FREEMAN
A Division of Allied Systems Company

OPERATOR'S MANUAL 1592D

SAFETY SUMMARY

GENERAL SAFETY NOTICES

The following pages contain general safety warnings which supplement warnings and cautions appearing elsewhere in this manual. All electrical and hydraulic equipment is dangerous. You must thoroughly review and understand the Safety Summary before attempting to operate, trouble-shoot or service this baler.

The following symbols/terms are used to emphasize safety precautions and notices in this manual:

⚠ DANGER

The "DANGER" indicates a hazardous situation which, if not avoided, will result in death or serious injury. Carefully read the messages that follows to prevent serious injury or death.

⚠ WARNING

The "WARNING" symbol appears wherever incorrect operating procedures or practices could cause serious injury. Carefully read the message that follows to prevent serious injury or death.

⚠ CAUTION

The "CAUTION" symbol appears wherever a hazardous situation which, if not avoided, could result in minor to moderate injury and equipment damage.

NOTICE

This signal word alerts to a situation that is not related to personal injury but may cause equipment damage.

NOTE:...

The term "NOTE" highlights operating procedures or practices that may improve equipment reliability and/or personnel performance.

NOTE: All possible safety hazards cannot be forseen so as to be included in this manual. Therefore, you must always be alert to potential hazards that could endanger personnel and/or damage the equipment.

Obey the following cautions and warnings before using your machine to avoid equipment damage, personal injury or death.

SAFETY

Allied Systems Co. is concerned with safety. Freeman Equipment is furnished with safety features. Even with these safety features, personal injury can still occur if the operator is careless when operating or maintaining the machine. There are “CAUTION,” “DANGER,” and “BE CAREFUL” decals on the machine. Read and pay attention to the decals. Following is a list of precautions that should be taken to help prevent personal injury:

1. **KEEP ALL SHIELDS IN PLACE.**
2. **SHUT OFF TRACTOR ENGINE BEFORE ADJUSTING, LUBRICATING, CLEANING OR SERVICING THE BALER.**
3. **WAIT FOR ALL MOVEMENT TO STOP BEFORE SERVICING BALER.**
4. **KEEP HANDS, FEET, AND CLOTHING AWAY FROM POWER DRIVEN PARTS.**
5. **KEEP ALL SHIELDS INSTALLED AND KEEP CLEAR OF THE P.T.O. DRIVE LINE.**
6. **KEEP ALL OTHERS OFF BALER.**
7. **USE APPROPRIATE SIGNS OR WARNING LIGHTS WHEN OPERATING ON HIGHWAYS.**
8. **MAKE CERTAIN EVERYONE IS CLEAR OF BALER BEFORE ENGAGING P.T.O.**
9. **DO NOT RIDE ON ANY PART OF THE BALER WHILE IN OPERATION.**
10. **KEEP HANDS AND FEET CLEAR OF PICKUP.**
11. **KEEP HANDS AWAY FROM KNOTTER WHEN BALER P.T.O. DRIVE IS ENGAGED.**
12. **PERIODICALLY CHECK ALL NUTS AND BOLTS FOR TIGHTNESS.**
13. **ALWAYS USE LIGHTS FOR NIGHT WORK.**
14. **AS A SAFETY PRECAUTION IT IS RECOMMENDED THAT AN “ABC” FIRE EXTINGUISHER BE CARRIED ON THE BALER AT ALL TIMES. IT IS ALSO RECOMMENDED TO CARRY A FOUR GALLON WATER CONTAINER WITH PUMP, OR AS REQUIRED BY LOCAL AND STATE LAW.**
15. **AVOID LOOSE CLOTHING WHICH CAN EASILY BE CAUGHT IN MOVING PARTS.**
16. **REMEMBER ‘SAFETY’ IS ONLY A WORD UNTIL IT IS PUT INTO PRACTICE.**

Be aware of the hazards of pressurized hydraulics:

» Wear personal protective equipment, such as gloves and safety glasses, whenever servicing or checking a hydraulic system.

» Assume that all hydraulic hoses and components are pressurized. Relieve all hydraulic pressure before disconnecting any hydraulic line.

» Never try to stop or check for a hydraulic leak with any part of your body; use a piece of cardboard to check for hydraulic leaks.

» Small hydraulic hose leaks are extremely dangerous, and can inject hydraulic oil under the skin, even through gloves.

» Infection and gangrene are possible when hydraulic oil penetrates the skin. See a doctor immediately to prevent loss of limb or death.

WARNING: Some illustrations in this manual show the baler without shields to allow for a better view of the area being addressed. The baler should never be operated with any of the safety shields removed.

TABLE OF CONTENTS

SPECIFICATIONS

GENERAL:
working length with bale chute ..... 30' 0" (9144 mm)
working width..... 10'4" (3150 mm)
working height .....11'5" (3480mm)
shipping height (w/o wheels) ..... 9'5" (2895 mm)
shipping width.....8' (2438 mm)
tires .....23.1"(7041 mm) x 26"(79245 mm)
weight .....22,500 lbs. (10205 kg)

TRACTOR REQUIREMENTS:
horsepower .....180 PTO HP or greater recommended
hydraulics ..... Single Remote
electrical ..... ASE seven pin connector

DRIVE SYSTEM:
PTO speed .....1000 rpm
drive protection .....Clutches and pressure relief valves
hydraulic pump capacity.....80 GPM
oil cooler .....Radiator with automatic reversing electric fan

PICKUP:
working width.....93" (2362 mm)
including 6" side flares.....105" (2667 mm)
drive system ..... Hydraulic Drive
protection.....Slip and overrunning clutches
pickup lift..... Hydraulic cylinder

FEED SYSTEM:
feeder crank.....Three crank crankshaft
feeder crankshaft bearings.....6 tapered roller bearings
feeder crank drive system .....Reversible hydraulic drive
feed fork drive system .....Reversible hydraulic drive

PLUNGER:
speed.....Up to 21 strokes per minute
stroke length..... @. 30" (762 mm)
drive.....4" (101.6 mm) bore hydraulic cylinder

DOUBLE KNOTTING SYSTEM:
knotters..... 6 heavy duty double twine knotters
knotter spacing ..... 7" (177 mm)
knotter lubrication ..... Automatic oil lubrication system
twine storage capacity .....30 balls of twine
twine type .....Plastic, at least 400 lbs. (181 kg) knot strength

BALE CHAMBER:
height .....38" (965 mm), (36" (914 mm), 34.5" (876.3 mm) optional)
width .....46" (1 168 mm)
bale length.....Adjustable up to 9'(2743 mm)
bale weight .....up to 1,600 lbs. (726 kg)

BALE CHAMBER DENSITY CONTROL:
type ..... Adjustable electric density control
density system ..... 4 hydraulic cylinders

GENERAL INFORMATION

The purpose of this manual is to assist the operator in maintaining and operating a Freeman Big Baler Model 1592D. Please read it carefully as it provides important information and instructions that will help you achieve years of dependable equipment performance. Please also refer to 89-015 Baler Operating System Manual for more technical information.

NOTE: Reference to left-hand and right-hand usage throughout this manual refers to the position when seated in the operator's seat, facing forward.

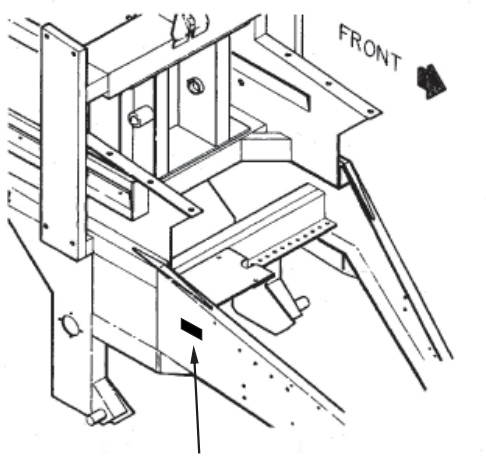
Replacement Parts:

Only genuine Freeman replacement parts should be used to service the baler. These parts are available from your authorized Freeman dealer. To ensure prompt and efficient service when ordering parts or requesting service repairs, remember to provide the dealer with the following information:

1. The correct part description or part number.
2. The model number of the baler.
3. The serial number of the baler.

Serial number location:

The serial number is very important in effectively transacting a parts order or service repair with the dealer. Use the serial number in all correspondence to ensure proper identification of your Freeman baler. The serial number is located on the right front tongue brace as shown.



Serial Number Location

SERIAL NO. ASC-1592-008 and ASC-1592-009
ORDER NO. PB1592OP09

GENERAL OVERVIEW

The Freeman 1592D Big Baler is a high density mechanical baler operated by an electrically controlled mechanical/hydraulic system. The 1592D can handle the toughest jobs including the baling of, Alfalfa, Coastal Bermuda, Sudan, Haylage, Corn Stalks, Biomass and more.

The hydraulically driven components of the 1592D Big Baler make it unique in the agricultural baling industry. A system of electrical components and sensors/switches control the hydraulic functions. Three separate hydraulic systems are interconnected by valving and electrical signals to allow the machine to produce solid, uniform bales with a minimum of operator effort. This state of the art design will provide years of dependable service and low operating cost.

The ICM (In-Cab Monitor) contains a computer processor that is pre-loaded with the 1592D baling software program. The ICM receives input signals from sensors/switches that monitor component positions on the baler. The ICM monitors all these inputs, processing this information following the pre-loaded operating program and sends commands (outputs) to the components on the baler, stopping and starting them as the program dictates.

The baling process begins as the product enters the baler by means of a conventional rotating pick-up. The pick-up delivers material directly to the feed chute. Material is then pushed further into the feed chute by the continuously rotating feeder. The feed fork then carries material from the feeder into the bale forming chamber. When an adequate volume of material is delivered to the bale chamber by the feed fork, the feed sensor mounted on the top of the bale chamber signals the feed fork to stop, thus holding the material up in the bale chamber. At the instant the feed fork stops at its top dead center position, the plunger begins to extend, compressing the product.

While the plunger extends, pressure required to compress the material increases. This increase occurs because the bale density system applies pressure to the top and sides of the forming bale. The density system applies force to create a restriction which increases the force being applied to the forming bale on the plunger until the plunger reaches its preset pressure setting. At this point, density pressure is modulated to maintain the desired forming pressure on the extruding bale. The maximum hydraulic plunger pressure available for forming the bale is 6,500 psi. The plunger reaches the end of its travel and is signaled to return. As the plunger returns, the feed fork starts its cycle, the plunger reaches the home position and the feed fork once again will carry material into the bale chamber. The density control system applies pressure to the forming bale while the plunger is extending and retracting. This complete cycle requires approximately three seconds to occur.

During the tying process, as a bale moves through the chamber, the length of the bale is measured by a meter wheel located in the bottom of the chamber. When an adequate bale length is achieved, a switch signals the control circuitry to begin a tie cycle. The plunger advances as during normal baling. Upon reaching the fully extended position, the plunger begins to return and the knotter assembly begins to operate. While the knotter is in operation, the plunger may stop briefly at a preset point to allow the knotter to complete the first half of its cycle. When the knotter has completed the first half of the tying process, the plunger will continue to return, the feed fork will start and the knotter continues to operate, completing the tying cycle. This cycle also occurs in approximately three seconds.

The 1592D baler is fully automatic. Bale lengths and bale densities are adjustable. Six heavy duty double knotters secure the bale with minimum 400 pound knot strength. To ease service and maintenance, each function of the baler can be operated manually, either in forward or reverse. Pressure relief valves protect the baler's systems from overload. Relief valves eliminate the need for shear bolts. The In-Cab Monitor (ICM) and Remote View Monitor (RVM) make any baling job easy and fast. These features add up to make the Freeman 1592D baler a very efficient and reliable machine.

TRACTOR REQUIREMENTS

PTO:

- Minimum PTO horsepower.....180 (104 kw)
- Steep terrain or soft ground conditions may require a tractor of greater horsepower.
- Type II 1000 rpm, 1-3/8" (35mm)
- Type III 1000 rpm, 1-3/4" (45mm)

ELECTRICAL:

- 12 volt power supplied through ASAE 7-pin connector outlet (for transport lights).

HYDRAULIC SYSTEM:

- System type: open or closed center
- Maximum pressure: 2500 psi (199 bar)
- Hydraulic outlets: one set (pickup lift)
- Refer to the Tractor Operator's Manual for controls locations and operation instructions.
- Minimum drawbar vertical load capacity:
- 3,300 lb (1,500 kg)

ADDITIONAL REQUIREMENTS

- An upright exhaust system.
- Ability to route control cables from baler to operators cab safely.
- Mounting platform for ICM and Bale Viewer.

⚠ DANGER

DANGER: Loss of steering or braking control can cause death or serious injury. Use a tractor that is large enough for sufficient steering and braking control.

The Freeman 1592D baler weighs approximately 24,100 lbs (10,931 kg) with a bale in the chamber.

- Do not tow faster than 20 mph (32 km/h).
- Do not tow with a tractor that weighs less than 15,000 lbs (6,810 kg).

CARRY FIRE EXTINGUISHER:

A 2 1/2 gal (9.5 liter) pressurized water fire extinguisher is recommended to be carried on the tractor.

ADJUST TRACTOR WHEELS:

Adjust tractor wheels as wide as possible to increase stability, and to avoid running over the windrow. The optimum windrow width for the baler is 4' (1.2 m).

PREPARING THE EQUIPMENT

WHEEL NUT TORQUE AND TIRE INFLATION PRESSURE

1. Ensure the rear wheel nuts are torqued to 450 ft. lbs. Do not lubricate wheel nuts. After the nuts have been torqued, tow the baler 1/2 mile and recheck the nuts for proper torque before towing a long distance.

⚠ CAUTION

CAUTION: Do not overinflate tires.

2. Inflate 12 ply tires to 28 psi., 16 ply to 36 psi. Inflate pickup tires (4.00 x 8) to 40 psi.

CONNECTING TONGUE

Connect using quantity 10 of 3/4" x 3" Bolts, Structural Washers and Nuts. Torque nuts to 420 ft. lbs. (see Parts Manual for more information).

CONNECTING PICKUP

⚠ DANGER

DANGER: Clear all personnel away from the machine while raising and lowering the baler. Baler could fall and cause injury or death.

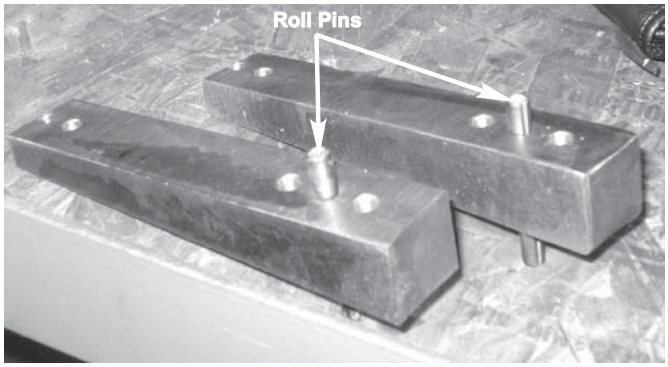


Figure 1-1 Pickup Pivot Wedges

1. Insert roll pins into pickup pivot wedges so the pins are protruding out each side evenly. You will use these pivot pins to secure the pickup to the baler.

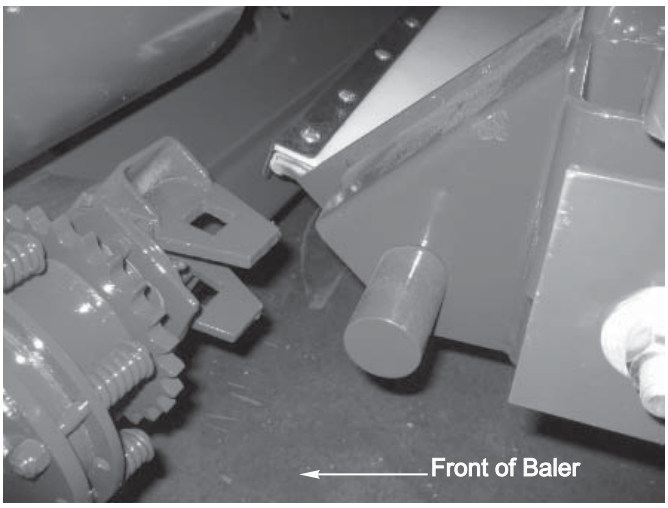


Figure 1-2 Aligning Pickup with Baler

2. Raise tongue of baler just high enough to move the pickup underneath. Line up pickup locking claw to baler pickup pins (see Figure 1-2). Push pickup so the locking claw has surrounded the pin. Place pickup pin through the pickup claw to lock the pickup into place. This needs to be done to each side of the baler. You may have to lower or raise the tongue so the wedge drops freely into place securing the pickup to the baler. Insert roll pin in bottom of pickup pivot wedge so the wedge is secure.

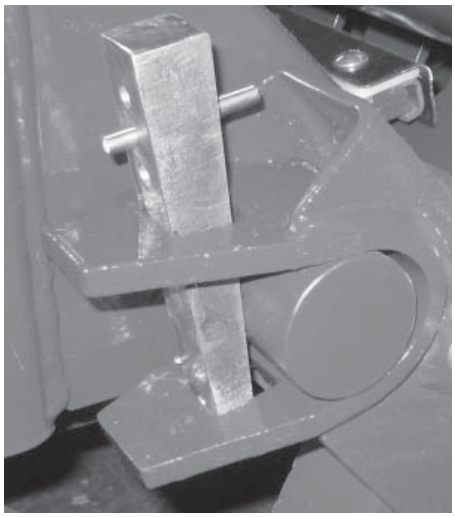


Figure 1-3 Securing Pickup

3. Connect pickup lift arm assembly on right hand side of baler (see Figure 1-4). Secure lift arm to pickup cylinder and baler.

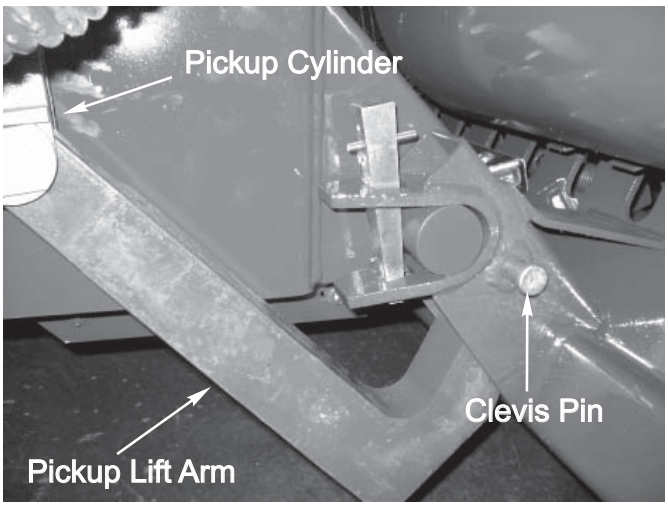


Figure 1-4 Pickup Lift Arm

4. Connect pickup drive chain on left side of baler (see Figure 1-5). Make sure to replace pickup chain guard when finished (see Figure 1-6).

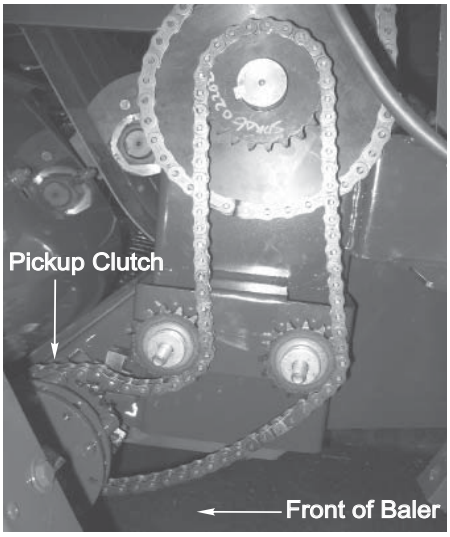


Figure 1-5 Pickup Drive Chain

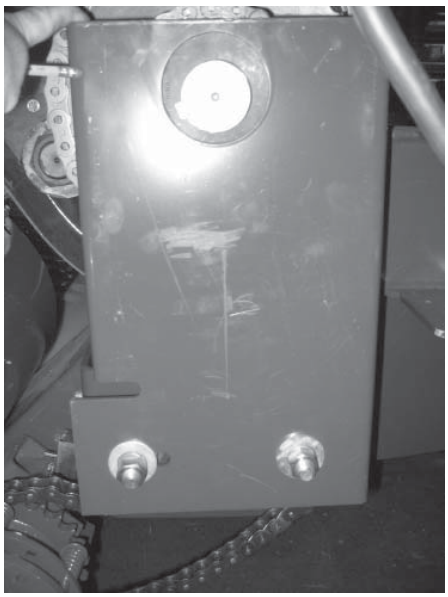


Figure 1-6 Pickup Chain Guard

5. Connect pickup lift spring, lift arm and lift spring bracket. Refer to your Parts Manual for assembly illustration (see Figure 1-7).

Adjust lift spring so front of pickup can be raised by hand with 40 lbs. of pressure.

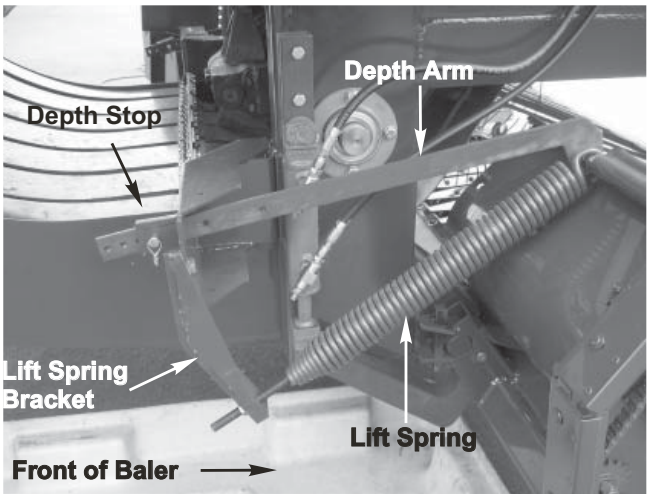


Figure 1-7 Pickup lift spring

ATTACHING BALER TO TRACTOR

1. Before attaching the baler to the tractor make sure the baler is securely resting on level ground. The baler must be powered by a tractor with a minimum of 180 horsepower at 1,000 RPM PTO.

NOTE: Adverse conditions such as soft ground or hilly terrain may require greater horsepower for maximum performance.

2. The front drawbar hitch on the baler can be adjusted up or down or inverted 180° (see Figure 1-8) to achieve proper alignment with the tractor drawbar. The distance from the bottom of the baler hitch mount to the ground should be 17" ± 1". Connect using quantity 8 of 5/8" x 2 1/2" Grade 8 bolts, lock washers and nuts. Torque nuts to 240 ft. lbs.

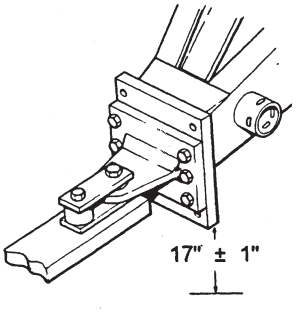


Figure 1-8 Hitch

3. The baler can be equipped or modified as required to work with tractors using either a 1 3/8" or 1 3/4" diameter PTO shaft. The tractor drawbar must be adjusted to provide the proper distance from the end of the tractor PTO shaft to the center of the hitch pin. Follow the SAE standards in Figure 1-10 and for correct adjustment of the tractor drawbar.

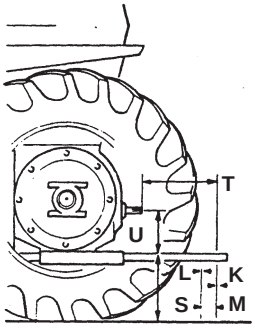


Figure 1-9 Drawbar Hitch on Baler

DIMENSIONS ASSOCIATED WITH TRACTOR DRAWBAR AND POWER TAKE-OFF				
			1 3/8" Diameter	1 3/4" Diameter
K-Hitch pin hole diameter			13/16"	1 5/16"
L-Auxiliary hole diameter			11/16"	11/16"
M-Auxiliary hole spacing			4"	4"
S-Height of drawbar with popular sized tire	Min.		13"	13"
	Max.		22"	20"
T-End of PTO shaft to center of pin hole			16"	20"
U-Top of drawbar to PTO centerline	Preferred.		8"	10"
	Min.		6"	8"
	Max.		12"	12"

Figure 1-10 Tractor Drawbar and Power Take-Off

When the baler is connected to the tractor, the PTO drivelines can now be installed and properly adjusted.

NOTE: Attach drawbar jack to rear left side of baler.

The correct drive line adjustment is achieved by positioning the carrier bearing support bracket either forward, back, up or down and bearing mount angles up or down (see Figure 1-11 and 1-14). The rear (baler) driveline fits either size front driveline.

5. The PTO shaft bearing mount angles, ANG0027391, are designed to be used with either size (1 3/8" or 1 3/4") drivelines. Use quantity 4 of 1/2 x 1 1/2 bolts, lock washers and nuts, torque nuts to 120 ft. lbs. to secure angles to frame . The 3" flange angle bolts to the baler tongue side plates while the 2 1/2" leg mounts the carrier bearing support bracket, MNT0028883. With the 3" flange towards the front of the baler, dimension 'A' is 19", with angle flanges towards rear of baler, dimension 'A' is 15" (see Figure 1-11). (see parts manual for more information).

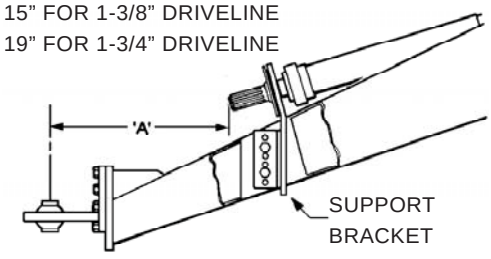


Figure 1-11 Driveline

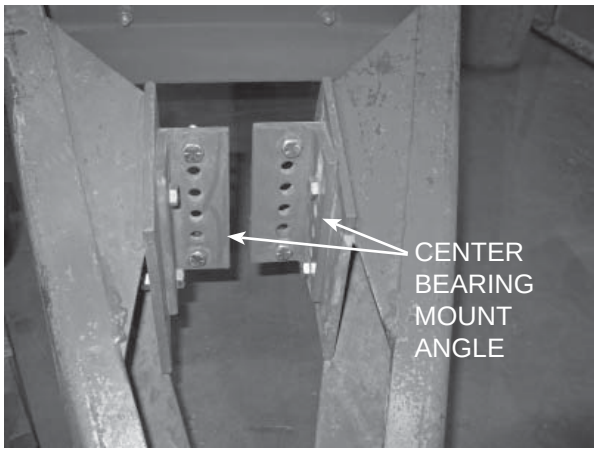


Figure 1-12 Driveline

NOTICE

Grease all points (see page 6-2) on driveline to prevent damage to PTO Shaft Bearing Mount.

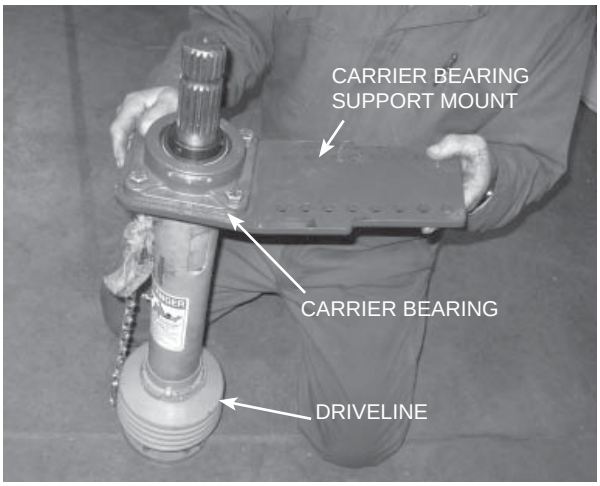


Figure 1-13 Driveline

6. Assemble rear driveline to the baler clutch and the carrier bearing support to center bearing mount angles (See Figure 1-14). Install the front driveline between the bearing support and the tractor PTO shaft, making sure the proper diameter shaft has been selected.

Figure 1-14 Driveline

7. The drivelines must be adjusted so the angle of the tractor u-joint, ‘A’, and the angle of the center u-joint, ‘B’ are equal (see Figure 1-15). To achieve equal angles at ‘A’ and ‘B’, adjust the vertical position of the carrier bearing support bracket. If after repositioning the support bracket, the angles are not equal, select the bracket position that allows the closest angle setting. The objective is to achieve, as closely as possible, equal angles as described above while keeping the angle of the u-joint at the slip clutch to a minimum.

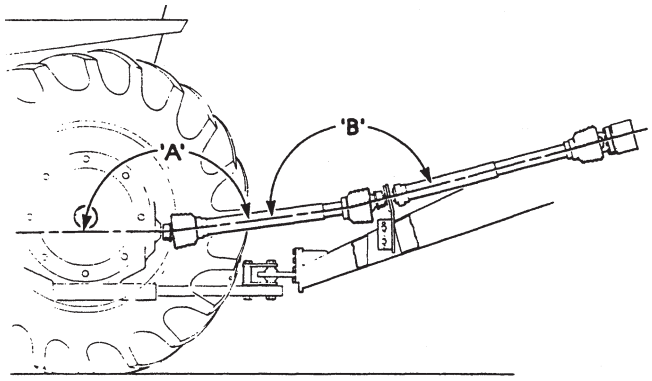


Figure 1-15 Driveline

8. If equal angles are not achieved at ’A’ and ’B’, (see Figure 1-14), either driveline phasing, (alignment of u-joint yokes), illustrated in Figure 1-15 is acceptable. If the angles cannot be made equal, then reposition the driveline yokes as shown. If the angle at ‘B’ is greater than at ‘A’, phase the driveline yokes as shown in Figure 1-16, (E). If angle at ‘A’ is greater than the angle at ‘B’, phase the yokes as shown in Figure 1-16, (D).

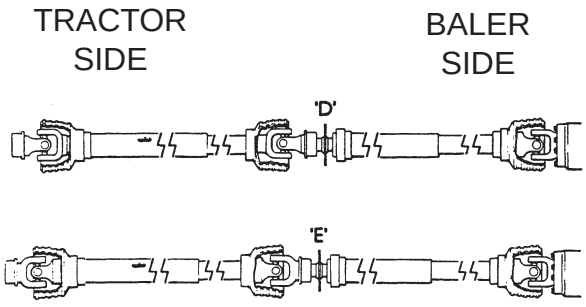


Figure 1-16 Driveline

9. When all adjustments have been properly completed, ensure that the driveline does not interfere with the tractor drawbar, PTO shields or baler draw-bar. On a level surface, pull the baler and turn the tractor left or right until the rear wheel of the tractor is nearly touching the baler drawbar. Attach baler PTO driveline to tractor PTO shaft. Ensure driveline does not bind or interfere with the baler hitch.

CONNECTING TAIL LIGHTS

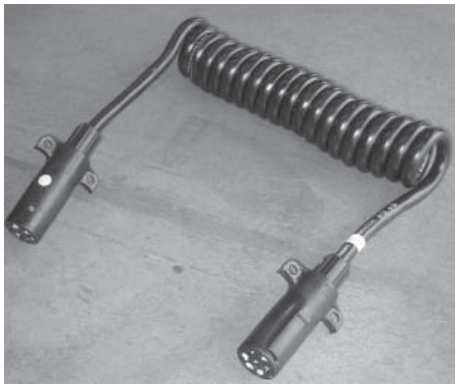


Figure 1-17 7 Pole Connector

- Connect seven-pole connector (see Figure 1-17 and 1-18) to electrical outlet on tractor. If tractor is not equipped with an outlet, contact tractor dealer for outlet installation.

- Amber lights are used for warning; red for rear marker lights.

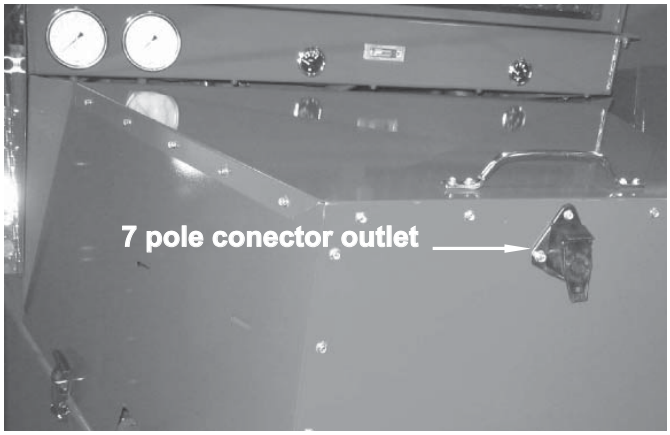


Figure 1-18 7 Pole Connector Outlet

CONNECTING HYDRAULIC HOSES

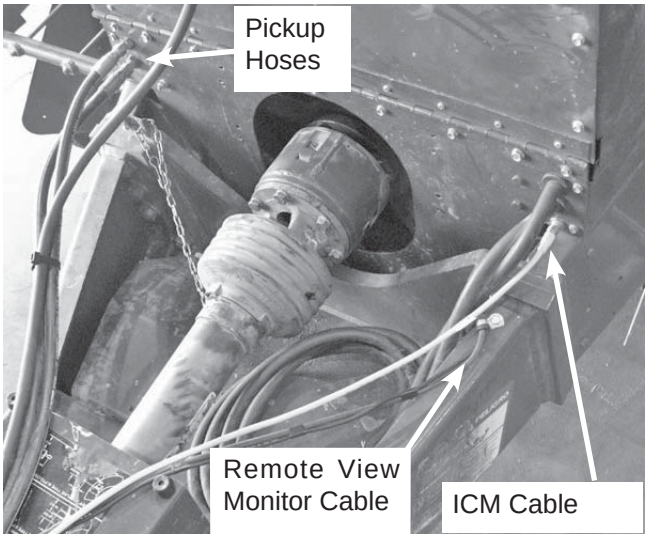


Figure 1-19 - Hydraulic and Electrical Outlets

- Ensure the style of couplers on hoses match the outlets on baler.

- Connect hoses from tractor to pickup lift outlets on baler (see Figure 1-19).

- Switch hoses at tractor outlets if auxiliary hydraulic control lever direction does not match desired movement of pickup lift.

- Ensure ICM cable is securely attached to baler hitch using the cable clamps provided. Keep all cables and hoses routed to prevent tangling or interference with rotating PTO drive line. The baler will not operate if the ICM cable is damaged or broken.

PREPARING THE EQUIPMENT

INSTALLING THE ICM AND RVM

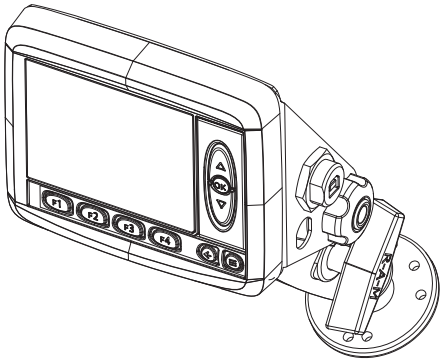


Figure 1-20 - In-Cab Monitor (ICM)

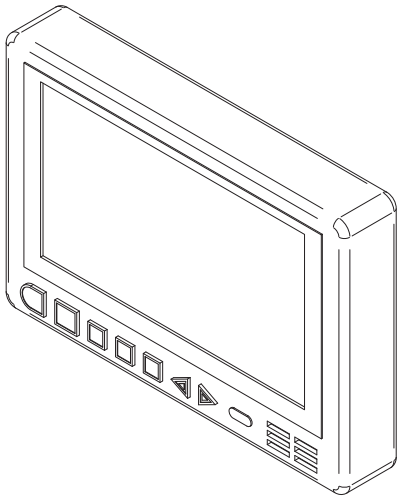


Figure 1-21 Remote View Monitor (RVM)

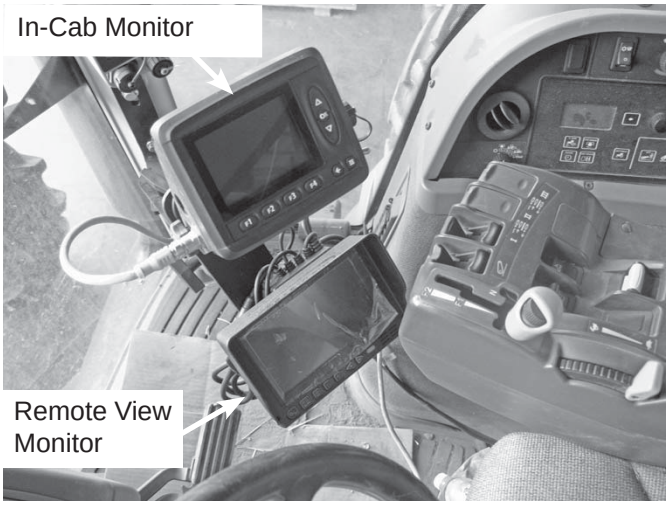


Figure 1-22 Cab Mounted ICM and Remote View Monitor

NOTICE

NOTICE: Extended periods of exposure to direct sunlight can cause an internal temperature exceeding 75°C / 158°F which may cause permanent degradation of the LCD display.

Mount the In-Cab Monitor and Remote View Monitor within operator's reach and comfort zone (see Figure 1-22).

Route and connect In-Cab Monitor and Remote View Monitor (RVM) cables from baler to cab. (See Figure 1-19).

NOTICE

NOTICE: ICM and Remote View Monitor cables should be securely attached from baler to cab out of the way of moving parts to prevent cable damage.

Mounting Considerations:

Position the In-Cab Monitor (ICM) per the following instructions:

Mount the ICM above RVM or in a side-by-side position. (see Figure 1-22)

- Position the unit to prevent cable folding, crushing, or wear. Less than 75 mm clearance will stress the cabling and distort the seals in the connectors.
- Leave sufficient room behind the unit to insert connectors to ensure that environmental specifications are met.

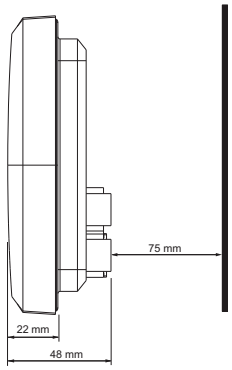


Figure 1-23 In-Cab Monitor (ICM)

- Position the unit so there is no risk of exposure to external heat, e.g. from the engine or heater.
- The best readability will be achieved by positioning the front face of the unit towards the operator.

TOWING THE BALER

⚠ DANGER

DANGER: Loss of steering or braking control can cause death or serious injury. Use a tractor that is large enough for sufficient steering and braking control.

The Freeman 1592 baler, with a bale in the chamber, weighs approximately 24,100 lbs. (10,932 kg):

- Do not tow faster than 20 mph (32 km/h).
- Do not tow with a tractor that weighs less than 15,000 lbs (6,810 kg).
- Do not tow without Safety Chain securely connected from baler to tractor.

To prepare for towing:

- Ensure that the tractor used is large enough to safely transport a baler without brakes.
- Clean out any accumulated crop, chaff, or dirt on the pickup. Open shield and clean out any material that has on or around the pickup clutch.
- Hitch baler to tractor (refer to Attach Baler to Tractor in “Preparing the Equipment” section).
- Connect Safety Chain from baler to tractor.
- Raise pickup.
- Raise and secure bale chute.
- Ensure that a slow moving vehicle (SMV) sign is properly installed on rear of baler and is in good condition.

TWINE INSTALLATION AND THREADING

The knotters and their related items are numbered in this example from 1 to 6 starting at the left side of the baler. For this example we will route the twine to the far right #6 knotter. Other knotters can be threaded in a similar manner. Needles must be in the home position before starting (see Figure 5-2 Page 5-2).

BOTTOM TWINES

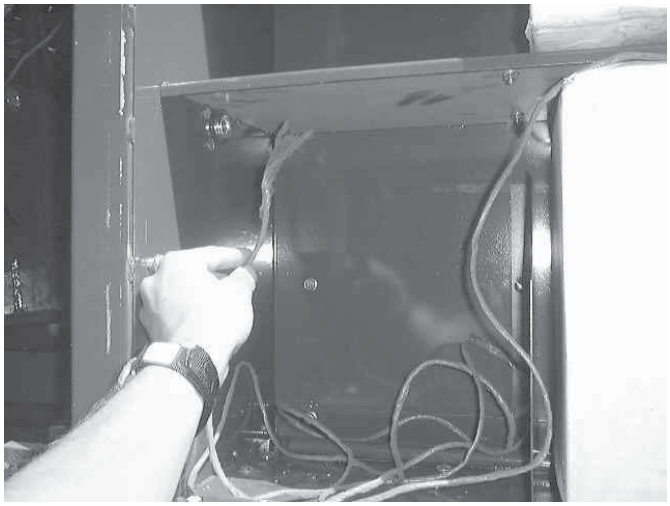


Figure 1-24 Twine Routing

The #6 knotter should take twine from the bottom shelf of the right side twine box. Pull the free end of twine from the twine ball and route through the twine guide at the rear of the twine box. When tying twine balls in series, always feed from the center of the ball. A surgeon's knot is recommended to ensure knot stability and prevent untying. (See Figure 1-26)

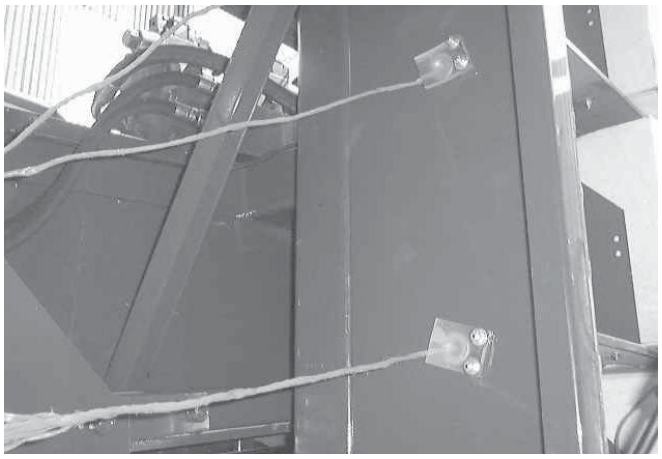


Figure 1-25 Twine Routing

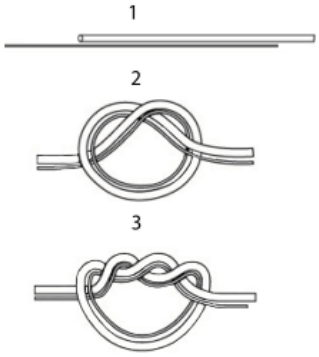


Figure 1-26 Surgeon's Knot

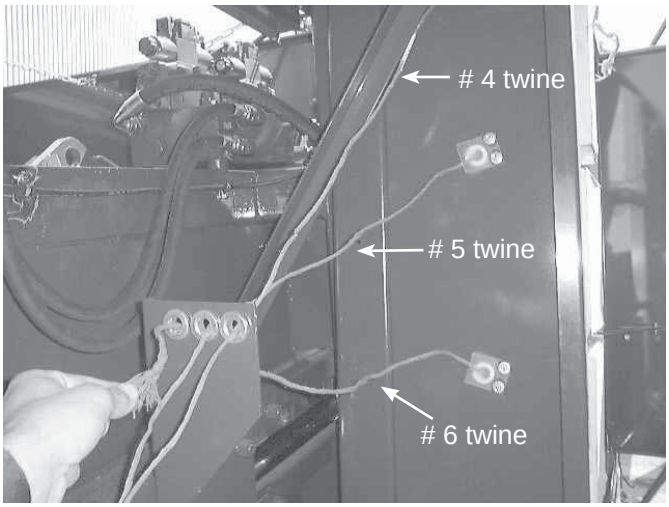


Figure 1-27 Twine Routing

Next, route the twine through the inner most eye on the twine guide mount on the feed fork link anchor. The twines for knotters #4 and #5 are shown for reference.

Figure 1-28 Twine Routing

Route the twine through the lower most guide eye on the mount. The guide mount is bolted to the feedlink mount.

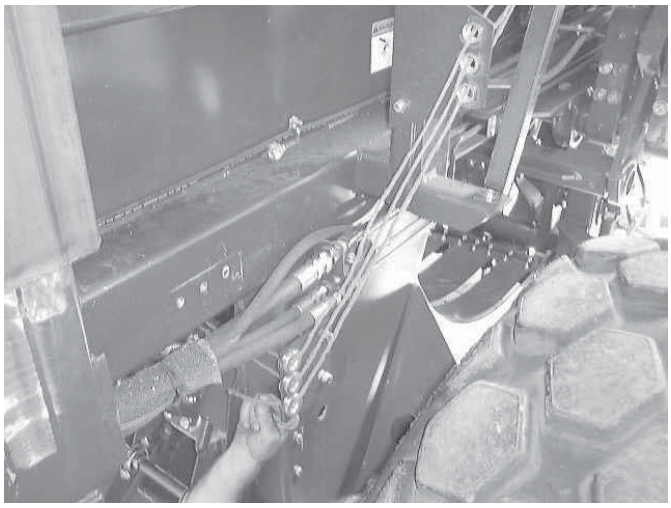


Figure 1-29 Twine Routing

Route the twine through the lower most eye on the twine guide bolted to the frame behind the tire.

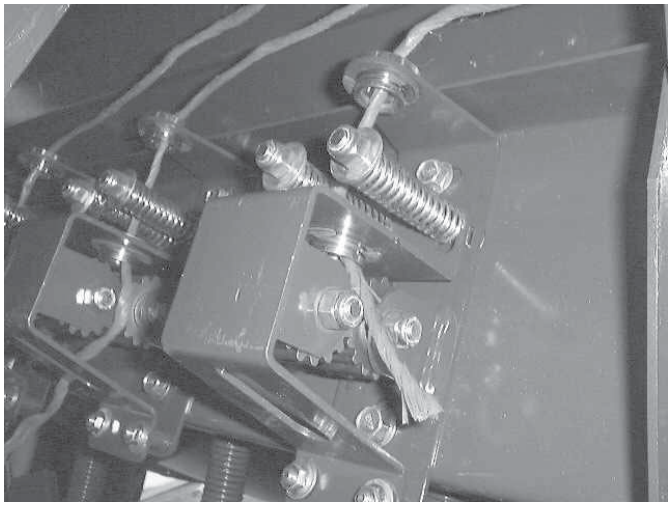


Figure 1-30 Twine Routing

Next, route the twine to the upper twine guide eye in the #6 twine tensioner assembly.

From there, thread the twine between the tensioner springs and through the second tensioner guide eye. Push the twine off to the side of the rollers as shown.

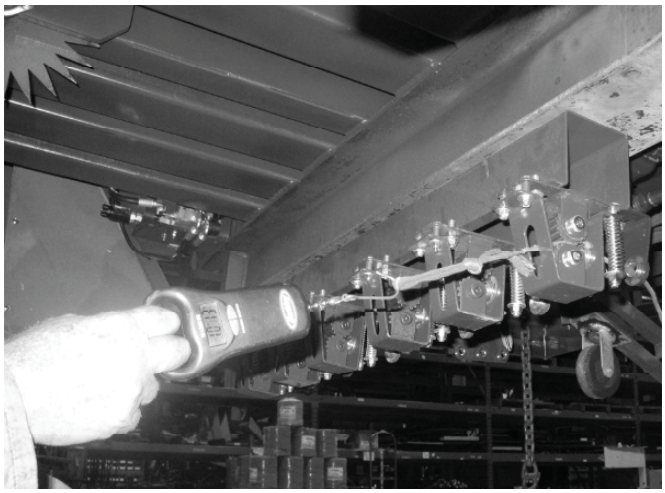


Figure 1-31 Twine Tension

Route the twine around the tensioner rollers and through the oval shaped slot in the tensioner frame.

Be sure the tensioner rollers turn freely when spring force is not applied to them. Loading the tensioner may seem difficult at first but with practice it becomes easier. Most operators develop their own technique, which is usually loosely based on the method shown here.

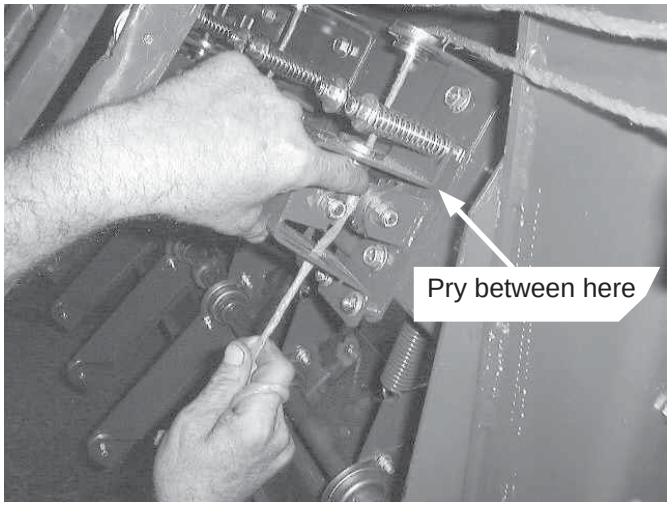


Figure 1-32 Twine Routing

To load the twine into the tension rollers, push the twine into the engaging roller teeth while pulling on the loose end coming through the oval slot. A fair bit of pressure on the twine may be necessary in order to get the roller teeth to “grab” the twine.

If the above methods yields negative results, use a pry bar to pull the moveable roller away from the stationary roller as noted in Figure 1-32.

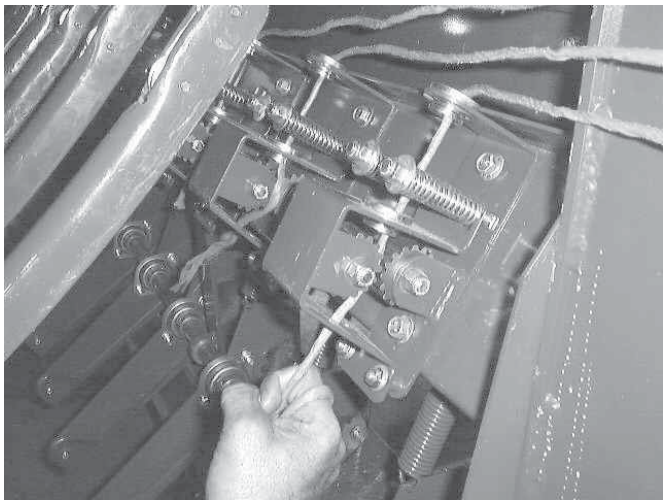


Figure 1-33 Twine Routing

With the twine tightly wedged into the engaging teeth, give a firm pull on the loose twine end. This should pull the twine into the center of the tensioner rollers. If the twine pulls loosely around the rollers, try again to wedge the twine into the roller teeth, this time applying more force to the twine where the roller teeth engage. Check twine tension with a spring scale. (See Figure 1-31) Twine tension should measure 22-25 ft lb when pulled through the tension rollers.

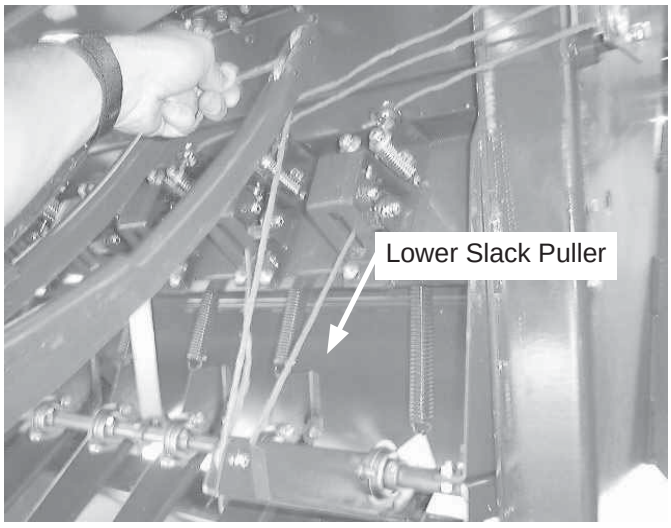


Figure 1-34 Twine Routing

After the tensioner is loaded, route the twine through the slack puller and up between the needle rollers.

When threading the baler for the first time, tie the twine from the needle to the twine hanging down from the chamber top. (see TOP TWINES page 1-11)

PREPARING THE EQUIPMENT

All needles can be threaded in a similar manner. Route the twine for the 3 left hand knotters in a pattern which mirrors the right side.

If re-threading the needle in the field after a mis-tied knot, tie the twine from the needle to the frame member behind the needle (bottom twine) or cross member behind the knotter for top twine. (See Figure 1-35)

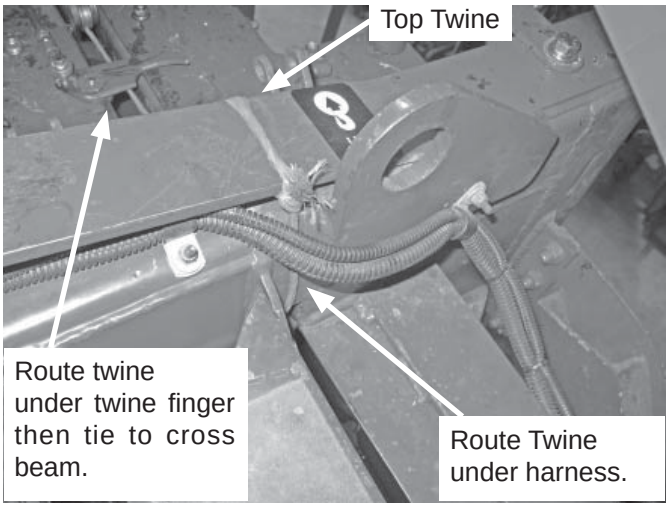


Figure 1-35 Tie top mis-tie twine to cross beam.

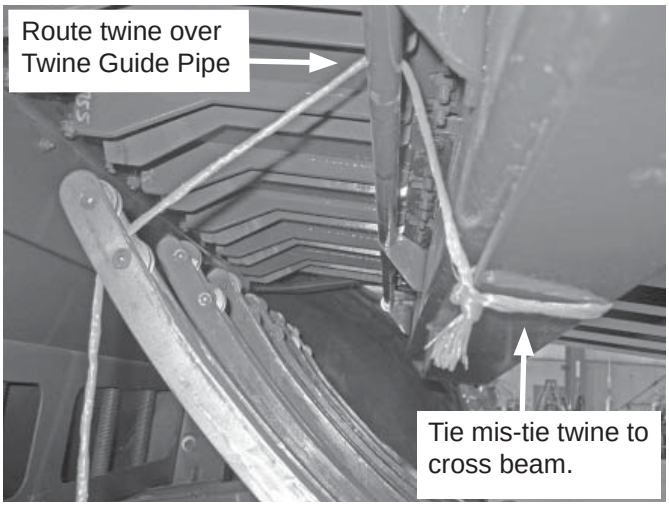


Figure 1-36 Tie mis-tie twine to cross beam.

NOTICE

Be sure to cut twine off cross beam on top and bottom of baler before the next knotting cycle. Twine on the bottom could damage twine guide pipe (see Figure 1-36).

NOTE: Once the knotter has cycled and loaded the twine into the knotter, remove the twine from the cross members. (See Figure 1-36)

TOP TWINES

The routing for the top twines is much more direct so will not be discussed in as much detail as the bottom. All top twines have similar routing to what is shown here.

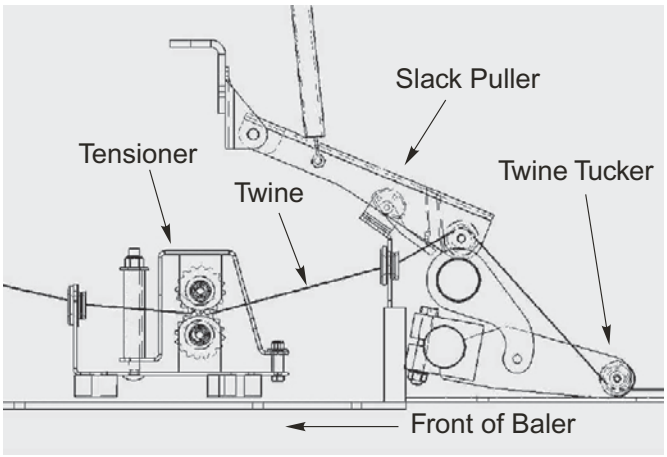


Figure 1-37 Twine Routing

From the top twine box, route the twine down through the guide in the top shield to the front end of the tensioner.

Load the twine in the top twine tensioner in the same manner as described for the bottom tensioners earlier.

From the twine tensioner, route the twine up through the slack puller roller and down through the twine tucker roller.

CONTROL OUTPUT DISABLE BUTTON

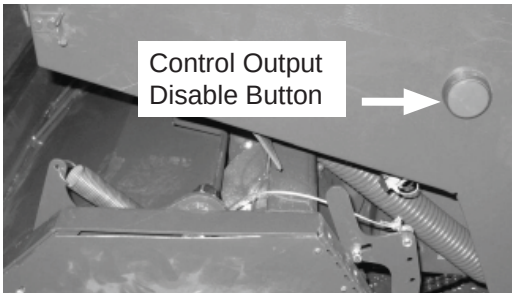


Figure 2-16 Front View Control Output Disable Button

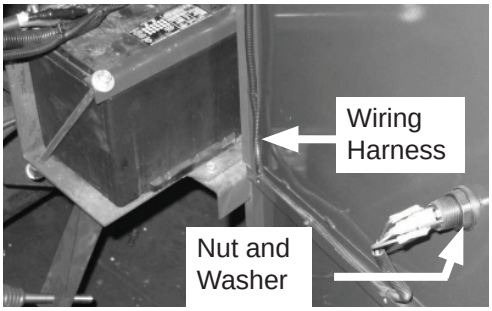


Figure 2-17 Rear View Control Output Disable Button

Insert threaded end of button through door hole so that the button is on the outside of the door. Replace plastic washer on threaded end and tighten plastic nut. Attach harness connector to button switch (see drawing 903359 for more information).

PICKUP SPEED SENSOR

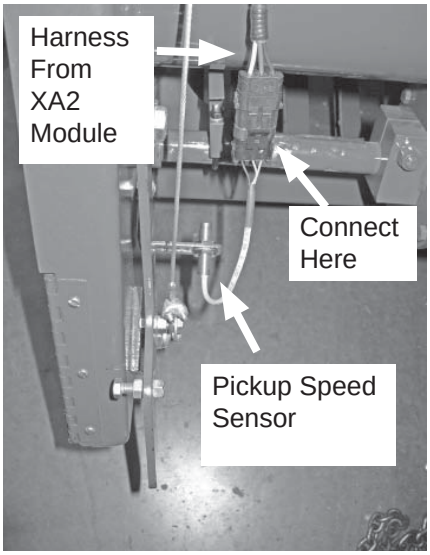


Figure 2-18 Pickup Speed Sensor

Connect the Pickup Speed Sensor to the XA2 module harness (see drawing 903359 for more information).

NOTICE

NOTICE: Make sure Speed Sensor Harness is away from all moving parts to avoid damage.

INTRODUCTION TO THE BALER OPERATING SYSTEM

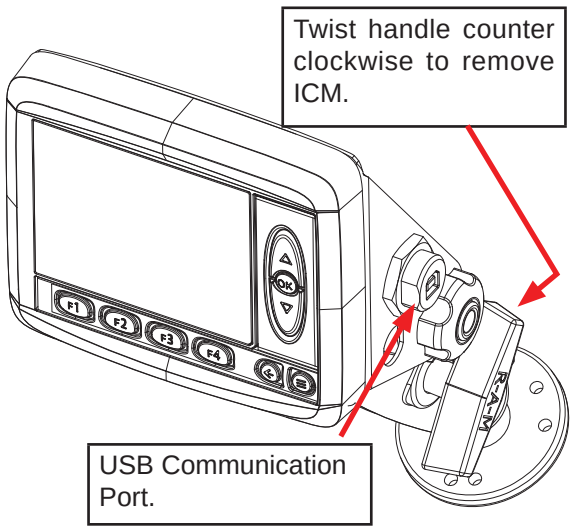


Figure 2-1 In-Cab Monitor (ICM)

The Baler Operating System consists of:

- In-Cab Monitor (ICM)
- Input / Output Control Modules (XA2)
- Machine / Baler Sensors

The ICM is used to control the functions of the baler and provide a display of its performance during operations. Multiple screens are utilized to monitor the baler, make adjustments to its operation, and perform problem diagnostics.

The ICM screens are divided into two groups; baling and machine setup.

The main baling screens consist of four (4) screens; Baling, Auto Statistics, Field Counts, and Functions.

The screens for setup of the machine are protected by a password, and should only be accessed after reading and understanding the 1592 Baler Operating System Manual (89-015).

Function and purpose of Input / Output Module (XA2):

- Receives commands from the ICM
- Monitors signals from the machine sensors
- Sends control signals to machine components (i.e. pump, tension manifold, etc.)

- The ICM uses a CAN-bus cable to communicate with the XA2 modules.

The XA2 modules receive instructions from the ICM to drive hydraulic valves and other electrically operated components. They also interface with sensors on the machine and relay this information through the communication cable back to the ICM.

USING IN-CAB MONITOR (ICM) AS REMOTE CONTROL

The ICM can be used remotely for diagnosing and making baler adjustments outside of the tractor cab.

Care should be taken when removing the ICM from the cab as damage to the ICM will make the baler inoperable. When moving the ICM, one hand can be placed on the top portion of the mount to prevent the unit from falling when loosened.

The ICM is mounted directly to the Mounting Plate on the tractor. It must be removed by twisting the knob on the side of the mount counterclockwise to remove the stand.

When the ICM is used remotely, extreme caution must be exercised regarding safety around the machine and with the ICM. Recommended safety precautions when using the ICM outside of the tractor cab are as follows:

- Tractor must be on level and solid ground.
- Tractor brakes and/or transmission must be locked.
- An extra long communication cable should be used in place of the tractor cab communication cable.
- ICM should never be placed in a location where it may be inadvertently activated or damaged.

⚠ DANGER

DANGER: Always make sure everyone is clear of baler before using In-Cab Monitor (ICM) remotely.

⚠ DANGER

DANGER: Maintain a safe distance from all moving components when remotely operating the baler with the ICM (In-Cab Monitor).

NOTICE

NOTICE: Always use the extra communications cables when using the ICM. Disconnecting routed communication cable between the Baler and the Cab could cause the cable to become damaged.

NOTICE

NOTICE: Use care when remotely using the ICM. The 1592 baler cannot be used if the ICM is not functional.

MONITOR OVERVIEW

Figure 2-2 Bale Screen

1. Function Buttons (activates function above button)
2. Navigation Arrow Button (scrolls through operator screens)
   Press and hold to return to main Baling Screen
3. Menu Button (Read and understand operating system manual before use)
4. Toggle Switch (Monitor and Baler Power ON/OFF)
5. Input Buttons (changes and sets functions)
6. Display Screen

NOTES

BALE SCREEN - FUNCTION BUTTONS & MANUAL CONTROL

Figure 2-3 Bale Screen

Theory of Operation
The Bale Screen is the main display used by the operator for all baling and basic diagnostics of problems. The functions indicated on the Bale Screen shown are used for the following functions:

- Start / Stop Baling
- Fully extend Plunger to clear chamber
- Set Target Plunger Pressure to control tension
- Manual control of the Feeder, Feed Fork, & Plunger

F1 1. CONTROL OUTPUT DISABLE

Function:
Disables the control system for the baler by halting all signal outputs. System will still monitor input signals.

Adjustment Objective:
To halt all operations of the baler controlled by the system.

⚠ CAUTION

CAUTION: Although the control system is disabled, the tractor PTO may still be operating. Operator must disengage the tractor PTO to bring the baler to a complete stop.

Adjustment Procedure:

1. Press F1 to disable the control system.
2. The symbol above F1 will change to a check mark and the Sequence (see reference #4 on Figure 2-3) will change to DISABLED.
3. A warning message will pop up. F2 will need to be pressed to acknowledge the message.
4. 3. Press F4 twice to change the Sequence to Pause. At this point the Indicator above F4 should indicate “GO”.

NOTE: When in the Pause Sequence, F4 will need to be pressed once more to start baling.

F2 2. CLEAR PLUNGER

Function:
Fully extends the plunger to its maximum stroke to clear the chamber of as much material as possible. This feature would also be used if the Feed Fork is stalled.

Adjustment Objective:
To fully clear the chamber of material and or fully extend the plunger cylinder.

Adjustment Procedure:
Press and hold F2 to fully extend the Plunger.

NOTE: Plunger Drift Compensation (see page 6-1) must be turned on in order for the plunger to return automatically if not currently attempting to extend (sequence 4). Otherwise, use the Manual Operation Controls (see bale screen reference #5 on Figure 2-3) to select and operate the plunger.

F3 3. PLUNGER PRESSURE

Function:
Establishes a target for the Plunger Pressure that is used to control the tension applied when creating a bale.

Adjustment Objective:
To establish a target for the Plunger Pressure

Adjustment Procedure:

1. Press F3. The text above F3 will turn red.
2. Press ▲▼ to adjust the value to the desired pressure. This target pressure should not be set above 6500 psi.
3. Press OK to save the setting.

[See Default Settings in manual 89-015]

F4 4. GO

Function:
Begin or pause baling

Adjustment Objective:
To start or pause the baling operation.

Adjustment Procedure:

1. Press F4, the baler should begin operating and the image above the button should change to read “PAUSE”.
2. Press F4 again to Pause the baler. If pressed, the plunger will complete its stroke before pausing. The image above the button should change to read “GO”.

The operator can monitor the baling sequence during operation. The sequence display is located above the time indicator above F4. The sequence of steps is as follows.

1. **DISABLED:** Disables all outputs from the XA2 modules. No functions can be run in this sequence.

2. **Pause:** Baler not in the Automatic mode; operator presses F4 to GO and baling process sequence starts.

3. **Forks Cycle:** Feed Fork rotates (cycles) until enough material is gathered to raise Full Chamber Paddles which activate sensor S-3 (See Sensor Locations and Chart on page 5-18).

4. **Feed Fork Stop:** The ICM receives a signal from the Feed Fork Stop sensor S-2 (See Sensor Locations and Chart on page 5-18) and sends signal to XA2 to stop Feed Fork (valve is shifted to neutral).

5. **Plunger Extends:** When feed fork stops, plunger extends until it reaches the extend cushion set point (see Plunger Settings page 6-2 in 89-015 manual).

6. **Plunger Retracting:** plunger retracts until it reaches the retract cushion set point. (see Plunger Settings page 6-2 in 89-015 manual). Sequence repeats until bale is determined to be correct length.

7. **Knotter Tying:** knotter cycles completing entire bale sequence.

5. FUNCTION SELECT FOR MANUAL OPERATION

Function:
Selects the system for manual control (Feed Fork, Feeder, and Plunger).

Adjustment Procedure:
Used to manually operate the Feed Fork, Feeder, and Plunger.

1. Press OK to select the system to manually control Feed Fork, Feeder, and Plunger. Selected system will be displayed at the top of the display.
2. Use ▲▼ to control the selected system.

NOTE: When "Plunger" is selected through the Function Select for Manual Operation the plunger cylinder cannot be fully extended, but will stop at cushion set points, unlike the clear plunger function


Proceeds to the Auto Statistics screen


Proceeds to the Main Screen

BALE SCREEN - DISPLAYS, INDICATORS, & GRAPHS

Figure 2-4 Bale Screen

Theory of Operation

The Bale Screen is the main display used by the operator for all baling and basic diagnostics of problems. The functions indicated on the Bale Screen shown are used to monitor the operation of the baler during operation.

1. % TENSION DISPLAY

Function:

Displays the percent of tension pressure currently being applied in the tension system to create restriction to cause the plunger pressure to rise to the Target Plunger Pressure. 100% = maximum tension available and 0% = no tension applied.

With the Tension Control set to “Auto” from the Auto Statistics screen (see reference #4 on Auto Statistics screen page 2-15) the tension % will adjust automatically as conditions (moisture) change in order to maintain the desired Target Plunger Pressure.

Note: Changes in material conditions and moisture content will cause this value to vary.

2. PREVIOUS BALE FLAKE COUNT DISPLAY

Function:

Displays the number of flakes in the previous bale.

3. CURRENT BALE FLAKE COUNT DISPLAY

Function:

Displays the number of flakes in the bale being formed. This value will reset to zero once a bale has tied.

4. NEEDLE HOME INDICATOR

Function:

This indicator will turn green when the Needle Yoke is in the home position. This indicator will show dark gray when the Needle Yoke is away from the home position and or the knotter is cycling.

5. BALE LENGTH GRAPH & DISPLAY

Function:
This is a value display of the length of the bale. The graph will be initially black and and turn yellow to show a bale being formed. It will start on the left with a new bale and end at the right when the knotter has cycled, completing the bale. The value above the graph displays the length of the bale as it is being formed in the chamber.

6. BALE COUNT DISPLAY

Function:
Displays the bale count for the selected field (see reference #14 on Figure 2-2)

7. TYING NEXT CYCLE

Function:
This illuminates when the machine will tie on the next cycle. This will display when the bale has reached the preset length, and the XA 2 has been signaled to start the knotter after the next plunger stroke, or the Tie Knot Next function has been activated (see page 2-15 for more information).

8. KNOTTER HOME INDICATOR

Function:
This indicator will turn green when the knotter has rotated to the home position and the stop pad has activated the S-12 knotter home sensor (see page 2-15 for more information). This indicator will illuminate green when the knotter is away from the home position

9. AVERAGE FEED FORK REVOLUTION PER PLUNGER (FRP) INDICATOR

Function:
This indicator displays the average revolutions per plunge over the last five (5) plunger cycles. As conditions permit, the operator should try to achieve 1 Feed Fork revolution while keeping the Feed Fork Pressure Indicator in a comfortable zone. The windrow size to baler ground speed are optimized when the indicator is turning to yellow. This allows the baler to operate as efficiently as possible.

If more than one Feed Fork revolution is required to fill the chamber, the ground speed of the baler may be increased so more material is being supplied to the feeder to fill the chamber by the Feed Fork.

10. CURRENT BALE LENGTH DISPLAY

Function:

This displays the length of the current bale being formed in the chamber.

11. KNOTTER POSITION INDICATOR

Function:
This indicates the relative position of the knotter. The home position is with the yellow portion of the indicator pointing up at 12:00.

12. FULL CHAMBER INDICATOR

Function:
The indicator will raise when the chamber is full during the auto baling sequence.

13. PLUNGER POSITION GRAPH

Function:
Indicates the current position of the Plunger during its stroke. The graph will be initially black and will turn gray as the plunger advances. It will start on the left at the start of a cycle, move to the right as the Plunger compresses the crop in the chamber.

14. FIELD BEING BALED AND COUNTED

Function:
Displays the name of the field being baled and counted. Field name can be changed in the Field Counts screen (see page 2-19 for more information).

15. PLUNGER PRESSURE DISPLAY & GRAPH

Function:
A graphical representation of the current Plunger Pressure (0 to 7,500 psi) taken from a pressure transducer (S-24) in the hydraulic system. The number above the graphs is the peak plunger pressure as the plunger completes its extend cycle. It will hold this value until the plunger begins another extend cycle.

16. PICK UP / FEEDER PRESSURE GRAPH

Function:
Graphically indicates the Pick Up / Feeder pressure (PSI). The graph will change color depending upon the measured pressure as follows:

- Green = Safe operating pressure
- Yellow = Optimal operating pressure
- Red = Near stalling

17. PICKUP INDICATOR

Function:
Indicates active motion of the Pickup. The spinning indicator reveals whether the pickup is stalled or rotating where the green/white bar graph above shows relative speed from 0 to 220 rpm. The pickup speed sensor measures the time between sensor triggers to calculate speed and updates the reading about 3 times a second at full PTO rpm.

The operator can use the graph to monitor the speed of the pickup for plugging. Maximum speed on the graph is equivalent to a pickup speed of 220 rpm.

18. FEEDER INDICATOR

Function:
Indicates that the Feeder is operating. There is no position sensor on the feeder so the display will show rotation of the feeder if the Feeder Valve is receiving a signal to rotate. If the Feeder is stalled or the PTO is disengaged, the display will continue to show the Feeder rotating if the valve is signaled to operate.

19. FEED FORK PRESSURE (CURRENT) INDICATOR

Function:
Graphically indicates the pressure of the active Feed Fork cycle. The graph will change color depending upon the measured pressure as follows:

- Green = Safe operating pressure
- Yellow = Optimal operating pressure
- Red = Near stalling

20. FEED FORK PRESSURE (PREVIOUS) INDICATOR

Function:
Graphically indicates the pressure of the previous Feed Fork cycle. The graph will change color depending upon the measured pressure as follows:

- Green = Safe operating pressure
- Yellow = Optimal operating pressure
- Red = Near stalling

21. FEED FORK INDICATOR

Function:
Accept indicates the position of the Feed Fork. The Feed Fork position is monitored by a position sensor which will indicate the direction of rotation. The Feed Fork indicator will not rotate when the Feed Fork is plugged. The Feed Fork will stop at the highest point when the chamber is full and the Plunger extends.

 Proceeds to the Auto Statistics screen

 Proceeds to the Main Screen

BALE SCREEN - SERVICE INDICATORS & WARNINGS

Figure 2-5 Bale Screen

Theory of Operation
The Bale Screen is the main display used by the operator for all baling and basic diagnostics of problems. The functions indicated on the Bale Screen shown are used to monitor the baler for function of particular systems or problems.

Several of the indicators will generate a warning screen when activated. These warning screens are located in the 89-015 Operating System Troubleshooting section page 23-1. Please consult this section for more information regarding the warning screens.

1. <u>ACCUMULATOR LOW PRESSURE WARNING INDICATOR</u>

Function:
Monitors the hydraulic system for low pressure. If the hydraulic system pressure drops below 200 psi, the warning indicator will be illuminated. The indicator will be illuminated if the main pump charge pressure drops below 200 psi.

NOTE: The indicator will be illuminated if the ICM is on, but the tractor PTO is not engaged.

2. <u>OIL COOLING FAN ON / OFF INDICATOR</u>

Function:
Displays the status of the Oil Cooling Fan, and will be illuminated when the fan is on. The fans are controlled by settings entered in the Oil Cooler screen (see manual 89-015 for more information).

3. <u>KNOTTER FAN ON / OFF INDICATOR</u>

Function:
Displays the status of the Knotter Fans, and will be illuminated when the fans are on. The fans turn on when "GO" F4 is activated and turn off when "PAUSE" F4 is selected again to pause baling. The fans can also be controlled from the Functions screen (see page 2-23). There is also a manual switch located near the rear left-hand service ladder for turning the fans ON and OFF.

4. OIL OVER TEMPERATURE INDICATOR

Function:
This will illuminate when the temperature is above the Overheat Temp setting (see manual 89-015 for more information). When the temperature exceeds the Oil Over Temperature the machine will cease operation after the current plunger cycle to protect the hydraulic system from damage from heat.

5. OIL TEMPERATURE INDICATOR

Function:
Graphically displays the oil temperature between 100° F to 220° F.

6. LOW OIL INDICATOR

Function:
This will illuminate when the oil level in the hydraulic reservoir has dropped below the oil level switch. When the oil level is below the level switch, the baler will stop baling after the current bale cycle. See the Operating Troubleshooting section for more information regarding the warning screen.

7. BATTERY LOW VOLTAGE INDICATOR

Function:
Indicator will be illuminated when the system voltage has dropped below 11.5 volts indicating the charging system should be inspected. If the voltage continues to drop below 9.5 volts, a pop-up message window will be displayed.

8. WORK LIGHTS ON / OFF INDICATOR

Function:
Displays the status of the Work Lights, and will be illuminated when the lights are on. See the Functions screen for operating the Work Lights (see page 2-23).

9. TIME

Function:
Displays the current time. The time can be set from Preferences on the Main screen (see manual 89-015).


Proceeds to the Auto Statistics screen


Proceeds to the Main Screen

NOTES

AUTO STATISTICS

Figure 2-6 Auto Statistics Screen

Theory of Operation

The Auto Statistics screen is used by the operator for the following:

- Initiate tying of the bale
- Setting the bale length
- Activating and monitoring of the Tension Mode (Automatic or Manual)
- Monitor the Plunger position and performance
- Monitoring the bale length and flake size (current & last bales)

Note: If you wish to periodically reset the Average Plunger Pressure and Average Tension while in the same field, you must periodically go into the Field Count Screen and reset the field count which also resets these two items for this screen. If you do not want to reset the field you are counting, select another field and reset, and then return to the field you desire. See page 2-19 item 2 for information on resetting the field count.

F1 **1. CONTROL OUTPUT DISABLE**

Function:

Disables the control system for the baler by halting all signal outputs. System will still monitor input signals.

Adjustment Objective:

To halt all operations of the baler controlled by the system.

⚠ CAUTION

CAUTION: Although the control system is disabled, the tractor PTO may still be operating. Operator must disengage the tractor PTO to bring the baler to a complete stop.

Adjustment Procedure:

1. Press F1 to disable the control system.
2. The symbol above F1 will change to a check mark.
3. A warning message will pop up, and F2 will need to be pressed to acknowledge the message.
4. Press F4 to twice to change the Sequence to Pause. At this point the Indicator above F4 should indicate "GO".

NOTE: When in the Pause Sequence F4 will need to be pressed once more to start baling.

F2 2. TIE KNOT NEXT / NOW

Function:
Allows the operator to tie the bale at any time before it has reached its predetermined length, but it must have minimum of three flakes. This function has two options; Tie Knot Now or Tie Knot Next. Both options occur like a normal knotter cycle except the Tie Knot Now option starts the plunger cycle as soon as the Feed Fork activates SW-2 Feed Fork Stop. This occurs regardless of condition of the SW-3 Full Chamber Paddles (see manual 89-015 for more information).

Adjustment Objective:
To tie off the baler before it has reached its full length.

Adjustment Procedure:

1. Press F2. The indicator for Tie Knot NEXT will illuminate green. If left in this state the plunger/knotter cycle will begin normally when the full charge sensor has been activated.
2. Press F2 again. The indicator for Tie Knot NOW will illuminate red. If left in this state the plunger/knotter cycle will begin as soon as SW-2 Feed Fork Stop is activated.
3. Press F2 again. Both indicators will turn off, and the tie function will be disabled. Pressing "Pause" and then "GO" will cancel the Tie Knot NEXT/NOW function.

⚠ CAUTION

CAUTION: The baler will automatically perform a tie cycle even if the machine is not baling.

F3 3. BALE LENGTH

Function:
To set the desired bale length (1 inch = 25.4 millimeters)

Adjustment Objective:
To set the desired bale length (1 inch = 25.4 millimeters)

Adjustment Procedure:

1. Press F3. The text above F3 will turn red.
2. Press ▲▼ to adjust the value to the desired setting. The maximum setting can not be more then 200 (inches).
3. Press OK to save the setting.

[See Default Settings in manual 89-015]

F4 4. TENSION CONTROL

Function:
To set the Tension System to Automatic or Manual mode. In Automatic Mode, the control system will adjust the tension pressure to maintain the Target Plunger Pressure (see manual 89-015 for more information).

For Manual Mode, the operator sets the Tension Pressure (%), and the control system will not attempt to make any adjusts to control the Plunger Pressure.

Adjustment Objective:
To set operating mode for the Tension Pressure.

Adjustment Procedure:

1. Press F4. The "Tension Pressure Control" box will appear.
2. Press ▲▼ to adjust the value to the desired setting (auto or manual).
3. Press OK to save the setting.
4. If "auto" is selected, the control system will automatically adjust the tension pressure to maintain the Target Plunger Pressure (see manual 89-015 for more information).
5. If "manual" is selected, Press OK and use ▲▼ to adjust the setting for the Tension Pressure (%). The higher the setting the more pressure that is applied when forming a bale.

5. AVERAGE CYCLES / PLUNGE DISPLAY

Function:
Displays the average number of Feed Fork Cycles per Plunger cycle. The average is taken over five (5) plunger cycles. The value is capped at 5 cycles/plunge to ignore conditions such as turning at windrow ends and cleanup.

6. AVERAGE STROKES PER BALE DISPLAY

Function:
Displays the average Plunger strokes per bale which is also the average number of flakes per bale. The average is taken over the current field and is reset when the field count is reset. Changing the field without resetting the field count will make this value erroneous.

7. AVERAGE PLUNGER PRESSURE DISPLAY

Function:
Displays the average Plunger Pressure (psi) since the last time the bale count was reset for the selected field.

8. STROKES PER MINUTE DISPLAY

Function:
Displays the Strokes Per Minute based on the measured cycle time for the last Plunger cycle.

9. AVERAGE FLAKE DISPLAY

Function:
Displays the Average Flake size (inches) for the current bale. The size is calculated by the Current Bale length divided by the number of Plunger strokes for the current bale.

10. LAST BALE LENGTH DISPLAY

Function:
Displays the Bale Length (inches) for the previous bale made.

11. CURRENT BALE LENGTH DISPLAY

Function:
Displays the Bale Length (inches) of the current bale being made.

12. PLUNGER POSITION DISPLAY AND INDICATOR

Function:
The numbers shown in gray indicate the preset positions for the Extend and Retract Plunger Cushions. The numbers in green indicate the last recorded Retract and Extend Plunger true stop positions. The position indicator is based on the full stroke of the Plunger Cylinder, and shows the values of the set versus the true Plunger Cushions (see Plunger Cushions Setup in manual 89-015 page 6-15 for more information).

The Plunger Cushions are the point in the stroke where the Plunger must stop, but due to varying conditions from flake to flake, the actual stopping position may vary before or after the cushions. Comparing the green values to the gray values may reveal the condition where the Plunger Auto Position system requires adjustment. If the green value is not cycling above and below the gray value, but remaining either higher or lower than the gray value for several plunger strokes, then refer to the Plunger Settings screen (see Plunger Settings in manual 89-015 page 6-1 for more information).

13. TENSION MONITOR DISPLAY

Function:
Displays the Tension Pressure (psi) and Output (%) as follows:

TENSION = Current Output (%) setting if Manual Tension Mode is selected (see reference #4 on Figure 2-6). NOTE: This value is not displayed with the Automatic Tension Mode is selected.

Pressure = Current Tension Pressure. The higher the pressure, the more pressure is being applied when making a bale. This pressure transducer is optional and if available, it must be set up in the “machine configuration”.

If in Automatic Mode, a higher pressure will indicate more Tension Pressure is required to maintain a Target Plunger Pressure. This could mean that the material being baled is dry. A lower pressure will indicate less Tension Pressure is required and the material is wetter.

Output = Current Tension Output (%). This is the percentage of Full Tension Pressure being applied to generate the Tension Pressure.

Avg. Out = Average Tension Output (%). This is the average percentage of Full Tension Pressure being applied for a selected field. The value is reset when the Field Count for the selected filed is reset (see page 2-19).

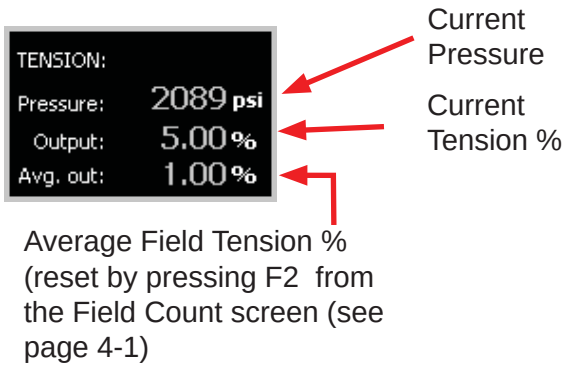


Figure 2-7 Tension

Returns to the Field Counts screen

Proceeds to the Main screen

FIELD COUNTS

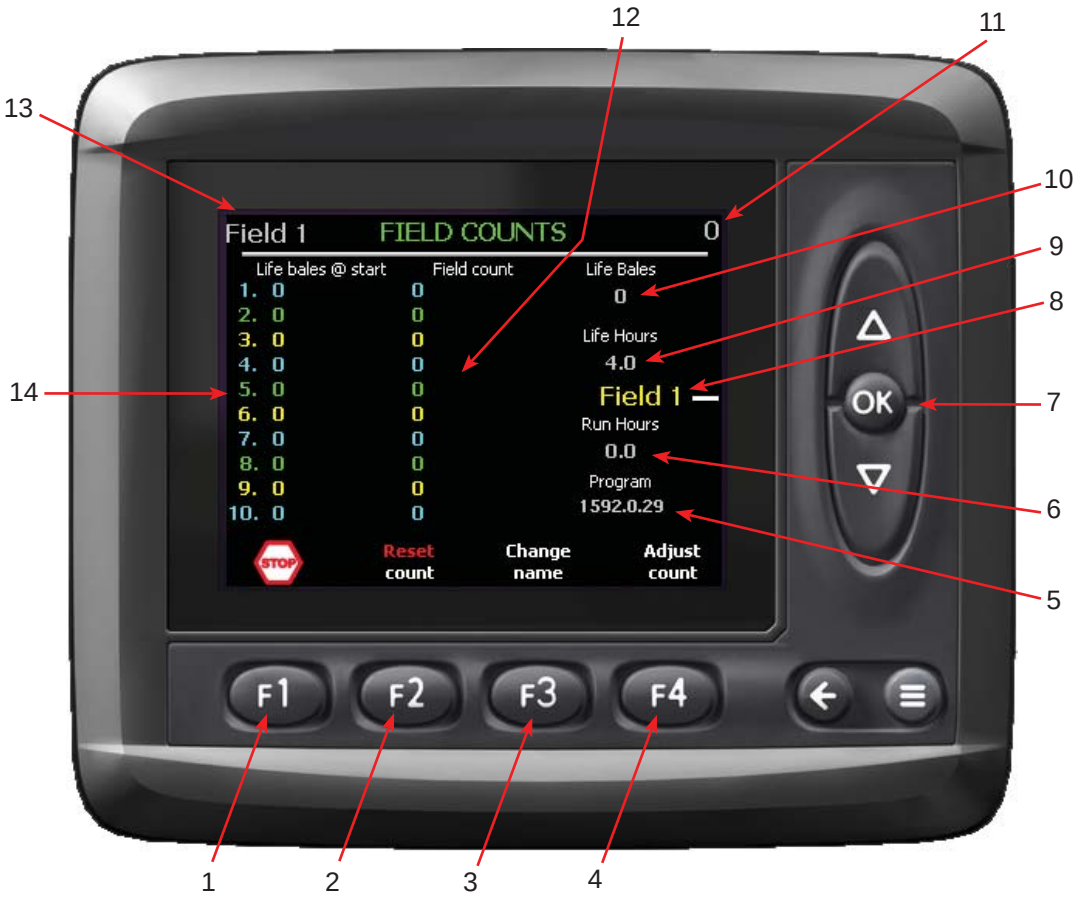


Figure 2-8 Field Counts Screen

Theory of Operation
The Field Counts screen is used to record and display the number of bales made per field (up to 10), and monitor the operating hours of the baler.

Controls are provided that allow the operator to assign a unique identification to each field, reset the count, and adjust the current field count.

F1 1. CONTROL OUTPUT DISABLE

Function:
Disables the control system for the baler by halting all signal outputs. System will still monitor input signals.

Adjustment Objective:
Halts all baler operations controlled by the system.

⚠ CAUTION

CAUTION: Although the control system is disabled, the tractor PTO may still be operating. Operator must disengage the tractor PTO to bring the baler to a complete stop.

Adjustment Procedure:

1. Press F1 to disable the control system.
2. The symbol above F1 will change to a check mark and the Sequence on the Bale screen will change to DISABLED.
3. A warning message will pop up. F2 Will need to be pressed to acknowledge the message.
4. Press F4 twice. At this point the Indicator above F4 on the bale screen should indicate “GO”.

NOTE: When in Pause, F4 will need to be pressed once more to start baling.

F2 2. RESET COUNT

Function:
Resets the Field Count to zero (0) for the selected field (see reference #8 on Figure 2-8). Resetting the count will also reset the calculations for Average Plunger Pressure and Average Tension.

Adjustment Objective:
Reset the Field count to zero (0) for the selected field (see reference #8 on Field Counts screen).

Adjustment Procedure:

1. Press and hold F2 for at least one (1) second.
2. The count displayed for the selected field should change to zero (0) in both the field count column for the selected field and the value displayed in the upper right hand corner of the display.
3. The current value for the "Life Bales" (see reference #10 on Field Counts screen page 4-1) will be transferred over to the "Life bales @ start" column (see reference #14 on Field Counts screen).

F3 3. CHANGE NAME

Function:
A unique identification (i.e. number, name, etc.) can be assigned to a specific Field Number.

Adjustment Objective:
Create a unique identification for a specific field.

Adjustment Procedure:

1. Press F3. The Field names screen will appear.
2. The current Field Name will be highlighted in the "Value" space.
3. Use the following controls to edit or enter a new Field Name.

▲▼ = Select the letter or number to be entered into each space. The command to delete text or add spaces to the name is also available.

F2 (Case) = Changes the text case for letters.

F3 (Numeric) = Toggles to numbers for entry into the Field Name. Use F2 to switch back to letters.

OK = Use OK to enter the desired text or command entered.

Main = Returns to the Field Counts screen without any change to the name.

NOTE: Upon entering the Field Names screen, use ▲▼ to select the "Delete" command, and repeatedly press the OK button to remove the current name.

4. When the Field Name is correct, use ▲▼ to highlight the "Done" command and press OK.
5. The Field Counts screen will appear, and the new Field Name will be shown in the upper left corner of the display.

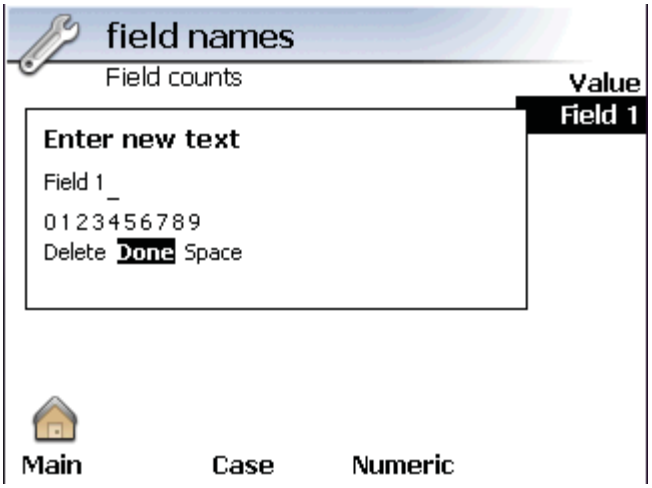


Figure 2-9 Field Names

F4 4. ADJUST COUNT

Function:
Sets the current field count to a different value. This command would be recommended when re-baling so as not to record an incorrect bale count.

Adjustment Objective:
Set the current field count to a different number.

Adjustment Procedure:

1. Press and hold F4 .
2. Use the ▲▼ arrow to adjust the bale count. The Bale Count (see reference #11 on Field Counts screen page 2-8) value in the upper right hand corner of the screen will change as the buttons are used.

5. PROGRAM VERSION DISPLAY

Function:
Displays the version of the control program loaded on the ICM.

6. RUN HOURS DISPLAY

Function:
Displays the total hours that the baler has been operated in the Automatic mode. This time begins when the "Go" button on the Bale Screen (see page 2-3) has been pressed and the baler is operating. The value of this display can not be adjusted.

7. FIELD SELECT (OK)

Function:
Changes the selected field when baling.

Adjustment Objective:
Changes the selected field displayed.

Adjustment Procedure:

1. Press OK. The field list screen will be displayed.
2. Use ▲▼ to select the desired field (1 through 10).
3. Press OK to select a field.
4. The Field number (see reference #8 on Field Counts screen page 2-8) will be displayed to the left of OK, and the Field Name (see reference #3 on Field Counts screen page 2-8) will be displayed in the upper left corner of the screen.

8. FIELD NUMBER DISPLAY

Function:
Displays the Field Number for the selected field.

9. LIFE HOURS DISPLAY

Function:
Displays the Life Hours that baler power has been turned on. The value of this display can not be adjusted.

10. LIFE BALES DISPLAY

Function:
Displays the total number of bales made by the baler. This will only count knotter cycles that are during the auto baling sequence, so tying in the "Test" screen will count bales but cycling the knotter in a setup screen will not. The value of this display can not be adjusted.

11. BALE COUNT DISPLAY

Function:
Displays the current bale count for the selected field.

12. FIELD COUNT DISPLAY

Function:
Displays the current bale count for a field.

13. FIELD NAME

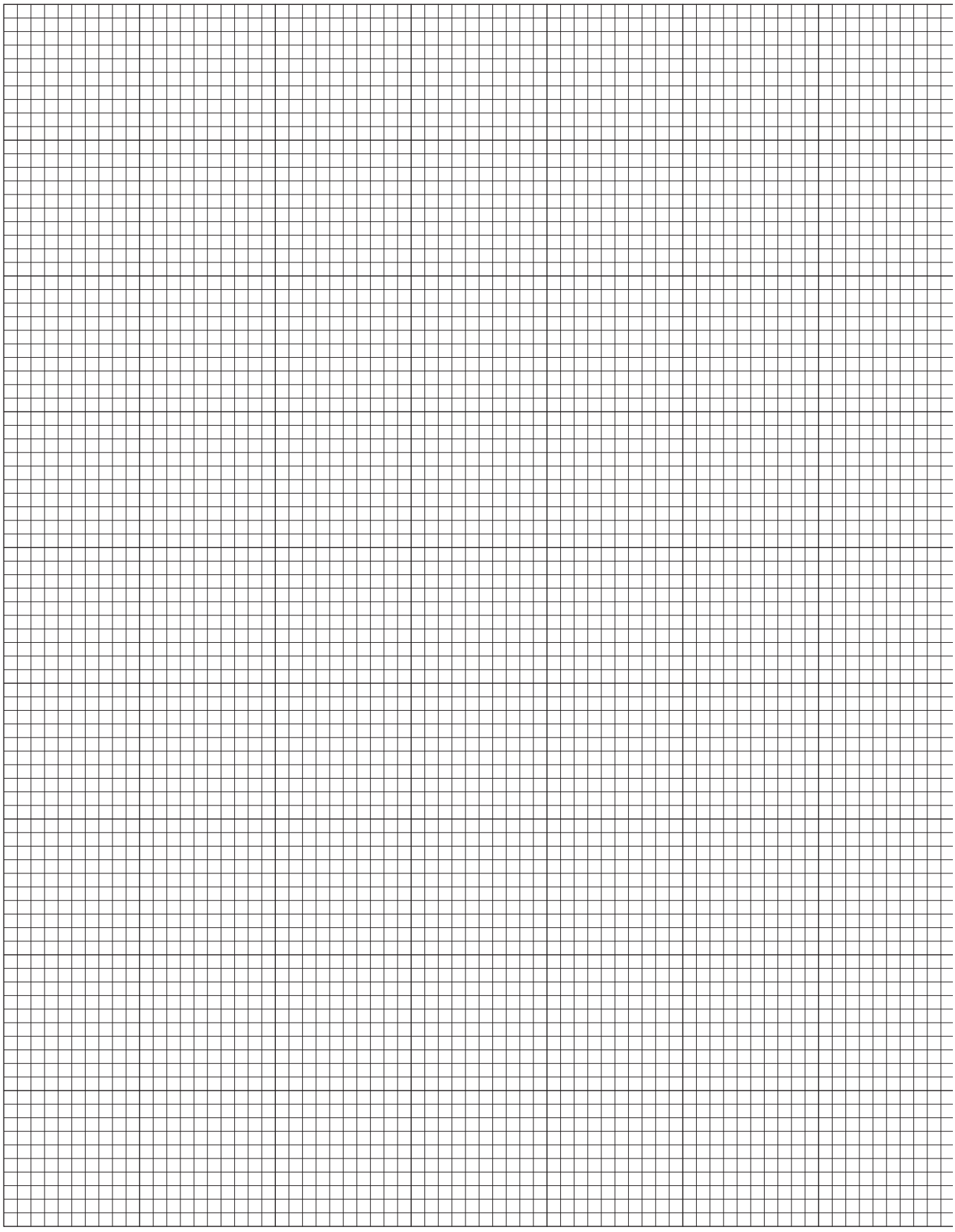
Function:
Displays the unique identification created for a field. This is the only location where the Field Name is displayed.

14. LIFE BALES AT START DISPLAY

Function:
Displays the Life Bales count when the Field Count for the selected field was last reset. This value can be used to estimate a bale count if a Field Count for a field was not reset when baling was started. Press ← to go to the Functions screen.

 Returns to the Bale Screen

 Proceed to the Main screen



FUNCTIONS

Figure 2-10 Functions Screen

Theory of Operation
Used for monitoring and control of various baler functions, including:

- Opening Tension Rails
- Turning on Work Lights & Knotter Fan
- Access to the Machine Settings
- Monitoring of key system functions
- Manual operation of the baler systems, including the Knotter

F1 1. CONTROL OUTPUT DISABLE

Function:
Disables the control system for the baler by halting all signal outputs. System will still monitor input signals.

Adjustment Objective:
To halt all operations of the baler controlled by the system.

⚠ CAUTION

CAUTION: Although the control system is disabled, the tractor PTO may still be operating. Operator must disengage the tractor PTO to bring the baler to a complete stop.

Adjustment Procedure:

1. Press F1 to disable the control system.
2. The symbol above F1 will change to a check mark and the Sequence (see reference #4 above on Functions screen above) will change to DISABLED.
3. A warning message will pop up, and F2 will need to be pressed to acknowledge the message.
4. Press F4 twice to change the Sequence to Pause. At this point the Indicator above F4 should indicate “GO”.

NOTE: When in the Pause Sequence F4 will need to be pressed once more to start baling.

F2 2. OPEN RAILS

Function:
Opens the tension rails to allow the bale or material in the chamber to be removed.

Adjustment Objective:
To open the tension rails

Adjustment Procedure:

1. Press F2. The tension rails will fully open.
2. Press F2 again to close the tension rails, or start the baler using the “GO” button (see page 2-5)

F3 3. WORK LIGHTS / KNOTTER FAN

Function:
This is a dual control feature for controlling both the Work Lights and Knotter Fans.

Adjustment Objective:
To operate the Work Lights and Knotter Fans

Adjustment Procedure:

1. Press F3. The Work Lights will turn on and indicator above the button will be visible. Press F3 again to turn off the Work Lights and indicator.
2. Press and hold F3. The Knotter Fans will turn on and the indicator above the button will be visible. Press and hold F3 again to turn off the Knotter Fans and indicator.

F4 4. MACHINE SETTINGS MENU

Function:
Accesses the Machine Settings to configure and setup the operation of the baler.

Adjustment Objective:
Allows access to the Machine Settings to configure and setup the operation of the baler.

Adjustment Procedure:

1. Press F4. The PIN code screen will appear. The code to enter for access to the Machine Settings is “1889”.

Figure 2-11 Pin Code Screen

2. Press ▲ twice to enter “1” in the 1st space.
3. Press OK.
4. Press ▼ twice to enter “8” in the 2nd space.
5. Press OK.
6. Press ▼ twice to enter “8” in the 3rd space.
7. Press OK.
8. Press ▼ once to enter “9” in the 4th space.
9. Press OK twice.
10. The Machine Settings Menu will appear.

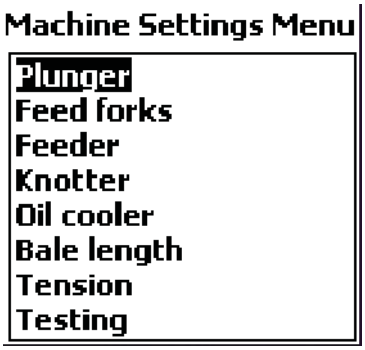


Figure 2-12 Pin Code Screen

OK 5. FUNCTION SELECT FOR MANUAL OPERATION

Function:
Selects the system for manual control from ▲▼ (Feed Fork, Feeder, Plunger, and Knotter).

Adjustment Procedure:
Used to manually operate the Feed Fork, Feeder, Plunger, and Knotter.

Steps

1. Press OK to select the system to manually control (Feed Fork, Feed, Plunger, Knotter). Selected system will be displayed at the top of the display.

   NOTE: If the Knotter is selected, a message screen will be displayed to remind the operator that the Plunger should be fully extended before operating the needles (F2 acknowledges the message). The Plunger can be selected and manually controlled using this same command.

2. Use ▲▼ to control the system.

6. CONTROL SYSTEM VOLTAGE DISPLAY

Function:
Displays the current system voltage for one of the system control modules. The voltage should be above 11.5 volts, and is usually between 12 to 14 volts.

7. SYSTEM DATE

Function:
Displays the current date.

8. LOW OIL INDICATOR

Function:
Indicator will be illuminated when the oil level in the hydraulic reservoir has dropped below the oil level switch. When the oil level is below the level switch the baler will stop baling after the current bale cycle. See manual 89-015 Operating Troubleshooting section page 23-1 for more information regarding the warning screen.

9. BATTERY LOW VOLTAGE INDICATOR

Function:
Indicator will be illuminated when the system voltage has dropped below 11.5 volts and the charging system should be inspected. If the voltage continues to drop below 9.5 volts, a pop-up message window will be displayed. See the Operating Troubleshooting section for more information regarding the warning screen.

10. OIL OVER TEMPERATURE INDICATOR

Function:
This is a fixed setting temperature switch set at 220° F (104° C). The indicator will be illuminated above this temperature setting, and operation of the baler will be stopped after the current bale cycle. See the Operating Troubleshooting section for more information regarding the warning screen.

11. OIL TEMPERATURE INDICATOR

Function:
Displays the current temperature of the hydraulic system measured at the hydraulic reservoir.

12. SYSTEM TIME

Function:
Displays the current time.

13. OIL OVER TEMPERATURE INDICATOR

Function:
Will be illuminated when the temperature is above the Overheat Temp setting (see page 10-1) specified by the control system. When the temperature is over the setting, the baler will stop baling after the current bale cycle. See the Operating Troubleshooting section for more information regarding the warning screen.

14. NEEDLE HOME INDICATOR

Function:
This indicator will turn red when the Needle Yoke is in the home position near the bottom of its travel. This indicator will not be red when the Needle Yoke is away from the home position.

15. KNOTTER HOME INDICATOR

Function:
This indicator will turn red when the knotter has rotated to the home position (12:00) and the stop pad has activated the sensor. The indicator will not be lighted when the knotter is away from the home position.

16. KNOTTER POSITION INDICATOR

Function:
This indicates the relative position of the knotter. The home position of the knotter is with the black portion of the indicator pointing up at 12:00. As shown, the knotter is in the home position.


Returns to the Bale Screen


Return to the Main screen

FRONT PANEL

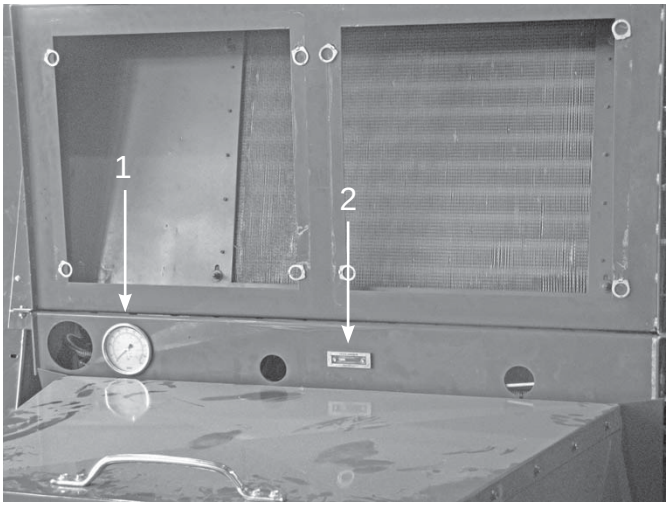


Figure 2-13 Front Panel

1. Plunger Pressure

2. Hydraulic Fluid Filter Condition Indicator

   Change filters when the yellow indicator reaches the red area on the indicator (when oil 170° F or above).

HYDRAULIC OIL RESERVOIR LEVEL DETECTOR

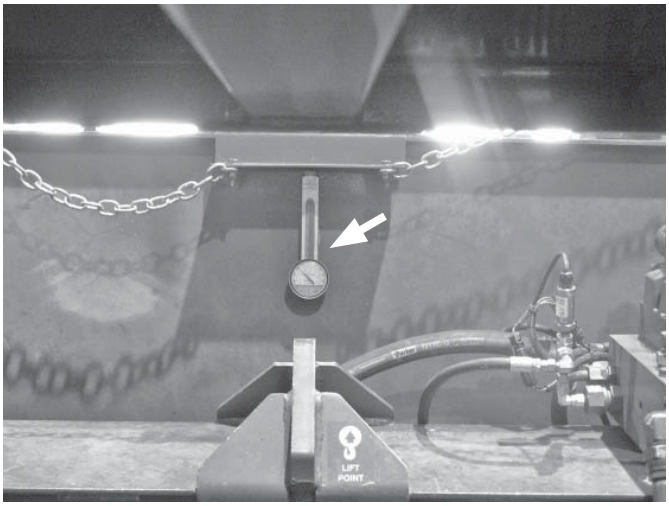


Figure 2-14 Oil Level and Temperature Gauge

The oil level gauge is located on the back side of the oil reservoir. Check oil level daily.

REMOTE VIEW CAMERA

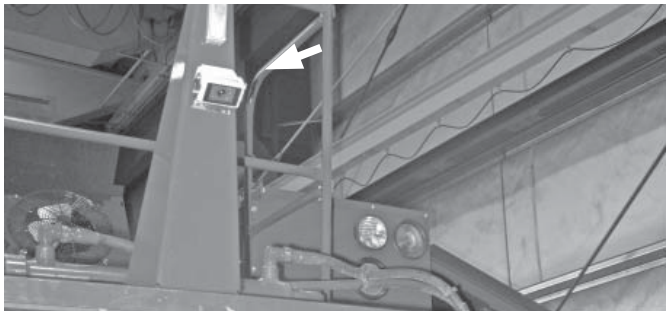


Figure 2-15 Remote View Camera

The Remote View Camera (RVC) provides a clear view of the bale chute area via the Remote View Monitor. The mounting angle is adjusted for viewing each tied bale as it exits the baling chamber. While the work lights are in use, a camera light above the RVC provides additional illumination to improve bale chute area monitoring. If obscured, maintain the camera lense clarity by wiping with a clean, soft towel or optical wipe.

Use the Remote View Monitor to spot mis-ties as bales leave the baling chamber. When mis-ties occur, check knotter settings in Maintenance and Adjustment Settings starting on page 5-1.

OPERATING BALER

HOW THE BALER WORKS

Pickup

1. Windrowed crop is picked up by pickup tines and moved into the throat of the feed chute.

2. As material enters the feed chute, the continuously rotating feeder pushes crop further into the feed chute for accumulation.

Compression

3. Feed fork carries the accumulated material up feed chute and into bale chamber.

4. When an adequate amount of crop has entered bale chamber, the feed fork stops and holds the material up in chamber, while plunger begins to extend and compress the crop.

5. As the plunger is applying pressure to the end of the forming bale, the density system is applying pressure to top and sides of the bale through four hydraulic cylinders.

6. When the preset plunger pressure is reached, the density system reduces the pressure applied to the sides of the bale and the bale is allowed to move.

7. After the plunger fully extends, reverses, and is almost fully retracted, the feed fork loads another batch of material into the bale chamber. This cycle will continue until the preset bale length is reached.

Knotting

8. When the preset bale length is reached, the plunger will extend to compress the bale for the last time.

9. As the plunger begins to retract, the knotting cycle begins. The plunger will stop momentarily to allow the twine needles to extend between the plunger and bale.

10. After the needles are extended, the plunger will finish retracting, and the feed fork will start to load another batch of material into the bale chamber.

11. The twine needles return to their home position, completing the knotting cycle.

12. As the next bale is produced in the bale chamber, the finished bale is pushed further back until it slides off bale chute.

OPERATING THE BALER

To start the baler and begin baling, the toggle switch on the ICM is flipped to the ON position, The Freeman startup screen should initialize.

When power is applied, the ICM checks component locations, the temperature, and level of the hydraulic oil. On the tractor mounted control box, the display flashes its start up menu showing your dealer's name. The baling screen will then appear.

Two components must be in the home position before the baling process can begin; the plunger and knotter. If power is applied and the plunger is away from the home position, the plunger will automatically retract to the retracted stop position as long as the Plunger Drift Compensation is activated. See the Operating System Manual 89-015 for additional information .

If the knotter or needle yoke are not in the home position (see Figure 5-2 page 5-2) when the ICM is turned on, then the plunger will not extend when the full chamber sensor paddles are activated. However the machine will be able to run in automatic mode until a message popup appears explaining that the needles and or the knotter are not in the home position and the machine will exit out of the Automatic Mode. There are two approaches that can be taken to remedy this situation. Which approach you take will depend on why the needle and knotter did not return to home position. Below are 2 suggested actions. For additional options please refer to the Baler Operating Systems Manual under the knotter trouble shooting section:

1. If the needles have not yet reached Top Dead Center (TDC) and the knotter has not yet tied a knot, the knotter can be run slowly in reverse while in the Functions screen until returned to the home position. With the PTO at half speed, slowly jog the needles until they are at the home. When the needles are in the home position, the Needle Yoke Drive Rod should make a straight line along its length that intersects with the center of the Needle Yoke Drive Sprocket.

2. If the needles have already reached TDC and the knotter has already begun to tie a knot, then the needles and knotter should be run at full speed to completely and adequately tie the knot. First, enter the Knotter menu under “Machine Settings Menu” from the Functions screen. Then bring the PTO up to 1000 RPM. Make sure no one is near the machine. Press F2 “Cycle Knotter Once”. This will automatically engage the needles and allow them to complete the tying sequence and bring the needles home.

OPERATING BALER

At this point the needles should be in the home position.

The Baler should be allowed to warm up before actual baling. During this warm up period, operate the PTO at approximately 500 RPM. Hydraulic oil temperature must be at a minimum of 32° F (0° C.) before baling.

To begin baling, increase PTO speed to 1000 RPM. Move baler over windrow and press F4 to start the feed system and proceed forward. Ideal ground speed should provide the baler enough material to activate the plunger with every cycle of the second feeder, or about 21 times per minute. Rough ground conditions that limit the travel speed, or uneven windrows, will have little effect on bale quality because the 1592D Plunger is activated only when the chamber is full.

Excessive ground speed and windrow volume may cause the feed system to stall, plugging feed system. There are two methods for solving this issue. Machines equipped with the automatic unplugging feature will allow you time to back up your machine. It will drive the first feed forward and then reverse in an attempt to unplug the system. If the automatic unplugging feature is not successful, it can be manually unplugged by using the forward and reverse features of the first feeder. A plugged feed chute and chamber will require manually operating the plunger. Refer to the Manual Control section of this book for instructions for manual operation. After unplugging the baler, select a ground speed to prevent further overfeeding.

The 1592D will be most efficient when operating at peak capacity. Greatest bale density is obtained by providing many small feeds to each bale. Peak production capacity of the baler will not necessarily be achieved by producing bales of highest obtainable density. For information pertaining to feed rates, density control, and bale length refer to sections of this book covering feed sensor adjustment, density adjustment and bale length adjustment.

PREPARING FOR FIELD

NOTICE

Inspect the field for any objects (stones, limbs, etc.) that could damage the baler, or interfere with its proper operation.

1. Load and route twine (see page 1-8 for more information).

2. Check Lubrication and Service schedule (see page 6-1).

3. Adjust pickup height:

Operated by the auxiliary hydraulic control lever on the tractor.

4. Set bale length:

Please refer to Baler Operating System Manual 89-015 for more information.

To Adjust:

Push F3 and use △/▽ and OK from AUTO FUNCTIONS screen on the ICM.

5. Set Tension to 300 lbs initially then raise as needed.

To Adjust:

From the Bale screen, press F3 and use UP/DOWN arrows to adjust and OK to set (see page2-5).

STARTUP PROCEDURE

1. Read entire manual before operating the Freeman 1592D baler.

2. Ensure twine needles are in their home position (refer to Position Twine Needles in Maintenance and Adjustments section for instructions).

2. Start tractor and run at low RPM.

3. Engage PTO and increase its speed to 500 to 700 rpm. Run baler without baling until the hydraulic fluid temperature is at least 32° F (O° C).

4. Toggle the ICM switch to ON (the ICM will briefly run system checks before the baling screen will display. The ICM may find a startup error and prompt you to fix the error. Follow the on screen instructions.)

NOTE: See Baler Operating System Manual 89-015 for more information.

5. The Baling screen displays and you are ready to bale (see Figure 2-2 page 2-3)

6. Choose desired plunger pressure for baling by pressing F3 from the Bale screen. Use UP/DOWN/OK buttons to adjust.

7. Press "GO" (F4) on the ICM and proceed baling.

SHUT DOWN PROCEDURE

1. Disengage power-take-off (PTO).

2. Set tractor park brake.

3. Toggle POWER switch to OFF on Baler Control Box.

4. Shut off tractor engine and remove key.

⚠ DANGER

Baler components can move if the flywheel is still turning causing death or serious injury. Flywheel coast down time can be up to 1 minute if shutdown at idle PTO speed, or 1-1/2 minutes if shutdown at 1000 PTO rpm. Wait for flywheel to stop before working on or near the baler.

5. Wait for baler flywheel and all moving parts to stop.

TYING OF BALE

⚠ WARNING

Twine needles and needle yoke move suddenly during knotting cycle and can cause death or serious injury if contacted.

KNOTTING CYCLE - FIRST BALE IN CHAMBER

The first bale tends to be loose and unusable, since there is not enough resistance to increase density. This bale is left untied and will fall off the bale chute in small pieces (to be baled up later) as the second bale is formed.

NOTE: The twines must be properly installed and tied together before initializing (refer to Install Twine in "Preparing the Equipment" section).

OPERATING BALER

1. When the preset bale length is reached, the knotting cycle begins and bale is tied with six twines.

2. Check the Remote View Monitor and look for any mis-ties on the bale being ejected.

NOTE: If any mis-ties, follow instructions on page 1-11 (see Figures 1-35 and 1-36).

⚠ DANGER

Shut off tractor engine and wait for all movement to stop before adjusting, lubricating, cleaning or servicing the baler.

3. Resume baling.

PICKUP HEIGHT

Pickup Lift : Operated by the auxiliary hydraulic control lever on the tractor.

Adjust pickup teeth to be as high as possible above ground - normally 1 " (25.4 mm) - without leaving any crop.

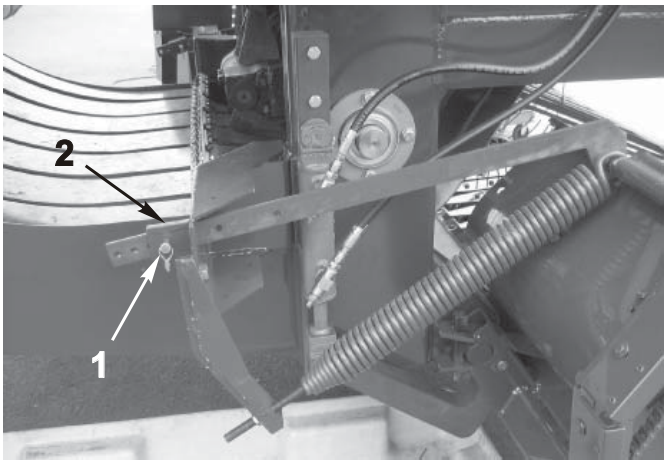


Figure 3-1 Pickup Height

To adjust.

I . Raise pickup using Pickup Lift lever in tractor.

2. Remove locking pin (1).

3. Slide stop block (2) along bar to desired hole; insert locking pin.

- Move toward pickup to increase pickup height; move away to decrease.
- Stop block can be turned end-for-end for small adjustments.

4. Lower pickup before resuming operation.

BALE DENSITY

Plunger pressure indicated by the plunger pressure gauge is relative to bale density. Most baling operations require plunger pressure in the 3,800 to 4,500 PSI range. Maximum baling pressure is 6500 psi. Type and condition of crop may need pressure adjustments to get the desired density.

The density pressure unloader valve located on the right rear of the machine, (see Figure 3-3), is adjustable from the ICM (see Baler Operating System Manual 89-015). Observe changes in plunger pressure after each adjustment of the unloader valve. Several plunger strokes may be necessary to normalize the pressure setting.

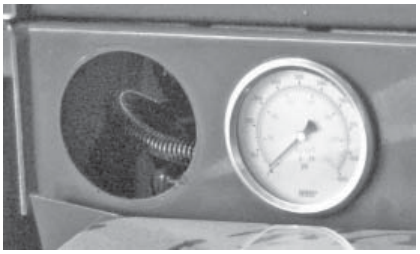


Figure 3-2 Plunger Pressure Gauge

NOTE: Actual pressure is displayed when the plunger is almost at full extension.

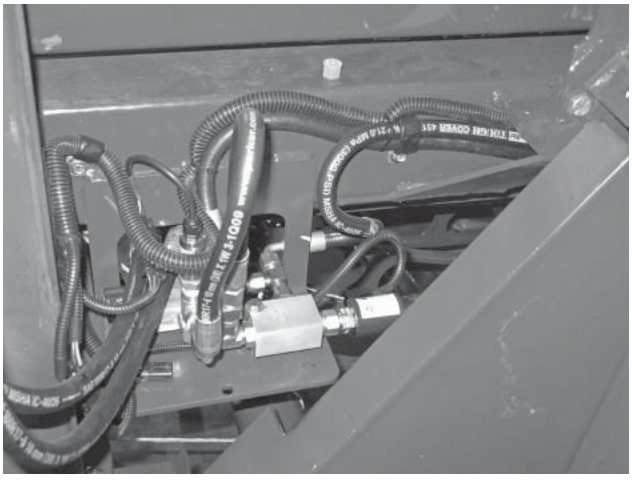


Figure 3-3 Unloader Valve

BALE LENGTH

The bale length adjustment sensor is located on the left rear side near the service ladder. Bale length is measured by a potentiometer driven by the star wheel shaft. The IQAN system stores the potentiometer reading at the start of a bale and calculates the number of revolutions and position required to tie off another bale. With this system, bale length can be adjusted from the cab at any time as well as calibration of the sensor.

UNPLUGGING THE BALER

⚠ DANGER

Baler intake can pull you in, causing death or serious injury. Stay clear of pickup reel and feed intake area. Baler can take in crop faster than you can let go.

- NEVER feed crop in by hand.
- NEVER remove any material from baler intake while it is running.
- NEVER attempt to unplug baler by hand while it is running. Use the reversing feature to unplug.
- ALWAYS disengage power take-off, shut off tractor engine, set park brake, remove key, and wait for flywheel to stop before unplugging by hand or servicing.

UNPLUG FEEDER

Plugging the feeder is typically caused by over-feeding material into it. Reduce ground speed as necessary to prevent plugging. Please refer to Baler Operating System Manual 89-015 for more information.

NOTICE

Do not reverse feeder with pickup raised in highest transport position.

TO UNPLUG:

1. Make sure everyone is clear of machine.

2. Check Feed Fork / Feed Chute to make sure it isn't plugged. A plugged Feeder Fork and Feed Chute can cause the Feeder to Plug

3. Press OK button until Feeder is displayed on In-Cab Monitor screen and press Down Arrow button to reverse Feeder. There will be slight delay before feed fork starts to move.

4. If feeder continues to stall, repeat steps 1 - 3 as necessary to remove plug.

UNPLUG FEED FORK / FEED CHUTE

⚠ DANGER

Never attempt to unplug the baler by hand while the baler is running. Contact with moving parts can cause death or serious injury. ALWAYS disengage power take-off, shut off tractor engine, set park brake, remove key, and wait for flywheel to stop before unplugging by hand.

Plugging the feed chute and stalling the feed fork is typically caused by over-feeding material into it. Reduce ground speed as necessary to prevent plugging.

TO UNPLUG:

NOTICE

The plunger can not be extended if the twine needles are protruding into chamber. This can cause damage to baler. If needles are protruding into chamber, refer to Position Twine Needles in “Maintenance and Adjustments” section for directions to retract them.

1. Make sure everyone is clear of machine.

2. Press OK button until feed fork is displayed on In-Cab Monitor screen and press Down Arrow button until feeder area is unplugged.

3. If feed fork continues to stall, repeat steps 1 - 2 as necessary to remove plug.

EMPTYING THE BALE CHAMBER

⚠ DANGER

Never attempt to unplug the baler by hand while the baler is running. Contact with moving parts can cause death or serious injury.

NOTE: Any length bale can be made when emptying the bale chamber. However, it is easier to remove a small bale rather than a large one.

1. Press Tie Knot NOW (F2) button from AUTO FUNCTIONS screen on In-Cab Monitor to tie current bale in chamber.

NOTE: See Baler Operating System Manual 89-015 for more information.

2. Once Tie Knot NOW function is complete, open tension rails fully by pressing Open Rails (F4) button from the FUNCTIONS screen on ICM.

3. Turn OFF power to tractor and baler, follow Shut Down procedure on page 3-3.

⚠ WARNING

Bale chute can be slippery and cause injury if you fall. Use caution when mounting, dismounting, and working up on chute to remove a bale.

4. Remove material from chamber.

DOUBLE KNOTTING PROCESS

The double knotter process is very similar to the standard knotter process. The main distinction, of course, is that two knots are tied instead of one during each cycle. It is important to remember that the knotter shaft and needles still only perform one complete cycle. The key difference is in the cam gears, which have gear teeth and cam lobes for operating the twine disc, bill hook, and knife arms twice per knotter revolution. One knot is tied while the needle is near the top of the stroke, the second knot is tied while the needle is on the downward part of the stroke.

Before the knotters can tie, the top and bottom twines must be tied together. During normal baling, this happens on the previous tie cycle. If the baler is starting empty, the twines must be tied together by the operator before starting to bale. During baling the twines, which are tied together, are fed out along the bale.

The top twine feeds from the top twine box, through a series of guides, to the tensioner. From the tensioner, the twine goes to another guide, up around the top slack puller roller (see Figure 4-1), down around the twine tucker roller, and lays along the top of the bale. The top twine runs rearward along the top of the bale until the point where it has been tied to the bottom twine at the top rear edge of the bale. During baling, the top slack puller is held down firmly by the top twine passing through it under tension from the tensioner.

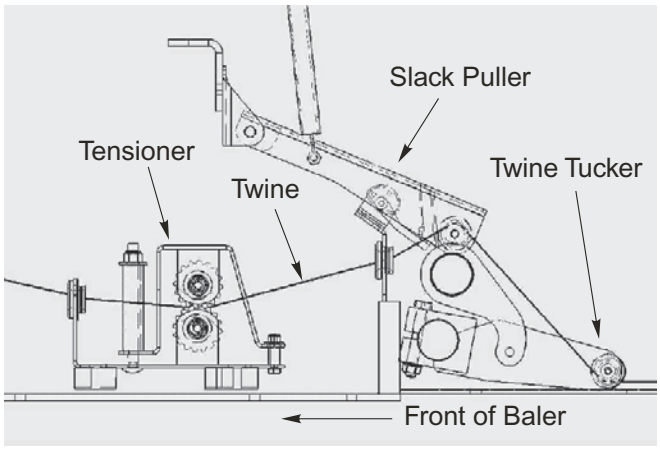


Figure 4-1 Slack Puller to Twine Tucker

The bottom twine feeds from the front twine side twine boxes at the front of the baler, through a series of eyes to the tensioner. From the tensioner, the twine goes around the roller in the slack puller and up between the rollers in the needle tip (see Figure 4-2). From the needle, the twine continues rearward along the bottom of the bale. At the end of the bale the bottom twine runs up between the bales to the top corner where it has been tied to the top twine.

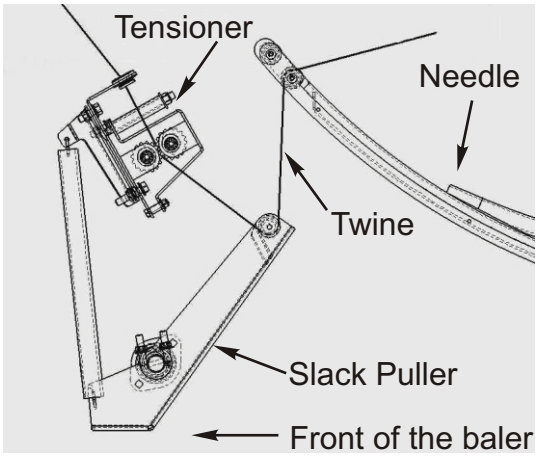


Figure 4-2 Slack Puller to Twine Needle

During bale formation, the twine finger is across the needle slot, the knife arm is at full extension, and the twine tucker is low (see Figure 4-3) in order to pass the twine under the finger.

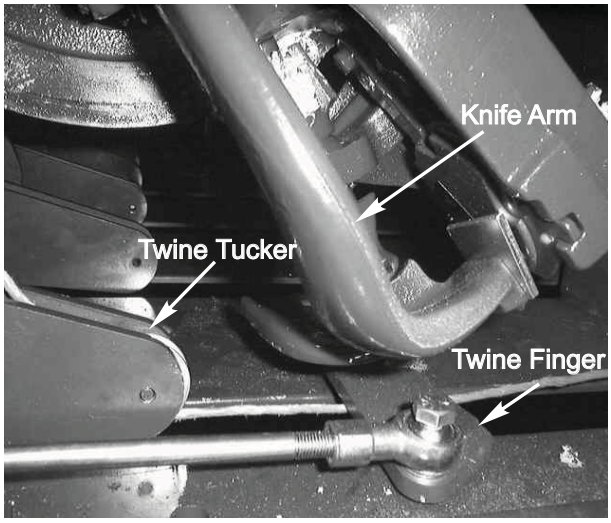


Figure 4-3 Twine Tucker in Low Position

As with a standard knotter, the tie cycle starts when the bale has reached a predetermined length. When the bale length trip bar activates the knotter motors, the shaft starts to turn and the needles begin to move up into the chamber. As the needles move, they carry the bottom twine up around the front end of the bale. When the needles approach the chamber top plate, the twine finger retracts across the slot to be ready to grab the twine from the needle. Also, the twine tucker rises out of the needle's path.

DOUBLE KNOTTING PROCESS

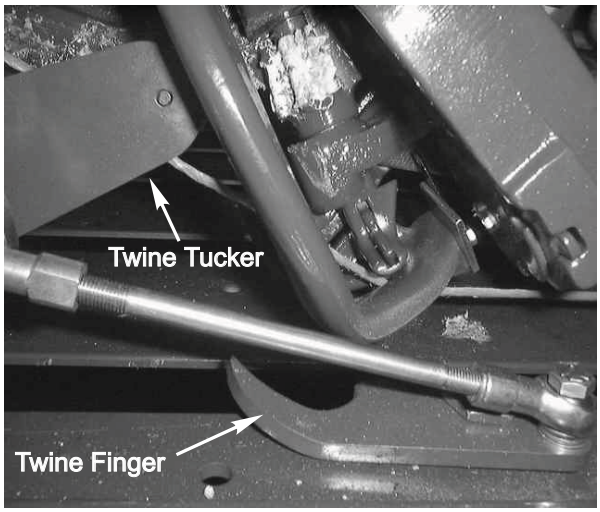


Figure 4-4 Twine Tucker Rises

As the needle comes through the top plate, it catches the top twine from the tucker in the top needle roller. At the same time, the twine finger grabs the twine, which the needle brought up, and moves it into position in the V of the knife arm. The top twine is also laid into the knife arm V as the needle carries it upward.

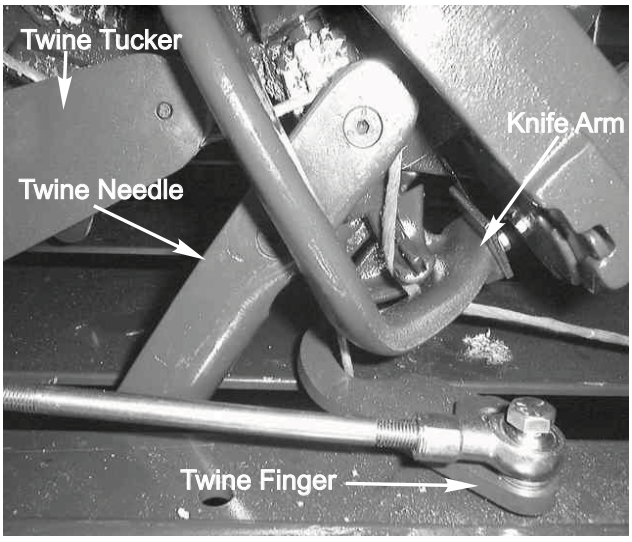


Figure 4-5 Knife Arm V

The needle continues upward, where it lays the twines across the bill hook and into a notch in the twine disc.

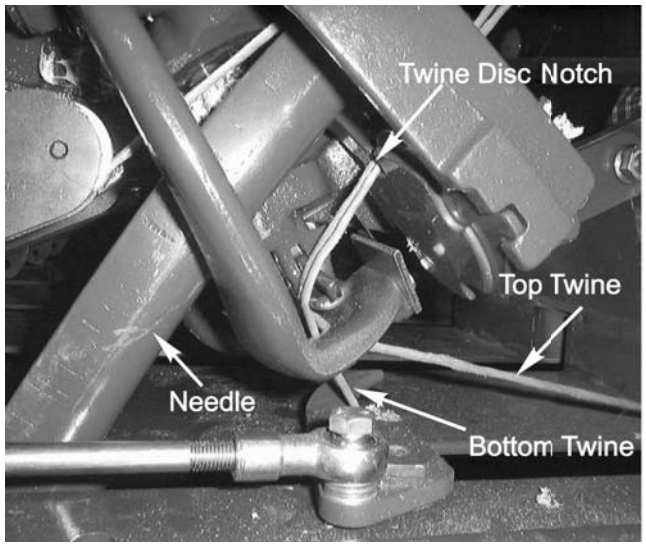


Figure 4-6 Twine in Twine Disk Notch

When the needle is at the top of its travel, the twine disc starts to rotate, gripping the two twines in the twine disc notch.

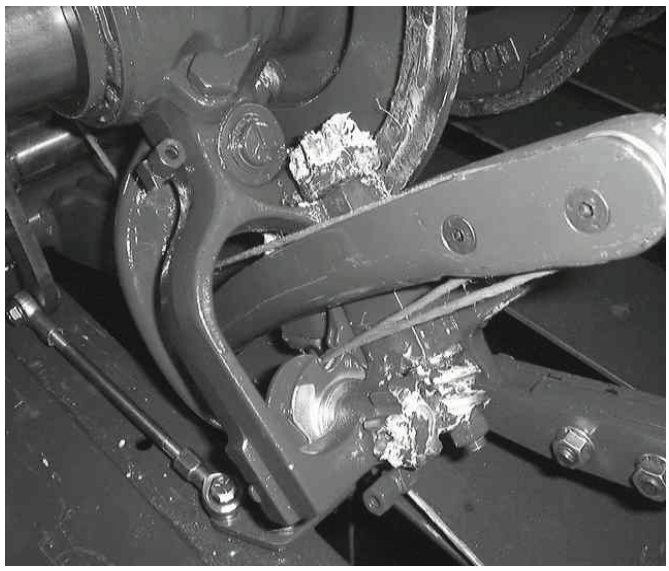


Figure 4-7 Twine Disk Gripping Top & Bottom Twines

As the needle starts down, the bill hook begins to rotate. It is important at this moment that the twines have been positioned properly on the bill hook by the twine finger and knife arm.

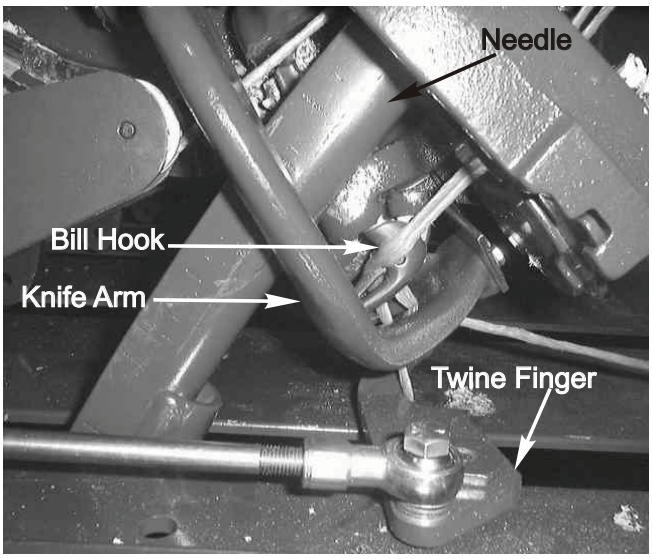


Figure 4-8 Twine on Bill Hook

When the bill hook has gone about a half revolution, the trigger opens in order to grab the twines coming from the twine disc, which has rotated about 90°.

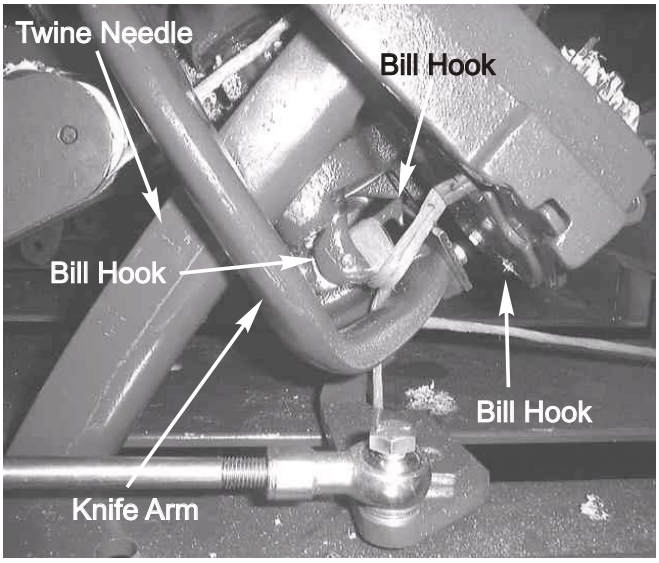


Figure 4-9 End of First Knot

When the trigger closes over the twines (see Figure 4-10), the knife arm sweeps across, cutting the twines between the bill hook and the twine disc while wiping the finished knot from the bill hook. This is the end of the “first knot” tied. Meanwhile, the needle has retracted (see Figure 4-11) from the knotter leaving the top and bottom twines in the next notch of the twine disc. Remember that the first knot is actually the knot that finishes the bale just formed. The next knot (second knot) starts the formation of the next bale.

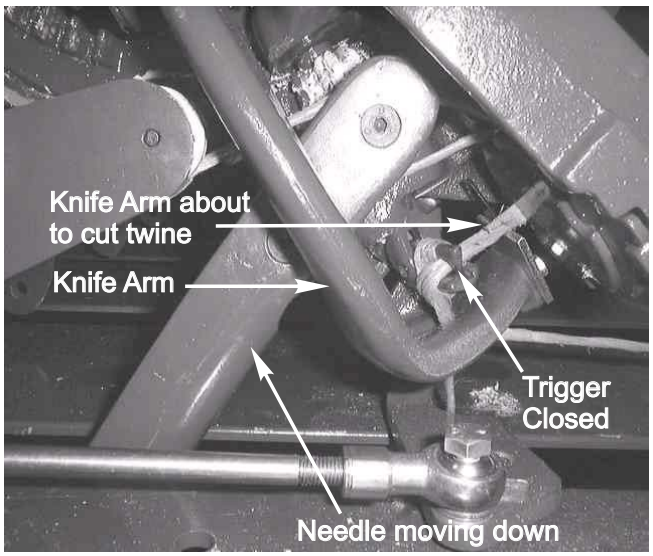


Figure 4-10 Twine Needle Yoke in Home Position

While the knife arm strips the first knot, the twine finger retracts again and the needle drops below the chamber top. Now both top and bottom twines are held together in the twine disc. Once the needle is out of the way the twine tucker drops the top twine below the chamber top plate where the twine finger will be able to grab it.

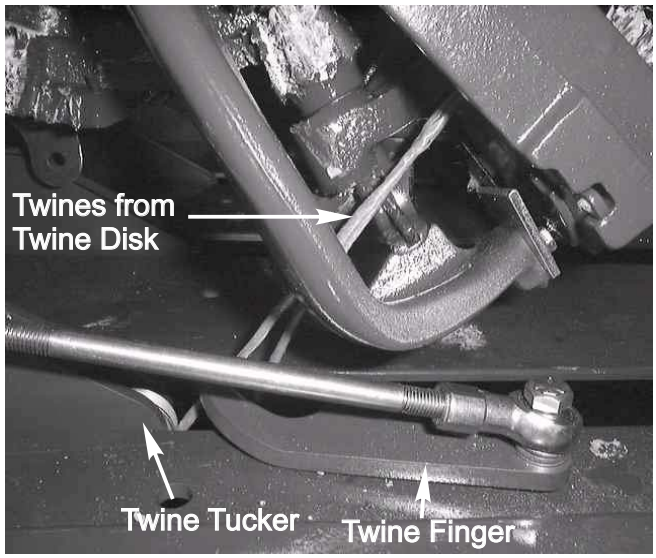


Figure 4-11 Twine Needle Yoke in Home Position

This is where the slack pullers do their job. If the twines are not held tight as the needle leaves the knotter, a loop of twine could get around the bill hook or let the twine slip out of the notch in the twine disc.

When the needle drops, the top slack puller works to keep the twine snug by raising.

DOUBLE KNOTTING PROCESS

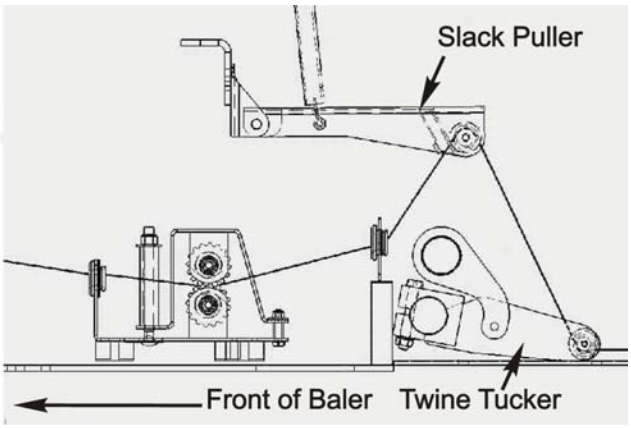


Figure 4-12 Knot Sensor

The twine finger grabs both the top twine (from the tucker) and the bottom twine (from the needle) and moves them both into position in the knife arm V. This lays the twines neatly over the bill hook as they continue up to where they are still held by the twine disc.

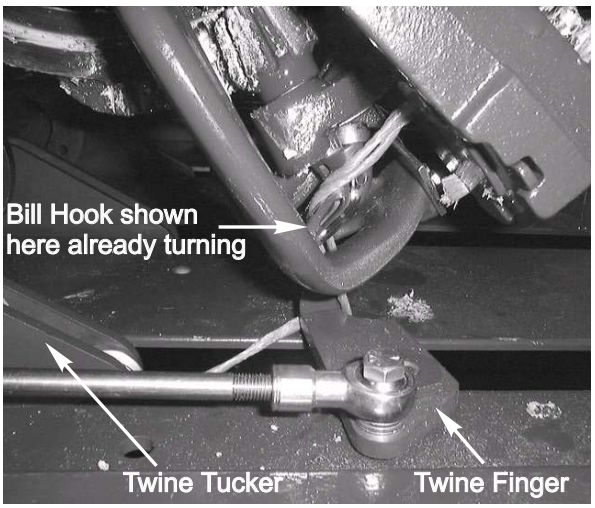


Figure 4-13 - Bill Hook Turning

When the twines are laid in position, the twine disc starts to rotate again, as does the bill hook. As before, when the bill hook has rotated about half way the trigger opens in order to grab the twines coming from the twine disc notch which has now rotated clockwise about 90° (see Figure 4-13).

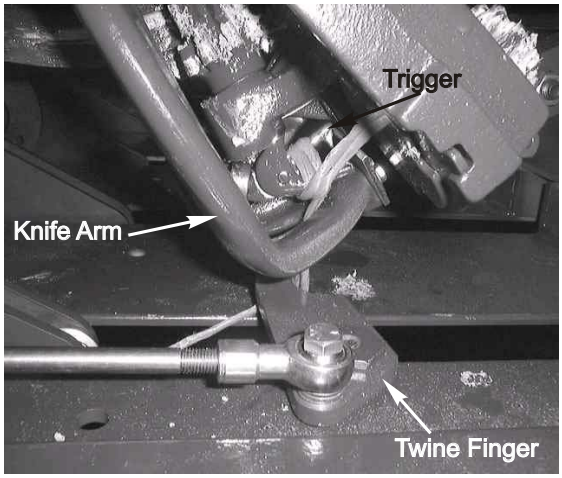


Figure 4-14 End of Second Knot

This is the end of the “second knot.” The top and bottom twines are now tied together, ready to be fed out as the next bale forms. As the bale is formed, the twine is pulled tight from the slack pullers.

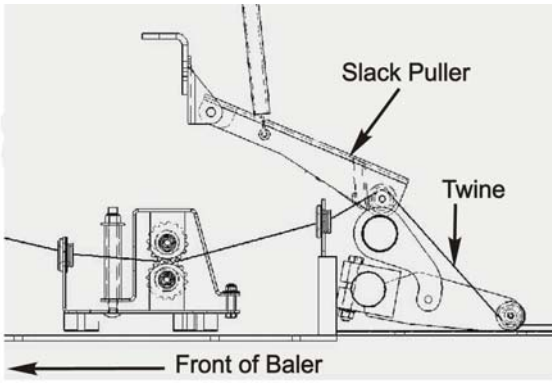


Figure 4-15 Twine Needle Yoke in Home Position

NOTE: It is normal for the tails of the second knot to be held by the trigger for one or two plunger strokes. Do not mistake this for the knot hanging on the bill hook.

Figure 4-16 Twine Needle Yoke in Home Position

MAINTENANCE AND ADJUSTMENTS

⚠ DANGER

Shut off tractor engine before adjusting, lubricating, cleaning or servicing the baler.

⚠ CAUTION

Many of the procedures outlined below require the use of the In-Cab Monitor (ICM) near the baler. The ICM will allow the operator to position machine components such that they may be inspected or adjusted. Do not operate the machine with the In-Cab Monitor unless you are familiar with its use. Always run the machine at the lowest possible PTO speed when using the ICM during maintenance checks on the baler. Stay well clear and keep others clear of all moving parts while using the ICM. Once the machine is in the desired position, turn off the machine and disengage the PTO before performing any work.

NOTICE

Keep ICM cables intact on baler. Removing them may cause damage to the cables. Use the extra cable that is equipped with the baler when using the ICM around the baler.

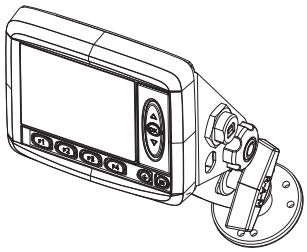


Figure 5-1 In-Cab Monitor (ICM)

IMPORTANT! Before running the knotter using the ICM, always fully extend the plunger and hold for one full second. Leave the plunger in the extended position in order to hold the material out of the needle path while the knotter shaft turns.

⚠ WARNING

Knotters can cause serious hand injuries. Keep hands clear during operation.

⚠ WARNING

Falling from the baler can cause serious injury. Stay off if it is not level or if its surface is slippery. When on top, stay in designated walking area.

⚠ DANGER

Wait for all movement to stop before servicing baler.

KNOTTER COMPONENTS:

Please refer to your 1592D parts book for illustrations of knotter parts.

Needle: Although typically not considered to be a knotter component, the needle is necessary, since it presents the twine to the knotter. As the needle comes through the knotter, it lays the twine across the bill hook and into a notch in the twine disc. The needles operate one cycle per bale.

Knotter Frame: The knotter frame has no function related to knot tying. The frame simply provides a means of locating all the knotter components properly and mounting them to the baler.

Cam Gear: Sometimes called the main gear, the cam gear drives all the components located in the knotter frame. The cam gear is driven by a key in the knotter shaft and makes one complete revolution for each bale tied. The cam gear has a cam track for operating the knife arm, a set of gear teeth for operating the bill hook, and a set of gear teeth for operating the twine disc.

Twine Disc: The twine disc controls the twine delivered by the needle and positions it for the bill hook. The twine disc has four notches and makes a quarter turn each time a knot is tied. The twine disc is driven by the worm shaft, which is in turn driven by the cam gear. At rest, the twine disc must be positioned such that one of the notches is pointing up.

Twine Holder: The twine holder holds pressure on the twine while it is controlled by the twine disc. The twine holder curves around such that as the twine disc rotates, there is always at least one twine disc notch covered by the holder.

Twine Holder Spring: The twine holder springs apply force to the twine holder. The springs are attached to the knotter frame by a single bolt which is loosened or tightened to vary the amount of holding force on the twine.

Twine Disc Cleaner: The cleaner sits in the groove between twine disc plates and removes debris from the disc as it rotates.

Bill Hook and Trigger: The bill hook and trigger together perform the most complicated function of the knotter group. This component is what actually ties the twine into a knot. The bill hook is driven by the cam gear and makes one complete revolution each time a knot is tied. The trigger action is controlled by the roller which runs on a cam surface of the knotter frame as the bill hook rotates. At the end of rotation, the bill hook cam closes the trigger.

Bill Hook Cam and Spring: The bill hook cam applies force to the trigger. The amount of force applied is adjusted by tightening or loosening the nut which holds the spring in place. The force between the cam and the trigger determines how tightly the trigger clamps down on the twine at the very end of the bill hook rotation.

Knife Arm: The knife arm performs more separate functions than any other single knotter component. The knife arm is driven by the cam gear and completes one extend and retract cycle each time a knot is tied. The most obvious function of the knife arm is carrying the knife which cuts the twine after the bill hook has completed its rotation. The next most important thing the knife arm does is strip the knot off the bill hook at the end of the tie cycle. For this reason the knife arm is sometimes called a stripper arm. Finally, the knife arm guides the twine and prevents it from falling off the tip of the bill hook. This happens both as the needle enters the knotter (when the twine finger presses the twine against the bill hook) and as the needle leaves the knotter (when the twine held in the holder is laid over the bill hook).

Twine Finger: The twine finger delivers the twine to the bill hook. Twine fingers are driven by a cam on the knotter shaft and complete one extend and retract cycle each time a knot is tied. As the needle comes through the top of the chamber the twine finger hooks the twine and holds it where the bill hook will wrap it up as the bill hook rotates.

Twine Tucker: The twine tucker is only used on double knotter style machines. When tying the second knot, the twine tucker “tucks” the twine below the twine finger so the twine finger can hook the twine and deliver it to the bill hook. The twine tucker is driven by a cam on the knotter drive sprocket and operates one complete cycle per bale.

Slack Puller: The slack pullers are only used on double knotter style machines. There are different style slack pullers for the top and bottom twines. Slack pullers are spring activated and operate continuously during baling operation. The main function of the slack puller however, is to keep the twine tight as the needle leaves the knotter while tying the second knot. Without the slack pullers, the twine would lay loosely over the bill hook and would be difficult to wrap into a tight knot.

Twine Tensioner: The twine tensioners produce drag on the twine between the twine storage area and the knotters. On double knotter machines, the tensioners must be tight enough to cause the twine to stretch the slack puller springs.

POSITION TWINE NEEDLES

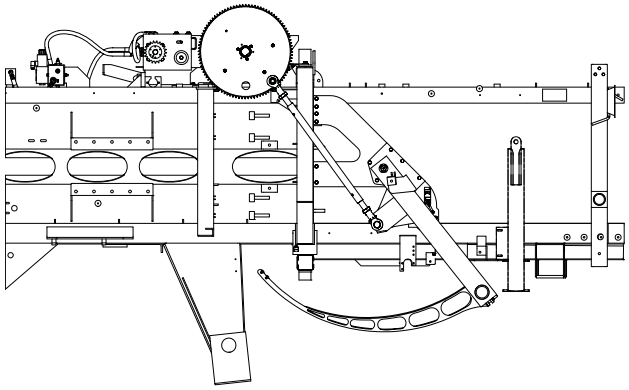


Figure 5-2 Twine Needle Yoke in Home Position

If the twine needle yoke is not in its home position as shown, perform the following:

1. Using the ICM, navigate to the FUNCTIONS screen and press the F4 button. Enter code : 1889 and use the UP/DOWN arrow buttons to navigate to Knotter and press the OK button.

⚠ DANGER

Maintain a safe distance from all moving components when operating the baler with the In-Cab Monitor (ICM) remotely.

2. Press OK button to navigate to Knotter function.

3. Press UP/DOWN arrow buttons to move needle yoke back in home position (see Figure 5-2).

KNOTTER ADJUSTMENTS

TWINE FINGER

The twine fingers have two important adjustable positions; extended and retracted. When extended, the

twine finger must position the twine properly for the bill hook to grab it. If the fingers extend too far however, they could hang up over center. When retracted, the twine finger must clear the needle slot sufficiently to not interfere with the twine from the needle or tucker.

When adjusting the twine fingers, always set the extended position first. This adjustment can be done with the needles in the home position (see Figure 5-2 page 5-2), or with the twine finger cam follower positioned on any of the three high points of the twine finger cam.

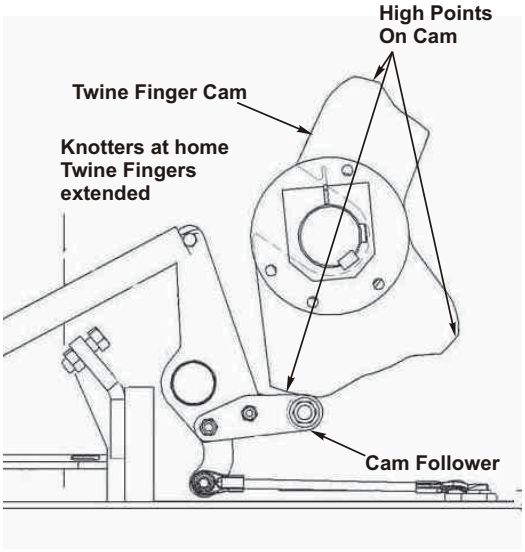


Figure 5-3 Twine Finger Cam

With the twine finger fully extended, adjust the twine finger drive rod such that the flat edge of the finger makes a 90° angle with the edge of the needle slot. Since every twine finger has its own drive rod, each twine finger must be set individually.

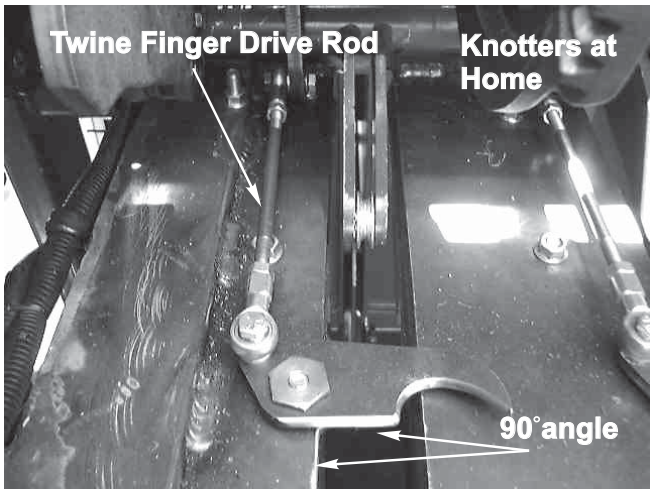


Figure 5-4 Twine Finger Drive Rod

After setting the extended twine finger adjustment, you must check the retracted twine finger adjustment. The retracted twine finger setting can be checked with the follower positioned at either of the two low points on the twine finger cam.

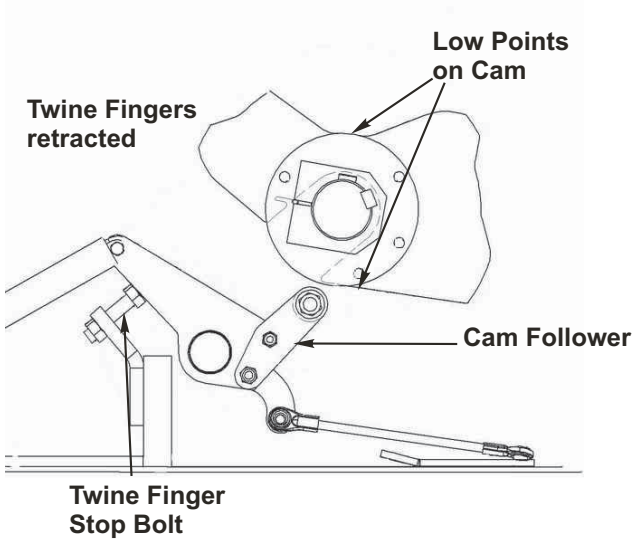


Figure 5-5 Cam Follower

With the cam follower not touching the cam, the twine finger spring lever should contact the twine finger stop bolt. Adjust the stop bolt such that each twine finger has no more than 1/8” of the twine finger tip hanging over the needle slot.

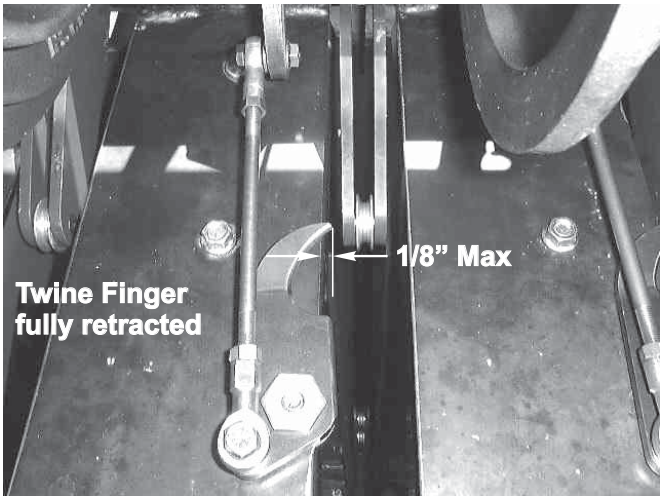


Figure 5-5 Twine Finger 1/8" Past Needle Slot

Since all twine fingers share the same stop bolt, the retracted twine finger position is set for all twine fingers simultaneously.

TWINE FINGER SHEAR BOLT REPLACEMENT

Occasionally an obstruction or mis-adjusted twine finger may cause the twine finger shear bolt to break. This is a feature built into the system in order to protect the twine fingers, cam, and cam follower from being damaged if their normal operation is interfered with.

It is easiest to replace the shear bolt if the knotter is positioned such that the twine fingers would normally be retracted. This way, the operator won't need to counteract the twine finger spring force in order to replace the shear bolt.

Position the knotter as described using the manual controller. Loosen the pivot bolt on the shear lever if necessary and insert the new shear bolt.

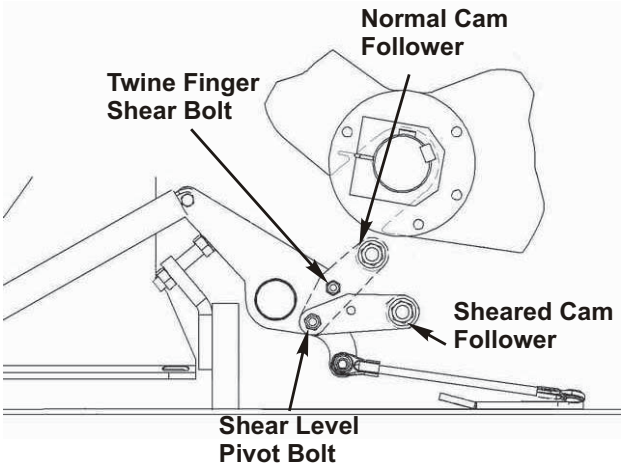


Figure 5-6 Twine Finger Shear Bolt

Torque both the 3/8" pivot bolt and the 5/16" shear bolt to 15 ft. lbs. IMPORTANT: Both the twine finger shear bolt and the shear lever pivot bolt must be fitted with esna style lock nuts. This is because a regular nut would come loose if not fully torqued. If either the pivot bolt or shear bolt is fully torqued (30 ft. lb. and 17 ft. lb. respectively) the bolt clamping load between the shear lever and the drive shaft may be too great to protect the twine fingers from damage.

TWINE NEEDLE ADJUSTMENT

Before checking needle adjustment, be sure the twine finger travel has been adjusted properly.

Use the ICM to run the knotters until the needle tips are through the chamber top and the twine fingers are just passing the needles. The twine fingers should miss the needles by 1/16" to 3/16" (see Figure 5-7). This distance is changed by adjusting the needle at the base. To bring the needle closer to the finger, tighten the upper needle mounting bolts and loosen the lower needle mounting bolts. To move the needle farther from the finger, do the opposite.

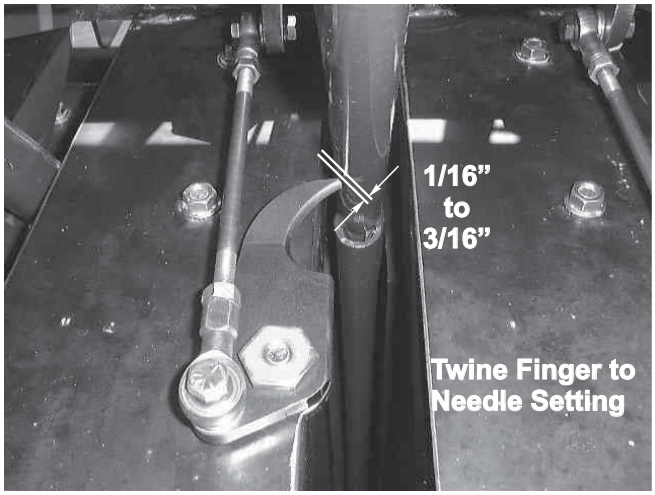


Figure 5-7 Twine Finger to Needle Setting

Run the knotters until the needles are at the very top of their stroke (see Figure 5-8). This is when the needle yoke drive rods are in line with the knotter shaft.

Check to see that the needles are centered in the bottom needle slots. This adjustment is made by loosening the needle mounting bolts at the base and sliding the needles either to the left or right.

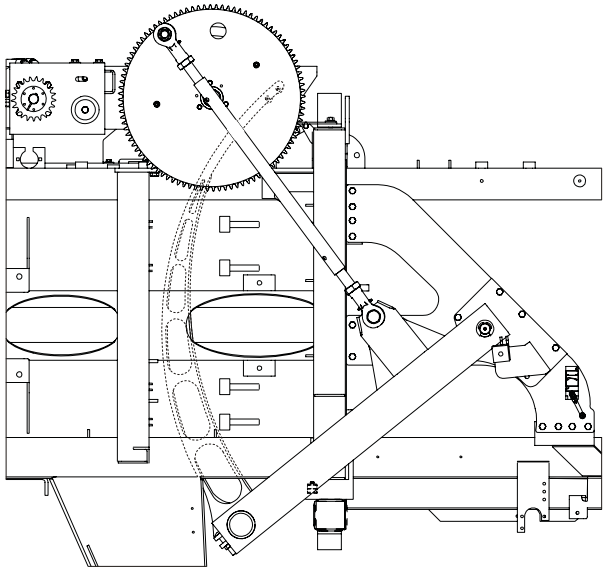


Figure 5-8 Needles at top of stroke

The distance from the twine disc to the center of the lower needle roller should be 6 1/2" (see Figure 5-9). Adjust the needle yoke drive arms longer or shorter to change the amount of needle penetration.

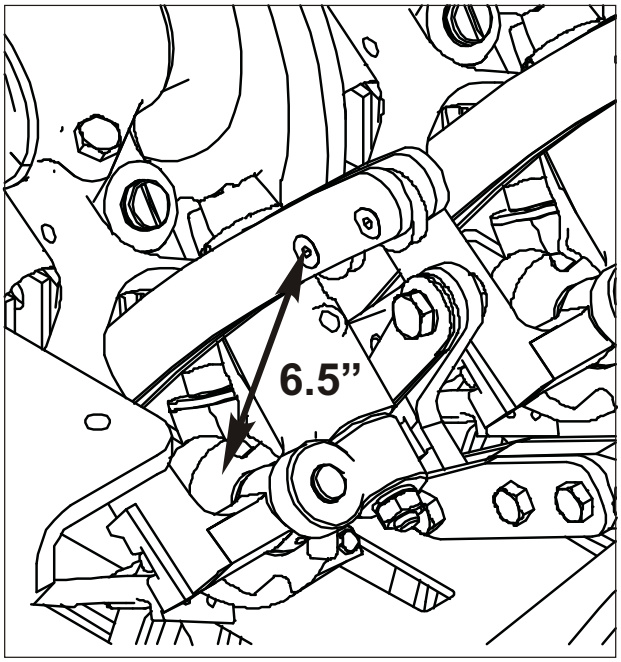


Figure 5-9 Needle Height from Twine Disk to Bottom Screw in Needle

When adjusting the amount of needle penetration, turn both needle yoke drive rods equally. At the very top of the needle stroke, the left and right drive rods should each pull with the same force. Check to see that neither drive rod is bound up.

With the needle in the knotter frame, there should be no more than 1/32" clearance between the frame and the right side of the needle. Light contact is preferred, as long as a force of one or two pounds is all that is necessary to move the needle away.

This contact can be adjusted by bending the needle slightly. Bend the needle to one side or the other by applying firm sideways force to the needle. The knotter should be in the home position. Always apply the force near the needle tip, just below the lower roller. Be careful no to bend the needle so far it will collide with the baler frame.

TWINE TUCKER ALIGNMENT

Be certain the needles are adjusted properly before checking the twine tucker alignment.

Use the ICM to run the knotter until the top needle rollers are in line with the twine tucker rollers.

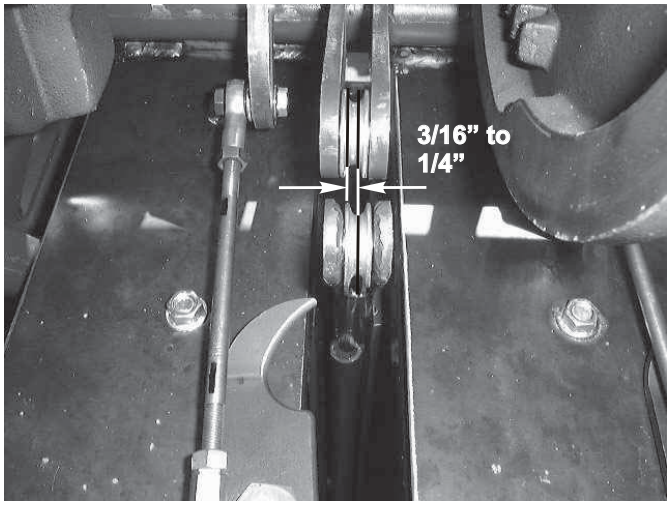


Figure 5-10 Twine Tucker Needle Roller Alignment

Each twine tucker roller should be 3/16" to 1/4" inch to the left of the needle roller. This offset is necessary in order to properly load the top twine into the needle due to the way the twine stretches between the twine tucker and the knife arm “V”.

KNOTTER DRIVE SPROCKET TIMING

The knotters and needle yoke are driven by two hydraulic motors. Each of the motors drive a sprocket mounted on a QD bushing (see Figure 5-14 page 5-6) at each end of the knotter shaft. Slight variations in the manufacture of the shaft keyways, sprockets, and QD bushings may cause the holes in the drive sprockets which operate the needle yoke to be slightly mistimed. Proper needle adjustment requires that the needle yoke drive arms be driven evenly from each end of the knotter shaft. This is only possible if the drive sprockets are in time.

Sprockets that are out of time will pull one side of the needle yoke on the up stroke and the other side of the needle yoke on the down stroke. This will cause the needles to run toward one side of the needle slots on the up stroke and the toward the opposite side of the needle slot on the down stroke.

NOTE: Before checking or adjusting drive sprocket timing, be sure to verify that the Needle Yoke Drive Rod lengths are set correctly (see above).

The drive sprockets will need to be timed any time the sprockets are removed and reinstalled. To check sprocket timing, use the diagnostic controller to run the needles up into the chamber and stop them when the top needle roller is just even with the chamber top as shown.

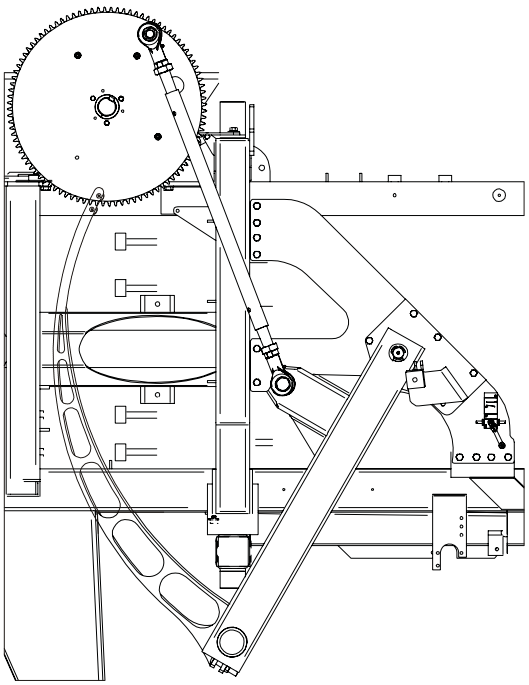


Figure 5-11 Needle on Up Stroke

Measure the distance from the side of the needle to the side of the needle slot.

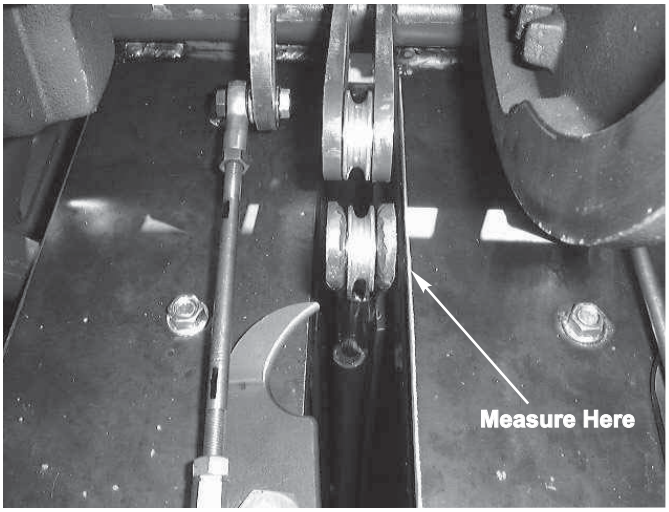


Figure 5-12 - Needle Slot Measurment

Now continue to run the needles up, past top dead center, and down until the top needle roller is again even with the chamber top.

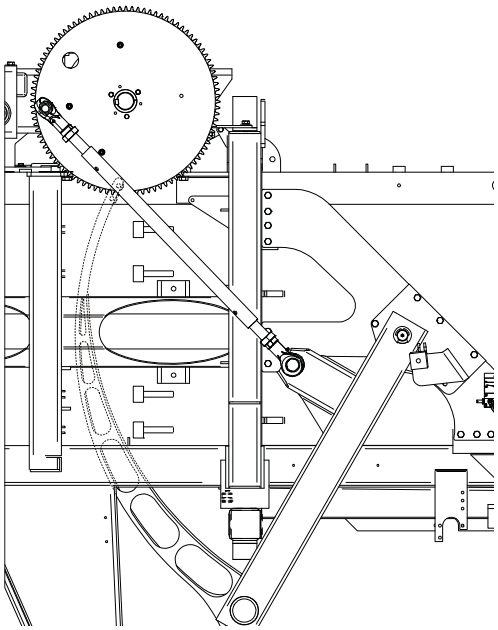


Figure 5-13 Needle on Down Stroke

Measure the distance again from the side of the needle to the side of the needle slot, being sure to use the same needle and slot as before. If the distance is within 1/16" of the first measurement taken, the drive sprockets are timed correctly. If the measurements are more than 1/16" different, the sprockets are out of time and should be corrected.

If the needle is to the left in the slot on the up stroke and to the right in the slot on the down stroke, the left hand sprocket is retarded and should be adjusted. Conversely, if the needle is to the right on the up stroke and to the left on the down stroke the right hand sprocket is retarded and should be adjusted.

To adjust the sprocket, loosen the three bolts which attach the sprocket to the QD bushing.

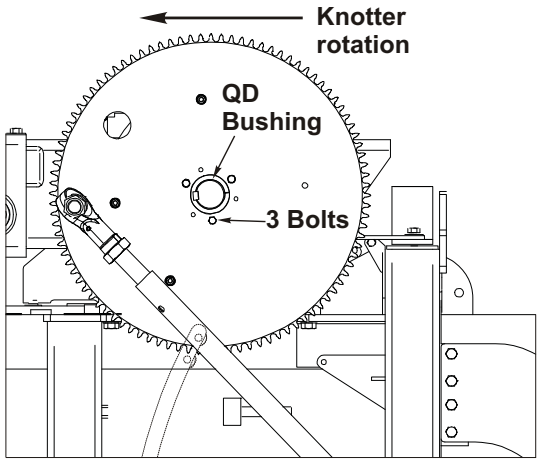


Figure 5-14 QD Bushing

Be careful not to slide the bushing on the shaft once the sprocket has broken loose or it will be necessary to align the sprocket with the motor. To advance the timing of a retarded sprocket, rotate the sprocket on the bushing in the normal direction of rotation (top toward the front). There is very little adjustment available or necessary. Essentially all that is allowed is to take up slop in the bolt holes. After rotating the sprocket, tighten the 3 bolts to 30 lb. ft. and re-check the needle clearance in the needle slots as described earlier. Repeat the process until the drive sprockets are properly timed.

NOTE: The adjustment should always be made to advance the sprocket which is retarded. If it is not possible to advance the retarded sprocket any further, then it is acceptable to do the opposite adjustment (retard) the sprocket which is advanced.

SLIP CLUTCHES

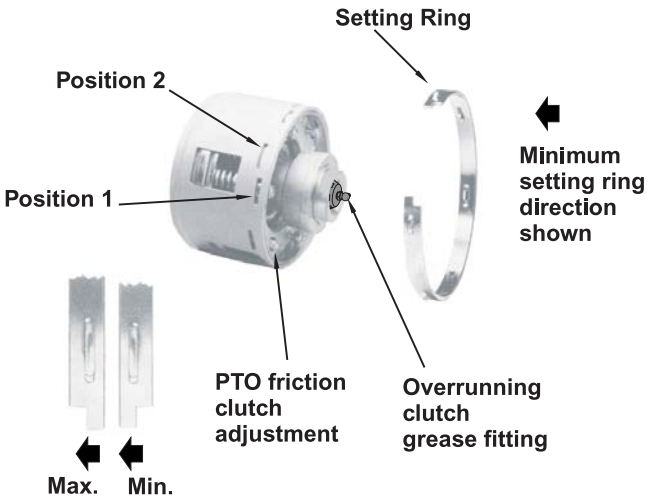


Figure 5-15 PTO Clutch

The 1592D driveline clutch has four torque settings that can be modified depending on the setting ring orientation and position in the locating slots.

The 1592D requires that the clutch be set to the maximum setting. The setting ring oriented to the maximum position and installed in the position number 2 (see Figure 5-15).

To change clutch setting:

1. Tighten all six nuts in an even sequence (do not use air impact tool). This will completely collapse all the springs in the spring pack removing all pressure of the spring pack against the setting ring.

2. Remove the setting ring using a flat blade screwdriver.

3. Orient the setting ring so the widest portion of the setting ring (MAX) is toward the spring pack.

4. Lock the setting ring tabs into the slots, and position number 2.

5. Loosen all six nuts tightened in step one to release all spring tension and apply it to the setting ring.

PICKUP CLUTCH

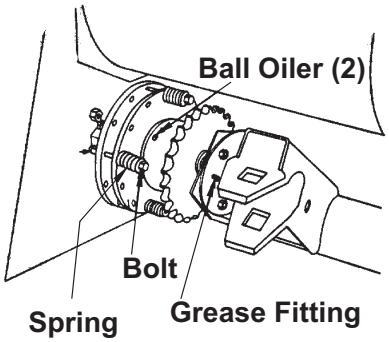


Figure 5-16 Pickup Clutch

1. Tighten the bolt to compress the springs until the coils are just touching. See Figure 5-16.

2. Do not allow the coils to become compressed against each other.

DRIVE BELT ADJUSTMENT

NOTE: It is important to keep the drive and driven belt sheaves aligned.

1. Adjust to obtain a 3/8” deflection when a 15 to 19 lb. force is applied at the center of the span length (see Figure 5-17). Check each of the six drive belts separately.

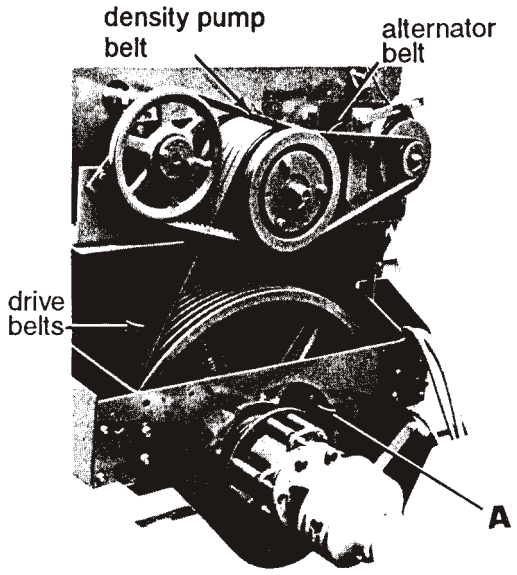


Figure 5-17 Mechanical Drive Unit

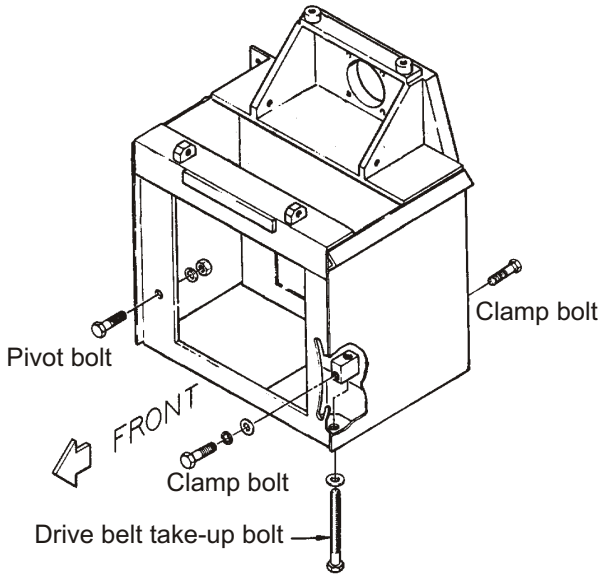


Figure 5-19 Twine Needle Yoke in Home Position

2. If adjustment is necessary, loosen clamp bolts (A) (front) and (B) (back) and pivot bolts (C) and (D) (see Figure 5-18 and Figure 5-19).

NOTE: The rear end of the drive unit belt take up may be slightly tipped downward in comparison to the front end.

Tighten take up bolt until the rear end of the drive unit belt take up has moved down approximately 1/4" (see Figure 5-19).

3. Tighten (B) (see Figure 5-18).

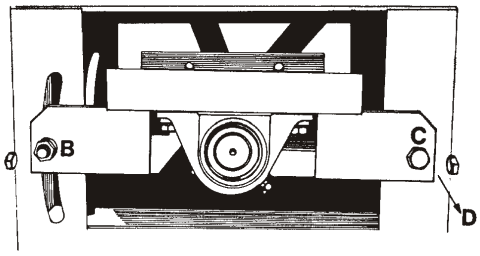


Figure 5-18 Take-up Plate

4. Keep tightening take up bolt until the drive and driven sheaves are aligned.

5. Check belts as in step 1. If too loose, repeat Steps 1 through 5.

6. Tighten clamp bolts (A) and (B) and pivot bolts (C) and (D), see Figure 5-18 and Figure 5-19.

ALTERNATOR BELT

Adjust to obtain a 3/16” deflection when a 2 to 3 lb. force is applied at the center of the span length (see Figure 5-17).

DENSITY PUMP BELTS

Adjust to obtain a 3/16” deflection when a 3 to 4 lb. force is applied at the center of the span length (see Figure 5-17).

SUNSTRAND PUMP COUPLER

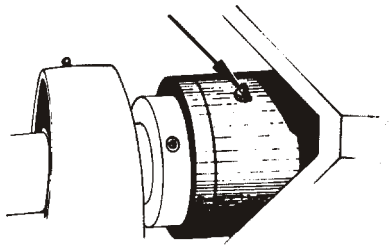


Figure 5-20 Sunstrand Pump Coupler

Grease specifications:
(For the Suntrand pump coupler)

1. N. L. G. I rating #2 Lithium base.

2. Base oil viscosity 900 to 2,150 SUS at 1 00' F (200- 470 CST at 40" C)

3. Minimum dropping point 3740 F (1 9011 C).

4. Maximum thickener content 2%.

5. Minimum Timken rating 40 lbs. (Approximately. 18.8 kg.).

6. Recommended additives:

(A) Extreme pressure (E.P.)
(B) Anti-oxidation
(C) Anti-rust

7. Should have good resistance to centrifugal oil separation.

NOTE: Zerk fitting not included.

To grease coupler, remove plugs (2) from coupler and add 1 3/8 zerk fitting. Pump grease into coupler until grease protrudes out of hole that is 180° from zerk fitting. When finished, remove zerk and return set screw plugs.

PLUNGER KNIFE ADJUSTMENT

The knives are used to shear the hay and should be kept sharp and in good condition for maximum performance. Dull, broken or missing knives will reduce capacity and cause a ragged appearance on the bottom of the bale. There are a total of nine knives on the baler, seven adjustable plunger knives and two stationary knives.

⚠ WARNING

Knife area is extremely hazardous. All care must be taken to prevent serious injury from occurring. Watch out for sharp knives.

Clearance of the plunger knives and stationary knives should be maintained at approximately 1/16". Adjustment is made on the plunger knives only. To adjust plunger knives, move the plunger with the diagnostic controller until the cutting edges of the knives are even or overlapping. Shim the knives (see Figure 5-21). Clearance from knife segment to knife segment may vary, therefore individual adjustments may be required.

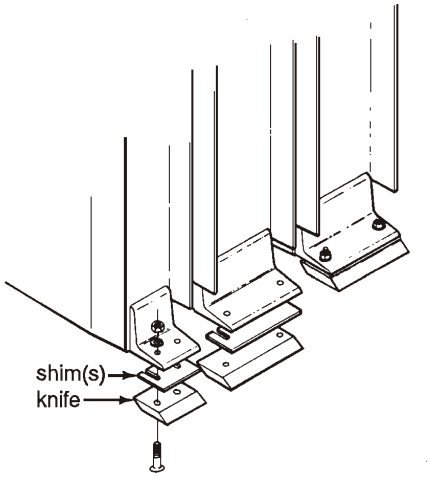


Figure 5-21 Twine Needle Yoke in Home Position

OPERATING TEMPERATURE

The hydraulic oil temperature and oil level in the reservoir are monitored by the ICM. The baling system shuts down if the oil level drops below the sensor, or the oil temperature rises above 220°F. If one or both of these situations occur (error), all ICM controlled functions on the baler will cease. The plunger and knotter will be in the last position before the ICM controlled functions were disabled.

The baler should not be operated when temperature is lower than 20° F (-6° C). If it is necessary to operate the baler at these temperatures, consult the factory for oil recommendations. At oil temperatures of 20° to 32° F (-6° to 0° C), operate baler at 500 PTO RPM in automatic mode. Once oil temperature reaches 32° F (0° C), run the baler at 1,000 PTO RPM.

If, when baling the hydraulic oil reaches 220° (over temperature) or the hydraulic oil level drops below a safe operating level, the error message in Reference #17 on page 2-3 displays on the tractor mounted control box.

At this time, the needle and plunger functions controlled by the ICM are allowed to travel to the home position and further operations are cancelled. The hydraulic oil cooling fan continues to cycle cooling the hydraulic oil. The feeder/pickup is also allowed to operate but only manually. This circulates oil through the heat exchanger. The ICM checks the temperature and level sensors every ten milliseconds or 100 times a second. When the oil temperature drops to a safe temperature or the oil level raises, the baler will require the user to activate the "GO" function to begin baling (see page 2-2). If the baler shuts down and restarts in 10 seconds, and stops and restarts again in ten seconds, the hydraulic oil level maybe approaching an unsafe level. The normal agitation of the oil in the

reservoir is signaling the ICM that the oil is low. If filling the oil to the recommended level (see page 5-11) does not solve this issue, see Possible Causes for Hydraulic Oil Over Heating below.

NOTE: Feeder and pickup will continue to run as they are independent of electrical control.

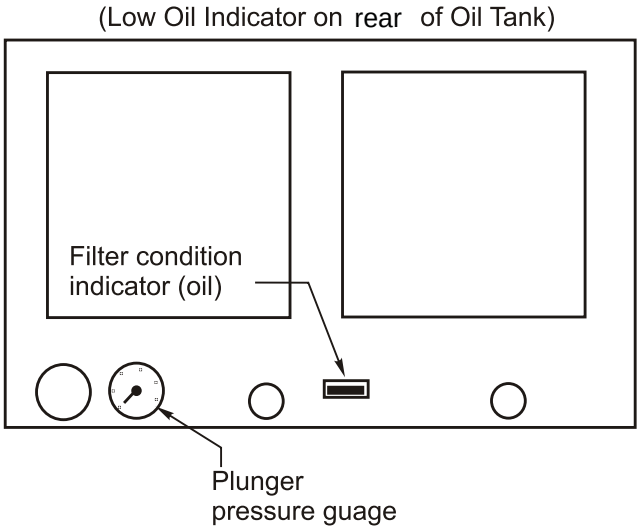


Figure 5-22 Oil Cooler Shroud

Possible Causes for Hydraulic Oil Over Heating;

1. Heat exchanger or grill screen plugged with chaff and debris. Clean with compressed air thoroughly, blowing debris back out of the heat exchanger from the rear to front.

2. Cooling fan motor not rotating fast enough, low air flow through the heat exchanger. Check amp draw on motor. When running, the cooling fan electrical motor should draw approximately 30 amps. Amp draw exceeding this indicates that the motor is turning at less than the recommended RPM of 1650.

3. Fan blade incorrectly positioned in relation to the shroud. The fan blade should split the shroud, so half of the fan is inside of the shroud.

4. Constant relief valve operation. All components on the baler are protected by relief valves. When a relief valve opens to protect a component, the pressure it displaces creates heat. Over feeding, or excessive plunger pressure, will cause a relief valve to open creating heat. If a component is stalling or sluggish to respond, it indicates a low relief valve setting, which also allows the relief valve to open creating heat.

5. Missing or damaged seals on hydraulic valves. The baler uses several different styles of cartridge style hydraulic valves. There are counter balance valves, logic valves, flow control valves, check valves, and relief valves. One of the things that all these valves have in common is O-ring and backup ring seals. These seals will fail over a period of time.

a. From expanding and contracting due to heat and pressure, seals will become brittle and decompose into very small particles which creates an internal leak, which in turn creates heat.

b. The pressure and the oil temperature that the baler is operated at determines the life of the o-ring seals. The higher baling pressure creates more heat and shortens the life of the o-ring seals.

c. Customers who bale in the area of 6000 PSI report these seals should be inspected yearly. Customers who bale at pressures around 4000 PSI, generally can go 3 to 4 years between seal changes. Seal kits are relatively inexpensive and are easily changed. Please see your parts book.

See page 5-9 for operating temperature.

- *If hydraulic fluid temperature is 20° to 32°F (-7° to 0°C), warm the fluid up at 500* PTO rpm until it reaches 32°F (0°C). Then increase PTO speed to 1000 rpm.

- *The baler will not operate if the fluid* temperature goes above 220°F (104°C); it will automatically shutdown. Cool by allowing the fans to run, and running the PTO at 500 rpm. Determine and correct the cause of over heating.

OIL LEVEL

Oil Reservoir Capacity.....90 Gallons (340 Liters)

If the oil is low, turn off baler, wait for all moving parts to stop and fill oil reservoir while watching the oil site gauge (see Figure 5-22).

The oil level will be 7 3/4" below the FULL mark on the site gauge when the low oil switch is activated. The oil reservoir will require approximately 33 gallons to raise the level back up to the FULL mark on the gauge (See Lubrication / Maintenance schedule on page 6-1 for recommended lubricant).

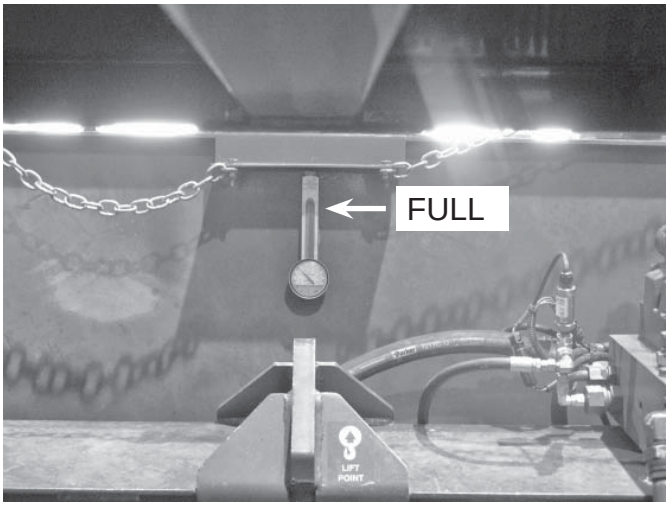


Figure 5-22 Oil Level and Temperature gauge.

OIL FILTER REPLACEMENT

Annually replace the main system filter elements located in the hydraulic tank. The filter is accessible on top of twine box. The hydraulic tank does not require draining in order to change the elements, however, you will need a container to catch the oil contained in the filter elements and housing. A check valve at the inside end of the housing will prevent oil draining from the tank. A ball valve is provided just below the filter housing to allow for draining the tank while changing the hydraulic fluid.

The charge system filter is a spin-on canister located on top of the main Sunstrand pump housing. It is not necessary to drain the main tank in order to replace this filter, however, some hydraulic fluid will be able to escape from the system while the filter is removed.

COOLING FAN OPERATION

The fan operates as follows whenever the power switch is "ON" and the oil temperature reaches 180° F (82.2° C).

1. The fan draws air through the heat exchanger for approximately 5 1/2 minutes.

2. The fan shuts down for approximately 10 seconds to allow the motor to stop.

3. The fan runs in reverse for approximately 10 seconds to clear chaff and dust from the oil cooler grill screens.

4. The fan shuts down once again for approximately 10 seconds to allow the motor to stop.

5. The fan will repeat the above sequence.

MAIN SYSTEM EXTEND PRESSURE

1. Engage the tractor PTO and run the baler at 700 rpm.

2. While on the Baling screen in the control monitor press F2 to Clear Plunger. This will extend the plunger until it stalls.

3. Read the plunger pressure gauge on the left side of the front gauge panel of the baler as illustrated in figure 5-23. It should read approximately 6,500 psi.

4. Disengage the tractor PTO, shut off tractor and lock tractor brakes and/or transmission. Wait for all movement in baler to cease.

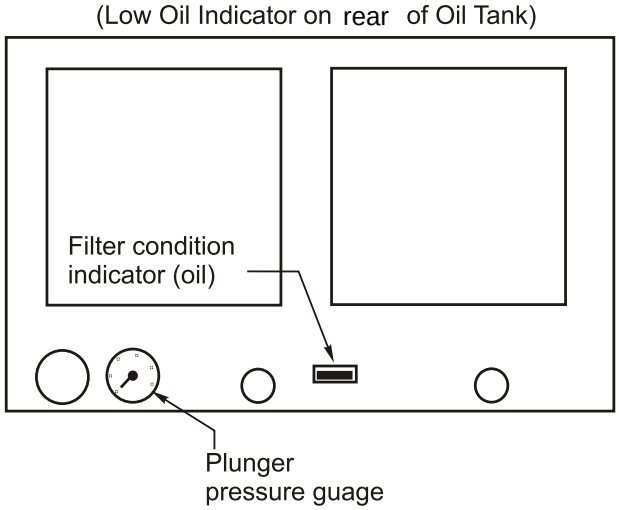


Figure 5-23 Front Panel

MAIN SYSTEM RETRACT PRESSURE

1. Disengage tractor PTO, shut off tractor and lock tractor brakes and/or transmission. Wait for all movement in baler to cease.

2. Remove the 1/4" JIC cap on the main valve retract pressure port, see Figure 5-24 (Retract pressure gauge port is labeled with a stamped “B”). Connect a 5,000 psi gauge to the retract pressure gauge port.

3. Enter the Plunger Settings screen from the Settings Menu. Select F3 and set the Plunger Stop at Cushions to NO.

4. Use the OK button to select the Plunger function as displayed in the upper right-hand corner. Using the down arrow, run the plunger slowly to the fully retracted position until the plunger stalls.

5. Read the pressure on the gauge. It should read 2,500 psi.

6. Disengage tractor PTO, shut off tractor and lock tractor brakes and/or transmission. Wait for all movement in baler to cease.

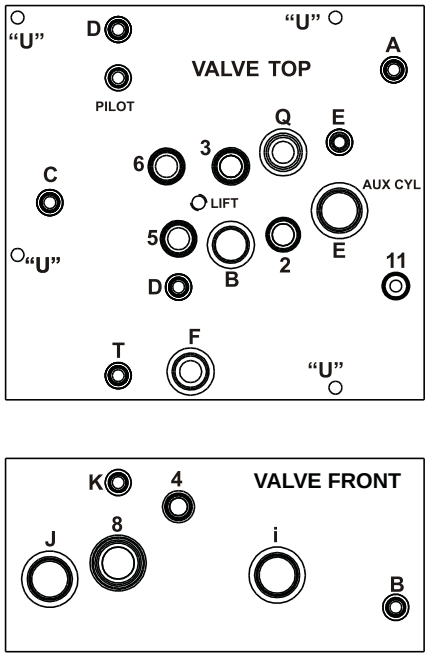


Figure 5-24 Main Valve

CHARGE PRESSURE

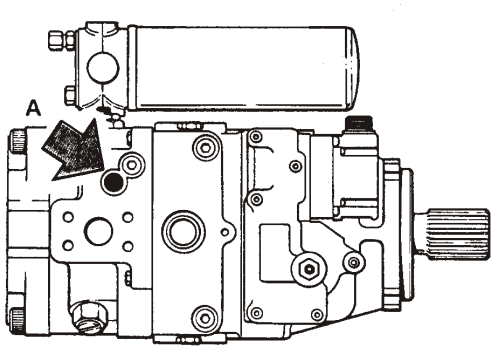


Figure 5-25 Gauge Port

1. Ensure the oil is at least 140° F. before starting this procedure.

2. Disengage tractor PTO, shut off tractor and lock tractor brakes and/or transmission. Wait for all movement in baler to cease.

3. Remove the 1/4" JIC cap on gauge port (A) (see Figure 5-25).

4. Connect a 600 psi gauge onto port (A).

5. Engage the tractor PTO and run the baler at 700 PTO RPM.

6. Read the pressure on the 600 psi gauge. It should read 400 psi.

7. On the baling screen, use the Baling Monitor to select the plunger function by selecting the OK button. Using the UP/DOWN buttons advance the plunger forward and backwards and read the pressure on the 600 psi gauge. It should read a minimum of 350 psi while the plunger is moving.

FEEDER PRESSURE

1. Disengage tractor PTO, shut off tractor and lock tractor brakes and/or transmission. Wait for all movement in baler to cease.

2. Remove the 1/4" JIC cap from gauge port (A) (see Figure 5-26).

3. Connect a 5,000 psi gauge onto port (A).

4. To prevent the feeder from rotating, secure it to the frame with a 3/8" chain.

5. Engage the tractor PTO, run baler at 700 rpm.

6. Using the arrow Input Button operate the feeder in the forward direction.

NOTE: Feeder will attempt to move but will be stalled by the 3/8" chain.

7. Read the pressure on the 5000 psi hand held gauge. It should read 3,200 psi.

KNOTTER AND FEED FORK MANIFOLD

Main system pressure (forward):

1. Disengage tractor PTO, shut off tractor and lock tractor brakes and/or transmission. Wait for all movement in baler to cease.

2. Remove the 1/4" JIC cap from gauge port (A) (see Figure 5-26).

3. Connect a 5,000 psi gauge to port (A).

4. To prevent the feed fork from rotating, secure the feed fork to the frame with a 3/8" chain (secure in center of Feed Fork for equal load).

5. While on the main baling screen of the Monitor, use the OK button to select the Feed Fork function.

6. Engage the tractor PTO and run the baler at 700 PTO RPM.

7. Using the UP button on the Baling Monitor move the Feed Fork in the forward direction and read the pressure on the 5,000 psi gauge. It should read 3,500 psi.

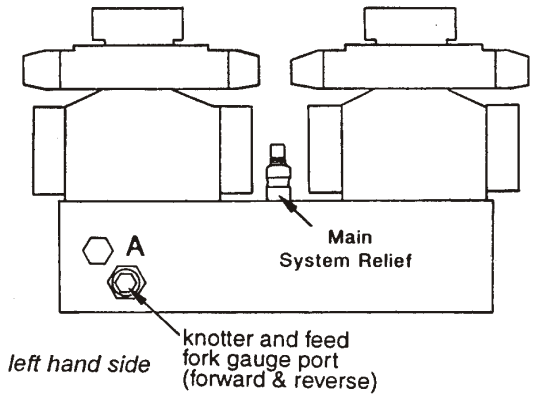


Figure 5-26 Knotter and Feed Fork Manifold

FEED FORK PRESSURE (REVERSE)

1. Disengage tractor PTO, shut off tractor and lock tractor brakes and/or transmission. Wait for all movement in baler to cease.

2. Remove the 1/4" JIC cap from gauge port (A) (see Figure 5-26).

3. Connect a 5,000 psi gauge to port (A).

4. To prevent the feeder crank shaft from moving forward, strap the feeder crank to the frame with a 3/8" chain.

NOTE: Ensure that the 3/8" chain is in the middle of the needle yoke; this will prevent bending of the needle yoke.

5. While on the main Monitor screen, use the OK button to select the Feed Fork function.

6. Plug in the Diagnostic Controller and set to Feed Fork.

7. Engage the tractor PTO and run the baler at 700 PTO RPM.

8. Slowly reverse the Feed Fork using the arrow Input Button on the monitor until the chain becomes taut.

NOTE: The feeder will stall.

9. Use the DOWN button from the Bale Monitor to run the Feed Fork in the reverse direction and read the pressure on the 5,000 psi gauge. It should read 2,000 psi.

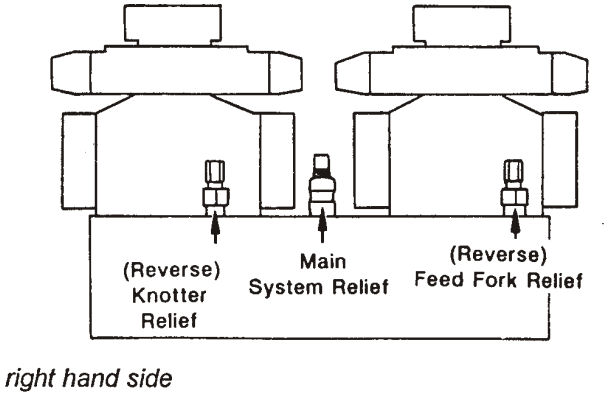


Figure 5-27 Knotter and Feed Fork Manifold

KNOTTER PRESSURE (REVERSE)

1. Engage the tractor PTO and run the baler at or below 500 PTO RPM.

2. Using the Bale Monitor use the back arrow button to move to the Functions screen. Use the OK button to select the Knotter function.

3. Using the DOWN button, drive the needle yoke until they are at mid-stroke (see Figure 5-28).

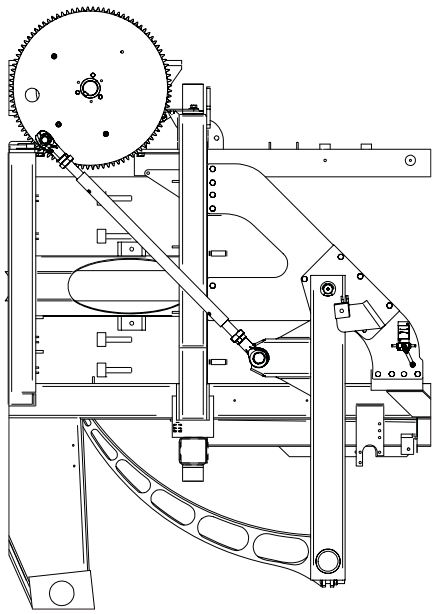


Figure 5-28 Twine Needle Yoke in Mid-Stroke Position

5. Disengage the tractor PTO, shut off the tractor and lock tractor brakes and/or transmission. Wait for all movement in baler to cease.

6. Remove the 1/4" JIC cap from gauge port (A) (see Figure 5-26).

7. Connect a 5,000 psi gauge to port (A).

8. To prevent the knotter from moving in reverse, strap a 3/8" chain around the middle of the needle yoke to the frame (see Figure 5-29).

NOTE: Ensure that the 3/8" chain is in the middle of the needle yoke, this will prevent bending of the needle yoke.

9. Engage tractor PTO and run the baler at 700 PTO RPM.

10. Slowly reverse the knotter the Feed Fork using the DOWN button on the monitor until the chain is taut.

NOTE: The knotter and needle yoke will stall.

11. Using the DOWN button run the knotter in reverse and read the pressure on the 5,000 psi gauge. It should read 2,000 psi.

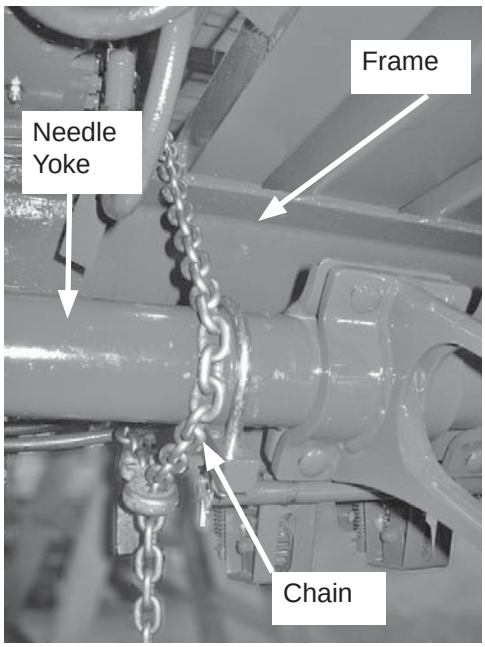


Figure 5-29 Twine Needle Yoke Chained to Frame

CHECKING INTERNAL SEALS ON PLUNGER CYLINDER VALVE ASSEMBLY

1. Remove Pilot Close Check and Logic Valve Cartridges (see Figure 5-30).

2. Pressurize drain hole D at 120 PSI of (see Figure 5-31).

3. Check for air leakage on any part of the valve. Air usually leaks around E. Repeat process on the other 2 cartridges.

4. Replace cartridge if any leaks are found.

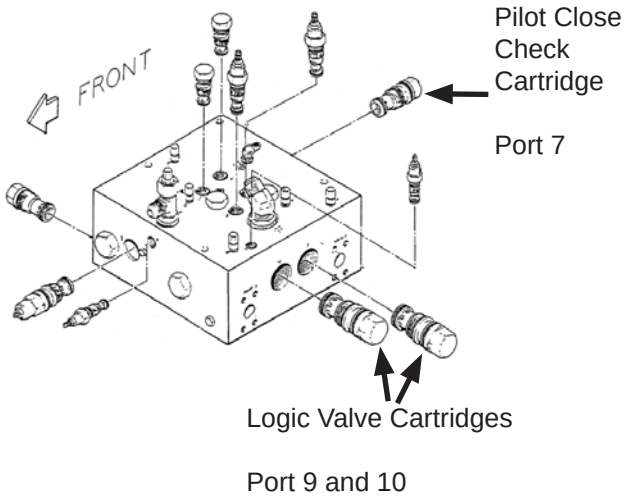


Figure 5-30 Plunger Cylinder Valve Assembly

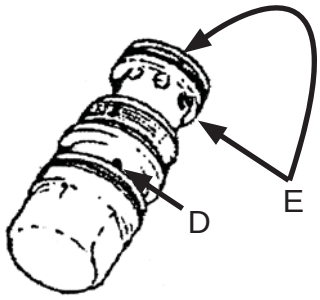


Figure 5-31 Cartridge Valve

SWITCH ADJUSTMENTS

See page 5-17 for switch location.

S-25 KNOTTER TOOTH COUNT

Function:

Counts the number of sprocket teeth on the right-hand knotter sprocket and calculates the position of the knotter and is used to trigger the slowdown flow valve.

S-11 KNOTTER STOP/HOME SENSOR

Function:

Triggers the stopping position of the knotter.

Adjustment:

Please refer to the 1592 Baler Operating System Manual in the Double Knotter screen for the proper procedure regarding the setup of these sensors.

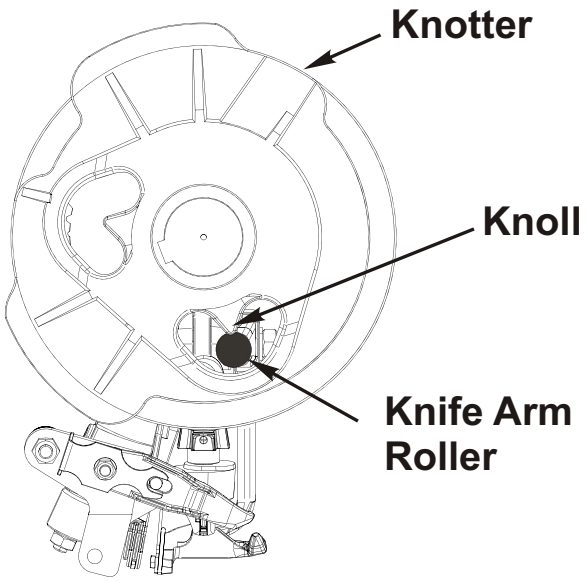


Figure 5-32 Knife Arm Roller Centered on Knoll

S-3 FULL CHARGE SWITCH

Function:

S-3 signals the control circuit that the feed chamber has been filled by the Feed Fork, thus causing the plunger to activate when the Feed Fork has stopped at the Feed Fork Stop Sensor which will be near the highest point for the Feed Forks..

Adjustment objective:

S-3 should be activated by the paddle in about the first two inches of upward travel of the paddle.

Adjustment:

1. Adjust the sensor so that it is between 1/8" to 1/4" away from the target.

2. Adjust the sensor so that it is at the bottom of the slot on the adjustment bracket.

S-21 PLUNGER POSITION SENSOR

Function:

This positional sensor is used to measure the position of the plunger.

Adjustment:

This sensor should only need to be adjusted in special circumstances. When adjusted position sensor should have approximately 1 inch of additional travel at each end of the sensor when the cylinder is fully extended and fully retracted.

S-12 NEEDLE HOME SENSOR

Function:

S-12 senses if the needles are in the home position.

Adjustment:

Adjusts sensor so that it clears the Needle Yoke by 1/8” to 1/4" of an inch.

S-2 FEED FORK STOP

Function:

S-2 Feed Fork Stop sensor determines the stopping point of the Feed Forks when the plunger extends into the chamber.

Adjustment Objective:

The Feed Fork Stop Cam should be adjusted so that it is 1/8" to 1/4" away from the Feed Fork Stop Pad. The Feed Fork Stop Cam should be adjusted so that the tips of the Feed Forks are higher than the bottom of the inside of the chamber when the Feed Forks stop.

Adjustment:

Please refer to the Freeman 1592 baler Operating System Manual under the section Feed Forks for the adjustment procedure.

S-27 FEED FORK POSITION TOOTH COUNT

Function:

The Feed Fork Position Tooth Count records the number of sprocket teeth on the Feed Fork driven sprocket (where 72 teeth equals one revolution). The position is recalibrated each time the Feed Fork Stop sensor is activated. However, the sensor does not take into account Feed Fork drift when stopped.

Adjustment Objective:

The sensor must be adjusted close enough to read the individual teeth.

Adjustment:

1. Adjust the sensor to within 1/8 to 1/16 inch of the sprocket teeth.

S-19 BALE LENGTH POTENTIOMETER
Function:

S-19 Bale Length Potentiometer measures the rotations of the star wheel and is used to calculate the length of the bale in the chamber.

Adjustment Objective:

This sensor should rarely be adjusted except for special circumstances.
Adjustment:

1. Make sure there is no pre-load of the rubber hose on the body of the potentiometer after the potentiometer and sensor shaft have been connected and the housing secured.
2. Refer to the Freeman 1592 Baler Operating System Manual under Bale Length Setup 1 and Bale Length Setup 2 for additional setup information.

S-33 PICKUP CLUTCH SPEED SENSOR

Function:

This sensor is used to measure the relative speed of the clutch on the pickup. This is used to measure any decrease in the relative speed of the pickup which is used to indicate slipping of the clutch and therefore possible plugging of the pickup.

Adjustment Objective:

The sensor should be adjusted to be within 3/16" to 1/4" inch of the sensor target. (See Figure 5-33)
Adjustment:

Adjustment:

1. Adjust the sensor so that it is centered on the target and within range.

2. Refer to the Freeman 1592 Baler Operating System Manual under Feeder Settings 2 for additional setup information.

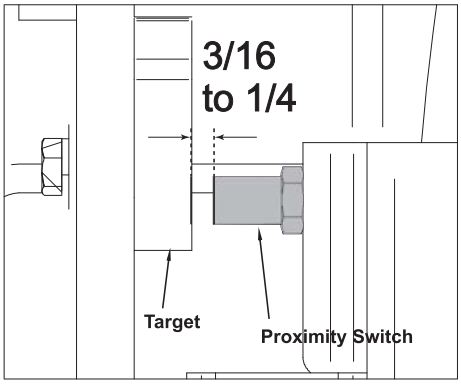


Figure 5-33 Proximity Switch Settings

STORING THE BALER

At the close of the season, remove all material from the bale chamber and clean the baler with compressed air. Pressure washing or steam cleaning is not advised. Moisture can create problems with electrical components by promoting corrosion. Any hay, chaff or dust on the baler will collect moisture and cause unnecessary corrosion.

Check the baler for any worn or damaged parts. Replace or repair as required.

Coat the bale chamber lightly with grease to prevent rusting.

Inspect, lubricate and adjust chains.

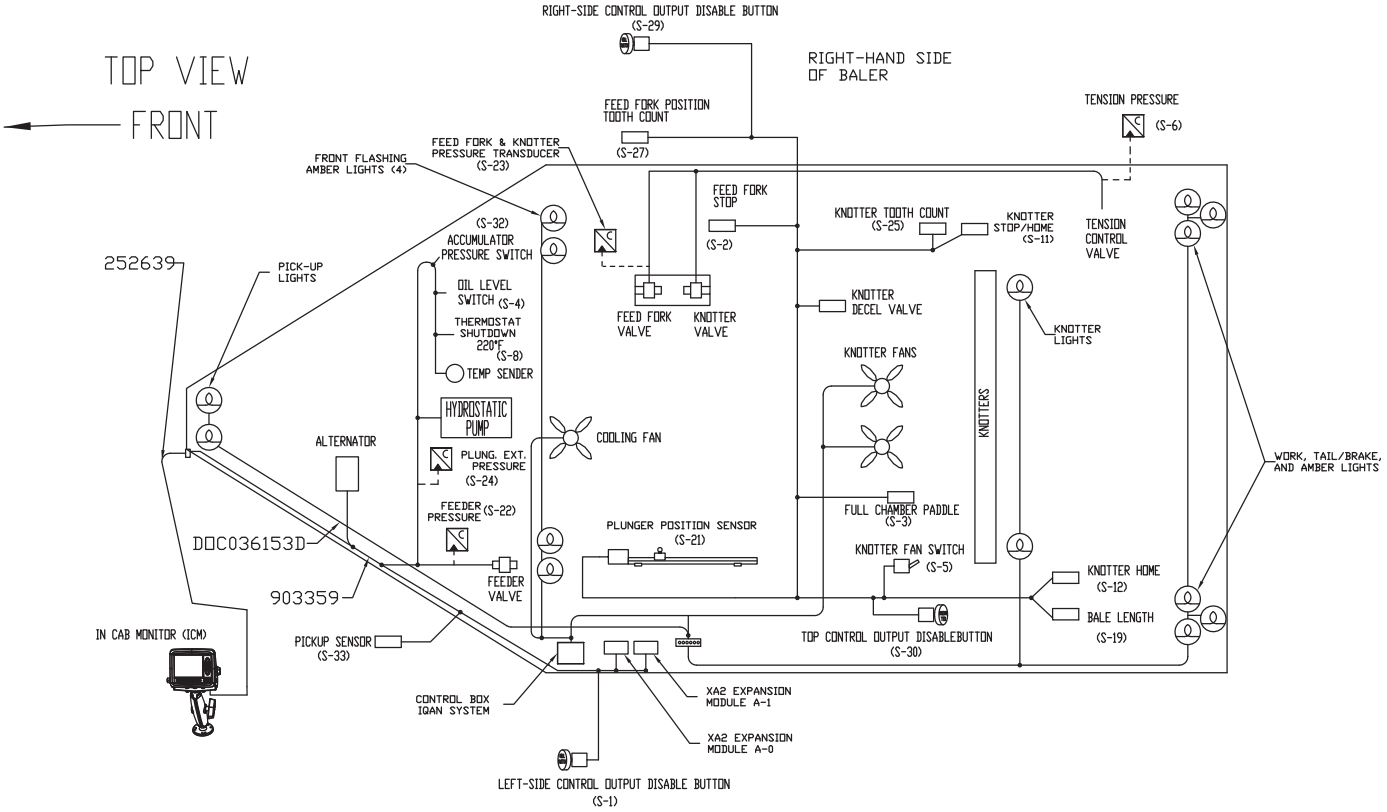
Check and lubricate all grease fittings.

Provide adequate protection from the weather.

To increase tire life during storage, place the baler on blocks to remove the load from the tires.

Disconnect the battery.

It is good practice to have the baler inspected at the end of the season and the entire machine placed in good serviceable condition prior to the next baling season.



NAME	FUNCTION	EQUIVALENT LS NUMBER (Reference Only)
S-11	Knotter Stop/ Home	LS-1
S-2	Feed Fork Stop	LS-2
S-3	Full Chamber Paddle	LS-3
S-27	Feed Fork Posi-tion Tooth Count	None
S-12	Needle Home	LS-13
S-32	Accumulator Pressure Switch	None
S-33	Pickup Speed Sensor	None
S-25	Knotter Tooth Count	LS-12
S-4	Oil Level Switch	None
S-8	220° F Shut-down Tempera-ture Switch	None
S-1	Left-Side Output Disable Button	None

NAME	FUNCTION	EQUIVALENT LS NUMBER (Reference Only)
S-21	Plunger Position Sensor	LS-10,9,8,6,5,4
S-6	Tension Pres-sure	None
S-23	Feed Fork/ Knotter Pressure	None
S-22	Feeder Pressure	None
S-24	Plunger Extend Pressure	None
S-19	Bale Length Potentiometer	None
S-30	Top Control Output Disable Button	None
S-29	Right Side Control Output Disable Button	None
S-5	Knotter Fan Switch	None
S-26	Oil Temp	None

Figure 5-34 Sensor Locations and Chart

NOTES

LUBRICATION/SERVICE SCHEDULE

Through timely service, maintenance, and the proper adjustments, you can realize the optimum performance and long life expected from this equipment. Follow the recommended service checks at their suggested intervals to maximize the baler's performance and service life.

MAIN SYSTEM HYDRAULIC OIL:
Chevron AW-46 or equivalent
Use NEW oil when refilling oil tank. Fill to the full mark on the oil tank site gauge located on the oil tank. Oil must be filtered 10 micron or less before entering the tank. Clean around the fill area with compressed air before opening the fill port.

GREASE FITTINGS:
Multi-purpose Lithium grease

AUTOMATIC AUTO LUBER:
SAE 80 GL5 gear oil

PUMP DRIVE COUPLING LUBRICANT:
NGLI Rating #2 Lithium base lubricant. Base oil viscosity 900-2,150 SUS at 100° F. (200-470 CST at 38°C). Minimum dropping point 374°F (190°C). Maximum thickener content 11 percent. Minimum Timken rating 40 lbs. (18 kg).

CHECK/ SERVICE EVERY 4 HOURS:

- Lube PTO shaft, u-joints and covers (1,2,3,4)
- Lube feed fork link bearings (6)
- Lube feed fork bearings (27)

CHECK/ SERVICE AT 8 HOURS:

- Pickup Drive Chain (both sides) (28)
- Chain (feeder shaft/pickup clutch) (29)
- Chain (Feeder Motor/Feeder drive) (30)
- Feed Fork Chain (31)
- Knotter Drive Chains (right and left) (32)
- Chain (knotter shaft/lubrication shaft) (33)

CHECK/ SERVICE EVERY 20 HOURS:

- Lube bearings upper flywheel drive shaft (14)
- Lube bearings lower (primary) drive shaft (15)

CHECK / SERVICE DAILY:

- Lube PTO overrunning clutch (4)
- Lube needle yoke pivot bearings (8)
- Lube needle yoke drive connecting rod ends (9)
- Lube bale chute bearings (26)
- Check oil level in knotter luber tank (7)
- Blow baler clean with compressed air *(NOTE: Do not steam clean)*
- Lube ball hitch (11)
- Check hydraulic tank level (24)
- Check oil condition indicator) (5)

CHECK/ SERVICE WEEKLY:

- Lube pickup overrunning clutch (4)
- Knotter Shaft Bearings (25)

CHECK / SERVICE EVERY 80 HOURS:

- Lube main pump drive coupler (13) (See page 5-8)
- Check belts (Check new belts at 8 hours) (16)
- Check battery water (Electrolyte) (17)
- Check tire inflation (18) see page 1-2
- Check wheel fasteners (19) see page 1-2
- Check chains (18) see page 1-2

NOTE: New Chains should be checked after first 8 hours

CHECK / SERVICE EVERY 250 HOURS:

- Change pump filter (21) (Freeman FIL0164056 Located on top of main Sunstrand pump)
- Check knotter brake adjustment (20)
- Check / clean battery terminals (17)

CHECK / SERVICE ANNUALLY:

- Lube feeder crank journals (22) (Lube until grease is visible at breather)
- Change system hydraulic oil
- Change oil tank filters (or as indicated by filter condition indicator) (5)
- Lube needle yoke crank shaft bearings (8)
- Repack wheel bearings (23)
- Repack plunger bearings (contact Freeman service department 503-625-2560)
- Check Valve Cartridges for leaks (see Page 5-15)

CHECK / SERVICE - END OF SEASON:

- Check chains and drive/accessory belts tension and condition
- Check hydraulic accumulator (150 psi nitrogen charge) Contact Freeman Service Department for Instructions 503-625-2560.
- Prepare equipment for off season storage (see page 5-17).

LUBRICATION/SERVICE SCHEDULE

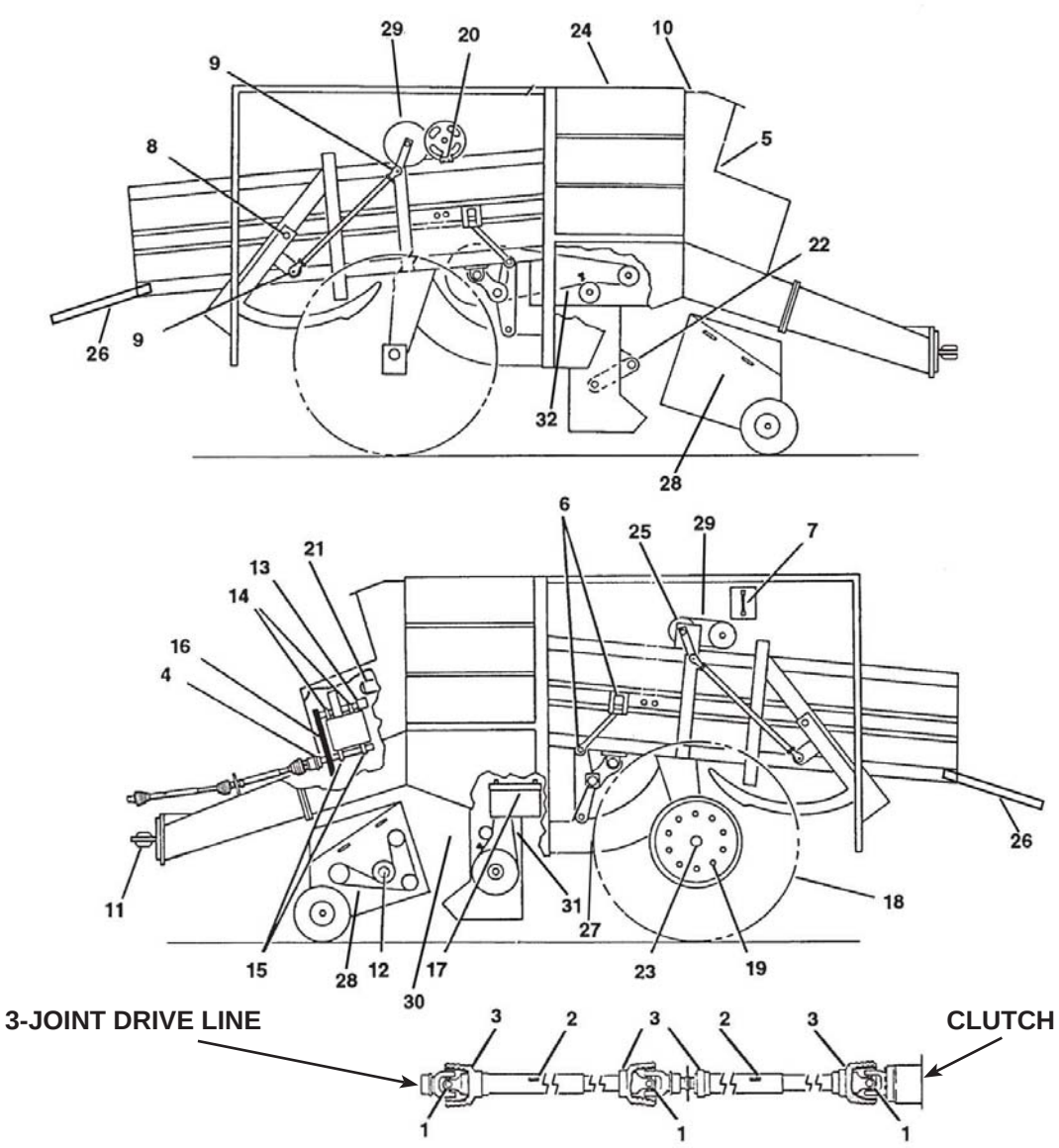


Figure 6-1 Grease Points

1. PTO universal joints	10. Hydraulic oil tank filter	19. Wheel fasteners (torque) see page 1-2
2. PTO sliding spline	11. Ball hitch	20. Knotter brake adjuster
3. PTO covers	12. Pickup overrunning clutch	21. Main pump (charge) filter
4. PTO overrunning clutch	13. Main pump drive coupler	22. Feeder crank journal bearings
5. Filter condition Indicator	14. Upper drive shaft bearings	23. Wheel bearings
6. Feed fork link bearings	15. Lower drive shaft bearings	24. Hydraulic oil level (90 gallon)
7. Knotter oil tank level	16. Drive belts	25. Knotter Shaft Bearings
8. Needle yoke pivot bearings	17. Battery (terminal/electrolyte)	26. Bale Chute Bearings
9. Needle yoke rod ends	18. Tires (inflation) see page 1-2	27. Feed Fork Bearings
28. Pickup Drive chains (right and left)	29. Chain (knotter shaft/lubrication tank)	30. Chain (Feeder Motor/Feeder drive)
31. Feed Fork Chain	32. Knotter drive chains (right and left)	

KNOTTER TROUBLESHOOTING

When troubleshooting knotter problems, it is important to determine which knot (first or second) and which twine (top or bottom) is suffering from the problem. The “first knot” is the first knot tied in the knotter cycle (with the needle in the knotter); this is the knot that finishes off a bale that has just been formed. The “second knot” is the second knot tied in the knotter cycle (after needle leaves the knotter); this is the knot that ties the twines together at the start of the bale formation. The “top twine” is the twine which runs from the twine tucker along the top of the bale while it is being formed. The “bottom twine” is the twine which runs from the needle along the bottom of the bale while it is being formed. Using different color twines for the top and bottom makes identifying twines in a knot very easy.

When a missed knot occurs the operator must determine:

1. Is the problem on the first knot or second knot?

2. Is the problem on the top twine or bottom twine?

3. Are the twine ends torn and frayed or cut and square?

4. Is there damage to the twine away from the knot?

5. Are any long (2” or more) scraps of twine in or around the knotter?

6. Is twine tangled in the knotter?

All the suggestions in the following table are related to knotter components and assume that twine is being delivered properly to the knotters. Often times a knot tying problem isn’t related to the knotter itself, but is the result of a problem with the twine delivery. For example, a knot connecting balls of twine could come untied, become tangled, or hang up in the tensioner rollers. Also, it is possible the twine is being cut or frayed by a burr or sharp edge on a twine guide, needle or twine finger, etc. Before making any adjustments to the knotter components, be sure the twine is routed properly from the twine box (see Twine Routing section page 1-8) and that all twine handling components are in good condition.

The Freeman big baler makes knotter troubleshooting easy because the hydraulic drive allows the operator to run the knotter cycle very slowly while observing the knotters in action.

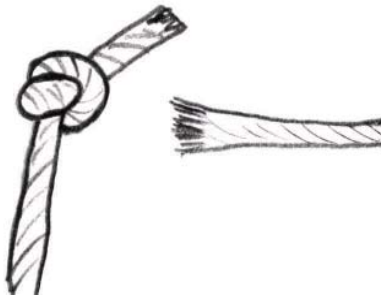
KNOTTER TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
No knot in either twine, one knotter only. First or second knot.  **Figure 7-1 No Knot**	Twine finger missing twine. Twine finger not extending properly. Bill hook trigger too loose. Bill hook trigger damaged or missing. Bill hook roll pin sheared. Twine is cut at holder or tears off between holder and bill hook.	Adjust needle to twine finger as described. Adjust twine finger as described (see Twine Finger Section page 5-2). Tighten nut at bill hook cam. Replace bill hook trigger. Replace roll pin. Loosen twine holder spring as described(see Twine Finger Section page 5-2). Check for rough or sharp edges on holder and twine disc.
No knot in either twine, all knotters. First or second knot.	Twine fingers not operating	Check for free movement of twine finger drive shaft, drive rods, and twine fingers. Replace broken twine finger shear bolt. Replace missing roller on twine finger shear lever.

KNOTTER TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
Second knot has no knot in either twine, first knot tied but twines are cut or badly frayed 4 to 6 inches from knot.	Twine finger spring not pulling twine fingers clear away from needle slot.	Check for free movement of twine finger drive shaft, drive rods, and twine fingers. Replace broken twine finger spring.
Knot hanging on bill hook. Typically only noticeable on the second knot. If it happens on the first knot the result is usually a large tangle of twine on the bill hook as both knots wrap together. *NOTE: it is normal for the tails of the second knot to remain in the bill hook trigger for 3-4 plunger strokes*	Knot is too loosely wrapped on bill hook when knife arm wipes across. Tails of knot too long, form a bow and get caught in trigger. Tails of knot gripped too firmly by bill hook trigger. Knife arm does not wipe bill hook firmly enough. Knife arm does not travel far enough beyond tip of bill hook.	Increase twine holder force. Tighten bottom tensioner. See “Bow Knot” Loosen nut on bill hook cam spring. Adjust knife arm for firm pressure across bill hook. Replace knife arm roller or knife arm itself if bent. Check cam lobe in cam gear for wear. Adjust LS-1 to correct knotter stopping point. (2nd knot only).
First knot: Knot in top twine only. Second knot okay.  **Figure 7-2 Knot in Top Twine Only**	Twine finger not extending properly or retracting clear of needle slot. Knife arm is bent, allowing twine to slip around end of bill hook.	Adjust twine finger as described. Check for free movement of twine finger drive shaft, drive rods, and twine fingers. Replace knife arm.

KNOTTER TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
First knot: Knot in bottom twine only. Second knot okay. (Exceedingly rare)	Knife arm is bent, allowing twine to slip around end of bill hook.	Replace knife arm.
Second knot: Knot in top twine only. First knot okay.  **Figure 7- 3 Knot in Top Twine Only**	Top slack puller not keeping twine tight. Twine tucker not holding twine down for twine finger.	Tighten top tensioner. Check for free movement of slack puller. Replace broken/missing slack puller spring or roller. Replace missing twine tucker roller. Replace missing roller on twine tucker cam follower. Check for missing clamp bolt in tucker cam lever.
Knots in bottom twines only. Top twine isn't cut and covers two or more bales.	Needle misses top twine from the tucker. Twine gets on left side of needle.	Adjust twine tucker and needle alignment.
Twine wrapped around bill hook shaft, first and second knots connected.	Needle misses top twine from the tucker. Twine gets on right side of needle. Twine misses notch in twine disc.	Adjust twine tucker and needle alignment. Retard twine disc timing. Adjust counter-clockwise.

KNOTTER TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
Twine wrapped around bill hook, first knot.	Needle misses top twine from tucker. Twine gets on right side of needle. Loop of twine gets around bill hook trigger roller. Twine misses notch in twine disc.	Adjust twine tucker and needle alignment. Advance twine disc timing. Adjust clockwise. Retard twine disc timing. Adjust counter-clockwise.
Twine wrapped around bill hook. First knot okay.	Loop of twine gets around bill hook trigger roller.	Check for proper slack puller operation. Replace broken or missing parts. Tighten twine tensioners. Advance twine disc timing. Adjust clockwise.
Twine ends uneven (more than ½") on same knot.  **Figure 7-4 Twine Uneven**	Twine holder letting twine slip instead of being cut. Twine knife pulling twine from holder instead of cutting it.	Increase twine holder spring force. Replace twine knife.
Frayed knot  **Figure 7-5 Frayed Knot**	Twine damaged as bill hook rotates.	Reduce twine holder spring force. Reduce twine tensioner force at top or bottom tensioner. Check for rough surface on bill hook, twine finger, holder or twine disc.

PROBLEM	POSSIBLE CAUSE	REMEDY
Good knot, frayed ends.  **Figure 7-6 Frayed Ends**	Knife isn't cutting twine cleanly.	Replace dull or chipped knife.
Bow knot, one or both twines.  **Figure 7-7 Bow Knot**	Tails of knot too long, form a bow and get caught in trigger. Bill hook trigger too loose. Knife arm does not travel far enough beyond tip of bill hook.	Increase twine holder spring force. Replace dull twine knife. Adjust twine disc timing (counter clockwise). Increase spring force on bill hook cam. Replace knife arm roller or knife arm itself if bent. Check cam lobe in cam gear for wear. Adjust LS-1 to correct knotter stopping point. (2nd knot only).

KNOTTER TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
End of one twine doubled back into knot..  **Figure 7-8 Doubled Back Knot**	Bill hook trigger closes on top of twine instead of completely capturing it.	Adjust twine disc timing. Model knife arm to guide twine farther to the right across bill hook trigger. Replace bent bill hook trigger.
Short tails on knot. Knot may pull apart. Usually second knot.  **Figure 7-9 Short Tail**	Twine holder too tight. Twine tension too loose. Bill hook trigger grips twine too loosely, lets twine slip around bill hook.	Loosen twine holder spring. Tighten twine tensioners. Tighten bill hook cam spring nut.
Knot looks strong but one twine broken at entry to knot. Usually second knot.  **Figure 7-10 One Twine Broke**	Classic “Tension break”. This type of failure is not a knotter malfunction. Bale tightness has exceeded limit of twine strength. This knot usually breaks at the rear of the bale just as bale exits the chamber. Broken twine will almost always be the bottom one.	Reduce bale tension pressure. Use stronger twine.

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