a vertical
6 lift at that time.

7 Q. Are you aware of instances in the
8 past where engineers were aware that vertical
9 lift could be put on a compact utility loader,
10 and they opted not to?

11 A. None that I know of.

12 Q. So you're not aware of instances, for
13 example, with the -- what was the other earlier
14 TX, TX 525?

15 A. 525 --

16 Q. So --

17 A. -- 427.

18 Q. So the 427 and the 525, you're not
19 aware of instances in which someone said: Maybe
20 we should go vertical lift, or maybe we should
21 go radial; no, let's go radial?

22 That decision was never made, right?

23 A. Never even heard of it --

24 Q. Okay.

25 A. -- until the TX 1000.

1 Q. Okay. Does Toro keep track of what
2 competitors are doing in the compact utility
3 loader space as far as you're aware?

4 A. I would say Toro probably does just
5 as much as any other company does as in keeping
6 up with what the competitors are doing.

7 Q. Um-huh.

8 A. Uh, I mean they look at other
9 machines so they can get a benchmark of what
10 they'd like to see in their machines.

11 Q. Um-huh. Is there some repository
12 within Toro's Siteworks division for competitive
13 intelligence or information about competitors?

14 A. None that I know of.

15 Q. Who within Siteworks would be
16 responsible for keeping track of competitive
17 product releases?

18 A. Oh, I don't even know if we have a
19 person to do that.

20 Q. Going back to the conversation we
21 were having a moment ago about the vertical lift
22 systems, um, did you ever raise your hand in one
23 of the engineering meetings, and say: Hey, why
24 aren't we putting vertical lift on our compact
25 utility loaders?

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Kuemper, James A.

June 19, 2019

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1 A. No, I never did that.

2 Q. Why not?

3 A. (Witness indicating).

4 Because you -- normally, I was so
5 busy with other projects, that why would I want
6 any more work put on me than what I had already?

7 Q. Did -- did anyone raise their hand
8 and propose that solution that you're aware of?

9 A. Not that I'm aware of.

10 Q. Okay. Are you aware of customers,
11 Toro customers or other customers modifying
12 their compact utility loaders to try to increase
13 lift capacity?

14 A. None that I know of.

15 Q. Have you ever heard of a customer
16 welding weights onto the back of their machine
17 for example?

18 A. No.

19 Q. Have you heard of customers having
20 more than one person stand on the back of the
21 machine to create more of a counter balance?

22 A. None that I know of.

23 Q. I know you wouldn't advise that.

24 A. I would not advise that at all.

25 Q. But you've never heard of any of

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1 Q. Do you know what the Atlas project
2 is?

3 A. That was a larger utility loader, but
4 I never worked on that project.

5 Q. Is that a project that was ever
6 finalized and released as a commercial product?

7 A. I don't think it was. I think they
8 might have halfway resurrected it, but it didn't
9 have floating bogie wheels on it anymore. Uh,
10 this here to me looks like they put -- imposed
11 one type of unit on top of another type of unit,
12 and I believe maybe the Atlas went and changed
13 into the TX 2000.

14 Q. Back in 2013, what was your exposure
15 to the Atlas project?

16 A. I had none.

17 Q. You were just aware of it anecdotally
18 from people talking in the office?

19 A. You see it out in the prototype shop.

20 Q. Would the Atlas project be discussed
21 at weekly meetings?

22 A. I never was in a meeting when the
23 Atlas or the TX 2000 was discussed.

24 Q. Okay. Was the Atlas program -- if
25 you know, was the Atlas program an effort to

1 create a higher lift capacity compact utility
2 loader?

3 A. I would say, yes, because it was much
4 larger.

5 Q. Do you know when work on the Atlas
6 project first began?

7 A. No, I couldn't say.

8 Q. Can you give me a guess understanding
9 it just to be a guess?

10 A. 2010 (witness indicating).

11 Q. And your understanding is that there
12 was an actual physical prototype of the Atlas
13 machine made?

14 MR. LAFEVER: Object to the extent it
15 mischaracterizes his testimony.

16 THE WITNESS: I believe there was an
17 Atlas built. I don't know how -- exactly how
18 far along they came with it.

19 REDACTED - AEO



20

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25

1 you from marketing to increase or to have
2 certain design goals.

3 Do you recall that?

4 **A. Yes.**

5 Q. And I believe you mentioned that lift
6 height and lift capacity were two of those
7 design goals.

8 Is that right?

9 **A. That is correct.**

10 Q. And this corroborates your
11 recollection of that as well, right?

12 This -- this document is saying that
13 customer wish list includes increased lift
14 height and increased lift capacity?

15 MR. LAFEVER: Objection, foundation.

16 THE WITNESS: That's what we were --
17 were striving for.

18 BY MR. BROPHY:

19 Q. Okay. Let's go to Toro 785. You'll
20 see a picture of a preliminary TMax there on the
21 upper right.

22 Do you see that?

23 **A. Yes.**

24 Q. Do you understand that to be a
25 representation referring to a vertical lift

1 compact utility loader?

2 A. The actual picture?

3 Q. Yes.

4 A. I would say it doesn't look anything
5 like the TX 1000.

6 Q. But is it a representation of a
7 vertical lift compact utility loader?

8 A. I couldn't say what that picture was.

9 Q. Do you see below the picture there's
10 an indication of the loader style, and it's
11 identified as a vertical lift style?

12 Do you see that?

13 A. Yes.

14 Q. Does that change your answer with
15 respect to the previous question?

16 MR. LAFEVER: Objection, foundation.

17 THE WITNESS: That looks like someone
18 just took a few blocks of this and that and
19 threw it together to make it kind of look like a
20 unit.

21 BY MR. BROPHY:

22 Q. Do you recall ever being shown a
23 picture like that when you first came on to work
24 on the TX 1000?

25 A. No.

1 project, would you have expected to see
2 representations of the actual design on this
3 kind of presentation rather than what's shown in
4 TX 786?

5 MR. LAFEVER: Objection, speculation.

6 THE WITNESS: At this time, there
7 were no models that I know of that -- of the
8 full machine. I believe at this time there was
9 probably 2D locations of where the geometry was
10 going to be.

11 BY MR. BROPHY:

12 Q. So let's -- let's go to Toro 790.

13 There's an indication here about lift
14 capacity, and it says: "We will investigate a
15 vertical lift loader due to its advantages over
16 a radial lift."

17 And then on the right side, you see a
18 depiction, a 2D depiction there?

19 A. Um-huh.

20 Q. Is that a depiction of a vertical
21 lift system?

22 A. It looks like they're trying to do a
23 four-bar linkage but it's -- it's pretty crude.

24 Q. Is this the design that existed in
25 April of 2013 at Toro for the TX 1000?

1 A. Umm, someone else may have done that.
2 I didn't do something like this (witness
3 indicating).

4 Q. Based on your recollection, is this
5 the location of the linkages and -- and pins in
6 the then existing design for the TX 1000?

7 A. The old saying, close but no cigar.
8 No. I would say not anywhere close
9 to where the actual pins for the TX 1000 are
10 because --

11 Q. And the vertical pin path that's
12 depicted here is very different from the one
13 that Toro ultimately developed for the TX 1000,
14 right?

15 A. It's very similar.

16 Q. I thought earlier today you testified
17 that the pin path had an S shape where it curved
18 out at the bottom and then back in at the top.

19 Is that correct?

20 A. If you look at this one, it starts
21 going out from being raised from the lowest
22 point, and then it comes back in a bit, and then
23 it curves back out near the top.

24 Q. And is that what the vertical lift
25 path of the TX 1000 does where it goes back out

1 the vertical lift system, right?

2 A. Correct --

3 Q. So was --

4 A. -- it was.

5 Q. Is it fair for me to say that the
6 majority of your time was spent on the vertical
7 lift system?

8 A. Most of my time would be spent on
9 there. I can't say what percentage or anything
10 like that.

11 Q. Okay. And you weren't the only
12 person working on vertical lift, right?

13 John Azure was helping with that
14 design process?

15 A. He would help out at times, or he
16 would recommend material. He may recommend a
17 few changes.

18 Q. So is it fair for me to say that
19 there were engineering challenges involved in
20 implementing vertical lift on the TX 1000?

21 A. No. I wouldn't really say there was
22 a challenge. It was just a matter of, you know,
23 anyone could put a vertical lift on a machine.
24 It's a matter of getting the specs for what we
25 wanted to do, which no one has ever done before,

1 which was never out there before.

2 Q. You said you would --

3 A. We want -- we wanted to be able to
4 make higher lift capacity with more reach and a
5 higher height than any other machine that we had
6 before this.

7 Q. You said anyone can put vertical lift
8 on a machine.

9 What is that opinion based on?

10 A. Well, if you're talking about a
11 simple four-bar linkage. I mean four-bar
12 linkage has been around for ages. I mean I
13 learned about four-bar linkage when I went to
14 school out in Willmar drafting design
15 technology.

16 Q. So why didn't anyone at Toro raise
17 their hand, and say: Let's put a vertical lift
18 on one of these predecessor TX or Dingo
19 machines?

20 A. That's something you're going to have
21 to ask the higher-ups at Toro. I have no idea
22 why they would not --

23 Q. But you didn't raise your hand,
24 right?

25 A. It's not my place to raise my hand

1 I think you testified that this one
2 wouldn't work well because the way the linkages
3 and pivots were set up, obscures the pitch of
4 the bucket, right?

5 A. I've got to find 790.

6 That's what it would look like to me.

7 Q. So in your mind, this is not an
8 acceptable design, right?

9 A. No, it would not be.

10 Q. So this person can't design a
11 vertical lift system, right?

12 A. I have no idea who designed this. I
13 don't know who drew this up, if it was even
14 someone that had -- (witness indicating) I have
15 no idea where this picture came from.

16 Q. So it's not fair to say --

17 A. And, but here on the defense of
18 whoever did this, maybe they weren't worried
19 about line of sight at this time.

20 Q. That's an important consideration for
21 designing one of these machines, isn't it?

22 A. Yes, it is.

23 Q. Okay. So it's not fair to say that
24 anyone can design -- can put a vertical lift on
25 one of these machines, right?

1 didn't use it but as you can see, this type of
2 four-bar linkage for vertical lift would work if
3 you didn't mind not having the visual sightlines
4 to your bucket.

5 BY MR. BROPHY:

6 Q. So my -- my question was unrelated to
7 that though.

8 The opinion you expressed that anyone
9 can put vertical lift on a compact utility
10 loader, is that an opinion that you had prior to
11 meeting with attorneys to prepare for
12 depositions in this case?

13 A. It's a thing that I never even
14 thought about before. I usually don't worry
15 about what the competition is doing. I wasn't
16 getting paid to worry about that.

17 MR. BROPHY: Let's go ahead and mark
18 this next, please.

19 THE COURT REPORTER: This will be
20 seven.

21 MR. BROPHY: Seven.

22 * * *

23 (Whereupon, Deposition Exhibit 7 was
24 marked for identification.)

25 * * *

1 the 500,000, these people all have to sign it,
2 so most of these pages in here is something that
3 I would never have seen, but really don't --
4 wouldn't even really care about to see them.

5 Q. But you were in the room when the
6 present- -- when this presentation was given?

7 Is that right?

8 MR. LAFEVER: Objection, misstates
9 the testimony.

10 THE WITNESS: I have seen some of
11 these pages on a slide show.

12 BY MR. BROPHY:

13 Q. So to be clear, you don't know if
14 you've seen all of these in a slide show and
15 just weren't paying attention to some of them?

16 A. No. I would not have seen all of
17 these. There's way too many that I would ever
18 -- they would ever put into a slide show during
19 our weekly meetings.

20 Q. Looking at the face of this document,
21 um, would you agree with me that this indicates
22 that there will be a total completion of project
23 cost of \$2.3 million for the TX 1000 project?

24 MR. LAFEVER: Objection, foundation.

25 THE WITNESS: As far as coming to the

1 finance of how much they spend on it, that's
2 something I never really paid attention to.

3 BY MR. BROPHY:

4 Q. I understand, but my question is this
5 document, the face of it indicates a projection
6 of \$2.3 million to complete the TX 1000 project,
7 right?

8 A. I believe that's what that means
9 (witness indicating).

10

11

12

13

14 Q. Okay. If we look at Toro 843,
15 there's a reproduction of some handwritten
16 notes. I'm jealous of this person's
17 handwriting, but do you know -- do you by any
18 chance know who wrote these notes?

19 A. Yeah.

20 Q. Who did?

21 A. Uh, that is -- I better make sure I
22 get his name right -- Mike Happ, Happe.

23 Q. And that's, as indicated on page two
24 of this document, vice president of RLC?

25 A. That is correct.

1 Q. Okay.

2 A. Not on -- not on my reading list.

3 Q. Okay. Lucky you.

4 If you move a few pages into Exhibit
5 1, you're going to see some text that begins
6 with numbers at the tops of the columns,
7 starting at one and moving on through to 14 at
8 the end.

9 I'd like you to go to column two if
10 you wouldn't mind, please?

11 A. (Witness indicating).

12 Q. You'll notice there are some numbers
13 that run down the middle of the page.

14 Do you see those?

15 A. Yes.

16 Q. That's a way that we refer to certain
17 rows within these columns quickly and easily,
18 considering the density of the text.

19 I'd like you to go to line 20 in
20 column two. It begins with the word "Finally."

21 Do you see that?

22 A. Yes.

23 Q. It says: "Finally, the vertical
24 reach of the loader arms on compact utility
25 loaders is somewhat limited. While high lift

1 loader arms are known on full size skid steer
2 loaders as disclosed in U.S. Pat. No. 5,542,814,
3 the use of such high lift loader arms on a
4 compact utility loader has been considered
5 difficult if not impossible due to size and
6 durability constraints."

7 Do you see that?

8 A. Yes.

9 Q. Do you agree with that statement?

10 A. Yes.

11 Q. It goes on to say: Accordingly, it
12 would be a further advance in the art to provide
13 a way to safely and durably provide high lift
14 loader arms on compact utility loaders to extend
15 the vertical reach of such loaders.

16 Do you see that?

17 A. Yes.

18 Q. Do you agree with that?

19 A. Yes.

20 Q. Are you aware of anyone within Toro
21 using other products outside of Toro or other
22 patents outside of Toro as the inspiration for
23 its vertical lift machine?

24 A. No, I am not.

25 Q. So you've not heard of anyone, um,

1 basing the TX 1000 on any full-size skid-steer
2 machines?

3 A. No, I have not.

4 Q. Okay. The patent that's referenced
5 here, patent 5,542,814, have you reviewed that
6 patent?

7 A. No, I have not.

8 MR. BROPHY: Go ahead and mark that,
9 please.

10 THE COURT REPORTER: It's 28.

11 MR. BROPHY: Uh, got it. Thanks.

12 * * *

13 (Whereupon, Deposition Exhibit 28 was
14 marked for identification.)

15 * * *

16 BY MR. BROPHY:

17 Q. This is a copy of that referenced
18 patent. It's a patent to Ashcroft and others.
19 Have you seen this patent before?

20 A. No, I have not.

21 Q. This patent is issued and assigned to
22 a company named New Holland North America.

23 Do you know who they are?

24 A. I've heard of New Holland.

25 Q. Yeah. Have you ever heard of a

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Kuemper, James A.

June 19, 2019

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I hereby certify that the proceedings and
evidence noted are contained fully and
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