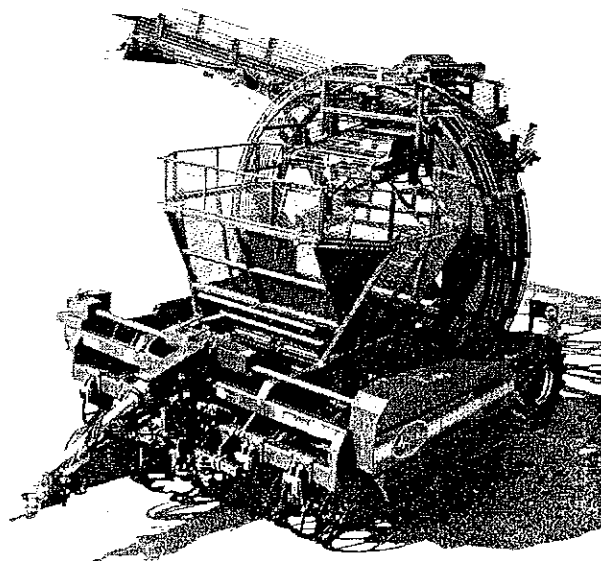




# *Model 697 Beet Harvester*



*Operator's Manual*

455670 (-)  
\$9.95

*Art's-Way Manufacturing Co., Inc.*



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# To the Owner

Congratulations on the purchase of your new Art's-Way 697 Sugar Beet Harvester. You have selected a top quality machine that is designed and built with pride to ensure you have many years of efficient, reliable service.

Many people have worked on the design, production, and delivery of this harvester. The information in this Manual is based on the knowledge, study and experience of these people through years of manufacturing specialized farming machinery. This Manual is designed to provide you with important information regarding safety, maintenance and machine operation so you can get the best possible performance from your harvester.

Even if you are an experienced operator of this or similar equipment, we ask you to **read this Manual before running this harvester**. The way you operate, adjust, and maintain this unit will have much to do with its successful performance. Any further questions you may have about this piece of Art's-Way equipment should be directed to your local Art's-Way dealer or to Art's-Way Manufacturing Co., Inc., Armstrong, Iowa, 50514, (712) 864-3131.

## **Specifications And Design Are Subject To Change Without Notice**

Art's-Way Manufacturing Co., Inc. is continually making product improvements. In doing so, we reserve the right to make changes or add improvements to our products without obligation for the equipment previously sold.

Because modifications to this harvester may effect the performance, function and safety of its operation, no modifications are to be made without the written permission of Art's-Way Manufacturing Co., Inc. Any modifications made without the written permission of Art's-Way Mfg. Co. shall void the warranty of this product.

In the interest of continued safe operation of this harvester, pay particular attention to the safety alert symbol throughout this Manual.

## **Art's-Way Manufacturing Co., Inc. Statement Of Product Liability**

Art's-Way Manufacturing Co., Inc. recognizes its responsibility to provide its customers with a safe and efficient product. Art's-Way attempts to design and manufacture its products in accordance with all accepted engineering practices in effect at the date of design. This statement should not be interpreted to mean that our products will protect against the user's own carelessness or failure to follow common safety practices, as set forth in this Manual, nor will Art's-Way be liable for any such act. In addition, Art's Way assumes no liability for product altered or modified in any way by users or anyone other than an authorized dealer.

## **Important Warranty Information**

The warranty for this harvester appears on page 7 of this Manual. In order to establish proper warranty registration, the Warranty Registration and Dealer Pre-Delivery Checklist must be completed and returned to the factory. Failure to comply with this requirement may result in reduced warranty allowances.

## **Limitations of this Manual**

This Manual contains operating instructions for your Model 697 Sugar Beet Harvester only. It does not replace the Manual(s) for any machine that it may be attached to or used with.

---

# Parts & Service

As the new purchaser of your Beet Harvester, it is very important to consider the following factors:

- A. **Original Quality**
- B. **Availability of Service Parts**
- C. **Availability of Adequate Service Facilities**

Art's-Way Manufacturing Co., Inc. has an excellent dealership network ready to answer any questions you may have about your harvester. Parts for your machine may be ordered through our dealers. When placing a parts order, please have the **model** and **serial** number ready. This will allow the dealer to fill your order as quickly as possible.

For your convenience, we have provided this space for you to record your model number, serial number, and the date of purchase, as well as your dealer's name and address.

**Owner's Name** \_\_\_\_\_

**Owner's Address** \_\_\_\_\_

**Purchase Date** \_\_\_\_\_

**Dealership Name** \_\_\_\_\_

**Dealership Address** \_\_\_\_\_

**Dealership Phone No.** \_\_\_\_\_

*Building on a*



*Tradition of Quality*

SERIAL NO.

MODEL NO.

*Manufactured By*  
*Art's Way Manufacturing Co., Inc.*  
*Armstrong, IA*

Enter the Serial Number & Model Number of Your Harvester In The Space Provided Above  
(The Serial Number is Located on the Left Front Corner of the Main Frame)

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# Table of Contents

<b>Limited Warranty .....</b>	<b>7</b>
<b>Safety First.....</b>	<b>9</b>
Notices of Danger, Warning, and Caution .....	9
<b>Safety Guidelines.....</b>	<b>10</b>
Before Operating .....	10
During Operation .....	10
Maintenance Safety .....	10
Hydraulic Safety.....	10
Transportation Safety .....	11
Storage Safety .....	11
Tire Safety .....	11
Assembly Safety.....	11
<b>Warning Decals .....</b>	<b>12</b>
Decal Locations.....	12
Decal Identification and Part Numbers .....	13
<b>Preparing for Operation.....</b>	<b>14</b>
Introduction.....	14
Beet Flow .....	14
Inspect the Beet Harvester.....	15
Tractor.....	15
Attaching To The Tractor.....	16
Adjust Row Spacing.....	20
Carrier Wheel Height Adjustments .....	21
Steerable Wheel Adjustments.....	21
Test Run The Harvester.....	22
Transporting.....	22
<b>Field Operation and Adjustments .....</b>	<b>23</b>
Machine Operation.....	23
Controlling Beet Flow .....	23
Operating Speeds .....	24
Machine Leveling.....	24
Lifter Wheel Spacing .....	24
Operating Depth .....	25
Row Finder Operation.....	25
Steerable Axle Operation .....	27
Flex Struts .....	28
Scrapers.....	28
Paddle Shaft Paddles And Barriers .....	29
Close-Up Attachments.....	29
Rock Cushions.....	29
Conveyor & Grab Roll Drives.....	30
Tilting Grabroll Bed .....	32
Paddle Shaft Slip Clutch .....	33
Tank Conveyor Chain Tension.....	33
Tank Conveyor Drive Chain .....	33
Holding Tank Discharge Gate.....	34
Front Tank Access Panel.....	34
Wheel Elevator.....	35
Wheel Elevator Alignment .....	36
Wheel Elevator Slip Clutch Adjustment.....	37
Stripper.....	37
Retainer .....	38

Tank and Truck Draper Chain Adjustments .....	39
Truck Elevator Boom Adjustments .....	40
Roller Chain Drives .....	41
Tire Pressure .....	41
Mounting tires .....	41
Tightening Wheel Bearings .....	41
Lug Nuts .....	41
<b>Lubrication and Storage .....</b>	<b>42</b>
General .....	42
Storage .....	46
<b>Pre-Delivery Checks .....</b>	<b>47</b>
Dealer Pre-Delivery .....	47
Unloading Beet Harvester .....	47
Assembly Safety .....	47
Assembly Preparation .....	48
697 Harvester Assembly .....	50
Steerable Axle Assembly .....	56
Hydraulic System .....	58
Work Light Installation .....	58
Safety Light Package Installation .....	59
Review The Machine .....	60
Attaching to the Tractor .....	60
Pre-Delivery Test Run .....	61
<b>Troubleshooting .....</b>	<b>62</b>
Basic Machine .....	62
Row Finder .....	64
<b>Specifications .....</b>	<b>65</b>
General Specifications .....	65
Tractor Requirements .....	67
Attachments .....	67

# Limited Warranty

**Art's-Way Manufacturing Co., Inc.** warrants the products it sells to be free from defects in material and workmanship for a period of one (1) year after the date of delivery to the first purchaser, subject to the following conditions:

- **Art's-Way Manufacturing Co., Inc.** obligation and liability under this warranty is to repair or replace (at the company's option) any parts which upon manufacture were defective in material or workmanship.
- All parts and repairs under this warranty shall be supplied at an authorized **Art's-Way Manufacturing Co., Inc.** dealer or at the factory, at the option of **Art's-Way Manufacturing Co., Inc.**
- **Art's-Way Manufacturing Co., Inc.** warranty does not extend to parts and elements not manufactured by **Art's-Way Manufacturing Co., Inc.** and which carry the warranty of the other manufacturer.
- Transportation or shipping to an authorized dealer for necessary repairs is at the expense of the purchaser.
- **Art's-Way Manufacturing Co., Inc.** makes no other warranty expressed or implied and makes no warranty of merchantability or fitness for any particular purpose beyond that expressly stated in this warranty. **Art's-Way Manufacturing Co., Inc.** liability is limited to the terms set forth in this warranty and does not include any liability for direct, indirect, incidental or consequential damages or expenses of delay and the Company's liability is limited to repair or replacement of defective parts as set forth herein.
- Any improper use, and maintenance, including operation after discovery of defective or worn parts, operation beyond the rated capacity, substitution of parts not approved by **Art's-Way Manufacturing Co., Inc.** or any alteration or repair by other than an authorized **Art's-Way Manufacturing Co., Inc.** dealer which affects the product materially and adversely, shall void this warranty.
- No dealer, employee or representative is authorized to change this warranty in any way or grant any other warranty unless such change is made in writing and signed by an officer of **Art's-Way Manufacturing Co., Inc.** at its home office.
- Some states do not allow limitations on how long an implied warranty lasts or exclusions of, or limitations on relief such as incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may have other rights which vary from state to state.

## Notes



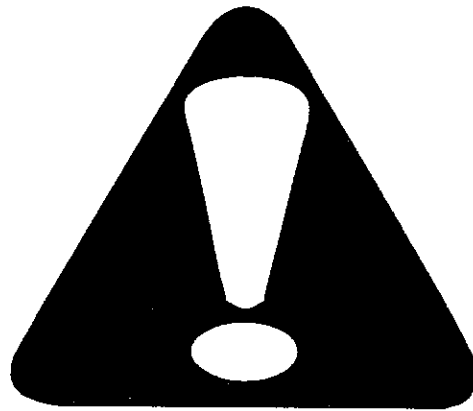
# Safety First

*"A careful operator is the best insurance against an accident."*

*National Safety Council*

Most accidents can be prevented if the operator:

- fully understands how the machine functions
- can anticipate situations which may produce problems
- can make necessary corrections before problems develop.



*Figure 1. The Universal Safety Alert Symbol*

The American Society of Agricultural Engineers has adopted the **UNIVERSAL SAFETY ALERT SYMBOL** (Figure 1) as a way to identify areas of potential danger if the equipment is not operated correctly. *Please be alert whenever you see this symbol in the Manual or on your harvester.*

Art's-Way Manufacturing Co., Inc. strives to make our equipment as safe as it can possibly be. The Art's-Way 697 Sugar Beet Harvester conforms to applicable safety standards at the time of manufacturing. A safety conscious equipment operator makes an effective accident-prevention program complete.

Safety features and instructions for the Art's-Way 697 Sugar Beet Harvester are detailed elsewhere in the Operator's Manual. It is the responsibility of the harvester owner to ensure that *all* operators read and understand the Manual before they are allowed to operate the machine. (*Occupational Safety and Health Administration (OSHA) regulation 1928.57*)

## Notices of Danger, Warning, and Caution

Watch for these words on harvester decals and in this Manual to alert you to important safety messages:



### **DANGER**

Immediate and specific hazard which will result in severe personal injury or death if proper precautions are not taken.



### **WARNING**

Specific hazard or unsafe practice **could** result in severe personal injury or death if proper precautions are not taken.



### **CAUTION**

A reminder of good safety practices. Personal injury could result if proper procedures are not followed.

# Safety Guidelines

**Remember:**

*"The Best Operator is a Safe Operator"*

## CAUTION

READ and UNDERSTAND the Operator's Manual and all the safety decals before operating the harvester. Review all safety instructions with all operators annually.

### Before Operating

- **Do not** wear loose fitting clothing as it may catch in moving parts.
- Make sure to install and/or secure all guards and shields, including the tractor power take-off master shield, before starting or operating the harvester.
- Be sure that the correct implement driveline parts are used and that they are properly secured.
- Lower the lifter wheels when the harvester is not in use.
- Install the safety chain when attaching the harvester to the tractor.
- Clear the area of bystanders, especially children, when making repairs, adjustments or performing maintenance on the harvester.
- **Do not** allow riders.
- Put all tractor and machine controls in "neutral" and disengage the PTO before starting. Follow the starting instructions according to your tractor Manual.
- Operate the harvester only while seated on the tractor seat.
- Make sure the unit is adequately supported with safety blocks or safety stands when changing tires or working on it.

### During Operation

- Keep hands, feet, hair and clothing away from moving parts.
- Keep all shields and guards in place and in good repair.
- Keep all children and bystanders away from the harvester while in operation.

- **Do not** allow riders while the harvester is in operation.
- **Do not** attempt to unclog, clean or adjust the harvester while it is running.
- Before servicing, adjusting, repairing or unplugging the harvester, stop the tractor engine, lower the machine to the ground, place all the controls in neutral, set the parking brake, remove the ignition key and wait for all moving parts to stop.
- Stay away from overhead power lines. Electrocution can occur even without direct contact.
- Keep all hydraulic lines, fittings, and couplers tight and free of leaks. (See the **Hydraulic Safety** section, below.)
- Be careful when ascending or descending on the harvester, wet shoes or boots are slippery.

### Maintenance Safety

- Follow all operating, maintenance and safety instructions found in this Manual.
- Before servicing, adjusting, repairing or unplugging the machine, always ensure that the tractor engine is stopped, the machine is lowered to the ground, all controls are placed in neutral, the parking brake is set, and all the moving parts have stopped.
- Use only the tools, jacks and hoists that are of sufficient capacity for the job.
- Use support blocks or safety stands when changing tires or working under the machine.
- Follow the good shop practices of keeping the service area clean and dry and use adequate light for the job at hand.
- Before applying pressure to the hydraulic system, make sure all lines, fittings and couplers are tight and in good condition.
- Make sure all shields/guards are in place and properly secured when maintenance work is complete.

### Hydraulic Safety

- Make sure components in the hydraulic system are kept clean and in good condition.
- Relieve pressure from the hydraulic circuit before servicing or disconnecting from the tractor.
- Keep all hydraulic lines, fittings, and couplers tight and free of leaks.

- Replace any worn, cut, abraded, flattened or crimped hoses.
- **Do not** make any temporary repairs to the hydraulic lines, fittings or hoses by using tape, clamps or cement. The hydraulic system operates under extremely high pressure and temporary repairs may fail suddenly and create a hazardous situation.
- Wear proper hand and eye protection when searching for a high-pressure hydraulic leak. Use a piece of wood or cardboard as a backstop instead of hands to identify and isolate a leak. If injured by a concentrated high-pressure stream of hydraulic fluid, seek medical attention immediately. Serious infection or toxic reaction can develop if hydraulic fluid penetrates the surface of the skin.
- Before applying pressure to the system, make sure all components are tight and that the lines, hoses and couplings are not damaged.

### Transportation Safety

- Be sure to comply with all local regulations regarding transporting equipment on public roads and highways.
- Make sure the Slow Moving Vehicle (SMV) emblem and all lights and reflectors required by local highway and transportation authorities are in place, clean and clearly visible to all oncoming or following traffic.
- **Do not** allow riders while transporting.
- Make sure the harvester is securely attached to the tractor and install a safety chain to the harvester.
- **Do not** fail to latch the tractor brake pedals together.
- **Do not** exceed 20 mph when transporting the harvester. Always reduce speed on rough roads and surfaces, or when going down inclines.
- Drive slowly when turning and always use turn signals on the tractor to indicate your turning intentions to the other traffic.
- The weight of the trailed machine should NEVER exceed the weight of the towing vehicle.
- Check clearances carefully wherever the machine is towed.
- Lower the elevator into the transport position before transporting the harvester on the highway.
- Stay away from overhead obstructions and power lines during transport. Electrocution can occur even without direct contact.

### Storage Safety

- Store the harvester in an area away from human activity.
- **Do not** permit children to play on or around the stored machine.
- Ensure that the harvester is stored in an area with a firm and level base to prevent the machine from tipping or sinking into the ground.
- Block the wheels to prevent the machine from rolling.

### Tire Safety

- Have a qualified tire dealer or repair service perform tire repairs.
- **Do not** attempt to mount a tire unless you have the proper equipment and experience to do the job.
- Follow proper procedures when mounting a tire on a rim to prevent an explosion which could result in serious injury.
- **Do not** substitute tires of lesser road rating and capacity for the original equipment tires.

## CAUTION

Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion which may result in serious injury or death. Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job. Have it done by your dealer or a qualified tire repair service.

### Assembly Safety

- Use adequate manpower to perform assembly procedures safely.
- Assemble the harvester in a area with sufficient space to maneuver the largest components and allow easy access to all sides of the machine.
- Use only forklifts, lift cranes, jacks and tools with sufficient capacity for the loads.
- **Do not** allow spectators in the working area.

**Remember:**  
*"The Best Operator is a Safe Operator"*

# Warning Decals

## Decal Locations

The different types of safety decals for your 697 Sugar Beet Harvester are illustrated on the following pages. Please familiarize yourself with the appearance of each decal, the warning it describes, and the area where it is located on the harvester. Refer to the diagrams below for decal locations. The 6 digit number following the description on page 13 is the part number of that decal. (This part number also appears in the lower right corner of the decal.)

Safety awareness is the responsibility of **each** operator of the harvester. Keep safety decals and signs clean and legible and, be sure the replacement parts display current safety decals and signs as well. **Remember: Always replace missing, damaged or illegible safety decals. New decals and signs are available from your dealer.**

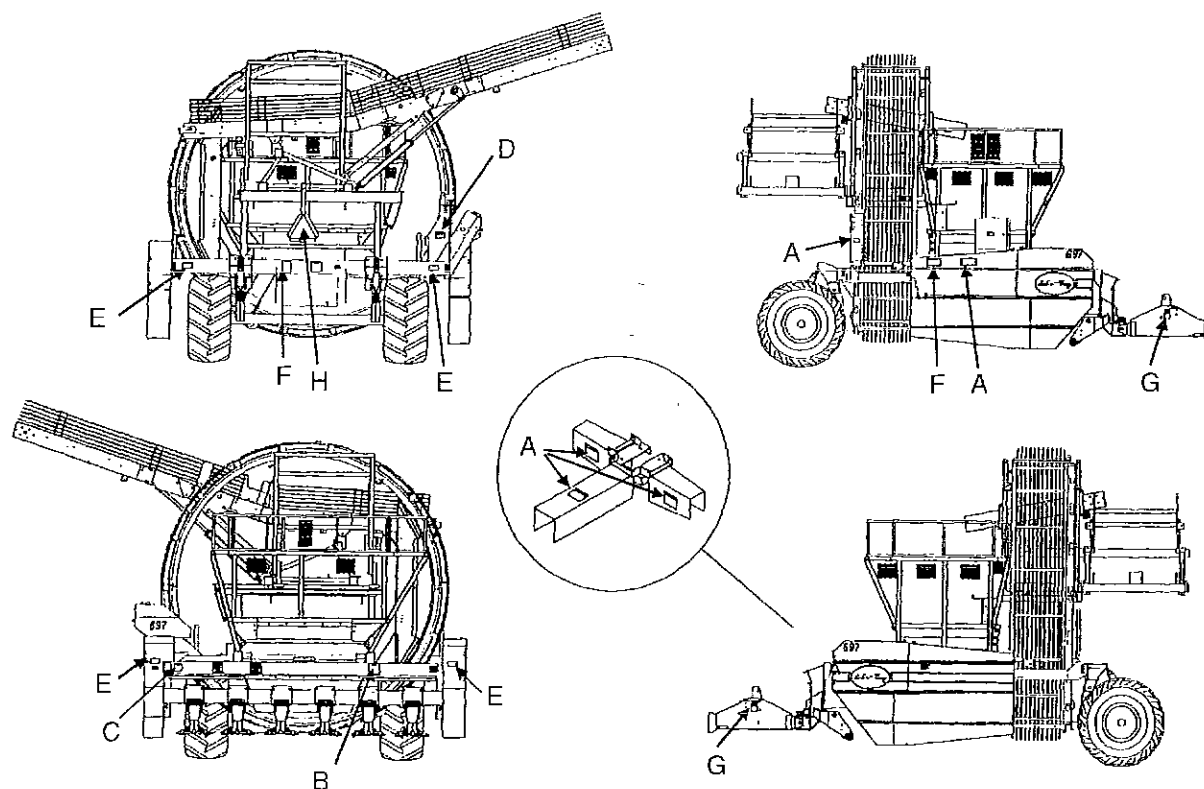


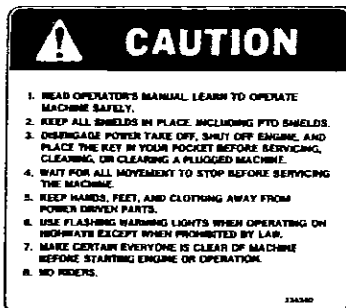
Figure 2. Model 697 Beet Harvester Safety Decal Locations

Table 1. Safety Detail Locations			
A	4	148190	Warning- Moving Part hazard
B	1	234340	Caution- Lists Eight Instructions
C	1	234350	Danger - Check for Clearance of Wires
D	2	E224071	Caution - Keep Hands Away
E	1	E224072	Warning - Don't Stand or Ride
F	3	E234360	Danger - Rotating Rolls
G	2	268860	Danger - Rotating Driveline
H	1	224138	Warning - Slow Moving Vehicle Sign

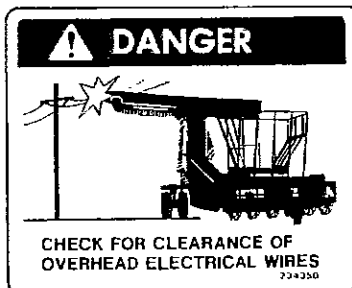
## Decal Identification and Part Numbers



A - "WARNING" - Moving Parts Hazard - Part No. 148190



B - "Caution" - Lists Eight Instructions. Part No. 234340



C - "DANGER" - Check for Clearance of Electrical Wires - Part No. 234350



D - "CAUTION" - Keep Hands Away. Part No. E224071



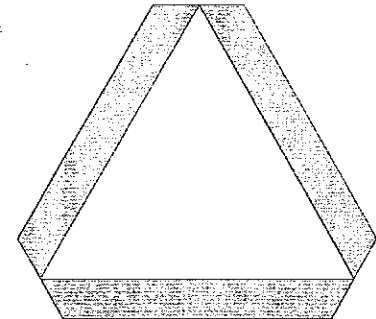
E - "Warning" - Don't Stand or Ride. Part No. E224072



G - "Danger" - Rotating Driveline. Part No. 268860



F - "DANGER" - Rotating Rolls. Part No. E224360



H - Slow Moving Vehicle Sign. Part No. E224138

Figure 3. Safety Decals

*Note: Keep all decals clean and free of dirt for maximum visibility. Replace any and all decals that are no longer legible. Read and obey all safety decals.*

# Preparing for Operation

## Introduction

This manual has been prepared to acquaint you with the proper assembly, operation, adjustment, service, and lubrication of the 697 beet harvester. Take time to better understand the efficient operation and care of your machine. Whenever the terms "Left" and "Right" are used, it should be understood to mean standing behind the machine and facing the direction of the forward travel.

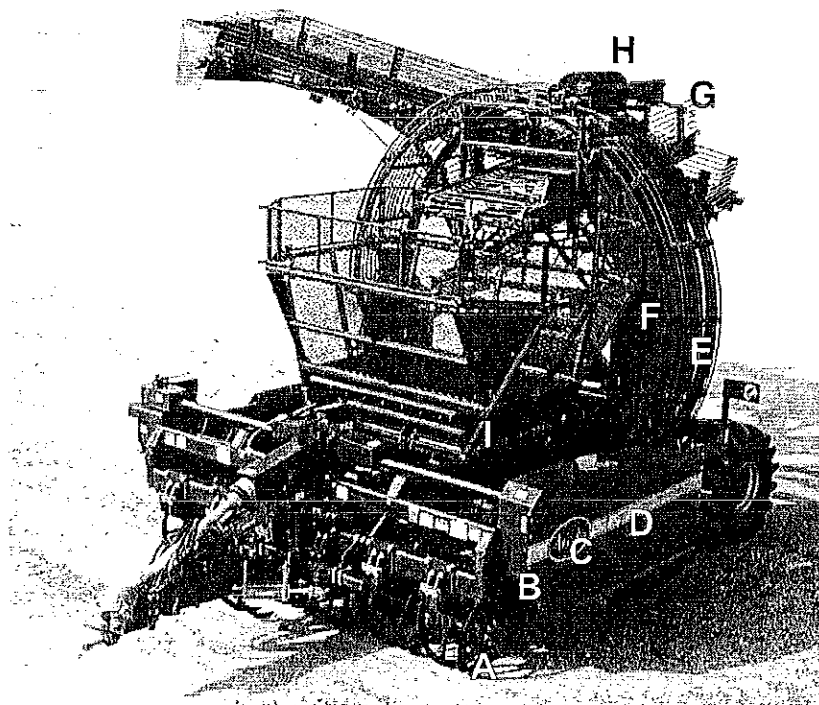


Figure 4. Beet Flow

## Beet Flow

The following is a step-by-step description of beet flow through the harvester. Refer to Figure 4.

The lifter wheels (A) penetrate the soil and lift the beets out of the ground.

The revolving steel/rubber paddles (B) at the rear upper quarter of the lifter wheels knock off dirt as they flip the beets onto the cleaning bed.

The forward section of the cleaning bed consists of conveyer rolls (C). The separation between the rolls sifts out dirt as the beets are carried back to the grab roll cleaning area (D).

Three spiral grab rolls are paired with three smooth rolls that strip dirt, soil, and trash from the beets as they are moved into the wheel elevator (E).

The wheel elevator revolves at approximately 11 RPM, (at 1000 PTO RPM) carrying the beets up

to the truck elevator. A retainer (F) holds the beets in the wheel until they reach the top, where the beets fall into the elevator (G). A stripper (H) clears the wheel of any rocks or beets that wedge between the elevator rods.

The belted chain conveyer delivers the beets to a truck or to the holding tank.

The tank bottom unloading conveyer (I) is actuated by a hydraulic motor - moving the beets into the wheel elevator and onto the truck elevator.

## Inspect the Beet Harvester

Generally inspect the machine for:

- Any loose bolts or set screws.
- Proper tensioning of all roller chains, drive belts and draper chains.
- Proper PTO installation.
- Proper installation of hydraulic cylinders and hoses.
- Electric wires and hydraulic lines are adequately secured to prevent damage.
- Oil level in gearbox up to fill plug.
- All shields and guards are in place.
- Proper installation of any options.
- Tires (21.5L-16.1 12 ply) inflated to 32 psi.

## Tractor

Art's-Way Sugar Beet Harvesters are designed to be used on large two-wheel drive or front-wheel assist agricultural tractors. To ensure good performance, the following requirements must be met:

**Horsepower** - In consideration of the size and weight of the harvester, we recommend that the harvester be operated with a tractor with 160 - 180 PTO horsepower. 160 PTO HP is the minimum requirement. This recommendation will provide the stability and control necessary for safe operation and highway transport.

**Drawbar** - Set the tractor drawbar at 16 inches from the end of the PTO to the center of the drawbar attaching hole for 1 3/8" PTO's, and at 20 inches for 1 3/4" PTO's. When connected to the tractor, the driveline should measure between 58 and 68 inches between centers of the universal crosses. Refer to Figure 6 and to Table 2, below.

Table 2. Drawbar and PTO Dimensions		
Dimension	Tractor PTO	Dimension
A	1 3/8" - 21 spline	16"
	1 3/4" - 20 spline	20
B	All	58" to 68"



Figure 5. Safety Chain Installed.

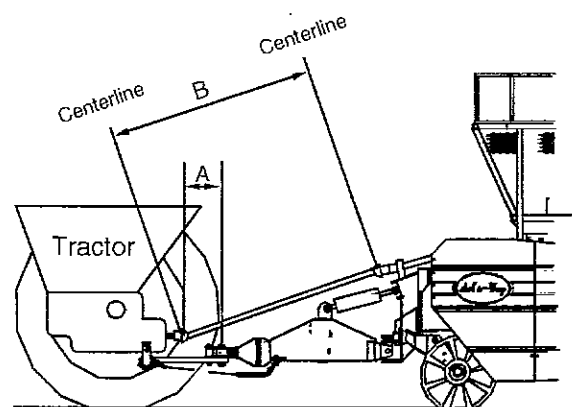


Figure 6. Drawbar Specification.

## NOTE

Use of an additional support for the tractor drawbar is recommended. An optional drawbar support kit is available from your Art's Way dealer.

**Power Take Off (PTO)** - Two PTO shafts are available; a 1000 RPM PTO shaft with a 1-3/8" diameter - 21 spline yoke, or a 1000 RPM PTO shaft with a 1-3/4" diameter - 20 spline yoke.

**Tractor Wheel Spacing** - Adjust the front and rear wheels of the tractor to fit the desired row spacing

**Tractor Hydraulics** - Install hydraulic hose ends to match the tractor.

## Attaching To The Tractor

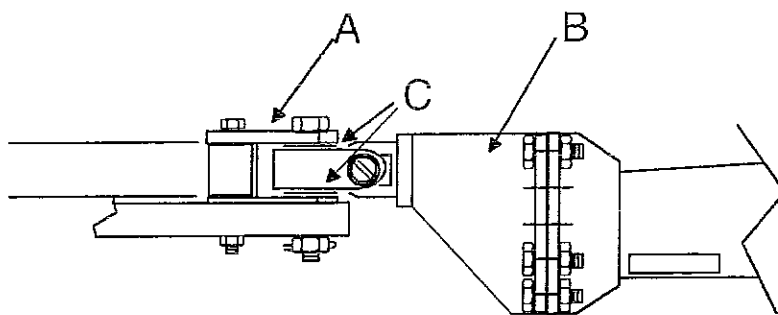


Figure 7. Drawbar Installation

When hooking the harvester to the tractor, refer to Figure 7 and the procedures below.

1. Clear the area of bystanders, especially small children.
2. Block the harvester wheels to prevent rolling.
3. Position the tractor near the harvester hitch.
4. Attach lift cylinder hoses to tractor outlets.
5. Activate the lift cylinder and lift the harvester hitch above the tractor hitch
6. Place all tractor controls in neutral, set the park brake and stop the engine. Remove the ignition key before dismounting.
7. Adjust the tractor drawbar. Refer to Figure 6 and Table 2 on the previous page.
8. Attach the harvester to the tractor with yoke weldment (Figure 7-A) and bolts provided. Be sure to install the hardened washers (C) between the yoke and the tractor drawbar. The existing tractor clevis may be used if a 3" spacing can be maintained. If the tractor drawbar mounting hole is smaller than 1 3/8", a 1 1/4" pin is available from your Art's Way Dealer (AW Part No. 456220). If the tractor drawbar mounting hole is larger than 1-3/8", a bushing should be installed.
9. Cycle the lift cylinder and observe the lift height. Reposition the front bolt-on hitch (Figure 7-B) to obtain the desired lift height, while still allowing adequate penetration into the ground.
10. Install the safety chain from the loop on the harvester tongue to the tractor drawbar. See Figure 5.
11. Connect the PTO driveline to 1000 RPM tractor PTO shaft. The required PTO length is shown in Table 2 on the previous page.

**NOTE:** The hitch must have at least 3 bolts installed on each side (total of 6 bolts).

**NOTE:** Additional support for the tractor drawbar is recommended.



12. The Art's-Way 697 Beet Harvester requires four (4) tractor hydraulic circuits to operate. Connect the tractor hydraulics according to the appropriate list that follows, starting with the tractor's priority valves first.

***NOTE:** It is very important to have the lift and main valve on the number one and number two priority valves. Adjust the flow at the tractor to the minimum required to operate all functions.*

13. Connect tractor hydraulics to the harvester as follows:

**With Fixed Carrier Wheels:**

- A. Lift of front of machine.
- B. Main Valve:
  - Truck boom - raise & lower.
  - Tank elevator.
  - Truck elevator.
  - Tank conveyor
- C. Override side shift.
- D. Row finder valve.

**With Steerable Carrier Wheels:**

- A. Lift of front of machine.
- B. Main Valve:
  - Truck boom - raise & lower.
  - Tank elevator.
  - Truck elevator.
  - Tank conveyor
- C. Steering and Override side shift.
- D. Row finder valve.

***NOTE:** The lift function needs to be connected to the priority outlet of the tractor.*

14. With the hitch pointed straight forward, adjust the side shift cylinder attaching bracket so that the cylinder is in the center of its stroke.

15. Lift the harvester and then cycle the row finder cylinder by moving the row finder arms from side to side. The harvester should move in the same direction as the row finder arms.



**CAUTION**

Keep clear of the machine as it shifts sideways.

### Electrical Controls:

1. Install the control box in the cab of the tractor and connect the power cord to a suitable 12 V power supply as shown in Figure 8. (White to Positive, Black to Negative).

**Important:** The control box *must* be hooked to a 12V power source.

2. Route the main wiring harness through the cab and connect the wires to the control box according to the color of the wires and the color code on the box. See Figure 9.
3. Connect the running lights to the appropriate circuit of the 7 connector plug provided with the hazard lights. See page 59.
4. Connect the control box wiring harness and the valve wiring harness with the 10 connector plug. Make sure all the wires have been properly routed and connected.

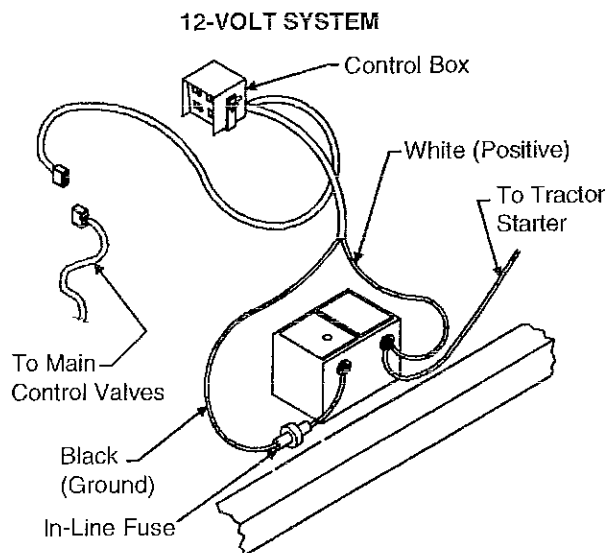


Figure 8. Control Box Power Connection

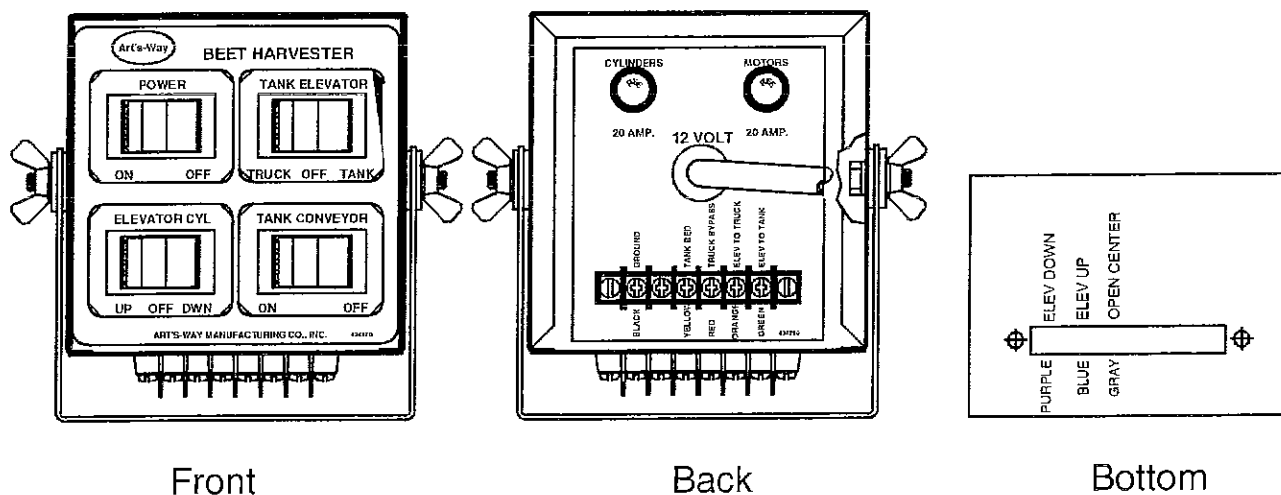


Figure 9. Control Box Wiring

## Wiring Harness and Solenoid Valves

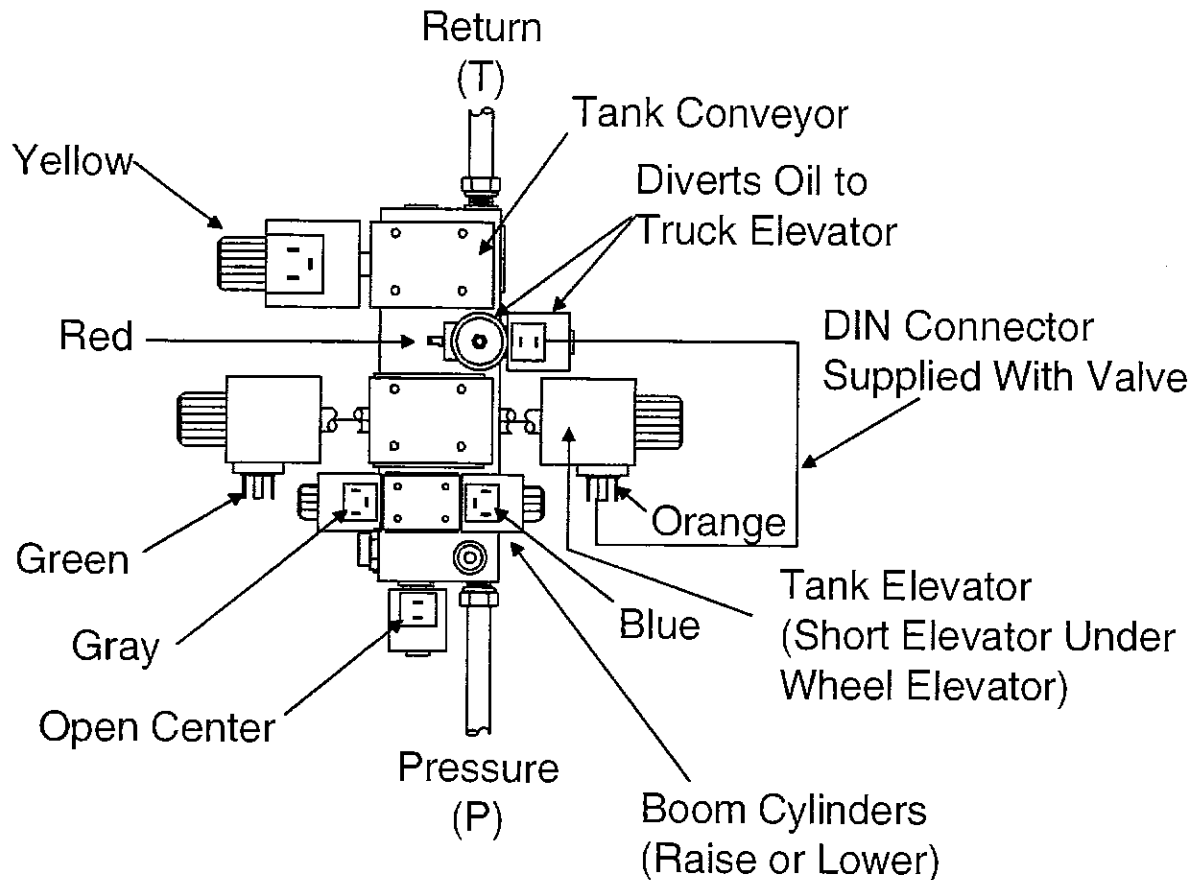


Figure 10. Wiring and Hydraulics

For the procedures below, refer to Figure 10. For a more detailed illustration of the system, refer to Figure 69 on page 53.

1. The solenoid valve on the bottom of the main valve was installed as standard equipment on the 697. This valve provided OPEN center operation on the system. This is for the newer tractors that have the load sense system. Special plugs can be obtained to switch this to closed center.
2. The pressure side of the valve is identified in Figure 10 as (P). The tractor valve must be set to provide pressure to this port in the valve.

**NOTE:** For all older tractors with a true closed center system; the closed center plug must be installed.

## Adjust Row Spacing

Refer to Figure 11 to determine the settings for lifter wheels. Make all measurements for setting lifter wheels from the centerline of the front of the machine to the pinch point on the lifter wheels. Set all lifter wheels at the exact row widths on either side of centerline. Double check the settings.

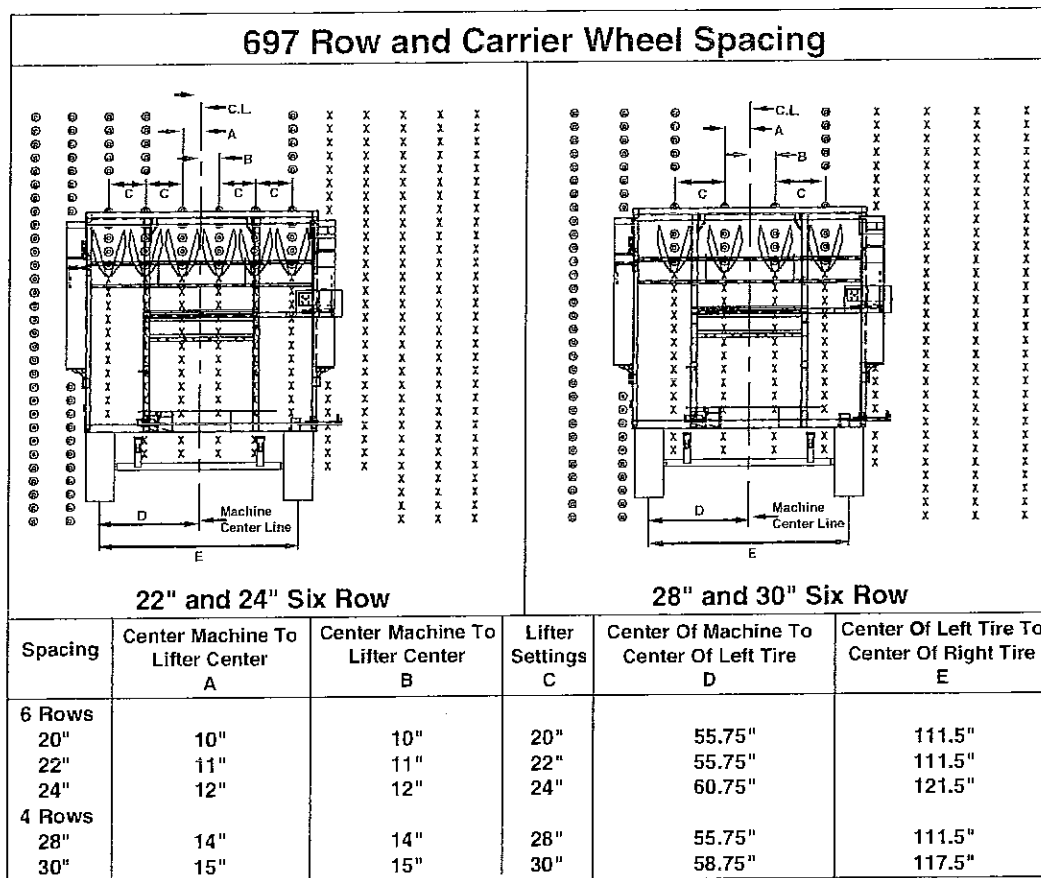


Figure 11. Row and Carrier Wheel Spacing

## Carrier Wheel Spacing Adjustment

The lateral position of the steerable carrier wheels is preset at the factory, they are not adjustable from side to side.

The wheels on the fixed carrier may be moved in or out by means of the multiple holes in the spindles.

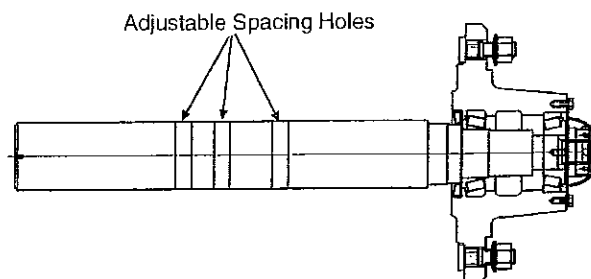


Figure 12. Fixed Carrier Wheel Spindle Adjustment.

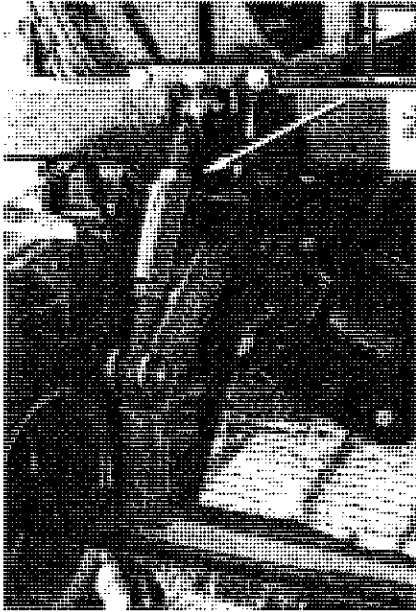
## Carrier Wheel Height Adjustments

It is very important that the harvester frame, in the digging position, run as level as possible from side to side.

### CAUTION

While working on the machine be sure to work safely. Use adequate blocking. Use adequately rated lifting devices. Make sure parts are secured before working under or near them.

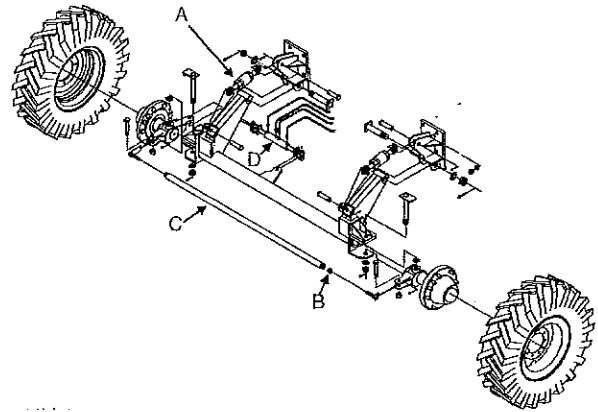
1. To adjust the height, alternately turn the screw jacks (see Figure 13 and Figure 14-A) in small amounts on each side until the desired position is reached.



*Figure 13. Carrier Wheel Height Adjustment (For Both Fixed and Steerable Wheels; Fixed Wheels Shown)*

## Steerable Wheel Adjustments

1. To adjust tires to parallel: loosen the jam nut (Figure 14-B) that is located on one end of the tie rod (Figure 14-C). Rotate the tie rod until the tires are aligned and then tighten the jam nut. Allow a slight tow in.
2. To adjust the tires to straight ahead: remove the yoke pin at the adjustable end of the cylinder (Figure 14-D). Loosen the locknut on the cylinder rod and turn the yoke to set the direction of the tires. Tighten the jam nut on the yoke.



*Figure 14. Steerable Carrier Wheels*

- A) Screw Jacks
- B) Jam Nut
- C) Tie Rod
- D) Steering Cylinder

## Test Run The Harvester

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### CAUTION

Before running the harvester, keep all children and bystanders away from the machine.

---

1. With the tractor running at low RPM, engage the PTO and check operation of the machine. Slowly increase the RPM to the proper operating speed of 1000 PTO RPM.
  2. Check the operation, alignment and clearances of all moving parts. Make any necessary adjustments.
- 

### CAUTION

Stay clear of moving parts. Before making adjustments, shut off the tractor, place all controls in neutral, set the parking brake, and remove the key. Wait for all movement to stop before approaching the machine.

---

3. The first operation of the hydraulic control valve circuit must be to raise the truck elevator to the operating position (the elevators must be off). Raise and lower the elevator boom several times with the tractor at idle. The other hydraulic functions of the control box are tank elevator, the truck elevator, and tank conveyor. The tank elevator runs both directions. The truck elevator stops when the tank elevator is turning forward (toward the tank). The truck elevator runs when the tank elevator is turning rearward (toward the truck elevator). Finally activate the tank conveyor. The tank conveyor will only function if the tank elevator is running or if the tank conveyor switch is on and the truck boom is being raised or lowered.
4. Check the oil level in your tractor after filling the hydraulic lines for the first time.
5. The flow of oil to the control valve circuit is regulated to 14 GPM. It is recommended this flow be reduced to the range of 10 to 12 GPM with the flow control on the tractor. Reduce the flow until the motors just start to slow down, then reduce the flow a bit more. The flow rate can then be adjusted (slightly) under operating conditions to a speed the operator is comfortable with.

6. Run the machine for 10 to 15 minutes. Then, check the machine for any loose hardware and check drive belt tension.

## Transporting

---

### CAUTION

Be sure to use safety lights that are provided with this equipment when towing on public roads. Be sure to comply with all regulations for your specific region regarding transportation of this equipment.

---

1. The tractor hitch *must be* securely installed.
  2. Attach a safety chain to the tractor and to the tongue of the harvester as shown in Figure 5.
- 

### CAUTION

A safety chain will help control drawn equipment should it accidentally separate from the drawbar while transporting. Using the appropriate adapter parts, attach the chain to the tractor drawbar or other specified anchor location. Provide only enough slack in the chain to permit turning.

---

3. Know the transport height and width of your harvester. With the truck boom folded, the transport height is 13' 8" and the width is 14' 5" (See the specifications on page 65).
4. Lower the truck elevator before transporting.
5. The harvester weighs approximately 9.5 tons *empty* and up to 15 tons when loaded. Transport when empty, if possible.
6. Raise the lifter wheels.
7. Never tow the harvester faster than 20 mph.
8. The harvester is equipped with safety lights, a SMV emblem, (2) red reflectors mounted on the rear, and two (2) amber reflectors mounted on the left and right sides. Keep the reflectors clean and visible at all times.
9. Turn safety lights on when on public roads. Refer to the Caution at the beginning of this section.

It is important that the Harvester be operated and adjusted correctly. The following section on "*Field Operation and Adjustment*" explains how to get the best service out of the machine.

# Field Operation and Adjustments

## Machine Operation

The 697 Sugar Beet Harvester utilizes the revolutionary rear wheel design for harvesting sugar beets faster, easier, and more profitably. This design incorporates the superior pinch point lifter wheels to squeeze the ground and elevate the whole beet out of the ground. The beet size can be matched with adjustments to pinch point height or width and with close-up adjustments to minimize beet loss. A steel paddle shaft moves beets from the lifter wheels through the rubber curtains and onto the cleaning bed rollers. The nine adjustable spiral and smooth rollers move the beets back and forth across the bed to the rear. The rear mounted wheel elevator elevates the beets directly to the bi-directional tank elevator, which carries the beets either to the truck elevator or to the holding tank for temporary storage.

The 697 Beet Harvester pulls straight through the field with its center mounted hitch and provides improved balance through its rear wheel design. The heavy duty axle has optional rear steering available for operation in tight head lands.

The 697 Beet Harvester is designed for simplicity and trouble free operation. Art's-Way Manufacturing Co., Inc. has provided a wide range of adjustments on this machine to allow the best operation under various operating conditions. Daily monitoring of the settings during harvest must be done for optimum performance. When field or crop conditions change, re-check your harvesting operation and adjustments. The following explains the operation and adjustment of the machine. See your dealer if questions arise.

## CAUTION

Keep well clear of moving parts. Be sure to shut off the tractor, set the parking brake, put the machine in neutral, and remove the tractor key while making adjustments. Wait for all movement to stop before approaching the machine.

## Controlling Beet Flow

Beets are loaded into the tank or truck by the tank elevator and the truck elevator, which are powered by hydraulic motors. Be certain that the truck elevator is raised into position and locked before operating the hydraulic motors.

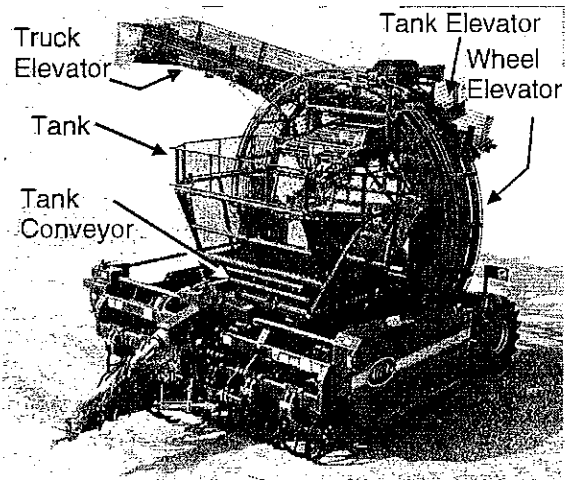


Figure 15. Basic Operations

To **load directly into the truck**, first activate the switch labeled TANK ELEVATOR in the direction marked TRUCK. This will start the hydraulic motors for the elevator over the tank and the truck elevator. The tank elevator will move the beets to the truck elevator, which carries the beets to the truck.

To **fill the holding tank**, activate the switch labeled TANK ELEVATOR to the TANK position. This will reverse the hydraulic motor on the tank elevator, and shut off the hydraulic motor on the truck elevator.

To **empty the holding tank into the truck**, activate the switch labeled TANK ELEVATOR to the TRUCK position. This will start the hydraulic motors on both the tank elevator and the truck elevator. Then activate the switch labeled TANK CONVEYER to the ON position. This will start the hydraulic motor on the bed of the tank. The tank conveyor will move the beets into the wheel elevator which carries them up to the tank elevator. The tank elevator will then move the beets onto the truck elevator which carries the beets to the truck. When the tank is empty, turn off the tank conveyor switch.

## Operating Speeds

The recommended ground speed is 3.5 - 4 mph. Adjust the speed to your conditions.

Maintain the full 1000 RPM output at the PTO shaft.

*Note: The 697 beet harvester is equipped with a constant velocity PTO. For "normal" turns, slow the PTO to approximately 600 RPM or less. When making sharp turns, it is recommended that the harvester be shut off.*

Always engage the PTO with tractor at low RPM and "run-up" to full RPM gradually.

Be sure the tractor drawbar is set as specified in Table 2 on page 15.

## Machine Leveling

*It is very important that when the harvester frame is in the digging position, it is as level as possible from side to side.*

Set the front of the harvester so maximum lift for transport is maintained and still allows for lowering into the ground as far as necessary. If necessary, separate the two hitch halves and offset them in order to achieve the proper height as shown in Figure 16. Note that at least three bolts must remain in each side of the hitch (total of six bolts).

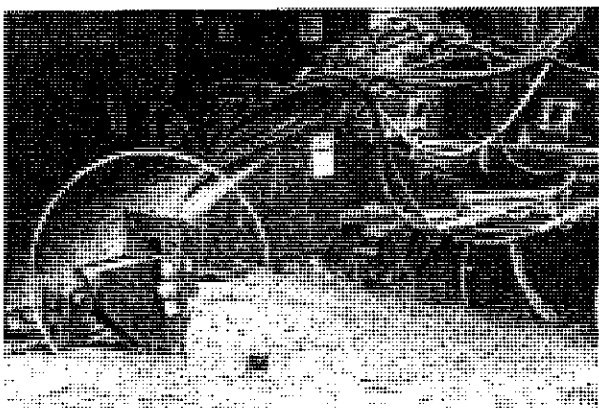


Figure 16. Front Hitch Adjustment.

## Lifter Wheel Spacing

Make sure the lifter wheels are located at the proper row widths (**measurement to be taken at the pinch point**) to prevent slicing and breaking the tails off beets.

**Spacing Adjustments** - Refer to Figure 17. Loosen strut mounting L-bolts (A); paddle bolts (B); and the bolts holding the barriers (C). Slide all to the proper row spacing. Tighten all bolts equally. Make sure all bolts are tightened to the correct torque. Refer to the torque guidelines in Table 4, page 49.



Figure 17. Lifter Wheel Spacing and Related Adjustments.

- A) L-Bolts
- B) Paddle Bolts
- C) Barrier Bolts

**Pinch Point** - The distance between each pair of lifter wheels can be increased to accommodate larger beets, or decreased for smaller beets. Lifter wheel spacing is adjusted by inserting or removing spacers between the lifter wheel and the hub. See Figure 18. Set the spacing at the widest position to prevent beet damage. Whenever the lifter wheel pinch point is adjusted, also, adjust the scrapers.



Figure 18. Lifter Wheel Adjusting Shims.



## Operating Depth

As a starting point, the lifter wheels should be set to dig approximately 2" to 3-1/2" deep. This setting will change with soil conditions. Set the lifter wheels to run as shallow as possible to prevent lifting excessive amounts of dirt and to reduce power requirements. To prevent breaking the tails of the beets in extremely hard ground, first add shims to widen the lifter wheels before you try deeper settings. Set the stop on the lift cylinder to help maintain the proper digging depth.

### Procedure for finding the correct depth.

1. Be sure the harvester is not digging across guess rows between rounds.
2. Begin digging as deep as necessary to keep from breaking beet tails.
3. Raise lifter wheels gradually until some beet tail breakage occurs.
4. Lower lifter wheels about 1/4".
5. Set lift cylinder stop to maintain this depth.

### Cylinder floatation in rocky conditions.

In rocky conditions, it is strongly recommended that the lift cylinder be allowed to float in the running position. To do this, the cylinder depth must be set with stops. If your tractor has a valve with a float position, connect the lift cylinder to this circuit and make sure the control lever is in the float position when the harvester is in the ground. If your tractor does not have a float valve, a single hose must be plumbed to the lift side of the lift cylinder and the other side of the cylinder must be equipped with a breather (allowing air to enter and escape). Consult your Art's Way dealer for the best method to accomplish this.

## Row Finder Operation

The optional row finder helps keep your harvester on the rows. The feeler arms (Figure 19-A) rest astride the row (B) and follow the line of beets - sensing any changes in the direction of the row or the position of the harvester. Sideward movement of the feeler arms actuates the hydraulic valve (C), which controls oil flow to the row finder steering cylinder.

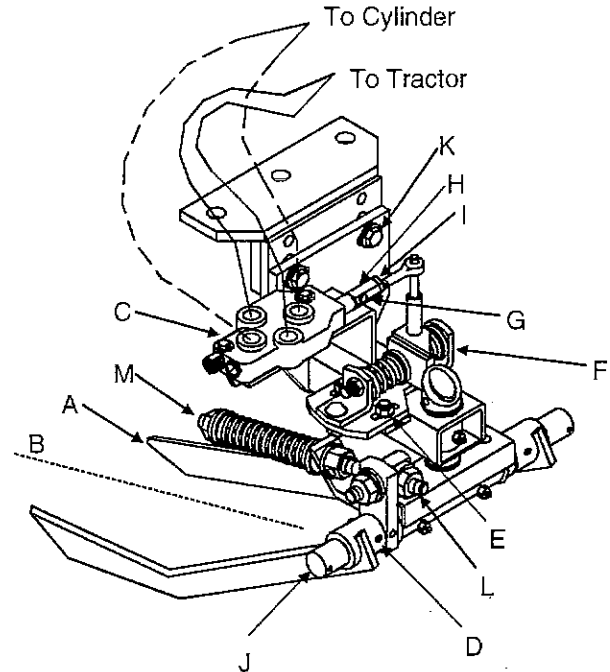


Figure 19. Row Finder.

The row finder steering cylinder extends or retracts according to the action of the feeler arms, steering the harvester back onto the row. A manually controlled hydraulic override function allows the operator to steer the harvester - which is particularly helpful when entering rows.

Be sure the row finder hoses are connected properly. *The harvester should move in the same direction as the tips of the arms.*



## CAUTION

Keep clear of the machine as it shifts sideways.

## Adjustments

The row finder is adjustable to beet size, bed height, operating depth and soil conditions. Correct adjustment of the row finder and a good understanding of the importance of each adjustment will provide maximum satisfaction during field operation.

Beets must be harvested in the same multiple as they are planted.

Make the following adjustments as necessary to meet crop and field conditions before taking the machine to the field.

### CAUTION

Be sure to raise the harvester when backing up so the row finder is not damaged.

#### 1. Feeler Arm Spacing

For this adjustment, refer to Figure 19. The feeler arms should be set so the largest beets will just pass through the opening, between the tips, while just touching each arm. To adjust the arms, remove the spring pins (D), set both arms at the same distance from the center line of the row for the desired width setting, then install the spring pins.

#### 2. Feeler Arm Centering

Refer to Figure 19. The horizontal shaft (J) in the row finder must be parallel with the front of the harvester frame to function accurately. Remove pin (G) and loosen the nuts (E), then slide the plate (F) until the shaft is parallel with the frame. Tighten the nuts.

The hydraulic control valve must be centered each time the shaft (J) is adjusted. Loosen lock nut (I), adjust nut (H) until pin (G) can be inserted freely through nut (H) and valve spool. Tighten the lock nut (I) and check to be sure the pin is still free.

The feeler arms must be centered with the gap between the lifter wheels to function accurately. To adjust, loosen bolts (K) and slide the entire assembly in the mounting slots until they are centered. Tighten the bolts.

#### 3. Row Finder Height

Set the row finder height in correct relationship to the lifter wheel working depth to assure proper function. Example: If the lifter wheels will work at a depth of 3", the bottom edges of the feeler arms should be about 3" above the rims of the lifter wheels when operating in the rows. See the Figure below.

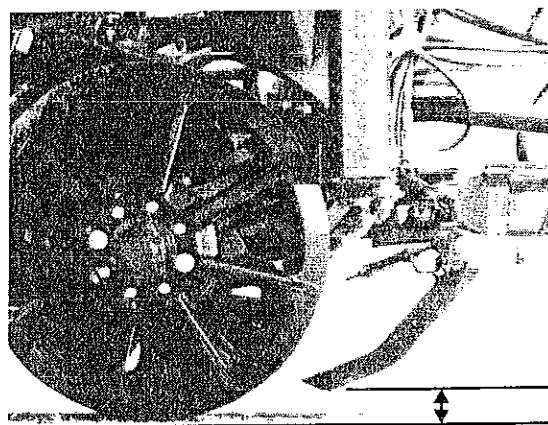


Figure 20. Row Finder Feeler Arm Height Adjustment

The feeler arms should ride along the surface of the ground or just slightly penetrating the surface.

To change the row finder height by more than 1", remove the four (4) bolts (Figure 19-K) attaching the row finder frame to the support plate. Bolt the row finder to the holes that provide the desired operating height. Tighten the bolts.

**NOTE:** For less than 1" height adjustments, raise or lower the feeler arms by adjusting nuts (Figure 19-L).

#### 4. Feeler Arm Down Pressure

The down pressure of the row finder is factory set at a spring length of 4-1/4". If the beet crowns are below the ground surface, adjust down pressure so the row finder arms penetrate the soil. To increase the down pressure, turn lock nut (Figure 19-M) to compress the spring.

## 5. Row Finder Steering Cylinder

The row finder steering cylinder (Figure 21-A), is activated by the row finder or by the operator with the tractor control valve.

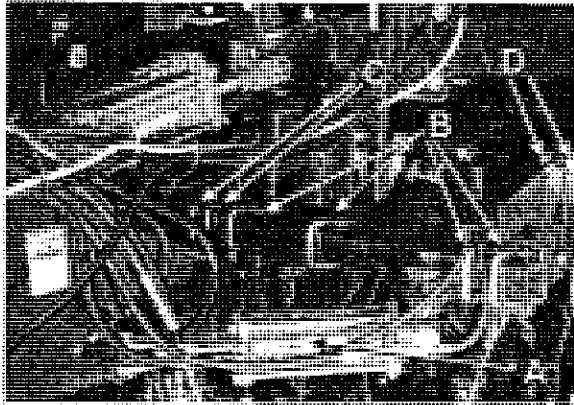


Figure 21. Row Finder Details

- A) Cylinder
- B) U-Bolts – Tube to Hitch
- C) U-Bolts – Row Finder
- D) U-Bolts – Brace to Frame

The main frame attaching bracket of the row finder steering cylinder can be moved left or right to enable use of the full stroke of the cylinder.

If the tractor must be set to straddle three rows, the tongue must be offset 11" for 22' rows or 12" for 24" rows.

To adjust the bracket position, refer to Figure 21 and perform the following:

1. Set the cylinder (A) in the center of its stroke.
2. Loosen the 4 U-bolts (B) that secure the 3x3 tube to the hitch.
3. Loosen the 2 U-bolts (C) that secure the row finder.
4. Loosen the 2 U-bolts (D) that attach the outer tube brace to the frame.
5. Move the tongue to the desired offset and retighten the U-bolts.

For offsetting one half row on 24" rows (tractor straddling three rows), move the tractor to the right.

## Steerable Axle Operation

The steering control box is used as a function *selector* rather than a function *actuator*. It offers the options of centering or turning as well as overriding the row finder steering cylinder. Once a function has been selected, the tractor remote lever must be activated to operate the selected function.

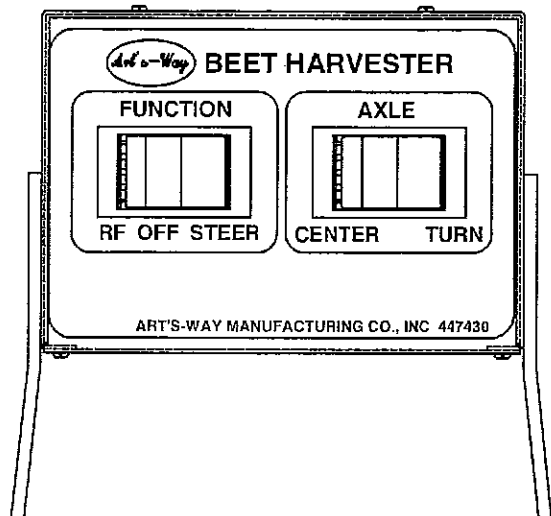


Figure 22. Steering Control Box

**Row Finder** - To operate the row finder override function, activate the switch labeled FUNCTION to RF, then engage the tractor remote lever. This will allow the row finder steering cylinder on the front hitch to move the machine to the desired position.

**Steering** - When turning on the ends of the field, activate the switch labeled FUNCTION to STEER. Then activate the switch labeled AXLE to TURN and engage the tractor remote lever. This will allow the rear axle steering cylinder to turn the harvester in the desired direction.

**Centering** - To center the harvester rear axle, with the FUNCTION switch still on STEER, activate the AXLE switch to the CENTER position. Operation of the tractor remote lever will center the rear axle.

**Note:** The harvester will center regardless of which port is energized by the tractor remote lever. When not using one of the steering control box functions, return the tractor remote lever to the neutral position.

## Flex Struts

In rocky conditions, flex lifter wheel struts are recommended. These struts are mounted with flex cushions that help absorb shock loads as large rocks are encountered. They flex to allow the strut to roll up over the rock. The lifter wheels are also protected by cushions that allow the wheels to open up when a rock is wedged into the pinch point. (See the following page for information on the rock cushions.)

As a starting position, set the flex strut cushions at 2-7/8" (actual cushion length). Adjust to match conditions as necessary. Flex strut cushions may need to be adjusted to 2-3/4" - 2-5/8" to reduce the amount of flexing on hard ground.

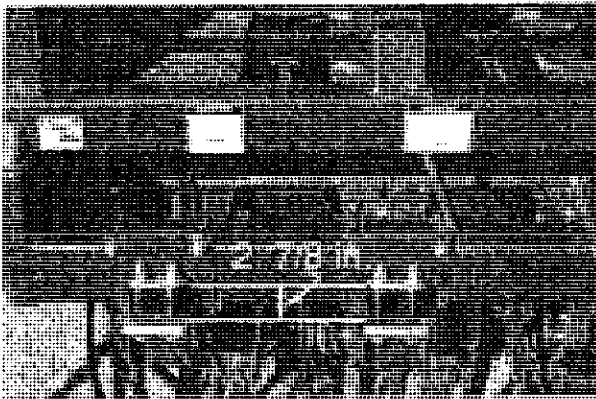


Figure 23. Flex Lifter Wheel Struts

## Scrapers

Wheel scrapers (see Figure 24) keep dirt and trash from building up on the lifter wheel hubs. Shim the scrapers so they just clear the hub and lifter wheel. Check the scrapers frequently and clean off any accumulated mud and trash.

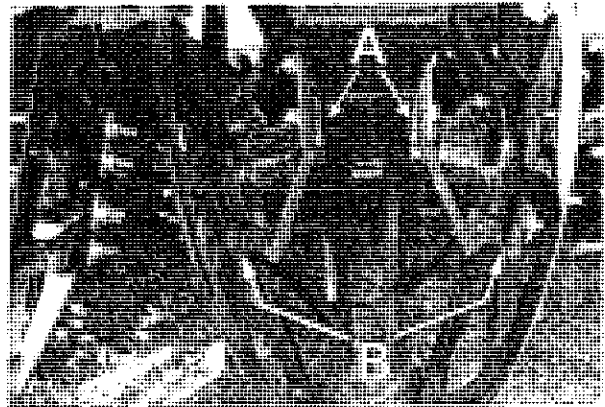


Figure 24. Lifter Wheel Detail.

A) Shims

B) Required Clearance

## Paddle Shaft Paddles And Barriers

The rubber paddles may be removed if desired (except when flex struts are used). If removed, reposition the paddle shaft by lowering it to the bottom set of bearing holes. This will keep the paddle tips in their correct relationship.

To adjust the paddles, first loosen the bolts (Figure 25-A). Adjust the split paddles outward to just clear the lifter wheels when the machine is running in muddy conditions. In this position, the paddles help keep the lifter wheels clean. In rocky conditions, some space must be left to prevent rocks from wedging.

Be sure the paddles are positioned around the paddle shaft so adjacent paddles contact beets at 45 degree intervals. This avoids excessive shock loads to the paddle shaft and drives.

When flex lifter wheel struts are used, the paddle shaft bearings must stay mounted in the top holes, and rubber paddles are attached to the steel paddles. With the paddle shaft in the top holes, the lifter wheel struts can flex without hitting the paddle shaft. The rubber paddles are added to bring the active tips of the paddles to the desired positions.

To adjust the barriers, loosen the U-bolts (Figure 25-B); center the barriers between the lifter wheels; then tighten the U-bolts.

The rubber flaps (Figure 25-C) located above the paddles, are *only* effective when they are centered over the paddle clusters and routed over the round tube.

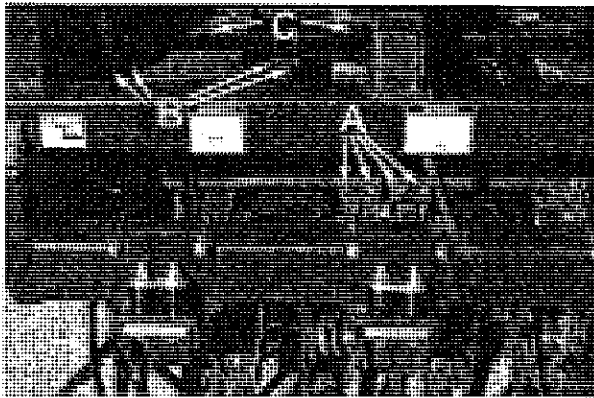


Figure 25. Barrier Adjustment (Shields Removed For Clarity)

## Close-Up Attachments

Optional wheel close-ups (Figure 26-A) are available to prevent small beets from falling out between the lifter wheel spokes. Slot adjustments are provided on the close-ups so they may be rotated out of the way as conditions warrant.

## Rock Cushions

Optional rock cushions (Figure 26-B) are available (standard on machines with flex struts) that allow the lifter wheels to spread apart when rocks are pinched between the wheels. The cushions are recommended where many small (baseball size) rocks are in the field. If large rocks are also present, the addition of flex struts is recommended. The lifter wheel cushions should be compressed to a height of 1-inch, including the washer.

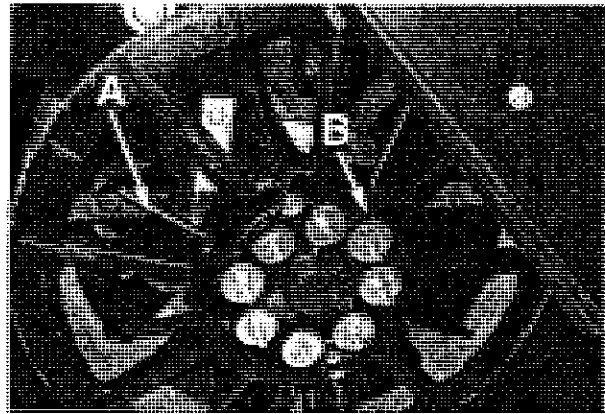


Figure 26. Lifter Wheel Options

A) Close-Ups

B) Rock Cushions

## Conveyor & Grab Roll Drives

The harvester's grab rolls and conveyor rolls are operated by drive mechanisms located behind the hinged panels on each side of the harvester.

- A 4-band V-belt drives the rollers on the right side of the harvester (Figure 27).
- A 6-band V-belt drives the rollers on the left side of the harvester (Figure 28).

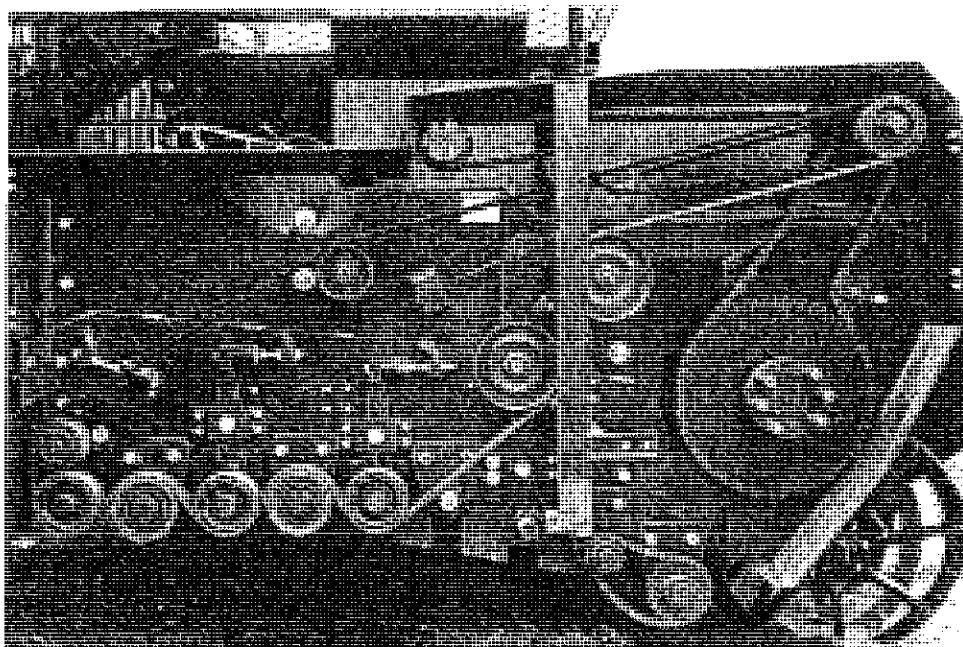


Figure 27. Right-Hand Drive Mechanism (Shields Removed For Clarity)

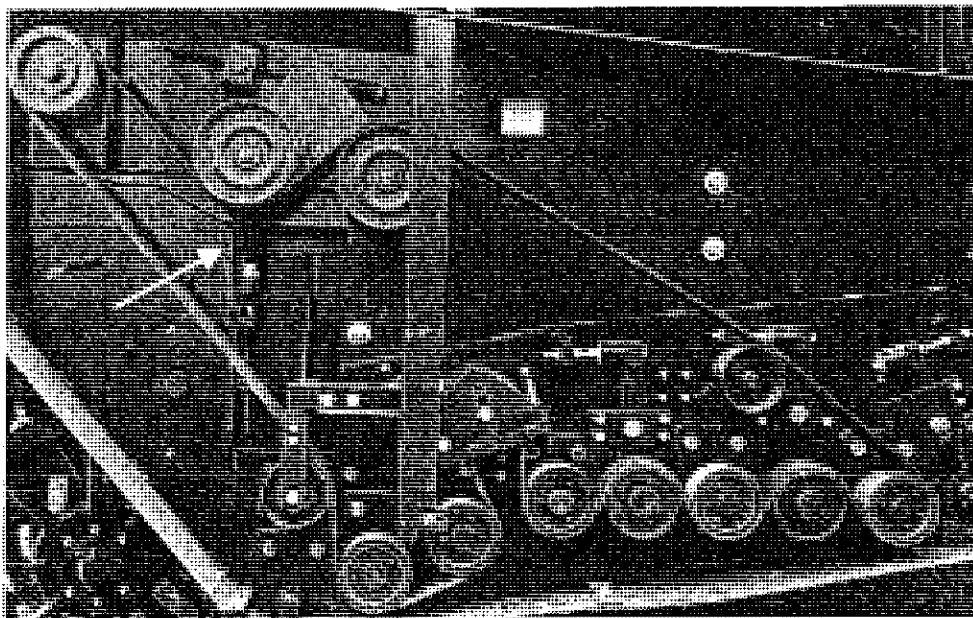


Figure 28. Left-Hand Drive Mechanism (Shields Removed For Clarity); Arrow Shows Assist Spring (Left-Hand Drive Only)

## Drive Belt Tension

Drive belt tension is adjusted with idlers on each side of the harvester. The idler springs (Figure 29) on both the right and left-hand drives should be set to 4-1/2" length. Check the tension regularly and tighten if required. The assist spring (indicated by the arrow in figure 28) should be set at a length of 13 1/2 " from the coil ends. Set this spring after adjusting the primary drive tension spring.

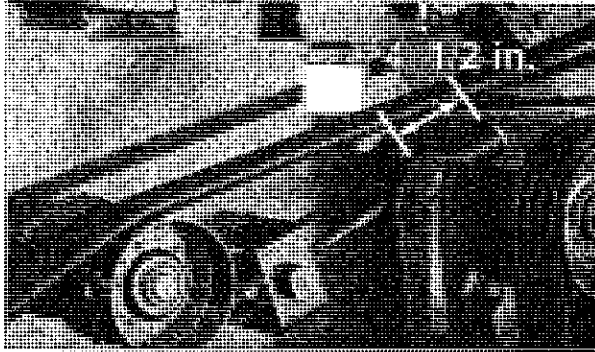


Figure 29. Belt Tension Adjustment

## Grab Roll Flex Cushion Adjustments

The grab roll bed is designed to separate and remove clods, soil and trash from the beets as they are directed to the rear elevator. Protection against rock damage to the grab rolls is provided by flex cushions (Figure 30-B) attached to the arms (Figure 30-A). These cushions (springs) allow the grab rolls to move when rocks enter the grab roll bed. Compress the flex cushions (Figure 30-B) to 2-3/4" (including the washer) on the end.

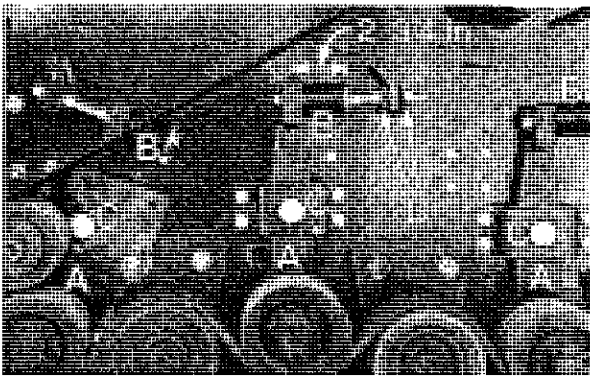


Figure 30. Grab Roll Spacing Adjustments.

- A) Arms
- B) Flex Cushions
- C) Pivot Bolts
- D) Flex Cushion Adjusting Nut

The 1" arm pivot bolts (Figure 30-C) should be checked occasionally for tightness, and tightened to 760 ft-lbs.

## Grab Roll Spacing

As a general recommendation, grab roll pairs should normally be equally spaced, 3/8" apart. They must be set parallel.

- For larger beets, or when additional cleaning action is required in heavy and/or muddy soil conditions or in extremely heavy trash, increase the space between the grab rolls.
- For smaller beets, it may be desirable to use narrower grab roll spacing.

**IMPORTANT:** Roll spacing must be set identically on both the right- and left-hand sides of the machine. Measure the distances between the center lines of the shafts.

The spiral rolls are fixed. The smooth rolls can be adjusted by loosening the nuts (Figure 30-D) that secure the flex cushions to the tabs on the chassis, and then tightening or loosening the nuts to change the position of the flex arms (Figure 30-A) that support the smooth drive rolls.

## Conveyor Roll Spacing

The conveyor roll bed is designed to evenly spread the beets out on the bed, move the beet flow to the sides, and then back to the grab roll bed. Conveyor rolls are factory preset to function well in most conditions. If adjustments are made, ensure that the conveyor rolls remain parallel to each other.

**NOTE:** If it is necessary to clean the conveyor rolls, grates may be removed to improve access. To remove the grates, first remove the D-rings that secure them in position. To retain the safety feature of the grates, be certain to replace the grates prior to operating the harvester.

## CAUTION

Keep well clear of moving parts. Be sure to shut off the tractor, set the parking brake, put the machine in neutral, and remove the tractor key while making adjustments. Wait for all movement to stop before approaching the machine.

## Tilting Grabroll Bed

The conveyor and grabroll bed consists of 9 rolls plus 2 diverter rolls at the rear to direct beets to the wheel elevator. With this design, the slope of the grabroll bed can be changed to increase or decrease the beet cleaning or to improve the flow of the beets. When lowering or raising the grabroll bed, you must first loosen the drive belts on each side. Refer to Figure 31 and perform the following on each side of the machine: loosen the front bolt (A), loosen the front U-bolt (B) and remove the rear U-bolt (C) that holds the grabroll panel on each side. Loosen the braces (refer to Figure 33) that hold the rear diverter roll supports on each side. Also loosen the center shield support (Figure 31-D) on the right hand side.

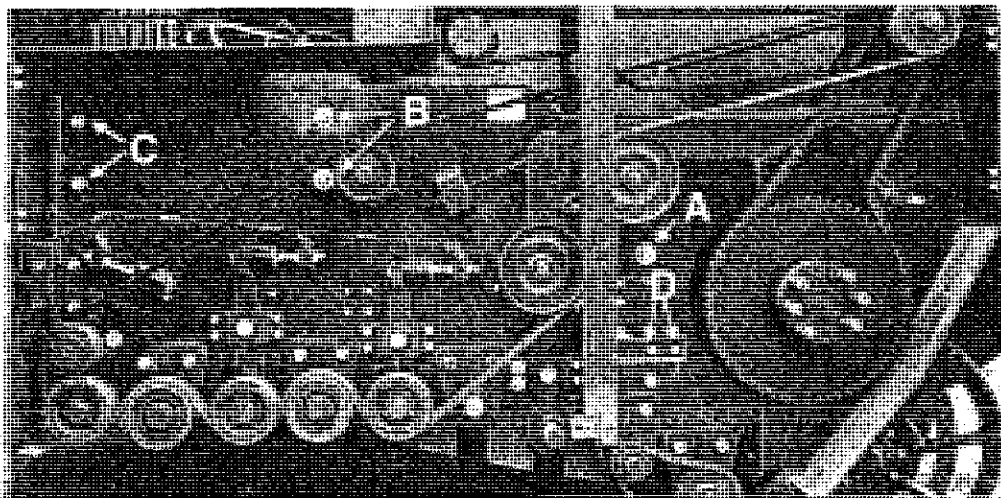


Figure 31. Fasteners That Must be Loosened to Adjust the Grab Roll Bed

Using the screw jacks attached to the rear of the grabroll roll panels, raise or lower both sides simultaneously until the desired hole aligns for the rear U-bolt. Retighten all the loosened bolts.

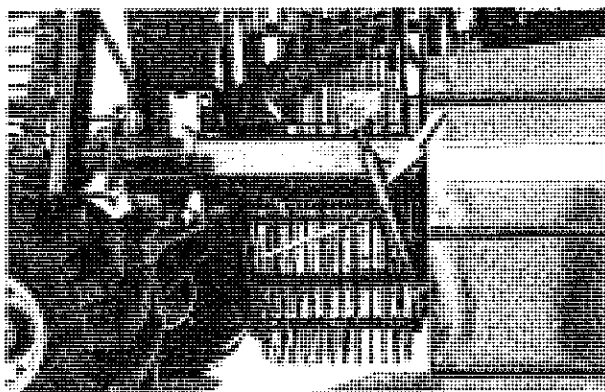


Figure 32. Screw Jacks Used to Raise or Lower the Grab Roll Bed

When tilting the bed, check to be sure that there is adequate clearance between the diverter roll and the wheel elevator, and between the diverter roll and the smooth roll below it. To increase

clearance, first remove the grate by detaching the D-rings that secure it (Figure 33-B). Then loosen the diverter support bolt (A), and reposition the assembly as necessary.

*Note: Always readjust the drive belt tension when the bed is raised or lowered.*



Figure 33. Diverter Roll Support

- A) Support Bolt
- B) D-Ring



## Paddle Shaft Slip Clutch

The paddle shaft is protected by a slip clutch. Six springs (Figure 34-A) are used to set the tension of this clutch. The recommended setting is 2-3/8" actual length of the springs. Be sure all the springs are the same length. **Keep jaws free of grease.**

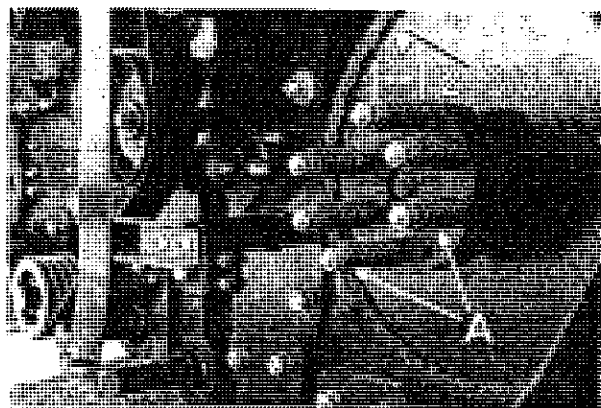


Figure 34. Paddle Shaft Slip Clutch Adjustment

**IMPORTANT:** Prior to each season of use, it is recommended to loosen the slip clutches - allow them to slip - then tension the springs to the proper settings.

## Tank Conveyor Chain Tension

To adjust the tension of the draper chain in the tank conveyor, loosen the bracket bolts (Figure 35-A). Using take-up bolts (B), tension both sides equally so the draper chain just clears the guide under the tank. Tighten the bolts. Check tension frequently.

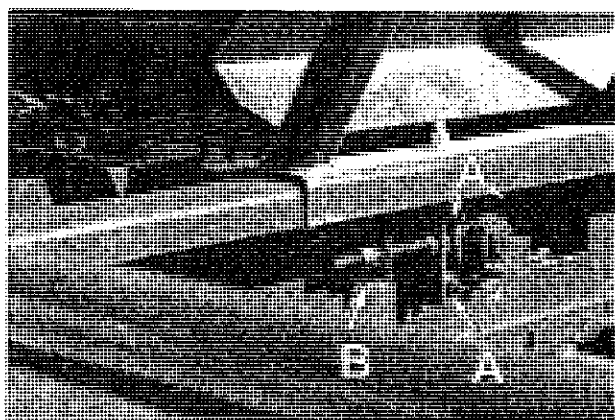


Figure 35. Tank Chain Tensioning

- A) Bracket Bolts
- B) Take-Up Bolt

## Tank Conveyor Drive Chain

Adjust the chain tension with the idler sprocket (see Figure 36). A guideline is to set the tension so that a 20 lb. force will deflect the chain approximately 1/2 -inch.

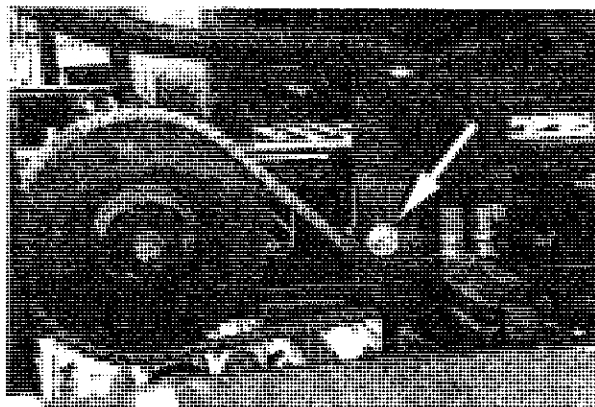


Figure 36. Tank Conveyor Drive ( Shields Removed For Clarity)

## Holding Tank Discharge Gate

An adjustable gate is provided in the tank discharge opening. Refer to Figure 37. The gate consists of a flexible curtain (A) that is held by an adjustable tube (B). The tube can be raised or lowered to change the rate of discharge to the wheel elevator. Adjust the gate to match various beet sizes, unloading speeds, and operating conditions. To change the discharge rate, remove the D-pins (C) that secure the tube in the available mounting holes (D), and install the tube in a different location. Raising the tube increases the discharge rate, and lowering it reduces the discharge rate.

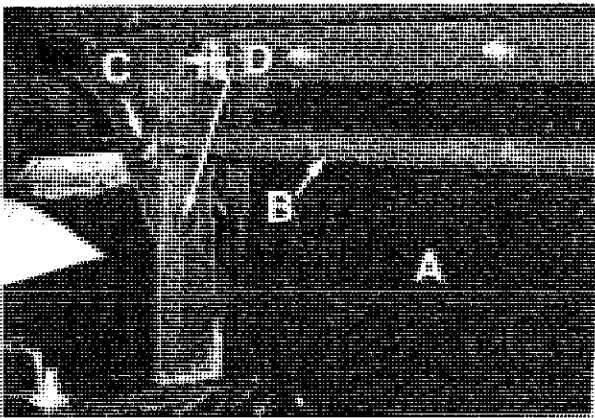


Figure 37. Tank Discharge Gate

- A) Flexible Curtain
- B) Tube
- C) D-Pins
- D) Mounting Holes

## Front Tank Access Panel

An access panel (see Figure 38) is located on the front of the holding tank. This panel may be removed to gain access to the tank for cleaning or maintenance by removing the attaching bolts (A).

### **WARNING**

Do not attempt to remove the front access panel or make adjustments to the rear discharge opening while the machine is operating or while there are beets in the holding tank. Empty the holding tank as described in the first part of this section, shut off the tractor, place all controls in neutral, set the parking brake, and remove the key. Wait for all movement to stop before approaching the machine.

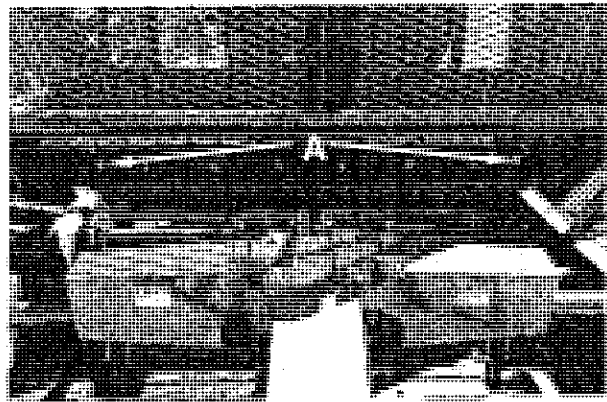


Figure 38. Front Tank Access Panel

- A) Access Panel Bolts

## Wheel Elevator

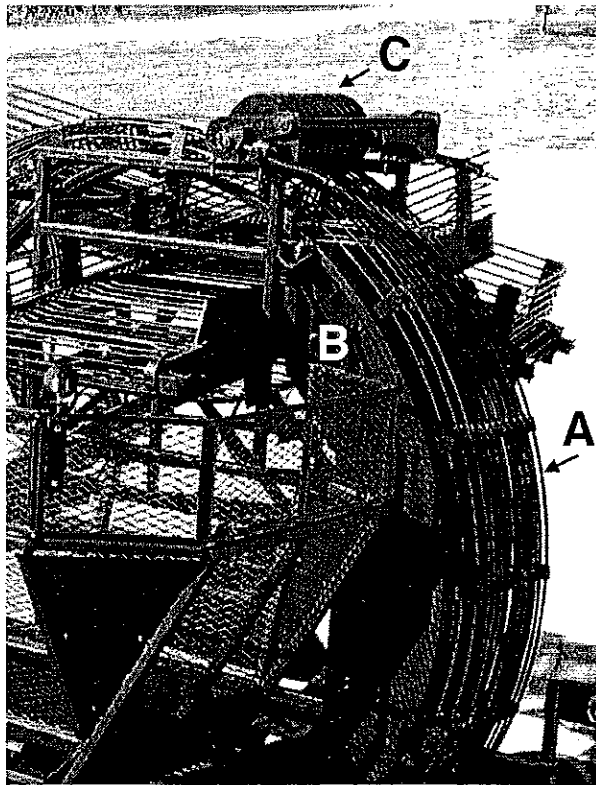


Figure 39. Wheel Elevator Details

- A) Elevator
- B) Retainer
- C) Stripper

The wheel elevator (Figure 39-A) revolves at approximately 11 RPM at 1000 PTO RPM. The wheel elevator carries the beets up to and deposits them in the tank elevator. The retainer (B) holds the beets in the wheel until they get to the top and fall onto the tank elevator. The stripper (C) clears the wheel elevator of any rocks or beets that get wedged between the wheel rods.

The wheel elevator must turn easily and the chain tension must be adjusted properly. The retainer must be adjusted properly for minimum beet loss and maximum capacity. The stripper must be centered to clear the wheel rods.

## Wheel Elevator Drive - Tightening Chain

Check this adjustment by pulling the chain away from the rear of the wheel elevator *on the side of the wheel elevator that is opposite the drive*. A distance of 1/2" indicates that the chain tension is proper.

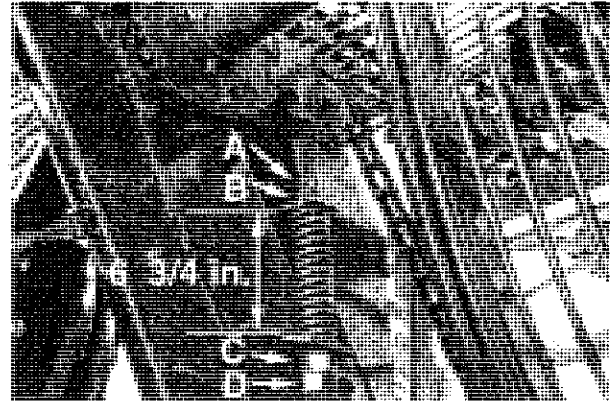


Figure 40. Wheel Elevator Drive

- A) Jam Nut
- B) Adjusting Nut
- C) Adjusting Nut
- D) Jam Nut

To adjust the tension, loosen the jam nut (Figure 40-A) and turn the adjusting nut (B). Set the dampener spring length to 6-3/4" by loosening the jam nut (D) and turning the adjusting nut (C). This is factory set and should not need to be changed.

**IMPORTANT:** Do not tighten the chain too tight or friction will drive the elevator and the chain will not feed into the slot properly. Do not remove links to tighten. Replace the chain if the tightener sprocket cannot be adjusted to sufficiently tighten the chain.

## Wheel Elevator Alignment

Operate the wheel elevator until the chain connector link is positioned near the drive shaft. Loosen the jam nut (Figure 40-A) and turn the adjusting nut (Figure 40-B) until the maximum chain slack is obtained. Disconnect the chain.

Lay one end of the chain over the other and wire them together so the wheel can be manually turned.

Turn the wheel elevator and check that all the rollers rotate. If the rollers do not turn, repair or replace them.

Check the alignment of the rollers and drive.

1. Four large flanged rollers (two on the left side and two on the right - See Figure 41) must be in alignment and the wheel elevator must be parallel to the frame (within 1/4"). The wheel elevator should just contact the upper front rollers (see Figure 42). Remove or add shims (washers) to the lower rollers if required.

**NOTE:** The wheel must be supported before removing any of the rollers.

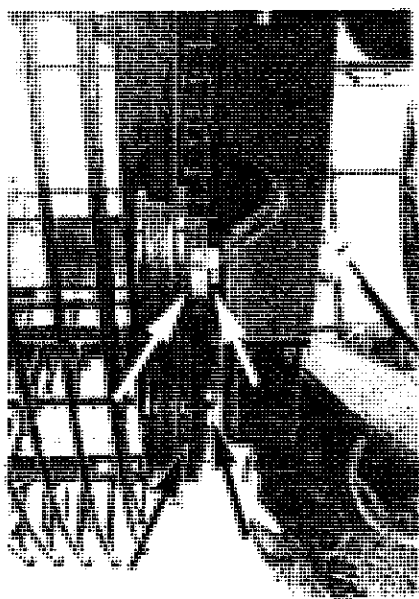


Figure 41. Wheel Elevator Roller Shim Locations

2. Two small solid rollers with bearings (Figure 42) guide the top of the elevator wheel on the front side of the harvester. The elevator wheel should just make contact with these rollers. Note that the roller on the right-hand side of the machine is adjustable.

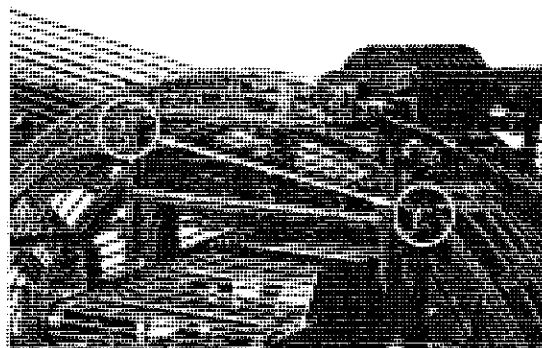


Figure 42. Top Front Wheel Elevator Rollers

3. The two upper stops prevent the wheel elevator from contacting the upper elevator structure. See Figure 43. The stops are bolted into a slot and can be adjusted. Adjust these rollers so there is approximately 1/4-inch clearance between the roller and the wheel elevator at the closest point.



Figure 43. Rear Elevator Wheel Rollers  
A) Adjustable Rear Stops  
B) 1/4-inch Clearance

**NOTE:** It is very important that the drive sprocket and idler sprocket (see Figure 40) be in alignment with each other and centered on the slots in the wheel. Make sure they are properly adjusted.

## Wheel Elevator Slip Clutch Adjustment

The elevator drive is protected by a slip clutch (see Figure 44). The four (4) springs set the tension of this clutch. The recommended setting is 2-3/8" actual length of the springs. Be sure all four springs are set at the same length. **Keep the jaws free of grease.**

**IMPORTANT:** Prior to each season of use, it is recommended to loosen the slip clutches - allow them to slip - then tension the springs to the proper settings.

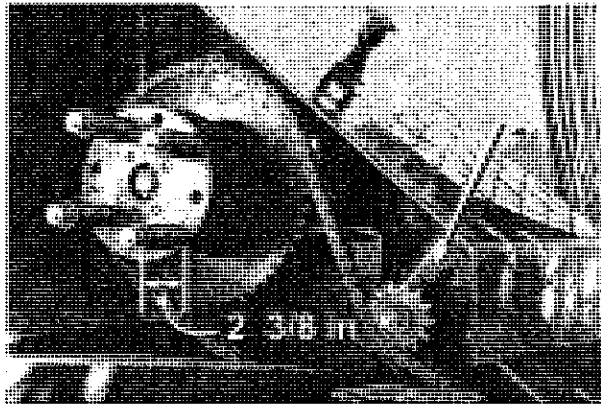


Figure 44. Wheel Elevator Slip Clutch

## Stripper

The stripper (Figure 45) consists of a series of disks that run between the rods of the wheel elevator to clean and remove rocks. It can be adjusted to center the disks between the wheel elevator rods by loosening the U-bolts and moving the stripper assembly sideways. It must not be allowed to hit any part of the wheel. The height can be adjusted by adding more washers or by moving the assembly right or left. The spring length should be set to 10-1/2" as indicated by the designation 'A' in the Figure below.

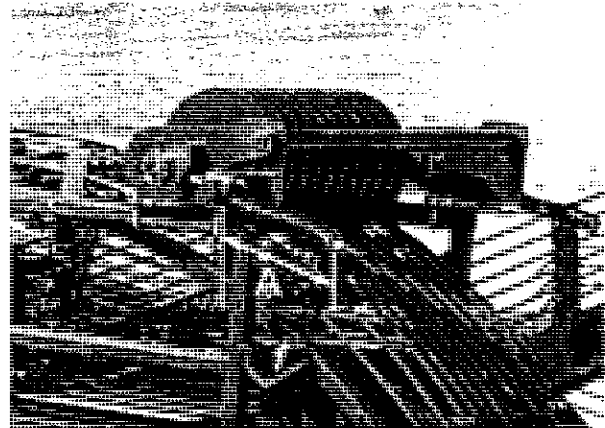


Figure 45. Stripper

Should additional stripper-to-wheel rod clearance be required, bend the wheel rods. *However this should only be necessary if the stripper support adjustment did not provide adequate clearance.* Pay particular attention to ensure that the stripper disks do not contact the wheel elevator joints.

## Retainer

The retainer and rods keep the beets from falling out of the wheel elevator pockets as they are elevated to the tank elevator. The retainer frame must be centered right-and-left and front-to-back with the wheel elevator. The distance between the retainer and the wheel elevator must be the same at the top (Figure 46-A) as it is at the bottom (Figure 46-B). Make sure the retainer does not make contact with the wheel elevator.

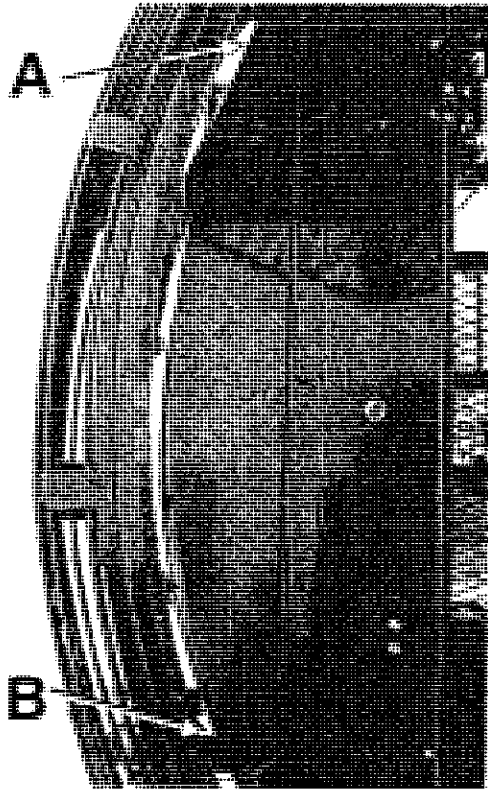


Figure 46. Retainer Assembly Distance From Wheel Elevator.

- A) Retainer Clearance At Top
- B) Retainer Clearance At Bottom

The retainer rod assembly is flexible so larger beets will not be damaged. Field adjustment is dependent on the beet size and tonnage. The spring adjusting nuts (Figure 47 A and B) are used to adjust the spring tension.

An additional set of holes (Figure 47-C) is provided for the spring bracket if required to reduce tension for large beets.

In muddy conditions, set the springs at location A to full tension.

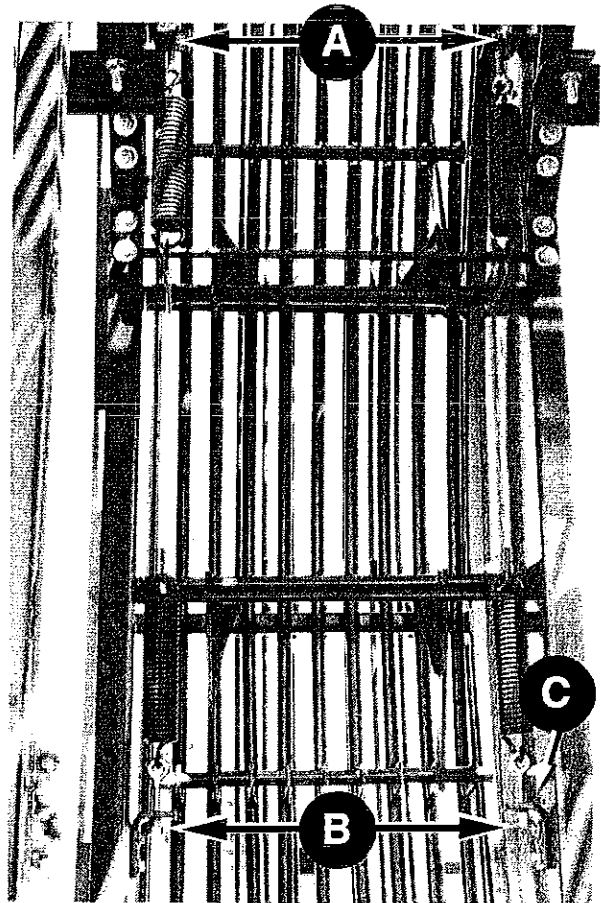


Figure 47. Retainer Spring Adjustments.

- A & B) Spring Adjusting Nuts
- C) Mounting Holes

## Tank and Truck Draper Chain Adjustments

The tank elevator moves beets either to the truck or to the tank. The truck elevator delivers beets from the tank elevator to the truck. The tank elevator and the truck elevator operate in conjunction with each other. When the tank elevator is directed to the tank, the truck elevator is off; when the tank elevator is reversed to deliver beets to the truck elevator, the truck elevator is activated.

### Tank Draper Chain Adjustments

Adjustments for the tank elevator draper chain are located at points A, B, and C in Figure 48. The idlers (B) can be set to position the chain as close as possible to the tank to help prevent beet loss. Ensure that adjustments are made identically on both sides of the draper chain.

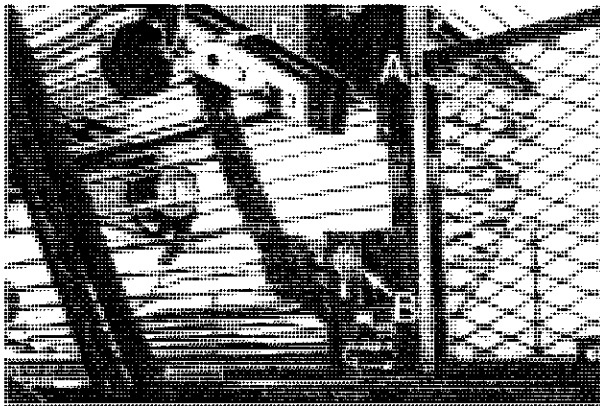


Figure 48. Tank Elevator Tension Adjustments.  
A, B, C) Draper Chain Adjustments

### Truck Draper Chain Adjustments

The truck elevator must be in the up position before adjusting the tension of the belted draper chain (Figure 49). Set the tension by loosening the bolts on the flange rollers (A), then adjust the bolts (B) to set the tension.

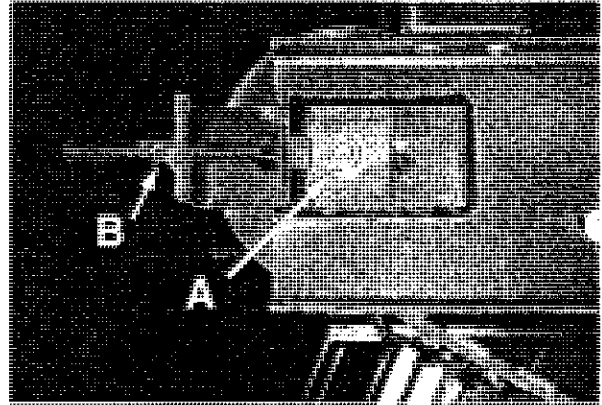


Figure 49. Truck Elevator Tension Adjustments  
A) Flange Bolt  
B) Adjusting Bolt

Large changes in belt tension can be made by changing the positions of the rollers shown in Figure 50. Ensure that tension is identical on both sides of the elevator.



Figure 50. Truck Elevator Tension Adjustments

**IMPORTANT:** Maintain equal chain tension on both sides of the conveyor so that the chain will run straight and wear uniformly.

## Truck Elevator Boom Adjustments

### 1. Up & Down Stop Settings

**Setting Boom Height** - To adjust the height of the truck elevator boom, raise the boom to the operating position. Install 1" bolts (Figure 51-B) just below the pivot point (A) to secure the boom. Loosen bolts C and remove bolts D on the channels that support the elevator. Operate the cylinders to assist removal of the lower bolts (D) and for positioning the bolts to a different setting. Tighten all loosened bolts and remove the upper 1" bolts (B) before folding the elevator.

**Setting Boom Stops**- Boom stops (Figure 51-E) MUST be set to prevent the boom from contacting the harvester frame when the boom is lowered. The boom stops are plates that can be installed in several positions. To set the stops, first remove them and then use the cylinders to lower the boom to the down position. Do *not* let the boom contact the frame. Then install the stops in the position that will prevent the boom from contacting the harvester when lowered fully.

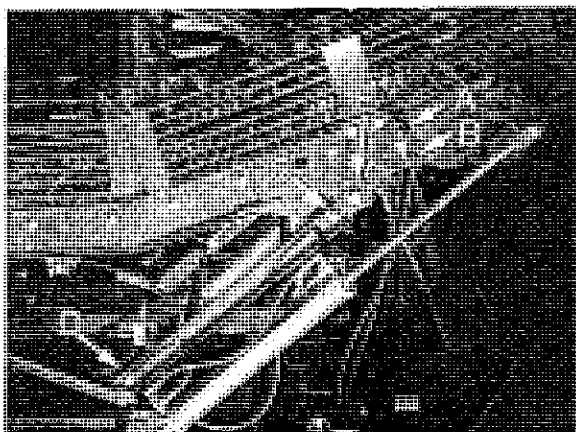


Figure 51. Adjusting the Truck Elevator Height and Boom Stop

- A) Pivot Point
- B) Upper 1-Inch Bolt
- C) Upper Support Channel Bolt
- D) Lower Support Channel Bolt
- E) Boom Stop

### 2. In & Out Stop Settings

The truck elevator is factory set to the farthest inward position. When additional reach is desired, or additional truck-to-harvester clearance preferred, it may be moved outward.

**NOTE:** Moving the truck elevator outward will effect the clearance for driving a truck under the elevator on the second pass when opening a land. It is recommended to make this adjustment in a shop using a hoist.

**Important:** Although the harvester includes provisions for three mounting positions, only the innermost and intermediate positions should be used. Setting the truck elevator to the outermost position will result in imbalance problems.

To adjust the settings, raise the truck boom and install 1" bolts (Figure 51-B) just below the pivot point (A) to secure the boom. Remove the grate(s) from the truck elevator at the point where the tank elevator dumps into it. Attach suitable hoists to support the elevator. Loosen hose bindings at the points where additional length will be required. Remove the six (6) U-bolts that are holding the lower 4"x4" square tubes to the tank frame. The arrows in Figure 52 show 2 of the 6 U-bolts). Slide the elevator and support assembly to the new position. Install the U-bolts that secure the 4"x4" tubes to the frame. Install any grates that were removed. Secure the hoses.

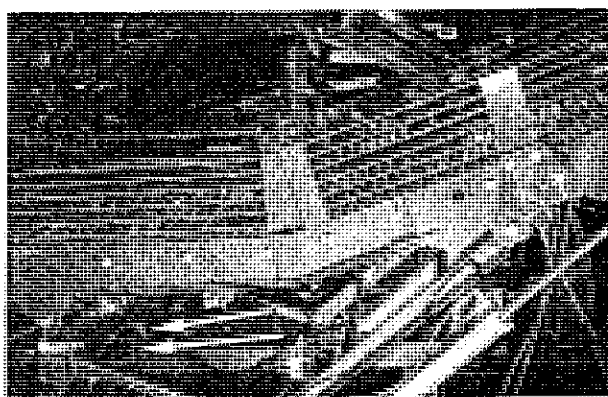


Figure 52. In-Out Adjustment of Truck Elevator; Arrows Show Two of Six U-bolts.



## Roller Chain Drives

Roller chain drives are tensioned by moving the idler sprockets in the slots. Check the roller chains frequently and tension them so approximately 20 lbs. of force deflects the chain 1/2".

Also, frequently check the sprocket alignment. If more wear appears on one side of a sprocket, realign the sprockets.

## Tire Pressure

Frequently check the tire pressure. Equal pressure should be maintained in all tires. **The recommended pressure for the 21.5Lx16.1 12 ply tires used on the 697 Beet Harvester is 32 psig.**

## Mounting tires

### CAUTION

Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion which may result in serious injury or death. Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job. Have it done by your dealer or a qualified tire repair service.

When seating tire beads on rims, never exceed 36 psi or the maximum inflation pressure specified by tire manufacturers for mounting tires. Inflation beyond this maximum pressure may break the bead, or possibly the rim, with dangerous explosive force. If both beads are not seated when the maximum recommended pressure is reached, deflate and reposition the tire, lubricate the bead, then inflate.

Detailed agricultural tire mounting instruction, including the necessary safety precautions, is also available from the Rubber Manufacturers Association and from tire manufacturers.

## Tightening Wheel Bearings

Raise the wheel and remove the hub cap (Figure 53-A). Remove the cotter pin from the castle nut and tighten until there is a slight drag on the bearing (while turning the wheel), then back off the nut one slot, insert and spread the cotter pin. There should be a slight drag on the bearing following the adjustment. Replace the hub cap.

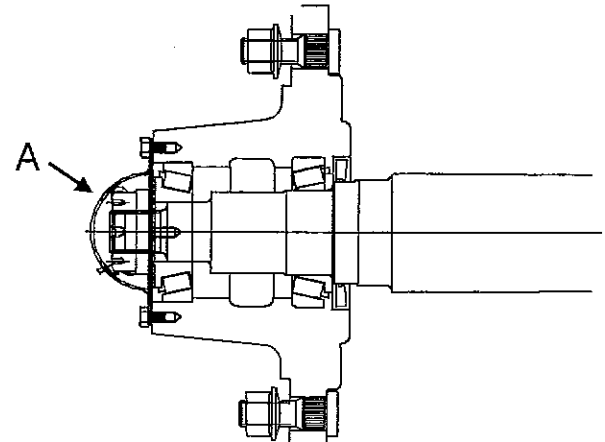


Figure 53. Carrier Wheel Bearings

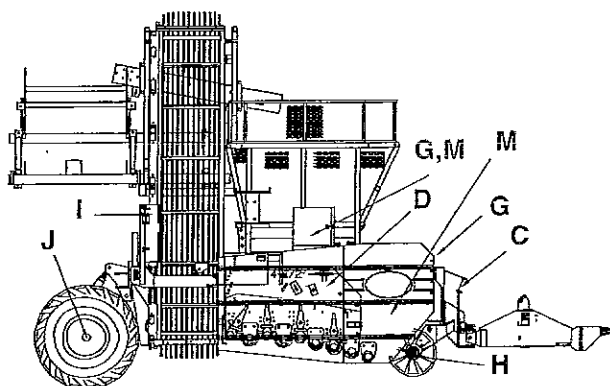
## Lug Nuts

Tighten all lug nuts to 400-450 ft-lbs.

# Lubrication and Storage

The Figure below show the general locations of lubrication and grease points. Lubrication requirements are discussed in detail on pages 43 through 45.

Right Side View



Left Side View

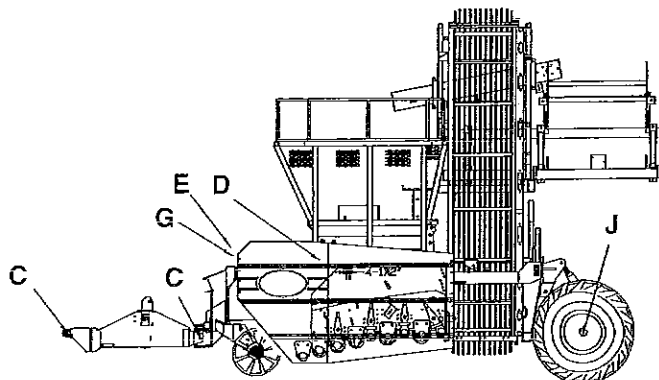


Figure 54. General Location of Lubrication and Grease Points

## General

Economical and efficient operation of any machine depends upon regular and proper lubrication of all moving parts with a quality lubricant. Failure to lubricate results in reduced efficiency, premature wear, breakdown and needless and costly replacement of parts.



## CAUTION

Keep a safe distance from all moving parts. Be sure to shut off the tractor and remove the key while lubricating. Wait for all movement to stop before approaching the machine. Where rotation of the drive line is required for access to lubrication zerk, be sure to follow these same cautions with each rotation.

**Lubricate Every 4 to 8 Hours Of Operation:**

**A. - CV PTO** – Lubricate with lithium-based grease. Prior to use, ensure that the CV center housing (IV) is full of grease. Lubricate the unit with the driveline as straight as possible. Pump until grease is evident around the housing and the center disk. Initially, up to 30 to 50 pumps may be required.

Lubricate every 8 hours with Lithium based grease.

**I. Cross & Bearings (3)**, until grease is purged around the seal (2-4 pumps).

**II. Telescoping Members (1)** until grease fills the telescoping area. Disassemble occasionally to ensure components are adequately greased (4 to 10 pumps).

**III. Shield Bearings (3 Plastic Zerk)** – 2 pumps.

**IV. CV Center Housing (1)**, until grease is evident around the center section disk (6 – 12 pumps).

**IMPORTANT:** When turning frequently or making many sharp turns, grease the CV center housing at 4-hour intervals.

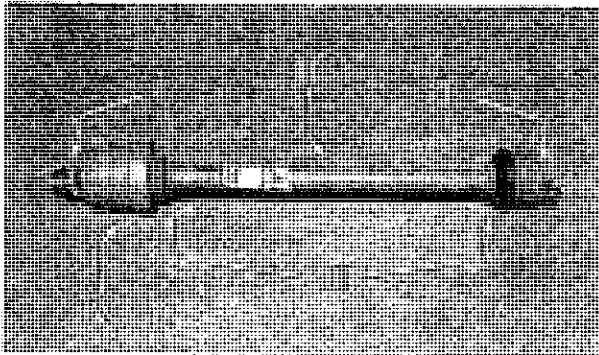


Figure 55. CV PTO

**IMPORTANT:** Failure to frequently grease the CV center housing and telescoping members will reduce the life of the CV.

## ⚠ CAUTION

When rotating the driveline to gain access to the lubrication zerk, be sure to shut off the tractor, and wait for all movement to stop. Remove the key before lubricating.

**Lubricate Every 10 Hours Of Operation:**

Lubricate with one, two or three pumps for items B through E below. )

**B. - Row Finder** - Lubricate every 10 hours with SAE Moly based or multi-purpose grease.

**C. - Hitch Components** - Lubricate the swivel pins for the steering cylinder, tongue pivots, and hitch bolt as shown in Figure 56.

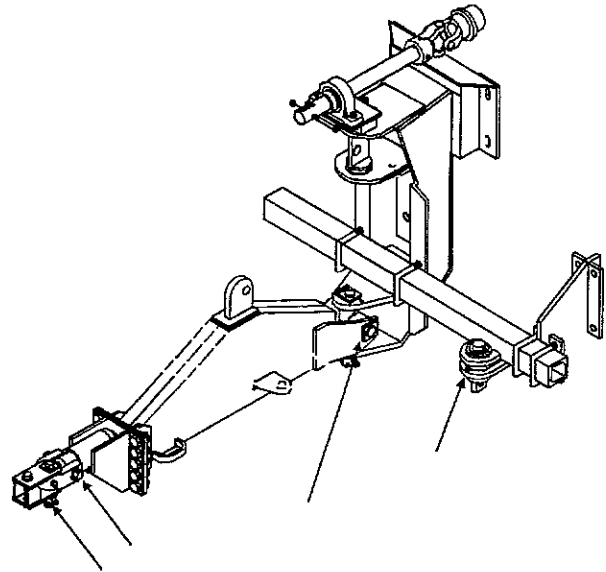


Figure 56. Hitch Lubrication Points

**D. - Belt Tensioner Pivots (4) and Take-Up Bolts (2)** - Lubricate every 10 hours with SAE Moly based or multi-purpose grease.

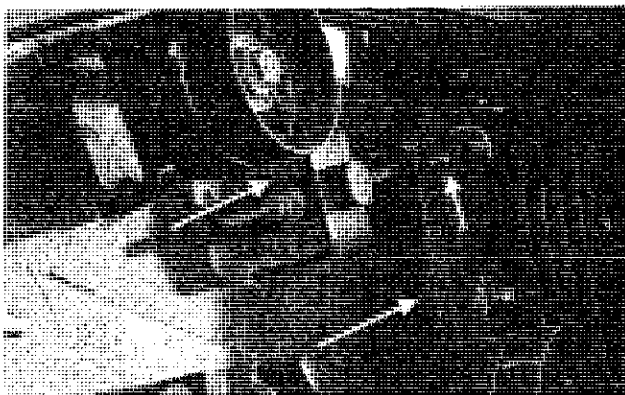


Figure 57. Zerk for Belt Tightener Pivots (4 Locations)

**E. - U-Joints on Gear Box Drive Shaft & Front Jackshafts** - Lubricate every 10 hours with SAE Moly based or multi-purpose grease.

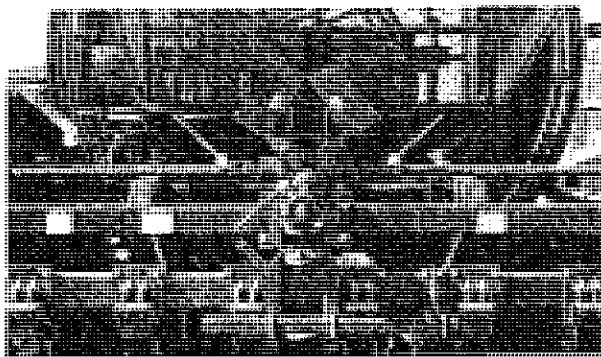


Figure 58. Drive Shaft/Jack Shaft U-Joints

### Lubricate Every 20 Hours of Operation

**F. - Pillowblock & Flange Bearings** - These are sealed bearings. Lubricate sparingly, seal damage may result. One or two pumps every 20 hours maximum. Diesel fuel squirted on seals at the end of the season will help to keep the seals soft and flexible.

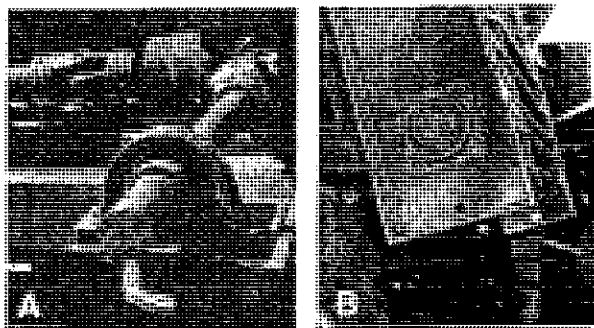


Figure 59. Bearings  
A) Pillowblock Bearing  
B) Flange Bearing

### Lubricate Every 50 Hours of Operation

**G. - Gear box Oil Level** - The oil level in the gearbox must be checked every 50 hours. Fill to level plug with SAE EP 90 gear oil.

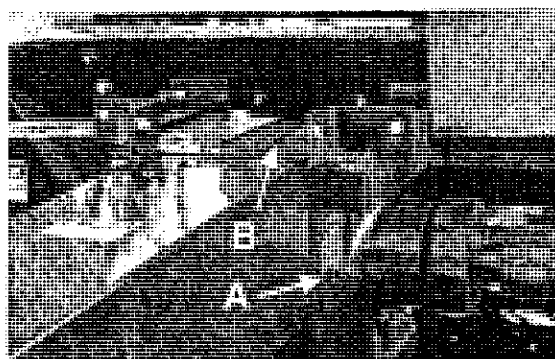


Figure 60. Main Gear Box Oil Level

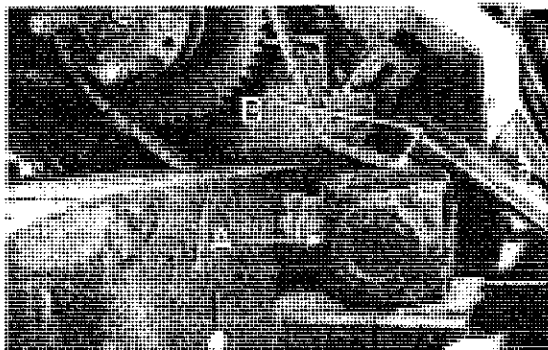


Figure 61. Wheel Elevator Gear Box Oil Level  
A) Level Plug  
B) Fill Plug

**H. - Lifter Wheel Hubs -** Grease through zerk with SAE Moly based or multi-purpose grease every 50 hours.

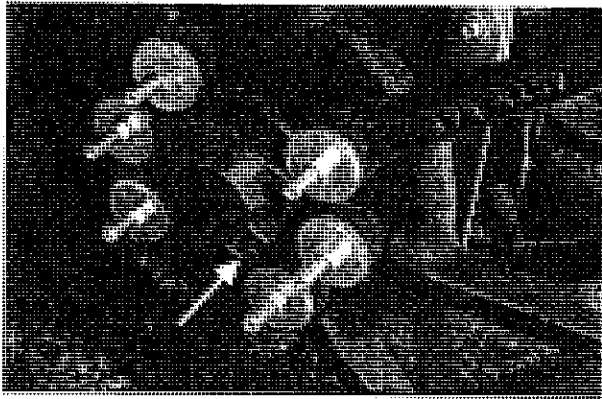


Figure 62. Lifter Wheel Hubs

**I. - Wheel Elevator Drive Idler Arm -** Grease with SAE Moly based or multi-purpose grease every 50 hours.

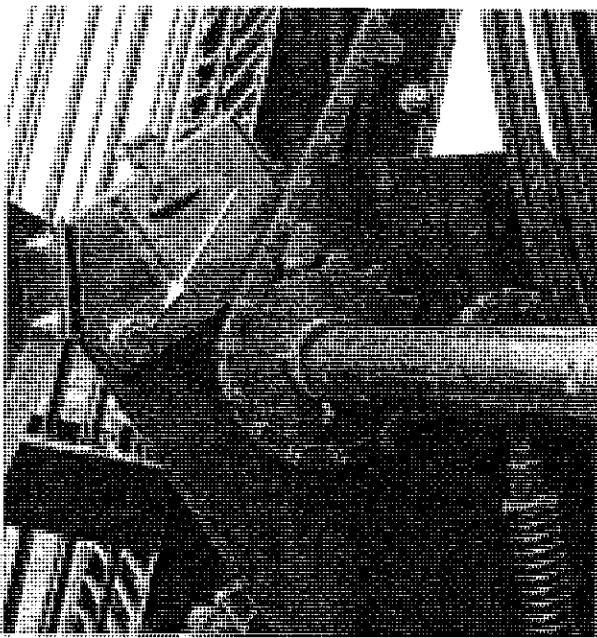


Figure 63. Wheel Elevator Drive Idler Arm

**Lubricate Once Every Season or Every 500 Hours**

**J. - Carrier Wheel Bearings -** Clean and repack with wheel bearing grease every 500 hours or each season.

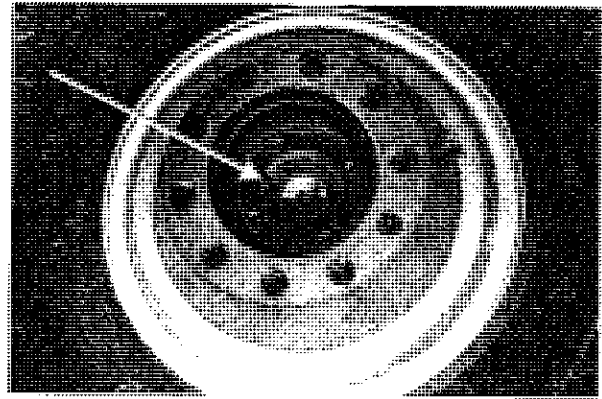


Figure 64. Carrier Wheel Bearings

**K. - Roller Chain -** Remove, clean and soak in oil every 500 hours or each season.

**L. - Change Gear Box Oil -** Oil in the gear boxes must be replaced every 500 hours or each season. Refill to the level plug with SAE EP 90 gear grease. Refer to Figures 60 and 61 on the previous page.

**M. - Slip Clutches -** Lubricate the paddle shaft slip clutch (shown below) and the wheel elevator slip clutch (upper left of Figure 61 on the previous page) with one pump every 500 hours or each season.

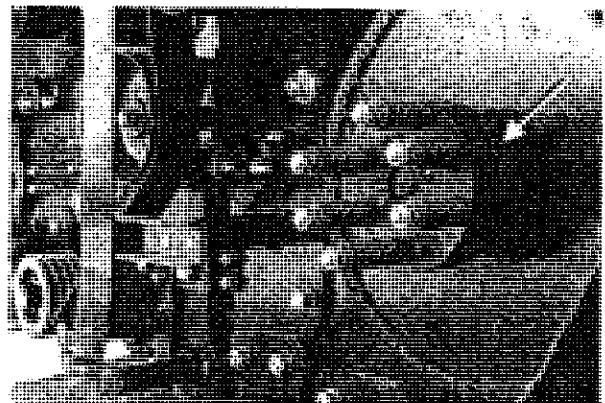


Figure 65. Paddle Shaft Slip Clutch Lubrications

## Storage

Proper storage will greatly extend the life of your machine and make it easier to place back into service at the beginning of the next season. Follow the guidelines below to ensure your harvester is protected.

### Preparing Harvester for Storage

1. Store the harvester in a dry place.
2. Squirt diesel fuel on seals of the bearing prior to washing with a power washer.
3. Thoroughly clean the harvester.
4. Thoroughly clean drive chains and brush with heavy oil to prevent rust.
5. Lubricate harvester. Grease the threads of adjusting bolts. Run the machine briefly to distribute the grease.
6. Remove belt tension.
7. Scrape and repaint all worn parts or coat with light oil to prevent rust.
8. Block up the harvester to remove load from tires, do not deflate the tire. If stored outside, remove the wheels and tires, then store them in a cool, dark, dry place.
9. Store the harvester on a firm and level surface. Block the wheels to prevent the machine from rolling. If the harvester is not stored on a hard surface, place a plank under the lifter wheels to prevent them from sinking into the ground.
10. List the replacement parts needed before the next season and order early. Your dealer can give better service in the off season. Replacement parts can be installed in your spare time - no delays at the time of need.
11. If hydraulic cylinders remain on the harvester with the cylinder rods extended, apply grease to the exposed rod ends to prevent rust.
12. If the harvester is not sheltered, the belted elevator chain should be protected from direct sunlight.

### Preparing Harvester for the Field

1. Replace the wheels if they were removed and remove the blocking.
2. Inflate the implement tires to the proper pressure; 32 psi for stock 21.5L-16.1 12 ply tires.
3. Clean the harvester thoroughly.
4. Check the drive and conveyor chains, making certain they have the proper tension.
5. Retension the belt drives.
6. Lubricate the harvester; then run at half speed for 10-15 minutes, listening for any unusual noises. Stop the harvester and check the bearings for over heating or excessive looseness. Recheck the chain tensions.
7. Review the safety and operating instructions in this manual.
8. Inspect all connections and make certain that the hardware is tight and the cotter pins are in place.
9. If the cylinders were stored on the machine with the cylinder rods extended and coated with grease, clean the grease from the exposed rods.
10. Make sure all shields are in place and properly fastened.

# Pre-Delivery Checks

## Dealer Pre-Delivery

The following items must be performed by an authorized Art's Way dealer before delivering the sugar beet harvester to the customer. All items listed on the Dealer Pre-Delivery Checklist form are to be checked and properly adjusted during the pre-delivery process. The owner information on the Dealer Pre-Delivery Checklist form is to be filled out in the presence of the owner(s) and returned to Art's Way with the Warranty Registration Form after delivery of the harvester to the customer.

## NOTE

The Pre-Delivery Checklist duties are to be performed by an authorized Art's Way dealer.

## Unloading Beet Harvester

### Unloading from Transport



## CAUTION

A 697 Sugar Beet Harvester weighs approximately 19,800 pounds. Use extreme caution when unloading, handling, supporting and assembling the machine. Carelessness or errors in judgment could result in slippage, causing serious injuries or death.

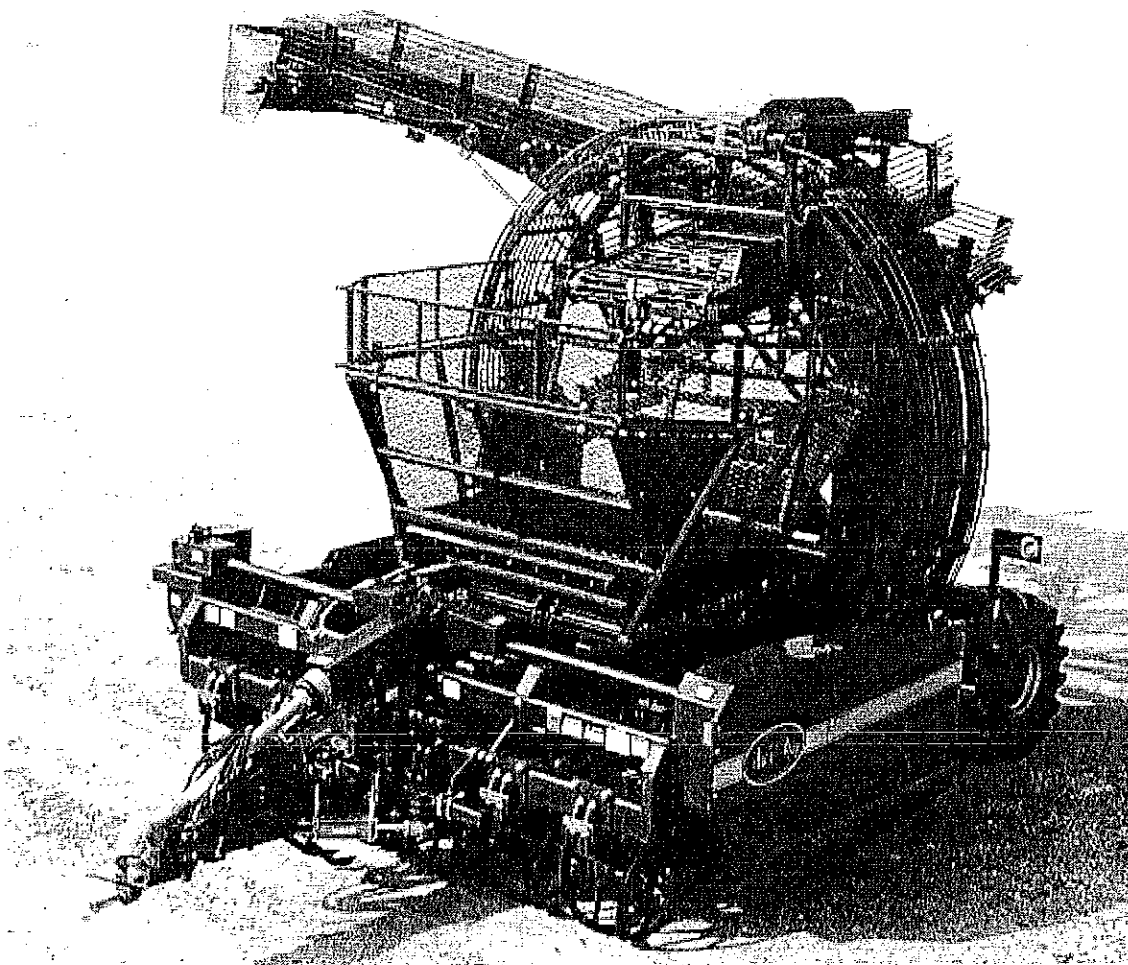
1. Unloading should be done on a level surface; depending on the transport, a loading dock or access to unload from a step trailer must be available.
2. Make sure safety stands, support blocks and safety straps are of sufficient strength and capacity to safely handle the harvester.
3. Install the carrier wheel/tire on the axle hubs, if they have been removed.

4. Install the wheel and tire assemblies to the hubs with the lug nuts provided. Torque the lug nuts to 400-450 ft-lbs.
5. Have a large capacity tractor available to unload the harvester from the transport.
6. Slowly roll the harvester off onto the ground surface.

## Assembly Safety

- Use adequate manpower to perform assembly procedures safely.
- Assemble the beet harvester in an area with sufficient space to maneuver the largest components and allow easy access to all sides of the machine.
- Use only forklifts, lift cranes, jacks and tools with sufficient capacity for the loads.
- **Do not** allow spectators in the working area.
- Tire safety: Should a tire require mounting, **do not** attempt to mount a tire to a rim unless you have the proper equipment and experience to do the job. Always follow proper procedures when mounting a tire on a rim to prevent an explosion which could result in serious injury. Should a tire shipped with the Art's-Way Beet Harvester require replacement, **do not** substitute tires of lesser load rating and capacity for the original equipment tires.

## Assembly Preparation



*Figure 66. Assembled Harvester*

**Unpacking** - The Harvester is shipped mostly assembled. The tires, hitch assembly, PTO, row finder, and attaching hardware are shipped loose.

**Assembly** - Follow these step-by-step instructions and guide-lines to prepare the machine safely and efficiently for operation.

**References** - References to pictures and diagrams showing important attachment elements or drive components are included to make assembly instructions easier to follow.



**Bolt Torque** - The Torque Specification Table below (Table 4) provides the (non-lubricated) torque values for various bolts and cap-screws. Do not grease or oil bolts or capscrews unless instructed to do so in this manual. When using locking elements, increase the torque values by 5%. Always replace hardware with the same grade bolt.




*Table 3. Specific Torque Specifications*

Item	Torque
Wheel nuts	400-450 ft.-lbs.
Hitch support hardware (1-1/8")	700 ft.-lbs.

*Table 4. Torque Values for Grade 5 Bolts*

Bolt Size	Clamp Load	Plain	Plated
1/4 - 20 (.250)	2,025	8 ft. lbs.	76 in. lbs.
5/16 - 18 (.3125)	3,338	17 ft. lbs.	13 ft. lbs.
3/8 - 16 (.375)	4,950	31 ft. lbs.	23 ft. lbs.
7/16 - 14 (.4375)	6,788	50 ft. lbs.	37 ft. lbs.
1/2 - 13 (.500)	9,075	76 ft. lbs.	57 ft. lbs.
9/16 - 12 (.5625)	11,625	109 ft. lbs.	82 ft. lbs.
5/8 - 11 (.625)	14,400	150 ft. lbs.	112 ft. lbs.
3/4 - 10 (.750)	21,300	286 ft. lbs.	200 ft. lbs.
7/8 - 9 (.875)	29,475	430 ft. lbs.	322 ft. lbs.
1 - 8 (1.000)	36,625	644 ft. lbs.	483 ft. lbs.
1 - 1/8-7 (1.125)	42,375	794 ft. lbs.	596 ft. lbs.

*Table 5. Head Markings of SAE Bolt Grades*

Grades 0, 1, and 2 No Markings	
Grade 5 3 radial dashes 120 degrees apart	
Grade 8 6 radial dashes 60 degrees apart	

**Tires & Rims** - Install the tire and rim assemblies, tighten the lug nuts to 400-450 ft.-lbs., and ensure the tires are properly inflated to their specified pressure.

Tire pressure for the 21.5L-16.1 12 ply tire is 32 psi.

**Shields** - Make sure that all shields are in place, secured and functioning.

**Oil Levels** - The 697 harvester has two (2) gearbox assemblies that require oil for lubrication. Check the gearboxes for oil level before operating.

For details, refer to appropriate sections as listed below:

Item	Lube	Page
Main Gearbox	SAE EP 90W	44
Wheel Elevator Gearbox	SAE EP 90W	44

**Lubrication** - Check that all grease fittings are in place (including the PTO) and have been lubricated. Refer to the **Lubrication Section**, pages 42-45.

## 697 Harvester Assembly

### Hitch Support, Tongue And Power Take Off

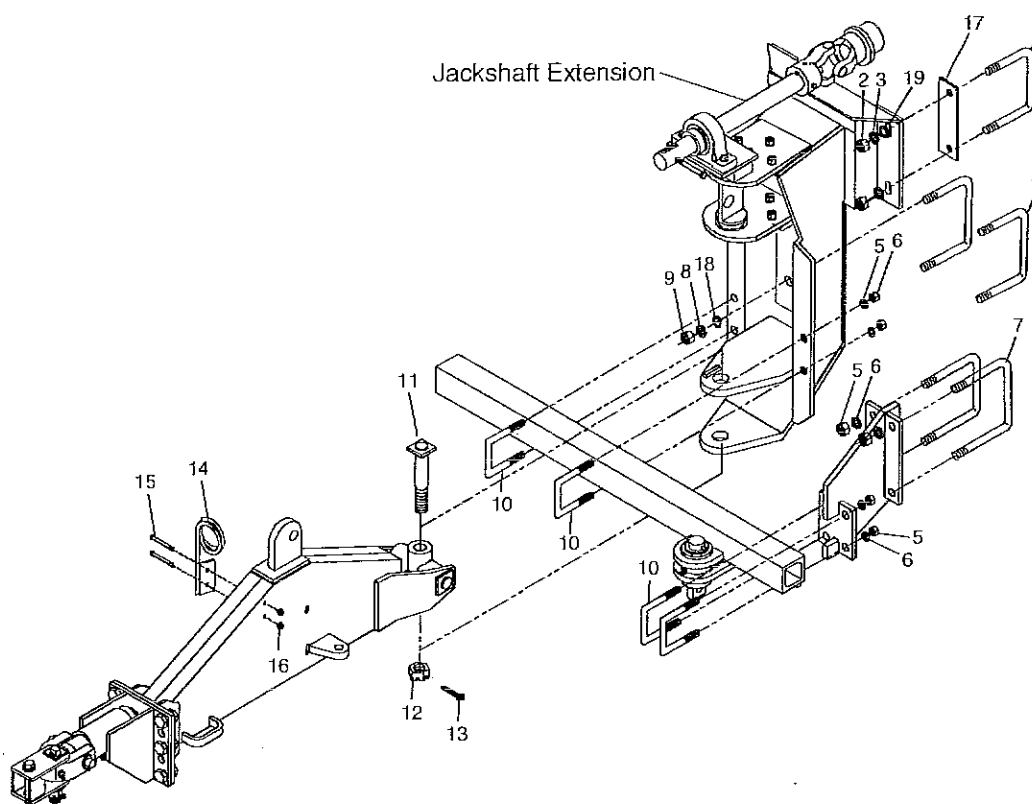


Figure 67. Hitch Installation

#### Bill of Materials

Item	Quantity	Part Number	Description
1	2	286490	Bolt, U 5/8-11 x 5-1/2 x 6"
2	4	I124589	Nut, Hex 5/8-11
3	4	020440	Washer, Lock 5/8 reg
4	2	460510	Bolt, U 1-8 x 2"
5	12	J14H794	Nut, Hex 3/4-10
6	12	036800	Washer, Lock 3/4
7	2	375070	Bolt, U 3/4-10 x 6-3/4 x 7-1/16
8	4	003350	Washer, Lock 1"
9	4	J14H805	Nut, Hex 1-8
10	4	246120	Bolt, U 3/4-10 x 1-1/2 x 4-1/2
11	1	E580109	Weldment, Pin
12	1	E552084	Nut, Slotted
13	1	E580042	Pin, Cotter 3/16 x 3
14	2	E150004	Hose Carrier
15	2	031020	Bolt, HHCS 3/8-16 x 5-1/2
16	2	E552044	Nut, Lock 3/8-16 Hex
17	2	455540	Strap, Shim
18	4	1107389	Washer, Flat 1"
19	4	020430	Washer, Flat 5/8"

## CAUTION

While working on the machine be sure to work safely. Be sure to use adequate blocking. Use adequately rated lifting devices. Make sure parts are secured before working under or near them.

### Hitch And Tongue Assembly

For the following procedures, refer to Figure 67.

If the bolt-on hitch assembly has been removed, install it on the harvester using the provided U-Bolts as noted below.

1. Attach the hitch assembly to the bottom front tube of the main frame using two U-bolts (item 4), hex nuts (item 9) lock washers (item 8), and flat washers (item 18). Do not tighten at this time.
2. Install the hitch to the upper frame tube with two straps (item 17), two U-bolts (item 1), lock washers (item 3), hex nuts (item 2), and flat washers (item 19). Tighten the U-bolts that attach the hitch to the frame.
3. Attach the left steering cylinder support to the lower frame tube with two U-bolts (item 7), lock washers (item 6) and hex nuts (item 5). Tighten all hardware. Attach the row finder mounting tube with U-bolts (item 10), lock washers (item 5), and hex nuts (item 6). Refer to page 55 on the Row Finder Assembly.
4. Attach the upper jackshaft support bearing.
5. Attach the tongue assembly to the hitch using the pivot pin (item 11), slotted nut (item 12) and cotter pin (item 13).
6. Install the two hose carriers (item 14) with their loops toward the hitch centerline using two hex bolts (item 15) and nuts (item 16).

### PTO

1. Install the jackshaft extension and U-joint to the main drive shaft with the slide ring collar.
2. Attach the PTO to the jackshaft extension using a 3/8" woodruff key, a 3/8" x 1/2" set screw and a 3/8" x 3-1/2" hex bolt and 3/8" lock nut.

*Note: The harvester is shipped with the PTO loose. When attaching the PTO with the hardware supplied, attach the shield chain to the harvester. Ensure that the PTO sliding tubes are free of dirt and foreign material. If the halves do not slide easily, premature failure of the universal joints could result. See page 43 for recommended lubrication of the PTO.*

## Hydraulic/Electrical Connections

### Lift and Row Finder Cylinders

1. Install the cylinder pin bushings in the appropriate holes.
2. Mount the 5" diameter x 8" stroke hydraulic depth control (lift) cylinder and 4" diameter x 8" stroke hydraulic row finder cylinder and hoses.

*Note: The upper mounting for the lift cylinder is to be turned with the hole closest to the front. The cylinder rod end must be mounted to the harvester. Adjust the steering cylinder to the center of its stroke. Position the hitch to the center of the row or where desired. Tighten the U-bolts on the steering cylinder mounting bracket.*

## Boom Elevator Hydraulic Cylinders

Install the boom elevator hydraulic cylinders with U-Stops, SMV sign, and boom elevator grates, and connect the boom elevator hydraulic motor as shown in the Figure below. Refer to the bill of materials for a listing of components.

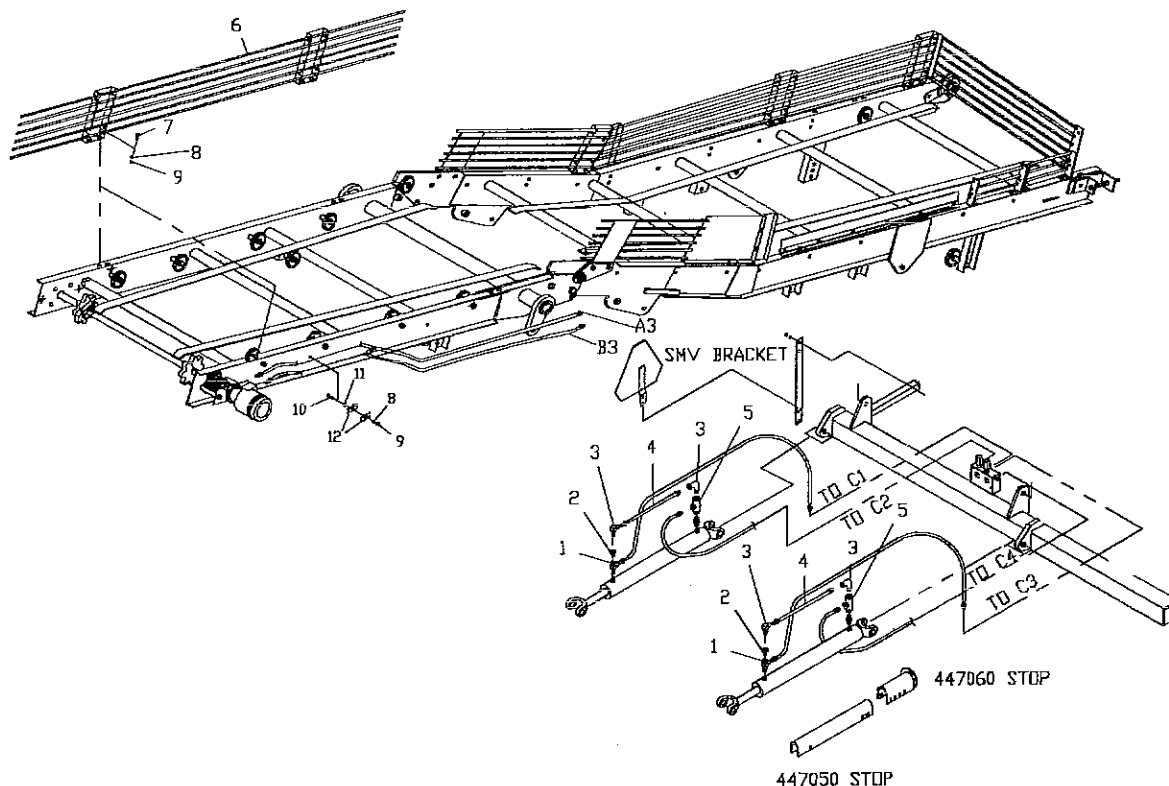


Figure 68. Boom Elevator Cylinders and Grate

### Bill of Materials

Item	Quantity	Part Number	Description
1	2	274410	½-14 NPTF Street Tee
2	2	277780	Bushing, Hydraulic Reducer
3	4	V612024	Fitting, 90 Degree Swivel
4	2	401180	Hose, Hydraulic ¼ x 34" 100RI
5	2	407500	Valve, Pilot Check
6	2	433640	Grate, Boom
7	8	006690	Bolt, HHCS 3/8-16 x 1 ¼
8	9	021180	Washer, Lock 3/8
9	9	027260	Nut, Hex 3/8-16 GR5 Zn
10	1	011370	Bolt, HHCS 3/8-16 x 1 ½
11	1	P98458	Spacer
12	2	413050	Hose Clamp

## Wiring Harness, Control Box, and Solenoid Valve

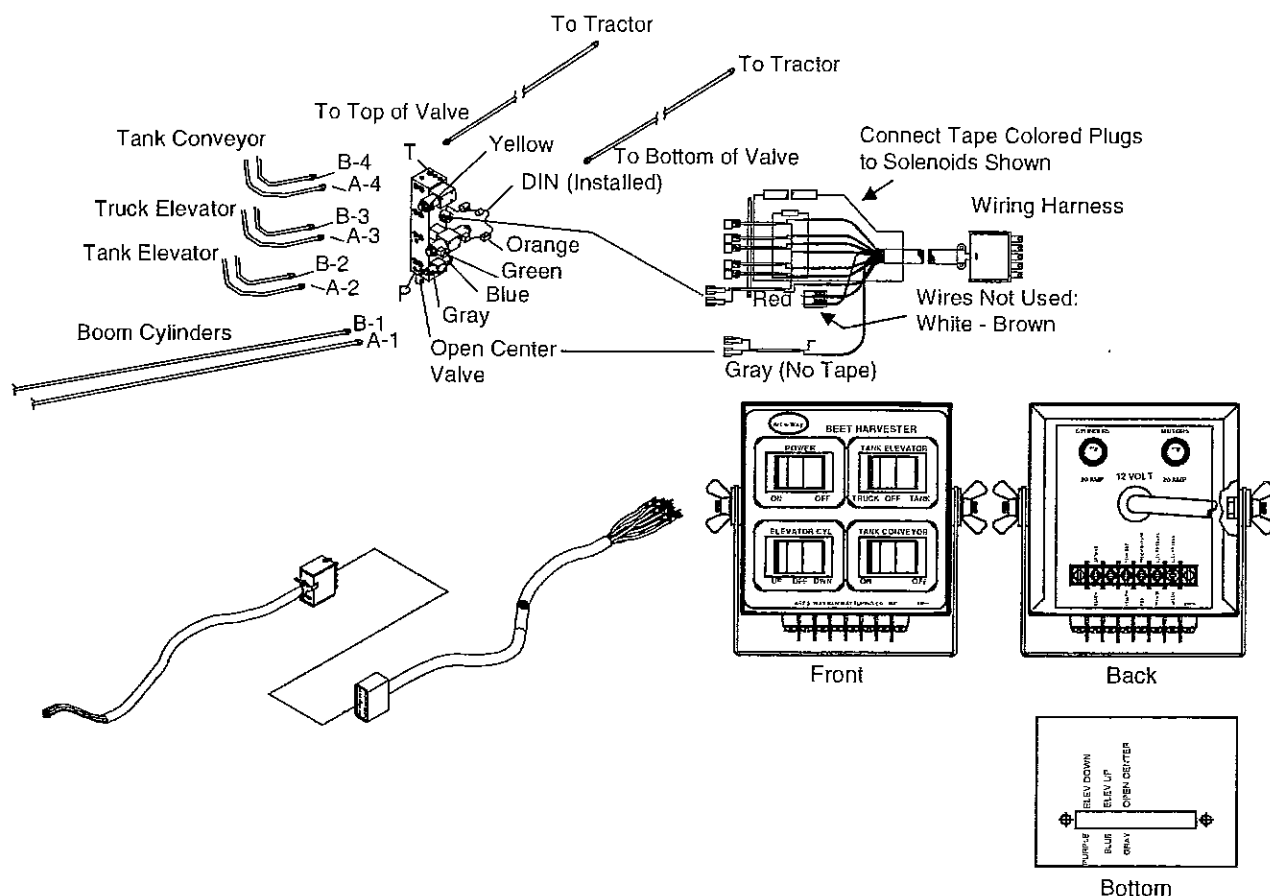


Figure 69. Wiring and Hydraulics

For the procedures below, refer to Figure 69.

1. Connect the wiring harness to the control box by matching the color of the wires to the colors called for on the control box decal. For a detailed illustration of control box wiring, refer to page 18.

**NOTE:** The DIN Connector to the purple wire is identified by gray tape on the DIN connector. Route and secure the wiring.

2. The solenoid valve on the bottom of the main valve was installed as standard equipment on the 697. This valve provided OPEN center operation on the system. This is OK for the newer tractors that have the load sense system. Special plugs can be obtained to switch this to closed center.

**NOTE:** For all older tractors with a true closed center system; the closed center plug must be installed.

3. Ensure the hoses from the boom elevator to the main valve are connected as shown in the Figure above. Note that the A and B ports of the valve are to be connected to the A and B ports of the hydraulic motors.
4. For proper operation, the boom cylinders must be operated separately, with all other functions off. The tank elevator must be running before the tank conveyor will operate.

**Note:** The tank conveyor will function if the switch is on while the truck boom is being raised or lowered.

## Stripper Assembly

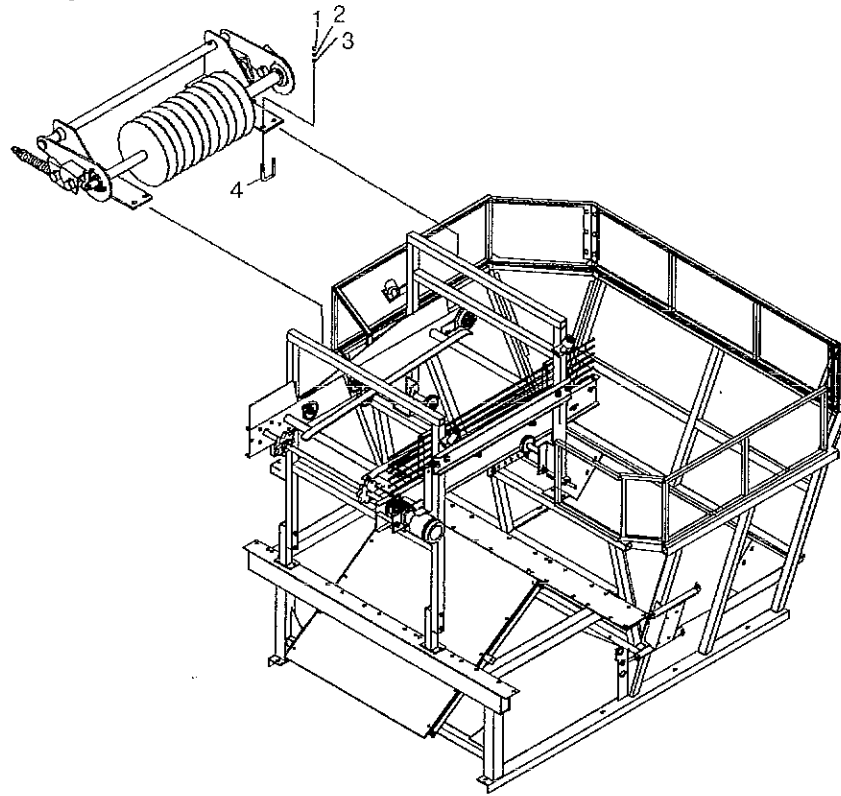


Figure 70. Stripper Installation

### Bill of Materials

Item	Quantity	Part Number	Description
1	8	005360	Nut, Hex 1/2-13 Gr. 5 Zn
2	8	005370	Washer, Lock 1/2 Zn
3	8	005200	Washer, Flat 1/2 Std. Zn
4	4	290890	Bolt, U 1/2-13 x 2.06 x 3.00"

Install the stripper to the left side of the 2"x2" square tubes (as detailed below) at the top of the wheel elevator. Note that the spring protrudes to the left. Refer to Figure 70 and the procedures below.

1. Lift the stripper assembly into position and attach with four 1/2" U-bolts (item 4), eight 1/2" flat washers (item 3), eight 1/2" lock washers (item 2), and eight 1/2" hex nuts (item 1) as shown above. Ensure that the stripper disks clear the cross members of the wheel elevator by approximately 1-inch from side to side.
2. Turn the wheel elevator through one or two complete revolutions and observe the clearances. Slide the stripper mounting supports right or left between the rods as necessary to achieve the proper clearance, and then tighten the U-bolts.

## Row Finder Assembly

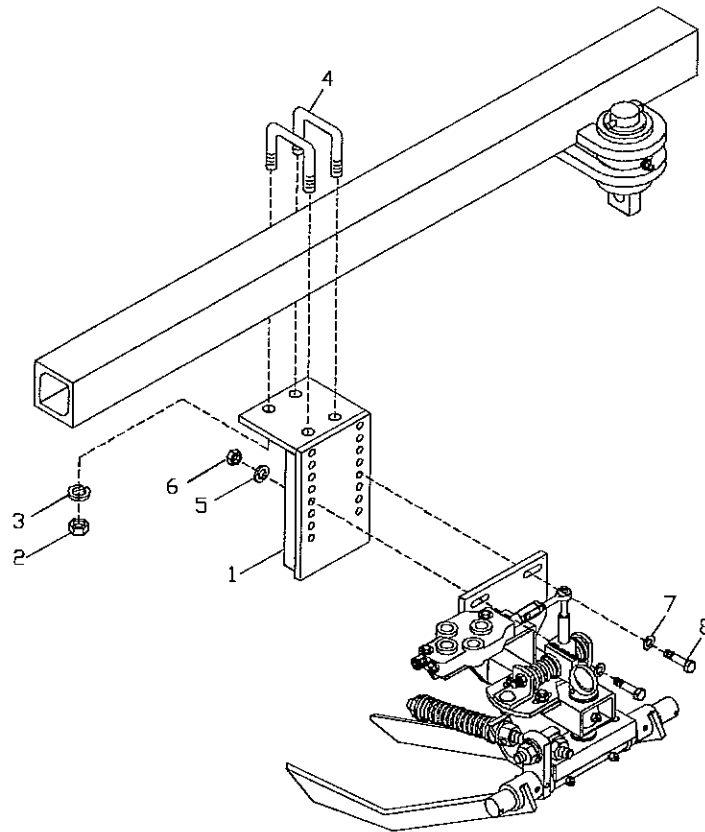


Figure 71. Row Finder Mounting.

### Bill of Materials

Item	Quantity	Part Number	Description
1	1	447160	Bracket Weldment, Mounting
2	4	J14H794	Nut, Hex $\frac{3}{4}$ -10
3	4	036800	Washer, Lock $\frac{3}{4}$
4	2	246120	Bolt, U $\frac{3}{4}$ -10 Gr 5
5	4	005370	Washer, Lock $\frac{1}{2}$
6	4	005360	Nut, Hex $\frac{1}{2}$ -13
7	4	005200	Washer, Flat $\frac{1}{2}$ Std
8	4	I770500	Bolt, HHCS $\frac{1}{2}$ -13 x 1 $\frac{3}{4}$ Gr 5

1. Install the mounting bracket using the  $\frac{3}{4}$ " U-bolts that are provided. Tighten the bolts.

*Note:* If the row finder is mounted on the second or third strut to the right, interference can result with the rear tractor tires.

2. Use four  $\frac{1}{2}$ " x 1- $\frac{3}{4}$ " hex bolts (item 8), four flat washers (item 7), four  $\frac{1}{2}$ " lock washers (item 5), and four  $\frac{1}{2}$ " nuts (item 6) to mount the row finder assembly to the mounting bracket on the first strut to the right-hand side of the hitch.

### Row Finder Adjustments

Refer to pages 26&27 for the procedures to properly adjust the row finder.

## Steerable Axle Assembly

The following steps are required for the operation of the steerable axle cylinder and valves. Also refer to the **Preparation For Field Operation** section on **Steerable Carrier Wheels**.

### Steerable Axle Cylinder and Valves

For the following procedures, refer to Figure 72.

1. Remove the transport lock on the rear axle. The lock is located between the left spindle

and the cylinder mount. Install the steering cylinder (item 3) with the clevis pins provided.

2. Mount the two valves (items 7 & 8) as shown. The smaller sized valve (item 8) bolts onto the rear frame with 1/4" hardware. The larger valve (item 7) bolts onto the left-hand frame inner channel using 3/8" hardware.
3. Install all hose fittings on the valves and plumb as shown. The connections must be done in the proper sequence.

To Rowfinder Cylinder

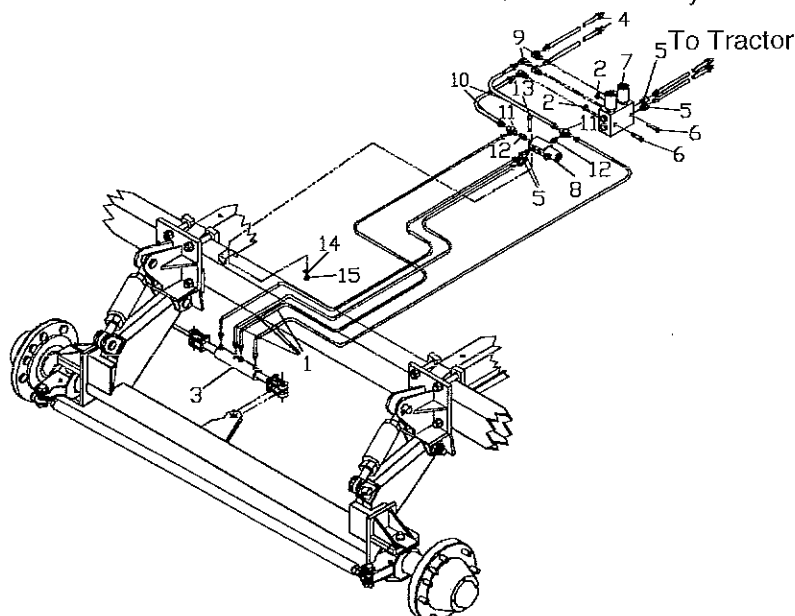


Figure 72. Steerable Axle Assembly

### Bill of Materials

Item	Quantity	Part Number	Description
1	4	445690	Hose, Assy., Hyd .5x54.0
2	2	032370	Nut, Hex 3/8-16 Gr 5 Zn
3	1	445680	Cyl., Double-Act 3 1/2 x4
4	2	447320	Hose, Assy., Hyd .5x70.0
5	4	274450	Adapt, 1/2 - 14 NPTF 3/4 ORB
6	2	990870	Bolt, HHCS 3/8-16 x 3 1/2 Gr 5
7	1	447330	Electro/Hydro Rem. Dbler
8	1	447340	Valve, 4-Way 2 Pos
9	4	277340	Elbow, 90 str. 3/4 ORB x 1/2 NPTF
10	2	447310	Hose, Assy., Hyd .5x150.0
11	2	166290	Adapter, Tee
12	2	343370	Conn., Male 3/4 ORB TO 1/2 NPTF
13	2	1100807	Bolt, HHCS 1 1/4-20 x 2 GR5
14	2	249560	Washer, Lock 1/4
15	2	027660	Nut, Hex 1/4-20 Gr5



## Steerable Axle Control Wiring

For the procedures below, refer to Figure 73.

1. Mount the control box (D) in a location that provides convenient access from the operator's seat on the tractor. It is designed to mount directly on top of the main control box.
2. Route the white (positive) cable to the battery and attach it securely. Connect the black (negative) cable to ground on the tractor. Refer to page 18 on Electrical Controls.

**IMPORTANT:** The controls are rated for use with a 12 Volt DC System only. A battery charger should not be used for testing.

3. Connect the female spades of the 4-cable wire harness (A) to the control box (D) according to the color coding on the box.

4. Route the wiring harness down the left side of the tank and secure it with the provided ties (E).
5. The other ends of the wire harness attach to the solenoid valves (B and C) as shown below. At each solenoid, the male spade farthest from the valve is positive. The black wire is ground. The row finder spades go to the solenoid nearest the front of the harvester (Item C) for the doubler valve. The steering spades go to the solenoid towards the rear.

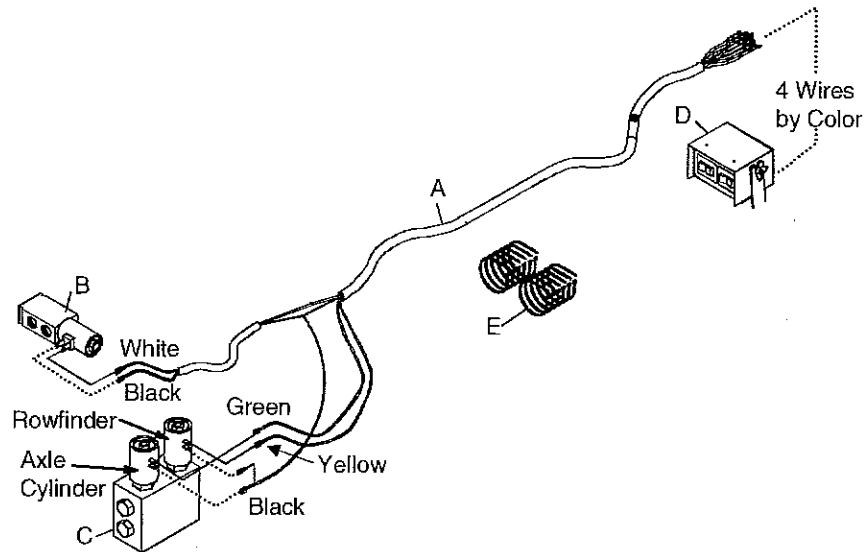


Figure 73. Steerable Axle Controls Wiring

## Hydraulic System

An "open center" plug is installed in the row finder from the factory. A closed center plug is included with the row finder.

**NOTE:** The plug must be changed for closed center operation.

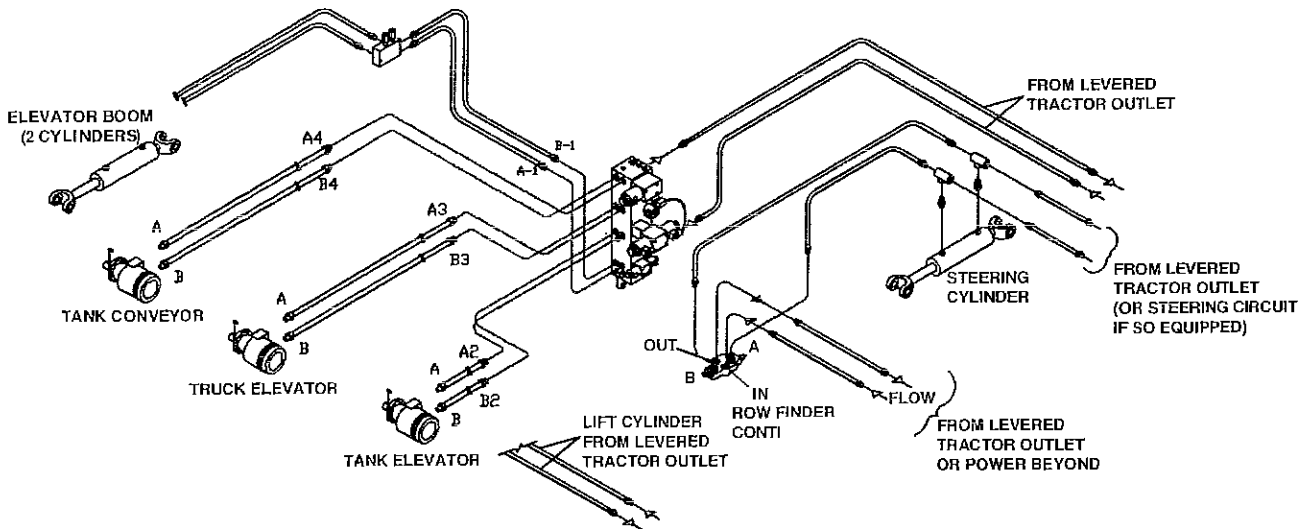


Figure 74. Hydraulic System With Two Circuits For Row Finder

## Work Light Installation

1. Choose locations where the light is desired during operation after dark. Position brackets to mount the lights in chosen locations.
2. Route the wire for the power to the 7-connector plug used for safety lights or directly to the tractor console.

**NOTE:** The bar (item 5, part # 236260) is provided for support when mounting the light to the mesh on the tank.

### Bill of Materials

Item	Qty	Part No.	Description
1	3	242110	Lamp, Horiz Mt, Halogen
2	7	011370	Bolt, HHCS 3/8 x 1 1/2
3	14	021190	Washer, Flat 3/8
4	3	236250	Bracket, Light Mounting
5	2	236260	Bar, Light Bracket Back Up
6	7	021180	Washer, Lock 3/8
7	7	027260	Nut, Hex 3/8

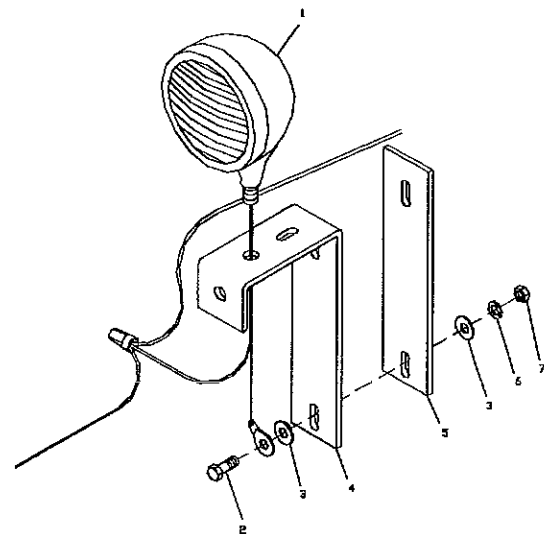


Figure 75. Work Light Components

## Safety Light Package Installation

The warning package includes two warning lamps, one tail lamp, a 7-pin connector, and two brackets with mounting hardware.

**IMPORTANT:** If harvester warning lights are being used to satisfy width lighting requirements, the lamps must be located within 16" of the lateral extremities of the harvester. Warning lamps must be equal distance from the implement centerline; as far to the rear as possible; visible from the front and the rear; and at least 42" from the center of the lamp to ground.

1. Install the two (2) light brackets on the 2"x2" upright tubes on the rear of the frame with the U-bolts provided in the kit. Install the lights through 17/32" (.531) dia. holes in the brackets and secure in position. Crimp the 3/8" ring terminals for 18 gage wire on one wire of each light. Ground all the ring terminals to the frame bolts on the light brackets.
2. Connect the lights directly to the tractor as provided by the tractor manufacturer.

**NOTE:** Four lights maximum - 200 watts maximum. Secure all loose sections of wire.

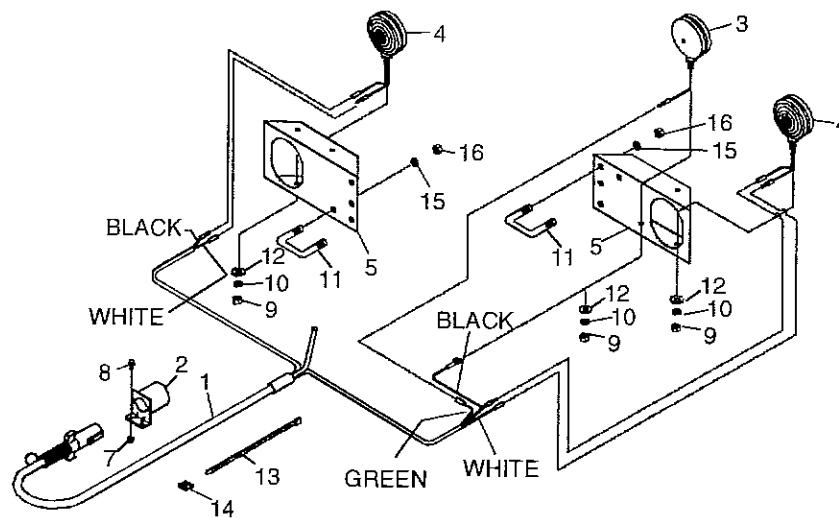


Figure 76. Safety Lighting

### Bill of Materials

Item	Qty	Part No.	Description
1	3	386280	Harness Assy, Light
2	1	JPT1296	Bracket, Plug Storing
3	1	350150	Light Assy, Red Tail
4	3	350160	Light Assy, Amber Hazard
5	2	420250	Bracket, Warning Lights
6	1	386290	Bag, Hardware, Light Kit (Not Shown)
7	2	027660	Nut, Hex 1/4-20
8	2	J37H3	Screw, Hex Self Tapping 1/4-20x.62
9	6	027260	Nut, Hex 3/8-16 G5 Zn
10	6	021180	Washer, Lock 3/8 Zn
11	2	290890	Bolt, U 1/2-13x2 1/16 x 3.00
12	3	1120394	Washer, Flat
13	10	149670	Tie, Nylon Cable
14	8	JAT55441	Mount, Cable Tie
15	4	005370	Washer, Lock 1/2
16	4	005360	Nut, Hex 1/2-13 Gr 5 Zn

## Review The Machine

Generally review the harvester for the following items:

- Any loose bolts or set screws.
- Proper tensioning of all roller chains, drive belts and draper chains.
- Proper PTO connections.
- Hydraulic cylinders and hoses for proper routing, installation and securing.
- Electric wires for adequate securing to prevent damage.
- Oil level in (2) gear boxes filled to the proper levels (fill plug).
- All shields and guards for proper installation.
- Proper installation of any options.
- Tire pressure for correct pressure (32 psi for stock tires).

## Attaching to the Tractor



### CAUTION

When ever possible during hookup procedure, place all tractor controls in neutral, set the park brake and stop the engine. When dismounting, be sure to remove the key from the ignition.

---

When hooking the harvester up to the tractor, follow this procedure:

1. Clear the area of bystanders.
2. Always follow good shop practices.
3. Block harvester wheels to prevent rolling.
4. Slowly back the tractor up to the harvester, position the hitch so it is above the drawbar and align hitch pin hole.
5. With the lifter wheels and cylinders attached, lift the machine to align the drawbar.
6. Install the hitch pin supplied with the harvester.
7. Attach the safety chain to the harvester hitch by inserting the large chain eyelet through the chain bracket on the tongue (from the back side). Route all chain links through the large chain link and pull tight. Route chain through the intermediate chain support and secure the chain to the tractor drawbar carrier. Be certain to allow enough slack in the chain for full articulation of tractor and harvester without binding. See Figure 5 in the **Preparing for Field Operation** section.

## PTO Hookup:

When hooking the harvester up to the tractor's power take off, you must follow this procedure:

1. Clean splines inside the yoke and on the tractor shaft.
2. Be sure the driveline and safety guard telescope easily and that the guard rotates freely.
3. Retract the slide collar on PTO yoke and slide the yoke over the shaft. Stop when the slide collar clicks into place. Pull on the yoke to make sure it is securely locked in place.
4. Be sure there is sufficient clearance between the drawbar, three-point hitch links and the driveline to allow maneuvering in the field.
5. Attach the safety chain for the PTO to the tractor frame to prevent the PTO guard from rotating.
6. Lower the tractor PTO shield over the universal joint and secure.

## Hydraulic Hoses

The harvester is NOT furnished with the hydraulic couplers to the tractor. Install couplers on the hoses. Use a quality pipe thread compound or Teflon tape to ensure a leak free connection.

## Hydraulic Hookup

1. Use a clean cloth or paper towel to clean dirt and build-up from around the remote receptacle and the male tips.
2. Insert the male tips into the receptacle and make sure that they are securely fastened.
3. Make sure the hydraulic hoses are properly routed along the hitch to provide adequate clearance.
4. Run the hydraulic functions of the harvester to purge the hydraulic system of the machine. Check the hydraulic oil level of the tractor after purging to ensure it maintains the proper level of hydraulic oil.

## Pre-Delivery Test Run

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### CAUTION

Before test running the harvester, keep all children and bystanders away from the machine.

---

With the tractor connected after assembly is completed, operate the harvester to ensure it functions properly. Be certain to check and complete the following items during the final run-in process.

1. Clear the area of bystanders.
2. Check that the harvester is clear of foreign objects (nuts, bolts, stones, wood blocks, etc.) and that the elevator chains and belts are free to operate.
3. Engage the PTO with the tractor at low RPM. Observe operation at low speed and listen for any unusual noises. Gradually speed up PTO to a speed of 1000 RPM.
4. Check operation, alignment and clearances of all moving parts. Make any necessary adjustments.

---

### CAUTION

Keep well clear of moving parts and wait for all movement to stop before approaching the machine. Be sure to shut off the tractor, place all tractor controls in neutral, and set the park brake. When dismounting, be sure to remove the key from the ignition.

---

5. Cycle the tank and elevator drives and continue to run the machine for 10 to 15 minutes. After running is complete and movement has stopped, re-check machine for any loose hardware and re-check drives.
6. Check all hydraulic connections for leaks and tighten if necessary (follow hydraulic safety instructions listed on pages 10 & 11 of the operator's manual).
7. Complete the Dealer Pre-Delivery Checklist in the back of the Operator's Manual.

# Troubleshooting

The Art's-Way 697 Sugar Beet Harvester is designed to provide simple and reliable operation throughout beet harvest. Its full range of adjustments ensure efficiency in varying operating conditions.

If you encounter a problem with the Harvester, check this Trouble Shooting section for a possible cause and solution. If you have a problem that is not covered in this section, please call you local Art's-Way dealer for assistance. Be sure to give the dealer your model and serial numbers when you call.

## Basic Machine

Problem	Possible Cause	Possible Remedy
Pulls too hard.	Lifter wheels running too deep	Do not run the lifter wheels deeper than necessary.
	Tractor too small.	Use a larger tractor.
	Grab roll spacing wrong.	Adjust grab rolls - must be parallel between pairs.
	Machine dirty - Not lubricated.	Clean and lubricate the machine.
Gear case runs hot, leaks oil	Machine dirty - Not lubricated.	Clean and lubricate the machine to avoid overload.
	Lubrication viscosity too light for climate.	If weather is hot and problems persists, change to No. 140 gear lube.
Hard to keep on rows.	Lifter wheel strut assemblies not set properly with rows.	Make sure the lifter wheel strut assemblies match the rows at the pinch points of the lifter wheels
	Machine straddling the guess row.	Make sure you are not straddling the guess row.
	Conditions suitable for utilization of row finder.	Install a row finder for automatic tongue steering.
Can't dig deep.	Tractor drawbar not set properly.	Set tractor drawbar properly.
	Front hitch in wrong hole setting.	Adjust front hitch to the proper holes.
	Improper cylinder being used.	Use correct depth control cylinder.
	Machine running uneven.	Level machine by adjusting the carrier wheels.

Premature wear of roller chains.	Improper lubricant or infrequent intervals	Lubricate chains with proper oil and more frequently.
Looses small beets.	Conditions suitable for utilization of close-ups.	Install close-ups.
	Ground speed too slow.	Increase ground speed - this may help get the beets to the paddles and onto the cleaning bed.
	Lifter wheels too far apart.	Space the wheels closer together.
Breaks the tails off.	Lifter wheels not running deep enough.	Run lifter wheels deeper.
	Lifter wheel strut assemblies not properly spaced.	Make sure lifter wheel strut assemblies are spaced to fit rows.
	Not steering properly.	Steer more accurately or install a row finder.
	Lifter wheels too narrow, pinch point is too tight.	Space wheels further apart.
Beet slicing.	Row finder not adjusted properly.	Adjust centering of row finder arms.
		Adjust down pressure.
	Harvester positioned over guess rows.	Dig on planted row only.
	Lifter wheels too narrow, pinch point is too tight.	Space wheels further apart.
	Replanted beets	
	Tractor moving beets.	Check tire size and spacing.
Loads too many clods.	Lifter wheels set too deep.	Run lifter wheels shallower, if possible without breaking tails.
	Grab rolls not set wide enough.	Set grab rolls for wider gap.
	Very dry soil conditions	Irrigate field or wait for rain.

## Troubleshooting

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Beet plugging cleaning bed.	PTO speed too slow.	Increase PTO speed to 1000 RPM.
	Ground speed too fast.	Decrease ground speed.
	Small beets.	Space the grab rolls closer together.
Excessive trash or dirt in the truck.	Cleaning areas plugged with trash and/or stones.	Remove stones and trash.
	Cloddy, stony field conditions	Space grab rolls further apart.
	Improper operation or adjustment.	Correct the operating procedures or adjustments.

## Row Finder

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Lifter wheels moving away from beets.	Hydraulic hoses incorrectly connected.	Check the valve connections at the tractor outlets.
Lifter wheels not tracking properly	Feeler arms not centered.	Center feeler arms.
Lifter wheels jump off rows too early	Not enough down-pressure.	Increase down-pressure or lower row finder.
	Row finder arms too high.	Lower arms.
	Drawbar mounting hole greater than 1-1/4".	Insert bushing.

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# Specifications

## 697 Harvester

4 ROW - 28" or 30" ROW PACING\*

6 ROW - 22" to 24" ROW SPACING

## General Specifications

Make:	Beet Harvester
Model:	697
Harvester Type:	Rear Elevator Wheel, Tank Type Harvester
Rows:	4 - 28" or 30"      - 6 - 22" to 24"
Operating Speed	3.5 - 4.0 mph
Lift & Depth Control	Hydraulic (5"x8" remote cylinder)
Steering Hitch Control	Hydraulic (4"x8" remote cylinder)
Overall Dimensions:	
Transport:	13'8"H x 14'5"W x 23'5"L
Operating:	14'4"H x 22' W x 23'5"L
Tread Width:	Row spacing pre-set at the factory
Shipping Dimensions (one unit):	13'8"H x 14' W x 12' L
Weight (approx.)	19,800 lbs.
PTO Drive:	Constant Velocity (CV) - allows turning w/o disengaging
Operating speed	1000 RPM
PTO Driveline	1-3/8" or 1-3/4" CV (Do not use an adapter shaft)
Power requirements:	160 PTO HP Recommended (min.)
Rear Wheels:	Wide Tread Fixed or Steerable (optional) with Heavy Duty Single Axle
Tires:	21.5L-16.1 12 ply - wide floatation
Operating tire pressure	32 psi.
Lifter Wheels:	(2 per row) 28" solid rim, heavy-duty, cast steel
Lifter Struts:	Heavy duty tapered roller bearings

## Specifications

Lifter Wheel Scrapers:	To prevent mud buildup on lifter wheels
Paddle Shaft and Drive:	
Type	Three steel paddles per row
Drive	Heavy #80H roller chain with heavy duty slip clutch
Center Gearbox:	Heavy, 1-3/4" diameter shafts
Gear lube Capacity	5 qts. 90W gear oil
Grab Rolls and Drive:	
Size:	20 sq.ft. - Front smooth & first two spiral rolls 39 sq.ft. - Rear six rolls and two diverter rolls
Type:	Five spiral grab rolls with 3/4" spiral rods and Four smooth grab rolls with adjustable spring loading and spacing. Two spiraled diverter rolls (at the rear).
Drive:	Belt drive with spring loaded idlers. Split into two drives for efficiency and more open access to drives.
Truck to Tank Loading Elevator:	
Size:	Width, 40" 56mm pitch belted chain
Type:	Electro-hydraulic valve and hydraulic motor driven belted chain, reversible for tank or truck loading, hydraulic fold down for transport.
Tank:	
Construction:	Welded steel
Capacity:	8,000 lbs.
Unloading:	Two 30" wide, 5/8" diameter rod, hooked draper chain.

## Tractor Requirements

<b>Recommended Horsepower Rating:</b>	160 PTO HP Recommended (min.)
<b>Hydraulic Requirements:</b>	Tractor must be equipped with four remote hydraulic outlets. The tractor must be capable of supplying 22 gpm flow. If using the "Power Beyond", connect to the row finder.
<b>Remote Cylinders:</b>	(1) 4"x8" and (1) 5"x8"
<b>PTO Shaft:</b>	Tractors must have 1-3/8" or 1-3/4" diameter 1000 RPM PTO shaft (do not use an adapter shaft).
<b>Front Ballast:</b>	Maximum tractor front ballast is required.
<b>Drawbar support:</b>	Additional support RECOMMENDED. Drawbar kit 427490, yoke weldment, included with harvester.
<b>Electrical System:</b>	12 Volt

## Attachments

<b>Row Finder:</b>	To keep the harvester on the row.
<b>Lifter Wheel Close-ups:</b>	To prevent loss of small beets through the lifter wheels spokes.
<b>Lifter Wheel Spacers:</b>	To increase the lifter wheel opening by 1/4" increments.
<b>Lifter Wheel Cushions</b>	To protect lifter wheels in rocky soil conditions (standard on flex struts).
<b>Flashing Warning Light Kit</b>	Standard.
<b>Light Package</b>	To light the machine for night operation (3 sealed beam halogen lights).
<b>Fixed or Steerable Wheels</b>	Optional

Art's-Way reserves the right to change design, specifications or add improvements without notice or obligation for equipment previously sold.

