FREEMAN
A Division of Allied Systems Company

OPERATOR'S MANUAL 1592D

SAFETY

IMPORTANT SAFETY REMINDERS!

- KEEP ALL SHIELDS IN PLACE AND IN SERVICEABLE CONDITION. ENSURE SAFETY WARNING SIGN DECALS ARE IN PLACE, PROPERLY MAINTAINED AND REPLACED AS NECESSARY.

- DISENGAGE TRACTOR PTO, SHUT OFF TRACTOR AND LOCK TRACTOR BRAKES AND/OR TRANSMISSION. WAIT FOR ALL MOVEMENT IN BALER TO CEASE BEFORE ADJUSTING, LUBRICATING, CLEANING OR SERVICING BALER.

- MAKE CERTAIN EVERYONE IS CLEAR OF THE BALER BEFORE ENGAGING PTO OR OPERATING BALER.

- AVOID WEARING LOOSE CLOTHING WHICH CAN EASILY BE CAUGHT IN MOVING PARTS.

- KEEP HANDS, FEET AND CLOTHING AWAY FROM POWER DRIVEN PARTS.

- AT ALL TIMES, BE CONSCIOUS OF FIRE DANGER. A WATER SUPPLY AND SHOVEL SHOULD BE ACCESSIBLE. THE OPERATION OF THE BALER SHOULD COMPLY WITH LOCAL AND STATE FIRE CODES.

- USE APPROPRIATE SIGNS AND WARNING LIGHTS WHEN OPERATING ON PUBLIC ROADWAYS. AT ALL TIMES KEEP THE DIAGNOSTIC CONTROLLER IN A SAFE LOCATION AWAY FROM POWER DRIVEN PARTS.

- PERIODICALLY CHECK ALL NUTS AND BOLTS FOR TIGHTNESS.

- REMEMBER, SAFETY IS JUST A WORD UNTIL IT IS PRACTICED.

NOTE: SAFETY DECALS FALL INTO FOUR CATEGORIES AS LISTED BELOW

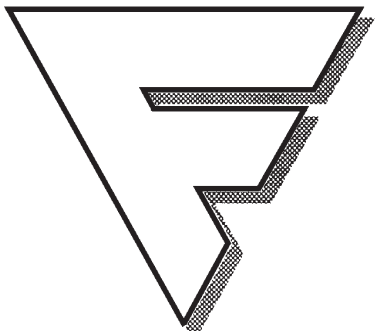
1 INSTRUCTIONAL: GENERAL INSTRUCTIONS AS TO OPERATION, PROCEDURES AND SERVICE. SIGNAL WORDS WILL BE ATTENTION, NOTICE, ETC.; WILL HAVE NO SAFETY ALERT SYMBOLS AND WILL BE DIFFERENT IN APPEARANCE TO THOSE LISTED BELOW.

2 **CAUTION**: GENERAL REMINDER OF GOOD SAFETY PRACTICE OR TO DIRECT ATTENTION TO UNSAFE PRACTICE. THE DECAL ON THE BALER WILL HAVE THE COLOR COMBINATION OF YELLOW AND BLACK.

3 **WARNING**: DENOTES SPECIFIC POTENTIAL HAZARD. THE DECAL ON THE BALER WILL HAVE THE COLOR COMBINATION OF YELLOW AND BLACK.

4 **DANGER**: DENOTES MOST SERIOUS POTENTIAL HAZARD. THE DECAL ON THE BALER WILL HAVE THE COLOR COMBINATION OF RED AND WHITE.

TABLE OF CONTENTS



Reference drawing's and schematics for your 1592D:

902096 Hydraulic Schematic Plunger
35102E Hydraulic Schematic #1 Plunger Drive
31794D Fan Sequencer Electrical Schematic
DOC036153D Light Wiring Diagram
902023 Electrical Schematic
DOC037572B Feeder, Feed Fork Hydraulic Schematic
DOC036848B Tension Control
901921 Control Box Wiring Diagram
901835 Remote Box Wiring Diagram
902056 Electrical Layout

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 KNOTTYING 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 hydraulic 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.

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.

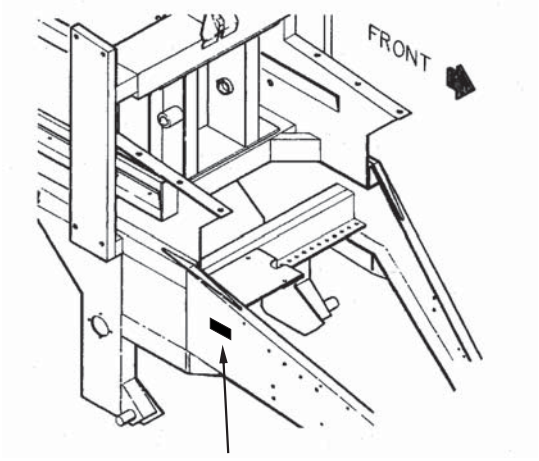


Figure 1 - Serial Number Location

SERIAL NO. ASC-1592-007 to Current
ORDER NO. PB1592DOPS

CAUTION: SOME PICTURES AND ILLUSTRATIONS IN THIS OPERATOR'S MANUAL SHOW THE BALER WITHOUT SAFETY 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.

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 and more.

The hydraulically driven components of the 1592D Big Baler make it unique in the agricultural baling industry. A system of electrical components, Digital Valve Controller (DVC-10) and 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 DVC 10 contains a computer processor that is preloaded with the 1592D baling software program. The DVC 10 receives input signals from sensors/ switches (see pages 46-56) that monitor component positions on the baler. The DVC 10 monitors all these inputs, processing this information following the preloaded operating program and sends commands (outputs) to the components on the baler, stopping and starting them as the program dictates.

The DVC 10 controls the operation of the feed fork cycle, plunger cycle, bale density system, and knotter cycle. The feeder/pickup direction is controlled by the manual switching in the cab mounted control box.

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, a three throw crank shaft with cantilevered fork tines.

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 will exert pressure on the forming bale until the bale plunger pressure reaches the preset by the operator to yield the desired bale density). At this point, density pressure is modulated to maintain the desired forming pressure on the extruding bale. The maximum hydraulic pressure available for forming the bale is 5,700 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 only while the plunger is extending. 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 metering 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 400 pound knot strength twine, (recommended). Individual knot sensors monitor the tying system. 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. These features add up to make the Freeman 1592D baler a very efficient and reliable machine.

LUBRICATION/SERVICE SCHEDULE

Only through timely service, maintenance and making the proper adjustments can you realize the optimum performance and long life expected from this equipment. Follow these 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)

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 (2)
- Lube needle yoke drive connecting rod ends (1)
- 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 (10)

CHECK/ SERVICE WEEKLY:

- Lube pickup overrunning clutch (4)

CHECK / SERVICE EVERY 80 HOURS:

- Lube main pump drive coupler (See page 45)
- Check belts (Check new belts at 8 hours) (16)
- Check battery water (Electrolyte) (17)
- Check tire inflation (18) see page 7
- Check wheel fasteners (19) see page 7

CHECK / SERVICE EVERY 250 HOURS:

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

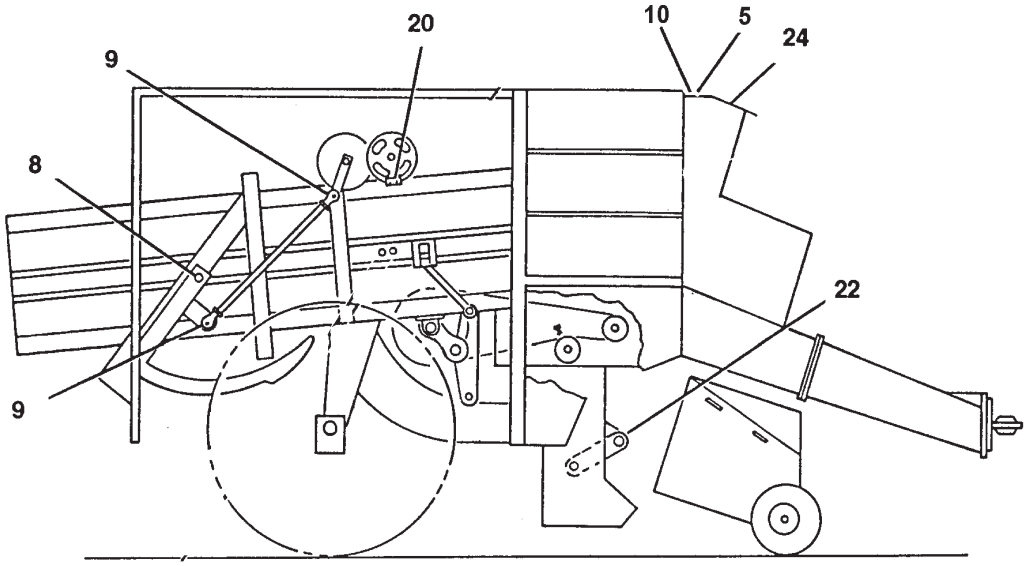
CHECK / SERVICE ANNUALLY:

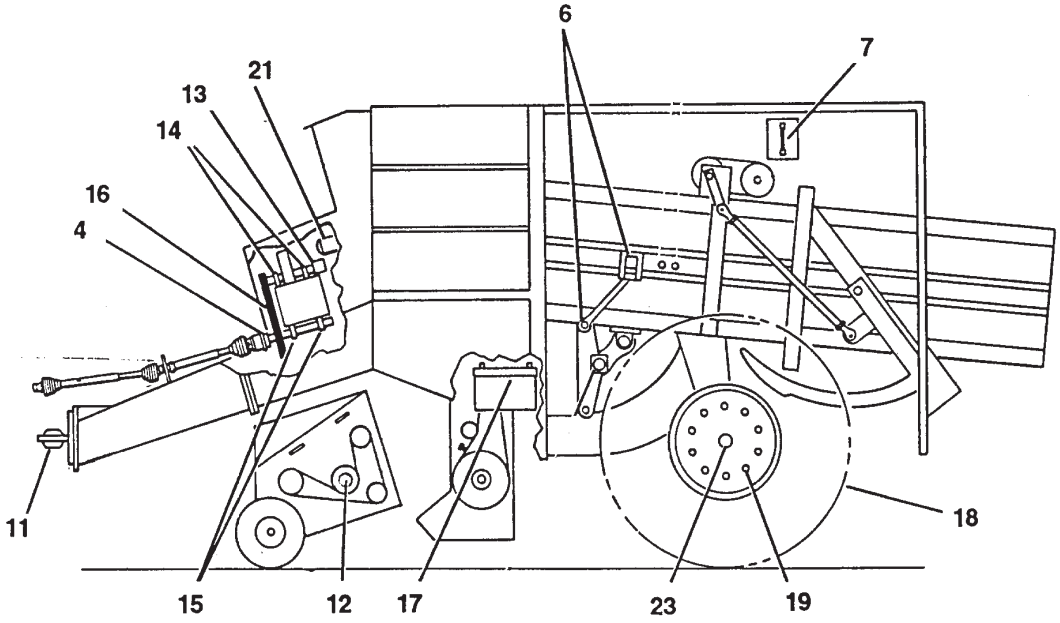
- Lube feeder crank journals (22) (Lube until grease is visible at breather)
- Change system hydraulic oil
- Change oil tank filters (or as indicated by filter condition indicator) (5)
- Lube needle yoke crank shaft bearings (8)
- Repack wheel bearings (23)

CHECK / SERVICE - END OF SEASON:

- Check 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 57)

LUBRICATION/SERVICE SCHEDULE





3-JOINT DRIVELINE

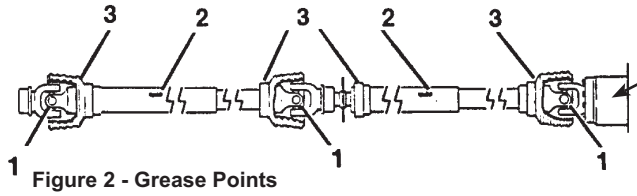


Figure 2 - Grease Points

1. PTO universal joints
2. PTO sliding spline
3. PTO covers
4. PTO overrunning clutch
5. Feed fork arm bearings
6. Feed fork link bearings
7. Knotter oil tank level
8. Needle yoke pivot bearings
9. Needle yoke rod ends
10. Hydraulic oil tank filter
11. Ball hitch
12. Pickup overrunning clutch
13. Main pump drive coupler
14. Upper drive shaft bearings
15. Lower drive shaft bearings
16. Drive belts
17. Battery (terminal/electrolyte)
18. Tires (inflation) see page 7
19. Wheel fasteners (torque) see page 7
20. Knotter brake adjuster
21. Main pump (charge) filter
22. Feeder crank journal bearings
23. Wheel bearings
24. Hydraulic oil

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: 2900 psi (199 bar)

- Hydraulic outlets: one set (pickup lift)

- Refer to the Tractor Operator's Manual for controls locations and operation instructions.

- An upright exhaust system.

- Minimum drawbar vertical load capacity: 3,300 lb (1,500 kg)

- Minimum gross weight: 15,000 lbs (6,810 kg)

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: 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 washer and Nuts. Torque nuts to 420 ft. lbs. (see Parts Manual page 6 for descriptions.)

CONNECTING PICKUP

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

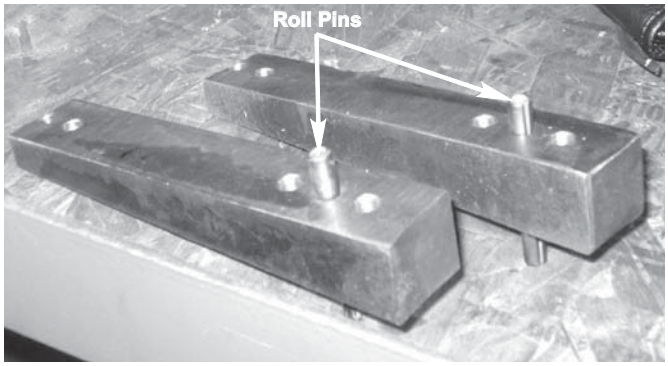


Figure 3 - Pickup Pivot Wedges

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.

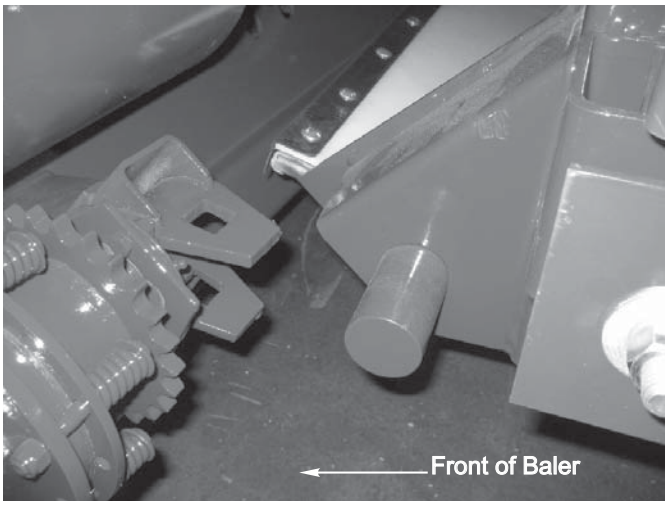


Figure 4 - Aligning Pickup with Baler

DANGER: **Make sure baler is secured and unable to fall when the tongue has been raised. May cause injury or death if baler falls.**

2. Raise tongue of baler just high enough to move the pickup underneath. Line up pickup locking claw to baler pickup pins as shown in Figure 4. 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.

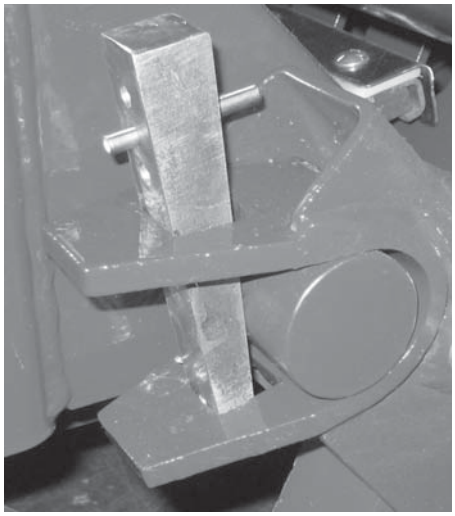


Figure 5 - Securing Pickup

3. Connect pickup lift arm assembly on right hand side of baler as shown in Figure 6. Secure lift arm to pickup cylinder and baler.

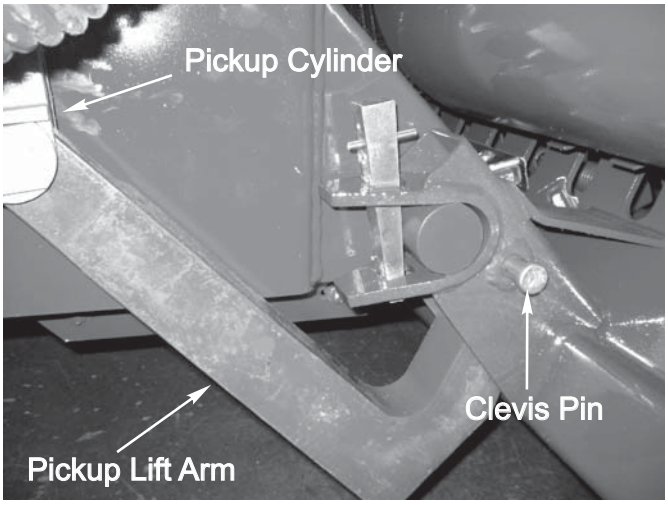


Figure 6 - Pickup Lift Arm

4. Connect pickup drive chain on left side of baler as shown in Figure 7. Make sure to replace pickup chain guard when finished as shown in Figure ?.

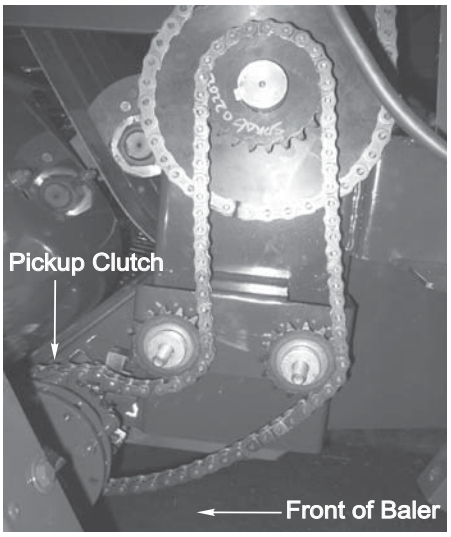


Figure 7 - Pickup Drive Chain

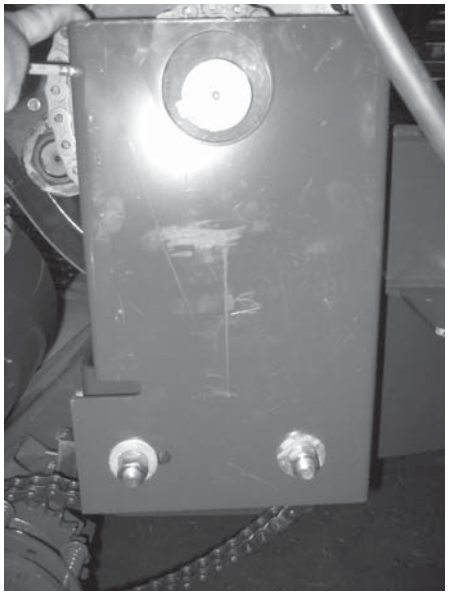


Figure 8 - Pickup Chain Guard

5. Connect pickup lift spring, Lift Arm and Lift Spring Bracket. Refer to your Parts Manual for descriptions see page 53.

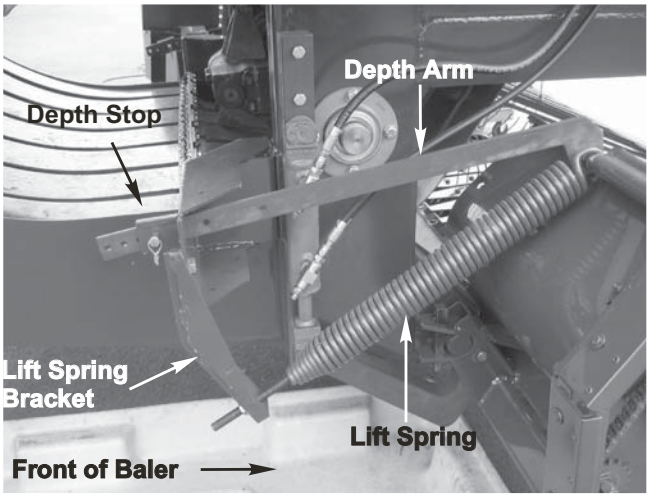


Figure 9 - Pickup lift spring

ATTACHING BALER TO TRACTOR

1. Before attaching the baler to the tractor make sure the baler is securely resting on level grund. 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 10) 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" bolts, lock washers and nuts. Torque nuts to 240 ft. lbs.

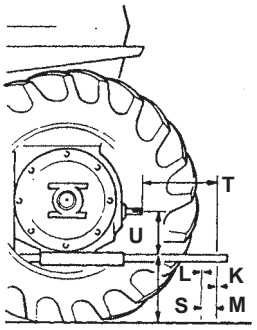


Figure 10 - Drawbar Hitch on Baler

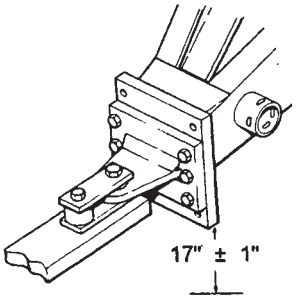


Figure 11 - Hitch

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 Fig 2 and Table 1 for correct adjustment of the tractor drawbar.

4. When the baler is connected to the tractor, the PTO drivelines can now be installed and properly adjusted.
The correct drive line adjustment is achieved by positioning the carrier bearing support bracket either forward, back, up or down. (see Figure 11). The rear (baler) driveline fits either size front driveline.

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 12 - Tractor Drawbar and Power Take-Off

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 13). (see parts manual page 42 for parts description).

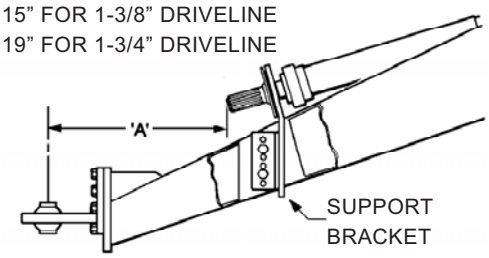


Figure 13 - Driveline

6. Assemble rear driveline to the baler clutch and the carrier bearing support. Install the front driveline between the bearing support and the tractor PTO shaft, making sure the proper diameter shaft has been selected.

7. The drivelines must be adjusted so the angle of

the tractor u-joint, ‘A’ Figure 4, and the angle of the center u-joint, ‘B’ Fig. 4, are equal. 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.

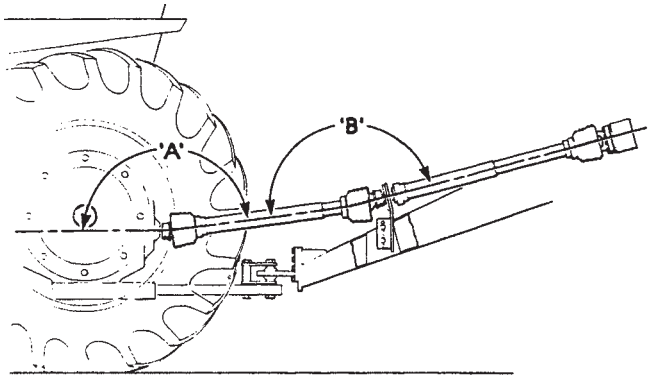


Figure 14 - Driveline

8. If equal angles are achieved at ’A’and’B’, (Fig. 4), either driveline phasing, (alignment of u-joint yokes), illustrated in Fig. 5 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 Fig. 5, (E). If angle at ‘A’ is greater than the angle at ‘B’, phase the yokes as shown in Fig. 5, (D).

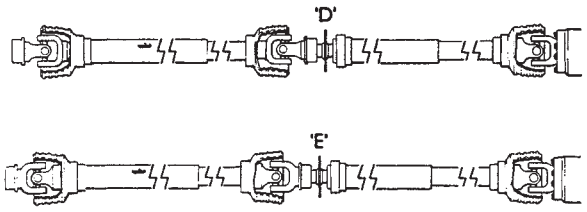


Figure 15 - Driveline

9. When all adjustments have been properly completed, ensure that the driveline does not interfere with the tractor drawbar, PTO shields or baler drawbar. 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.

CONNECT TAIL LIGHTS

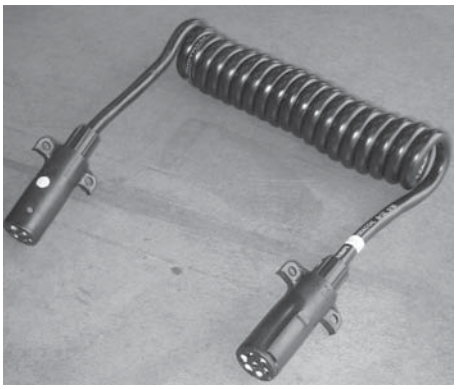


Figure 16 - 7 Pole Connector

- Connect seven-pole connector (see Figure 16) 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.

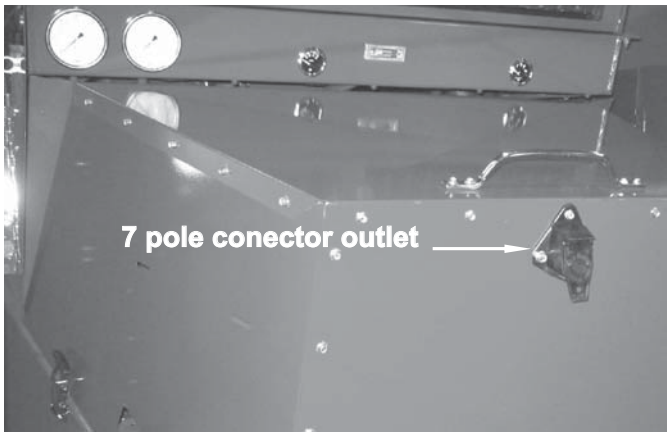


Figure 17 - 7 Pole Connector Outlet

CONNECT HYDRAULIC HOSES

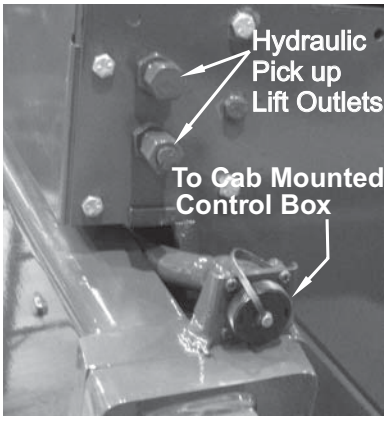


Figure 18 - Hydraulic and Electrical Outlets

- Ensure the style of couplers on hoses match the outlets on baler.
- Connect hoses from tractor of pickup lift outlets on baler (see Figure 18).
- Switch hoses at tractor outlets if auxiliary hydraulic control lever direction does not match desired movement of pickup lift.

INSTALL CAB MOUNTED CONTROLLER

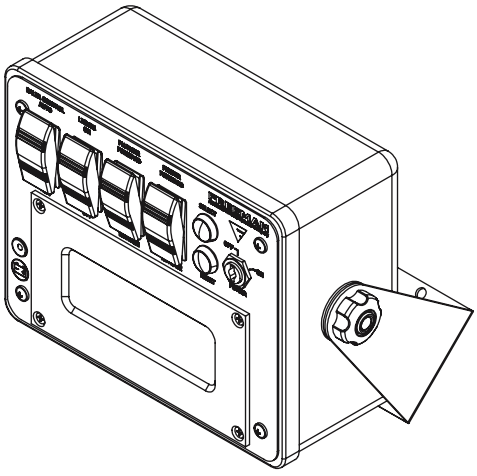


Figure 19 - Cab Mounted Controller

1. Mount controller at a convenient location near the operator.

NOTE: Check for mounting hardware clearance before drilling any holes.

2. Route wire harness from baler, to tractor (see Figure 18), and into bottom of tractor mounted controller.

PREPARE FOR TOWING

⚠	**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.
- Connect Safety Chain from baler to tractor.
- Hitch baler to tractor (refer to Attach Baler to Tractor in “Preparing the Equipment” section).
- Clean out any crop, chaff, or dirt that has accumulated on the pickup. Open shield and clean out any material that has accumulated around the pickup clutch.
- Raise pickup.
- Raise and secure discharge ramp.
- Ensure that a slow moving vehicle (SMV) sign is properly installed on rear of baler and is in good condition.

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.

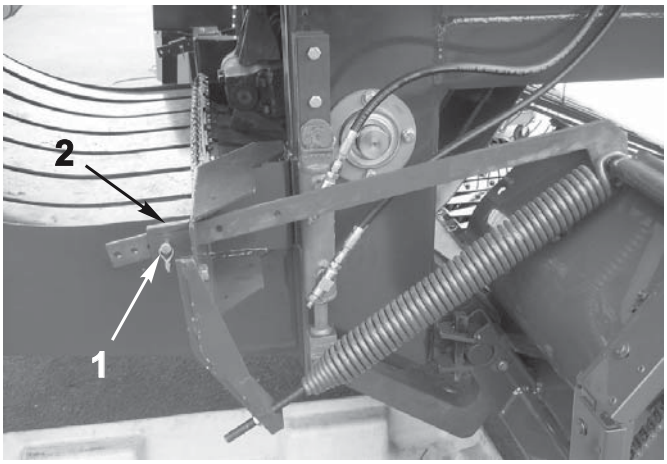


Figure 20 - Pickup Height

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.

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.

BOTTOM TWINES

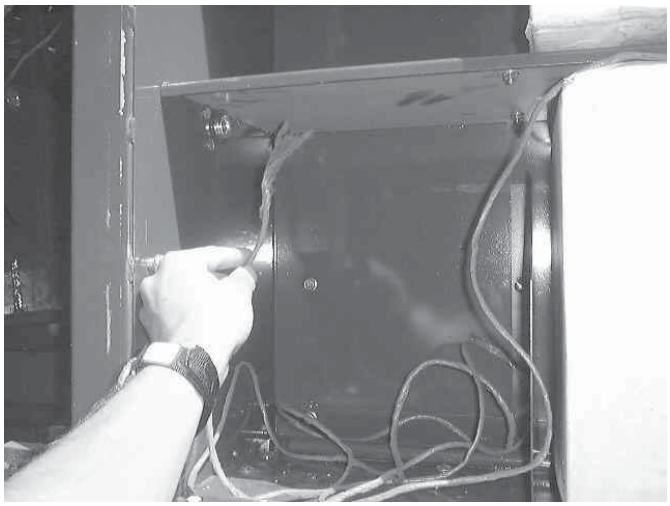


Figure 21 - Twine Routing

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 run it through the twine guide at the rear of the twine box.

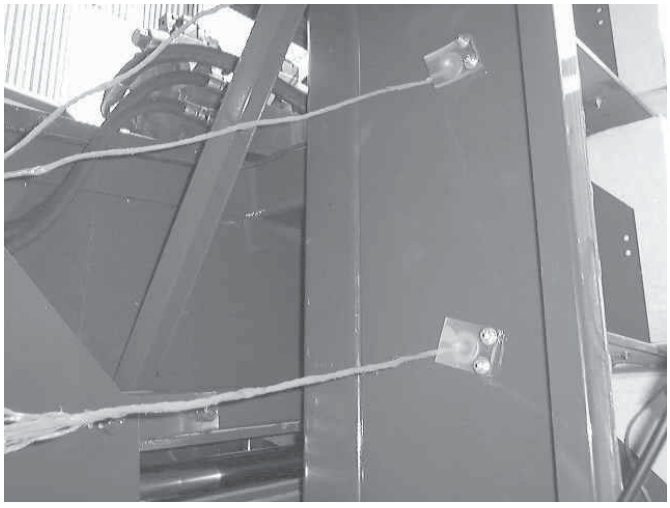


Figure 22 - Twine Routing

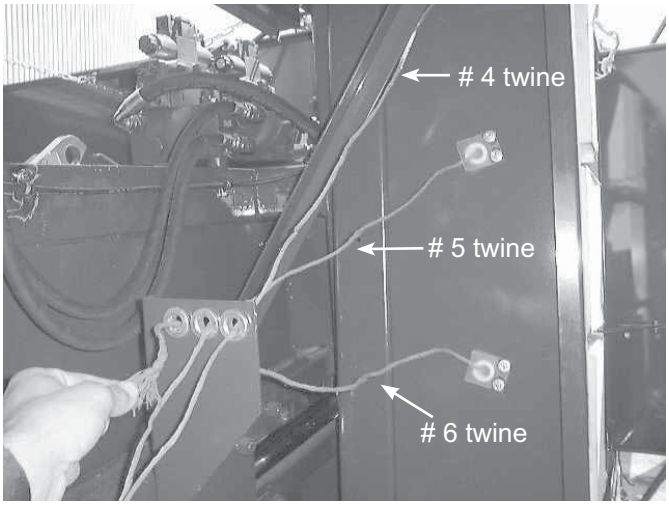


Figure 23 - Twine Routing

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.

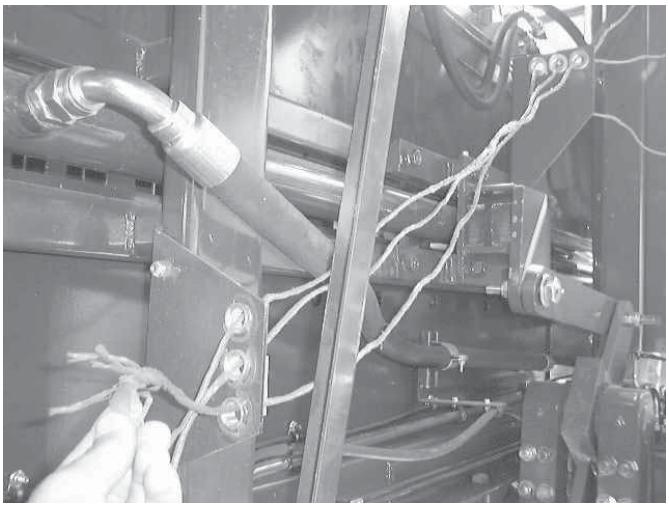


Figure 24 - Twine Routing

Route the twine to the lower most eye on the guide mount which is bolted to the rectangular frame member.

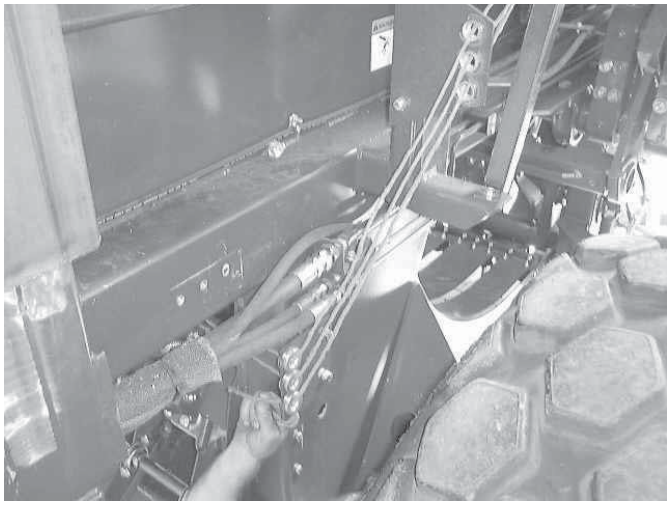


Figure 25 - Twine Routing

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

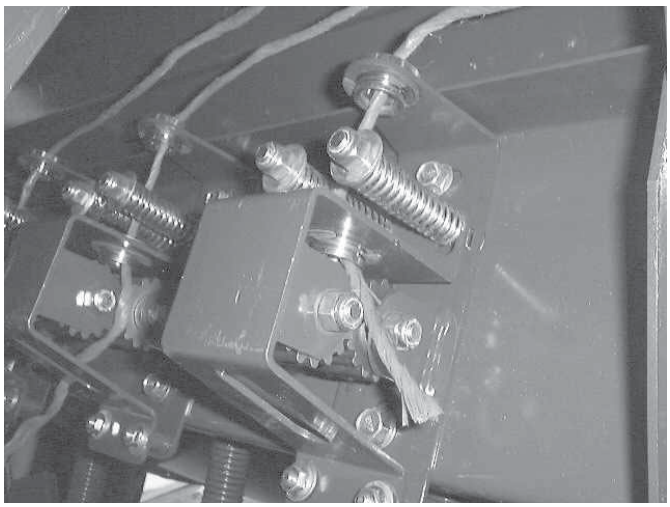


Figure 26 - Twine Routing

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

From there run 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.

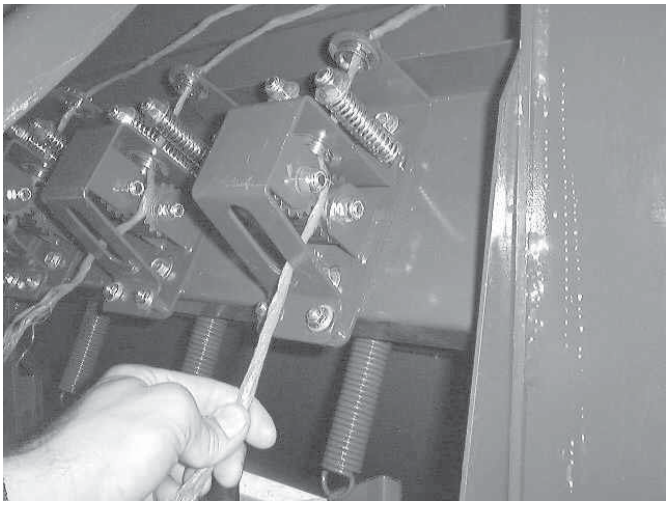


Figure 27 - Twine Routing

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.

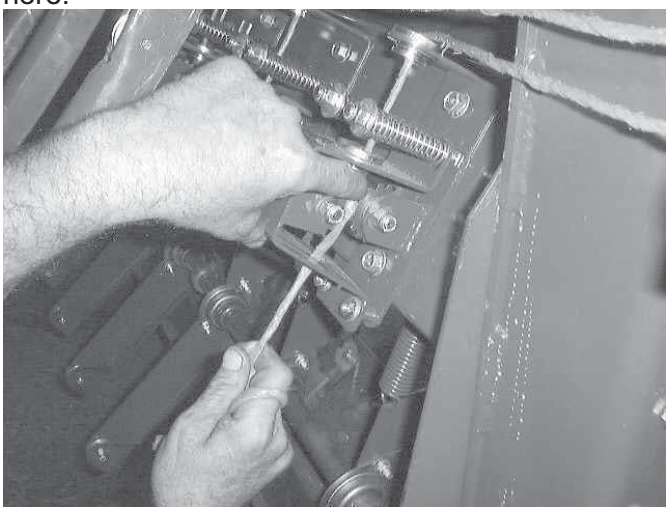


Figure 28 - Twine Routing

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.

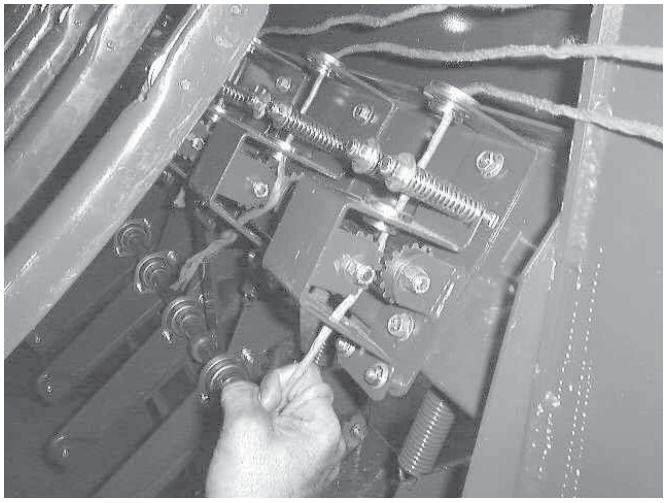


Figure 29 - Twine Routing

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.

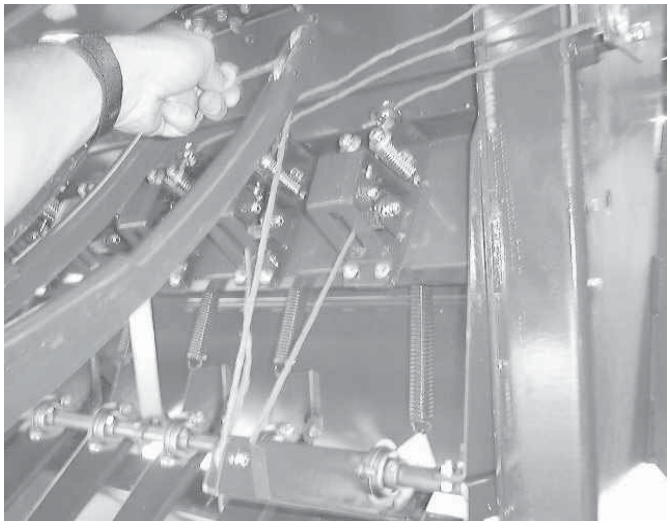


Figure 30 - Twine Routing

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 section page 15) 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.

All needles can be threaded in a similar manner, route the twine for the 3 left hand knotters in a pattern which mirrors that shown here.

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.

From the 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.

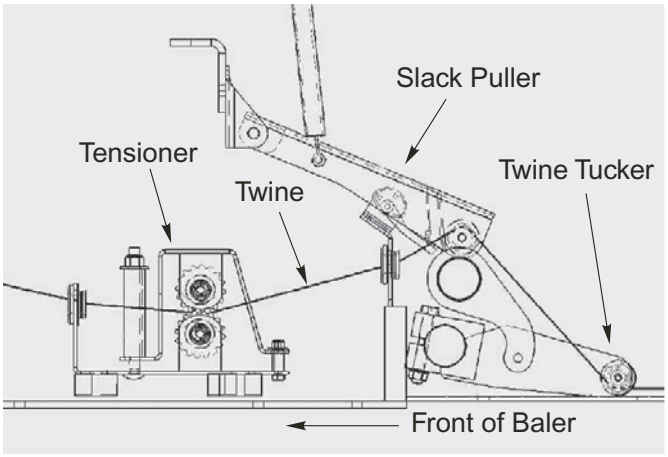


Figure 31 - Twine Routing

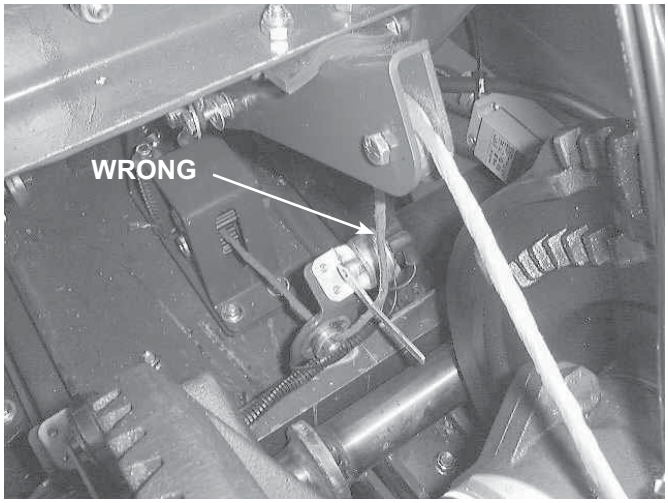


Figure 32 - Twine Routing

IMPORTANT! Be careful not to let twine loop around knot sensor switch arm between the twine guide and the slack puller.

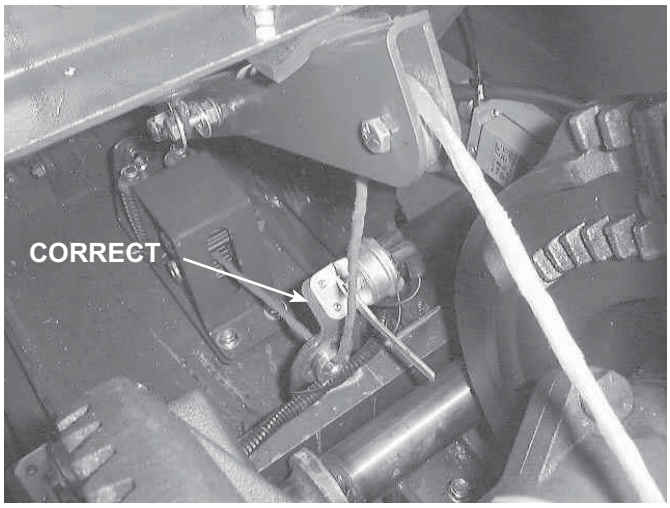


Figure 33 - Twine Routing

CONTROLS

BALER CONTROL BOX

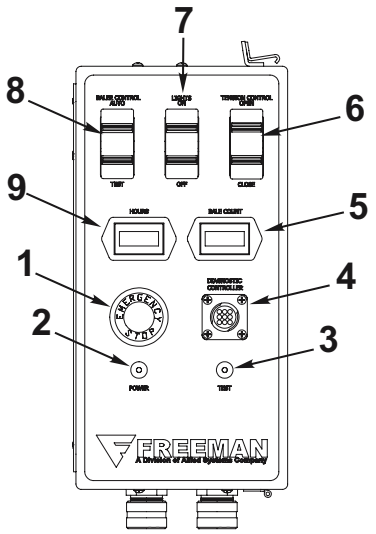


Figure 34 - Baler Mounted Control Box

1. **EMERGANCY STOP** Kills power to baler.

2. **POWER** Indicates when baler is turned on.

3. **TEST** Indicates when in test mode.

4. **DIAGNOSTIC CONTROLLER** Outlet for diagnostic controller.

5. **BALE COUNT** Indicates how many bales the baler has produced.

6. **TENSION CONTROL**
   OPEN/CENTER/CLOSE

   Manually pressurizes tension rails. Baler must be in TEST mode to manually open tension rails.

   Leave in center position when in AUTO mode for normal baling operation.

7. **LIGHTS** ON/OFF Turns baler lights on and off.

8. **BALER CONTROL** AUTO/TEST

9. **HOURS** Hours the baler has been in use. (Only counts when first feeder is in forward)

CAB MOUNTED CONTROL BOX

The cab mounted control box communicates with the DVC 10 via input from the operator controlled switches, and it receives data from the DVC 10; error messages, bale count, battery voltage etc.

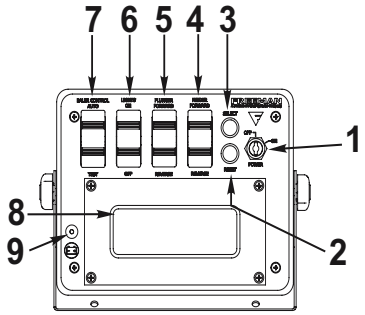


Figure 35 - Cab Mounted Control Box

1. **POWER** ON/OFF Ignition for key to turn baler power on & off.

2. **RESET** Button Push to reset field counts. Push to put knotters in home position when monitor displays.

3. **SELECT** Button Select between 3 separate fields with its own bale count.

4. **FEEDER** FORWARD/CENTER/REVERSE
   Rotates feeder forward and reverse.
   (Do NOT reverse feeder when the pick up is in the raised portion.)

5. **PLUNGER** FORWARD/CENTER/REVERSE
   Moves Plunger forward and reverse manually in TEST mode at half speed between LS-10 and LS-5..

6. **LIGHTS** ON/OFF Turns baler lights on and off

7. **BALER CONTROL** AUTO/TEST
   Switches Baler from auto to test mode.

8. **MONITOR** View commands and functions.

9. **LOW VOLTAGE INDICATOR** Life of alternator or battery.

DIAGNOSTIC MANUAL CONTROLLER

The 1592D is equipped with a Diagnostic Controller. This allows the operator to test the feed fork, plunger and knotters independently. This feature is to be used when testing, sevicing, adjusting or unplugging the machine.

WARNING. **Use of the Diagnostic Controller is limited to diagnosing particular baler setup operations and malfunctions. Any use other than those for which it is intended can lead to death or serious injury.**

WARNING. **Always look and see what function the Diagnostic Controller is in before pushing Forward or Reverse.**

Maintain a safe distance from moving components when using the Diagnostic Controller.

After diagnosing the baler malfunction, follow the Shutdown Procedure on page 23 before correcting the problem.

Figure 36 - Diagnostic Controller

1. **SELECTION KNOB** Use to move between different controls.

2. **REVERSE** Button Push to reverse the action the selector knob is pointing to.

3. **FORWARD** Button Push to forward the action the selector knob is pointing to.

4. **KNOTTER** Twist Selection Knob to the right to choose knotter.

5. **PLUNGER** Twist Selection Knob to center to choose plunger. (Plunger will not extend if needles are not in home position)

6. **FEED FORK** Twist Selection Knob to the left to choose the feed fork.

WARNING. **Use of the Diagnostic Controller is limited to diagnosing particular baler setup operations and malfunctions. Any use other than those for which it is intended can lead to death or serious injury.**

IMPORTANT: Operation of the Diagnostic Controller requires:

1. Tractor PTO remain engaged and run at 500 (maximum) PTO rpm.

2. BALER CONTROL on Baler Control Box be turned to TEST.

3. The controller key be inserted into POWER ignition on Cab Mounted Control Box and turned to ON.

4. Diagnostic Controller plugged into Control Panel.

Certain manual functions are limited to prevent damage to machine components.

- The plunger will not advance if the needle yoke is away from its home position.

WARNING. **Always look and see what function the Diagnostic Controller is in before pushing Forward or Reverse.**

- The needle yoke and knotter assembly will not operate in reverse through a portion of its total cycle.

FRONT PANEL

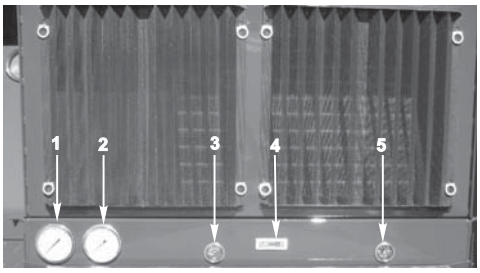


Figure 37 - Front Panel

1. Restriction Pressure

2. Plunger Pressure

3. Voltmeter
   Normal ..... 12.0 - 15.0 volts

4. Hydraulic Fluid Filter Condition Indicator

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

5. Hydraulic Fluid Temperature Gauge

   - Do not operate baler when fluid temperature is lower than 20°F (-7°C). If necessary to operate at low temperatures, contact a Freeman dealer.

   - 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.

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. See page 39 for Proper Operating Pressures

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 contacting due to heat and pressure, seals will become brittle and decompose into very small particles which creates an internal leak, which creates heat.

b. The pressure and the oil temperature that the baler is operated at determine the life of these 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.

d. Seal kits are relatively inexpensive and are easily changed.

See page 43 for operating temperature.

OPERATION

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.

Ejecting

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

OPERATING THE BALER

To start the baler and begin baling, the key switch on the Cab Mounted Control Box is turned on, the baler control switch is turned to the AUTO position and the feeder control switch is turned to FORWARD. On the main control box, the EMERGENCY STOP switch must be pulled out to operate, the bale control switch must also be in the AUTO position, and the tension control switch in the center position.

When power is applied, the DVC-10 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 dealers name and reminding you that the Freeman baler is the “Best in the Field”. Next, the baling screen (see Figure 35 page 16) comes on and the feeder, pickup and feed fork should start to rotate.

Two components must be in the home position before the baling process can begin; the plunger and knotter. If, when power is applied, the DVC -10 finds the plunger away from the home position (see Figure 104 page 52 and Figure 65 page 32), a message “resetting plunger” appears on the display screen on the tractor mounted control box. The DVC -10 automatically returns the plunger to the home position, and the baling screen will appear. This message is a result of the program looking for a signal from the plunger stop or home sensor, LS-10, and not receiving a signal from the sensor. Once the plunger is returned LS-10 sends the signal telling the DVC-10 the plunger is home and the baling screen appears and the baler starts.

If the knotter is away from the home position (see Figure 65 page 32) when the DVC-10 is turned on, a message displays on the tractor mounted control box (see Figure 42 page 22). At this time you have 2 choices, either reset the knotter from the tractor cab, or manually return the knotter. You can reset the knotter to the home position by holding down the reset button on the tractor mounted control box (see page 16). When the reset button is pushed, the knotter will rotate forward and stop in the home position at LS-1 position (see page 56). LS-1 then sends the signal that the knotter is home and this screen will change to the baling screen (see page) and the baler will start. Or if you prefer, return the knotter to the home position using the Diagnostic Controller. see page 17

For error codes see page 66.

The Baler should be allowed a warm up a period 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 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 the baler. The operator can unplug the first feeder by simply pushing the Feeder rocker in forward or reverse. 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.

MONITOR MESSAGES

There are many messages that your cab mounted control box may display. The Following are some examples of what your control box monitor will display and what they mean. For error codes, see page 66.

Bailing Screen

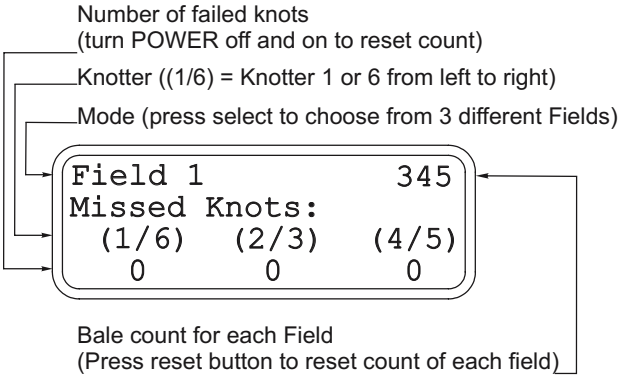


Figure 38 - Field 1 AUTO Mode

The baling screen shows bale count & missed knots. The cab mounted control box will save up to three separate bale counts. The current field count that is shown on the display is the only count being advanced when the knotter cycles. When the select button (see page 16) is pushed, the field count then shows Field 2 and the resulting bale count will be displayed. The field that is displayed (Field 1, Field 2, Field 3) is the active field that is being counted. To reset the bale count to zero, hold the reset (see page 16) until the count returns to zero. Only the field count displayed will be reset.

When the knotter cycles, the baling screen will flash once every time the plunger strokes, for 4 plunger strokes. The screen flashing alerts you that the knotter has cycled, and when the flashing stops, if the counts remain at zero, all knots were tied successfully. If a knot indicator registered a miss, it will advance one digit.

The screen in Figure 39 shows that the knotter has cycled six times, and had a miss tie on either the number 1 or the number 6 knotter or both. The number of miss ties will remain on the screen until power is cycled off and then on. Bale counts are not affected by power cycling.

Baling Screen Continued

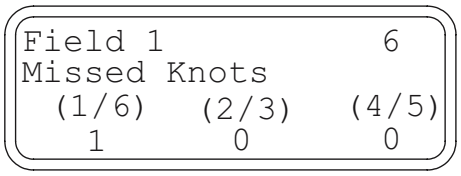


Figure 39 - Baling Screen / missed knot

Baling Screen Continued

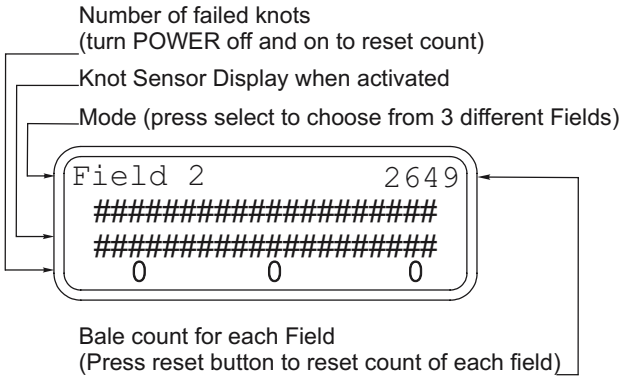


Figure 40 - Knotter Cycling, Knot Sensor Activated

Error Messages

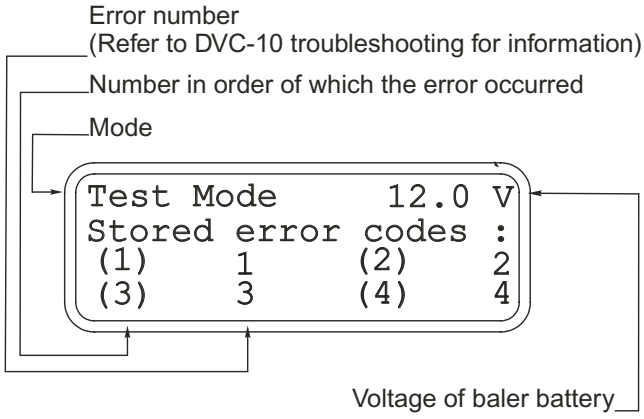


Figure 41 - Knot Errors Displayed

Error messages will stay on the screen until another error occurs or the error codes have been reset. When another error displays, the last error will move to indicator 2,3 or 4.

(1) = Most recent error.
(2) = Previous
(3) = Previous
(4) = Previous

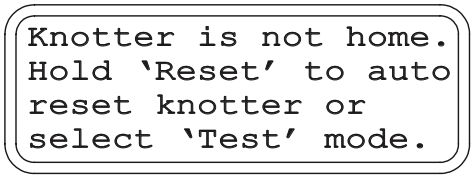


Figure 42 - Knotter is not in the Home Position

This message will display when the knotter is away from the home position.

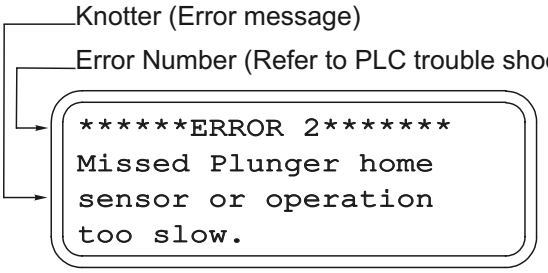


Figure 43 - Error 2

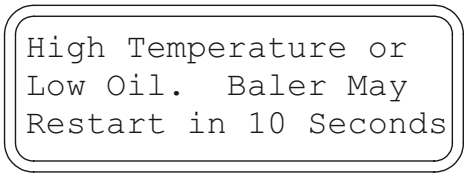


Figure 44 - High Temperatur / Low Oil Warning

See Operating Temperature on page 43.

START PROCEDURE

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

2. Push Baler Control to AUTO

3. Engage PTO to 500 RPM (maximum)

4. Turn key on (Here the DVC-10 will run system checks for a brief delay before the bailing screen will display. The DVC-10 may find a startup error and prompt you to fix the error. Follow the on screen instructions.)

5. The Baling screen displays and you are ready to bale (see Figure 38 page 21)

SHUT DOWN PROCEDURE

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

2. Set tractor park brake.

3. Turn POWER key to OFF on Cab Mounted Control Box or push EMERGENCY button on Baler Control box.

4. Shut off tractor engine and remove key.

⚠	**WARNING: Baler components can move if the flywheel is still turning - causing death or serious injury. Flywheel coastdown 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.

ARRIVING AT THE FIELD

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

1. Lower pickup.

2. Adjust pickup height.

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

4. Insert controller key into POWER ignition and switch baler control to AUTO.

5. Start tractor and run at low RPM.

6. 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).

NOTE: Pickup, feeder, and feed forks will be operating.

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 6000 psi. Type and condition of crop may need pressure adjustments to get the density you like.

The density pressure unloader valve located on the right rear of the machine, (see Figure 46), is equipped with an adjusting screw to allow the operator to make changes in bale density. Turning the adjusting screw clockwise will increase bale density. A counterclockwise adjustment will reduce bale density. Observe changes in plunger pressure after each adjustment of the unloader valve. Several plunger strokes may be necessary to normalize the pressure setting.

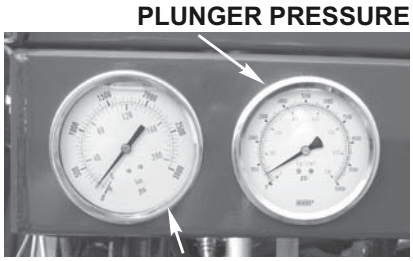


Figure 45 - Pressure Gauges

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

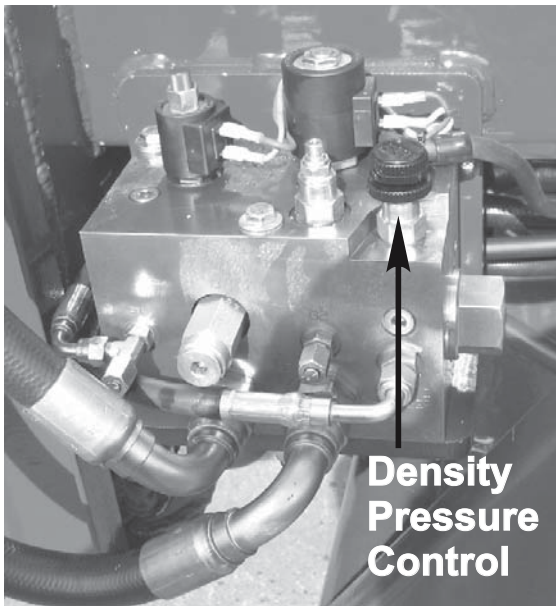


Figure 46 - Unloader Valve

BALE LENGTH

Adjustment Bar Setting	Approximate Bale Length	
	Feet	Meters
#1 - 5	3 - 4	0.9 - 1.2
#5 - 10	4 - 5	1.2 - 1.5
#10 - 15	5 - 7	1.5 - 2.1
#15 - 20	7 - 8	2.1 - 2.4
#20 - 23	8 - 9	2.4 - 2.7

Figure 47 - Adjustment Settings

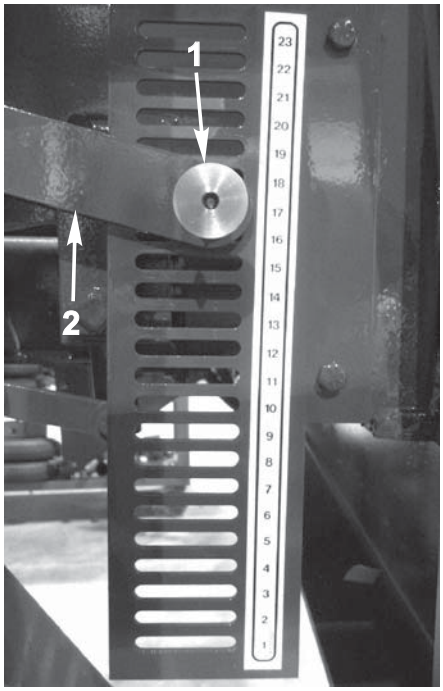


Figure 48 - Bale Length Adjustment

To adjust.

1. Pull out locking pin (1).

2. Raise adjustment bar (2) to increase bale length; lower to reduce.

   NOTE: Bale sizes are approximate and vary in size depending on crop and baling conditions.

   IMPORTANT: If sizing bales for shipment, ensure that bales do not exceed maximum shipping width. Bale lengths can vary 6" (152 mm) at any particular setting. Windrow to distribute crop in the bale chamber.

TYING OFF 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 discharge ramp 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).

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

2. After the knotting cycle is complete, the baling screen will flash for four strokes of the plunger. If there is a mistie on any of the twines, the baling screen (see Figure 35 page 16) will display which knotter mistied (refer to Install Twine in “Preparing the Equipment” section page 12).

The DVC-10 will check for misties after every knotting cycle.

3. Resume baling.

WARNING: Knotters can cause serious hand injuries. Keep hands out during operation.

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

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.

NOTE: The unplugging operations can be done with the use of the Baler Controller and do not require the use of the Diagnostic Controller.

UNPLUG FEEDER

Plugging the feeder is typically caused by over-feeding material into it. Reduce ground speed as necessary to prevent plugging,

TO UNPLUG:

1. Turn and hold Baler Control to REVERSE. This will reverse the direction of the feeder and eject the plugged material from it.

2. Return Baler Control to FORWARD AUTO, and push Start Switch to resume normal operation.

3. If plug was not fully removed, repeat steps 1 and 2 as necessary to remove plug.

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

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:

IMPORTANT: The plunger can not be extended if the twine needles are extended. If extended, refer to Position Twine Needles in “Maintenance and Adjustments” section for directions to retract them.

1. Switch Baler Control to TEST.

2. Fully extend plunger using Manual Plunger Control.

3. Return Baler Control to FORWARD AUTO, and push Start Switch to resume normal operation.

NOTE: Depending on length of bale in chamber, knotters can cycle when Start Switch is pushed.

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

EMPTYING THE BALE CHAMBER

1. Disengage tractor PTO. Shut off tractor and lock tractor brakes and/or transmision. Wait for all movement in baler to cease.

2. Fully lower bale length adjustment bar to make the smallest bale possible (see page 24).

3. Engage tractor PTO and run baler at 500 PTO RPM in TEST mode.

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.

4. Start tractor and run PTO at 500 rpm and switch Baler Control to TEST.

5. Push TENSION CONTROL switch to OPEN on the baler control box.

6. Fully extend plunger using the Diagnostic Controllerl. Hold switch until the Plunger Pres sure Gauge reaches approximately 6,000 psi (413 bar). This will release the pressure applied to the sides of the bale.

6. Disconect Diagnostic Controller, switch baling operation to AUTO.

WARNING.- Discharge ramp can be slippery and cause injury if you fall. Use caution when mounting, dismounting, and working upon ramp to remove a bale.

7. Produce one or more bales to push the previous, higher density bale out. The remaining bale in the chamber is low density and easy to remove.

NOTE.- Obtaining a bale of low enough density to remove may require baling two to three bales.

8. Follow Shutdown Procedure (page 23) and remove bale from chamber.

9. Open Density System Shutdown before resuming baling.

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 each 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 49), 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.

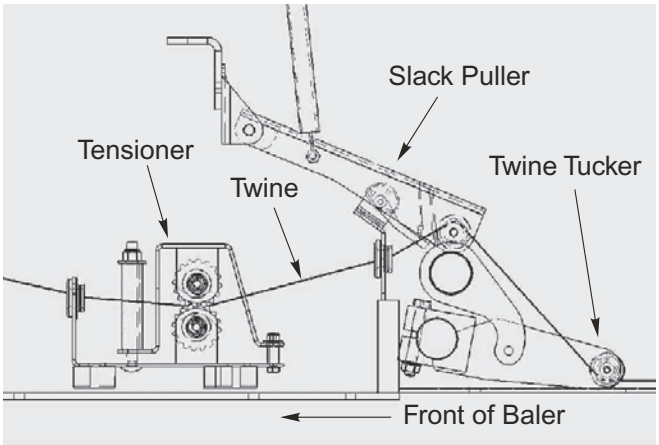


Figure 49 - Slack Puller to Twine Tucker

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 50). 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.

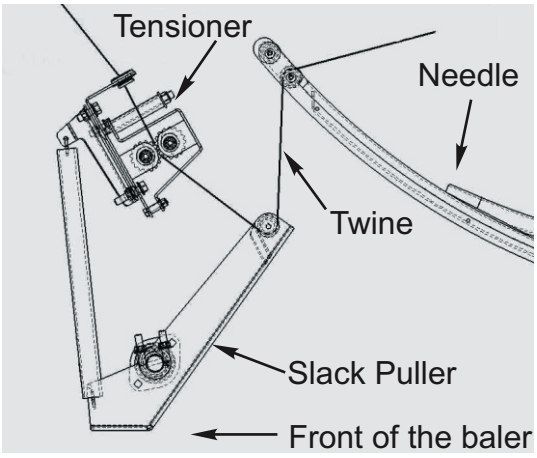


Figure 50 - Slack Puller to Twine Needle

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 51) in order to pass the twine under the finger.

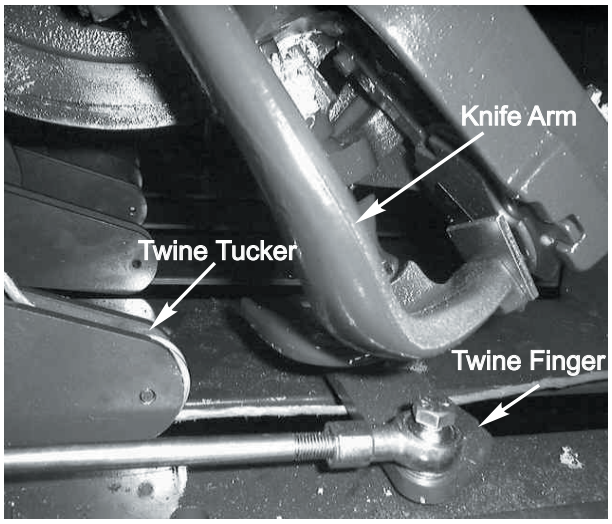


Figure 51 - Twine Tucker in Low Position

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.

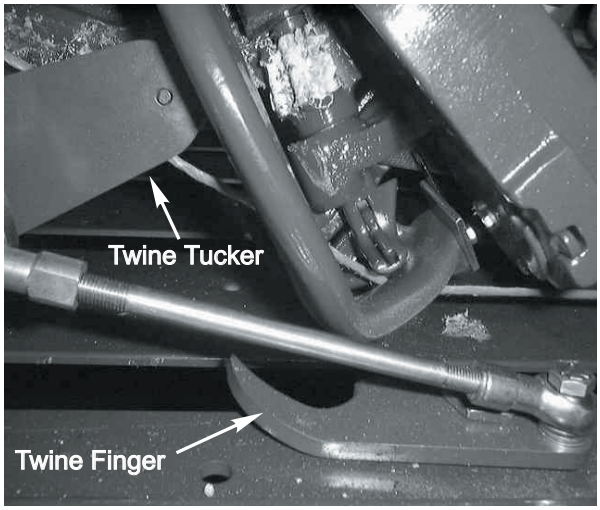


Figure 52 - Twine Tucker Rises

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.

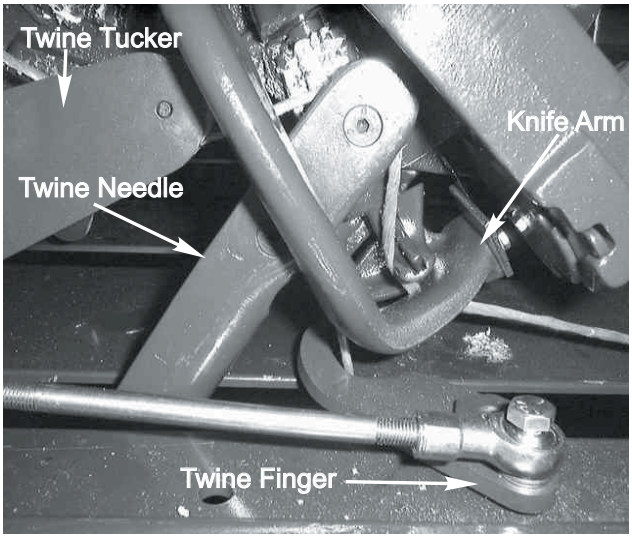


Figure 53 -Knife Arm V

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

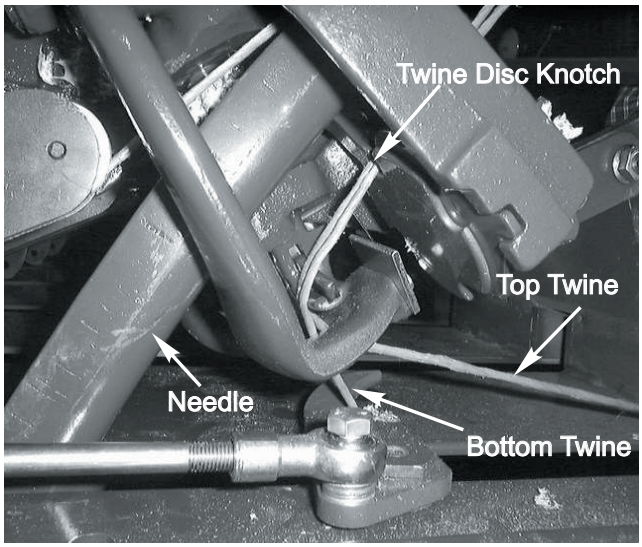


Figure 54 - Twine in Twine Disk Knotch

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.

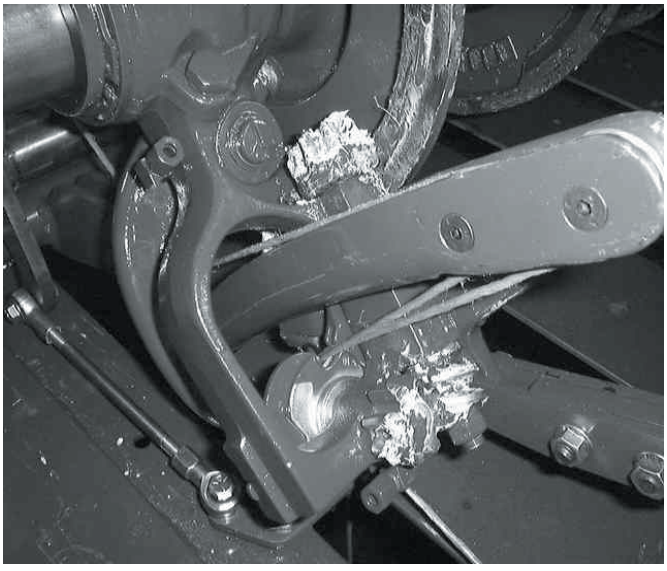


Figure 55 - Twine Disk Gripping Top & Bottom Twines

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

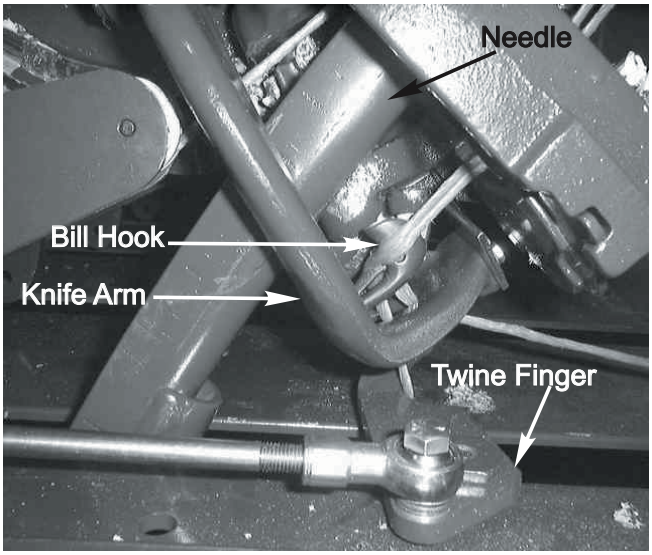


Figure 56 - Twine on Bill Hook

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°.

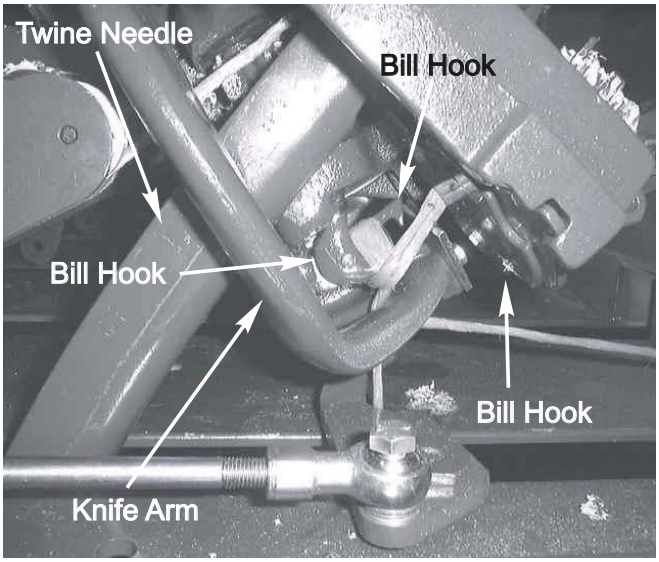


Figure 57 - End of First Knot

When the trigger closes over the twines (see Figure 57), 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 58) 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.

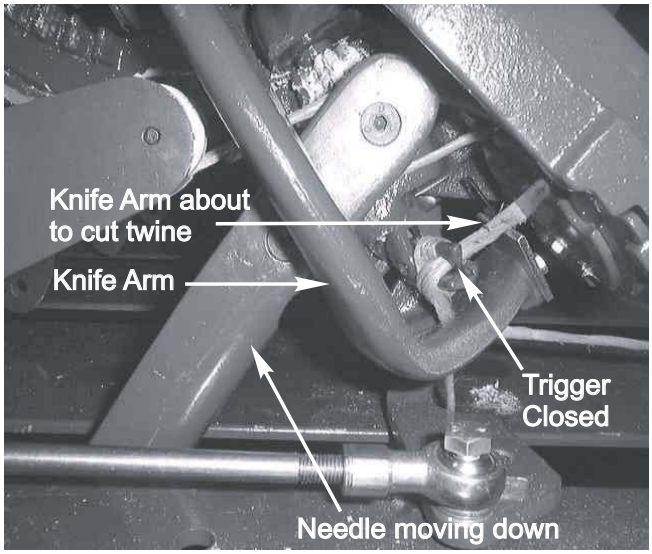


Figure 58- Twine Needle Yoke in Home Position

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.

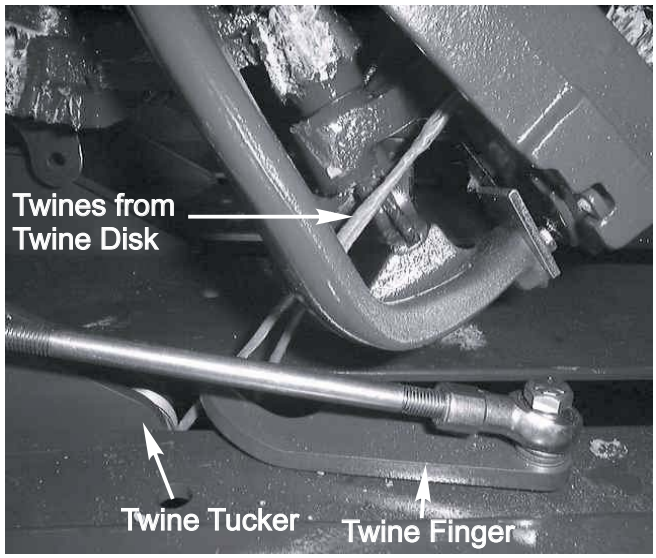


Figure 59 - Twine Needle Yoke in Home Position

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 up. As the slack puller rises it releases the arm for the knot sensor switch, this causes your cab mounted monitor display to flash to flash.

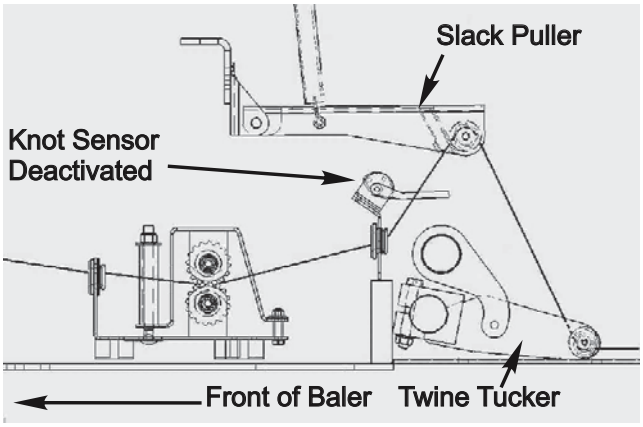


Figure 60 - Knot Sensor

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.

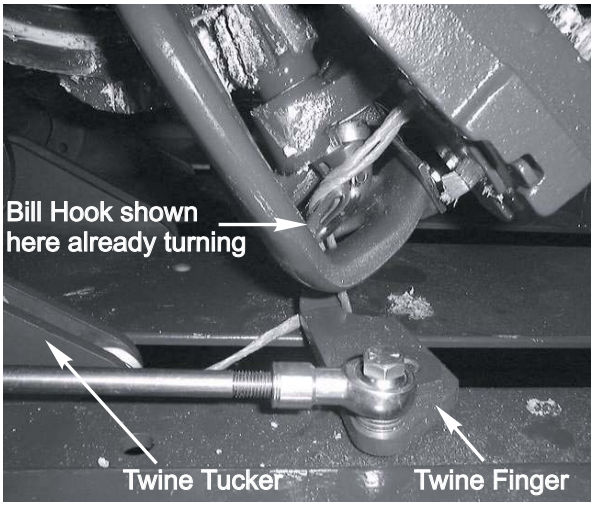


Figure 61 - Bill Hook Turning

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 62).

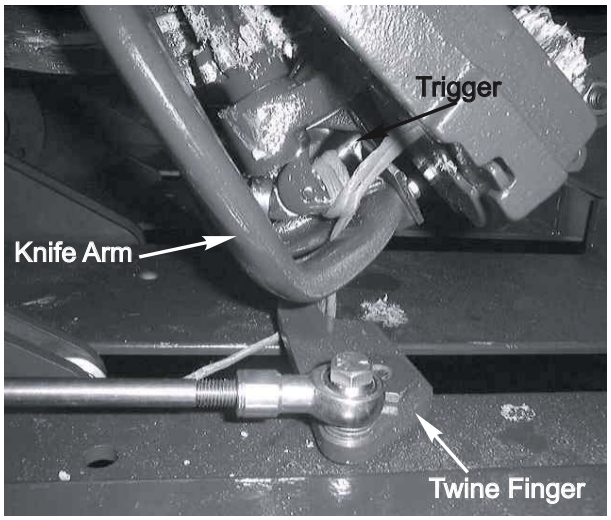


Figure 62 - End of Second Knot

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. It should only take 3 or 4 plunger strokes for the top slack puller to be pulled down by the twine far enough to activate the knot sensor.

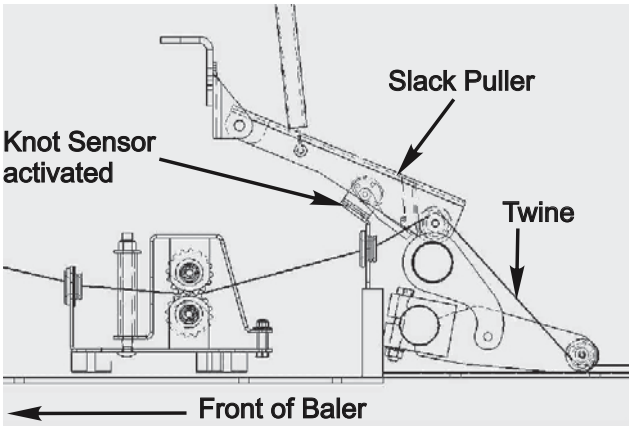


Figure 63 - Twine Needle Yoke in Home Position

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 64 - Twine Needle Yoke in Home Position

MAINTENANCE AND ADJUSTMENTS

CAUTION! MANY OF THE PROCEDURES OUTLINED BELOW REQUIRE THE USE OF THE MANUAL CONTROLLER. THE MANUAL CONTROLLER WILL ALLOW THE OPERATOR TO POSITION MACHINE COMPONENTS SUCH THAT THEY MAY BE INSPECTED OR ADJUSTED. DO NOT OPERATE THE MACHINE WITH THE MANUAL CONTROLLER UNLESS YOU ARE FAMILIAR WITH ITS USE. ALWAYS RUN THE MACHINE AT THE LOWEST POSSIBLE PTO SPEED WHEN USING THE MANUAL CONTROLLER. STAY WELL CLEAR AND KEEP OTHERS CLEAR OF ALL MOVING PARTS WHILE USING THE MANUAL CONTROLLER. ONCE THE MACHINE IS IN THE DESIRED POSITION, TURN OFF THE MACHINE AND DISENGAGE THE PTO BEFORE PERFORMING ANY WORK.

IMPORTANT! Before running the knotter using the manual controller, 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.

POSITION TWINE NEEDLES

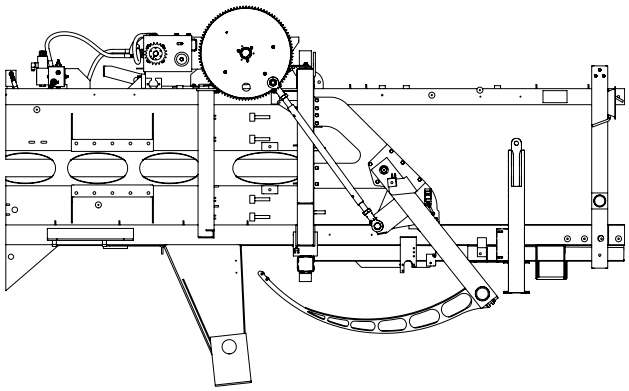


Figure 65 - Twine Needle Yoke in Home Position

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

WARNING. Use of the Diagnostic Controller is limited to diagnosing particular baler setup operations and malfunctions. Any use other than those for which it is intended can lead to death or serious injury.

1. Set Function Selector on your Diagnostic Controller to KNOTTER.

WARNING: Maintain a safe distance from moving components when operating the baler with the Diagnostic Controller.

2. Open side panel of baler to view yoke movement.

3. Push and hold the Forward/Reverse Switch to FORWARD and cycle the knotter until the twine needle yoke has returned home.

NOTE: Release Forward/Reverse Switch when twine needle yoke has fully returned home - it will not stop automatically.

4. Remove Diagnostic Controller and return controls to original settings (refer to Diagnostic Procedure).

5. Follow Normal Shutdown Procedure.

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.

Knot Sensor: The knot sensor indicates whether a bale has been tied successfully or not. The knot sensor is activated by the top slack puller. Normally the light will turn on each time a bale is tied then go out after three or four plunger strokes. A light which never comes on, or stays on without blinking for more than six strokes, indicates a missed knot or a sensor malfunction.

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 65 page 32), or with the twine finger cam follower positioned on any of the three high points of the twine finger cam.

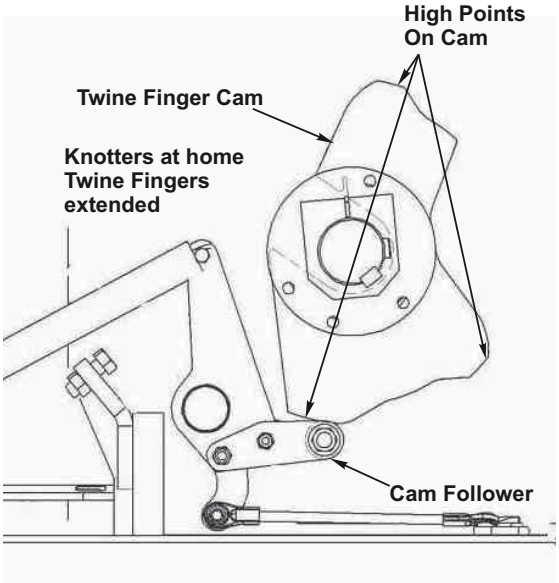


Figure 66 - Twine Finger Cam

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.

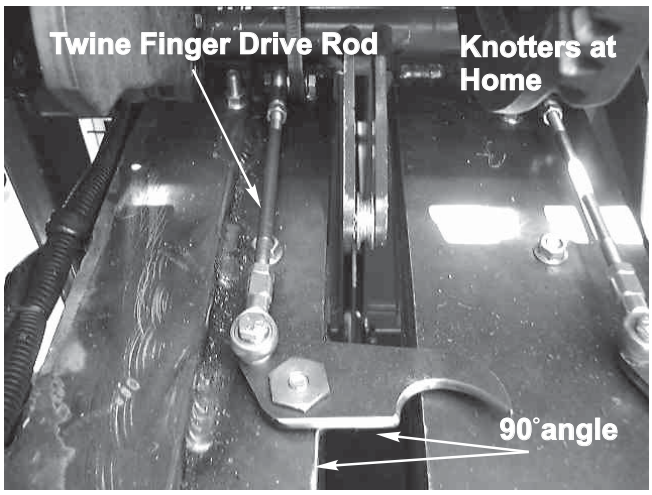


Figure 67 - Twine Finger Drive Rod

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.

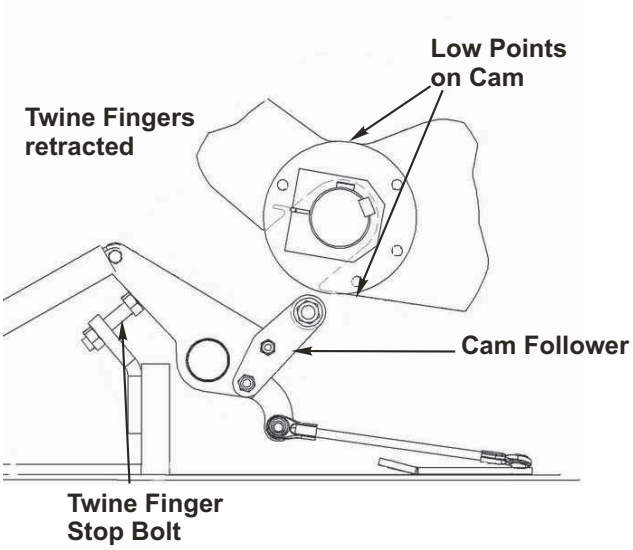


Figure 68 - Cam Follower

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.

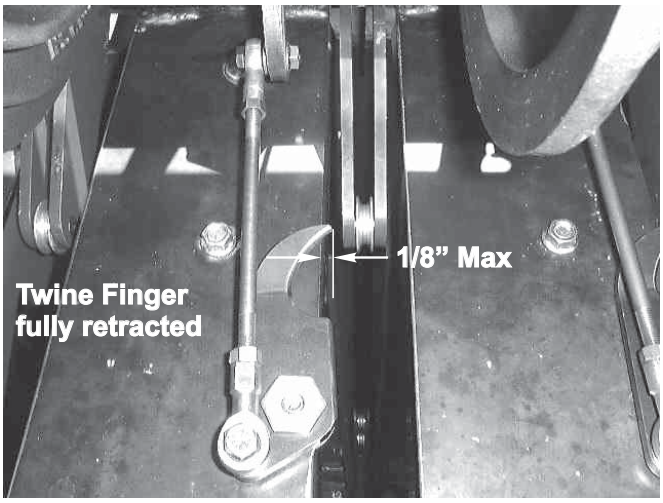


Figure 69 - Twine Finger 1/8" Past Needle Slot

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.

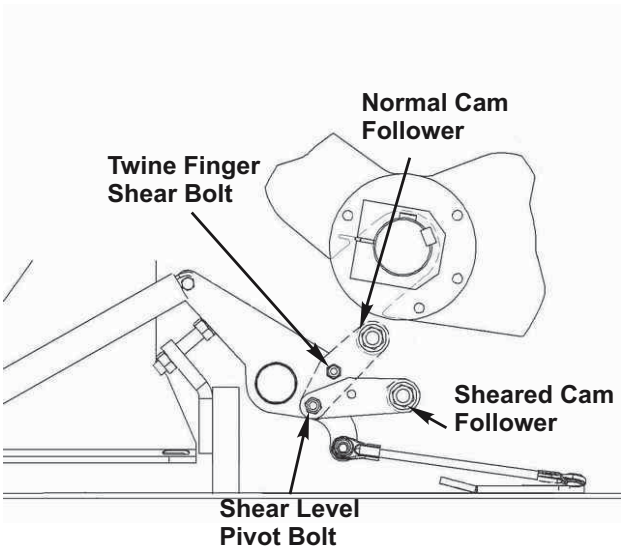


Figure 70 - Twine Finger Shear Bolt

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 manual controller 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 71 on Page 36). 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.

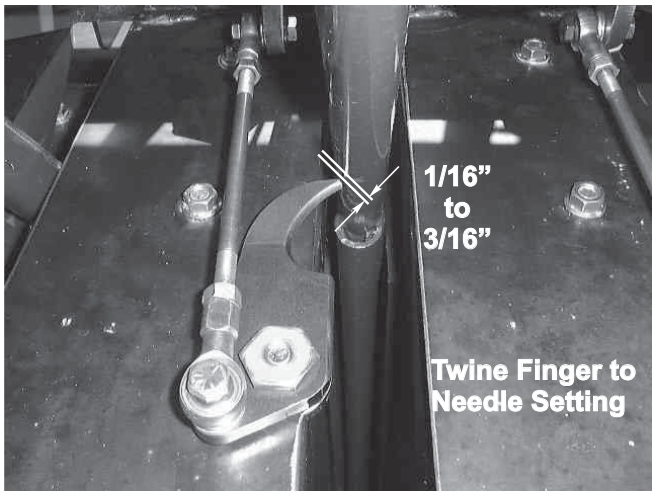


Figure 71 - Twine Needle Yoke in Home Position

Run the knotters until the needles are at the very top of their stroke (see Figure 72). 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 needles slots. This adjustment is made by loosening the needle mounting bolts at the base and sliding the needles either to the left or right.

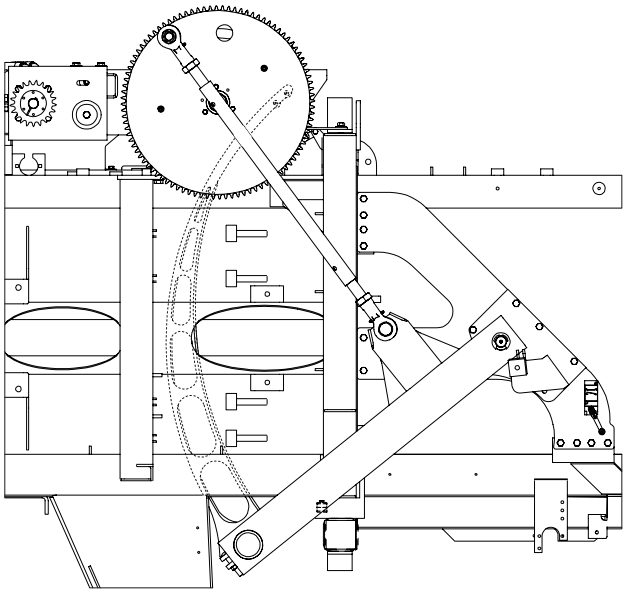


Figure 72 - Needles at top of stroke

The distance from the twine disc to the center of the lower needle roller should be 6 1/2” (see Figure 73). Adjust the needle yoke drive arms longer or shorter to change the amount of needle penetration.

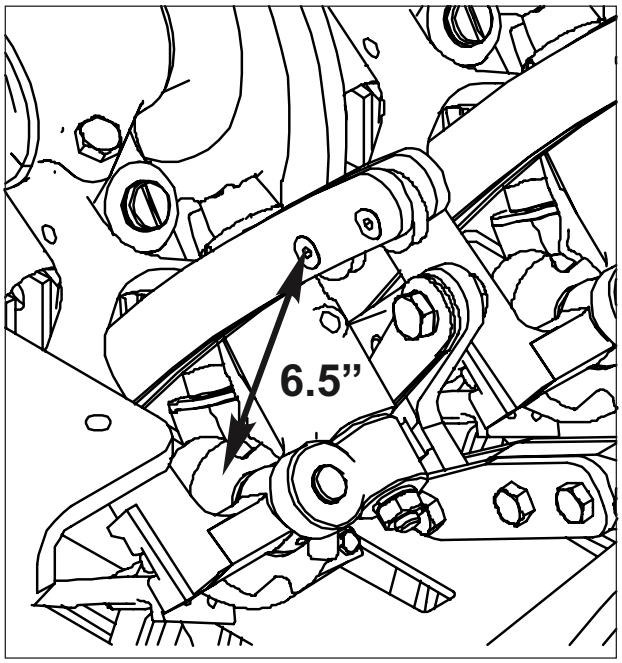


Figure 73 - Needle Height from Twine Disk to Bottom Screw in Needle

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 ride 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 manual controller to run the knotter until the top needle rollers are in line with the twine tucker rollers.

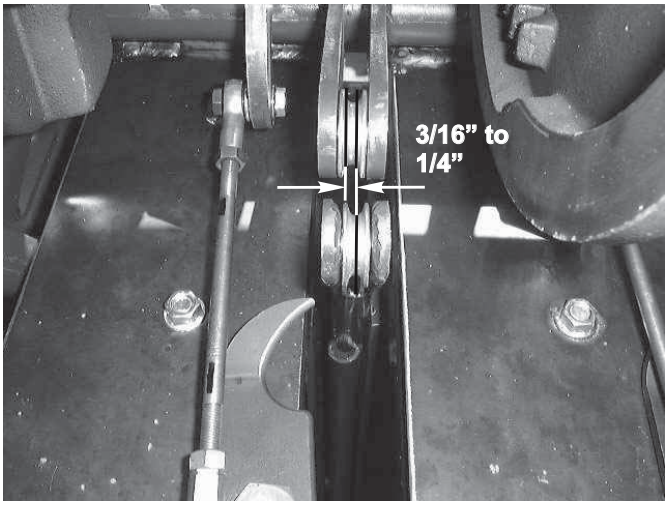


Figure 74 - Twine Tucker Needle Roller Alignment

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 78 page 38) 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.

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.

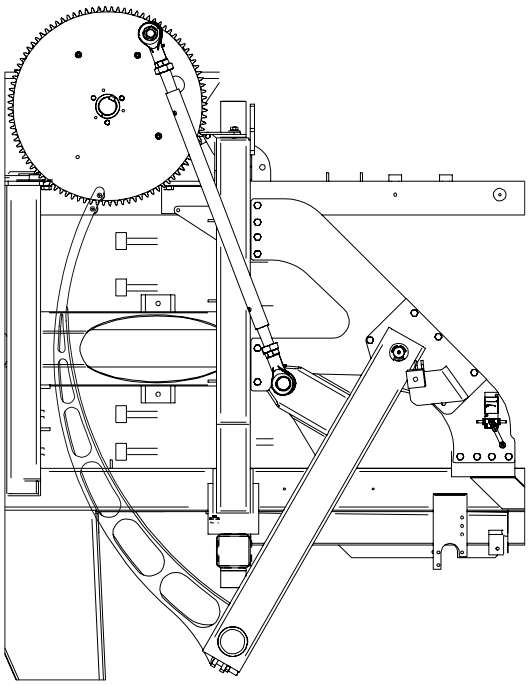


Figure 75 - Needle on Up Stroke

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

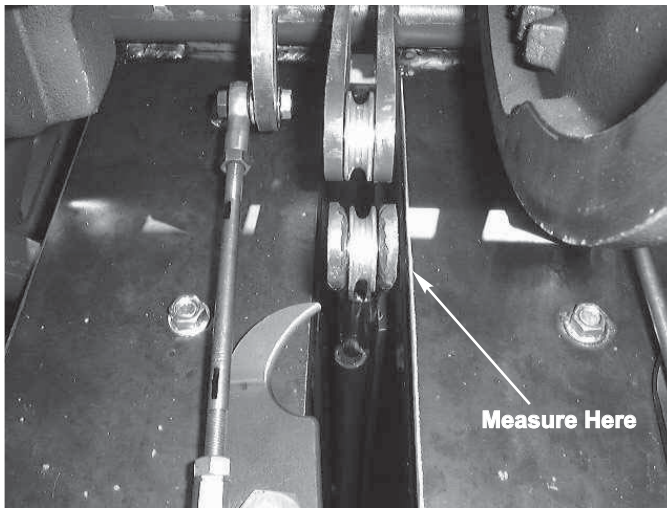


Figure 76 - Needle Slot Measurment

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.

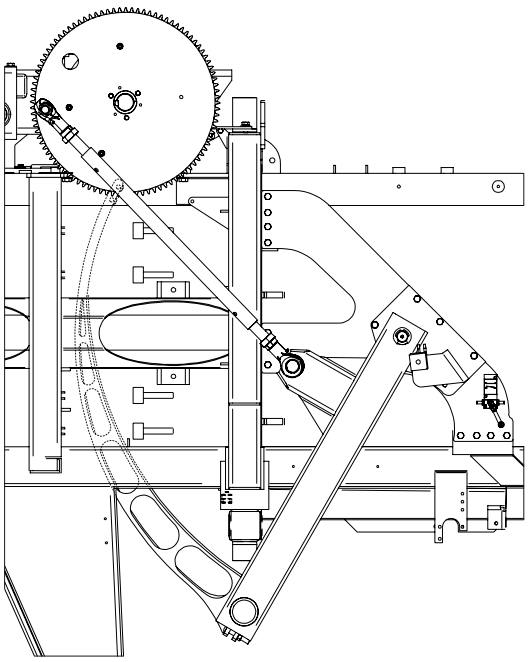


Figure 77 - Needle on Down Stroke

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.

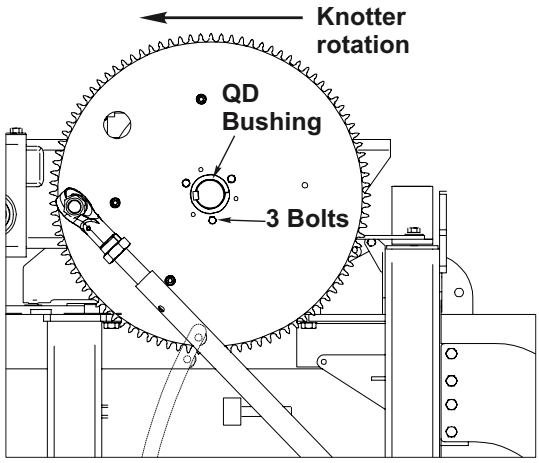


Figure 78 - QD Bushing

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.

PROPER OPERATING PRESSURES

MAIN SYSTEM EXTEND PRESSURE:

1. Unplug LS-5

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

3. Set the control mode switch to TEST on baler control box.

4. Plug in the Diagnostic Controller and use it to advance the plunger until it stalls.

5. Read the plunger pressure gauge on the left side of the front gauge panel of the baler as illustrated in Figure 79. It should read approximately 6,500 psi.

6. Disengage tractor PTO, shut off tractor and lock tractor brakes and/or transmission. Wait for all movement in baler to cease. Plug in LS-5 (see Figure 101 page 50).

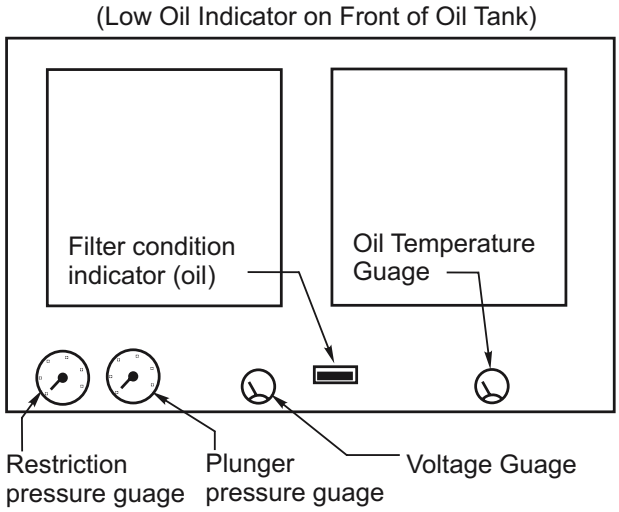


Figure 79 - Front Panel

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 80 (Retract pressure gauge port is labeled with a stamped “B”). Connect a 5,000 psi gauge to the retract pressure gauge port.

3. Unplug LS-10.

4. Switch the control mode to TEST. Engage PTO.

5. Plug in the Diagnostic Controller and use it to retract the plunger until it stalls.

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

7. Disengage tractor PTO, shut off tractor and lock tractor brakes and/or transmission. Wait for all movement in baler to cease. Plug in LS-10 (see Figure 102 page 50).

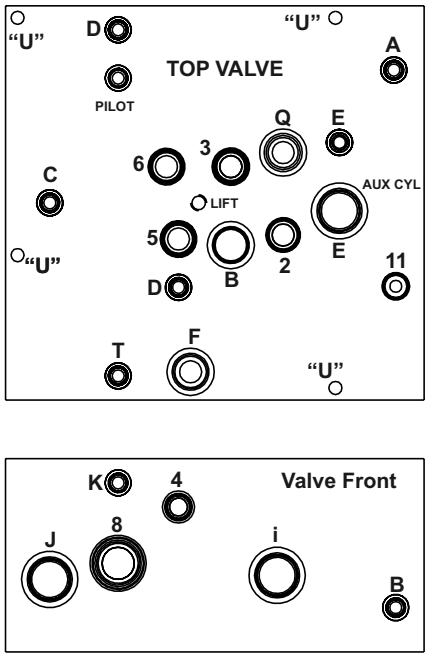


Figure 80 - Main Valve

CHARGE PRESSURE

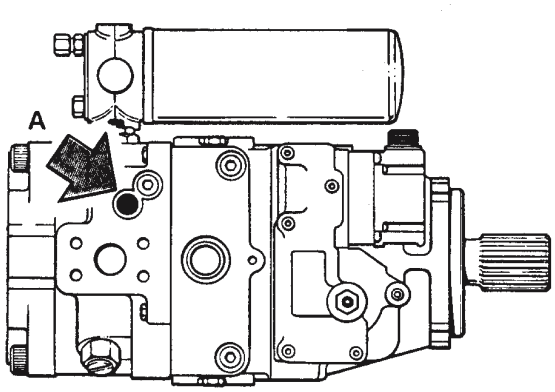


Figure 81 - Twine Needle Yoke in Home Position

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 81).

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. Set the control mode switch to TEST on either the baler control box or the cab mounted control box (see page 16).

8. Plug in the Diagnostic Controller and use it to advance the plunger and read the pressure on the 600 psi gauge. It should read a minimum of 350 psi while 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 81).

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. Keep the FEEDER switch on the cab mounted control box in the center position (see page 16).

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

7. Push the FEEDER switch in the forward position .

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

8. 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 81).

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. Set the control mode switch to TEST on baler control box.

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. Depress the Forward button on the Diagnostic Controller and read the pressure on the 5,000 psi gauge. It should read 3,500 psi.

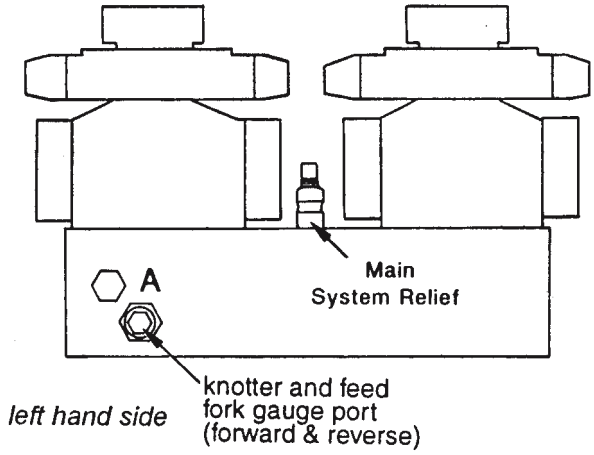


Figure82 - Twine Needle Yoke in Home Position

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 82).

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. Set the control mode switch to TEST on baler control box.

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 with the Diagnostic Controller until the chain becomes taut. NOTE: The feeder will stall.

9. Depress the feed fork button and read the pressure on the 5,000 psi gauge. It should read 2,000 psi.

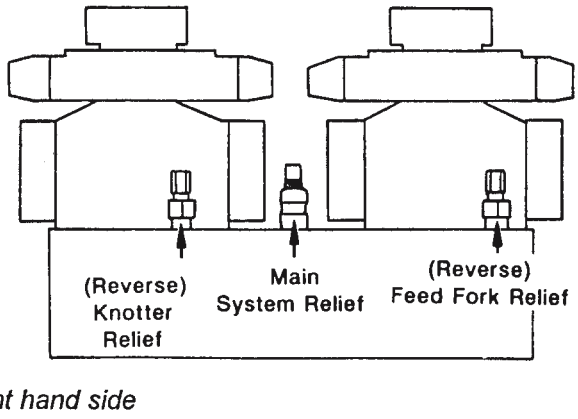


Figure 83 - Twine Needle Yoke in Home Position

KNOTTER PRESSURE (REVERSE):

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

2. Set the control mode switch to TEST on baler control box.

3. Plug in the Diagnostic Controller and set to Knotter.

4. Slowly reverse the Knotter with the Diagnostic Controller until the needle yoke is at mid-stroke (see Figure 84).

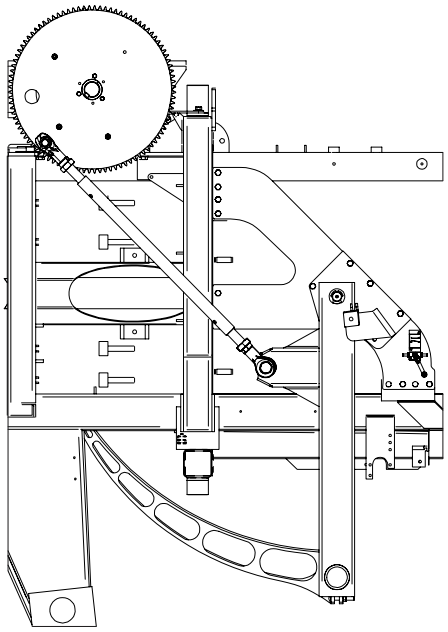


Figure 84 - Twine Needle Yoke in Mid-Stroke Position

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 82).

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 85).

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 with the Diagnostic Controller until the chain is taut. NOTE. The knotter and needle yoke will stall.

11. Depress the Knotter button on the Diagnostic Controller and read the pressure on the 5,000 psi gauge. It should read 2,000 psi.

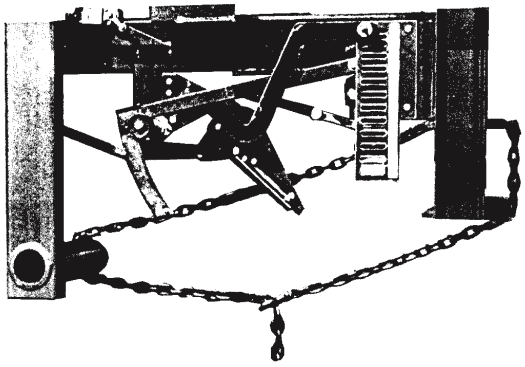


Figure 85 - Twine Needle Yoke Chained to Frame

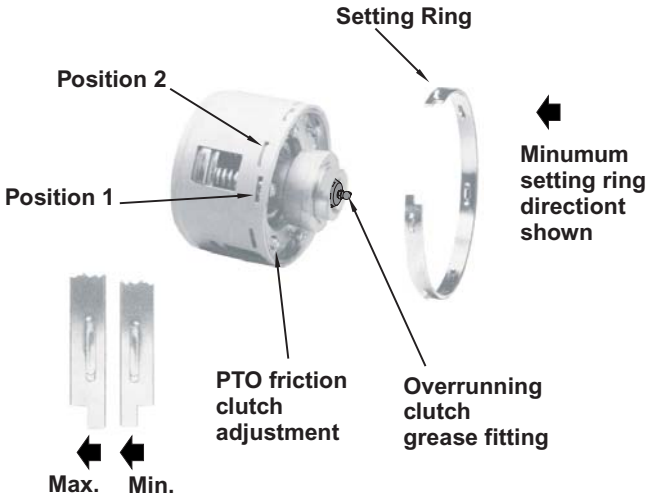


Figure 86 - PTO Clutch

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 orientated to the maximum position and installed in the position number 2 (see Figure 86).

To change clutch setting;

1. Tighten all six nuts in an even sequence (do not air impact). 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. Orientate 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, position number 2.

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

SLIP CLUTCHES

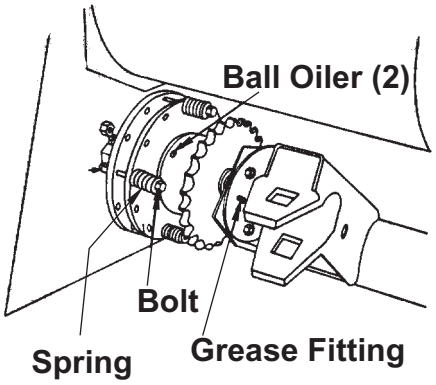


Figure 87 - Pickup Clutch

OPERATING TEMPERATURE

The hydraulic oil temperature and oil level in the reservoir are monitored by the DVC-10. The baling system shuts down if the oil level drops to a dangerous level, or the oil temperature becomes too high. If one or both of these situations occur (error), all DVC-10 controlled functions on the baler will cease. The plunger and knotter will always be in the home position if this shut down occurs.

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 Figure 44 on page 22 displays on the tractor mounted control box

At this time all functions controlled by the DVC-10 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 (see page 44). The feeder/pickup is also allowed to operate to circulate oil through the heat exchanger. The DVC-10 checks the temperature and level sensors every ten seconds. When the oil temperature drops to a safe temperature or the oil level raises, the baler will automatically restart and this error screen is replaced by the baling screen (see page 16). 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 DVC-10 that the oil is low. If filling the oil to the recommended level (see page 4) does not solve this issue, see Oil Over Heating issues on page 18.

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

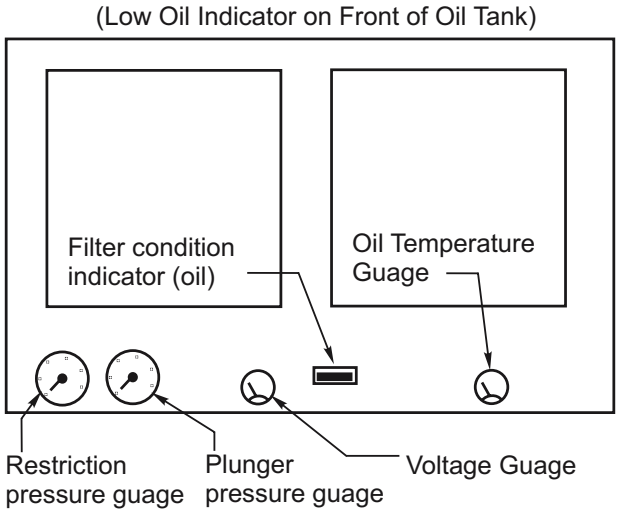


Figure 88 - Twine Needle Yoke in Home Position

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.

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 89). Check each of the six drive belts separately.

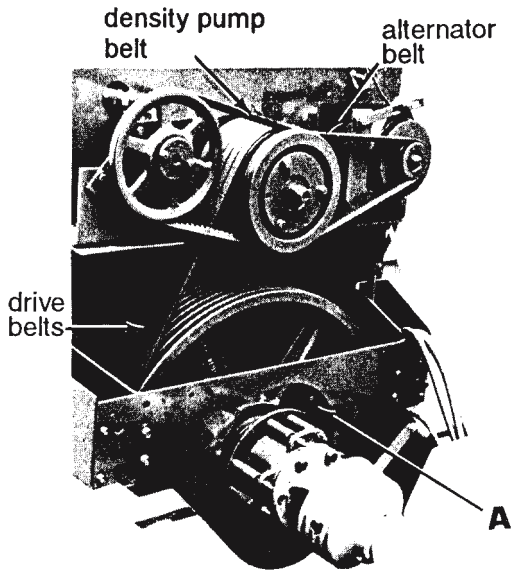


Figure 89 - Mechanical Drive Unit

2. If adjustment is necessary, loosen clamp bolts (A) (front) and (B) (back) and pivot bolts (C) and (D) (see Figure 89 and Figure 90).

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 92).

3. Tighten (B) (see Figure 91).

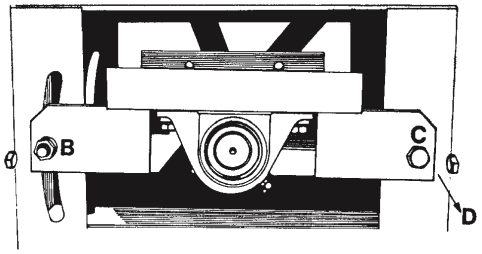


Figure 90 - Take-up Plate

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

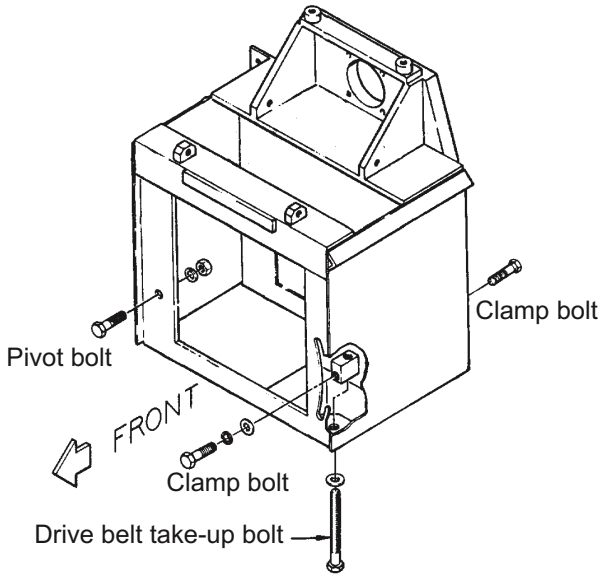


Figure 91 - Twine Needle Yoke in Home Position

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 89 and Figure 90.

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 89).

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 89).

SUNSTRAND PUMP COUPLER

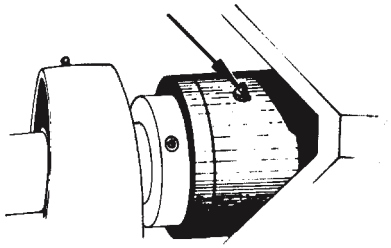


Figure 92 - Sunstrand Pump Coupler

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.

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 approximatly 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 93). Clearance from knife segment to knife segment may vary, therefore individule adjustments may be required.

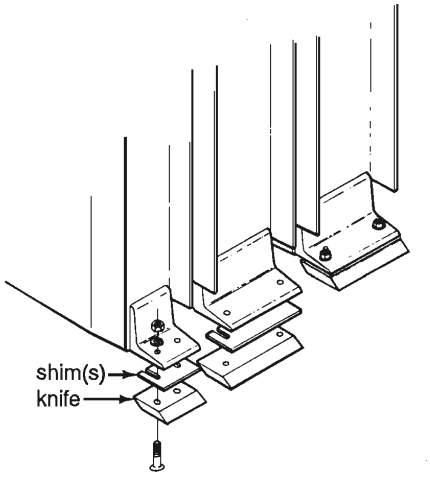


Figure 93 - Twine Needle Yoke in Home Position

OIL FILTER REPLACEMENT

Annually replace the main system filter elements located in the hydraulic tank. See Freeman Model 1592D Baler parts manual, page 121 for a parts breakdown. 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.

SWITCH ADJUSTMENTS

See page 56 for switch location.

LS-1 and LS-14 KNOTTER SAFETY SWITCH

1. Engage tractor PTO and run baler at 500 PTO RPM in TEST mode.

2. Use the Diagnostic Controller to set knife arm so that it is fully extended. The Knife arm is fully extended when the knife arm roller is centered on the roller track knoll (see Figure 94) and the needles are in the home position (see Figure 77 on page 38).

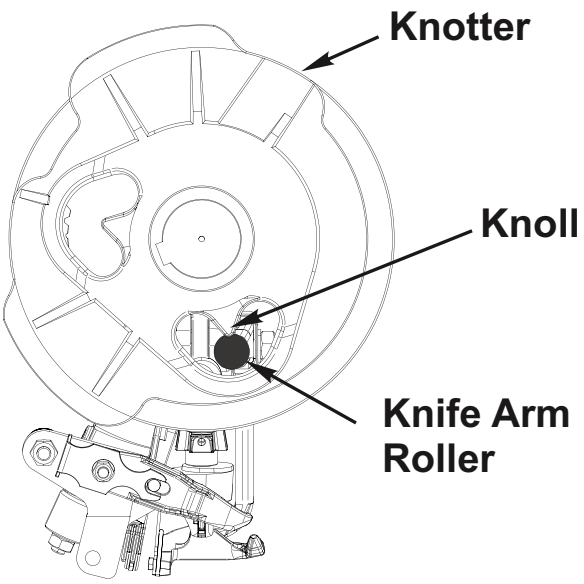


Figure 94 - Knife Arm Roller Centered on Knoll

3. Remove Diagnostic Controller. Disengage tractor PTO. Shut off tractor and lock tractor brakes and/or transmision. Wait for all movement in baler to cease.

4. Attach test strings to LS-3 (Full Charge Switch) and LS-11(Knotter Trip Switch) roller arms. Route strings so that the limit switches can be easily activated and released while standing on the ground.

5. Adjust stop cam so LS-1 lever arm roller is centered on stop cam (see Figure 95).

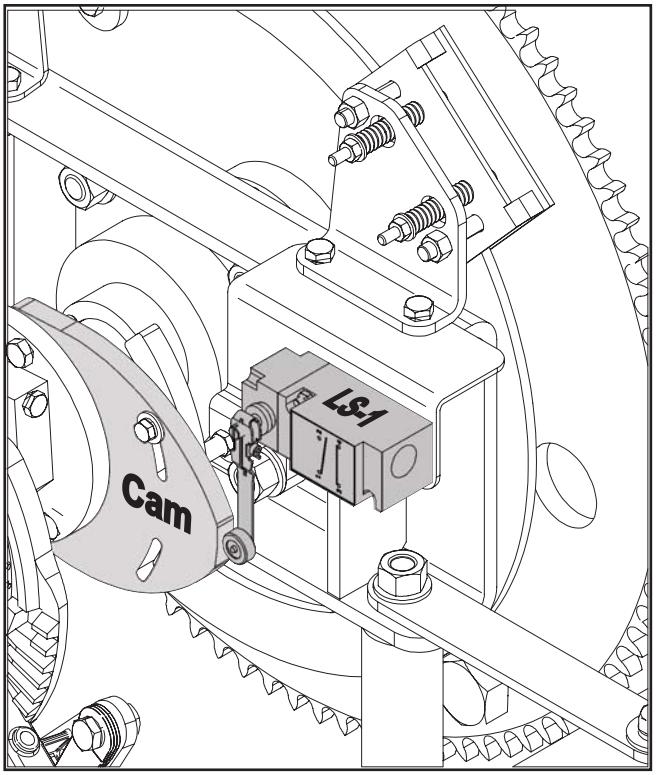


Figure 95 - Roller Centered on Cam

6. Use a jumper wire and connect one end to a 12 volt supply. Connect other end to input number 5 on DVC-10 (see Figure 96).

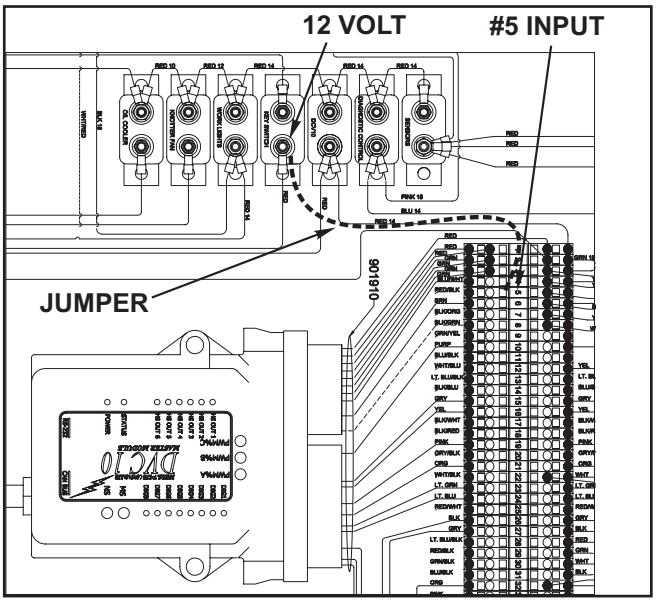


Figure 96 - Twine Needle Yoke in Home Position

7. Engage tractor PTO and run baler at 1,000 PTO RPM in automatic mode.

8. Pull test string from LS-11 (Knotter Trip Switch) and hold.

9. Pull test string from LS-3 (Full Charge Switch) and release when knotter starts to advance.

10. Knotter cycles at half speed and stops.

11. Observe stopping position of LS-1 roller on cam (see Figure 95). If necessary, adjust roller to center of cam. The Knife should be fully extended. The Knife arm is fully extended when the knife arm roller is centered on the roller trak knoll (see Figure 94) and the needles are in the home position (see Figure 77 page 38).

12. Repeat step 8 through 11 as necessary to check adjustments.

13. Disengage tractor PTO. Shut off tractor and lock tractor brakes and/or transmision. Wait for all movement in baler to cease.

14. Remove jumper wire.

15. Engage tractor PTO and run baler at 1,000 PTO RPM in automatic mode.

16. Repeat step 8 and 9.

17. Adjust LS-14 target (Slow Down Cam) until LS-1 roller stops on center of cam (see Figure 97).

18. Remove test strings. Close and securely tighten baler control box.

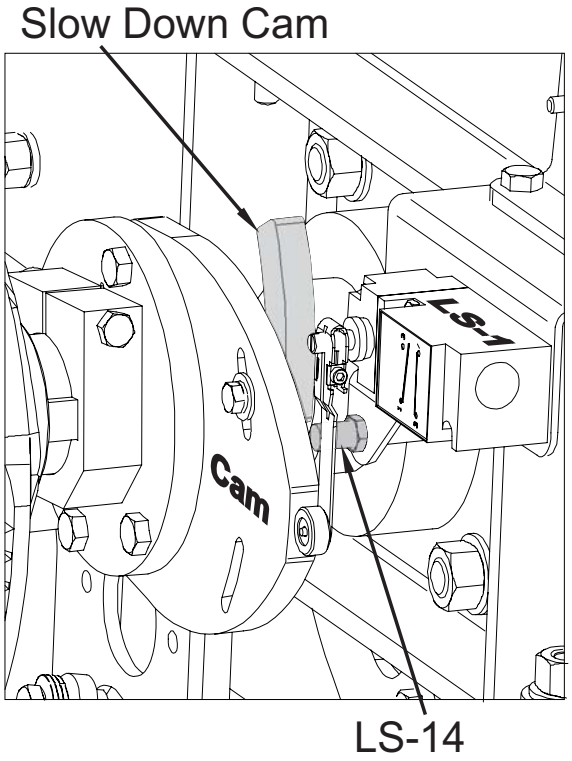


Figure 97 - Slow Down Cam and LS-14

LS-2 PLUNGER DELAY / FEED FORK SWITCH

Function:

LS-2 delays plunger advance until the feed fork travels to its highest position and stops.

Adjustment objective:

LS-2 delays plunger advance until the feed fork travels to its highest point of travel in the bale chamber after LS-3 (Full Charge Switch) has been activated. The switch roller arm must be on the high part of the cam.

Adjustment:

Note: Adjustment to be made with oil hot (170° F, 77° C or greater).

1. Attach test string to LS-3 (Full Charge Switch) roller arm and route string so that switch cam can be easily activated and released while standing on the ground.

2. Engage tractor PTO and run baler at 1,000 PTO RPM in automatic mode.

3. Pull test string and release when feed fork stops and the plunger advances.

4. Turn power OFF at Control panel.

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

6. Check stopping positon of switch arm roller on cam. It should be on the high part of the cam (see Figure 98).

7. If not on high part of cam, mark the location of the switch roller arm on the switch shaft to indicate the original position.

8. If feed fork stops with switch arm roller on forward slope of cam, raise the switch roller arm. If feed fork stops with switch arm roller on rearward slope of cam, lower the switch arm slightly.

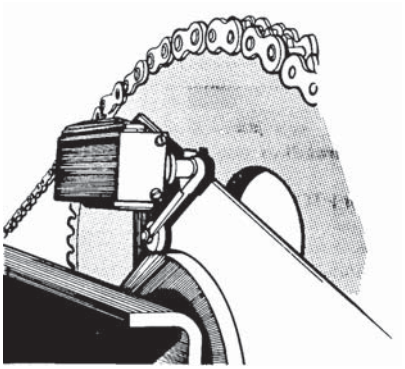


Figure 98 - LS-2 Delays Plunger Advance

9. Turn power ON at Control panel.

10. Repeat Steps 2 through 5 and step 8 until the switch arm roller is on the high part of the cam (see Figure 98).

11. Again turn power ON at Control panel and repeat Steps 2 throgh 5.

12. Measure from rear side of feed fork crankshaft to front side of feed fork tine mounting tube (see Figure 99). When the feed fork is at its highest point of travel in the chamber, the measurement should be 12.5" to 13 inches. Rotate the cam forward.

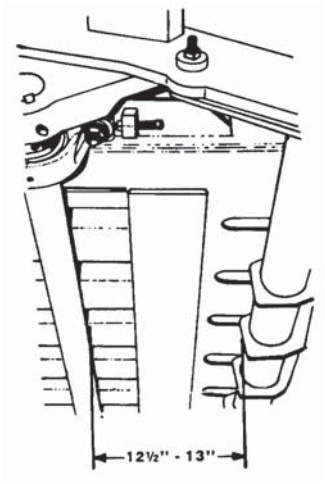


Figure 99 - Feed Fork Crank Shaft to Feed Fork Mounting Tube

16. Repeat Steps 2 through 5 untill required measurement is achieved.

17. Remove test string from LS-3 (Full Charge Switch).

LS-3 FULL CHARGE SWITCH

Function:

LS-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 its highest point of travel in the bale chamber.

Adjustment objective:

LS-3 should be operated by the charge sensor cam in about the first two inches of upward travel of the charge sensor paddles. As the charge sensor is returned to its rest positon LS-3 should be released within one half inch of the paddles rest position. Measure at the rubber bumber for the right hand paddle.

Adjustment:

1. Adjust the cam with the feed sensor paddles down (see Figure 100).

2. Loosen clamp bolt (A) and rotate cam forward untill the switch clicks to operate.

3. Rotate the cam rearward until switch clicks to release.

4. Tighten clamp bolt (A).

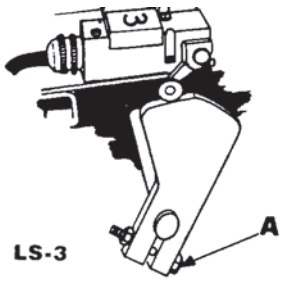


Figure 100 - Charge Sensor Cam

LS-4 PLUNGER ADVANCE DECELERATE

Function:

LS-4 decelerate the plunger to half of full speed just prior to the end of its extend stroke and ensures the knotter automatic control circuit is activated only with the plunger near its full extension. It will also cause the plunger to pause until the knotter has finished half a cycle.

Adjusment objective:

LS-4 is to ensure the plunger decelerates prior to activating LS-5 (Plunger Return Switch).

Adjustment:

1. Ensure LS-5 (Plunger Return Switch) is properly adjusted (see Figure 101).

2. Disengage tractor PTO. Shut off tractor and lock tractor brakes and/or transmision. Wait for all movement in baler to cease.

3. Place LS-4 approximatly 2 1/2" forward of LS-5.

Note: If plunger bottoms out while baling and system pressure is above 3500 PSI, follow Shut Down Procedure and adjust LS-4 in 1" increments forward of LS-5.

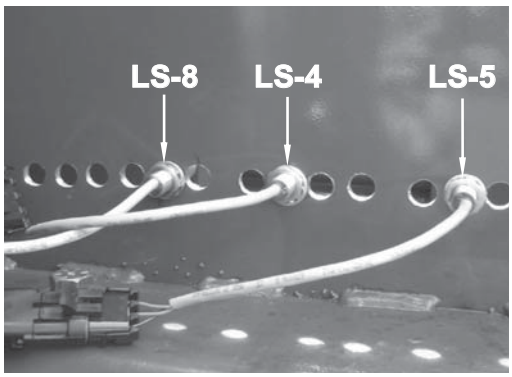


Figure 101 - Twine Needle Yoke in Home Position

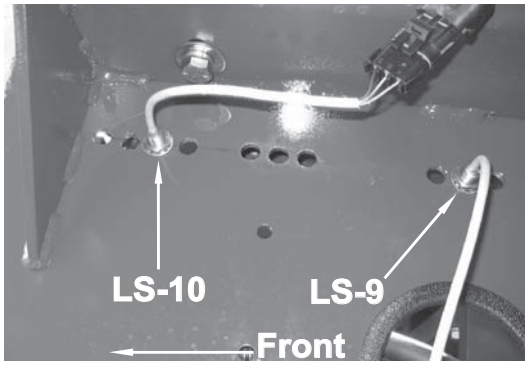


Figure 102 - Twine Needle Yoke in Home Position

LS-5 PLUNGER RETURN SWITCH

Function:

LS-5 signals the plunger to return at the end of its extend stroke. LS-5 (see Figure 101) also signals the knotter to begin its cycle.

Adjustment Objective:

The plunger must stop one inch prior to the end of the extrend stroke to prevent bottoming of the plunger cylinder.

⚠	**CAUTION: It will be necessary to have the two large side door on the baler open to observe the plunger operqation. At all times keep a safe distance.**

1. Unplug LS-5. see Figure 101

2. Engage tractor PTO and run baler at 500 PTO RPM in TEST mode.

3. Use the Diagnostic Controller to advance the plunger until it is fully extended.

4. Disengage tractor PTO Shut off tractor and lock tractor brakes and/or transmision. Wait for all movement in baler to cease.

5. Mark the location of the plunger fully extended. Also mark 1 inch forward of this position (see Figure 103).

6. Plug in LS-5 (see Figure 101).

7. Engage tractor PTO and run baler at 1000 PTO RPM in TEST mode.

8. Use the Diagnostic Controller to advance the plunger until it is fully extended.

9. Disengage tractor PTO Shut off tractor and lock tractor brakes and/or transmision. Wait for all movement in baler to cease.

10. Noting the plungers stopping position in relation to the 1" mark forward of full extension (see Figure 103) move the LS-5 switch correspondingly. The LS-5 switch may be moved 1". It is extremely critical for the knotting process that the plunger travel its full stroke. Short stroking of the plunger will result in mis-ties, and if the plunger travels too far it effects the quality of the bale.

11. Repeat as necessary to achieve the proper stopping position.

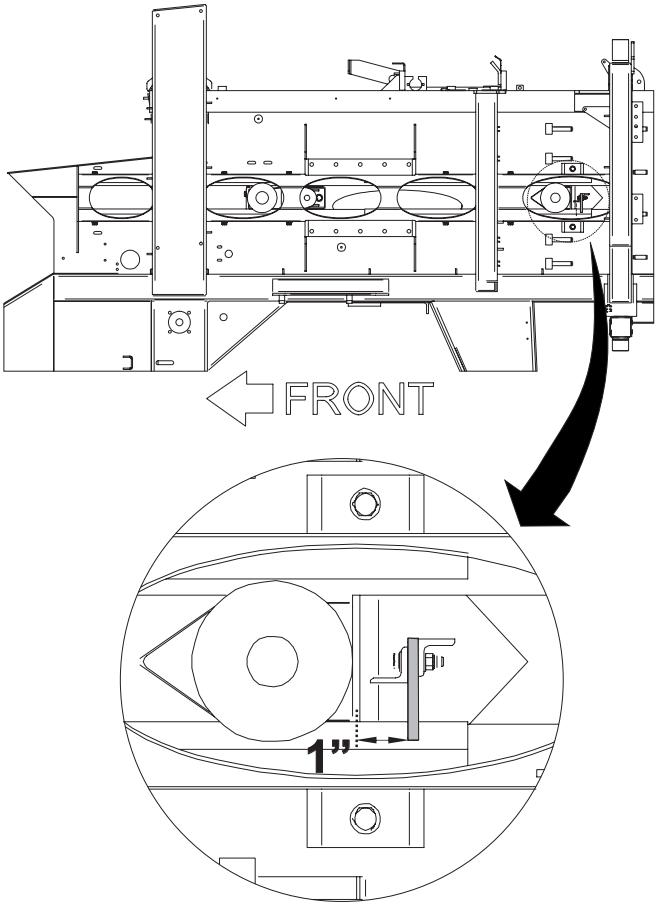


Figure 103 - Plunger Return Mark

LS-10 PLUNGER RETURN STOP SWITCH

Function:

LS-10 stops the plunger at the end of its return stroke. The plunger will retract if LS-10 and LS-9 are not tripped.

Adjustment Objective:

The plunger must stop one inch prior to the end of the retract stroke to prevent bottoming of the plunger cylinder.

CAUTION: It will be necessary to have the two large side door on the baler open to observe the plunger operqation. At all times keep a safe distance.

Adjustments:

1. Unplug LS-10 switch (see Figure 102).

2. Engage tractor PTO and run baler at 500 PTO RPM in TEST mode.

3. Use the Diagnostic Controller to reverse the plunger until it is fully retracted.

4. Disengage tractor PTO Shut off tractor and lock tractor brakes and/or transmision. Wait for all movement in baler to cease.

5. Mark the location of the plunger fully retracted. Also mark 1 inch rearward of this position (see Figure 104).

6. Plug in LS-10.

7. Engage tractor PTO and run baler at 1000 PTO RPM in TEST mode.

8. Use the Diagnostic Controller to reverse the plunger until it is fully retracted

9. Disengage tractor PTO Shut off tractor and lock tractor brakes and/or transmision. Wait for all movement in baler to cease.

10. Noting the plungers stopping position in relation to the 1" mark behind of full retract (see Figure 104) move the LS-10 switch correspondingly. The LS-10 switch may be moved approximatly 1".

11. Repeat as necessary to achieve the proper stopping position.

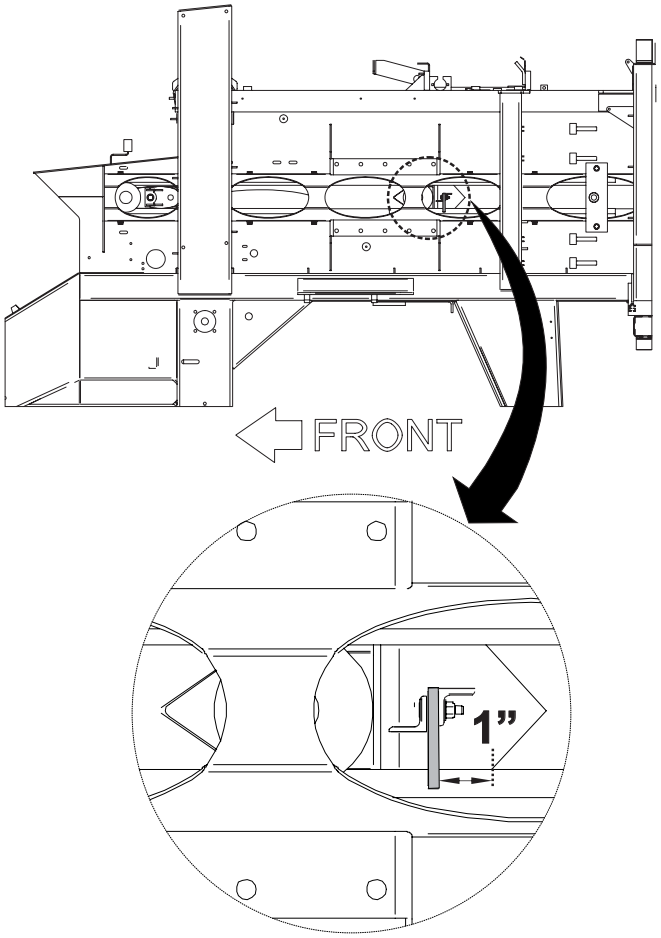


Figure 104 - Twine Needle Yoke in Home Position

LS-8 FEED FORK DELAY PLUNGER SWITCH

Function:

LS-8 allows the feed fork to start before the plunger has completely retracted to its home position. It also keeps the feed fork stopped to ensure no compaction of hay in the feed chute while the plunger is stopped during the first half of the tying cycle.

Adjustment:

1. Engage tractor PTO and run baler at 1000 PTO RPM in AUTO mode.

2. Use the Diagnostic Controller to advance the plunger then retract while noting where LS-8 triggers the feed fork to move. The feed fork should start its cycle when LS-8 is triggered. The feed fork tines should be in line with the bottom of the chamber while the Plunger is fully retracted.

3. Disengage tractor PTO Shut off tractor and lock tractor brakes and/or transmision. Wait for all movement in baler to cease.

4. Move LS-8 aproximatly 12 inches forward of LS-5 (see figure 101 page 50).

5. Attach test strings to LS-3 (Full Charge Switch). Route strings so that the limit switches can be easily activated and released while standing on the ground.

6. Engage tractor PTO and run baler at 1000 PTO RPM in TEST mode.

7. Use test string to cycle plunger. When the plunger has returned to its home position (fully retracted) the feed fork should be in the 6 o'clock position (see figure 105).

8. Once proper adjustment has been achieved, remove test string and reconnect the harness for LS-5.

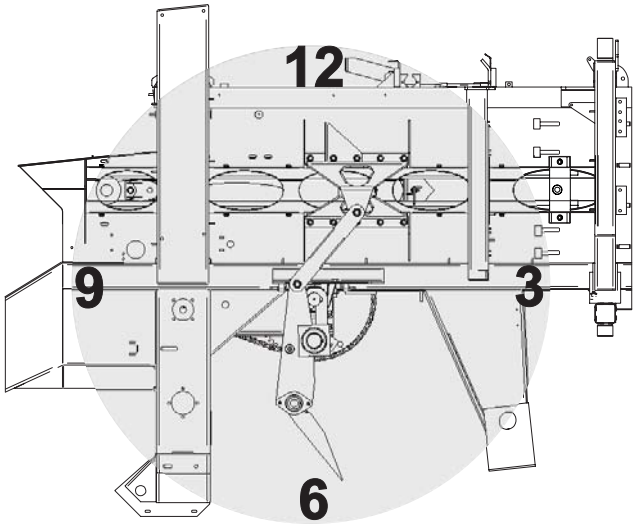


Figure 105 - Feed Fork in 6 o-clock Position

LS-9 PLUNGER RETURN DECELERATE SWITCH

Function:

LS-9 (see Figure 102 page 50) decelerates the plunger to half of full speed just prior to the end of its retract stroke. The plunger will retract if LS-10 or LS-9 are not tripped.

Adjustment objective:

LS-9 is to ensure the plunger decelerates prior to activating LS-10 (Plunger Return Switch).

Adjustment:

1. Ensure LS-10 (Plunger Return Switch) is properly adjusted.

2. Disengage tractor PTO Shut off tractor and lock tractor brakes and/or transmision. Wait for all movement in baler to cease.

3. Place LS-9 approximatly 2 1/2" rearward of LS-10.

Note: If plunger bottoms out while baling, follow Shut Down Procedure and adjust LS-9 in 1" increments rearward of LS-10.

4. At this point. a smooth deceleration from full speed retract to a complete stop should be observed. There should be no noticeable slow speed retract between LS-9 (Plunger Return Decelerate Switch) and LS-10 (Plunger Return Stop Switch).

LS-7 KNOTTER REVERSE SAFETY SWITCH

Function:

LS-7 (see Figure 106 page 53) prevents the knotter from rotating in reverse at those points at which the bill hook would rotate. This prevents possible damage to the knotter due to reverse bill hook rotation.
NOTE: LS-7 is the only switch that has no AUTO function. Only used in MANUAL.
Adjustment:

1. To increase the duration of the non-reversing portion of the knotter cycle, lower the switch roller arm. To decrease this duration, raise the switch roller arm (see Figure 106).

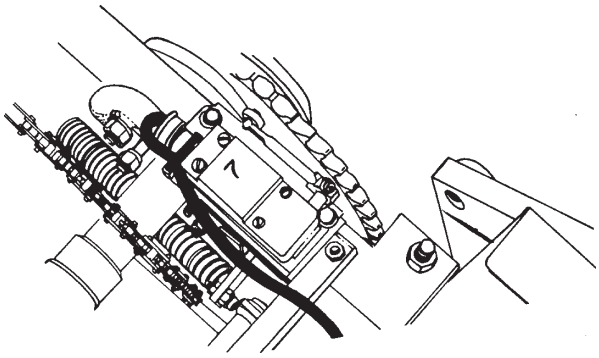


Figure 106 - LS-7 Knotter Reverse Safety Switch

LS-11 KNOTTER TRIP SWITCH

Function:

LS-11 (see Figure 107) completes the circuit to allow the knotter to cycle when the plunger has reached LS-4 (Plunger Decel Swicth) near the end of the plunger advance stroke. LS-11 also will cause the knotter to stop at midpoint of the tie cycle if the meter arm has failed to reset.

Adjustment:

1. Push forward on the rear meter bar. This will disengage knurled teeth on meter bar from the knurled teeth on friction disc.

2. Raise the meter bar until cam contacts switch arm roller and switch clicks to operate (see Figure 107).

3. Release rear of the meter bar allowing knurled teeth to engage.

4. Measure from top of roll pin, (A) to bottom of guide washer, (B).

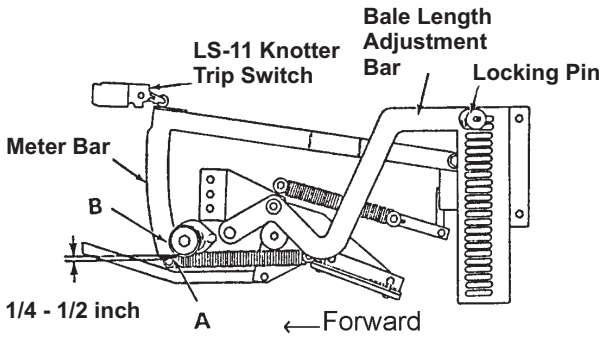


Figure 107 - LS-11 Knotter Trip Switch

5. If measurement is less than 1/4 inch, lower the switch roller arm as necessary. If more than 1/2 inch, raise the switch roller arm.

6. Return the meter bar to its rest position.

LS-12 KNOTTER SAFETY SWITCH

Function:

LS-12 (see page 56) Causes the plunger to complete its retract stroke after the knotter has completed the first half of its cycle.

Adjustment:

1. Cut twine at all six knotters.

2. Pull twine through bale chamber and completely remove from needles.

3. Attach test strings to LS-3 (Full Charge Switch) and LS-11 (Knotter Trip Switch) roller arms. Route strings so that the limit switches can be easily activated and released while standing on the ground.

4. Engage tractor PTO and run baler at 500 PTO RPM in the Automatic mode.

5. Pull test string from LS-11 (Knotter Trip Switch) and hold.

6. Pull test string from LS-3 (Full Charge Switch) and release when feed fork stops and plunger starts to advance.

7. Release test string from LS-11 (Knotter Trip

Switch) as soon as the knotter starts to move.

8. When the knotter is halfway through its cycle, LS-12 (Plunger Early Start Knotter Switch) should be activated by its cam the plunger should complete its retract stroke.

9. If the plunger did not retract at the mid-point of the knotter cycle, use Diagnostic Controller to retract the plunger.

10. Disengage tractor PTO Shut off tractor and lock tractor brakes and/or transmision. Wait for all movement in baler to cease.

11. Rotate the switch roller arm LS-12 a 1/4 (Plunger Early Start Knotter Switch) toward the rear of the machine.

12. Repeat Steps 4 through 11 to ensure the plunger returns to its home position.

13. Disengage tractor PTO Shut off tractor and lock tractor brakes and/or transmision. Wait for all movement in baler to cease.

14. Remove test strings.

15. Rethread twine. Follow Twine Routing on page 12.

16. Engage tractor PTO and run baler at less than 500 PTO RPM.

17. Use the manual control to cycle the knotter forward to load twine into knotters and return knotters to home position.

LS-13 NEEDLE SAFETY SWITCH

Function:

LS-13 (see Figure 108) Prevents plunger from extending while the needles are away from home position. The plunger can extend when needles are in the home position.

Adjustments:

1. Engage tractor PTO and run baler at 500 PTO RPM in the TEST mode.

2. Advance the knotter FORWARD just enough to leave home position using the Diagnostic Controller.

3. Disengage tractor PTO Shut off tractor and lock tractor brakes and/or transmision. Wait for all movement in baler to cease.

4. Adjust LS-13 roller arm as shown in Figure 108.

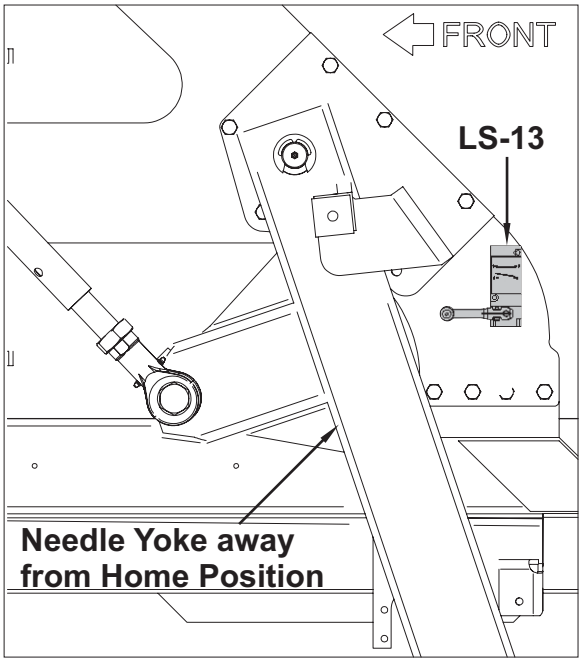


Figure 108 - Needle Away from Home Position and Away from LS-13

LIMIT SWITCH ARM POSITIONS.

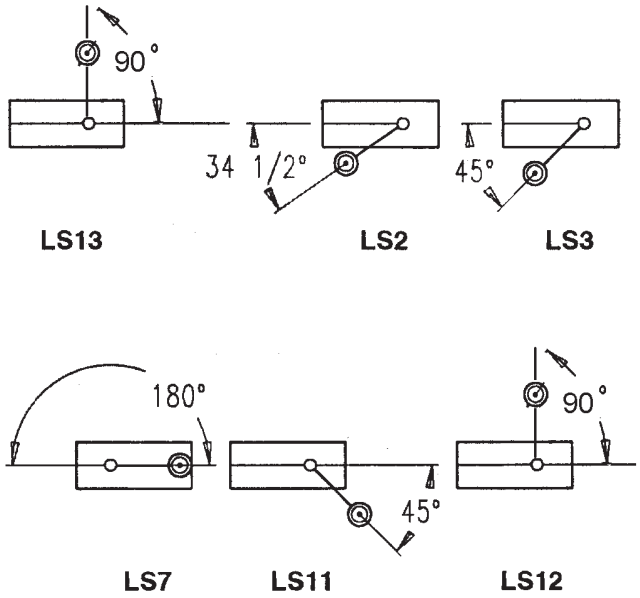


Figure 109 - Limit Switch Settings

Proxi Switch positions.

LS-4, LS-5, LS-8,LS-9,LS-10, LS-14 should all be adjusted 3/16 to 1/4 inch from target.

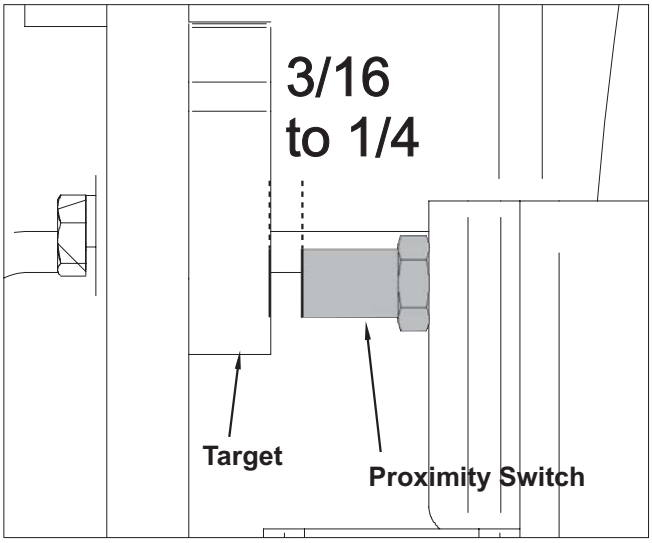


Figure 110 - Proximity Switch Settings

FREEMAN

HARNESS AND SWITCH LOCATIONS

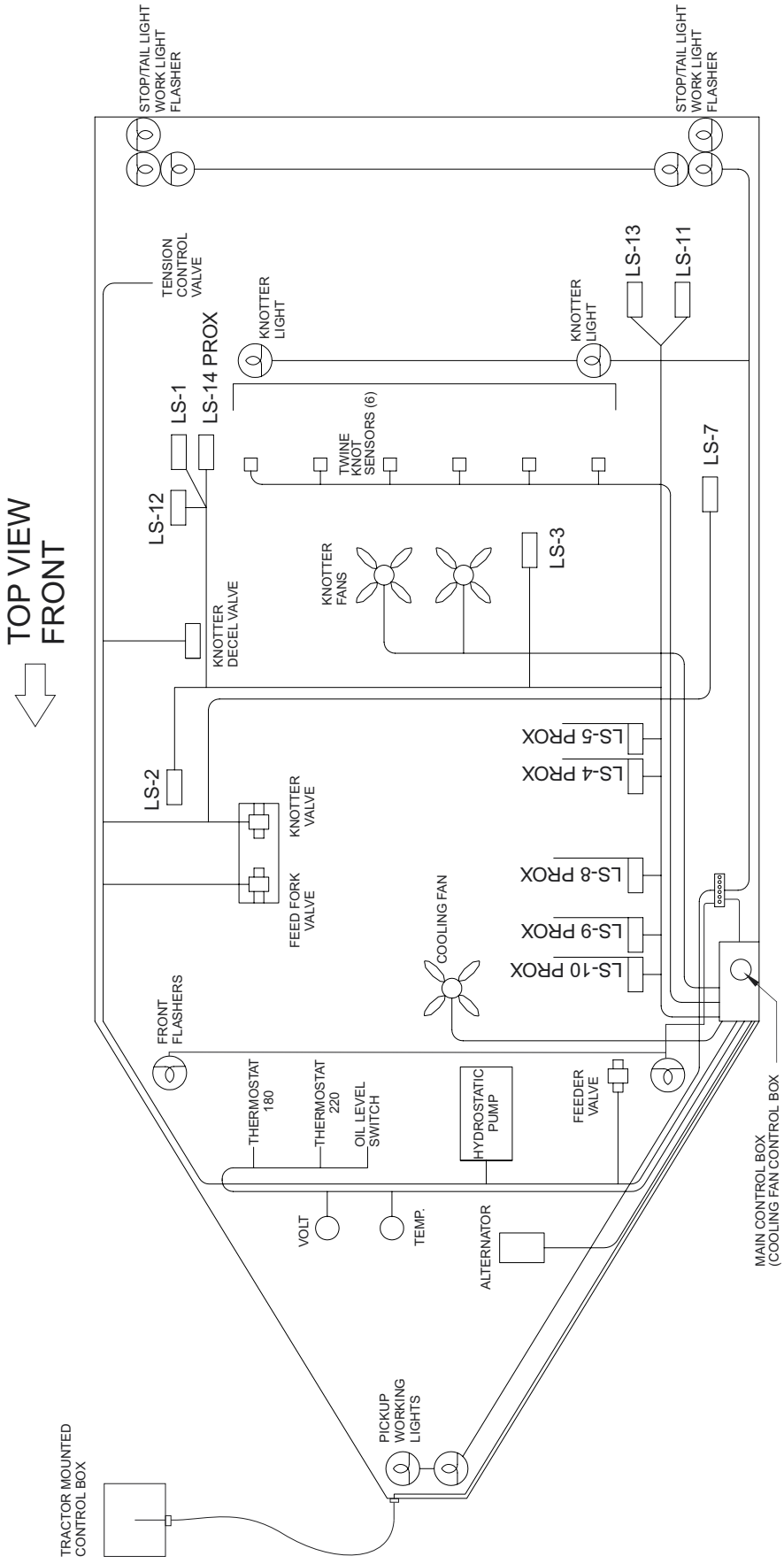


Figure 111 - Harness and Switch Location

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.

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?

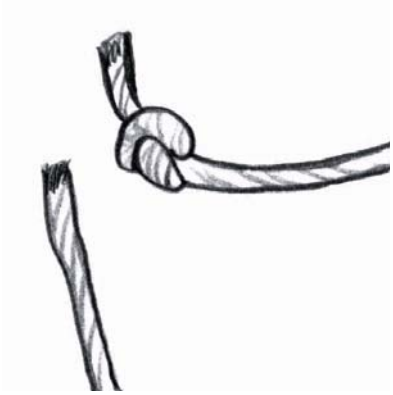
5. Are any long (2” or more) scraps of twine in or around the knotter?

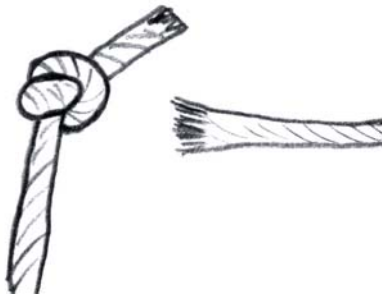
6. Is twine tangled in the knotter?

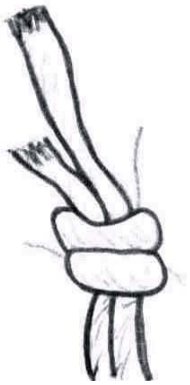
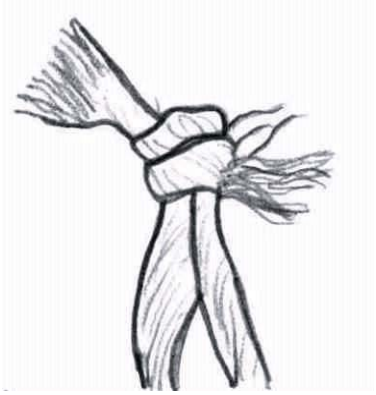
All the suggestions in the following table are related to knotter components and assume that twine is being delivered properly to the knotters. Often times a knot tying problem isn’t related to the knotter itself, but is the result of a problem with the twine delivery. For example, a knot connecting 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 12) and that all twine handling components are in good condition.

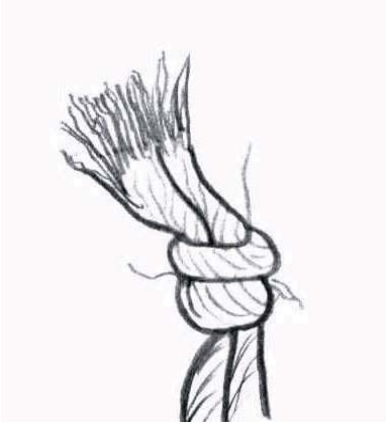
The Freeman big baler makes knotter troubleshooting easy because the hydraulic drive allows the operator to run the knotter cycle very slowly while observing the knotters in action.

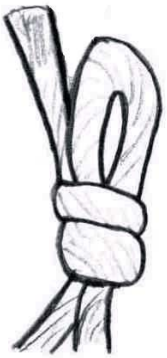
PROBLEM	POSSIBLE CAUSE	REMEDY
No knot in either twine, one knotter only. First or second knot.  **Figure 112 - No Knot**	Twine finger missing twine. Twine finger not extending properly. Bill hook trigger too loose. Bill hook trigger damaged or missing. Bill hook roll pin sheared. Twine is cut at holder 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 34). Tighten nut at bill hook cam. Replace bill hook trigger. Replace roll pin. Loosen twine holder spring as described(see Twine Finger Section page 34). 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.

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 113 - 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.

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 114 - 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.

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 115 - 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 116 - 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 117 - Frayed Ends**	Knife isn't cutting twine cleanly.	Replace dull knife or chipped knife.
Bow knot, one or both twines.  **Figure 118 - 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).

PROBLEM	POSSIBLE CAUSE	REMEDY
End of one twine doubled back into knot..  **Figure 119 - 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 120 - 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 121 - 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.

DVC10 - TROUBLE SHOOTING

Note:
If any solenoids are disconnected, the DVC10 will flag an open circuit and will not operate these valves after reconnected until the DVC10 power is cycled.

Current to hydrostatic pump controller is 0.09 amps in auto mode and 0.045 amps in test mode between TB9 and TB11 in retract and TB10 and TB11 in extend.

Proximity sensors should be adjusted between 1/8" and ¼" from triggers, but will sense up to about 7/16".

Some missed sensor errors may occur when a later sensor is misadjusted or malfunctions and trips before the probable missed sensor. For example, if knotter slow switch is misadjusted with the nut too close to the tip (causing the light to stay on), error 18 may be set claiming a missed knotter mid sensor.

Properly working sensors must provide a signal back to the DVC10. If there is not a light indicating operation on the DVC10 body, this may be easiest checked at the terminal block. All sensors are normally open (except for LS7, knotter reverse, which does not interact with the DVC10) and provide system voltage or ground if limit switch type, or 5 v signal if proximity type.

Most errors may be caused by slow operation. Timers are set throughout the DVC-10 code to shut down processes and prevent damage if sensors are not seen when the should be.

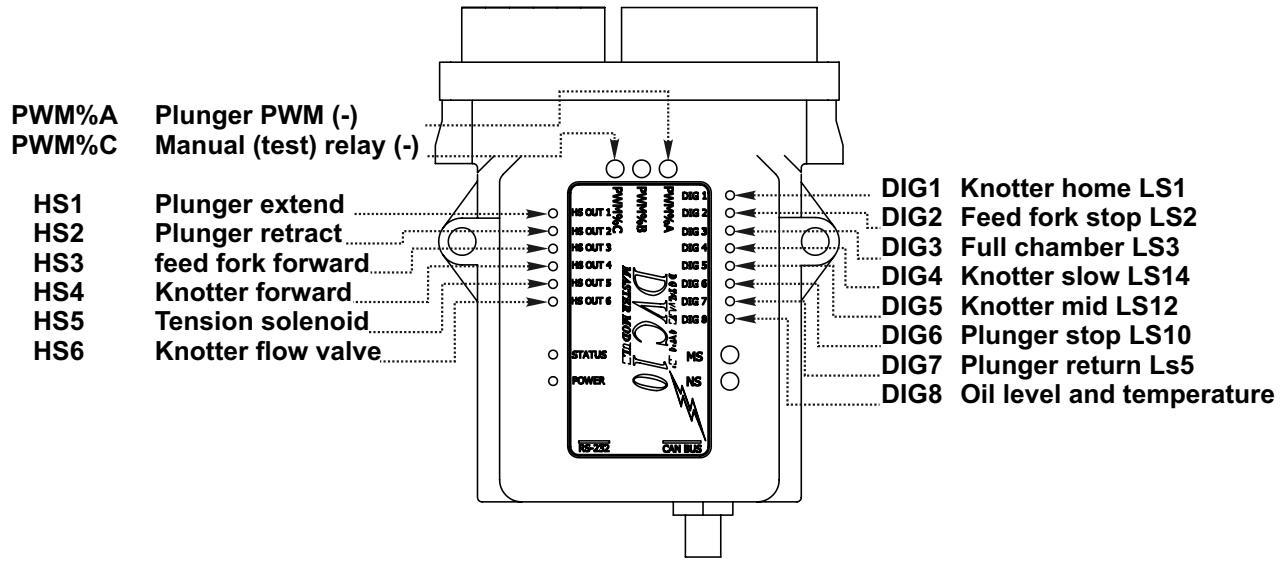


Figure 122 - DVC-10

ERROR	MESSAGE	POSSIBLE CAUSE / CHECKS
Warning 1	High temperature or low oil. Baler may restart in 10 sec.	The low oil switch or High temperature switch have opened. These switches are in series and must provide system power through the yellow wire to TB12 to turn off warning.
Error 2	Missed plunger home sensor, or operation too slow.	Plunger timed out after not seeing LS-9 for 8 seconds after retracting plunger. If plunger operates in test mode, check LS-9 switch and circuit to TB25. Otherwise, check power to pump controller (between TB9 and TB11)
Error 3	Missed Plunger stop sensor or operation too slow.	Plunger timed out looking for LS-10 either 8 seconds retracting or 2 seconds extending. If plunger operates in test mode, check LS-10 switch and circuit to TB18. Otherwise check power to pump controller.
Error 4	Missed knotter home sensor or knotter malfunction.	Knotter timed out between knotter slow and knotter home without seeing knotter home sensor. If knotter has past home, check knotter home sensor and wiring.
Error 5	Missed feed fork stop sensor. Feed forks stalled.	The full chamber paddle has been switched and the feed fork timed out 3 seconds looking for the feed fork stop switch. If feed forks did not stall before feed fork stop switch, check switch and wiring.
Error 6	Knotter drifting or bad needle home or knotter home switch.	While plunger was extending, it timed out 8 sec. without sensing plunger decel (LS-4), plunger return (LS-5), or bale length switch (LS-11). If plunger is extending, check LS-4 and LS-5.
Error 7	Plunger is not extending.	The plunger decel switch (LS-4) was missed on a non-tie cycle because plunger return (LS-5) was sensed. Check LS-4 switch. The plunger will pause at full extension for 1/2 a second, and then continue with the cycle until the problem occurs on a tie cycle.
Error 8	Missed plunger decel switch.	The plunger decel switch (LS-4) was missed on a non-tie cycle because plunger return (LS-5) was sensed. Check LS-4 switch. The plunger will pause at full extension for 1/2 a second, and then continue with the cycle until the problem occurs on a tie cycle.

ERROR	MESSAGE	POSSIBLE CAUSE / CHECKS
Error 9	Missed plunger return switch.	While the plunger was extending, it timed out after passing plunger decel (LS-4) for 4 sec. without sensing plunger return switch (LS-5). Check LS-5 if plunger extends manually.
Error 10	Missed both plunger mid and plunger home sensors.	From full extension, the plunger either timed out 4 sec. or tripped Plunger stop (LS-10) attempting to retract at 100% without sensing plunger mid (LS-8) and plunger home (LS-9). If plunger retracted, check LS-8 and LS-9. If plunger did not retract, check plunger operation (in test mode) and check LS-10 for misadjustment (stuck on)
Error 11	Missed plunger mid sensor.	While retracting plunger on a non-tie cycle, plunger mid (LS-8) sensor was missed and plunger home sensor (LS-9) was tripped. Check LS-8 and verify LS-9 is not misadjusted. This error will stop to plunger for 1/2 a second and then continue.
Error 12	Missed plunger home and plunger stop.	The plunger was retracting on a non-tie cycle, passed plunger mid (LS-8), restarted the feed forks, and then timed out 5 seconds without sensing plunger home (LS-9) or plunger stop (LS-10). If plunger is retracted, check sensors LS-9 and LS-10, otherwise, check plunger operation in test mode.
Error 13	Missed plunger home or operation too slow.	While the plunger was retracting on a non-tie cycle, after passing plunger mid (LS-8), it sensed plunger stop (LS-10) without sensing plunger home (LS-9). Check LS-9.
Error 14	Missed plunger stop sensor.	Plunger timed out 4 sec. while retracting in non-tie cycle after passing plunger home switch (LS-9) without sensing plunger stop (LS-10). Check LS-10. The cycle will continue after another 1/2 a second, but the feed forks may already be plunged.

ERROR	MESSAGE	POSSIBLE CAUSE / CHECKS
Error 15	Missed plunger decel on tie cycle.	The plunger timed out 4 seconds while extending without tripping plunger decel (LS-4) and the bale length switch (LS-11) was tripped (before LS-4). If the plunger is extending, check LS-4.
Error 16	Missed plunger return sensor.	In a tie-cycle, the plunger was extending and timed out 4 seconds after passing plunger decel (LS-4) without sensing plunger return (LS-5). This means the knotter will cycle and the plunger will bottom out for 4 seconds. If the plunger did fully extend, check LS-5.
Error 17	Missed plunger decel and knotter mid on tie cycle.	After the plunger fully extended in a tie-cycle, it was switched to retract and then timed out 5 seconds without sensing plunger decel (LS-4) or knotter mid (LS-12). If the plunger retracted and the knotter cycled, check both LS-4 and LS-12.
Error 18	Missed knotter mid and plunger mid on tie cycle.	On a tie cycle, as the plunger returned, plunger decel (LS-4) was hit before knotter mid (LS-12). This caused the plunger to stop and wait for the knotter. To get this error, both LS-12 and plunger mid (LS-8) were not tripped within 5 seconds, or knotter slow (LS-14) was hit. Check LS-12, LS-8, and possible a misadjusted knotter slow switch.
Error 19	Missed plunger mid (or possibly plunger decel) on tie cycle.	Caused by the plunger home sensor (LS-9) being tripped when the program was looking for Plunger mid (LS-8). This could be caused if LS-8 is inoperative or LS-9 is stuck on. It may also be caused if plunger decel (LS-4) is missed and LS-8 is tripped before LS-12. Check LS-8, LS-9, then LS-4.
Error 20	Missed plunger mid, plunger home, knotter slow, and knotter home.	On a tie cycle, the program timed out 5 seconds waiting for either plunger mid (LS-8), or knotter slow (LS-14). Either both LS-8 and LS-14 are not sensing, or the hydraulics operation is too slow.

ERROR	MESSAGE	POSSIBLE CAUSE / CHECKS
Error 21	Missed plunger home, plunger stop, knotter slow, and knotter home.	During the plunger retract on a tie cycle, the plunger passed plunger mid (LS-8) and timed out 5 seconds looking for plunger home (LS-9), plunger stop (LS-10), knotter slow (LS-14), and knotter home (LS-1). Most likely this is a mechanical or hydraulic failure.
Error 22	Missed plunger mid, plunger home, and knotter home.	While the plunger was retracting on a tie cycle, the knotter tripped knotter slow and powered up the knotter flow valve. The program then timed out 5 seconds without passing plunger mid (LS-8), or knotter home (LS-1). If there was no mechanical or hydraulic failure, check both LS-1 and LS-8.
Error 23	Missed plunger home, plunger stop, knot slow, and knot home.	On a tie cycle, the plunger retracted to plunger home (LS-9) and then timed out 5 seconds waiting for plunger stop (LS-10), knotter slow (LS-14), and knotter home (LS-1). This is most likely a slow operation or hydraulic failure but could be three bad switches: LS-10, LS-14, and LS-1.
Error 24	Missed knotter slow switch.	Caused by knotter home switch (LS-1) being tripped on a tie cycle when the program was looking for knotter slow (LS-14). This is most likely caused by a bad LS-14 switch or circuit, but in one case could possibly be a faulty knotter mid switch (LS-12) or circuit (or too slow operation).
Error 25	Missed plunger home sensor.	Occurs on the plunger retract of a tie cycle when the program was looking for plunger home (LS-9), and sensed plunger stop (LS-10). Check LS-9, and possibly LS-10 for maladjustment that would cause early detection.
Error 26	Missed plunger home, plunger stop, and knotter home.	During plunger retract on a tie cycle, the program timed out 5 seconds waiting for the plunger home (LS-9), knotter home (LS-1), and plunger stop (LS-10). Either operation is too slow or all three switches are inoperative.

ERROR	MESSAGE	POSSIBLE CAUSE / CHECKS
Error 27	Missed plunger mid and plunger home, or operation too slow.	The knotter just reached home on a tie cycle and the program timed out 5 seconds waiting for the plunger to retract to plunger mid (LS-8) and plunger home (LS-9) (which would have caused error 19 if tripped). Operation is too slow, the plunger is not retracting (hydraulic or mechanical failure), or both LS-8 and LS-9 malfunctioned.
Error 28	Missed knotter slow switch or operation too slow.	On a tie cycle, the plunger just returned home and the program timed out 5 seconds waiting for the knotter to reach knotter slow (LS-14). LS-14 is malfunctioning, the knotter has a mechanical or hydraulic problem, or the machine is operating too slow.
Error 29	Missed plunger home and plunger stop sensors.	After the knotter returned home on a tie cycle, the program timed out 5 seconds without sensing plunger home (LS-9) or plunger stop (LS-10). Operation is too slow, the plunger has a mechanical or hydraulic problem not allowing retraction, or both LS-9 and LS-10 are bad.
Error 30	Missed plunger stop and knotter home sensors.	During the plunger retract on a tie cycle, the program timed out 5 seconds without sensing plunger stop (LS-10),knotter home (LS-1), and knotter mid (as a safety to stop knotter from cycling for 5 sec.). Most likely, this is a hydraulic problem or slow operation, but it could be three bad sensors: LS-10, LS-1, and LS-12.
Error 31	Missed knotter home switch or operation too slow.	This error is a safety to help prevent the knotter from continuing to cycle if knotter home (LS-1) is not sensed. Check LS-1 if operation is not too slow.
Error 32	Missed plunger stop switch or operation too slow.	On a tie cycle, the plunger timed out at least 5 seconds retracting from plunger decel (LS-9) to plunger home (LS-10). Check plunger retract manually and LS-10.

ERROR	MESSAGE	POSSIBLE CAUSE / CHECKS
Error 33	Missed Needle home sensor or knotter malfunction.	While automatically resetting the knotter, the knotter will stop at knotter home sensor (LS-1). The DVC-10 will then check the needle home sensor (LS-13). This error will occur if LS-13 is not closed. LS-1 and/or LS-13 could be out of adjustment.
Error 34	Knotter malfunction. Missed Knotter slow switch.	After 'reset' is pushed to automatically reset the needles, the knotter forward valve will receive power for 8 seconds. If knotter slow (LS-14) is not sensed in that time, this error will occur. If the knotter cycled, check LS-14. Otherwise, check power to the knotter valve in test mode or hydraulics.
Error 35	Missed Knotter mid sensor.	During a tie cycle, the plunger stopped while retracting past plunger decel (LS4), and the program is looking for knotter mid (LS12). Instead, it sensed knotter slow (LS14). Check LS12 and possibly LS14 for mis-adjustment.
Error 36	Bale length bar did not drop on tie cycle.	On a tie cycle, if the bale length meter bar does not drop and release bale length sensor (LS-11) before both the plunger and the knotter return home, this error will set. Check meter bar linkage and LS11.

To find a dealer in your area,
Call: 503-625-2560,
Fax: 503-625-7269, or

Visit our website: http//www.alliedsystems.com

Allied Systems COMPANY

PB1592OPS6 10/06
Printed in USA