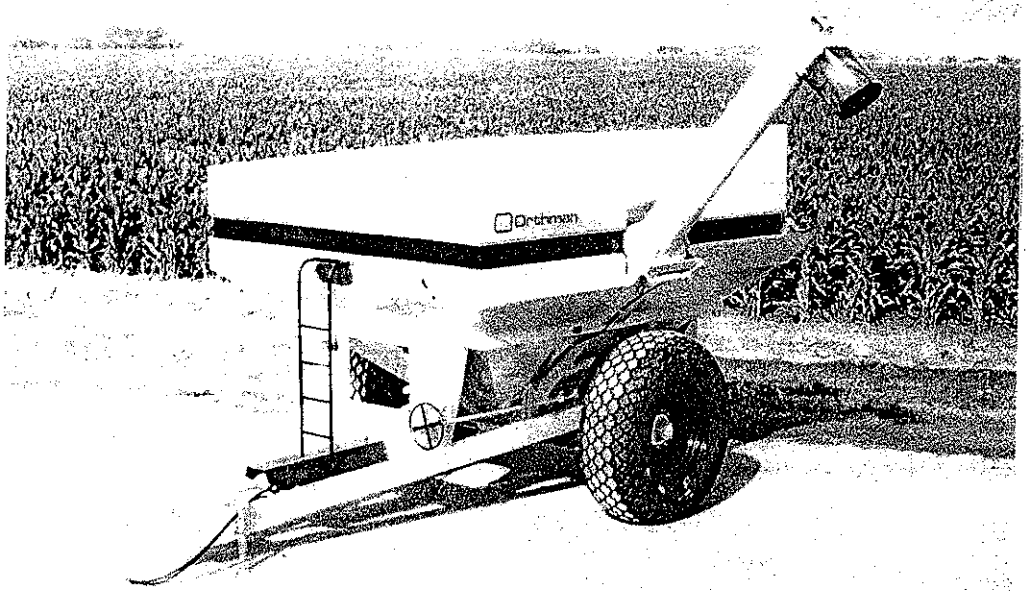
Orthman®

GRAINSHUTTLE



OPERATOR'S MANUAL

OM 07/86/40

Farm Safety

Contrary to the popular image of fresh air and peaceful surroundings, a farm is not a hazard-free work setting. Every year, thousands of farm workers are injured and hundreds more die in farming accidents. According to the National Safety Council, agriculture is the most hazardous industry in the nation.

How You Can Improve Farm Safety

You can start by increasing your awareness of farming hazards and making a conscious effort to prepare for emergency situations including fires, vehicle accidents, electrical shocks from equipment and wires, and chemical exposures. Be especially alert to hazards that may affect children and the elderly. Minimize hazards by carefully selecting the products you buy to ensure that you provide good tools and equipment. Always use seat belts when operating tractors, and establish and maintain good housekeeping practices. Here are some other steps you can take to reduce illnesses and injuries on the farm:

- Read and follow instructions in equipment operator's manuals and on product labels.
- Inspect equipment routinely for problems that may cause accidents.
- Discuss safety hazards and emergency procedures with your workers.
- Install approved rollover protective structures, protective enclosures, or protective frames on tractors.
- Make sure that guards on farm equipment are replaced after maintenance.
- Review and follow instructions in material safety data sheets (MSDSs) and on labels that come with chemical products and communicate information on these hazards to your workers.

Health and Safety Hazards on Farms

Farm workers including farm families and migrant workers are exposed to hazards such as the following:

Danger	Potential Effect or Injury	Prevention
Chemicals/Pesticides	Skin and respiratory injury or death	MSDS and proper Personal Protective Equipment. Review Manufacturers data sheets
Cold	Illness, Frostbite or death	Dress properly for the day.
Dust	Respiratory injury or explosive combinations	Be aware of your surroundings and activity
Electricity	Shock, burns, fire, death	Use a qualified professional for wiring dangerous electrical devices. Never overload a circuit. Replace damaged electrical devices or cords. Electrical tape will not insulate you from injury.
Grain bins, Silos	Entrapment, Suffocation, Explosion from formation of dangerous gases and poisoning.	Make sure the bin is properly ventilated and maintained. Never walk the grain.
Hand tools	Injury including cuts abrasions, electrocution, strains, sprains and death	Make sure you hand tools are in good condition. Never leave a damaged tooling accessible for someone else to use.
Highway traffic	Collisions resulting in injury or death	Follow regulations, stay alert. Avoid alcohol and use of communication devices while driving
Lifting and lifting devices	Back injury, sprains, strains. Falling material resulting in being struck or crushed by heavy material	Use proper lifting technique. Get help when the load is too heavy. Inspect chains, straps or cables routinely to make sure they are in good condition.
Livestock handling	Serious injury or death resulting from being pinned struck or trampled.	Always make sure you have adequate room and an escape route
Machinery/Equipment	Cuts, abrasions, amputations, death.	Thoroughly read and understand your Owners Equipment Manual. Never operate the equipment without guards in place. Make sure the equipment can not be energized or otherwise put into operation while you are working on it.
Manure pits	Explosion from formation of dangerous gases. Suffocation. Poisoning	Proper maintenance.
Mud	Sprains, strains, entrapment and suffocation. Eye injury and skin irritation.	Proper Personal Protective Equipment. In some conditions a "Spotter" may be needed.
Noise	Hearing damage	Personal Protective Equipment.
Ponds	Drowning	Wear a life preserver and make sure help is readily available.
Slips/Trips/Falls	Sprains, strains, back and neck injury, bone breaks or death	Keep work area free from clutter and organized. If working on anything elevated make sure you have appropriate guarding and/or fall protection such as a harness and lanyard.
Sun/Heat	Sun burn, Heat Stroke, shock, death	Use common sense on excessively hot days, use sun screen, wear a hat and stay hydrated.
Toxic gases	Skin and respiratory injury or death. Explosion.	MSDS and proper Personal Protective Equipment. Review Manufacturers data sheets
Tractors	Cuts, abrasions, amputations, death.	Thoroughly read and understand your Owners Equipment Manual. Never operate the equipment without guards in place. Anti-roll over devices.
Wells	Electrocution, amputation, death	Avoid contact with water while working on an electrical device. Always be sure the equipment can/will not be energized during repair or maintenance. Make sure all guarding is in place.
Severe Weather	Electrocution, "struck by" injuries, death	Move to a safe place. Lightening, hail and tornadoes are unpredictable.

Orthman Manufacturing, Inc. does not limit the potential effects or injuries nor prevention measures to those listed above. They are provided solely as a guideline to making your farm life safer. Always consult your Owner/Operators Manual for specific tool and equipment safety requirements.

High Risk Factors on Farms

The following factors may increase risk of injury or illness for farm workers:

• **Age** – Injury rates are highest among children age 15 and under and adults over 65.

• **Equipment and Machinery** – Most farm accidents and fatalities involve machinery. Proper machine guarding and doing equipment maintenance according to manufacturers' recommendations can help prevent accidents.

• **Protective Equipment** – Using protective equipment, such as seat belts on tractors, and personal protective equipment (such as safety gloves, coveralls, boots, hats, aprons, goggles, face shields) could significantly reduce farming injuries.

• Take precautions to prevent entrapment and suffocation caused by unstable surfaces of grain storage bins, silos, or hoppers. Never "walk the grain."

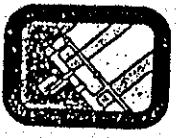
• Be aware that methane gas, carbon dioxide, ammonia, and hydrogen sulfide can form in unventilated grain silos and manure pits and can suffocate or poison workers or explode.

• Take advantage of safety equipment, such as bypass starter covers, power take-off master shields, and slow-moving vehicle emblems.

• **Medical Care** – Hospitals and emergency medical care are typically not readily accessible in rural areas near farms.

The Benefits of Improved Safety and Health Practices

Orthman Manufacturing Provides this document in the hope that everyone that has a job to do, does it SAFELY. Our goal and yours should be to end each day in the best possible health. Better safety and health practices reduce fatalities, injuries, and illnesses as well as associated costs such as workers' compensation insurance premiums, lost production, and medical expenses. A safer and more healthful workplace improves morale and productivity.



Orthman

To Our Valued Customers:

We at Orthman Manufacturing would like to thank you for the confidence you have shown in us by the purchase of this product.

Our whole company is committed to furnishing you the best value and highest quality products available.

However, we would appreciate any comments you might have on how we can improve our service to you.

Thank you again for the trust you have placed in Orthman Manufacturing.

William H. Orthman
President

Orthman Manufacturing, Inc./P.O. Box 8, Lexington, NE 68850•Phone (308) 324-4654•FAX (308) 324-3758

WARRANTY

Orthman Manufacturing, Inc. warranties the products it manufactures to be free from defects in materials and workmanship for a period of one year from the date of sale to the original user. The warranty is valid provided written notice of the alleged defect is received by Orthman Manufacturing, Inc. during said period and within ten days after its discovery.

If proven to our satisfaction that the product is defective as to material and workmanship, the necessary parts will be replaced and/or repaired, this being Orthman Manufacturing, Inc. sole responsibility. Our obligation under this warranty is limited to repair or replacement of Orthman product or part only and does not obligate Orthman Manufacturing, Inc. to bear any other cost involved.

This warranty will apply only if the product has not been subject to misuse, misapplication, neglect, repair or alteration. In respect to products and parts not manufactured by Orthman Manufacturing, Inc. the warranty obligations of Orthman Manufacturing shall in all respects conform and be limited to our suppliers warranty.

Incoming freight should be prepaid. If products are found to be within warranty, credit will be allowed on the incoming charges and return freight will be prepaid.

THE WARRANTY IN THE PRECEEDING STATEMENT BY ORTHMAN MANUFACTURING, INC. IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING THE WARRANTY OF MERCHANTABILITY AND FITNESS FOR USE. WE NEITHER ASSUME , NOR AUTHORIZE ANY OTHER PERSON TO ASSUME FOR US, ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF OUR PRODUCTS.

INTRODUCTION

This manual details information concerning safety, operation and maintenance guide lines pertaining to your Orthman 550 or 680 GRAIN CART.

Read and thoroughly understand the contents of this publication before operating the grain cart. Please keep the operator's manual in good condition for handy reference in the future.

This product was designed and manufactured with common sense and integrity; therefore, if the prescribed operating techniques and maintenance intervals are met, you will receive many years of satisfactory performance.

The directions left, right, front, and rear, as mentioned in this manual, are based on the driver sitting on the tractor seat and facing in the direction of travel.

The serial number plate is located on the left, front corner tub brace. Information contained on this plate should be recorded below for future reference when ordering replacement parts from an authorized Orthman dealer, or when corresponding with ORTHMAN MANUFACTURING, INC.

Serial No._____

Model No._____

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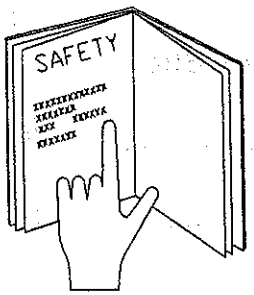
APPENDICES

SAFETY INSTRUCTIONS

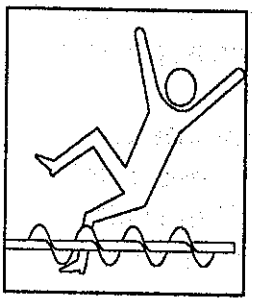
This symbol is used to call your attention to instructions concerning your personal safety. Be sure to observe and follow these instructions. Failure to do so increases the possibility of personal injury or death. Read manual carefully before operating or servicing your Orthman Grain Shuttle.



You are responsible for the SAFE operation of your Orthman Grain Shuttle. Anyone operating, maintaining or working around the Grain Shuttle must be familiar with the procedures and pertinent safety information contained in this manual.

Do not modify the equipment in any way. Do not add extensions to the 550 Grain Cart. Do not add additional extensions (other than the factory built ones) to the 680 grain cart. Modifications will void your warranty and may affect the safety and life of the equipment.

Observe all safety decals found on the Orthman Grain Cart. Replace all damaged or faded safety decals immediately. New decals are available from your Orthman dealer. Keep equipment clean to insure retaining safety decals are at their highest visibility level.



⚠ INSTALL AND SECURE ALL SHIELDS AND GUARDS IN THE PROPER MANNER BEFORE OPERATING.

DANGER! DO NOT OPERATE GRAIN CART WITH AUGER SAFETY CAGE OR PTO SHIELDS REMOVED. DO NOT ENTER CART DURING OPERATION.

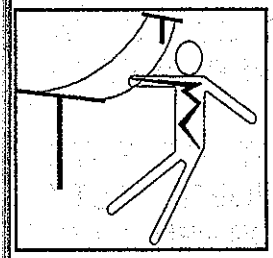
Death or serious injury may result from grain suffocation or entanglement with unloading auger. If it is necessary to enter cart for repair or clean out, follow these steps:

1. Shut off tractor, engage park brake, and remove ignition key.
2. Wait for all moving parts to stop.
3. Open internal flow control gate.
4. Open external pit dump gate.
5. Disconnect hydraulic supply hoses from tractor
6. Disconnect PTO shaft from tractor.

REPLACE ALL SHIELDS PRIOR TO RESUMING OPERATION.

⚠ **CAUTION!**

1. Equipment is to be operated by qualified personnel only. A full understanding of the operation, maintenance, and safety requirements is mandatory before use.
2. Before operating Grain Cart, be sure everyone is clear of tractor and cart. Absolutely no riders on tractor or cart during operation. Severe bodily injury may result.



3. LOOK UP for obstructions before activating hydraulic auger fold.

4. Stay away from overhead obstructions and power lines during setup and operation. Even without direct contact, electrocution can occur.

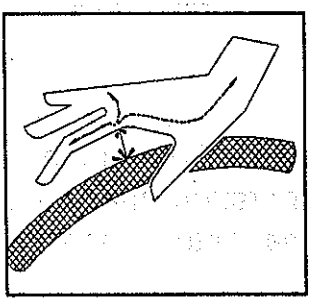
5. MINIMUM tractor horsepower requirement: 125 HP.

6. MAXIMUM towing speed: Loaded: 10 mph. Empty: 20 mph. Grain cart is designed for off-road use only.

7. Recommended PTO operating speed: 600 RPM.

8. Be sure internal flow control gate is closed before unloading auger is engaged.

9. Escaping hydraulic oil under pressure can have sufficient force to penetrate the skin, causing serious personal injury. Before attaching or disconnecting hydraulic lines, relieve pressure by shutting off tractor and moving corresponding remote cylinder lever in both directions. Before applying pressure, make sure all connections are tight and that lines, pipes and hoses are not damaged. Hydraulic oil escaping from a very small hole can be almost invisible. Use a piece of cardboard or wood rather than hands to search for suspected leaks. If injured by escaping



hydraulic oil, see a doctor at once. Serious infection or reaction can develop if proper medical treatmentis not administered immediately.

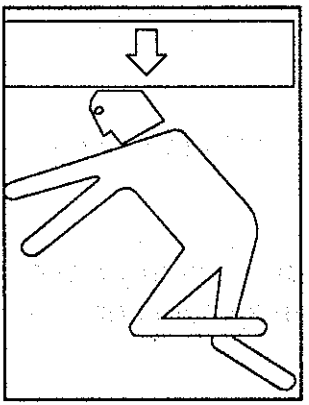
10. Wear suitable ear protection for prolonged exposure to excessive noise.

11. Never wear ill-fitting, baggy or torn clothing when working around or on any of the drive system components.

12. Keep hands, feet, hair and clothing away from all moving or rotating parts.

13. Never operate the machine inside a closed building.

AXLE



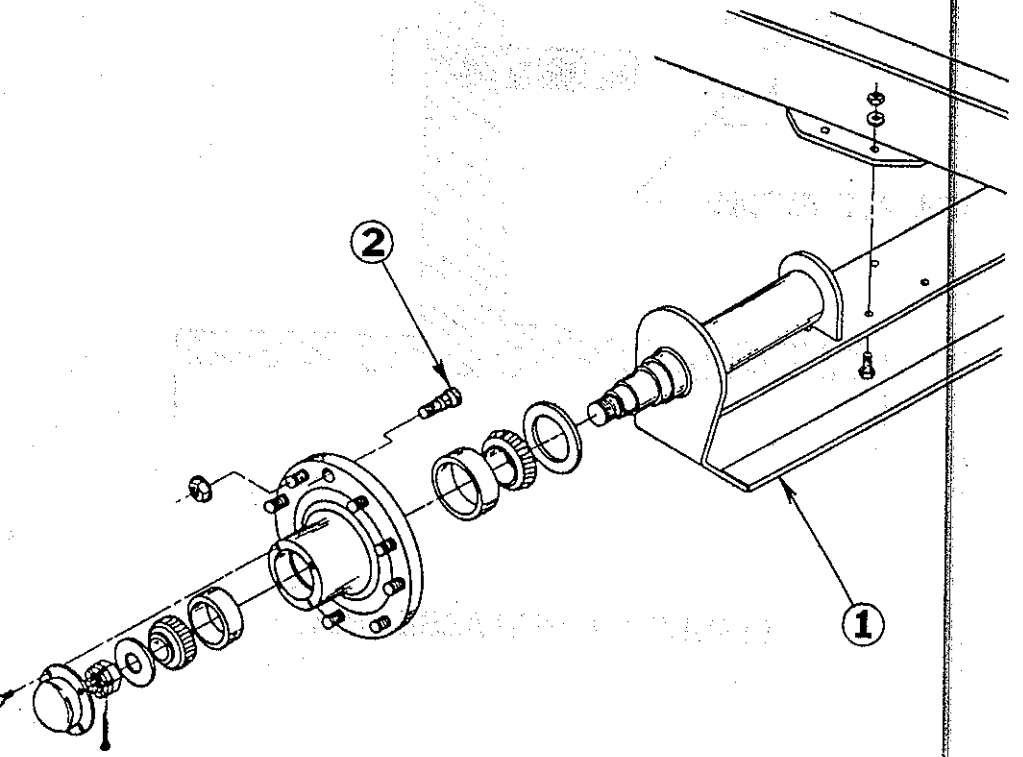
WARNING: Properly block grain cart when assembling axle onto frame. DO NOT allow anyone to position themselves underneath frame work while cart is suspended in air. Use safe practices to prevent needless mishaps that could result in death or permanent injury.

1. Jack cart frame up until transport wheels are clear. Block framework securely to prevent cart movement while suspended.

2. Unbolt shipping axle and remove from underneath cart. Position permanent axle under frame and secure with eight (8) 3/4" x 2" grade 5 bolts, lock washers and nuts. See Figure 1. Tighten mounting bolts and torque accordingly. See page 34 for Torque Specifications. Make sure the tires and axle match for your particular grain cart size.

3. Mount wheels onto axle hubs. See Figure 1A for proper placement of nuts. The flat side of the nuts must be flush against the axle. Torque to 340 lb-ft. Check torque after first hour of operation and weekly thereafter.

4. Carefully remove support blocks and lower cart to ground.



1 - Permanent Axle
2 - 3/4" x 2" Bolts

FIGURE 1: AXLE

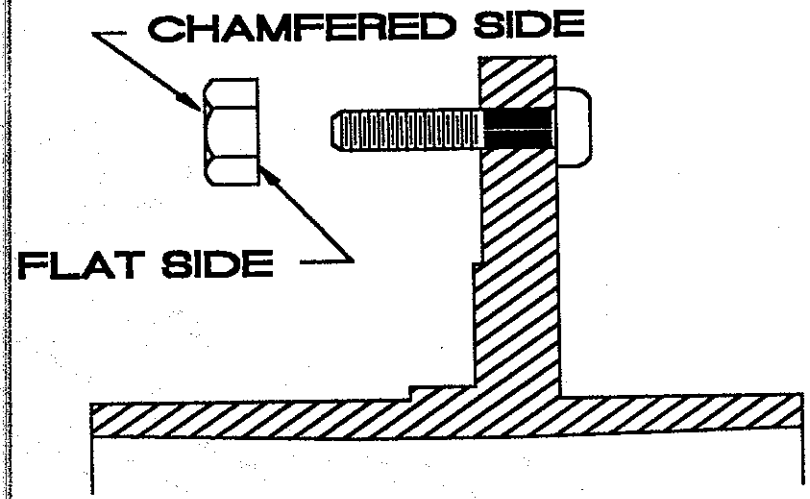


FIGURE 1 A: HUB ASSEMBLY

ASSEMBLY INSTRUCTIONS

AUGER

IMPORTANT! Remove rubber boot from top auger discharge to prevent auger lock. The boot is tucked inside for shipment.

Note:
The over center adjusting linkage strap will require adjustment to properly mesh corresponding auger surfaces. Your Orthman Grain Shuttle is equipped with four (4) dog pins in the auger dog to provide a more positive auger drive. The presence of four dog pins will equalize stress and help to prevent fatigue failure of pins. These are shown in Figure 2. Adjustments will be made in Step 6. Top auger setting (page 12) also needs to be checked. Make sure bearing lock collar is secure.

1. See Figure 2. Place top auger hinge plate (1) in line with bottom auger plate (2) in the transport (folded) position. Grease shaft pin (3) and insert into hinge from left to right. Be sure nut end of pin (3) is on the side away from the grain cart. If pin does not slide in easily it may be hit with a rubber mallet. Hitting it with a hammer will damage the nut and cause the pin to be very difficult to remove. If a rubber hammer is not available, remove the nut and insert a bolt before striking with a hammer. Replace nut when pin is installed.

2. Align drilled hole in shaft (3) with hinge plate hole (3A) and drive in 1/2" x 2 1/2" roll pin (4), securing shaft in hinge assembly.

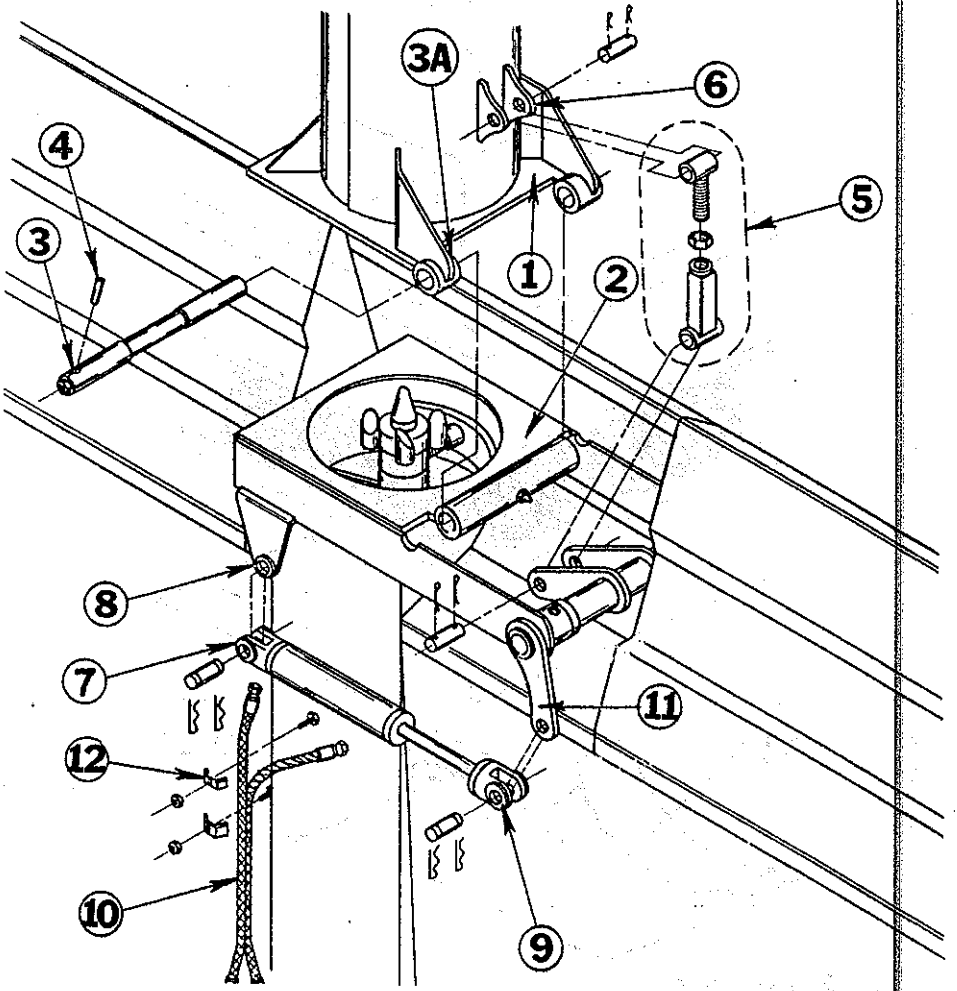
3. Connect adjusting screw assembly (5) to over center lock linkage (6) with 1/2" x 2 1/2" roll pin. Secure with hair pins. Assemble 2 1/2" x 8" cylinder (7), base end to stationary mounting tab (8), leaving rod-end clevis (9) loose. Attach hoses (10) to remaining supply line fittings and secure to cart with clamps(12), 5/16" nuts and 5/16" lockwashers.

5. To avoid auger whipping into place, cycle cylinder to purge system of all possible air locks. Extend cylinder rod and attach rod-end clevis (9) to top auger mounting tab (11) using cylinder pin. Secure with hair pin.

6. Retract cylinder to unfold auger. When fully extended with over center linkage (5) locked, auger will not seat tight against bottom plate (2). Extend over center adjusting screw assembly one half turn at a time until auger surfaces mesh satisfactorily.

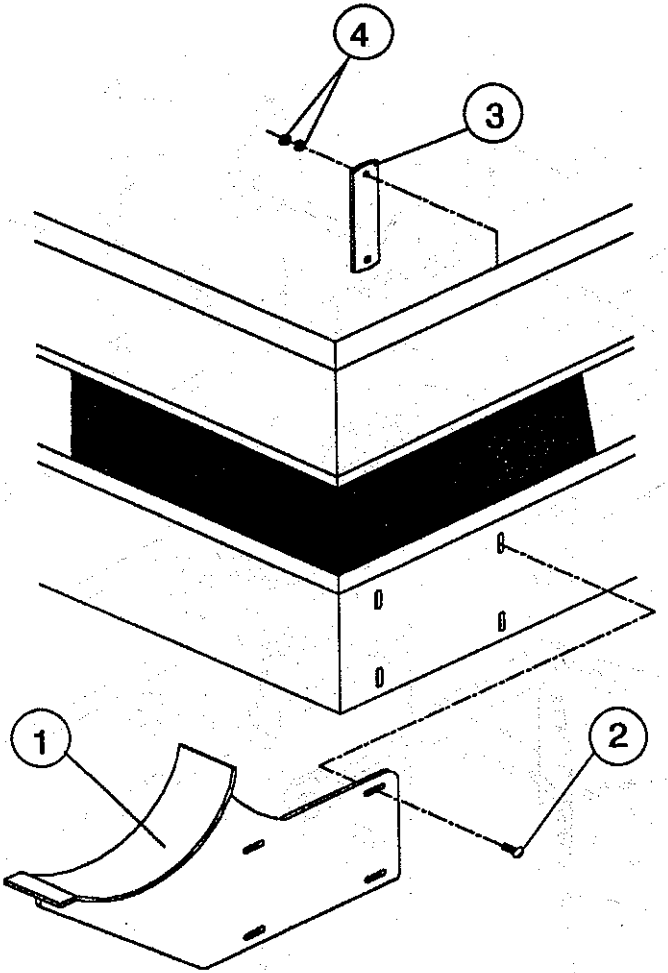
IMPORTANT! **DO NOT EXTEND** adjusting screw in more than half turn increments. Extending more than a half turn may damage hinge and over center linkage assemblies

7. See Figure 3. Position rest (1) onto outside left rear corner of grain cart tub with four 3/8" x 1 1/4" carriage bolts (2). Place two strengthening straps (3) vertically over carriage bolts on the inside of tub. Secure entire assembly with 3/8" lockwashers and 3/8" nuts.



1 - Top Auger Hinge Plate
2 - Bottom Auger Hinge Plate
3 - Shaft Pin
3A - Hinge Plate Hole
4 - Roll Rin
5 - Adjusting Screw Assembly
6 - Center Lock Linkage
7 - Cylinder
8 - Cylinder Mounting Tab
9 - Rod End Clevis
10 - Hydraulic Hoses
11 - Mounting Tab
12 - Hose Clamps

FIGURE 2: AUGER ASSEMBLY



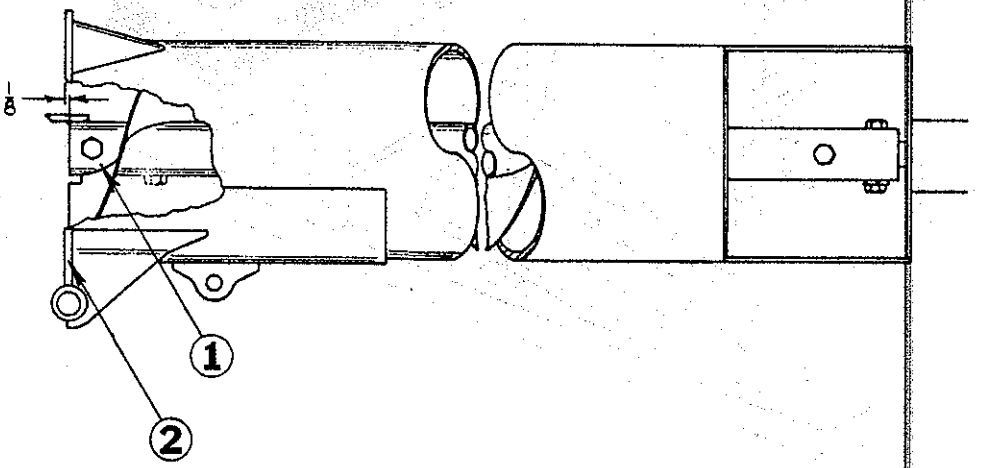
1 - Auger rest
2 - 3/8" x 1 1/4" carriage bolts
3 - Strengthening straps
4 - 3/8" Lockwashers and nuts

FIGURE 3: AUGER REST

TOP AUGER SETTING

IMPORTANT! The top auger is shipped complete with auger tube clearance factory set. Clearance should be reset only if auger is disassembled for repair.

See Figure 4. The auger screw (flighting shaft, 1) must be 1/8" inside the hinge plate (2). Using a square, position auger screw to the recommended 1/8" clearance dimension, then secure bearing lock collar. Clearance should be checked each time top auger is assembled onto cart.



1 - Auger Screw or Flighting Shaft
2 - Hinge Plate

FIGURE 4: TOP AUGER

LADDER

See Figure 5. Locate mounting hardware in ladder mounting holes. Assemble ladder to cart tub and drive-line shield with supplied hardware.

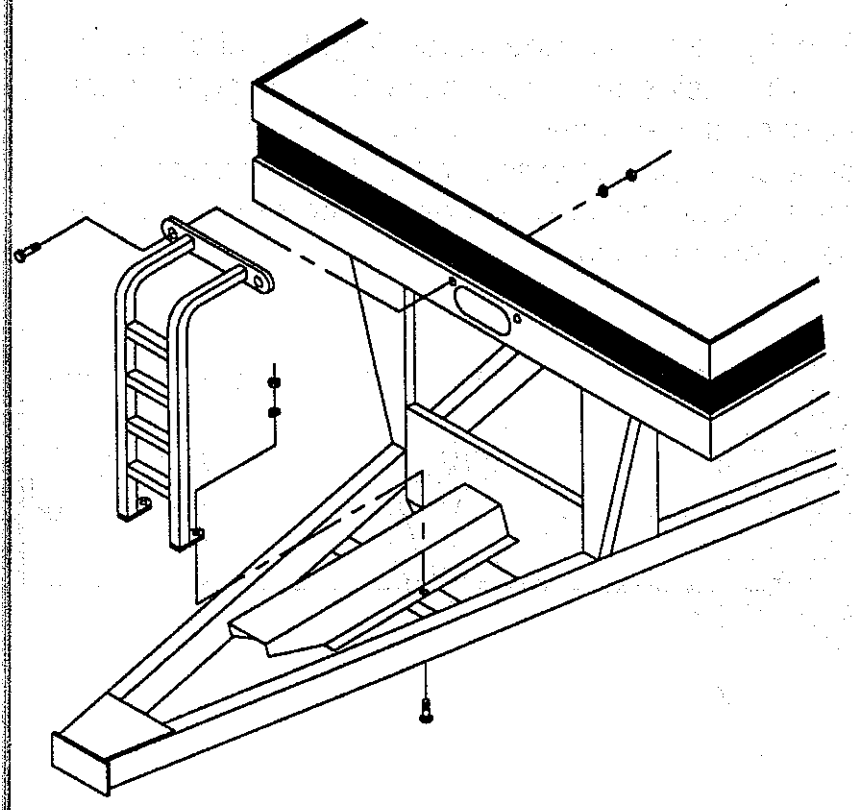
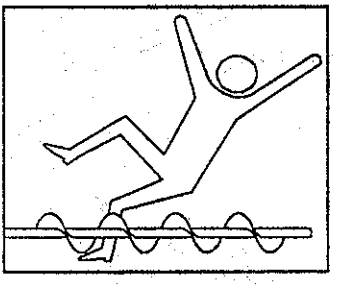


FIGURE 5: LADDER MOUNTING

AUGER GRATE AND FLOW CONTROL CYLINDER HOSES



DANGER! DO NOT OPERATE CART WITH AUGER GRATE OPEN OR REMOVED. Death or permanent injury may result from entanglement with unloading auger.

1. Open auger grate and lean it against side of bin. This grate was designed to expedite the flow of grain while providing maximum protection against personal injuries.

2. Attach 1/4" hoses to internal flow control cylinder elbows and bulkhead fittings in tub. See Figure 6. Hoses should feed along cylinder barrel. Secure hoses to prevent movement.

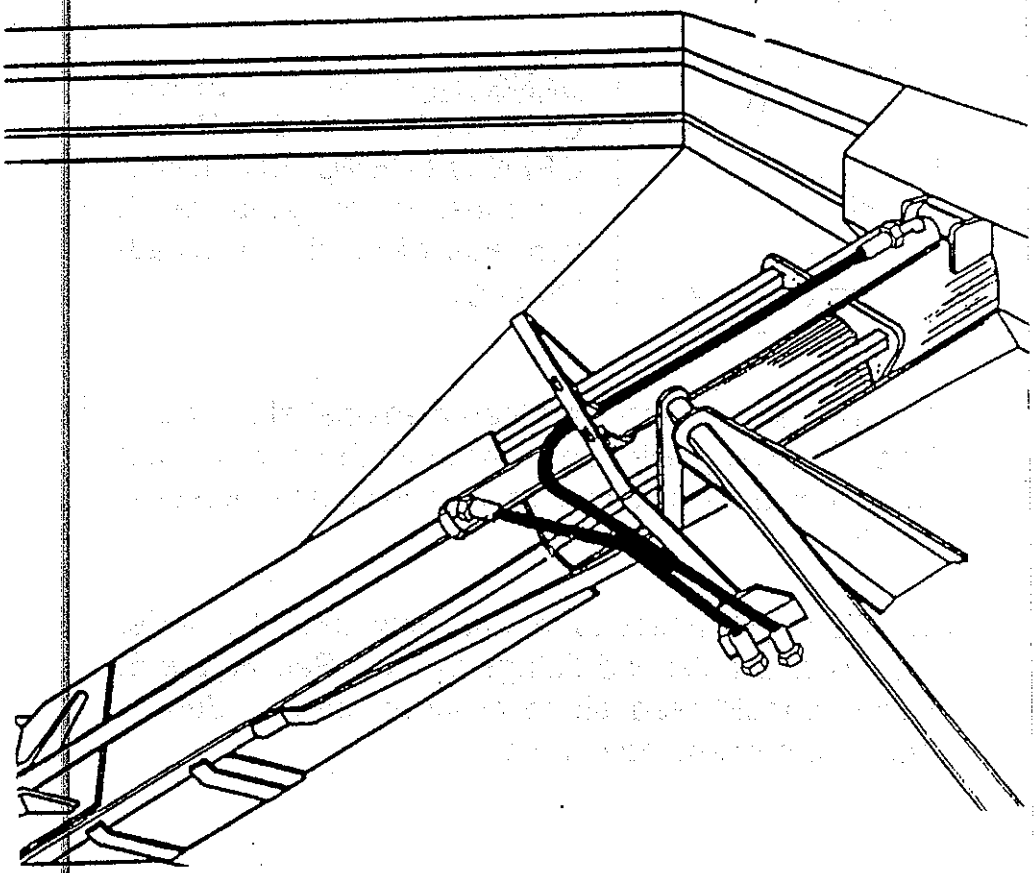


FIGURE 6: FLOW CONTROL CYLINDER HOSES

EXTENSIONS

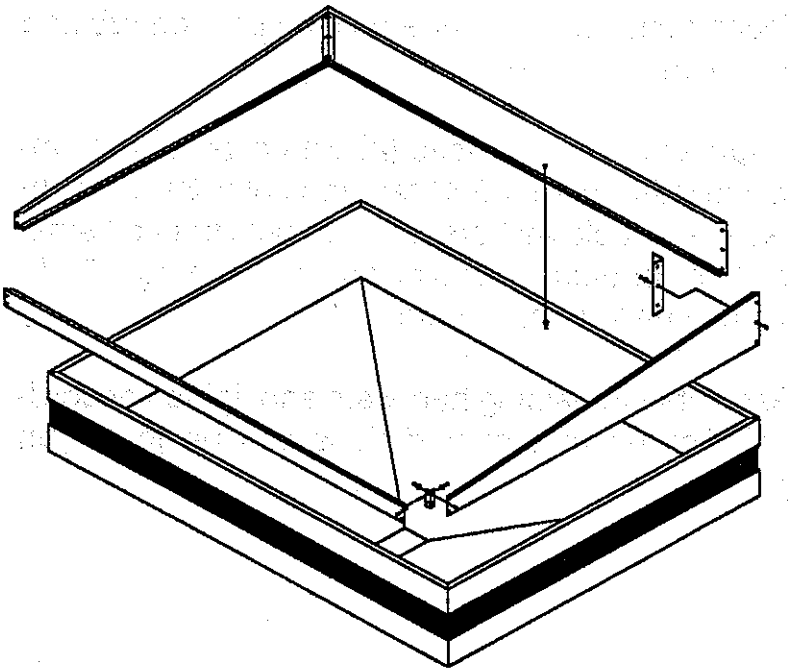


FIGURE 7: EXTENSIONS FOR THE 680 GRAIN CART

1.See Figure 7. Carefully position left hand extension (21" deep) in place on auger side of tub and loosely secure with some of the 5/16" x 3/4" carriage bolts,flat washers, lock washers, and hex nuts from bottom up through tub and extension mounting surfaces. There are 50 each of bolts, flat washers, lock washers, and hex nuts in the hardware packet.

2. Attach right hand extension member (6" deep) with some of the 5/16 x 3/4" carriage bolts, washers and nuts. Initially secure as few bolts as possible.

This will help enable alignment with other extension members and corner braces.

3. Place front and back tapered members on tub and secure with hardware.

4. Align four corner braces (A) with extension members and insert 5/16" x 3/4" carriage bolts. Secure with flat washers, lock washers, and hex nuts from outside. Slide these through extension and corner brace. Slide brace downward against tub.

5. Assemble remaining hardware and tighten accordingly. Torque recommendations can be found on page 34.

PTO SHAFT INSTRUCTIONS

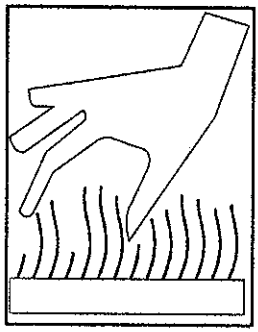
The grain cart drive line is protected from overloading by a slip clutch as well as an overrunning clutch. These clutches are to relieve shock loading and stress on the gear box.

Spring lengths are preset at 1 3/4". This length has a torque of 4100 in.-lbs. before run-in and 4900 in.-lbs. after run-in.

1. Atmospheric conditions and prolonged storage may alter the operating characteristics of friction clutches. Before first use and after storage of more than one month all spring adjusting nuts should be backed off until springs are just loose. Then they should be tightened one turn.

2. The clutch should be slipped until it starts to smoke. The springs should then be set to the desired spring setting.

3. The temperature of the clutch should be checked often during the first 20 minutes of operation and about every 8 hours thereafter. If the clutch smokes or is too hot to touch (more than approximately 140 degrees F), the springs should be tightened or the clutch will burn up and fail. When checking clutch, care should be taken to avoid skin burning.



4. Some clutches may have a spring stop INSIDE the spring to prevent tightening the spring beyond a

preset length.
IMPORTANT: DO NOT TIGHTEN SPRINGS DOWN COMPLETELY (SO THEY ARE SOLID) AND OPERATE.

Set all springs to the same length.

NOTE: After a clutch has been "run in" it will slip about 20 percent higher than before.

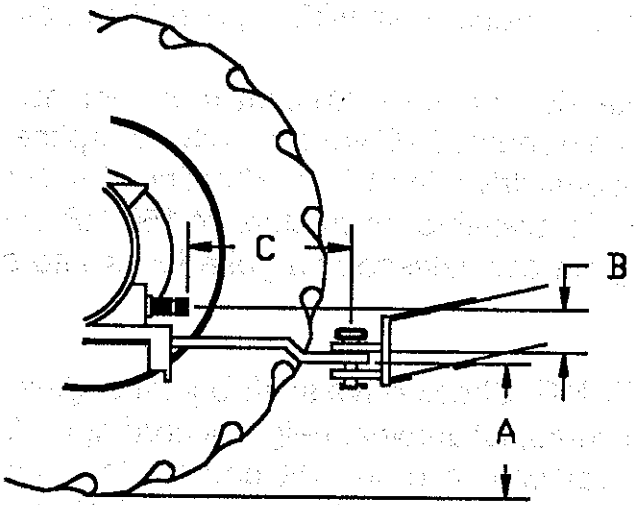
CAUTION! If an attempt is made to tighten the spring beyond the preset length the bolt may break and the spring will make the fastener fly off.

MACHINE PREPARATION

The following procedure will help the operator properly prepare the tractor and grain cart for use.

1. Minimum tractor horsepower requirement is 125HP.

2. Adjust tractor drawbar according to standard ASAE specifications for 1 3/8"-21 1000 rpm PTO spline. Dimension guidelines are given in Figure 8. Align drawbar with center line of PTO spline and secure from side sway.



		1 3/8"	1 3/4"
A	13"-20"		
B		8"	10"
C		16"	20"

FIGURE 8: TRACTOR DRAWBAR ADJUSTMENTS

2. Lubricate grain cart and check fluid levels per the lubrication and maintenance sections of this manual. Check tire inflation pressure and lug nut torque prior to each use period. Recommendations are on page 33 and 34.

WARNING! Clear the area of all bystanders, especially children, before attaching tractor to grain cart. Serious injury or death may result from tractor run over.

3. Hook grain cart up to tractor with 1 3/8" x 7 1/2" drawbar pin. Secure pin with supplied linch pin.

4. The standard tractor PTO spline requirement adaptable to grain shuttle PTO yoke is 1 3/8" - 21 spline 1000 rpm. Optional drive-line 1 3/4" - 20 spline (Part Number 152-166) is available for tractors of 150 HP and up. Attach grain cart telescoping yoke locks into spline groove.

IMPORTANT! Check drive shaft U-joint angles. If excessive, re-adjust drawbar height accordingly. Swivel hitch on cart can be turned 180 degrees to either raise or lower (depending on initial position) tongue approximately 2".

5. Connect the pair of twin 1/4" hoses to the supply line bank located on inside of left A-frame tongue member (Figure 10). One set attaches to the top two JIC tapered male fittings (1) and the other set attaches to the bottom two fittings (2). See Figure 9.

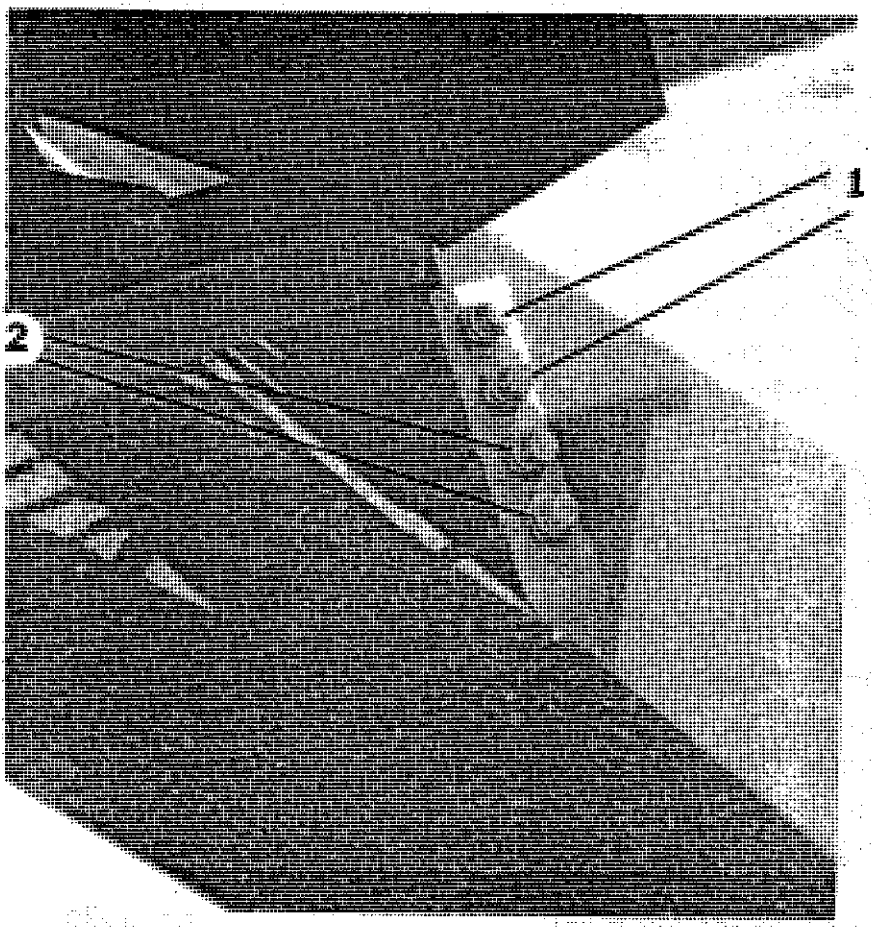


FIGURE 9: HOSE CONNECTIONS

6. Match quick disconnect couplers to tractor requirements. Assemble with appropriate sealant material to 1/2" adaptors. Clean tips thoroughly and insert into appropriate control remote outlets in a fashion that is both convenient and safe for the operator.

OPERATION

The operation procedures are crucial to you, as the operator, to follow and understand. These must be followed to obtain optimum performance and reliability from your grain cart. Please read and practice the following recommendations and procedures concerning operation of the cart and your personal safety, both in and out of the field. Keep this manual convenient for reference at anytime.

CAUTION! Equipment is to be operated by qualified personnel only. A full understanding of the operation maintenance and safety requirements is mandatory before use.

CAUTION! Before operating grain cart, be sure everyone is clear of tractor and cart. Absolutely no riders on tractor or cart during operation. Severe bodily injury may result.

Do not exceed 10 mph when loaded. Avoid ruts, washouts, pivot tracks, etc. at high speeds when cart is under load. If rough conditions are inevitable, throttle back and gear down to acceptable speed while crossing such conditions.

Look up for obstructions before activating hydraulic auger fold. Make sure hinge linkage is locked before engaging unloading auger.

Lubricate cart according to intervals indicated on page 28.

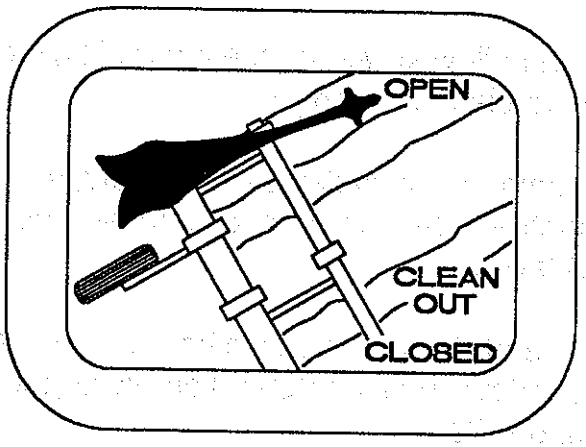


FIGURE 10: FLOW GATE INDICATOR

Via Auger

1. Unfold (extend) auger to unloading position.

2. Engage PTO with tractor at an idle, slowly feather into operating position.

IMPORTANT! DO NOT engage PTO lever at high engine RPM's. Severe drive-line damage may occur, resulting in extended down time and expensive repair costs. Take time to idle down engine.

3. Slowly open internal flow control gate until indicator is positioned into open range. See Figure 10.

4. Throttle engine up to desired unloading speed.

Recommended PTO operating RPM is 600. DO NOT exceed 1000 RPM.

5. When grain flow slows, choke internal flow control gate down to clean out range.

6. When grain tank is satisfactorily empty, shut internal flow control gate, throttle back engine, and disengage PTO lever.

7. If auger needs to be shut down before tank is empty, shut internal flow control gate and empty auger before disengaging PTO.

DO NOT START OR STOP UNLOADING AUGER FULL OF GRAIN UNLESS ABSOLUTELY NECESSARY FOR SAFETY REASONS.

Via Pit Dump Gate:

1. Position grain cart over desired unloading zone. Activate internal flow control gate to "open" range. Shut off tractor and engage park brake. Remove keys from ignition.

2. Rotate pit dump wheel to open gate, initiating grain flow out of cart. Sprocket latch enables gate to hold a desired opening distance. If flow reduction is required, the sprocket latch must be manually released and wheel rotation reversed.

3. When cart is empty, close internal flow control gate and external pit dump gate.

LUBRICATION AND MAINTENANCE

To safely prepare cart for service, please follow the below steps:

1. Shut off tractor, engage park brake, and remove key from ignition.

2. Disconnect PTO shaft from tractor.

3. Disconnect hydraulic supply hoses from tractor.

4. Visually inspect machine to ensure all shields are attached to their respective positions. This is to protect you and others from needless accidents!

LUBRICATION AND MAINTENANCE (continued)

The recommended lubrication intervals, if properly followed, should result in continued satisfactory grain cart performance. Intervals cited below are based on average machine working conditions. If working in extreme conditions, exposed components should be lubricated more frequently.

SYMBOLS

DO NOT service grain cart when PTO shaft or hydraulic hoses are connected to tractor. Accidental entanglement with drive line or auger could result in death or permanent injury.

Indicates component should lubricated with a multipurpose lithium based NLGI NO. 2 grease at recommended hourly intervals indicated within a circle,(i.e. every 10 hours of operation).

Indicates component should be lubricated (level checked)with an SAE 90 gear oil with an extreme pressure additive at recommended hourly interval within circle (i.e. gearbox level should be checked every 50 hours of operation.

GEARBOX

The drive line gearbox should be visually inspected daily for possible seepage or loss of gear oil. If a leak develops, keep a close watch on gearbox fluid levels until problem can be corrected. Under normal conditions, the gearbox level should be checked in 50 hour intervals (about every two weeks) according to the following procedure.

1. Position cart on level, shut of tractor and engage park brake. Remove keys from ignition.

2. Remove breather plug from filler elbow and sight plug from side of gearbox case .

3. Fluid level should be at bottom of sight plug opening, which corresponds with approximately half-way up on filler opening elbow. Note indicated fluid level line.

If low, slowly add SAE 90 gear oil. Do not overfill.

4. Replace plugs to their respective locations and wipe excess oil from gearbox surface.

OIL CHANGE

Change oil at beginning of use season.

1. Remove bottom plug and drain oil from gearbox. A suction pump may be required in some cases to completely drain gearbox.

2. Inspect oil for indications of foreign material.

3. If satisfactory, refill with approximately eight pints of an extreme pressure SAE 90 weight gear oil until level.

The following tips will prove invaluable for the purpose of extending useful machine life. A few minutes taken at the beginning and end of each season may add years of serviceable life to the machine.

Beginning of Use Season

1. Drain gearbox oil and refill. Winter condensation may cause formation of water in gearbox.

2. Visually inspect U-joints, bearings,hubs, cylinders, etc. for wear and replace as needed.

3. Check wheel bearings. If necessary, pack or replace wheel bearings.

4. Check lug nut torque and tire inflation pressure.

5. Lube grain cart.

6. Inspect hitch pin and replace if worn.

LUBRICATION AND MAINTENANCE (continued)

During Use Season

1. Check lug nut torque weekly (340 lb-ft.).

2. Check tire inflation pressure frequently.
   18.4 x 26 10 ply - 35 psi
   24.5 x 32 12 ply - 35 psi

3. a. Lubricate auger bearings and drive shaft carrier bearings every 50 hours or as needed. An approximate interval would be twice during the use season.

IMPORTANT! Do not grease grain cart bearings excessively, they are sealed bearings that are factory lubricated. If overgreased,seal damage may occur, leading to premature bearing failure.

b. Lubricate U-joints in drive line every 10 hours.

Note: On drive line U-joint yoke located near gearbox input shaft, the lock pin has intentionally been removed allowing yoke to slide on gearbox spline, relieving drive line strain due to possible frame flex.

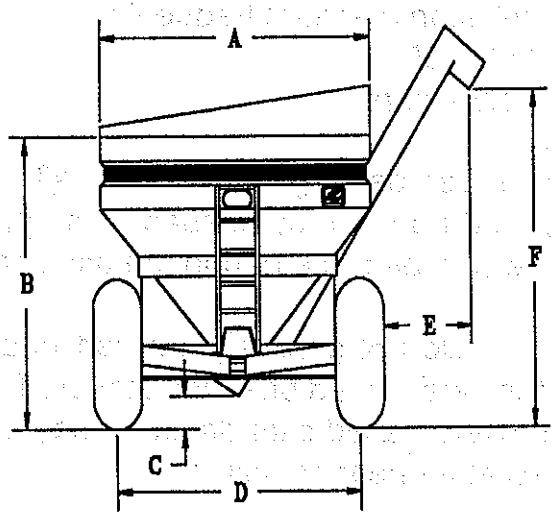
c. Lubricate auger hinge every 50 hours.

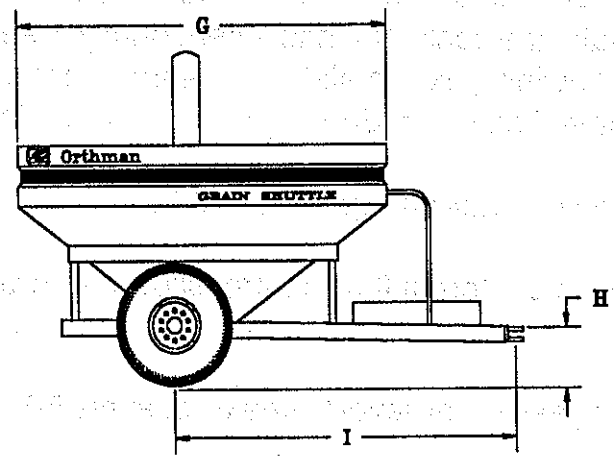
d. Lubricate internal flow control slide with graphite weekly.

4. Check gearbox oil level biweekly or every 50 hours.

5. Inspect hydraulic cylinders and lines frequently for suspected leaks.

GRAIN SHUTTLE SPECIFICATIONS

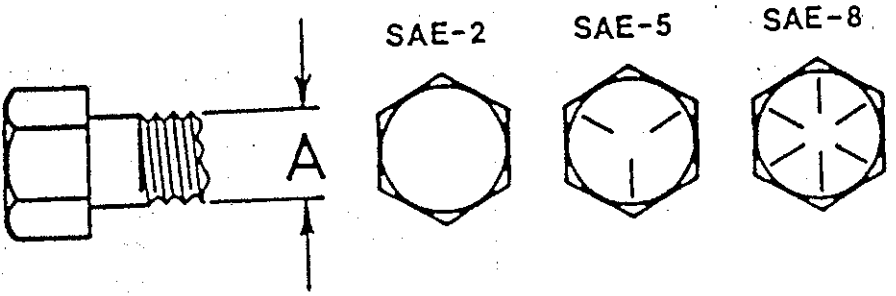




SPECIFICATIONS

DIMENSION:	550	680
A	132"	132"
B	120"	120"
C	16"	16"
D	120"/144"	120"/140"
E	65"/53"	65"/50"
F	150"	150"
G	168"	168"
H	17"	17"
I	168"	168"
CAPACITY	550 bu.	680 bu.
TIRE	18.4 x 26 10-ply	24.5 x 32 12-ply
Unloading time	Approx. 3 min.	Approx. 4 min.
Gearbox capacity	4 pints	4 pints
Axle	120" - 33 lb.-ft. 144" - 39 lb.-ft.	120" - 39 lb.-ft 144" - 54 lb.-ft
Hub & Spindle capacity	15,000lbs./@	20,000 lbs./@
Slip Clutch (set spring length)	1 3/4"	1 3/4"

TORQUE SPECIFICATIONS



Check bolt tightness on Orthman 550 or 680 GRAIN CART. Retighten after initial 10 hours of use and check periodically thereafter. Torque recommendations for SAE grade 5 bolts are listed below.

Bolt Diameter	Bolt Torque in Lb-Ft (N-m) (kg-m)		
	Lb-Ft	SAE 5 N-m	Kg-m
3/8"	35	(47)	(4.7)
7/16"	55	(75)	(7.5)
1/2"	85	(115)	(11.5)
9/16"	130	(176)	(17.6)
5/8"	170	(231)	(23.1)
3/4"	300	(407)	(40.7)
7/8"	445	(603)	(60.3)
1"	670	(910)	(91.0)
1-1/4"	910	(1235)	(123.5)

The 580 and 660 Grain Shuttles have the option of a Butler electronic scale indicator.

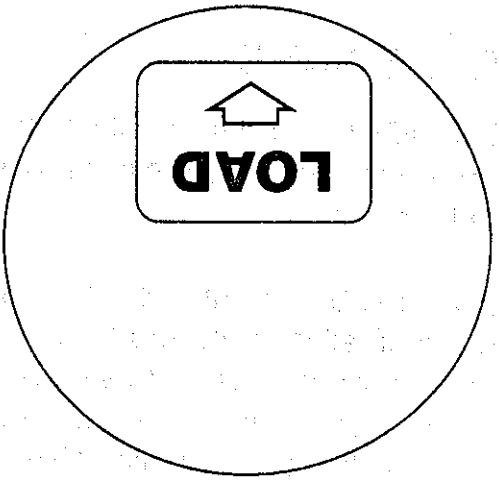
To install scale on the grain shuttle:

1. Insert scale load cells into permanent axles on right and left side of grain cart. Secure with bolts.

2. Unscrew bolt holding tongue in place. Remove tongue.

3. Take off tongue end weldment by removing six 1/2" x 1" flat head socket cap screws.

4. Insert scale load cell into tongue. The load cell has a sticker on the clevis end. The load sticker arrow must be pointing up:



TONGUE LOAD CELL

5. Slide wire cable through holes on left side of hitch. Slide load cell in rest of the way until holes in load cell line up with holes in frame. Secure with one 1" x 5" bolt, 1" lockwasher, and nut. Tighten per torque recommendations on page 34.

6. Attach scale clevis with one 1"x 5" bolt, 1" lockwasher, and nut.

7. Uncoil cables from tire axle load cells. Use ties and tie mounts every 30" to secure the cables on top rear brace. Use more ties and mounts to secure cables to back side of rear brace. Run left hand cable from axle across rear brace to right side of rear brace. Join left and right cable at right frame. Use ties to secure cables to metal conduit on right frame. Run the two cables along right frame to front center support plate directly behind drive line cover shield.

JUNCTION BOX INSTALLATION

CAUTION! In order to obtain maximum protection from moisture this procedure must be followed.

1. Junction box must be mounted on a flat surface and equally supported on all four corners so the box will not warp. This also allows the gasket to seal properly. We recommend this box be mounted on the center support plate behind the drive line cover sheild. Use the template included in the back of this manual to ensure proper placement of holes. Drill 3/16" holes.
Mount back of junction box . Use two shorter screws at

top and two longer screw at bottom. Loop excess cable and secure to plate with ties and tie mounts.

3. Remove the gland nut from the strain reliefs. Insert cables through gland nuts and verify that the rubber sleeve is in the strain releif while inserting the cable into the junction box.

4. Install colored wires in the proper colored terminals. Each series of wires in a cable should connect to one set of terminals, but it is not important which set of teminals as long as the colors on the wires match the colors coded on the terminals. Tighten the screw securely against the wire and not the insulation. Give a short tug on wires to verify tighteness .

5. Tighten the gland nut securely. When properly tightened, the cable should not slide easily when pulled. This is very important as the gland nut is there to provide strain relief and to seal against moisture.

6. Re-install top on box.

7. It is important the junction box not be mounted where water, snow, etc., is a constant hazard to it. Box is water resistant not water proof.

Turn to Butler Electronic Scale Indicators Operation Manual.

APPENDIX A

Erection 3105

J-STAR ELECTRONICS

OMP 5 AND OMP 15 ELECTRONIC SCALE INDICATORS

INSTALLATION INSTRUCTIONS
OPERATION MANUAL & SERVICE PARTS

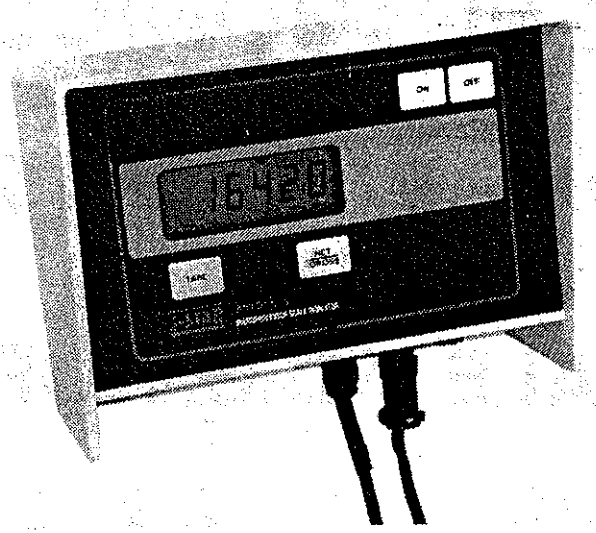
J-STAR INDUSTRIES, INC.
801 JANESVILLE AVENUE
FORT ATKINSON, WI, USA, 53538

F2827A 04/89 Printed in U.S.A.

INTRODUCTION

The successful operation of your system depends upon the care it is given and the way it is operated. This manual has been carefully prepared and illustrated to make operation as easy as possible.

Read the entire manual carefully and familiarize yourself with the operation before using the scales. For further information check with your Dealer or contact J-Star Industries,Inc., 801 Janesville Ave., Fort Arkinson, WI 53538. Phone (414) 563-5521.



MODEL 5

TABLE OF CONTENTS

SCALE INSTRUCTIONS

OMP 5 AND 15 INDICATOR SYSTEM

DESCRIPTION AND PRINCIPLES OF OPERATION

The Electronic Scale System consists of one or more loadcells and the Indicator.

The Scale System has been designed for use in outdoor environments and is weatherproof.

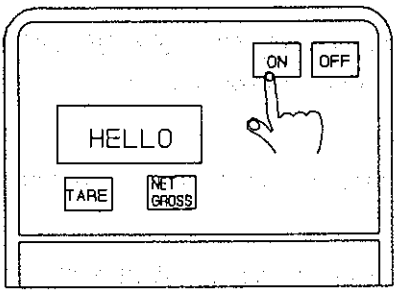
Operation is performed by pressing the keyboard on the front of theIndicator Panel. Feedback to the operator is by the Backlite Liquid Crystal Display on the Panel.

The Indicator operates from a 12 VDC power source.This can be a standard12 VDC battery or a regulated 12 VDC power supply. IF a LOW BATTERY condition exists (less than 10.5 volts), this will be indicated on the display by the message LO BAT. During this condition the unit cannot be balanced or calibrated.

Your scale will measure total or gross weights of material. The System can also be used with a Tare Weight, in which case it will record weight added or removed since the last recorded Tare Weight. This last method is used to determine net weights or loads and is also used for batch weighing applications.

GETTING STARTED

THE PANEL



POWER ON

The operator can keep track of the operation of the Indicator by observing the small messages in the top and bottom edges of the large display window on the Panel.

When using the keyboard, the indicator responds to the operator as follows:

1) As each key is pressed an audible "beep" will be heard. If the beep is not heard, the key hasn't been adequately pressed to activate it or the weight on the scale is not stable.

2) Messages (annunciators), which are generally 3 or 4 letter abbreviations for an operation, will appear at either the top or bottom edge of the display to confirm to the operator that what he has requested is being executed.

3) When the weight is not stable the indicator displays a flashing "bell" shaped annunciator to tell the operator it is processing or stabilizing information. While this annunciator is flashing the indicator is not ready for, nor will it accept further input.

NOTE: The bell shaped annunciator refers to stability. There may be applications, such as weighing animals, when it is not possible for the reading to perfectly settle down. In these cases it is necessary to turn the bell annunciator **off** as described in the Setup And Calibration Procedure section of this manual.

In the upper RH corner of the panel you will find the ON and OFF keys. Pressing the ON key starts the unit. After about 4 seconds the unit will start and is indicated by a "HELLO" message on the display. However, the unit will not be ready for stable operation until it has been allowed to warmup for at least 10 minutes. In cold weather, allow 20-30 minutes for warmup. Pressing the OFF key will shut off power to the unit.

Test Function

If the ON key is depressed a second time after the "HELLO" message displays, the unit conducts a test of itself. During the test it will display program parameters and the display annunciates the word TEST. This function is not used during normal operation. Should you enter the test mode, which requires nearly a minute to complete, it canbe cancelled by pressing any key except **ON.**

OPERATION

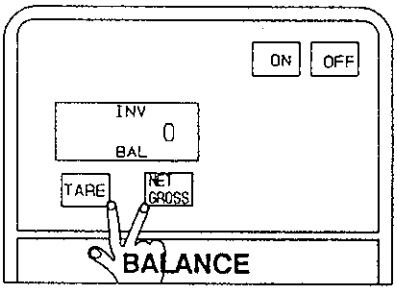
POWER ON

The indicator starts up in the GROSS weight mode.

This can be verified by observing the annunciator INV *(inventory)* at the top of the display.

BALANCING

After the display is warmed up and stable, the indicator should be balanced with no weight on the scale. Do this by pressing the NET/ GROSS key and then while still holding it pressing the TARE key and hold both for one second. BAL will be displayed at the lower display to verify the operation. If 'INV' an '0' are not displayed, rebalance.



IMPORTANT: When balancing the scale, it must be empty and the display must be stable. Beware that if the scale is not empty during balancing, it will be in error. In a mobile application the vehicle must be stopped and on level ground.

Balancing can be done at any time, but if the bell shaped annunciator is flashing, the unit will not balance. The indicator "remembers" balance weights even when power is turned off but it should be checked regularly. Balance is affected by large temperature changes and by physical environment such as mud or snow buildup.

GROSS (INV) WEIGHING MODE

The INV annunuciator displayed in this mode stands for *Inventory.*

In the Gross (INV) mode, the Indicator displays the weight of itemson the scale. If the scale is empty and the display is not zero, rebalance the indicator.

NET WEIGHING MODE (Using Tare Weights)

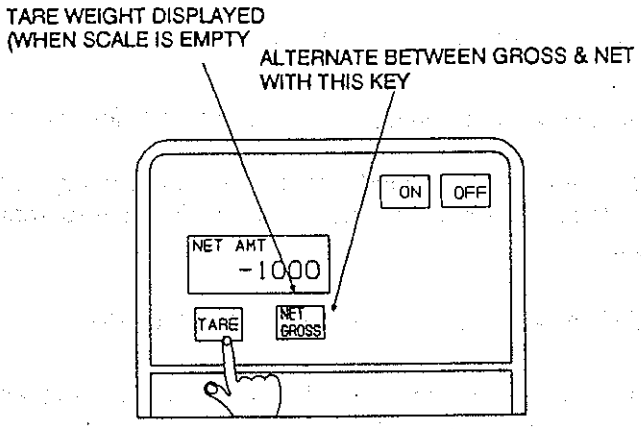
This method involves recording a TARE weight with the system (tare this weight off from future loads).

The NET mode does not function until a Tare Weight is entered. Therefore, if you change to the NET mode with "no Tare weight entered," the indicator displays a series of dashes.

Tare Weights can be entered in either GROSS or NET modes as follows:

With the Tare load on the scale and when the display is stable, press the TARE key. The display will then be in the NET mode and read zero. When the load is removed, the display indicates the Tare Weight as a negative value. Examples of a tare weight might be an empty truck to which you want to learn how much load has been added later; or a loaded truck to which you want to learn how much load has been removed later.

NOTE: The indicator does not "remember" Tare Weights if power is turned OFF. They must be entered again to use.



TARE

After the Tare Weight has been entered, the system will display the weight that is either added to or subtracted from the Tare Weight. When weight is added the display will be positive. When weight is removed the display will be negative and is the actual weight removed; not the difference between the Tare Weight and weight removed.

During the NET mode if you want to know the GROSS weight (NET plus TARE weights) on the scale, press the NET/GROSS key. This toggles the mode display between NET and GROSS.

OPERATION SUMMARY

KEY(S)	DESCRIPTION
ON	Turns the indicator on. If power is already on, holding ON for one second starts the display test.
OFF	Turns the indicator off.
NET/GROSS	Toggles the display mode between the gross (INV) and net (NET AMT) modes.
TARE	Puts the indicator in the net mode and zeros the display.
<GROSS+TARE>	Balances the indicator.

WEIGHING EXAMPLE

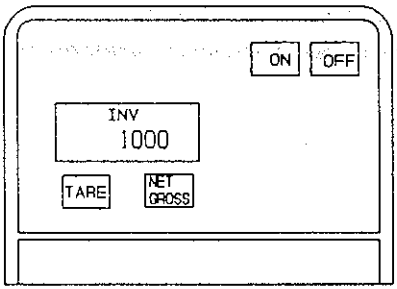
EXAMPLE 1. Typical Weighing Sequence In A Batch Mixing Application.

1. Press ON. Your display will read HELLP for a short time.

2. Allow a 10 minute warm up period (20-30 minutes in cold weather).

3. Hold NET/GROSS and press TARE, "BAL" will be displayed for a short time and then the display will read 0.

4. Add the first ingredient until the desired weight is reached. Let's use 1000 lbs.

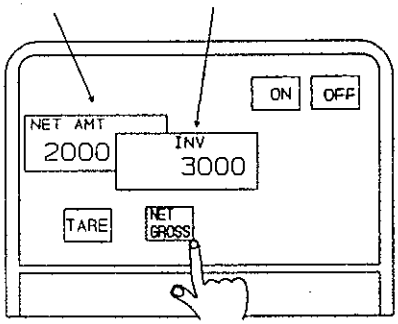


5. Press the TARE key. The mode changes to NET AMT and the display changes to 0.

6. Add the next ingredient. In this example assume 2000 more lbs. are added. The display will read 2000.

7. At any time the total (gross) weight can be viewed by pressing NET/gross. To return to the net weight display press NET/GROSS again. In this example the GROSS weight display will be 3000 lbs. (1000 + 2000)

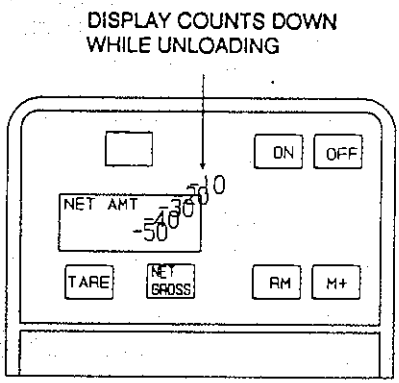
PRESSING NET/GROSS KEY ALTERNATES DISPLAY BETWEEN NET AND GROSS MODES



8. If more ingredients are required, then repeat steps 5 and 6 until loading is completed.

9. To begin unloading, press TARE to zero the display.

10. Dump material until the desired weight is reached. The displayed number will be negative to show that weight has been removed.



11. Repeat steps 9 and 10 as required.

MAINTENANCE AND TROUBLE SHOOTING

MAINTENANCE:

The Model 5 and Model 15 scale indicators do not require regular maintenance to operate properly, however calibration of the scale system should be checked once a year to maintain the accuracy of the system. The manual supplied with the weighing portion of the system contains maintenance information for that specific product, *i.e.* Platform Scale, Mixer, Etc., but these general rules apply to all all systems:

1. Verify that there is no physical interference between the weighing surface and the frame.

2. Check that the load cell is not bound up in the mount.
Verify that there is a slight amount of play between the load cell and mount.

3. If there are any moving parts in the weighing system (for example the power take off shaft of a mixer) make sure they are well lubricated and move easily.

4. Verify that the weighing surface is level with the frame so that all load cells are equally loaded and the weighing surface doesn't rock from corner to corner.

5. Apply a load to each corner of the weighing surface and verify that the corners read the same +/- 1 display increment. The easiest way to do this is stand on or hang from each corner.

TROUBLE SHOOTING:

The following table lists common problems and their possible cause, if a problem not listed in the table occurs contact your Distributor. All tests assume the scale system is on and warmed up for 10 to 30 minutes.

SYSTEM	CIRCUIT	CORRECTIVE ACTION
I. System Dead	Power Switch On	Check fuses. Replace blown fuse. Check power cable for loose connection to the battery, or power supply. Voltage must be 10-1/2 V. minimum.
II. Display is unstable (variesmore than 4 increments up and down in 5 seconds)	Power On	Remove junction box cable from bottom of indicator. If display is still not stable, then indicator needs repair. **IMPORTANT:**On Model 5 after S/N 2681and Model 15 after S/N 2224 this test will not work. Display will flash 9999's. Use a simulator to test indicator stability or use a shorting wire between pins of J902 to eliminate flashing 9999's.
or		
Display is unstable, gradual shift of weight in one direction (more than 10-20 increments in one hour).		If the indicator passesII. above, then disconnect load cells from junction box until the defective load cell is located.If all load cells check out O.K., then the junction box is defective. Check for loose or dirty connections, if none, contact your Distributor for repair or replacement.

SYSTEM	CIRCUIT	CORRECTIVE ACTION
III. System inaccurate, small error.	Power Switch On and Circuit Balanced.	Contact your Distributor for calibration instructions.
IV. System inaccurate, 10% or more error.	Power Switch On and Circuit Balanced.	Apply weight to each corner to determine which load cell is defective. Before replacing, check for binding or interfer ence with the mount.

INSTALLATION REQUIREMENTS

INDICATOR MOUNTING:

Various mounting plates are available. The indicator is easily attached by hooking the top of the indicator over the plate and securing with two #10-24 x 5/8" bolts and nuts.

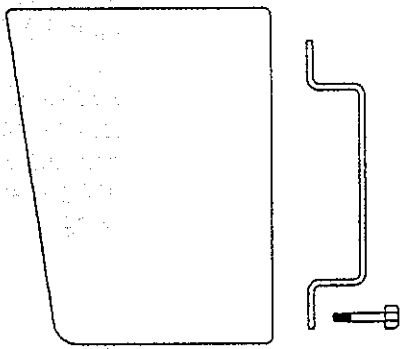


Figure 1.

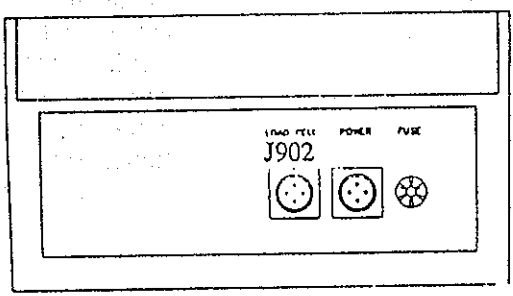


Figure 2 Bottom View

POWER CONNECTION:

The power cable should be connected directly to a vehicle battery or regulated power supply. The scale end of the power cable is connected to the indicator as shown in Figure 2. Connect +12 VDC to red wire and GROUND to white wire. The indicator is fused at 4 amps.

TABLE 1: Power Cable Connections:

Wire Color	Wire Function
Red	Battery (+12VDC)
White	Ground
Green	Not Used This Model
Black	Not Used This Model

LOAD CELL AND JUNCTION BOX CONNECTIONS:

The indicator is designed to operate with strain gage load cells. The indicator will be supplied with an interconnection cable going to the load cell junction box. If a new cable is required or if a longer installation dictates that a cable be made, consult your Distributor for required parts.

To connect the load cells, plug the J-Star supplied interconnect cable from the load cell junction box into the connector labeled J902 and located on the bottom of the scale. (See Figure 2)

NOTE: If load cells are not manufactured by J-Star, color codes of wires may not match J-Box.

Connect the cables from the load cells to the junction box terminals as follows (See instructions on junction box cover):

TABLE 2:Load Cell Connections In Junction Box:

Terminal Color	Description
A) Red	+Excitation
B) Black	- Excitation
C) White	+Signal Out
D) Green	- Signal Out
E) Blue	Shield

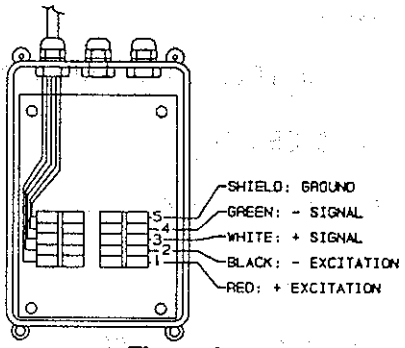


Figure 3

SPECIFICATIONS

SYSTEM

Operating Characteristics

Load Range	Up to 99,999 lbs. depending upon application
Accuracy	System 99.75% or 99.5% depending on load cell used
Power Requirements	12VDC (10-1/2 VDC min. 13VDC max.)
Temperature Range	
(Operating)	-20 to 140 degrees F
(Storage)	-40 to 180 degrees F
Remote Zero Option (TR4)	Operates up to 100 feet
LCD Back Light	Standard

JUNCTION BOX

Cable	5/16" dia. x 15' or 30' long standards. Also available in 50',70' & 90' Lengths
Capacity	4 Load Cells
Weight	2 pounds

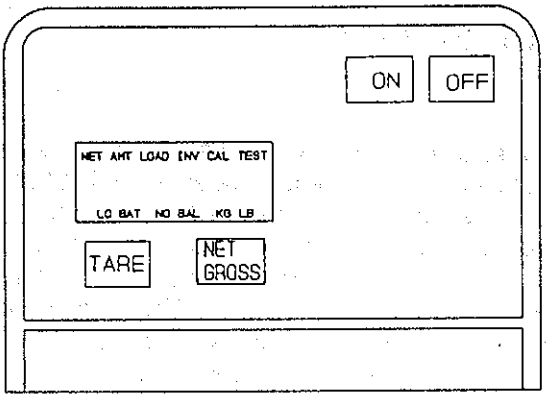
(Optional Duplex Kit Provides for up to 8 Load Cells)

LOAD CELLS

Operating Characteristics

Capacity	Depends on load cell
Overload Safety Factor	200% typical

PARTS LIST



MODEL 5
P/N 141620

ACCESSORIES

Part Number	Description
824461	Power Cord
141880	Junction Box, 30' Cable
141879	Junction Box, 15' Cable
143968	Junction Box, 30' Cable w/Lightning Protection
823872	AC/DC Converter (12VDC Power Supply)
824352	10' Trailer Extension for Power Cord w/Tractor Plug
141941	Junction Box Cable Extension Kit For Tractor Cab Mounting
141826	Receptacle For Tractor Plug

MODEL 5 AND 15

SETUP AND CALIBRATION PROCEDURE

IMPORTANT!

Do not attempt to recalibrate the scale indicator unless it is absolutely necessary. Indicators are factory precalibrated to the load cells they are shipped with. If the indicator is to be used with load cells different from the cells originally used with the indicator it may be necessary to make an internal change. If you are moving the indicator to a system with a different kind of load cell, contact your Distributor for assistance. If the indicator is suspected to be inaccurate, then proceed with the calibration. To change calibration values you must have a known weight available or a load cell simulator. The known weight must be a minimum of 25 percent of the scale capacity.

GETTING STARTED, AN OVERVIEW OF SETUP

Setup and calibration of the Model 5 and Model 15 is done from the front panel. It is not necessary to open the indicator to change switch settings or turn a potentiometer. You will press the NET/GROSS and ON keys at same time to start calibration. The scale will show you which parameter it is ready to work on, and after a two second delay, the parameter itself. You will press the NET/GROSS and TARE keys if you wish to change this value. We will explain this in detail on the next page. To enter the new value you will press ON. You can continue in this manner until the scale is set as you wish. When you are done, you press TARE then ON at same time to go back to regular weighing. If you have set all possible parameters, the scale will go back to weighing by itself.

TEXT CONVENTIONS

We will be working with the keys and display. We will describe each key or part of the display the same way each time we refer to it. We will use the following plan:

• *DISPLAY INDICATIONS*: Numbers or messages on the main display will be enclosed in single quotes i.e. '1'

• *ANNUNCIATORS INDICATIONS:* An annunicator is one of the small signs around the main display. Annunicators will be described with the annunicator capitalized and in single quotes, i.e. 'INV'.

• *SWITCH OR KEY NAMES:* Switches will be shown by capital letters and no quotes, i.e. TARE. Some operations require pressing and holding one key then pressing a second key. At the end of this, you should be holding two keys down at the same time. This will be designated with an arrow, i.e. NET/GROSS->TARE.

To start the set up and calibration procedure press and hold NET/GROSS then press ON (NETGROSS->ON) and hold both keys for approximately one second . The indicator will beep when the keys have been held long enough and the 'CAL' annunicator in the main display will begin flashing. This annunicator will continue to flash as long as the indicator is in the setup and calibration procedure. You may release the NET/GROSS and ON keys at this point.

All of the parameters are set in one of the following three ways:

For most of the parameters, the indicator displays a message for one second to describe the parameter to be set, then changeso display the present value. To change the value, press NET/GROSS and the value will change to the next choice. When the suitable choice is displayed press ON to store the new value and advance to next parameter.

When entering numbers for overrange, calibration weight, time and date, NET/GROSS advances the flashing digit by one. To change another digit press TARE and the next digit to the left will begin flashing and can now be changed by pressing NET/GROSS as shown above. If you "over-shoot", the numbers continually loop or repeat from 9 to 0. When the digit is what you want, press TARE to move to the next digit. Note that the star annunciator (in the upper left corner of the main display) represents 100,000 pounds and should be off when a number is ready to be entered. If it is not, continue pressing NET/GROSS until the left most digit is correct and the star is off. Continue this way, using the GROSS/NET and TARE keys until the value is set the way you want it. After the correct value has been entered press ON to store the new value.

Some of the parameters (input and output units-LB/KG) show the label and parameter at the same time. To change the value, press NET/GROSS and the value will change to the next choice. After the correct choice has been made press ON to store the new value.

The calibration routine can be exited at any time by pressing and holding TARE then pressing ON (TARE-ON).
Note: ON must be pressed before TARE->ON or any change to the displayed parameter will not be saved.

The following text describes the parameters, their possible values, and descriptions of what they do. The parameters may not appear in the order listed here. Depending upon options installed - see tables at end of this section.

NOTE: Depending on the revision level of indicator and installed options, your indicator may not have all of the following parameters. Please refer to the tables at the end to determine what parameters you should have. The indicator revision level maybe determined by entering the test mode. Press ON after indicator warmup.

We recommend that the scale operator contact your Distributor before attempting to change any of the setup and calibration parameters. Items marked with an * affect the scale indicator's performance and should only be modified by trained service personnel. Continue through these parameters by pressing ON or exit the setup and calibration routine by pressing TARE->ON at any time.

1. To begin, press and hold NET/GROSS then press ON until the indicator beeps and the 'CAL' annunicator begins flashing.

2. **sEt t** Enter time with hours, am/pm, minutes

The time is set using standard 12 hour format, with the am/pm letter set to 'A' for AM and 'P' for PM. Use the NET/GROSS key and the TARE key to change the time value.

Press ON.

3. **sEt d** Enter date

Enter month and day. The system makes no provision for leap years. Use the NET/GROSS key and the TARE key to change the date.

Press ON.

4. **sEt Yr** Enter year

Use the NET/GROSS key and the TARE key to change the year.

Press ON.

DISPLAY OPTIONS

5. **tc** 1, 2, 4, 8 Time constant

The time constant changes the responsiveness of the display to weight variations. 1 is the fastest and 8 is the slowest. Recommended values are 4 for batching applications and bin scales and 8 for platforms. Change by pressing NET/GROSS until the desired time constant is displayed.

Press ON.

6. **out** LB or K
Select pounds or Kilograms

Output units (display units.) Allow the displayed weights to be in either pounds or kilograms.Press NET/GROSS for desired selection. Recalibration is not required after changing the output units.

Press ON

NOTE: 2 thru 4 support a time and date option which is not yet a standard product.

***7.** **cntS** .1, .2, .5, 1, 2, 5, 10, 20, 50, 100 Display count size

The count size determines the increment the scale will count by. The count size should normally be the scale capacity divided by 4,000. Setting the count size too low (less than capacity/4000) does not increase the accuracy of the scale system and can cause an unstable display. Use NET/GROSS key to select desired count size.

Press ON.

8. **stAbl** on or off Stability feature

Stability, commonly known as motion detection, must be on to calibrate the scale.

When motion detection is 'on', the bell { } annunciator on the display will flash when the displayed weight is not stable. When the weight is not stable, the following functions are disabled until the weight is stable: print, balance, calibration and memory accumulation. When 'off', zero tracking (OtrAc) is also automatically set to 'off'. Stability must be on to allow calibration later in this procedure.

Use the NET/GROSS key to select 'on' or 'off.'

Press ON.

9. OtrAC on or off Zero track feature

When 'on' is selected, the scale will automatically zero the display, compensating for minor variations in zero balance. For example: if mud or snow accumulates on the weighing surface of a platform scale, the display will continue to display zero. This feature functions only when the displayed weight is within two counts of zero and is stable. The calibration procedure will automatically exit after over range is set if zero tracking is on.

Zero tracking must be set to 'off' to calibrate the scale.
After calibration OtrAc may be reset to 'on'. Use the NET/GROSS keyto select 'on' or 'off'.

Press ON.

10. tr4 clr or nEt TR4 option, Model 15 only

Applies to use of tr4 option only. One of four buttons on TR4 transmitter may be reprogrammed to perform either, 'clr' (clear memory) or 'nEt' (net/gross) functions. Refer to TR4 Users Manual for more information. Use the NET/GROSS key to select 'clr' or 'nEt'.

Press ON.

11. AutoP on or off Auto print feature, Model 15 only

When 'on' and a printer is connected, the scale will automatically print after each of the following keys are pressed: CM, PRINT, TARE,NET/GROSS, RM and M+. When NET/GROSS or TARE is pressed the weightdisplayed is printed and then the normal key function is performed.Use the NET/GROSS key to select 'on' or 'off'. Refer to XT Users Manual.

Press ON.

***12. in** LB or KG Select pounds or kilograms

Input units. Allows the calibration weights to be entered as pounds or kilograms. For example if weights are to be displayed as kilograms but the weights used to load the scale are certified in pounds, the input units are LB's and the output units are KG's. Press NET/GROSS for

selection.

Press ON.

***13.** **o rng** any valid weight Scale over range capacity

The overrange value is set by J-STAR for the application the indicator is to be used in. Do not change this value unless the indicator is moved to a different capacity scale. In this case the overrange value should be set at 5% above the rated capacity (i.e. 42000 for a 40000 lb capacity scale.) Use the NET/GROSS key and the TARE key to change the over range.

Press ON.

To exit the setup and calibration procedure at this point without changing the scale calibration press TARE ->ON.

***14.** **bAl** ———

Allows the scale to be balanced before calibration weights are added. Press the NET/GROSS key and hold, then press the TARE key.The instrument will beep and display 'BAL' when balancing is achieved.

Press ON.

***15.** **Add** ———

At this point weight should be added to the scale or simulator switch moved to .2 mv/v or .4 mv/v. If the weight added is less than 5% of the scale capacity the indicator will continue to prompt to add weight. Recommended weight is 25 percent or more of scale capacity. See the J-STAR simulator manual for specific instructions on its use.

Press ON.

***16.** **cal** any valid weight

Enter the amount of calibration weight added to scale using NET/GROSS and TARE keys. Pressing ON after entering the calibration weight returns to the gross mode, and calibration is complete. When weight is removed from scale, indicator should display 0(zero). If not, repeat the calibration process.

DISPLAYING SETUP INFORMATION

After calibration the test procedure should be run to check for correct values. To do this press ON. The indicator will beep and begin a test. After the display test is completed the indicator setup information. The following table lists the parameters displayed and a short description of each parameter:

MESSAGE	*DESCRIPTION*
1. test pattern	display test
2. tc	the display time constant
3. cntS	display count size
4. stAbl	on or off (model 15 rev f or later)
5. OtrAc	on or off (model 15 rev f or later)
6. tr4	clr or net (model 15 rev f or later)
9. rng	used by service personnel only
10. prgno	program revision

Calibration Parameters for model 5 or 15, revision 'D'

Action	Display	Options
Select Time Constant	tc	1, 2, 4, 8, 16
Select Output Units	out	LB, KG
Select Count By	cnt	.1, .2, .5, 1, 2, 5, 10, 20, 50, 100
Select Input Units	in	LB, KG
Enter Over Range Value	o rAng	System overrange limit value. Should be 105% of system capacity.
Balance Scale Now	baL	Any weight, balance to zero.
Add Calibration Weight Now (may be simulator)	Add	Any weight greater than 100 and at least 5% of capacity.
Enter Calibration Value	CaL	Calibration value for system. Adjust to match known weight.

Calibration Parameters for model 5, revision 'G'.

Action	Display	Options
Select Time Constant	tc	1, 2, 4, 8
Select Output Units	out	LB, KG
Select Count By	cnt	.1, .2, .5, 1, 2, 5, 10, 20, 50, 100
Enable Motion Detector	stAbL	on, Off
Enable Zero Track	0trAc	on, Off
Select Input Units	in	LB, KG
Enter Over Range Value	o rAng	System overrange limit value.Should be 105% of system capacity.
Error, Zero Track Enabled. (Zero track must be off to set the next parameters.)	Error 0trAc	none Displayed only if 0trAc on.
Balance Scale Now	baL	Any weight, balance to zero.
Add Calibration Weight Now	Add	Any weight greater than 100 and at least 5% of capacity.
Enter Calibration Value	CaL	Calibration value for system. Adjust to match known weight.

NOTE: Each Line of the tables represents one parameter that may be adjusted with the calibration.

APPENDIX B

Orthman Grain Shuttle

Operator's Manual

Light Package Installation

LIGHT PACKAGE INSTALLATION

1.Drill mounting holes (4) on each side for light housing and a single hole (1) on each side for wiring access (see Figure L-1) on each rear tub brace member. Not all grain carts will need to be drilled for light mountings.

2. Feed six-wire jacketed cable through right frame member conduit, positioning connectors to the rear. For carts without conduit, utilize six cable tie mounts and ties approximately 30" apart. Two large tie straps should be used on each end. Make sure excess cable is pulled forward before tie straps are tightened.

3. Attach tail-light mounting brackets to rear tub braces with four screws and keps nut , positioning red lens to outside. The light with long brown and yellow leads mounts on the left side. Be sure red, green and white wires are located through access hole in brace (brown wires are not used and should be coiled up behind bracket). Scrape paint from around one nut surface on each light bracket. Use this surface as an electrical ground.

4. Drill 1/2" hole in auger discharge for work light mount (see figure L-2). Install and set light in direction desired and tighten hardware. Run two-wire cable down auger tube using four tie straps, behind hinge brace assembly, through cylinder hose clamps and back along left frame using three to four tie straps. See Figure L-3. The main objective is to route cable along an unobstructed path that is free of pinch and wear points.

5. Continue two-wire cable, combined with yellow and brown leads from left tail-light, through rear conduit to right side. Secure with two tie straps and mounts if conduit is not present.

6. Connect wires at right rear corner of grain cart, according to Figure L-4. Male bullet connectors from six wire cable will match female bullet color scheme from other wiring (tail-lights, work lights, etc.). The sixth wire (blue with spade) will connect to light mounting screw, previously freed of paint on metal surface, combined with two white spades. Left tail light ground (white spade) will be connected to mounting screw on left light accordingly.

7. Strip six wire cable jacket back 1" on "tractor" end. Remove insulation (1/8 to 1/4") from individual conductors. Place wires into plug screw terminals according to wiring diagram below. Re-assemble plug cover and strain relief.

6-Wire Cable	Plug Terminal	Description
Blue	Wht 1	Ground
Black	Blk 2	Work Lights
Yellow	Yel 3	L.H. Turn Signal
------	Red 4	Auxiliary
Green	Grn 5	R.H. Turn Signal
Brown, Red	Brn 6	Tail Lights
------	Blu 7	Auxiliary

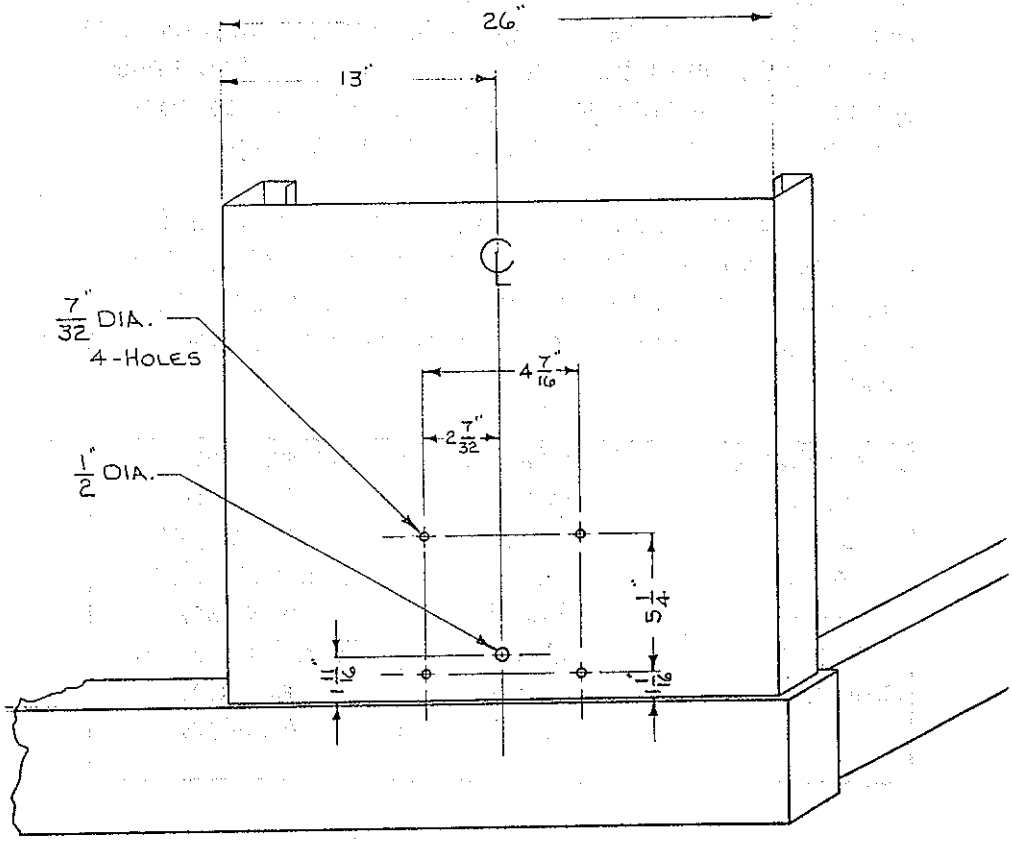


FIG. 1

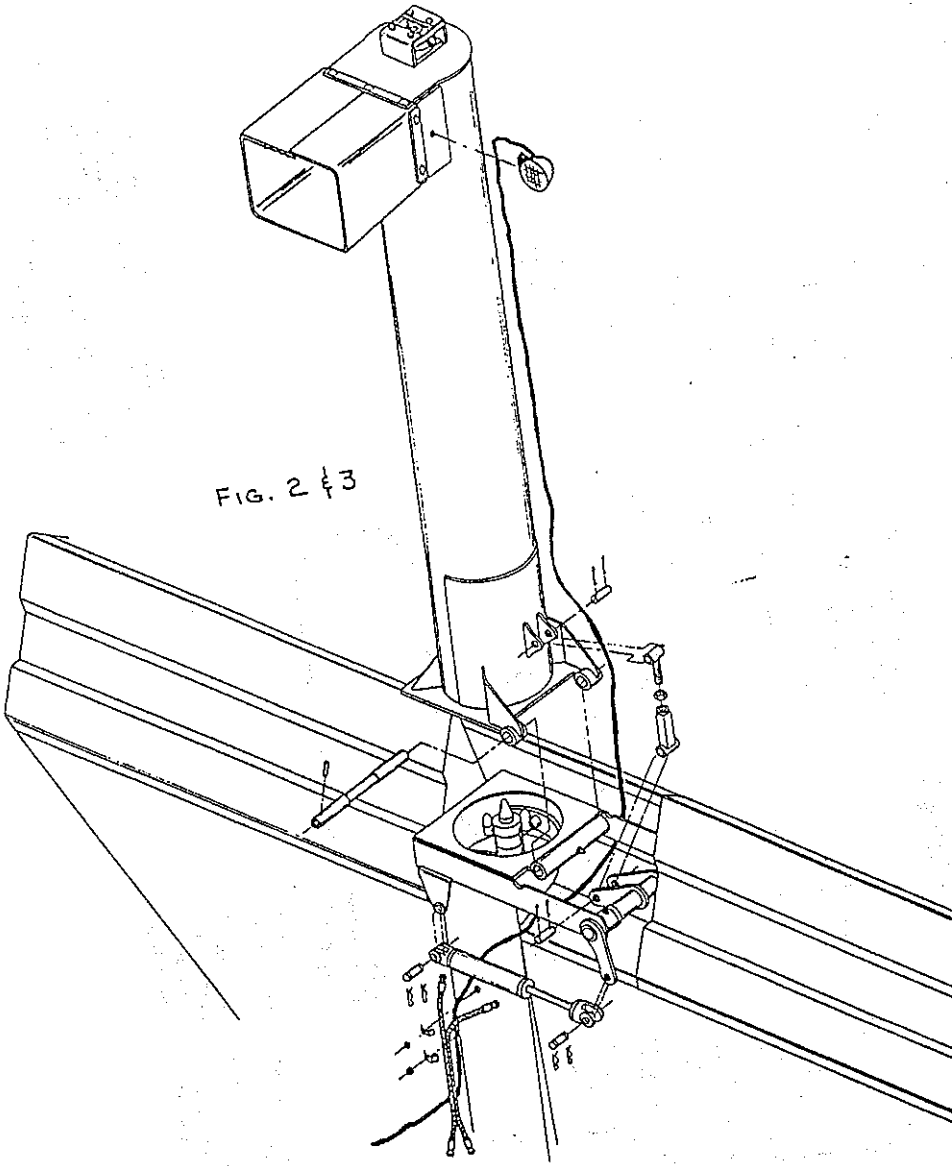
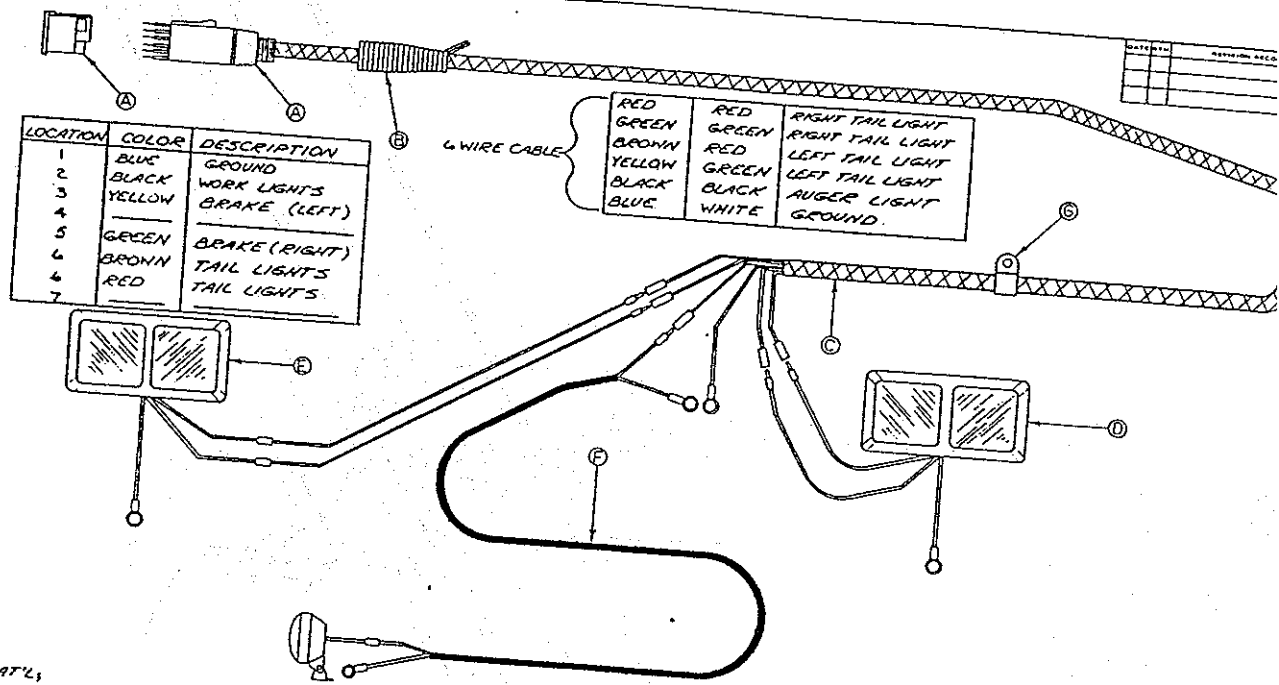


FIG. 2 & 3

Orthman Grain Shuttle



LOCATION	COLOR	DESCRIPTION
1	BLUE	GROUND
2	BLACK	WORK LIGHTS
3	YELLOW	BRAKE (LEFT)
4	———	———
5	GREEN	BRAKE (RIGHT)
6	BROWN	TAIL LIGHTS
6	RED	TAIL LIGHTS
7	———	———

6 WIRE CABLE

RED	RED	RIGHT TAIL LIGHT
GREEN	GREEN	RIGHT TAIL LIGHT
BROWN	RED	LEFT TAIL LIGHT
YELLOW	GREEN	LEFT TAIL LIGHT
BLACK	BLACK	AUGER LIGHT
BLUE	WHITE	GROUND.

MAT'L;

A. PLUG, 7 WAY	
B. STRAIN RELIEF SPRING	(152-237)
C. MAIN CABLE	(152-236)
D. TAIL LIGHT (RIGHT)	(318-582)
E. TAIL LIGHT (LEFT)	(318-583)
F. TOP AUGER LIGHT	(318-584)
G. 3/8 CABLE CLAMP	(318-581)
	(154-245)

TOLERANCES	ORTHMAN MFG INC. LEXINGTON NE
SCALE	NTS
TITLE	GRAIN CART LIGHT PACKAG
DATE	8-25-86

GRAIN CART

LIGHT PACKAGE INSTALLATION

1. Drill mounting holes (4) on each side for light housing and a single hole (1) on each side for wiring access (see fig. 1) on each rear tub brace member. Not all grain carts will need to be drilled for light mountings.

2. Feed 6-wire jacketed cable through right frame member conduit, positioning connectors to the rear. For carts without conduit, utilize six (6) cable tie mounts and ties approximately 30" apart. Two (2) large tie straps should be used on each end. Make sure excess cable is pulled forward before tie straps are tightened.

3. Attach tail-light mounting brackets to rear tub braces with four (4) screws, and keps nuts, positioning red lense to outside. The light with long brown and yellow leads mounts on left side. Be sure red, green and white wires are located through access hole in brace (brown wires are not used and should be coiled up behind bracket). Scrape paint from around one (1) nut surface on each light bracket to serve as an electrical ground.

4. Drill 1/2" hole in auger discharge for work light mount (see fig. 2). Install and set light in direction desired and tighten hardware. Run 2-wire cable down auger tube (4 tie-straps), behind hinge brace assembly, through cylinder hose clamps and back along left frame (3 - 4 tie-straps, see fig. 3). The main objective is to route cable along an unobstructed path that is free of pinch and wear points.

5. Continue 2-wire cable, combine with yellow and brown leads from left tail-light, through rear conduit to right side. Secure with two (2) tie-straps and mounts if conduit is not present.

6. Connect wires at right, rear corner of grain cart, according to Fig. 4. Male bullet connectors (5) from 6-wire cable will match female bullet color scheme from other wiring (tail-lights, work lights, etc.). The 6th wire (blue w/spade) will connect to light mounting screw, previously freed of paint on metal surface, combined with two (2) white spades. Left tail-light ground (white spade) will be connected to mounting screw on left light accordingly.

7. Strip 6-wire cable jacket back 1" on "tractor" end. Remove insulation (1/8 - 1/4") from individual conductors. Place wires into plug screw terminals according to wiring diagram below. Re-assemble plug cover and strain relief.

6-Wire Cable	Plug Terminal	Description
Blue	Wht 1	Ground
Black	Blk 2	Work Lights
Yellow	Yel 3	L.H. Turn Signal
———	Red 4	Auxiliary
Green	Grn 5	R.H. Turn Signal
Brown, Red	Brn 6	Tail-lights
———	Blu 7	Auxiliary

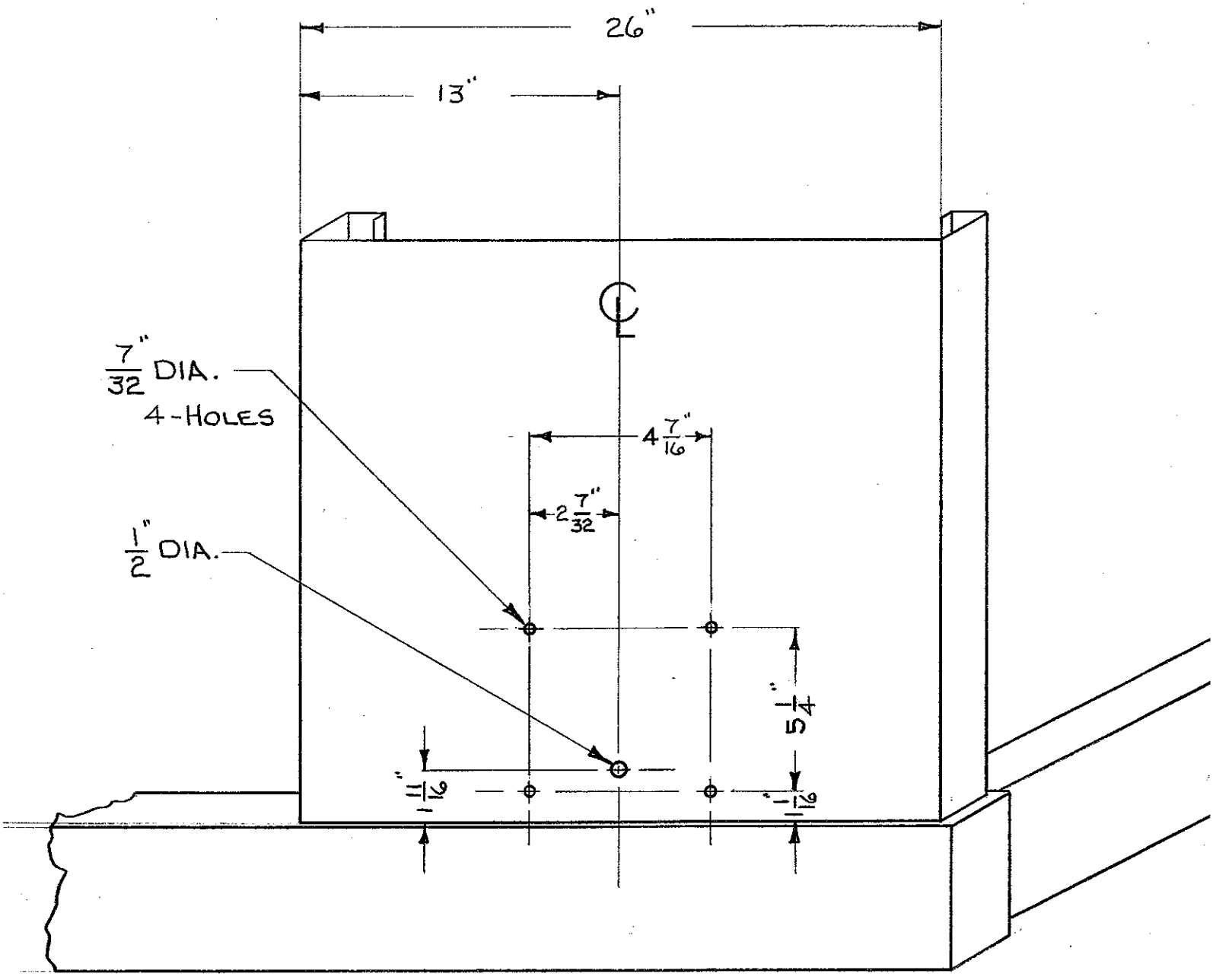


FIG. 1

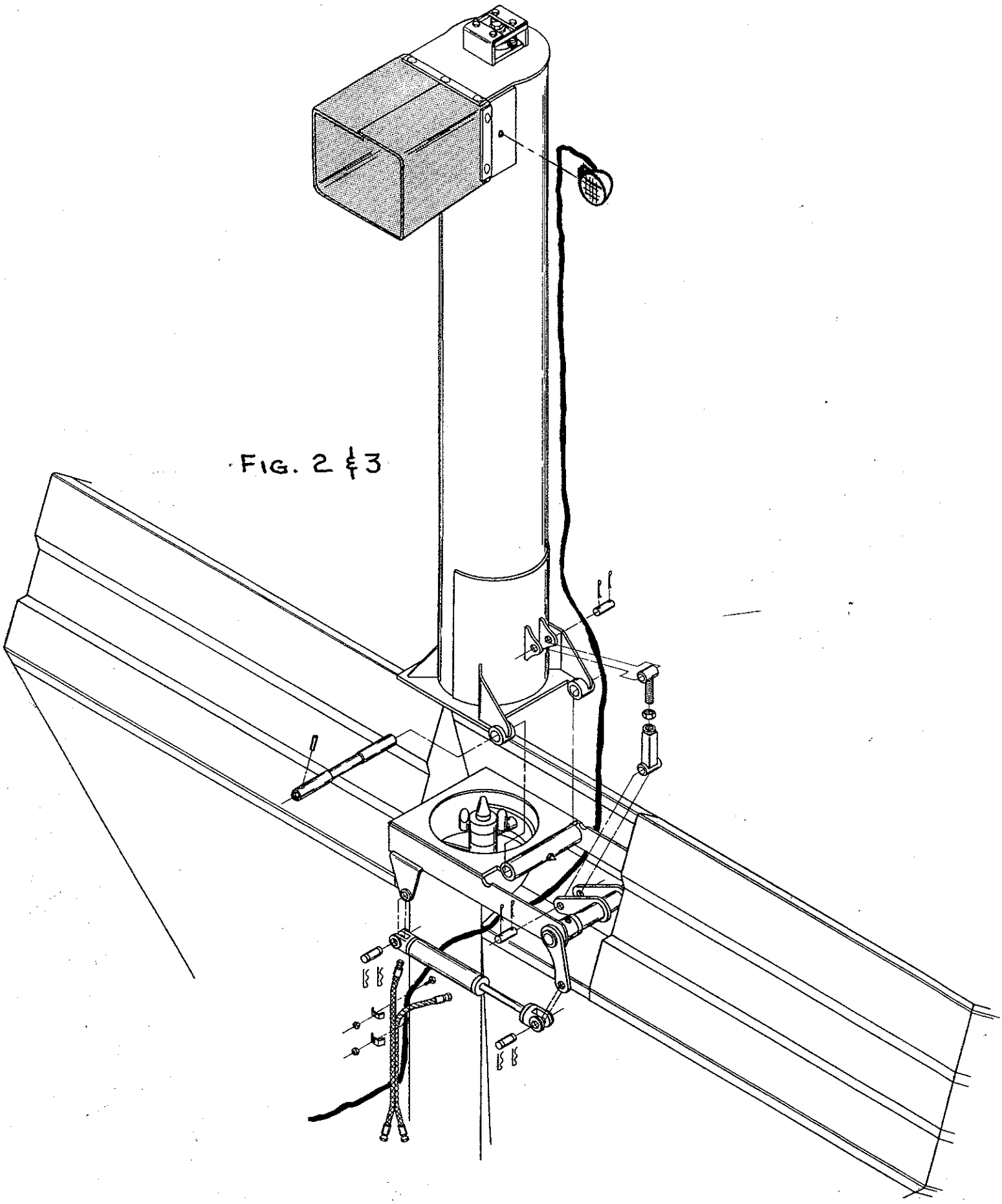
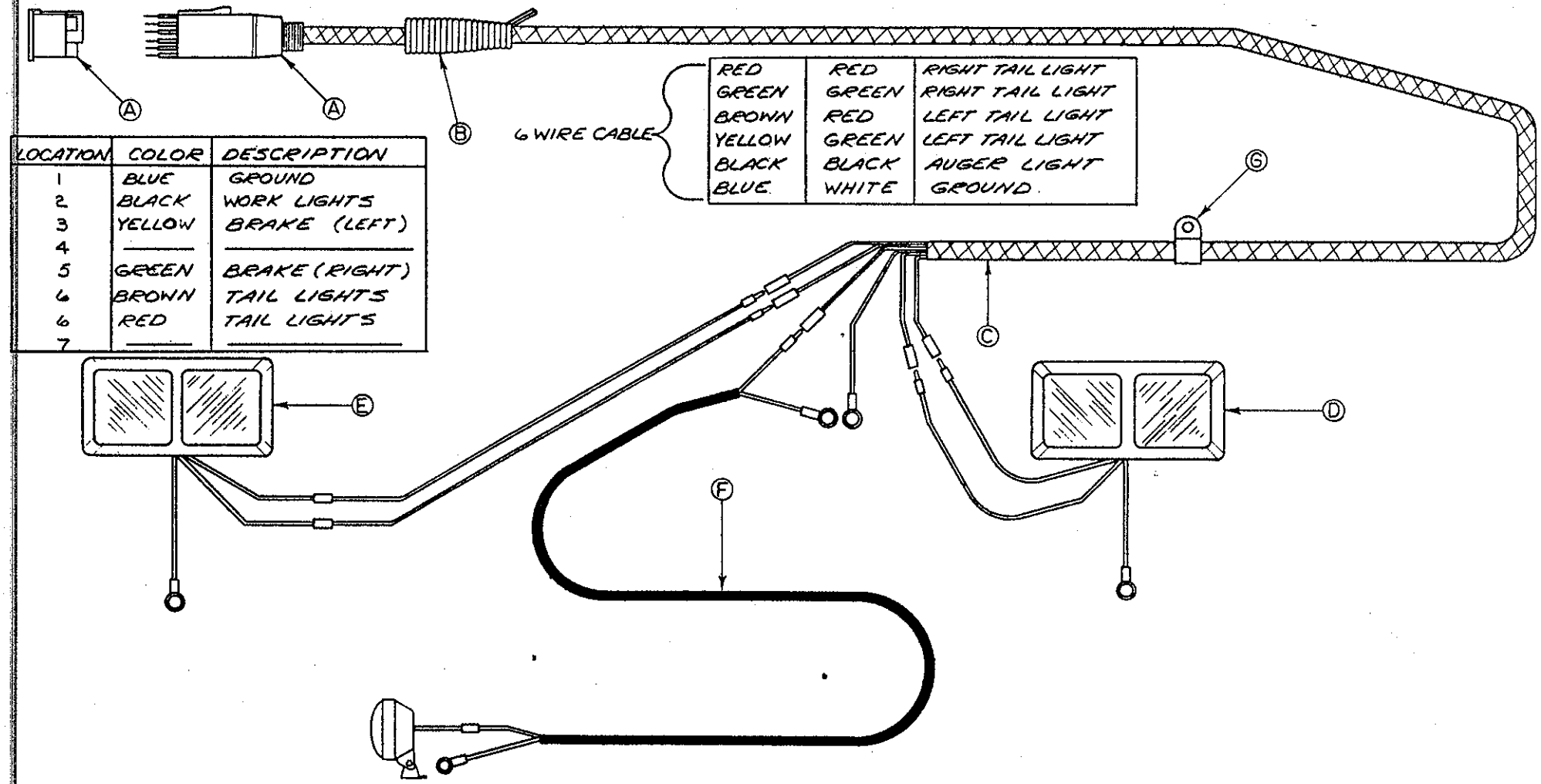


FIG. 2 & 3



LOCATION	COLOR	DESCRIPTION
1	BLUE	GROUND
2	BLACK	WORK LIGHTS
3	YELLOW	BRAKE (LEFT)
4	———	———
5	GREEN	BRAKE (RIGHT)
6	BROWN	TAIL LIGHTS
6	RED	TAIL LIGHTS
7	———	———

6 WIRE CABLE

RED	RED	RIGHT TAIL LIGHT
GREEN	GREEN	RIGHT TAIL LIGHT
BROWN	RED	LEFT TAIL LIGHT
YELLOW	GREEN	LEFT TAIL LIGHT
BLACK	BLACK	AUGER LIGHT
BLUE	WHITE	GROUND

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FIG. 4